A better development pattern for DR/GR lands would concentrate allowable development rights into a compact form rather than placing a ribbon of private development around former mining pits. This would apply to residential as well as commercial and mixed-use development. Ideally the developed area would be close to the county's transportation network and would have its runoff flow to treatment areas instead of directly into the water body. This concept is illustrated here for the northeast quadrant of Alico and Treeline Roads. Mining pits would be dug at the end of the new runway, separating urban uses from aircraft noise. Development previously planned for this entire site would be concentrated in multiple story mixed-use buildings with excellent highway visibility and access. This intense mixed-use development form is consistent with recommendations for the Treeline corridor in the county's 2007 "Commercial / Industrial Land Use Analysis." A new waste-to-energy facility could even be placed alongside the major transmission line (upper right in this illustration); it would have a ready supply of cooling water at this location, and refuse trucks would use Alico Road which is already dominated by trucks from nearby mines.

Compact and Walkable Development Alternatives

Existing citrus groves surround isolated wetlands (this view is looking south over SR 82 from Lehigh Acres).

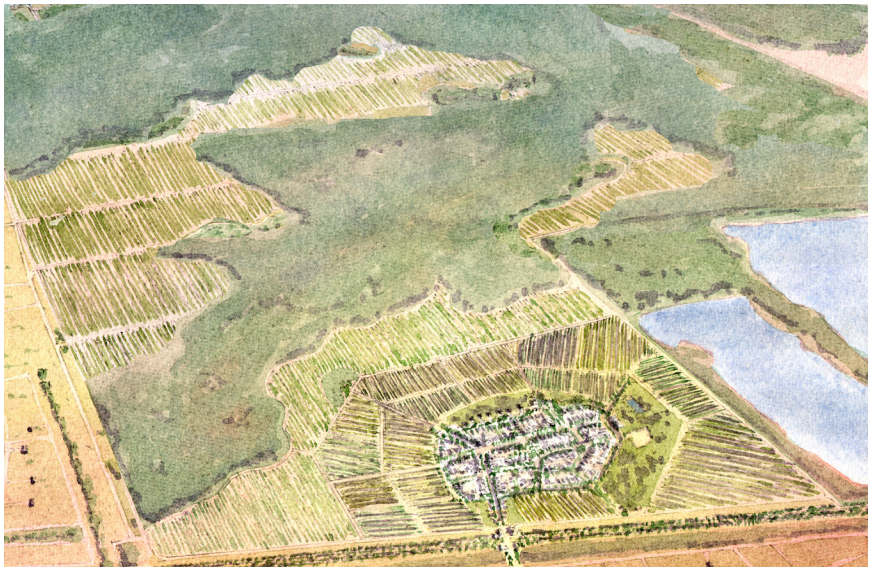
Default DR/GR policies would allow agriculture to be converted to ten-acre ranchettes, as shown here.

Compact and connected mixed-use communities should be the standard in the DR/GR.

Compact development can replace land-consuming ranchettes on agricultural parcels. This concept is illustrated here for the roughly ten square miles of land known as Old Corkscrew Plantation, which extends from SR 82 to south of Corkscrew Road. The site is now an active citrus grove.

If this site were developed under the existing DR/GR regulations, home sites would be spread across the landscape, eliminating large-scale agriculture. The same number of units can be constructed in compact form on a fraction of the acreage while providing some commercial and employment opportunities along SR 82. Such a community would typically require a sewers or a collective septic system. Small-scale, community-supported agriculture could be nearby while commercial-scale farming continues on the periphery. Historic flowways could reconnect the now-isolated wetlands.

Even though this development pattern would not increase the total number of dwelling units, crowded conditions on SR 82 still might affect the timing of approval because of concurrency requirements.



A better way: DR/GR density could be concentrated in a compact and walkable form near SR 82; agriculture could continue but be reconfigured to allow wetlands systems to be reconnected

Live Lightly on the Land

Adverse human impacts on DR/GR lands should be minimized.

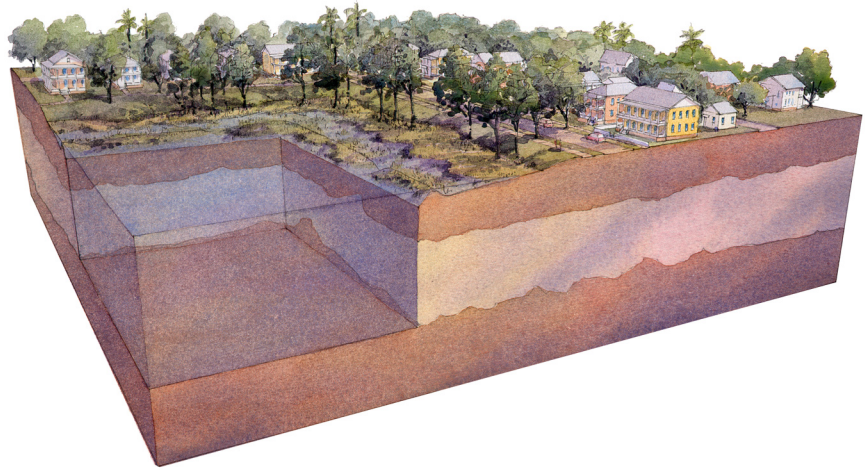
Residential settlement is a permitted use in the DR/GR, but past development practices should not be repeated given the Lee Plan requirement of maintaining surface and groundwater at their historic levels. Residences in the DR/GR have affected environmental systems in a number of ways. Roads built to serve rural subdivisions have blocked flowways, altering the distribution and movement of water through the area. Many homes have been built on artificial fill-mounds to lift the homes above high water levels; these mounds sometimes create barriers to flowways. It is likely that older residential septic systems release pollutants into groundwater during the wet season.

Any additional development in the DR/GR should comply with new light-imprint development standards which would apply to all aspects of development, from road construction to house placement and design to septic system location and configuration. The location should be carefully considered to have the least impact on regional natural systems and lands with the highest potential for restoration. Rural roads should be designed to allow flowways to continue through residential areas through the use of porous construction materials, frequent culverts, and more thoughtful placement of roads. New homes should be lifted safely above historic water levels on piers or stem walls to protect property and ensure that future restoration efforts do not flood out residents. Finally, septic tanks should be designed to have the least impact on the natural environment and to be resilient in the face of changing water levels and patterns.

Encourage cluster development to reduce the cumulative impact of human settlement.

The most effective way to reduce the impact of low-density residential development is to concentrate it in compact areas, preferably near existing infrastructure, to minimize disruption to natural systems. The clustering of residences into a hamlet or village-style of development can also reduce vehicular travel. Changes to Lee County's program for transferring development rights can encourage this clustering between parcels owned by different parties.

Future use of sensitive DR/GR lands should leave as light a footprint on the land as possible. This CREW trail features an elevated boardwalk that allows visitors to enjoy the site without affecting the flow of water, plant communities, or animal movement.



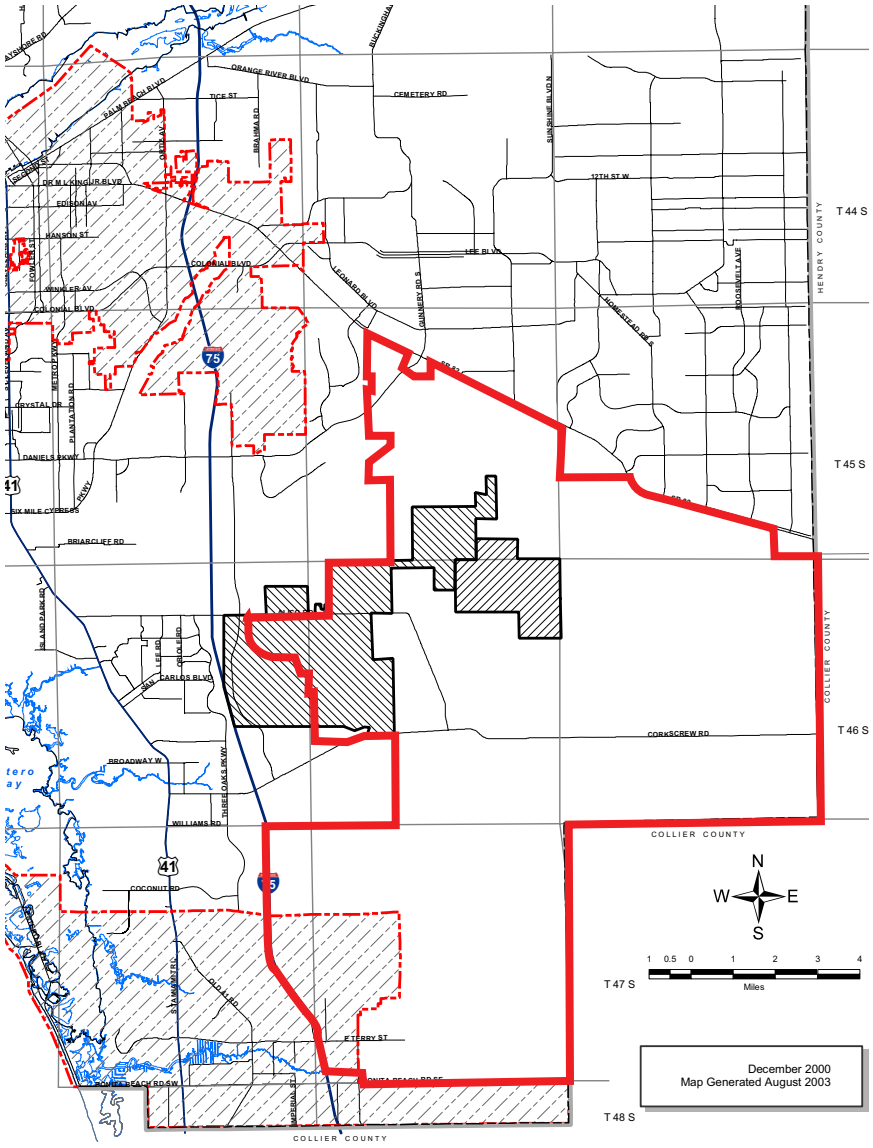
Housing could be positioned away from the sensitive surface waters and littoral zone of a reclaimed mining pit. A littoral zone is the area of a water body that is suitable for emergent aquatic plant growth because it is shallow enough for light to reach the bottom. Mining pits that are reclaimed in accordance with today's Lee County regulations are not required to have meaningful littoral zones and thus will never become biologically productive lakes.

Cluster Development Scenario

The Corkscrew Country Store serves as a community centerpiece for residents of eastern DR/GR lands and allows some of the daily needs of residents to be met without extensive travel.

Future development in the DR/GR should leave a light footprint on the land. Development rights could be exercised on two small blocks around the existing store by creating a mixed-use hamlet that includes an enlarged store and new residences. The existing air strip would remain, but the majority of the site would be preserved open space.

MINING PRINCIPLES



Lee Plan Map 14: Generalized Map of Existing and Approved Limerock Mining Areas (with DR/GR boundary superimposed in red)

Create a Meaningful Map of Preferred Mining Areas

Create maps that serve as predictable guides to mine permitting in the DR/GR.

Elected officials and the public have had little technical information available regarding limerock availability, demand, and mining impacts to inform decision-making. Most data and analysis has been provided by mining applicants rather than independent sources.

An important step in informing decision-making would be the creation of accurate maps indicating the location of mineral resources throughout the state, as well as the specific location of minable limestone in the DR/GR area. The Strategic Aggregates Review Task Force has recommended that the state create this type of mapping following the California model. The task force also wants the state to provide an estimate of the rock volume available from already-permitted mines in order to compare it to projected demand; such an analysis for Lee County mines is presented in Appendix B.

Accurate maps and knowledge about permitted reserves would equip public officials with background information they need to make sound decisions on new mine applications.

Plan for limerock mining in increments of time.

Currently, the Lee Plan provides only general guidance on locations where mining is encouraged, discouraged, or not permitted. Mines have been approved in the Wetlands category on the Future Land Use Map where it is not currently allowed.

A "Generalized Map of Existing and Approved Limerock Mining Areas" was added to the Lee Plan in 1990. The staff report at the time stated: "The addition of this map to the Lee Plan Future Land Use map series will indicate to planners, the public, and elected officials the general locations where limestone mining is anticipated to take place in the future." This map is not referenced in any policies of the Lee Plan and the map contains the following legend note that makes it clear that this map is not regulatory: "This map is for illustrative purposes only. It is not intended to confer approval or to limit limerock mining."

New mines must apply for an industrial rezoning; applications are reviewed on a case-by-case basis following an overall review of Lee Plan and land development code provisions and a determination of compatibility with nearby land uses. This system has created little certainty for investors or for existing residents.

Objective 10.1 of the Lee Plan is to "Designate through the rezoning process sufficient lands suitable for providing fill material, limerock, and other natural resource extraction materials to meet the county's needs and to export to other communities, while providing adequate protection for the county's natural resources." Unfortunately, no guidance is provided as to what period of time into the future is intended by the phrase "sufficient lands."

The Lee Plan is generally based on a long-term time frame of the year 2030. Only the future land use map considers a longer period, which was the original basis for the state's legal challenge that resulted in the DR/GR designation.

Rezoning decisions for mining should be based at least on needs through the year 2030 given the corresponding need to protect mining areas from incompatible residential uses. Although not generally permissible, it would be prudent to identify preferred mining areas for an increment of time (perhaps decades) beyond 2030 so that owners and residents would be aware of the likely need for additional mining. County policy would determine whether or not land in a preferred mining area would be rezoned to meet demand beyond the Lee Plan's long-term time frame of 2030.

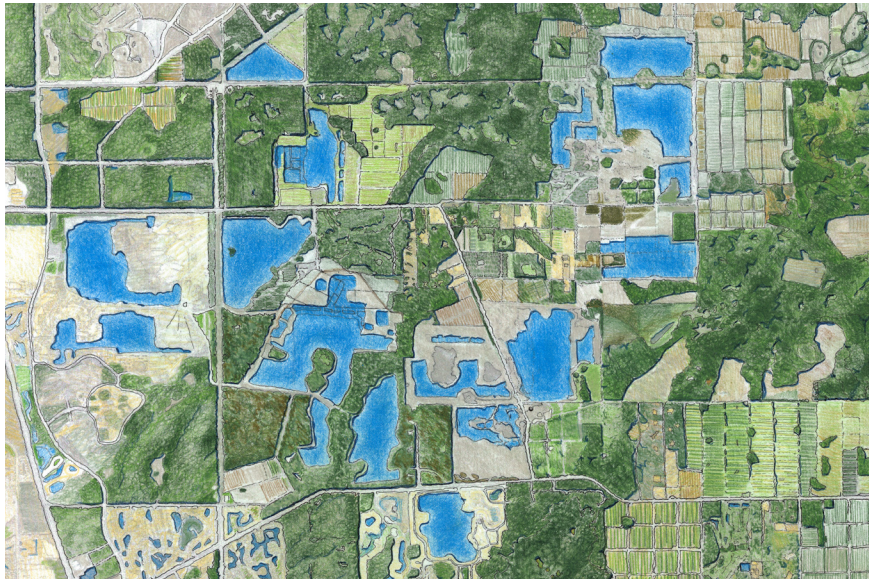
Don't concentrate fill-dirt mines in the DR/GR.

The DR/GR is a remote, highly sensitive environment whose natural resources need special protection. Land uses and activities that disturb DR/GR lands should only be considered if they serve a larger public need or if it is determined that their impact on the natural environment will be minimal.

Currently, there are mines that produce only fill dirt within the DR/GR, in addition to limerock mines that also sell fill dirt that must be removed to reach the rock deposits. Although fill dirt can be extracted from almost any site throughout the region, there is a natural tendency to push mines to remote locations because residents of more urbanized areas do not want mining near them. This practice drives up transportation costs, adds wear and tear to the road system, and actually subjects even more neighborhoods to heavy truck traffic, especially when fill dirt is transported to distant parts of the region.

This method of locating fill dirt mines should be re-thought. The Lee Plan already recognizes limerock mining as potentially acceptable on land designated as Rural or Open Lands. Mining that is limited to fill dirt is acceptable in even more locations:

> "… In order to reduce transport costs and minimize wear on the county's roadways, the extraction and transport of fill material may also be permitted as an interim use in the Future Urban Areas provided that the above requirements are met; however, special restrictions may also be applied to protect other land uses. These determinations will be made during the rezoning process." (Policy 10.1.4)



Current mining activity is concentrated along Alico Road in the northwestern corner of the DR/GR.

Mining, by its very nature, is a high-disturbance activity.

Stick to the Traditional Mining Corridor

Limerock mining is a high-disturbance activity whose effects on the surrounding area can never be completely mitigated.

By its very nature, limerock mining makes permanent changes to a parcel of land.

The surrounding area is also affected. During the extraction period, which typically continues for decades, mining creates noise from heavy equipment, dust from the crushing process and from trucks hauling material away, and vibration from the explosives that are needed to fracture the limestone so it can be removed from the mining pit.

A mining pit looks like a very large lake after mining is completed, but the pit continues to affect the surrounding area. Wildlife movement is restricted, and native vegetation can never be replanted. Mining lakes are not biologically alive like natural lakes because they have little shallow area relative to their size. Large lakes lower the surrounding water table when mine pits are not dug on completely level land. Wetlands originally formed where water levels are naturally high; if high water levels no longer exist for any reason, the wetlands will not continue to regenerate.

Many of these impacts cannot be avoided by mine operators. County policy should be to minimize impacts where possible and keep the unavoidable impacts from spreading throughout the DR/GR area.

Minimize the impacts of mining on valuable watersheds, residential areas, and the road system by concentrating mining activity in the traditional Alico mining corridor.

The Alico Road corridor has been mined for limerock for many decades and has evolved into an industrial corridor. Mining began moving from the area along US 41 into southeast Lee County in the late 1970s. The initial construction of Alico Road was a joint effort of Florida Rock Industries, Harper Brothers, Alico Inc. (owner of land then being mined by Florida Rock), and Lee County.

As recently as 1990 the Florida Geological Survey believed that commercially usable limestone didn't exist as far south and east in the DR/GR as is now known to be the case. When the DR/GR designation was placed on southeast Lee County, a pattern had been established for mining to be along Alico Road and residential development to be along Corkscrew Road.

The speculative building boom of recent years affected every segment of the construction industry. Even plentiful products like limerock skyrocketed in price, due mainly to limited processing facilities rather than any shortage of raw material. These price increases triggered major investments into procuring additional mining capacity in Lee County. In addition, in July 2007 a federal judge temporarily shut down limerock production in parts of Miami-Dade County's "Lake Belt" because he concluded that environmental regulators had failed to properly protect the county's public water supply, which tapped the same limestone layer that is being mined.

The northwest DR/GR quadrant along the Alico Road industrial corridor is heavily disturbed and has the land and infrastructure to support further mining.

The most recent building boom has passed and the federal judge's Lake Belt ruling has been overturned, but mining applications initiated during that period along the eastern Corkscrew Road corridor are still being processed. Lee County is faced with a policy decision as to whether it is wise to spread mining out to the eastern DR/GR edge.

The northwest DR/GR quadrant along the Alico Road industrial corridor is heavily disturbed and has the land and infrastructure to support further mining. Encouraging additional mining in this area would also reduce the distance that mining trucks must travel to distribute aggregate and would limit truck traffic to the existing industrial corridor.

Prioritizing mining in the northwestern quadrant of the DR/GR would ease the pressure to mine less disturbed DR/GR lands east of the Flint Pen Strand that are part of a regional and restorable natural system. Designating a priority mining area in the northwest quadrant would also provide relief for DR/GR residents who live in areas that have never been mined.

Fully utilize the limerock resources in existing disturbed areas before spreading out into more pristine environments.

Limerock mines in the DR/GR are generally prohibited from disturbing larger wetlands, thus creating irregularly shaped mining pits. Irregular pits with wetland "islands" will be more attractive than square barren pits, but there are costs to this approach. Irregular mining sites cannot extract as much limerock, especially when reclamation plans required shallow areas along their perimeters. The remaining wetlands get cut off from their natural water sources (above ground and below ground) and cease to function as they once did.

The mining industry is prevented from fully concentrating their area of disturbance by these requirements. Instead, they must seek new sources of aggregate, often in more pristine, ecologically valuable areas that have a more important role in regional natural systems. Allowing mining to more fully extract resources from their sites could reduce the pressure for mining to "sprawl out" east of the Flint Pen Strand. Without mining, historic flowways could be reconnected and endangered species habitat could be restored. Future wellfields could also be located there provided they were designed to be compatible with the area wetlands.

Webb Lake was dug to produce fill dirt for the construction of I-75 south of Punta Gorda. It was designed in close collaboration with biologists and wildlife experts to ensure a second life. Today Webb Lake is a popular fishing and canoeing lake in the Fred C. Babcock-Cecil M. Webb Wildlife Management Area.

Design Before You Dig

The active extraction period of a mining site comprises a small percentage of its life.

It is critical to think about long-term consequences when planning a mining site. Although mining activity continues for many decades, the post-mining state of a site can last indefinitely and must be carefully considered during the permitting process.

Ensure that post-mining land uses and site design are appropriate to their location and to the needs of the community.

Reclamation plans must be biologically and hydrologically practical and be sustainable solutions that respond to their context, both as to environmental conditions and future uses. Locations for development, recreation, and restoration should be determined during the planning phase.

Mine sites that are close to already-developed areas may be appropriate for future development. The amount of development should be based on land area available after the pit is dug, in contrast to the current policy of allowing residential development to be based on the pre-mining land area. Development areas should concentrate their permitted development rights into a compact area in order to create a stronger sense of character, to limit the amount of infrastructure needed on the site, and to reduce ultimate travel to and from the site.

The same areas that are suitable for development may also be appropriate for recreational uses. Desirable sites are close to population centers so that the public doesn't need to travel unnecessary distances. The reclamation plan for these mines should reserve space for ample littoral shelves to support vegetation and native fish populations. The plan should take into consideration facilities for recreational opportunities such as fishing, kayaking, and hiking.

Isolated mines that are surrounded by high-quality conservation lands should be discouraged because the potential is low for reverting to a high-quality natural environment after mining is complete. Exceptions would include areas where water levels have already been permanently lowered and cannot be restored. In such cases, these sites should be integrated back into the natural systems through active reclamation and reforestation measures. Attention should be given to creating an appropriate littoral shelf and an irregular shoreline.

MIAMI-DADE LAKE BELT PHASE II STUDY

The Miami-Dade Lake Belt Plan Phase II (2001) includes recommendations for reclamation plan designs which are the most detailed found to date. The littoral wetlands would be designed by each land owner, with review and approval by the permitting agencies.

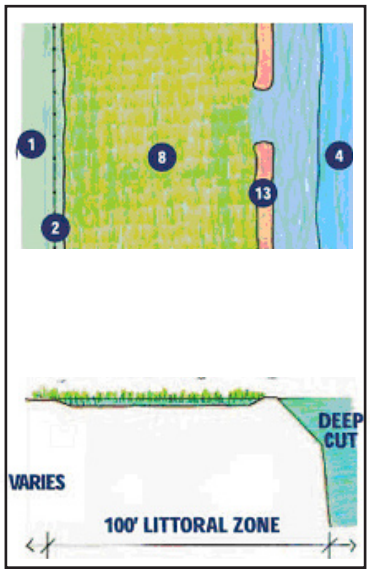
The **typical littoral area** reclamation plan consists of a 100-foot wide littoral marsh with a protective berm between the marsh and the borrow pit.

The **diversified littoral area** reclamation plan includes a 100-foot wide area including a mosaic of upland planting areas, natural elevation seasonal wetlands, littoral marsh, fish refugia, forage pockets, and tree islands set apart from the main deep borrow bit by a protective berm.

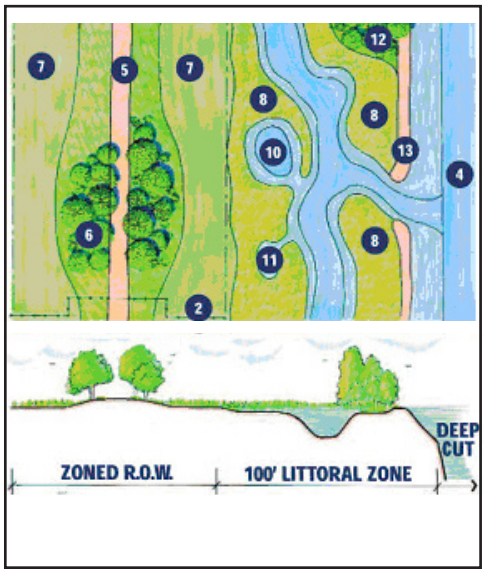
The **expanded littoral area** reclamation plan consists of varied habitats similar to the diversified littoral zone, but on a larger scale between two borrow pits providing a wider littoral area, such as a 400-foot width shown in the illustration.

The Miami-Dade Lake Belt Phase II standards indicate that littoral shelves may be inappropriate around lakes located within the public potable water well field protection area due to the possible contamination of the water by mammals utilizing the littoral areas, more specifically the potential for the introduction of the parasite Cryptospiridium.

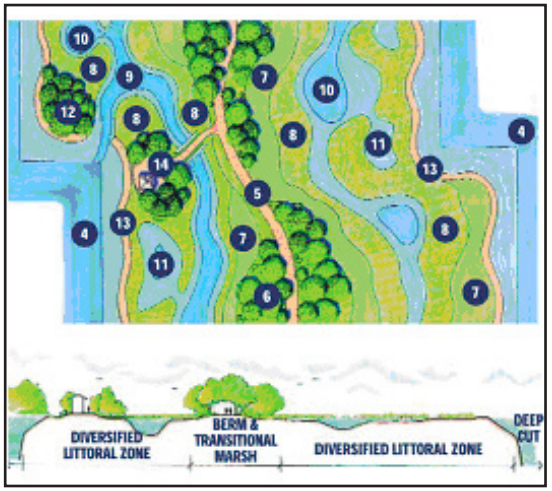
Typical Littoral Area



Diversified Littoral Area (Preferred)



Expanded Littoral Area (Ideal)



Key:
1. Adjacent Property of Right-of-Way (conditions vary)
2. Fence (if required)
3. Minimum Safety Slope
4. Deep Borrow Pit
5. Maintenance Road/Berm/ Potential Greenway
6. Upland Planting
7. Natural Elevation Seasonal Wetland
8. Littoral Marsh
9. Deep Cut
10. Fish Refugia
11. Forage Pocket
12. Tree Island
13. Protective Berm
14. Observation Area

Miami-Dade Lake Belt Mine Reclamation Plan Designs (from Miami-Dade Lake Belt Phase II Plan, 2001).

TRANSPORTATION PRINCIPLES

Large-scale road-building projects are costly and are planned on the assumption of cheap and plentiful fuel.

Anticipate Higher Fuel Costs

The rising price of fuel may affect all aspects of the construction industry, as well as the day-to-day life of average citizens.

Local land-use policy that makes assumptions about worldwide trends does so at great risk, given the number of competing forecasts to choose from and the unpredictability of markets, technology, and natural systems on any large scale. That said, the price of fuel has been moving upward at such a pace that it can no longer be ignored.

Continued high fuel prices will affect where people can afford to live and work because of the high cost of commuting. This would alter the scale and price of construction projects, and where materials can be obtained. High fuel prices may even affect food distribution if the price of flying produce from distant locations becomes prohibitive.

The rising cost of driving may reduce demand for new and expanded roadways. Road-building in southwest Florida may have to adjust as the rising cost of aggregate affects the practicality of bringing granite from Georgia and Nova Scotia and limerock from Mexico and the Dominican Republic. Despite the uncertainties, these possibilities must be thoughtfully considered when planning for future land uses in the DR/GR.

Plan future mining and residential uses in the DR/GR with rising transportation costs in mind.

Rising fuel prices may alter other assumptions about land-use demand within the DR/GR. Existing agricultural land may become highly valued as an important local food source. Distant ten-acre ranchettes may become less attractive for commuters if it becomes too expensive to drive long distances for daily needs.

One important strategy in the face of rising fuel prices is concentrating or clustering most residential uses closer to existing services, as discussed in other sections of this chapter. Another valuable strategy, discussed in the final principle, is the expansion of different modes of transportation that will reduce the reliance on fuel-dependent automobiles and trucks. Finally, the possibility must be kept in mind that demand for aggregate may decrease if road-building projects slow down or new development is slow to resume.

Explore alternative sources of materials for roads and construction as virgin sources become more difficult to obtain.

As the price of fuel increases, the energy required to mine new aggregate and transport it throughout seven southwest Florida counties may make truck-dependent regional mining less feasible. Moreover, as local aggregate sources are depleted or forced out by encroaching residential uses, other methods of providing local construction materials may become more important.

Alternatives should be considered, the foremost of which is recycled materials. Asphalt paving is regularly recycled today; as roads are repaired or replaced, old asphalt is reprocessed and blended into new asphalt mixes. There are various reasons why recycling other types of aggregate is difficult; but as the price of new aggregate increases and experience with recycling expands, ordinary economic forces will increase the amount of aggregate that is obtained from recycled sources.

There are a number of programs in the United States that are working to increase the percentage of recycled materials in the construction industry. One of their primary goals is to provide policy-makers with reliable research that supports the use of recycled materials in government construction projects. The Green Highways Partnership (GHP), for example, is an organization that brings together key representatives of the Environment Protection Agency (EPA), Federal Highway Administration (FHWA), members of academia, state transportation and environmental agencies, industry, trade associations, and contractors. GHP is currently working to provide information about the use of alternative materials in road construction, such as recycled concrete, crushed glass, foundry sand, coal combustion products (CCP), tire-derived aggregate, and dredge spoils.

Large roads and auto-oriented uses make other modes of transportation, such as walking, biking, or transit, more difficult.

Most highways in Lee County are entirely oriented towards automobile use. This is a function both of highway design and of land-use decisions for adjoining properties.

Heavy transport vehicles, such as mining trucks, place stress on conventional road pavement.

Most residences in the DR/GR are located on large parcels, located far from their neighbors and established infrastructure.

Manage Speed and Vehicle-Miles-Traveled

Enforce speeds in the DR/GR to reduce mining truck and residential traffic conflicts.

Speeding is a serious problem in the DR/GR. Anyone who drives on Corkscrew Road and SR 82 will agree that these highways are uncomfortable places to drive, with large trucks and personal vehicles alike traveling at dangerously high speeds. Frequent use of these roads by mining and farming trucks creates conflicts with all other vehicles. Heavy trucks also damage the roadways, a subject that is being examined in detail in another part of this planning effort.

Speed limits in the DR/GR need to be assertively enforced. Mining companies should consider working together to create a system for enforcing the speed of vehicles transporting their products. This can be done by subsidizing regular police enforcement, video camera recording, or the use of GPS devices that record the location and speed of each mining truck during delivery runs. GPS devices could also be used to ensure that mining trucks are using their designated routes. For example, many of the mines along Alico Road are required to use Alico Road for aggregate transport in order to keep traffic off of Corkscrew Road. The current difficulty in enforcing this requirement may lead to abandoning a valuable rule.

Focus mining uses along the existing road network to reduce the amount of miles travelled for transport.

An important benefit of concentrating mining activity along the Alico Road industrial corridor and around the airport is access to existing roads. Mines in this area are generally closer to future construction sites, I-75, and a number of planned road construction projects, thus minimizing the distance that materials must be transported.

Create small mixed-use centers near existing communities to reduce traffic for daily needs and services.

A standard measure of auto-dependency is “Vehicle-Miles Traveled” (VMT). This rate is very high for residents of the DR/GR and nearby residential developments, particularly Lehigh Acres. These areas lack many goods and services to meet daily needs, forcing residents to drive long distances to work, buy food, bring their children to school, or meet friends and family. Mixed-use development along SR 82 has the potential to also serve the residents of Lehigh Acres and reduce the distances they must travel to meet some daily needs.

Transportation Projects Must Follow Land Use Policy

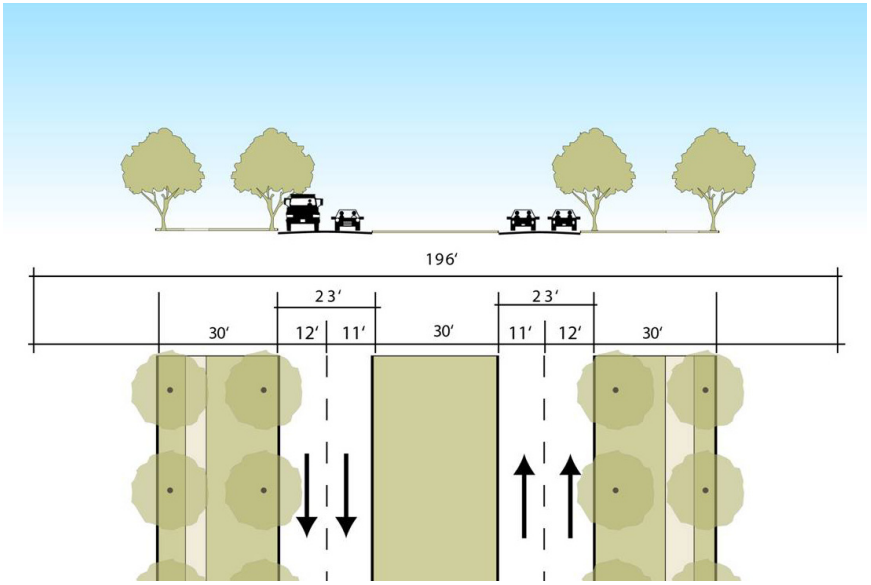
Think carefully before concluding that road widening is the only transportation solution.

In Florida and most of the United States, large-scale transportation projects are planned and executed before a clear land-use policy is established for the surrounding areas. As a result, new roads are built very wide from the start, and existing roads quickly become major arterials in the absence of a network of secondary roads. This road pattern spawns shopping centers, big-box stores and large single-use office buildings instead of locally oriented retail and service businesses. It is important that future development pressures be understood when constructing new roads in the DR/GR and elsewhere in Lee County.

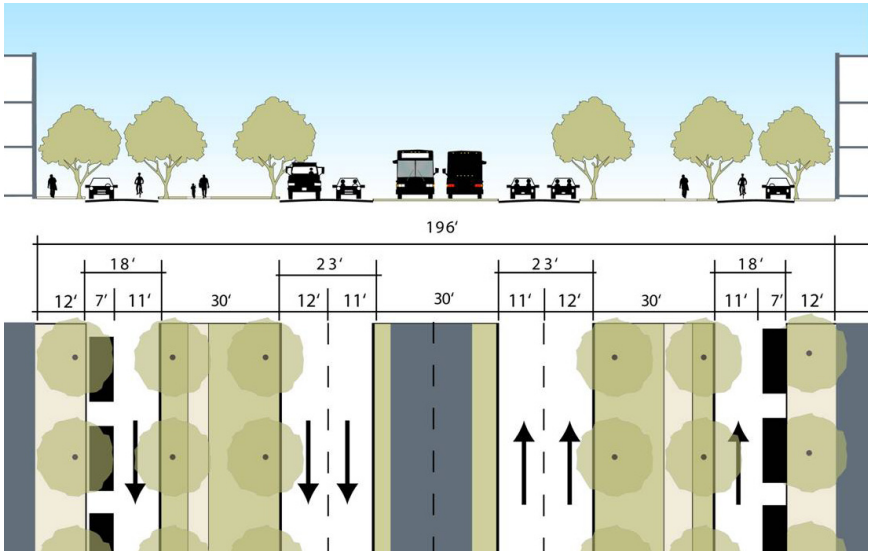
Begin tailoring existing roads for multi-modal use.

Road widening projects and new road construction in southeast Lee County are aimed primarily at moving commuters back and forth from the north and east (particularly Lehigh Acres) to locations to the south and west, such as job and shopping destinations in Fort Myers, Estero, Bonita Springs, and Naples. New and wider roads are touted as solutions to existing traffic congestion, but it has been repeatedly demonstrated that aggressive expansion of roadways can actually induce further travel demand. Potential users are willing to drive further and more often because it becomes convenient to do so. As the new road capacity quickly fills up, the decision to build the road is seemingly validated, yet traffic congestion can actually become worse. The concept behind this phenomenon is summarized neatly by Walter Kulash, a Smart Growth traffic engineer: "Widening roads to solve traffic congestion is like loosening your belt to cure obesity."

This newly-widened intersection is already beginning to influence development, as seen from the construction activity on the bottom corner of the photograph.



A first step towards increasing multi-modal use of SR 82 would be to add a central median and two side medians. The side medians feature biking and walking paths as a first step towards a multi-modal future.

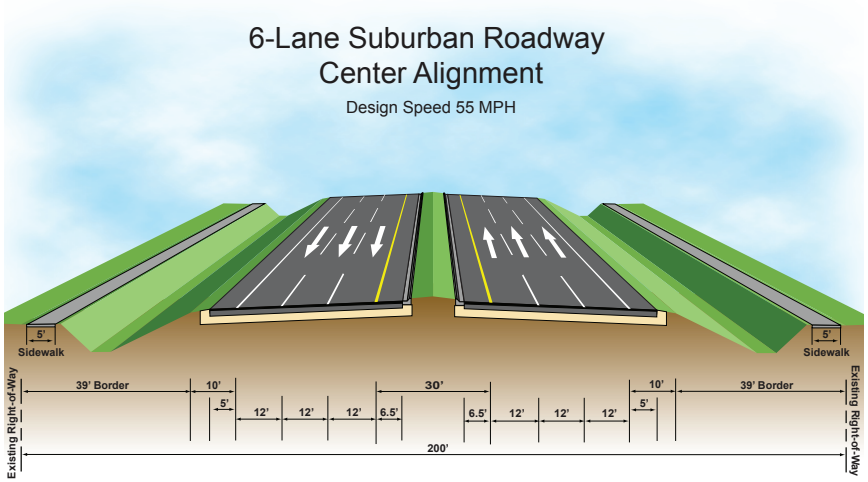


This alternative cross-section of SR 82 includes through lanes for cars, dedicated lanes for bus rapid transit (or any other form of transit), wide side medians for walking and biking paths, and local access lanes to support local traffic.

A more sustainable approach to transportation in southeast Lee County would be multi-modal solutions that complement a more transit-oriented development pattern. Multi-modal roadways should be tailored to the specific needs of the area and to the future vision for the surrounding lands. SR 82 is a heavily-used regional roadway that is bordered on one side by the extensive development of Lehigh Acres. To accommodate both its regional transportation role and its local role as the front door for Lehigh Acres, SR 82 could be improved as a multi-modal, multi-way boulevard instead of a standard highway.

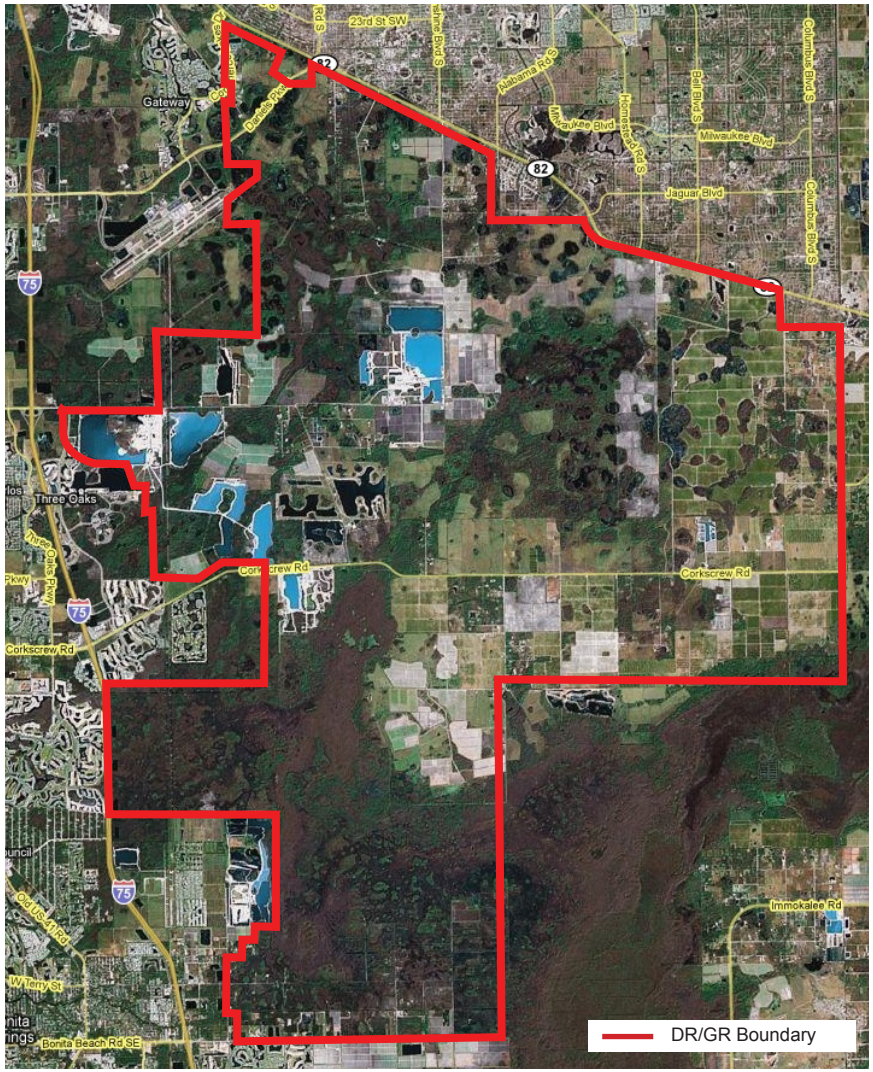
This evolution of SR 82 could occur incrementally, with the road first expanded to have a wide central median and later being supplemented with access lanes added to serve local traffic through mixed-use centers in Lehigh Acres. Bus rapid transit could serve these areas, or it might evolve into rail service.

In the absence of an immediate concerted effort by Lee County officials, SR 82 will one day be built as currently envisioned by Florida DOT, a rural six-lane highway with no provision for public transportation or other multi-modal uses. The cross-section below shows FDOT's current plans for SR 82.



This highway cross-section is proposed by Florida DOT for SR 82.
SOURCE: www.sr82pde.com/SR%2082%20Preferred%20Typical%20Section.pdf

plan scenarios 4



Satellite images of the DR/GR reveal the major physical features of the DR/GR: farmland, mines, and regional wetlands. Surface flows to the Estero River have been disrupted, but the other two major flow systems are largely intact. The Imperial Marsh (east of the mines) flows into the Flint Pen Strand south of Corkscrew Road. The Corkscrew Marsh waters flow into the Corkscrew Swamp (both in Collier County), before this system merges with the Flint Pen Strand in the southern portion of the DR/GR area.

Introduction

Chapter 2 described the process that was used to accomplish these purposes:

- Outreach and involvement with the public and stakeholders.
- Identification of the spectrum of issues and potential responses.
- Fast-track review of initial ideas during a nine-day charrette.
- Illustration of key planning concepts and potential solutions.
- Generation of principles to guide the remainder of this process.
- Formulation of initial concepts for future DR/GR scenarios.

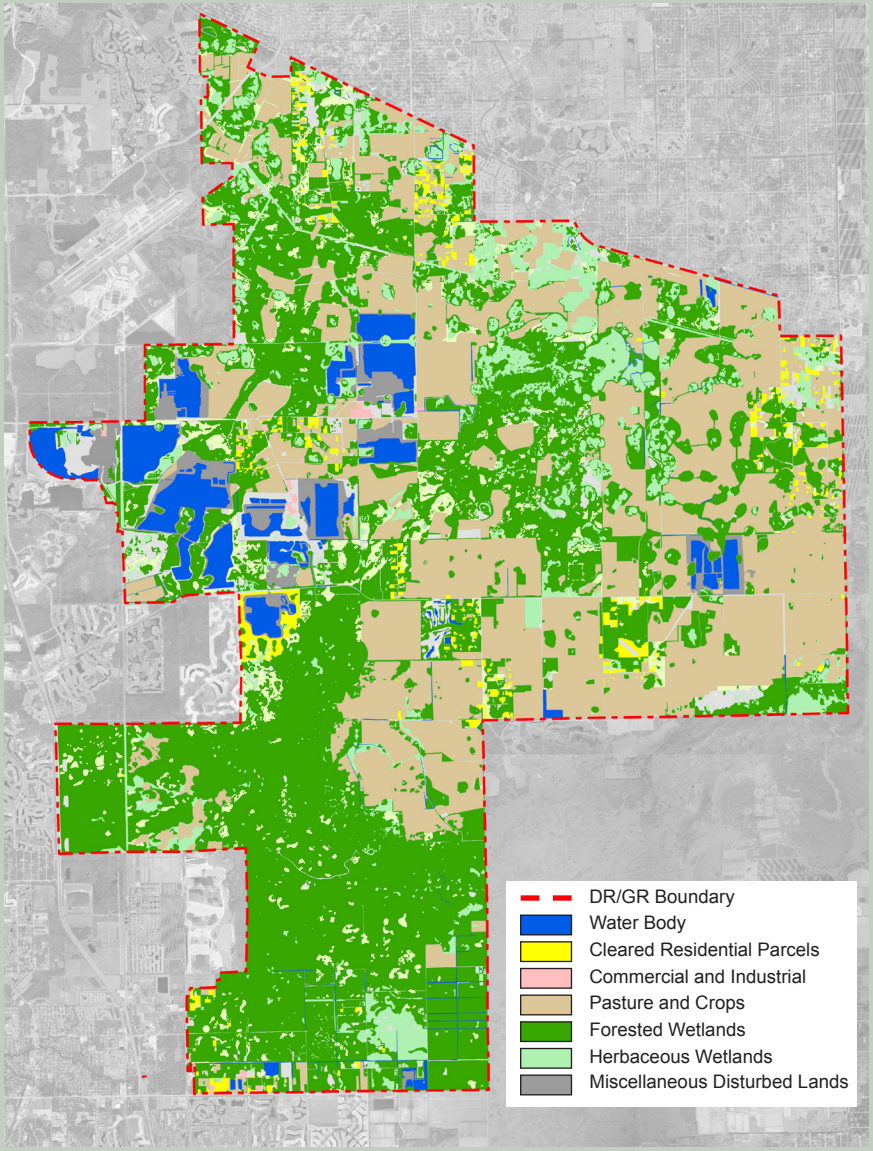
This chapter synthesizes the major findings of the entire process and presents its preliminary conclusions. Three scenarios are offered for careful consideration, each describing a potential course for evolution of DR/GR land uses. Lee County government must balance the often-conflicting demands of a rapidly growing population, a fragile environment, and the prudent use of mineral resources while respecting the rights of all property owners.

Chapter 3 set forth planning principles that reflect the community's vision for the future of the DR/GR. The three scenarios presented here in Chapter 4 attempt to implement these principles while varying the levels of protection of future water supply options, restoration of habitats and flowways, and productive use of mineral resources. None of the scenarios suggest significant increases in residential or commercial development or any attempt to abandon the agricultural economy of southeast Lee County.

These scenarios are provided for preliminary consideration by the public and by policymakers. Key advantages and disadvantages are presented for each scenario. Some potential effects of these scenarios on surface and groundwater resources will be evaluated in the coming months by computer modeling; testing of this nature may help decision-makers to further evaluate the potential effects of each scenario.

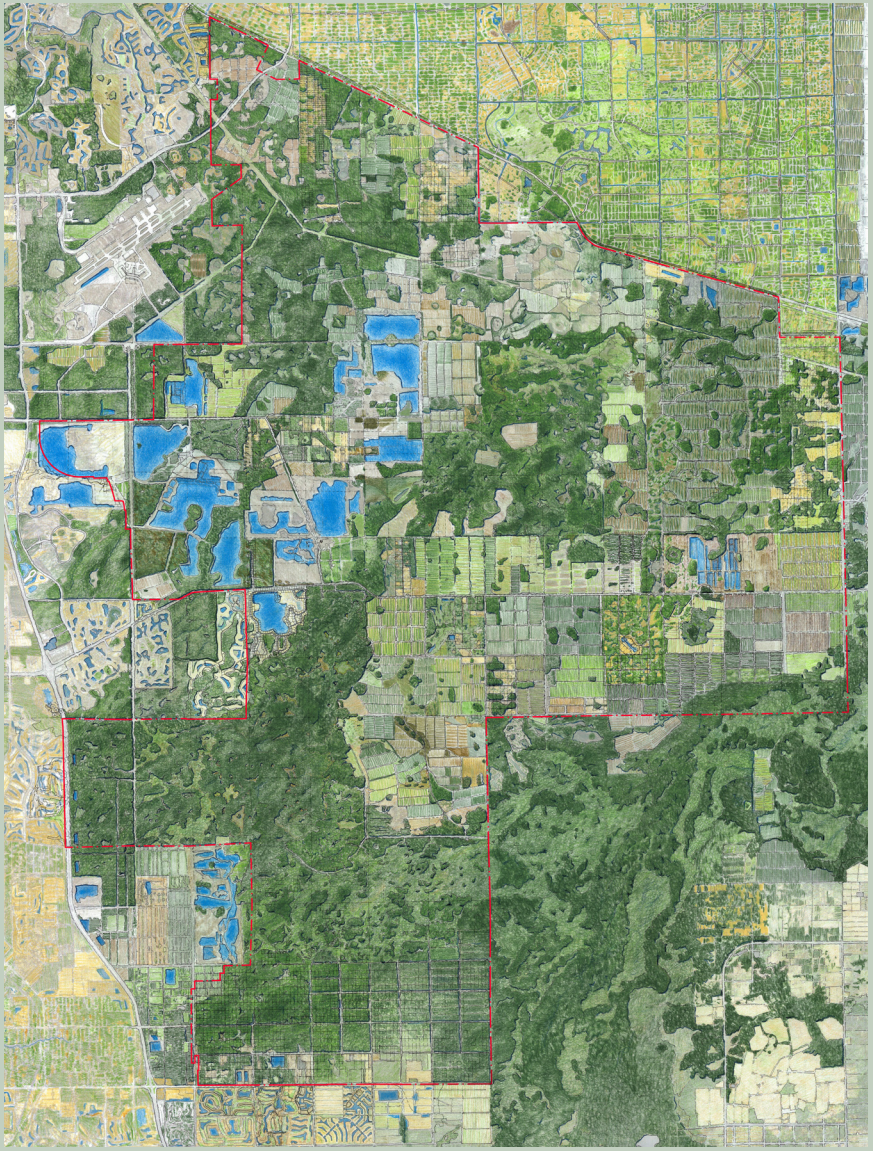
Two maps are presented here to display current DR/GR conditions. The first map is a precise identification of physical conditions based on the careful mapping process described on page 1.7. The second map is an illustration of existing conditions that visually highlights the differences in land use and land cover in southeast Lee County.

EXISTING LAND COVER



As part of the *Prospects for Southeast Lee County* Study a new Land Use, Cover and Forms Classification System (FLUCFCS) GIS dataset was created. It provides a greater level of specificity than the South Florida Water Management District 2004 data used previously.

ILLUSTRATION OF EXISTING CONDITIONS



An illustration of existing conditions in the DR/GR

Residential and Commercial Development

DR/GR land has been subject to a residential density cap of one unit per ten acres since 1990. This cap was intended to stop sprawl at typical suburban densities of one to three units per acre. Since this cap was imposed, almost no land has been developed at the new density level, although one small subdivision has been constructed and one large development order has been approved.

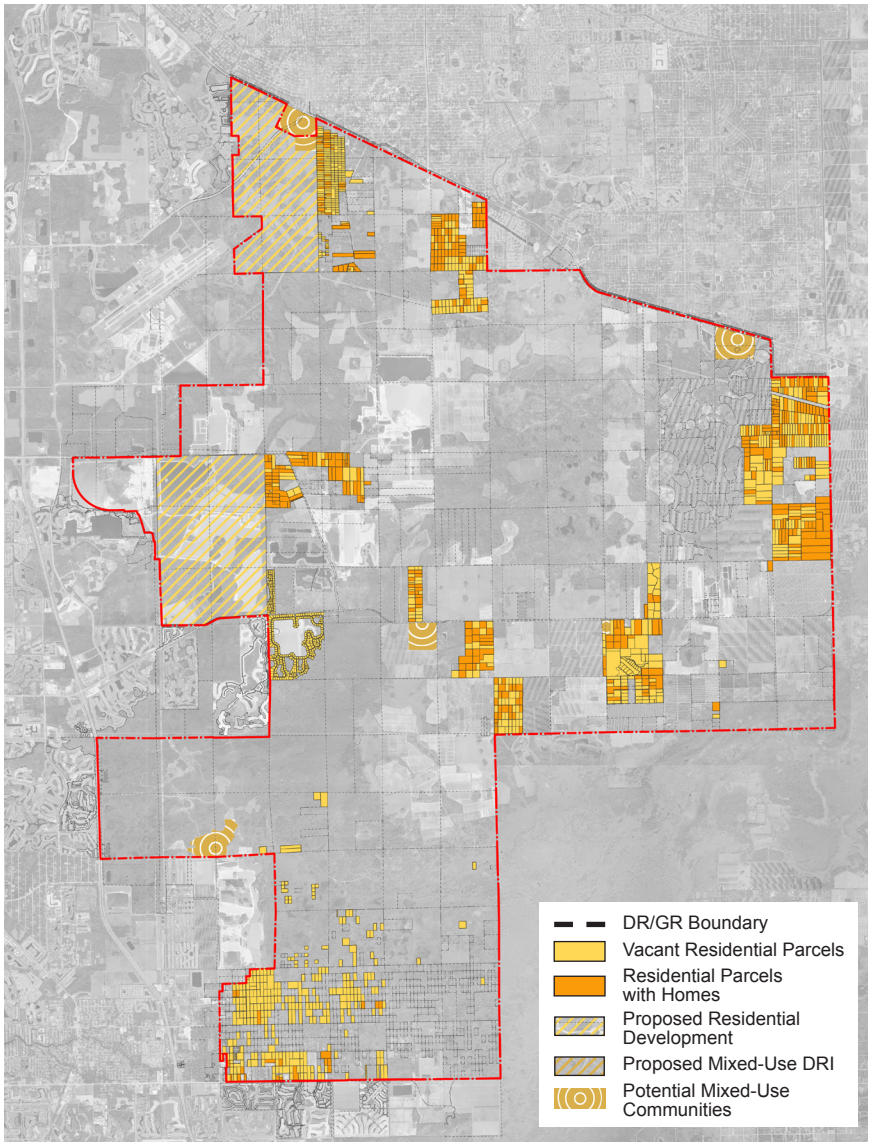
Today the DR/GR area contains 1,582 residential parcels; only 437 currently have homes (see Appendix A). Most of these parcels are 5 to 10 acres in size and located in rural subdivisions created in the 1970s. The vacancy rate suggests there is little demand for more parcels of this size, at least at current land and development costs. The current density cap should be implemented so that clustering is expected rather than just allowable and that allowable densities can be transferred to non-contiguous parcels, even to parcels outside the DR/GR whenever possible.

Current development trends often place a ribbon of residential lots around former mining pits. The county's regulations seem to encourage this; the pits are treated as if the land that has been removed is still there. The scenarios proposed in this chapter all assume that the county will stop granting development rights to land that no longer exists.

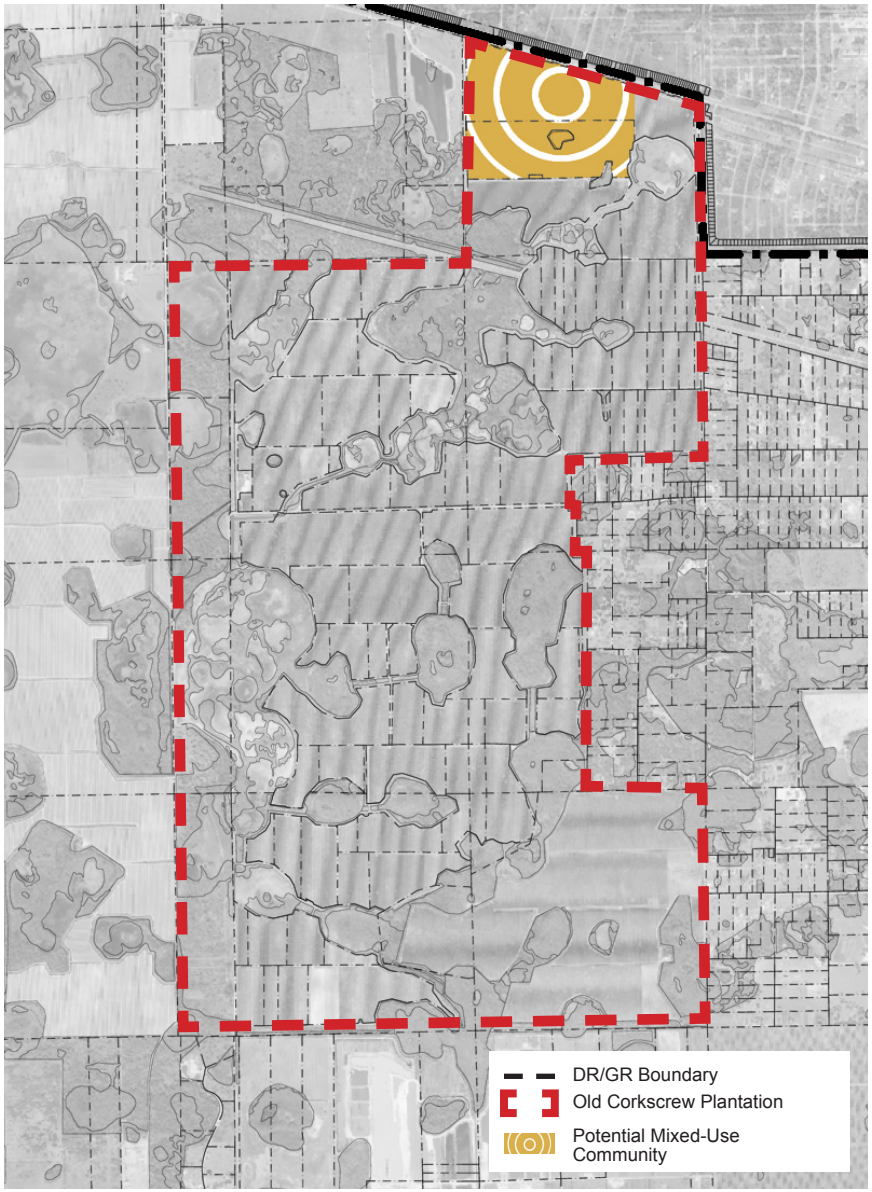
The current Lee Plan's "Future Land Use Map" can accommodate about 1,430,000 people, a number that exceeds the expected population in 2030 by 46% (see Appendix A). Attempts to further increase the amount of developable land in Lee County or to increase overall densities in the DR/GR area should be expected to be met with strong resistance by the state.

Nonetheless, there are situations where density increases may still be acceptable or even desirable in order to further the planning principles set forth in state law and in the Lee Plan.

For instance, carefully crafted density bonuses can help carry out important public policy without additional regulations or financial incentives. Nominal density bonuses could incentivize transfer of development rights from remote uplands in the DR/GR area to potential mixed-use communities such as those suggested on the map, or to non-DR/GR land such as Lehigh Acres or the Lee Plan's new Mixed-Use Overlay.



Existing residential parcels, proposed residential developments, and potential locations for new mixed-use communities that concentrate existing development rights into compact neighborhoods.



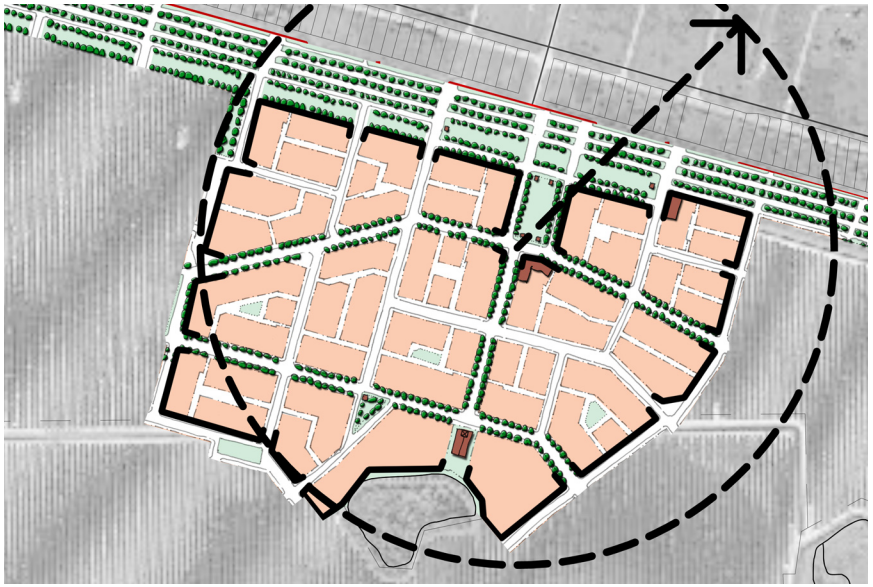
The Old Corkscrew Plantation property could consolidate its residential development rights and/or be a receiving area for transferable development rights to create a mixed-use community along SR 82, all without displacing agriculture or blocking flowway restoration opportunities.

Potential Mixed-Use Communities - Old Corkscrew Plantation

The northern portion of the Old Corkscrew Plantation property contains approximately 3,000 acres of developable land, currently used for citrus groves. This land could be developed into 300 10-acre parcels, eliminating the potential for agriculture as well as greatly reducing the abilty to restore historic flowways.

A better way to exercise these development rights would be to concentrate them at the northern edge of the site into a compact neighborhood, as illustrated below. The footprint of development is so reduced that only a fraction of the land is utilized for residential purposes while the majority of the land could remain in agriculture.

A larger and more complete mixed-use community could also be created on this site. Additional development rights could be transferred from elsewhere in the DR/GR through a TDR program, or more extensive employment and shopping could be incorporated to serve the eastern reaches of Lehigh Acres (see concept diagrams on the next page).



This illustrative site plan for a mixed-use community shows a quarter-mile radius which represents the five-minute walk that many people prefer to driving the same distance. The solid black lines indicate a suggested edge to this neighborhood.

Differing transect zones define the various intensities that are permitted within a mixed-use community. The core can contain mixed-use buildings (ground floor commercial space with residential above), while the edge is mostly single-family homes.

A larger and more complete mixed-use community could result from transferring additional development rights from elsewhere in the DR/GR or by adding extensive employment and shopping to serve Lehigh Acres.

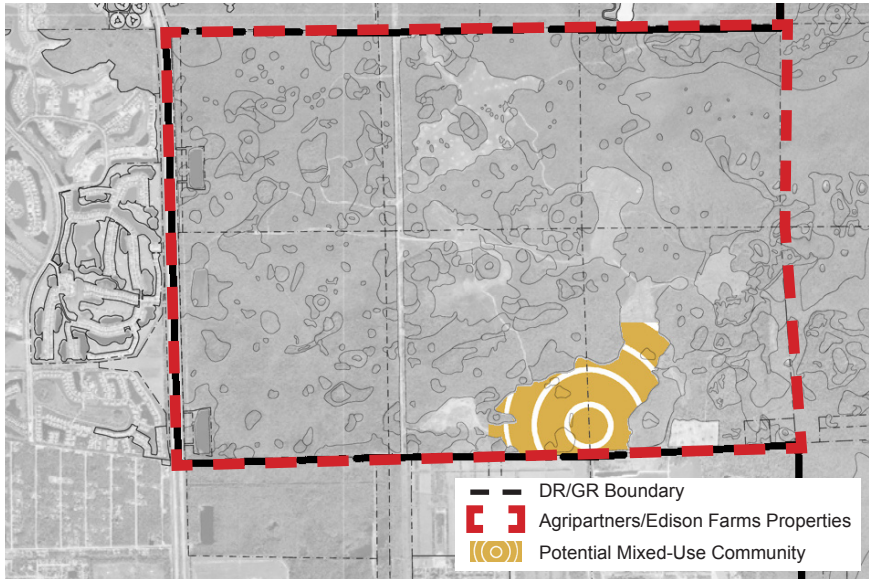
Potential Mixed-Use Communities - Agripartners/Edison Farms Property

The Agripartners/Edison Farms properties consist of approximately 4,000 acres just north of Bonita Springs. Most of this land is extremely wet; the natural systems are generally healthy although the herbaceous wetlands are infested with invasive plants.

The wet conditions on this site preclude most development. The Lee Plan currently allows a home to be built on each ten acres of uplands and twenty acres of wetlands, but large-lot development is ill-suited for this environmentally sensitive site.

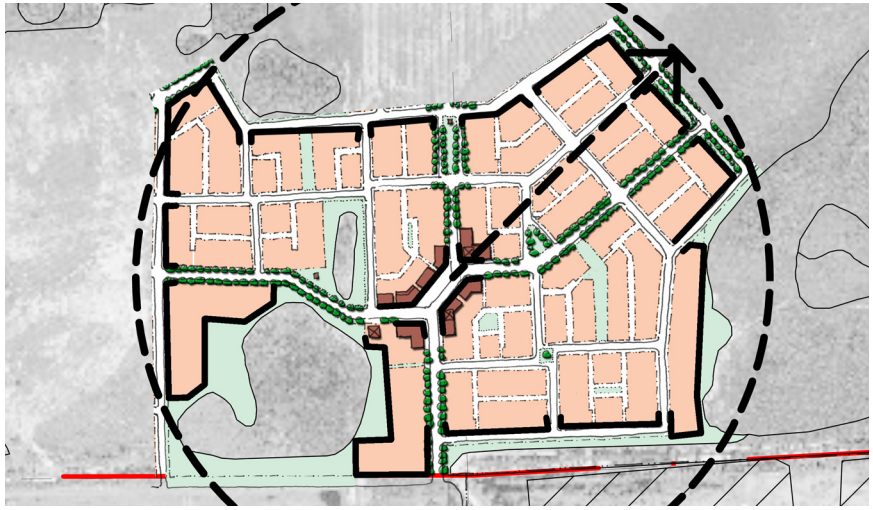
Some development could occur on uplands just north of the Bonita Springs municipal boundary which would have direct access to the proposed CR 951 alignment. A better way to exercise the existing development rights for the entire site would be to concentrate them into a compact neighborhood, as illustrated on the next page. Clustered development would have less impact on water resources and natural habitats.

A larger and more complete mixed-use community could also be created by transferring additional development rights from elsewhere in the DR/GR through a TDR program (see concept diagrams on the next page).

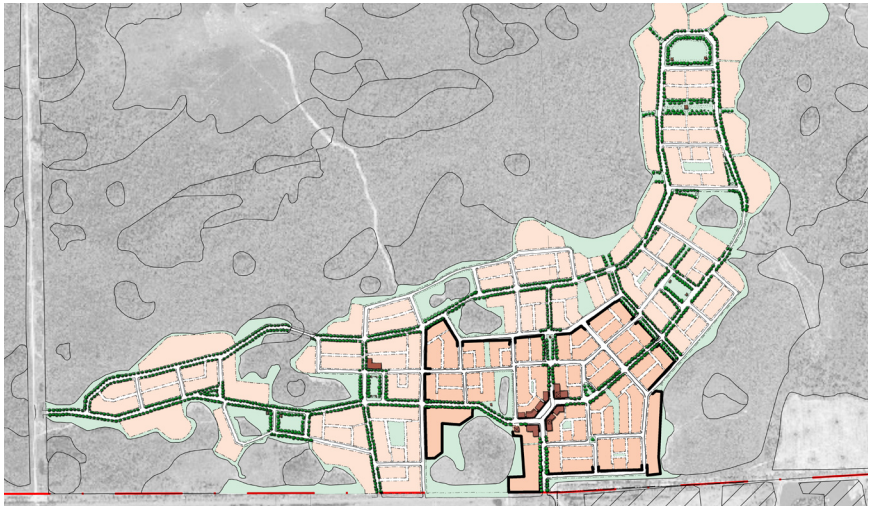


The Agripartners/Edison Farms property could consolidate its residential development rights and/or be a receiving area for transferable development rights to create a mixed-use community at the edge of Bonita Springs along the proposed CR 951 alignment.

Differing transect zones define the various intensities that are permitted within a mixed-use community. The core can contain mixed-use buildings (ground floor commercial space with residential above), while the edge is mostly single-family homes.



This illustrative site plan for a mixed-use community shows a quarter-mile radius which represents the five-minute walk that many people prefer to driving the same distance. The solid black lines indicate a suggested edge to this neighborhood.



A larger and more complete mixed-use community could result from transferring additional development rights from elsewhere in the DR/GR.

Approval of Additional Limerock Mines

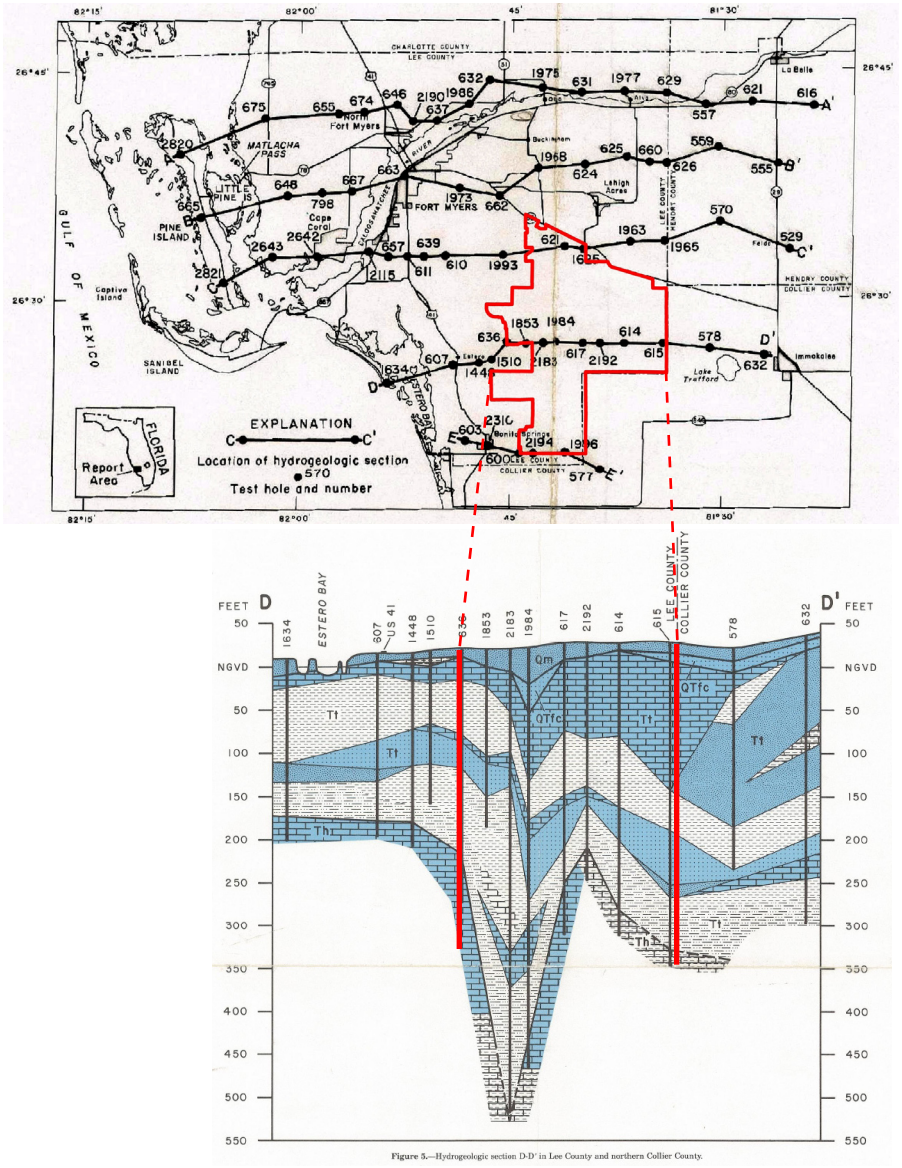
Aggregate needs from 2007 through 2030 are projected to require 4,397 additional acres of mine pits, an average of 183 acres per year. Lee County has already approved 3,576 additional acres for limerock mining; to meet the projected demand, an additional 22% (821 acres) would be required through 2030. See Appendix B for details of the projections.

Aggregate-quality rock exists in other parts of Lee County, but the DR/GR is the most likely area for limerock mining due to its remoteness and the quality of its limestone deposits. A hydrogeologic cross-section of the land under Corkscrew Road is reproduced on this page (the map above shows the location, which extends from "D" at Fort Myers Beach to "D1" at the Collier County line). Wet layers are shown in blue; confining layers of clay or marl are shown with gray hatching. The shallow layer that appears as a blue "brick" pattern is the limestone formation that stores and protects much of the county's drinking water supply. This same layer is removed and crushed during the mining process. (The vertical scale in this diagram is greatly exaggerated to highlight the relative thickness of each layer.)

Some additional DR/GR land needs to be designated for mining through 2030, and general planning for mining beyond 2030 is also important. However, current applications are considerably in excess of foreseeable demand; and during the course of this study, Lee County officials have been advised by landowners that many thousands of additional acres of DR/GR land will be submitted for mining approval shortly after the current moratorium expires in September.

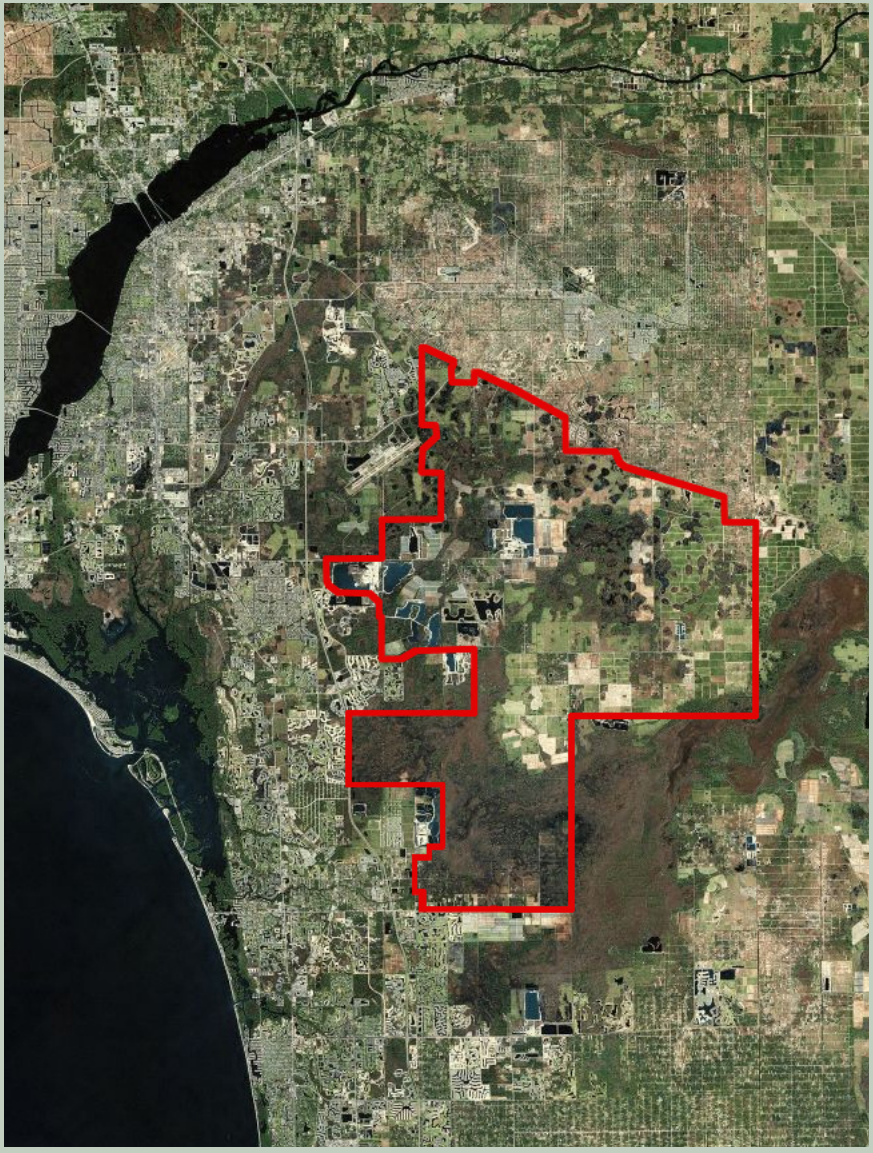
This would be a historically unprecedented expansion of mining which could displace the current agricultural economy of southeast Lee County, disrupt its rural and natural character, and run counter to the natural resource protection strategies that were established in the Lee Plan in 1990.

Development trends that exceed true demand are self-correcting over time, as evidenced by the current slump in the construction industry. However, due to the decades-long nature of mining approvals (sometimes up to 50 years), approval of too much mining capacity by Lee County would shape the county's future far beyond the normal scope of public-sector planning.

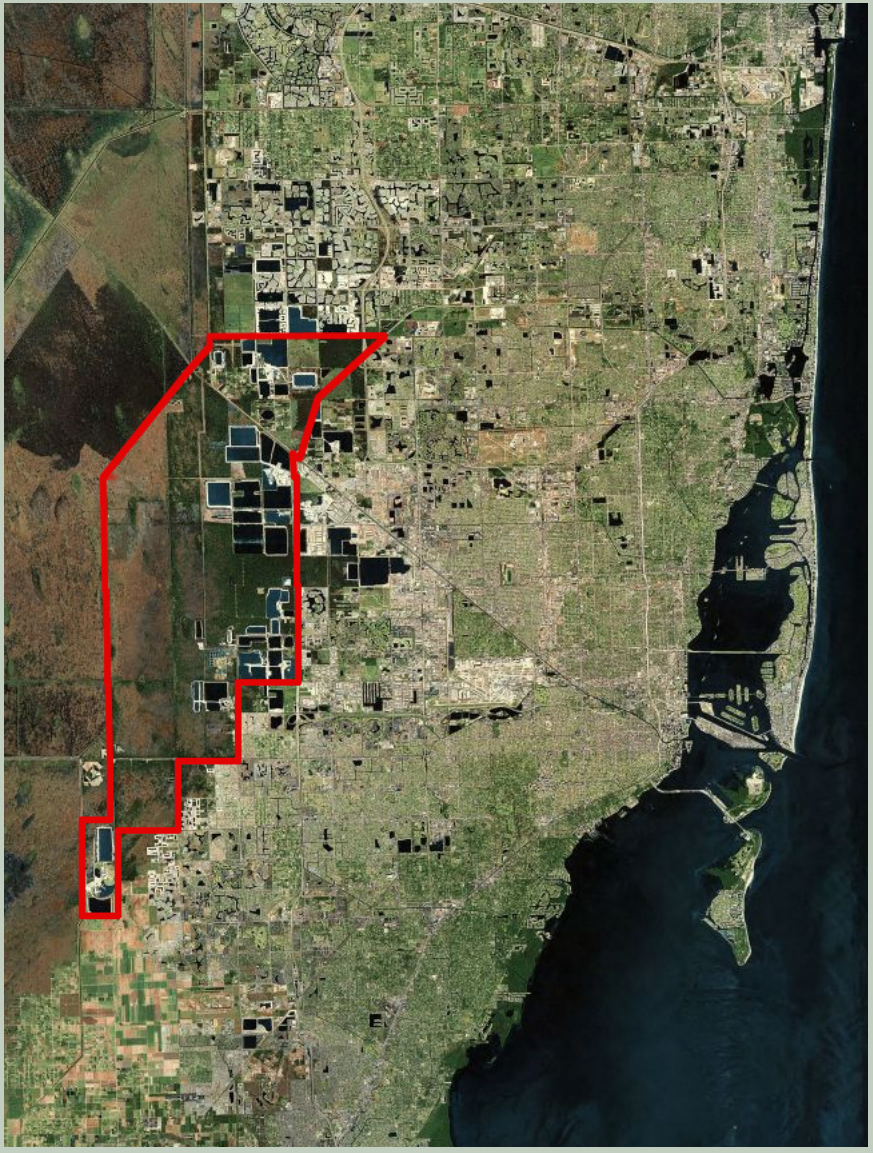


SOURCE:
"Hydrogeologic Sections Through Lee County and Adjacent Areas of Hendry and Collier Counties, Florida," by D. H. Boggess, T. M. Missimer, and T. H. O'Donnell, U. S. Geolgical Survey Open-File Report 81-638, 1981. (DR/GR perimeter and guidelines added in red)

MINING SCALE COMPARISON



DR/GR



Miami-Dade County Lake Belt

These aerial photos are displayed at the same scale. The Miami-Dade County Lake Belt is the source of half of Florida's limerock products. It is clear that until now it has been mined more than the DR/GR area. A major difference between these two mining areas is that the Lake Belt is served by a major rail line running up the east coast of Florida. Limerock products are distributed by freight train the entire length of the state (including the Orlando and Jacksonville regions), without the heavy truck traffic that is unavoidable from DR/GR mines.

Flowway Restoration

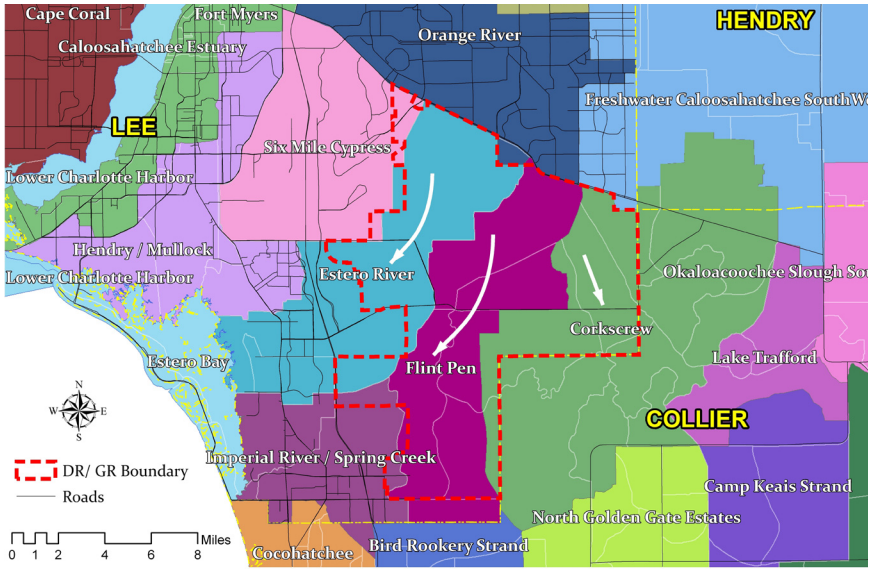
The significant role of the DR/GR in water resource functions has been documented by the numerous studies conducted over the last three decades. Three major hydrological systems traverse the area, including the headwaters of the Estero River, the Flint Pen Strand, and the Corkscrew Swamp. The DR/GR is one of the most important ecological areas within southwest Florida due to water resource functions, flowways, and key habitat areas.

This importance has been recognized for decades and is reflected in the amount of land already put into protected status by public and private entities. Restoration of degraded lands is already underway on several large tracts. However, this task has only begun; many key properties should be acquired when they become available to connect the already-protected areas and increase their size and functionality.

Several land use practices have interrupted historic surface and groundwater flows. These include agricultural drainage practices, roads, limerock mines, and residential subdivisions.

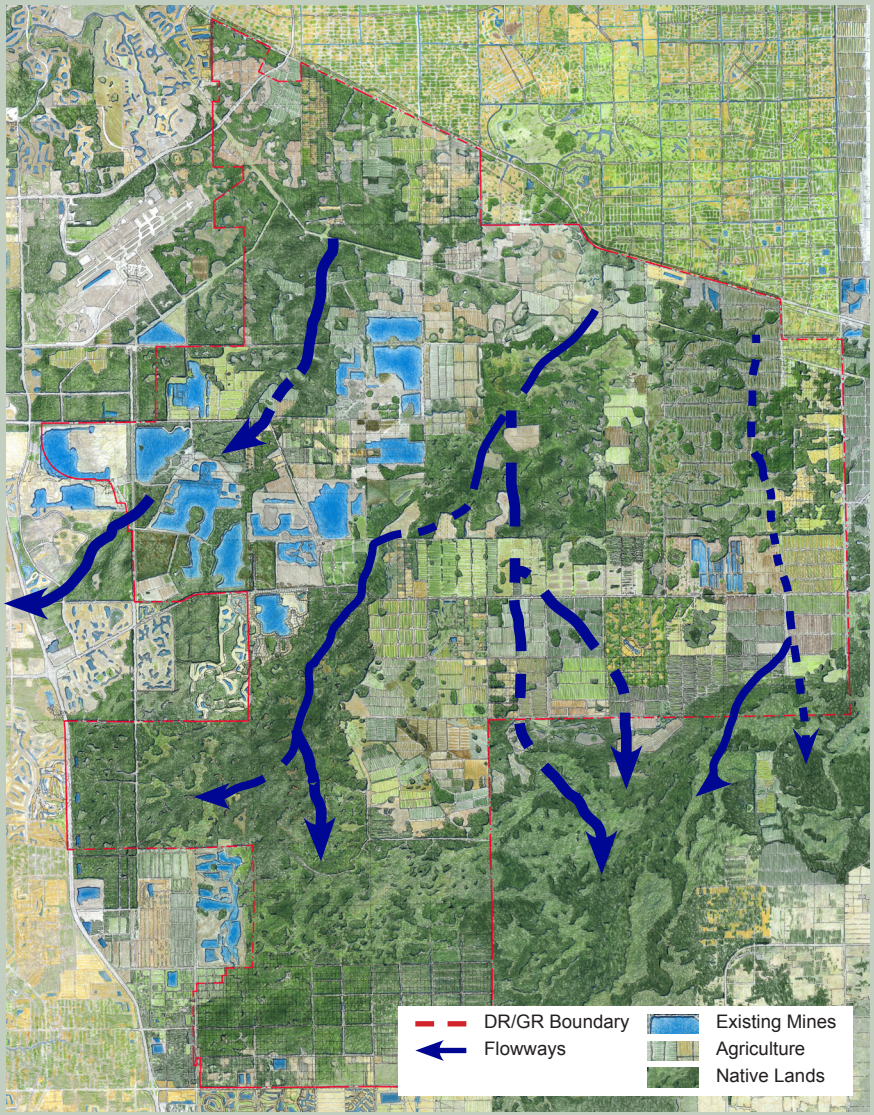
Agricultural practices are the least difficult to correct or mitigate; many farms could function close to their natural manner through a combination of best management practices, flowway maintenance, and full-scale restoration. Participation by landowners would be strictly voluntary and dependent on identifying long-range funding sources.

In order to restore flowway function to historic levels and reset the important water resource functions of the DR/GR, an ambitious long-term restoration strategy is introduced on the following pages. Four intervention areas are shown, with the highest priority interventions identified as Priority 1.

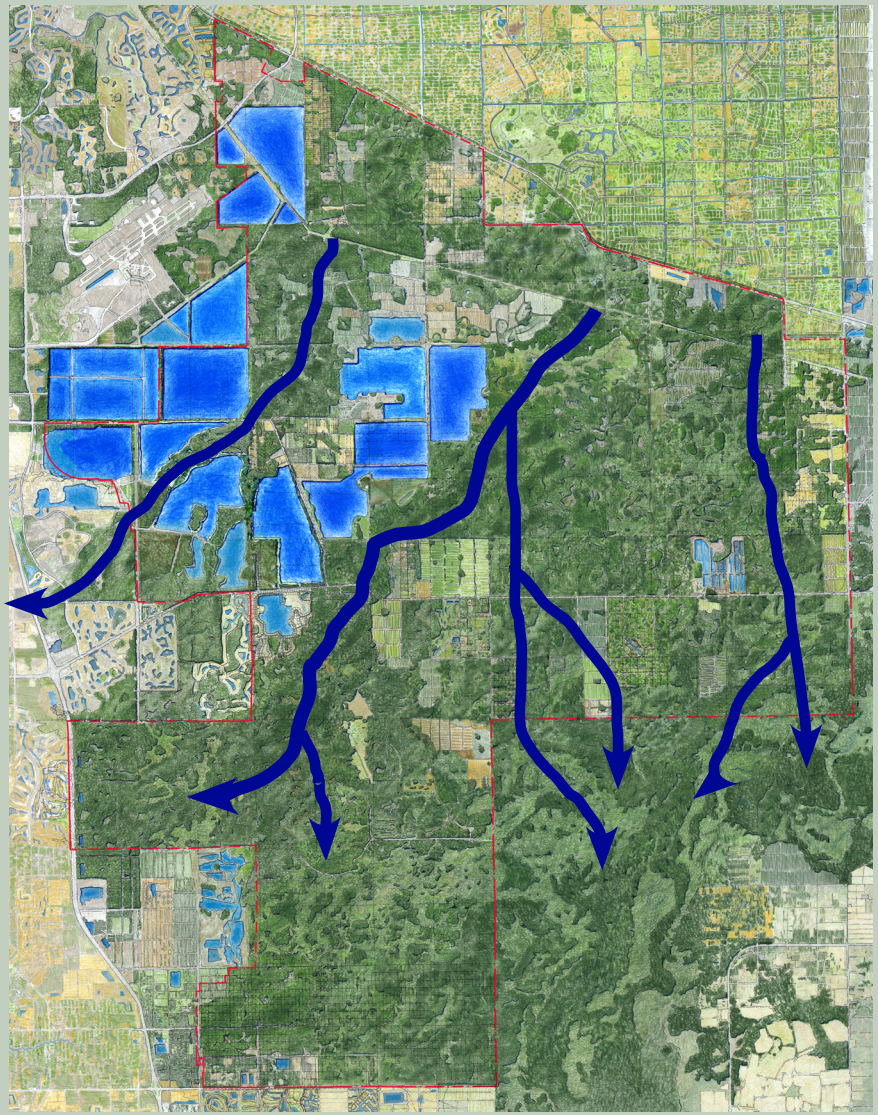


The South Florida Water Management District has identified watershed sub-basins for the Estero River, the Flint Pen Strand, and Corkscrew Swamp as shown. Some adjustments to these boundaries are expected as a result of the computer modeling underway as part of this study.

FLOWWAY RESTORATION STRATEGY



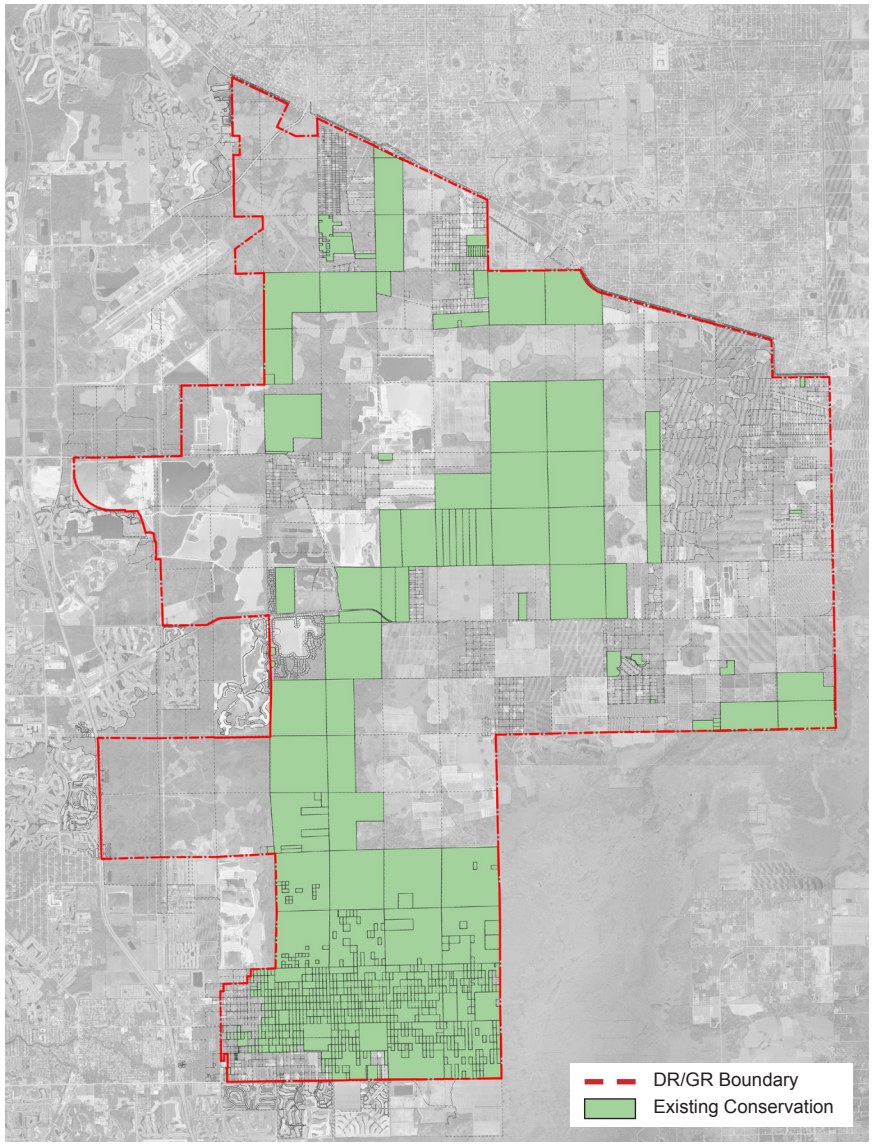
Approximate existing conditions in the DR/GR area.



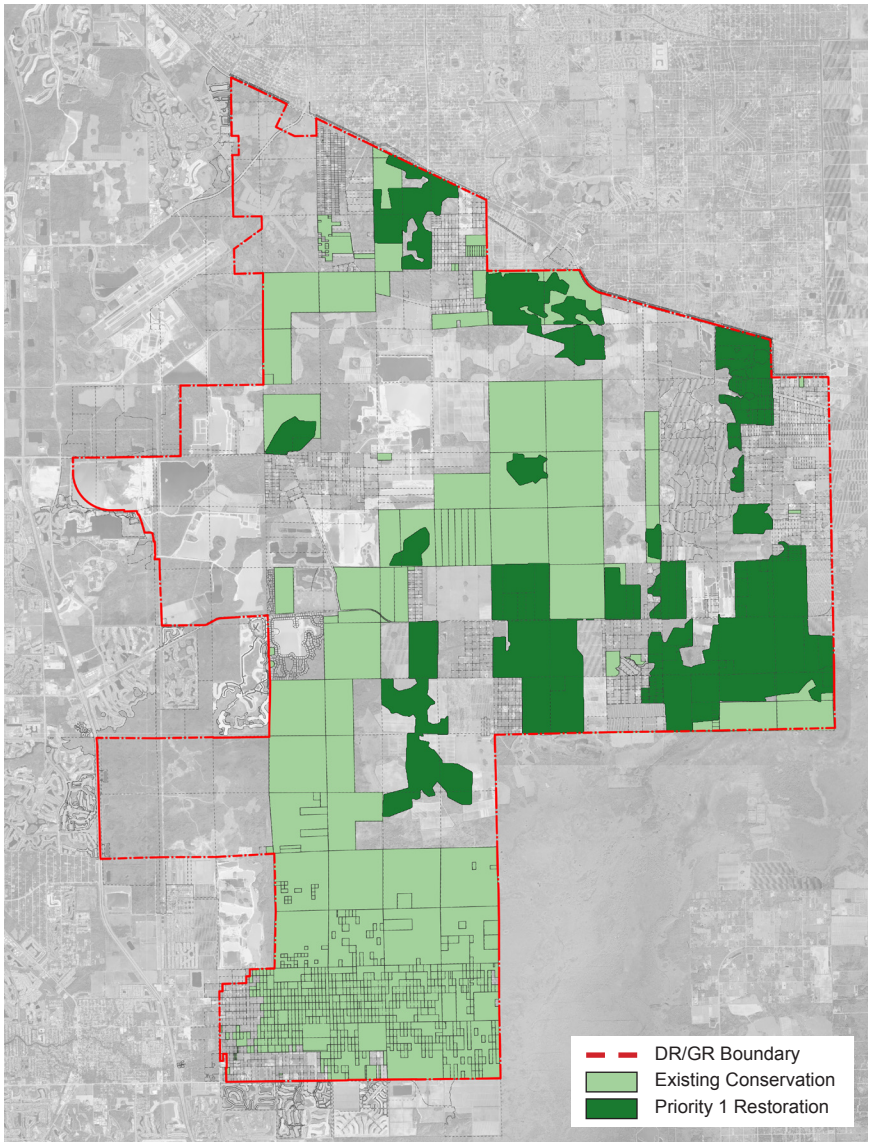
The full implementation of an ambitious, long-range restoration strategy.

The illustration on the right shows the fullest implementation of the restoration strategies described on the following pages. Mining would be concentrated in the traditional mining corridor. Already-protected lands would be fully restored and reconnected to original surface water flows. Other historical linkages would be re-established, allowing even greater restoration of historic water flows. Flowways east of the mining corridor would receive a higher degree of protection than those to the west, but an extreme effort would be made to restore flows to the Estero River despite the present hydrologic impacts. These strategies would take generations to accomplish and would require intensive cooperation with landowners and ultimate acquisition of vast tracts from willing sellers.

Restoration Priorities and a Step-by-Step Restoration Strategy

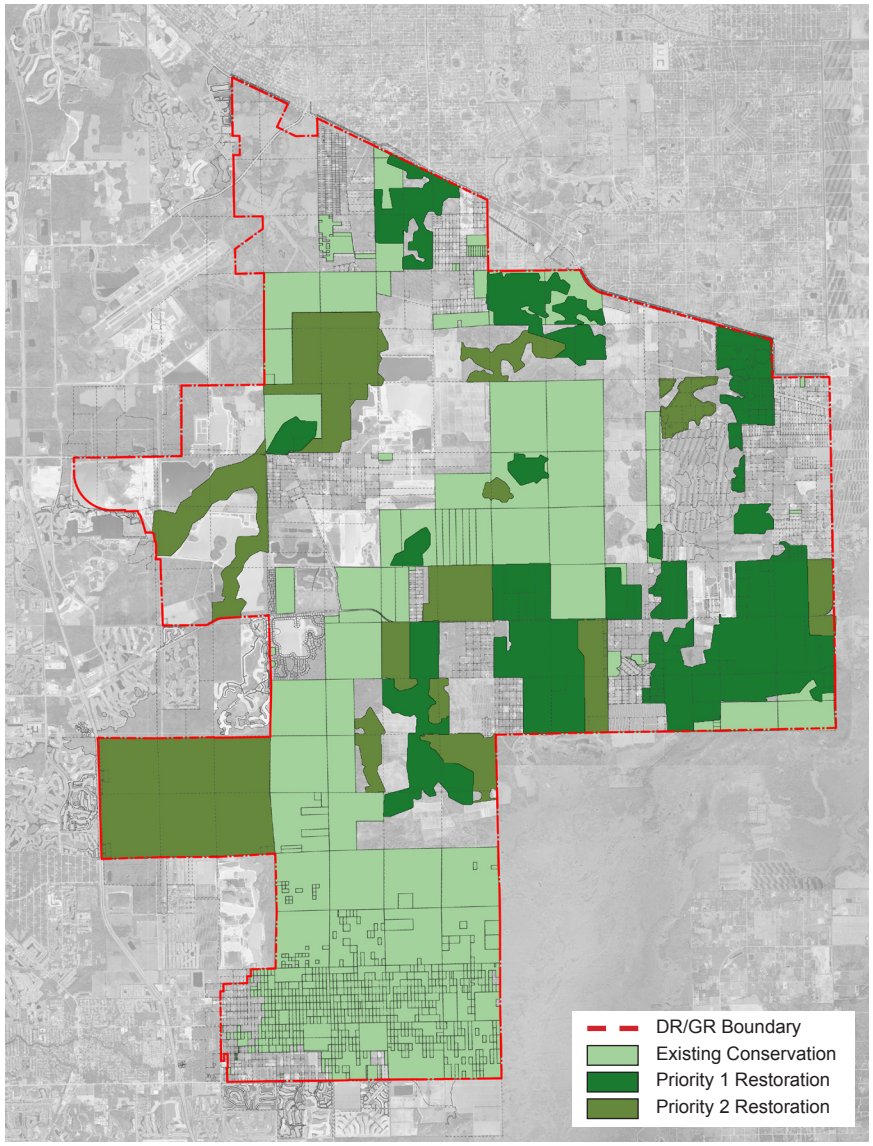


Existing lands conserved within the DR/GR

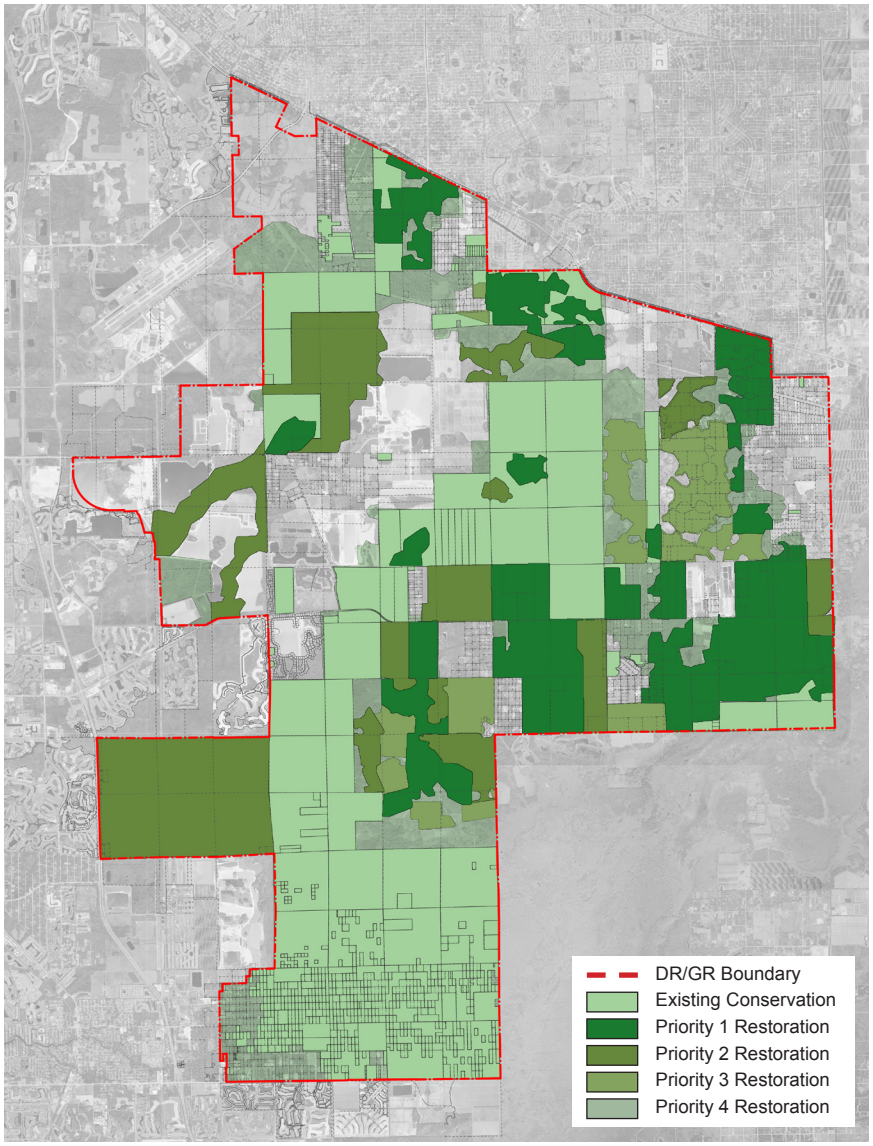


Priority 1 lands that could be restored

Restoration lands are ranked based on their capacity for flowway restoration and their role in maintaining historic groundwater levels.



Priority 2 lands that could be restored have been added.



Priority 3 and 4 lands that could be restored have been added.

Maintaining Historic Groundwater Levels

Even the limited land uses that can be approved in the DR/GR area have to comply with Lee Plan Policy 1.4.5 which states in part that these land uses "must be compatible with maintaining surface and groundwater levels at their historic levels."

Often today's water levels are already lower than their historic levels due to agricultural drainage, mining, roadside swales, and other "drainage improvements." In some cases these changes are irreversible and may actually get worse, for instance where existing and approved mining pits essentially form linear drainage channels that will get longer as mining proceeds and whose drainage effects will become even more pronounced.

In other cases, water levels are now actively managed by farmers to suit the seasonal needs of row crops or the year-round need to keep citrus roots above groundwater levels. Historic water levels could be restored on these farms either in conjunction with changes in agricultural practices or through partial or complete restoration of the native habitats that preceded farming. When farming has ceased, restoration could be accomplished by public agencies after acquiring the property, or there could be a joint effort between public agencies and the landowners.

Unlike the reversible nature of agricultural drainage, mine pits can lower groundwater levels indefinitely. This effect increases as the size of mine pits increase, especially where the land surface slopes even slightly. The diagrams on the following page illustrate these effects.

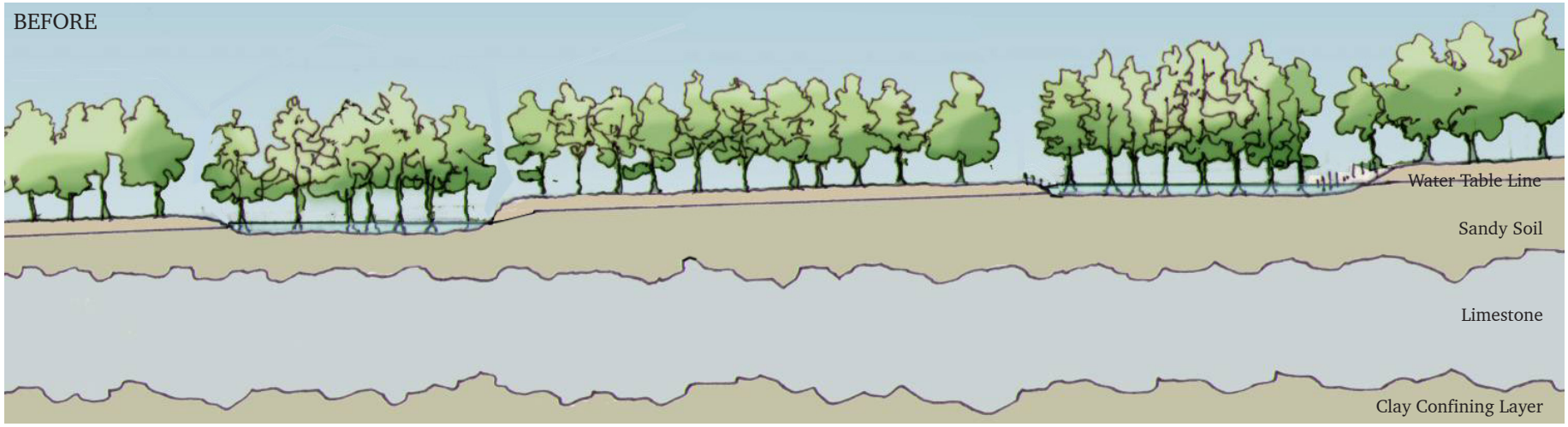
Mines pits are often sited to replace existing farm fields and avoid adjoining wetlands, based on current wetland regulations and the assumption that farm fields have no environmental value. During the non-growing season, farm fields often have high water levels; fields with impoundments can also store large amounts of water above ground. Some effects of a mining pit will last forever while the effects of farming are reversible. This applies to impacts of mining on water levels and its potential impacts on water quality.

The limestone whose pores store much of the water that supplies public wellfields is the very material that is physically removed during mining. This removal creates an open window into the aquifer. It is obvious that a mining pit will store a much greater volume of water than the aquifer did when it was mostly sand and limestone. However, after mining, if contaminants enter the pit they can move very quickly through the open water of the pit instead of moving very slowly through limestone. Natural slow movement allows contaminants to be filtered out, die off, or be slowed sufficiently to minimize their danger to public water supply.

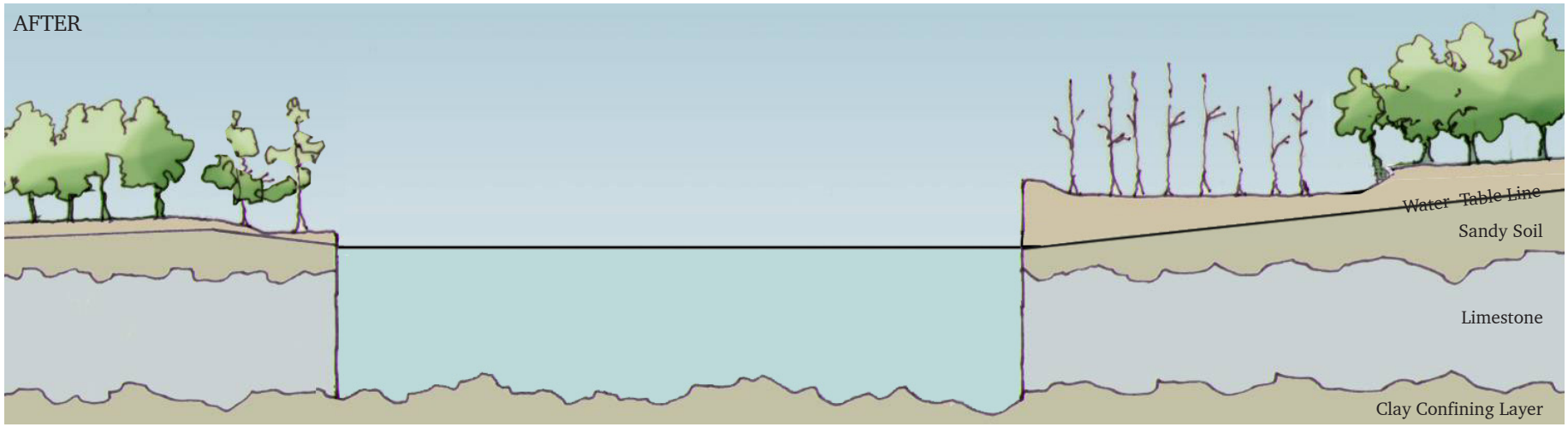
The sloughs that used to be the headwaters of the Estero River demonstrate actual impacts to surface and groundwater levels. Although two wetland/flowway corridors were left untouched during the mining process, surface water flows through these flowways appear to have ceased entirely because water levels in the pits are below the bottom of the former flowways. The wetland plants in these corridors no longer experience their historic wet/dry cycles and as a result are losing their essential natural functions. This preservation of wetlands adjacent to mining was well-intended and its effects are aesthetically pleasing, but the ecological results have been significantly less than expected and these effects must be considered when planning future mines.

Just above the temporary road in this photograph lies the remnants of a slough system that used to be the headwaters of the Estero River.

Water Level Impacts of Large Mining Pits



This diagram represents conditions before mining in the absence of artificial drainage. The top layer of soil is the root zone of wetlands and uplands, which supports a rich variety of plants and animals. Immediately below is a sandy layer that extends down to rock; this layer is the source of fill dirt (considered "overburden" in limerock mines). Beneath the sand is the major limestone layer. The sand and limestone layers together form the surficial or water table aquifer; water flows underground through this aquifer, exchanging water with wetlands and later discharging to creeks and rivers while filtering and storing vast quantities of water. Below the limestone lies a thick confining layer of clay that restricts movement of water to other aquifers that lie even deeper.



This diagram represents water levels after limerock mining. Within the mine pit, all layers have been removed to the bottom of the limestone. The absence of sand and limestone changes the way water moves through the aquifer and exposes groundwater to evaporation (and to potential contaminants). Estimated evaporation rates from open water bodies are higher than evapotranspiration rates from pine flatwoods and cypress wetlands (although lower than rates for melaleuca forests and many irrigated crops). Under natural conditions, groundwater levels tend to slope downhill roughly matching the ground surface above. However, when pits are dug on land that slopes even slightly, the water level in the pit will stabilize at the level of groundwater at the lower end of the pit, drawing down groundwater levels especially toward the upper end of the pit. Draw-down effects make it difficult to preserve isolated wetlands within mining pits. Large pits will hinder or prevent the restoration of nearby wetlands and uplands, especially in the uphill direction.

Wellfield Locations

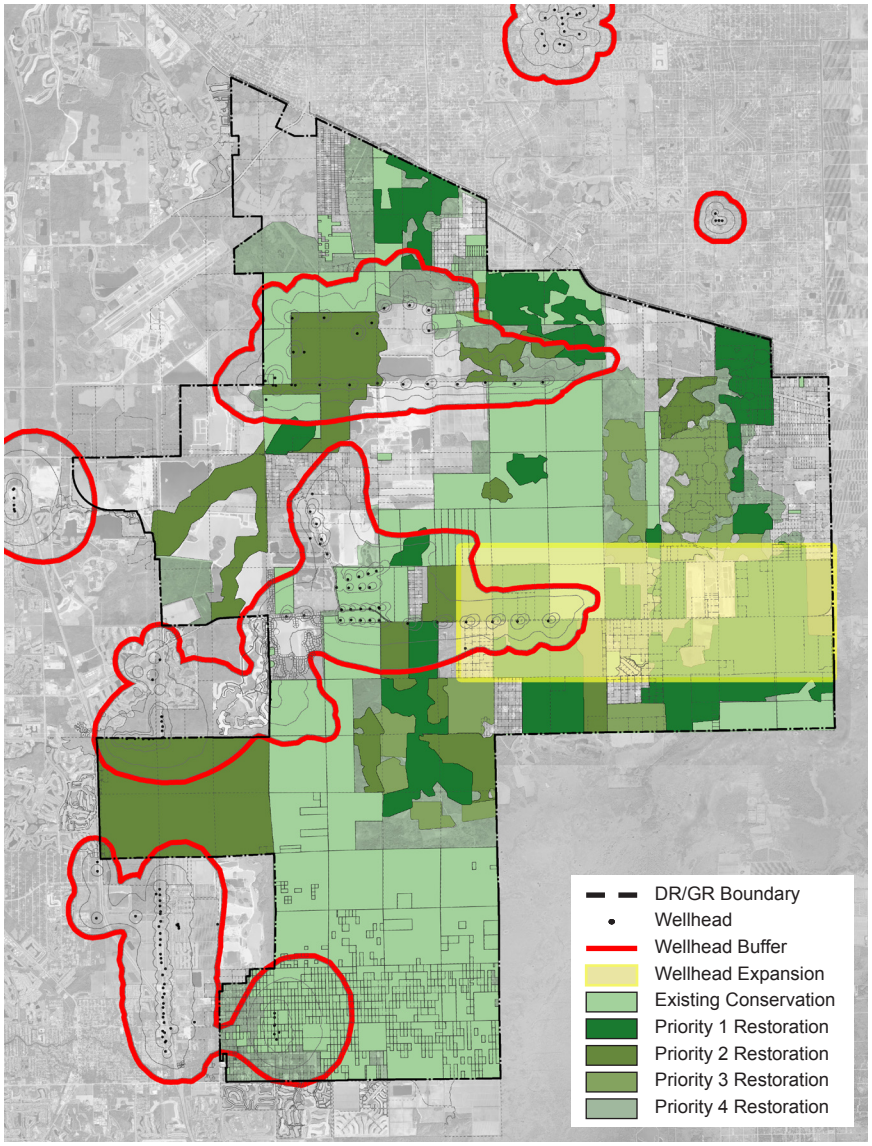
The DR/GR area is an important wellfield resource. About 70% of the potable water produced by Lee County Utilities is extracted from the DR/GR. Most of the water is withdrawn from the surficial (water table) aquifer, which is directly and regularly recharged by rainfall.

Lee County will nearly double in population by the year 2030. Additional wellfields must be created to serve this growing population. Whether there will be sufficient water in the DR/GR area to meet this demand will depend on how well Lee County manages land uses and water resources.

If the easily accessible surficial aquifer is no longer available for potable water withdrawals, water will have to be produced from sources that are more expensive to tap and more difficult to treat. Already the cities of Sanibel, Cape Coral, and Fort Myers have had to switch to these expensive alternative water sources. Lee County Utilities will have to compete for this water if existing sources become contaminated from incompatible land uses or are no longer available for public use.

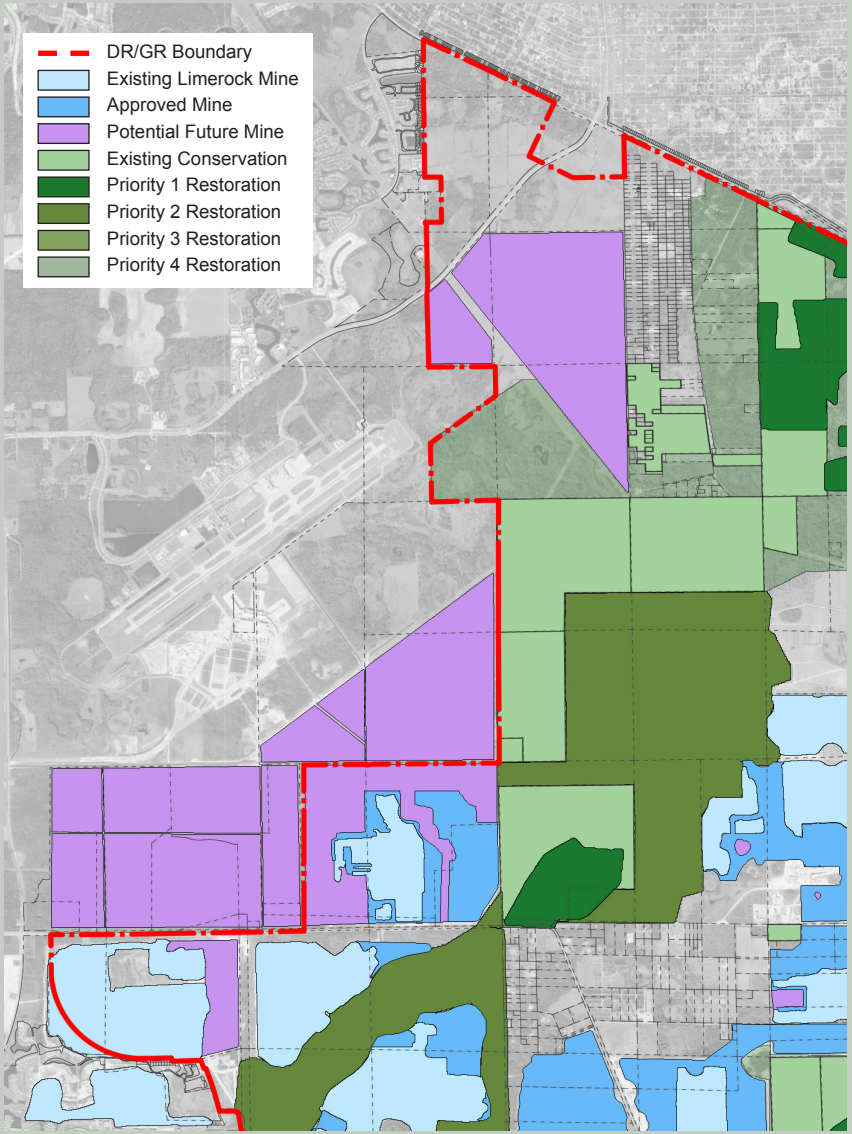
The impacts of land uses near wellfields is subject to continuing study. In December 2007 Lee County updated its wellfield protection ordinance to reflect computer modeling of how long it would take contaminants to reach wellheads. U.S. Geological Survey (USGS) scientists have proposed research to determine whether DR/GR subsurface conditions match the homogeneous character assumed by these models. Similar USGS research on public wellfields in Miami/Dade County's mining zone concluded that "highly permeable flow zones" below ground could allow contaminants to reach wellheads ten times more quickly than previously believed.

Hopefully these conditions do not exist in Lee County and existing wells that are surrounded by mining will continue to be productive and provide safe drinking water. Prudent planning dictates that potential conflicts between public water supply and mining be avoided whenever possible, for instance by not spreading mining throughout the DR/GR area where it could hinder or preclude future water supply options. Wellfields must be sited properly as they cause draw down of the water table in wetlands even more than mining. Unless restoration is possible, future wellfields should be located away from areas where groundwater levels have already or will be lowered by agriculture, mining, or development; lowered groundwater means the continual loss of water that had been stored for free by nature.

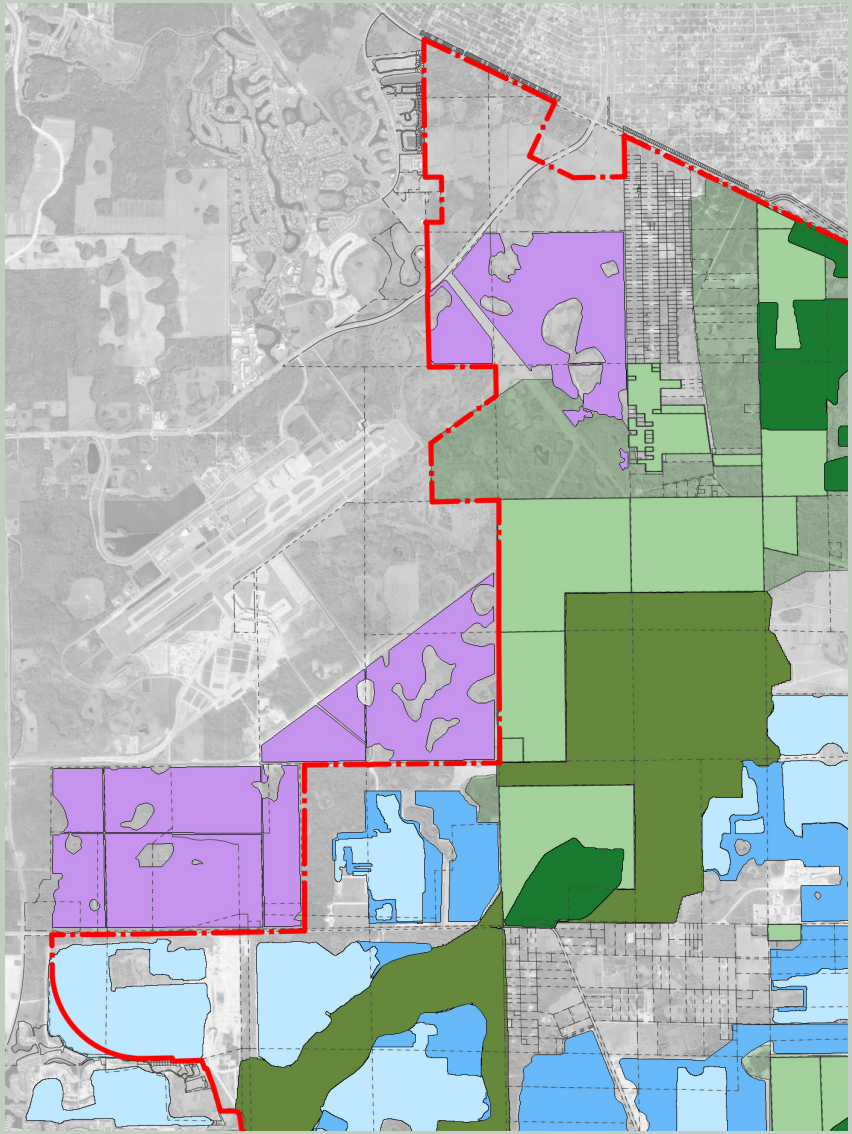


The above map shows locations where wellheads exist or are being installed. The red outlines define the area where contaminants that enter the aquifer could reach wellheads within a ten-year period. The yellow rectangle highlights one potential area for future expansion due to easy access along Corkscrew Road; new wells are already being installed there during 2008 as shown here.

PRESERVATION OF ISOLATED WETLANDS WITHIN MINES



This report recommends a planning strategy of concentrating mining activity in already impacted areas to allow more valuable lands elsewhere to be saved. To some degree this strategy is undermined when impacted areas have isolated wetlands that must be protected even though they will not retain wetland functions after mining is complete. The diagram above shows a potential mine pit configuration if isolated wetlands in preferred mining areas were not protected as they are today.



The diagram above shows a potential mine pit configuration if isolated wetlands in preferred mining areas were protected to the current extent. The effect of this configuration on aggregate production would be much greater than appears here if buffer areas or shallow slopes were required around all wetlands.

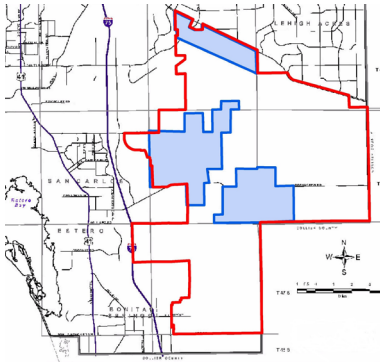
Trail and Recreational Opportunities

The ability to create an extensive trail system throughout the DR/GR is an advantage of public land acquisition, whether for wellfields, habitat protection, flowway restoration, or maintenance of historic water levels.

A continuous system of trails in the DR/GR would allow residents and visitors to appreciate and gain a sense of ownership over vast natural systems. A Captiva-Hendry-Collier trail is already proposed in the County's Greenways Master Plan to run along the power lines southeasterly into Collier County. Additional trails and recreation paths should connect to this and other future trail networks, including the proposed Imperial River trail in Bonita Springs, trails in the Bird Rookery Swamp, and other trails now being considered in Collier County's ongoing trail feasibility study.

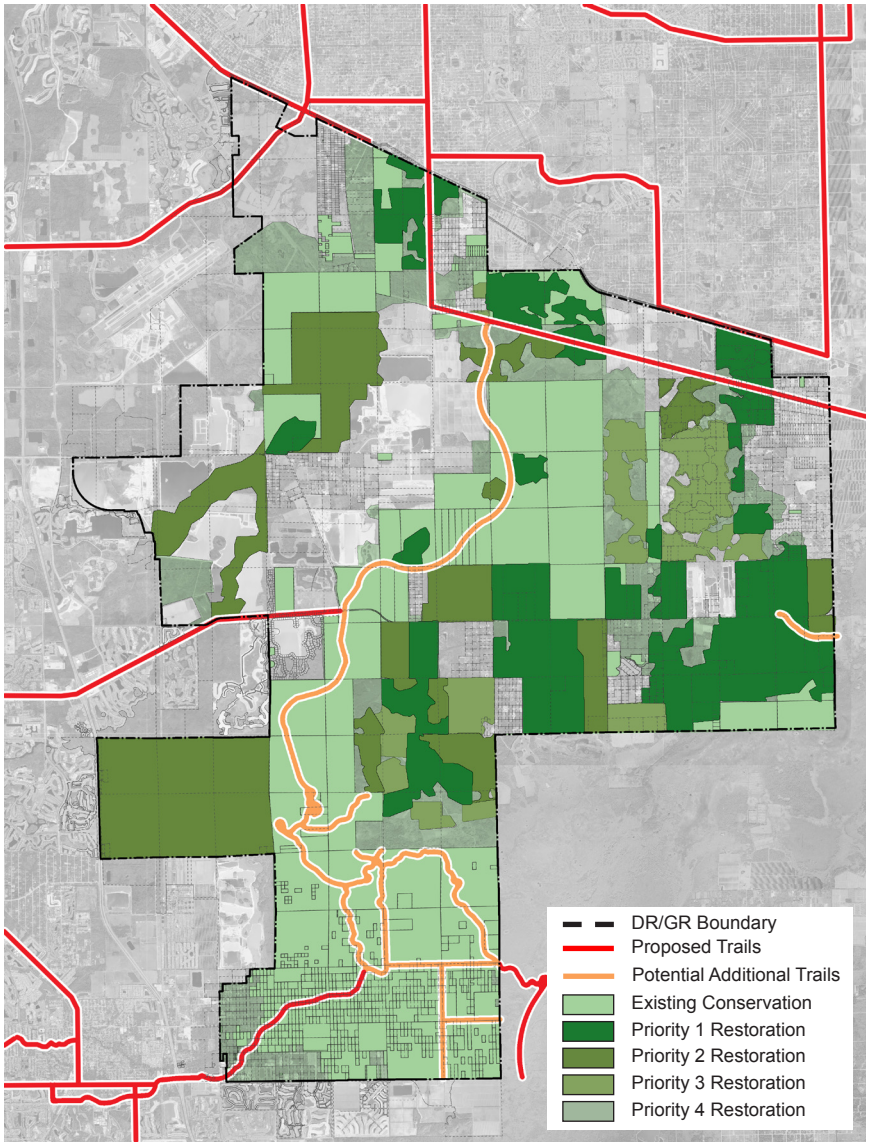
The proposed Imperial River trail, Greenways trails, and Collier County trails are shown in red on the map to the right. Potential additional trails that could be created, along with existing paths on public lands, are shown in orange. An extensive DR/GR trail network would expand walking, biking, and birdwatching throughout southeast Lee County.

Private golf courses may now be approved in the areas shown in blue on the map below. One golf course, Old Corkscrew Golf Club, has been built on the south side of Corkscrew Road. Lee Plan Policy 16.2.10 calls for a comprehensive evaluation of this program in 2010. During that evaluation, Lee County should consider whether the current limitation to private golf courses is justified; this restriction prohibits Lee County from considering a public golf course or other public recreational facilities in the DR/GR area.



DR/GR Boundary
Potential Golf Course Area

Map of the DR/GR depicting potential new sites for golf courses.



Trail systems could extend throughout the DR/GR and connect to regional trails.

PLAN SCENARIOS

Three scenarios for the future of southeast Lee County are presented here. Each scenario illustrates a potential evolution of DR/GR land uses.

New residential uses are minimized in all scenarios. Given the importance of this area for water supply, agriculture, mining, and restoration of historic surface and groundwater levels, most residential development rights should be exercised in a few identified growth areas near roads and services, preferably at the edge of the DR/GR boundary.

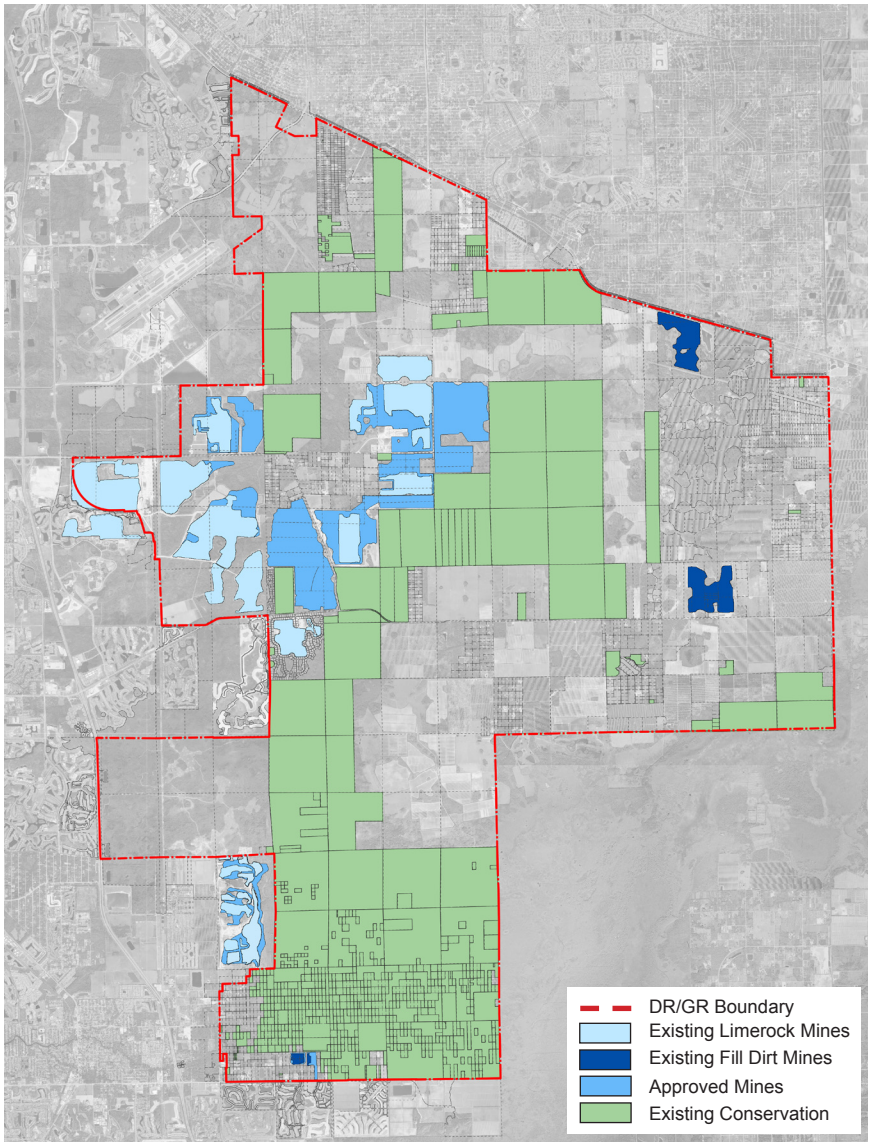
Each scenario begins with a baseline mining condition that assumes all permitted mines will be constructed as approved. This represents about 3,600 acres of existing limerock mines, plus an additional 3,600 acres of new mine pits in locations that have previously been approved by Lee County.

All of the scenarios attempt to carry out the planning principles described in Chapter 3; none suggest significant increases in residential or commercial development or any attempt to abandon the agricultural economy of southeast Lee County. However, the three scenarios differ significantly in the degree to which they are able to carry out principles as to mining and habitat restoration.

For instance, Scenario 1 would provide the greatest ability to protect and restore natural habitats and flowways, but it provides less land for mining than the other scenarios. Scenario 3 would provide the greatest opportunity for mining applications in process to be approved, but it forecloses several restoration and water supply options.

These scenarios are provided for preliminary consideration by the public and by policymakers. Advantages and disadvantages are identified for each scenario. Key implementation issues are identified to show how Lee County would proceed if a particular scenario is selected as the preferred future for southeast Lee County.

Potential effects of these scenarios on surface and groundwater resources will be evaluated in the coming months by computer modeling; testing of this nature may help decision-makers to further evaluate the potential effects of each scenario.



All plan scenarios are illustrated as changes to this diagram of baseline conditions: Protected lands are shown in green; existing limerock mine pits are shown in light blue; approved pits are in medium blue; approved fill-dirt pits are shown in dark blue. Approved mine pits are assumed to be completed over time.

Scenario 1

Scenario 1 strives for the greatest natural resource benefits through two complementary strategies. By keeping limerock mining near the traditional Alico Road industrial corridor, less-impacted portions of the DR/GR to the east and south can be the focus of a long-term restoration strategy to benefit water resources and habitat protection.

In addition to the 3,576 acres of already-approved limerock pits (shown in medium blue), Scenario 1 identifies additional locations as preferred mining areas (in purple). These locations have various regulatory and ownership hurdles and there may never be sufficient demand for limerock to justify mining this much land. In the unlikely event that all were to become mines, an additional 4,048 acres would be available for aggregate production.

Consolidating future mining has several advantages:

- Truck traffic impacts aren't spread to new areas that would require longer trucking distances for distribution of aggregate.
- Hydrologic impacts of large mine pits will be less consequential where water levels have already been lowered by drainage features installed for the airport and nearby roads.
- Large mine pits create a biologically sterile environment with very little bird life, a desirable condition near airport runways.
- Mining would provide an economically valuable use for land that would otherwise be continually affected by aircraft noise.

The best opportunities for flowway restoration and increased water storage are identified in this scenario. Priority 1 lands would begin to link flowways together; Priority 2, 3, and 4 lands would further complete the system over time. Except for the most critical flowway reconnections, these lands can remain in agriculture. Over time they would be acquired and either converted to agricultural uses that are more consistent with water storage or restored to native habitat.

Several compact mixed-use communities are identified conceptually in Scenario 1 along major roads. Residential development rights would be transferred from more sensitive and remote DR/GR locations. Larger overlay zones could be established in the Lee Plan to allow flexibility in siting these communities.

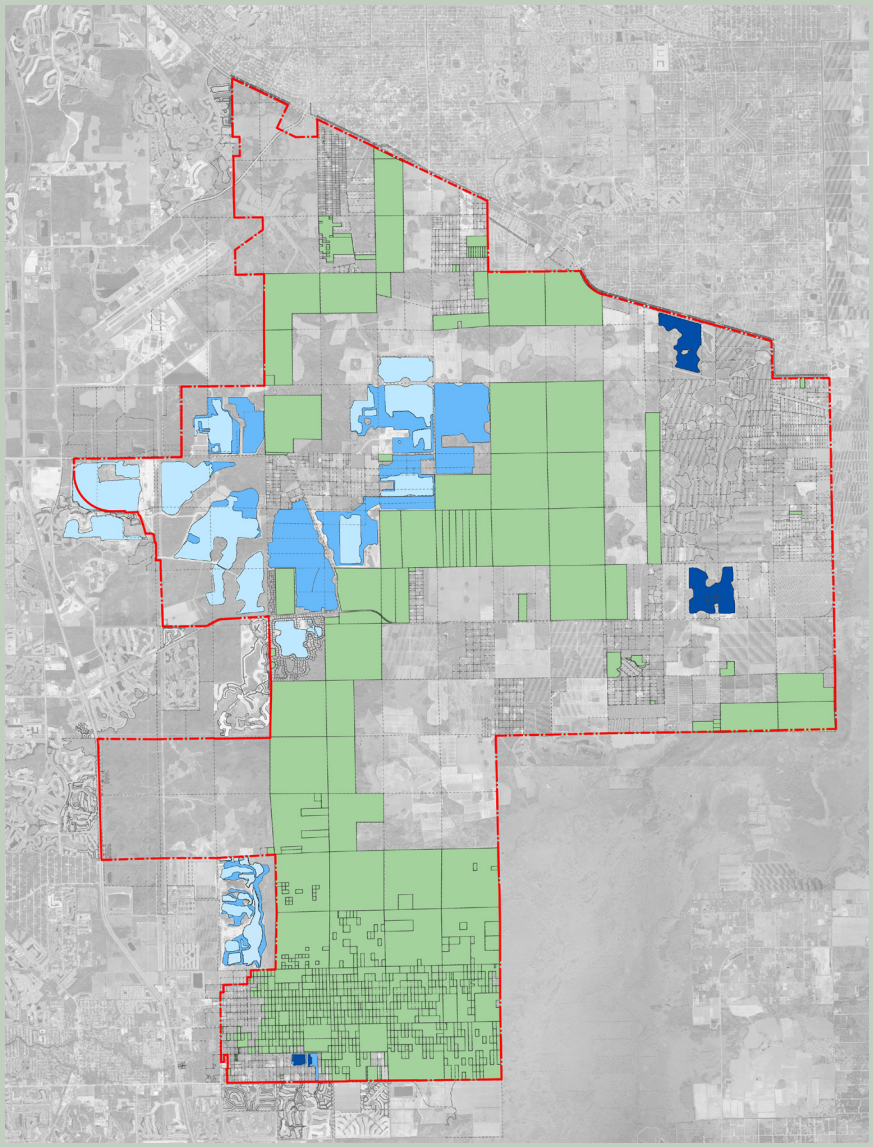
Potential Advantages

- Best overall balance between need for limerock products and protection of natural resources
- Maximum use of the traditional Alico Road industrial corridor for mining
- Ample (but not excessive) land available for mining
- Greatest potential for protecting and restoring flowways
- Least interference with restoring flows to the Estero River
- Best compliance with planning principles set forth in this report
- Least interference with restoring flows to the Estero River

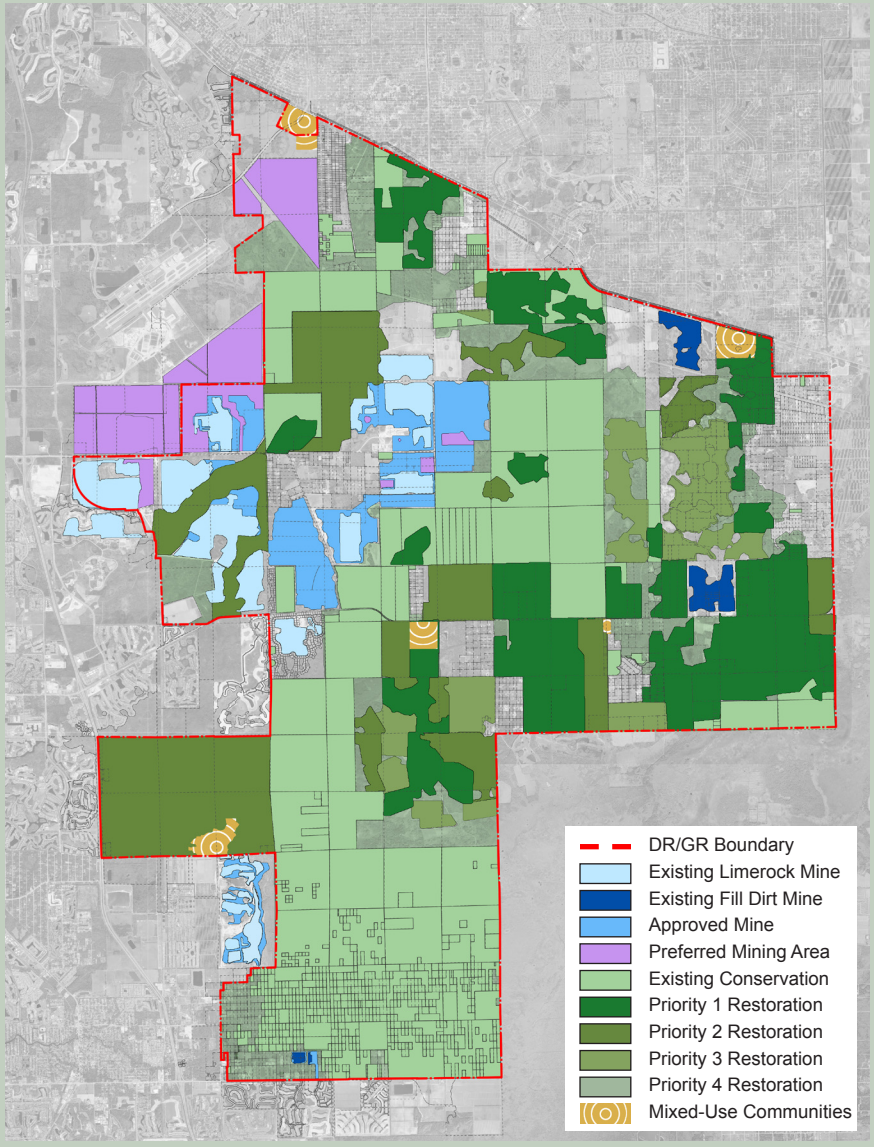
Potential Disadvantages

- Mining pits would be more visible to passengers arriving at airport
- Land in preferred mining areas may have lower quality rock or a thinner layer of minable rock
- Landowners in preferred mining areas may not be interested in mining
- Current mining applicants are likely to strongly resist this scenario

SCENARIO 1



Baseline conditions



Scenario 1 strives to achieve the greatest environmental benefit by optimizing opportunities for restored flowway function, increased water storage and consolidation of mining activities. Preferred mining areas are identified in locations that have already been hydrologically impacted.

Scenario 2

Scenario 2 is a variation on Scenario 1, sharing the same basic strategy of keeping mining in the traditional Alico Road industrial corridor while beginning restoration of less-impacted portions of the DR/GR to the south and east.

Scenario 2 adds an additional 4,450 acres for potential mining (shown in dark purple). Adding these areas would increase Lee County's ability to compete more aggressively with Collier County mines in the regional aggregate market and possibly begin competing with Miami-Dade County's Lake Belt for a larger market should transportation capacity be available.

Two potential mining areas have been added in Scenario 2. The first is along Treeline Avenue just beyond the existing and proposed runways. The second area would wrap around the existing Greenmeadows mine. These areas all have their own hurdles and constraints; they should be approved for mining only if the lands identified in Scenario 1 cannot be mined or cannot meet actual demand for aggregate.

Some of the lands designated as preferred mining areas in Scenario 1 may become unavailable if they are used for other purposes (or if the isolated wetlands within mines must be preserved). Some of the additional areas in Scenario 2 could then serve as replacements.

Opportunities for flowway restoration and increased water storage are identified similar to Scenario 1, except that the Greenmeadows mine expansion would reduce the ability to re-start surface water flows to the Estero River. The health of Estero Bay depends on the quantity and timing of fresh water flowing from its watershed. The Ten-Mile Canal has already disrupted natural flows into the northern reaches of Estero Bay; flows from the Estero River have become even more important to Estero Bay as a result. Additional analysis of these impacts is recommended prior to implementing this scenario.

Compact mixed-use communities are designated in the same manner as Scenario 1.

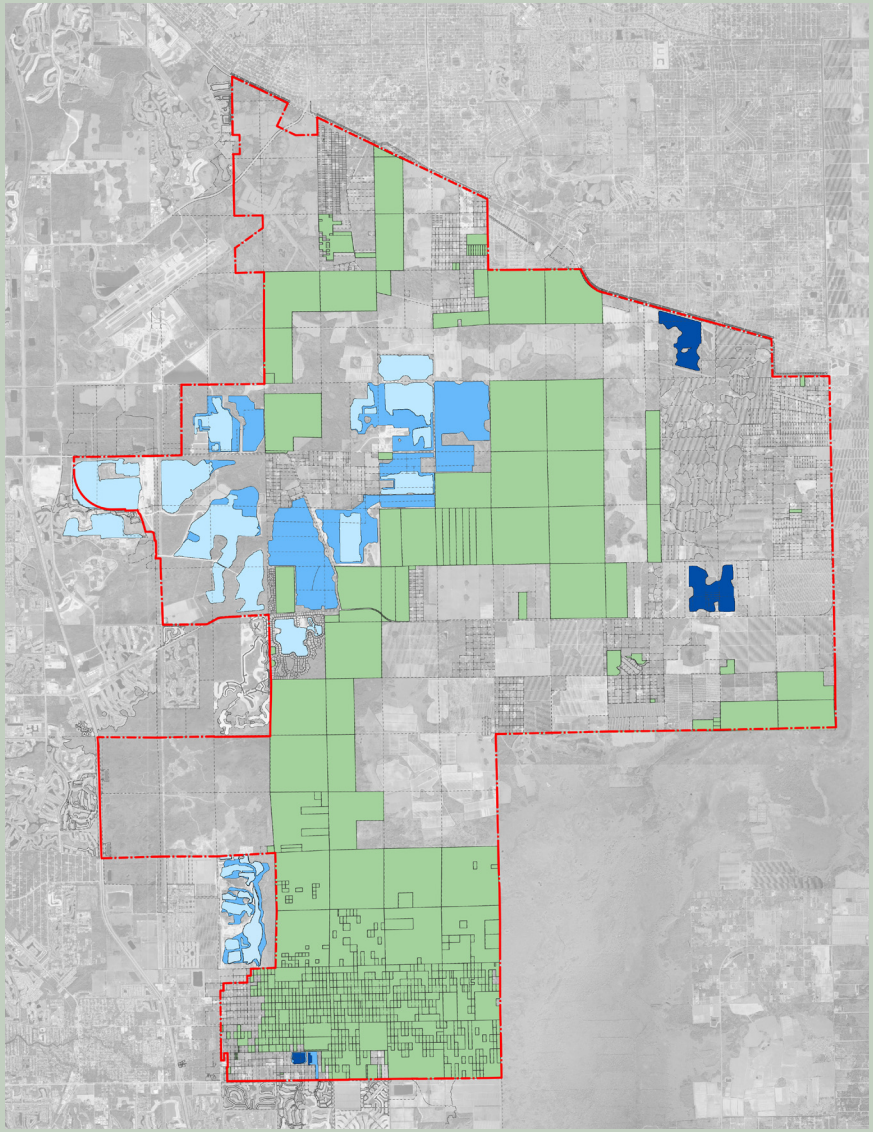
Potential Advantages

- Good overall balance between need for limerock products and protection of natural resources
- Maximum use of the traditional Alico Road industrial corridor for mining
- Ample land to meet potential future increases in demand for mining
- Excellent potential for protecting and restoring flowways, except for Estero River watershed
- Good compliance with planning principles set forth in this report

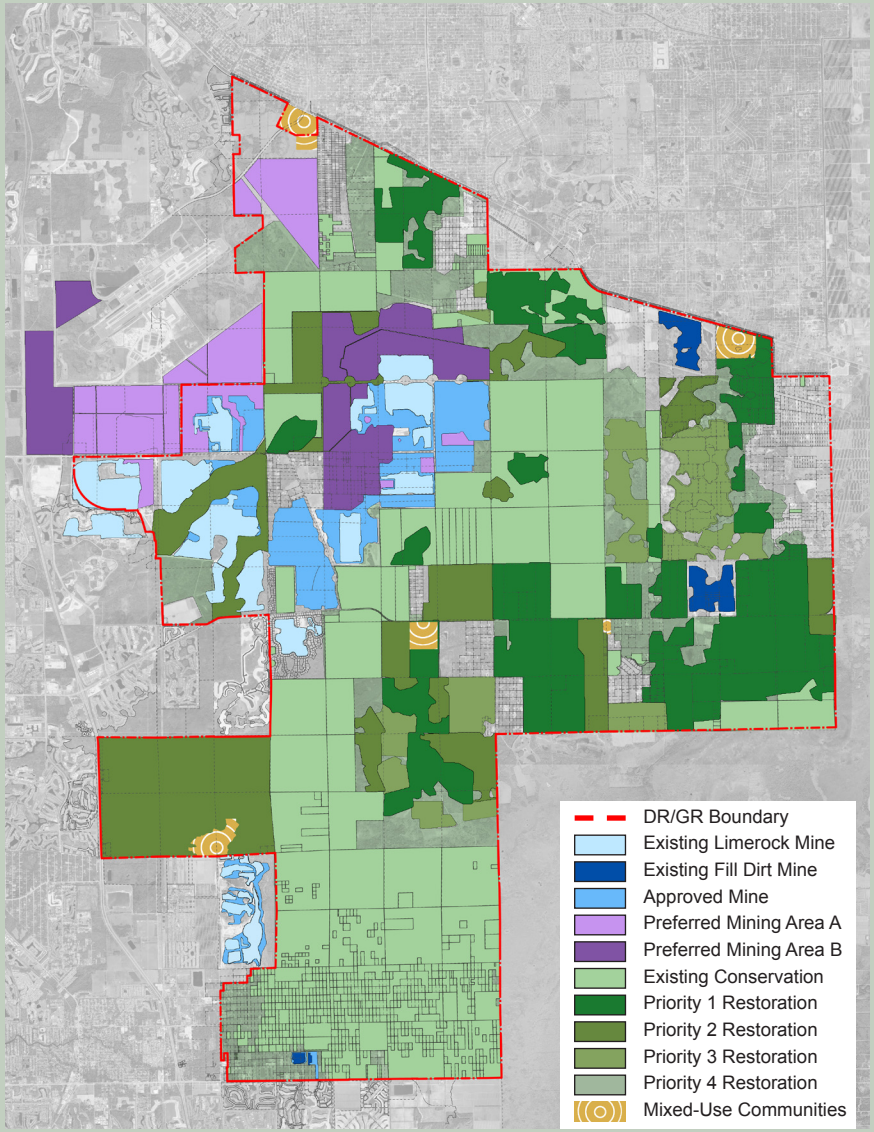
Potential Disadvantages

- Mining pits would be more visible to passengers arriving at airport
- Over-allocation of land for mining
- Land in preferred mining areas may have lower quality rock or a thinner layer of minable rock
- Additional mining is likely to interfere with restoring flows to the Estero River
- Less compliance with planning principles set forth in this report than the other scenarios

SCENARIO 2



Baseline conditions



Scenario 2 provides a larger area for future mining than Scenario 1. Restoration opportunities are still strong except in the Estero River watershed. Preferred mining areas are consolidated in the traditional Alico Road industrial corridor as in Scenario 1; restoration activities would be focused on land to the east and south of the Imperial Marsh and east of the Flint Pen Strand.

Scenario 3

Scenario 3 is based on current landowner proposals for the location of new mines instead of the mining consolidation strategy used in Scenarios 1 and 2. Appendix B provides details on those mining proposals.

One new mine complex would be the partially approved Florida Rock #2 mine north of the existing Greenmeadows mine (shown in light purple). Another series of mines would be constructed along Corkscrew Road east of the Flint Pen Strand between the airport mitigation park and the Corkscrew Swamp Sanctuary (shown in darker purple).

When the DR/GR designation was established in 1990, geologists believed that commercially usable limestone didn't exist much beyond the established limerock mines. Since that time, testing has shown that many other areas had equally good or better rock deposits. Scenario 3 would give preference to existing mining applications over applications that other landowners may have been unable to submit because of Lee County's current moratorium.

Scenario 3 shows as much land restored as might be possible if these mines are approved. Additional analysis of the potential effectiveness of this partial restoration strategy is recommended prior to attempting the implementation of this scenario.

Compact mixed-use communities are designated in the same manner as Scenarios 1 and 2.

A variation on Scenario 3 is presented on page 4.23 to indicate the potential results of a strategy of even greater deference to the private sector on location of new mines, a strategy where DR/GR land would be rezoned for limerock mining anywhere the mineral resource exists provided that basic compatibility issues can be addressed.

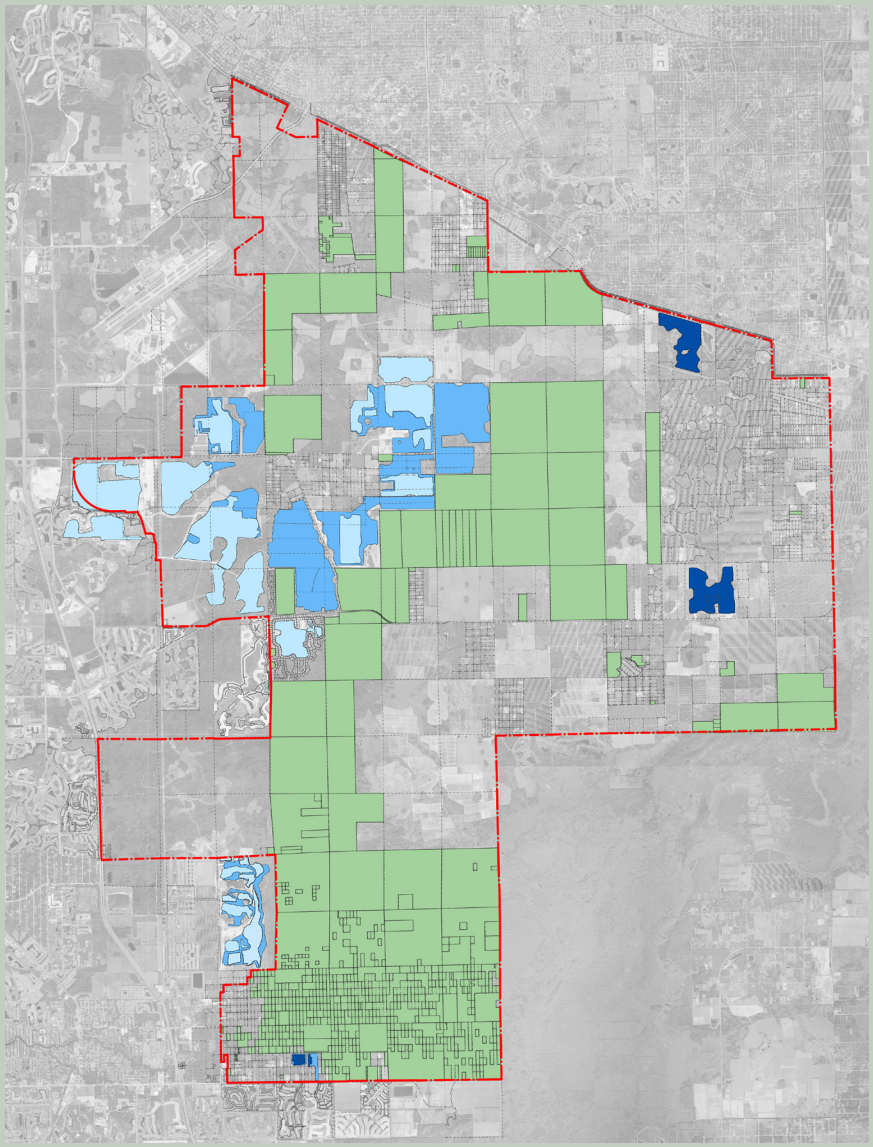
Potential Advantages

- Greatest deference to planning undertaken by current mining applicants
- Ample land to meet potential future increases in demand for mining
- Mining pits would be less visible to passengers arriving at airport
- Additional mines could drive down aggregate prices for end users
- Litigation filed by current mining applicants would be less likely

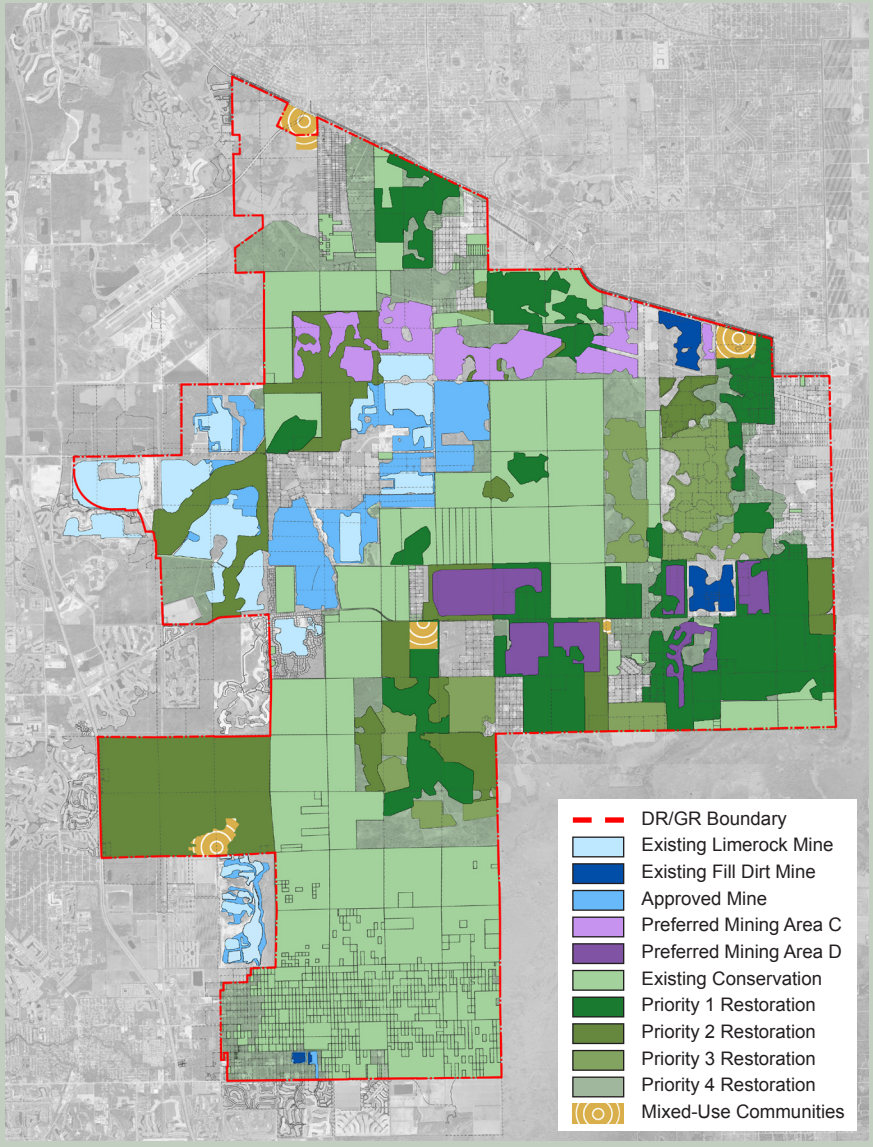
Potential Disadvantages

- Greatest over-allocation of land for mining
- Significantly less potential for restoration than other scenarios
- Mining approvals east of the Imperial Marsh and Flint Pen Strand are likely to lead to further mining applications in that area
- Additional mining is likely to interfere with restoring flows to the Estero River
- Only moderate compliance with planning principles set forth in this report

SCENARIO 3



Baseline conditions



Scenario 3 eliminates the mining consolidation strategy of Scenarios 1 and 2, instead expanding mining in areas where current landowners have filed formal applications. Restoration opportunities are reduced throughout the DR/GR area, but Scenario 3 includes portions of the restoration strategy on land that would not be mined.

Recommended Scenario

Scenario 1 is recommended by the consulting team because it provides the best overall balance between protecting vital natural resources while meeting the demand for limerock products for southwest Florida.

This balance is reached through two complementary strategies:

- Consolidating future mining in the traditional Alico Road industrial corridor.
- Beginning a long-term restoration program in non-mined portions of the DR/GR to benefit water resources and habitat protection.

The overall quantities of future residential and commercial development would not be significantly increased, but whenever possible, development rights would be exercised in mixed-use communities near existing services rather than spread throughout the DR/GR.

Scenario 1 provides the strongest compliance with the planning principles set forth in this report (see rating matrix below).

Some disadvantages to Scenario 1 include the following:

- Mining pits would be more visible to passengers arriving at the airport.
- Although current mines near the airport have provided the highest quality rock in Lee County, other land in the preferred mining areas in Scenario 1 may not match this quality or may have a thinner layer of rock, which would require more acres to be mined to produce a given quality of aggregate.
- Landowners in preferred mining areas may not be interested in mining.

RATING OF EACH SCENARIO AS TO COMPLIANCE WITH PLANNING PRINCIPLES (see Chapter 3)
("A" is greatest compliance, "C" is least compliance)

	Scenario 1	Scenario 2	Scenario 3
CONSERVATION PRINCIPLES			
Large-Scale Ecosystem Integrity Must Be Restored & Maintained (page 3.4)	A	B	C
Retain and Improve Ecologically-Responsible Farming (page 3.7)	A	A	B
DEVELOPMENT PRINCIPLES			
Reallocate Development Rights; Create Sustainable Settlements (page 3.8)	A	A	A
Live Lightly on the Land (page 3.13)	A	A	A
MINING PRINCIPLES			
Create a Meaningful Map of Preferred Mining Areas (page 3.16)	A	B	C
Stick to the Traditional Mining Corridor (page 3.18)	A	A	C
Design Before You Dig (page 3.20)	A	A	A

Variation on Scenario 3

A variation on Scenario 3 could give even greater deference to the private sector concerning where to locate new mines.

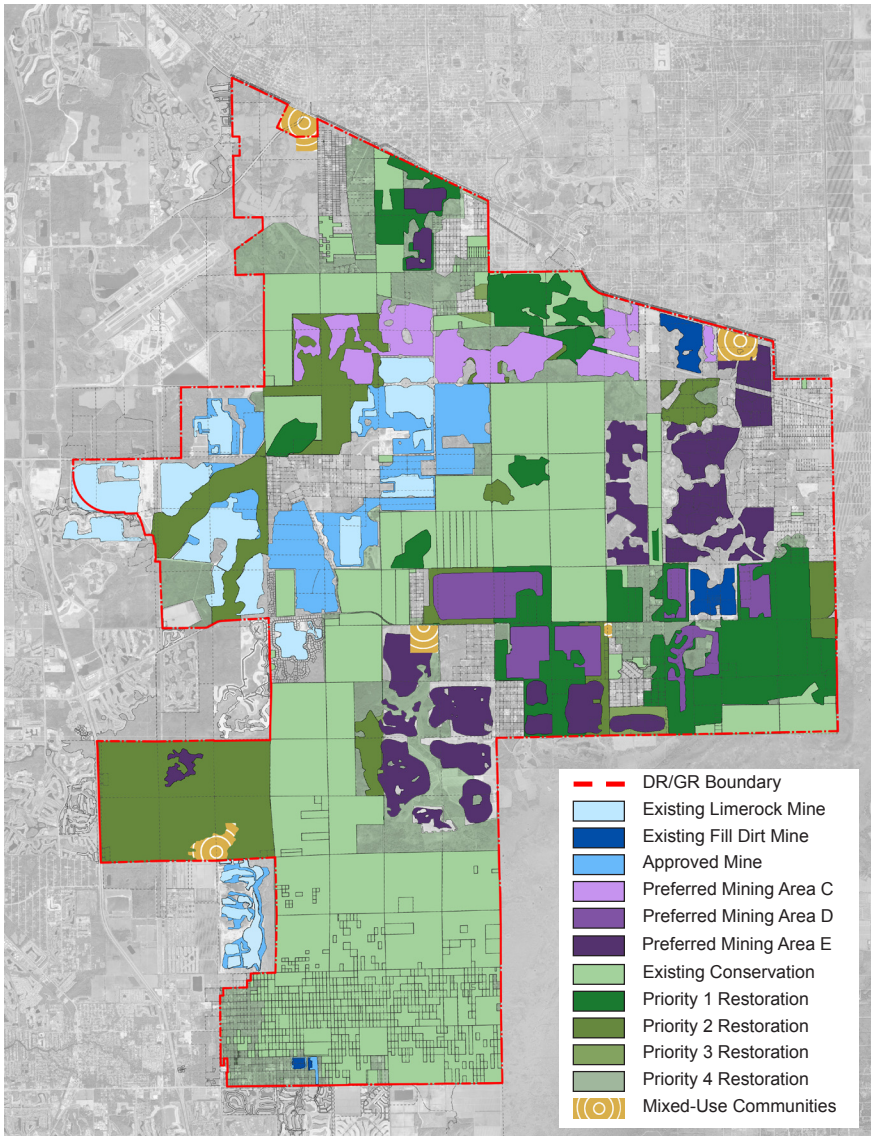
Scenario 3 as presented on pages 4.21-4.22 would give preference to existing mining applications over applications that other landowners have been unable to submit because of Lee County's current moratorium. The variation on the right illustrates the potential results of a strategy of even greater deference to landowners. Possible additional mine pits are shown in the darkest purple color.

Representatives of Six L's Farms, Troyer Brothers, and Old Corkscrew Plantation have formally notified county officials of their intention to submit rezoning applications for very large mines. The location of these farms are shown in Appendix A.

Representatives of Edison Farms/Agripartners have verbally indicated the same intentions. Schwab Materials has purchased 860 additional acres south of the two sections of land it has previously proposed for mining on the south side of Corkscrew Road.

Minable rock exists in the DR/GR in far greater quantities than ever envisioned, and far exceeding the quantities that can be consumed in southwest Florida within any foreseeable timeframe.

The DR/GR's water resource functions would be greatly impacted and the long-term restoration strategy would become infeasible if mining were to be approved everywhere that has minable rock. This variation on Scenario 3 is not recommended for further testing for these reasons and because the amount of mining is not related to actual demand for mining products.



This variation on Scenario 3 explores the option of permitting mining in all areas where limerock deposits are now believed to exist, regardless of commercial demand. This variation is presented here to illustrate a logical extension of Scenario 3's allowance of industrial conditions east of the Imperial Marsh and the Flint Pen Strand.

Implementation

In the fall of 2007 the Board of County Commissioners took a proactive role in addressing competing needs in the DR/GR area with a 14-point Action Plan that included critical mining, traffic, and land-use issues.

As part of the Action Plan, Lee County commissioned a major planning effort that includes four related parts: a mining truck impact study, an integrated surface and groundwater model, detailed ecological mapping, and this land-use study. This study presents eleven planning principles and three land-use scenarios for the DR/GR area. The truck study and mapping and modeling reports will be published separately.

Lee County's DR/GR Advisory Committee will review this study and present its independent findings to the Board of County Commissioners. After weighing the recommendations of the committee, county staff, stakeholders, and the general public, the commissioners will provide direction to staff and consultants about the goals of the final phase of this planning effort. The final phase will include a package of implementing steps that lead to the preparation of Lee Plan policies, regulatory changes, and other public actions that will lead toward the evolution of the preferred scenario.

The individual steps in the final phase of this land-use study will depend on direction from county commissioners. Some of the implementation strategies described below are only needed for certain scenarios; other strategies may be needed if commissioners provide direction that differs from one of the scenarios described in this report. A tentative list of strategies is provided here to illustrate the types of implementing actions that would be required.

	Applicable to scenario? 1	2	3
TECHNICAL EVALUATIONS:			
Design a workable program of transferable development rights to encourage internal or external reallocation of DR/GR development rights.	✓	✓	✓
Evaluate the advantages and disadvantages of Lee County obtaining delegation of authority to review and issue Environmental Resource Permits in the DR/GR area.	✓	✓	✓
Identify potential mechanisms to help agricultural operators move toward best management practices including increased water storage and flowway restoration.	✓	✓	✓
Modify the conceptual restoration program as needed to accommodate additional limerock mining.		✓	✓
Conduct a technical evaluation to determine the minimum width of buffer zones between mine pits and other design criteria that would be needed to assure that groundwater flows between pits cannot lower historic groundwater levels.			✓
LEE PLAN CHANGES:			
Lee Plan Future Land Use Map Changes:			
Create an overlay zone to indicate preferred receiving areas for DR/GR transferable development rights.	✓	✓	✓
Modify Map 14 ("Approved Limerock Mining Areas") to become an overlay that designates preferred mining areas.	✓	✓	

	Applicable to scenario? 1	2	3
Modify Map 20 ("Contiguous Agricultural Parcels over 100 Acres In Non-urban Future Land Use Categories) to reflect conversions of agriculture to mining and recent changes in agricultural exemption practices.	✓	✓	✓
Redesignate the Airport Mitigation Park on the Future Land Use Map from "Public Facilities" to "Conservation Lands."	✓	✓	✓
Lee Plan Text Changes:			
Establish a new program for DR/GR transferable development rights.	✓	✓	✓
Modify Policy 1.4.5 so that clustering of DR/GR development rights is the preferred method of exercising those rights.	✓	✓	✓
Clarify Policy 1.4.5 to indicate that "historic levels" of surface and groundwater refers to post-logging but pre-farming conditions (as depicted in 1953 aerial photography).	✓	✓	✓
Modify Policy 1.4.5 so that mining approvals east of Imperial Marsh and Flint Pen Strand are tied to expansions of Conservation Lands.			✓
Modify Policy 1.4.5 so that mining in preferred mining areas would no longer be required to maintain surface and groundwater levels at their historic levels and would receive special treatment regarding development and reclamation standards.	✓	✓	
Modify Objective 1.5 which defines the "Wetlands" designation to allow consideration of mining in preferred mining areas.	✓	✓	

	Applicable to scenario? 1	2	3
Modify Policy 2.2.2 which inaccurately states the relationship between the Future Land Use Map and population forecasts for Lee County.	✓	✓	✓
Modify Policy 9.1.7 to set a new target date for a formal evaluation of a PDR program (Purchase of Development Rights).	✓	✓	✓
Update Goal 10 ("Natural Resource Extraction") to reflect policy directives of the Board of County Commissioners (incorporate the pending plan amendments that would create Objective 10.3 into this larger amendment).	✓	✓	✓
Preclude future residential development on land that is rezoned to Industrial Planned Development for mining (similar to the requirement in Policy 16.2.3 that applies to Private Recreation Facility Planned Developments).	✓	✓	✓
Require that areas designated to be preserved during the mining rezoning process be protected by perpetual conservation easements, with Lee County listed as an easement-enforcing entity.	✓	✓	✓
Modify Policy 10.1.3 to specifically set forth the purposes for mine reclamation.	✓	✓	✓
Modify Policy 114.1.2 to expand Lee County's role in determining compliance of development and mining applications with the wetlands requirements of the Lee Plan.	✓	✓	✓
Modify the Year 2030 allocations in Table 1(b) to track limerock mining, including acreage zoned, acreage with mining operation permits, acreage mined, and quantity of rock removed.	✓	✓	✓

	Applicable to scenario? 1	2	3
LAND DEVELOPMENT CODE CHANGES:			
Amend the LDC as necessary to carry out the policy changes described above.	✓	✓	✓
Clarify the application requirements for new mines so that applicants have a clear understanding of county requirements, including groundwater monitoring and the use of the new integrated surface and groundwater model.	✓	✓	✓
Rewrite the mining reclamation standards, which at present require only inconsequential littoral zones and do not address wildlife habitat or water quality/level impacts on surrounding properties.	✓	✓	✓
Provide minimum standards to reduce groundwater impacts from mining in proposed restoration areas (flowway impacts; maximum pit size relative to topography; minimum open space after mining, etc.).		✓	✓
CONSERVATION 20/20 CHANGES:			
Amend the Conservation 20/20 program criteria to seek out strategically important parcels for acquisition, initially to focus on potential acquisitions that would carry out the preferred DR/GR land-use scenario and/or parcels identified on the Lee County Master Mitigation Plan.	✓	✓	✓
Consider a major expansion of the Conservation 20/20 program, including additional funding for DR/GR acquisition and restoration, to allow strategic acquisitions as key parcels become available.	✓	✓	✓

agricultural, conservation and residential lands A

AGRICULTURAL LAND

In the early twentieth century, agriculture was well-established along the Caloosahatchee, on Sanibel, and in Iona, all areas where fruit and vegetables could be transported by boat. Southeast Lee County was too isolated for agriculture. Harshberger's 1912 assessment explained how difficult it was even to tell land apart from water in the South Florida interior (see excerpt in box).

To induce railroads to expand throughout Florida and open the rest of the state to commerce, the state government made enormous grants of "swamp and overflowed lands" to firms willing to lay tracks and begin any semblance of rail service. Figure A-1 shows the alternating sections of land that were claimed and offered for sale in 1888 by the Florida Southern Railway, the company that built railroad tracks from phosphate mines in central Florida to the port at Boca Grande.

"That no accurate maps of this territory exist, notwithstanding that a number of maps of recent issue have covered this region, is due to several reasons. First, the country is one extremely difficult to penetrate, being covered by dense growths of saw grass, cypress and tropic vegetation. The cypress swamps are so far removed from the coast that the exploitation of their timber resources has not been attempted..... Second, it has been found difficult to locate by actual surveys the relative extent of the land and water areas, because these vary relatively with the seasons. During dry weather the land occupies much country which is entirely under water during the rainy seasons. A map constructed from surveys made during the dry season will show many land features which would not be shown on a map constructed from data obtained during the wet season. Third, the survey of South Florida has been delayed also in part for the reason that outside of the land itself, which is now being exploited, the country has had only three sources of wealth, namely, its timber, its fish and its game."

— John W. Harshberger, from "South Florida: A Geographic Reconnaissance," an abstract of Harshberger's 1912 trip to South Florida under the auspices of the Geographical Society of Philadelphia

Figure A-1: 1888 map showing the sections of land for sale by the Florida Southern Railway (darker color indicates sections for sale)

In 1894, the Carrabelle, Tallahassee and Georgia Railroads were granted 110,323 acres in eastern Lee County and in Hendry County, including about half of Townships 45 and 46, Range 27. The Atlantic Coast Line reached Fort Myers in 1904, and its subsidiary, the Atlantic Land and Improvement Company (later Alico, Inc.), also obtained title to land in southwest Florida.

Figure A-2 is a composite land ownership map from the mid-1950s that shows four major landowners in the DR/GR area:

- Alico, Inc.
- Pioneer Game Farms, which acquired tracts owned by the Collier family
- William Kehl, whose namesake canal in Bonita Springs still drains the Flint Pen Strand
- Consolidated Naval Stores Company

Consolidated acquired forested land across the southeast United States to harvest gum from pine trees to produce turpentine pitch and rosin. This industry had begun in North Carolina, but after exhausting the supply of longleaf pines there, virgin forests of South Carolina, Alabama, Georgia, and Florida were targeted. By the early 1930s, Consolidated was the largest business of its kind in the nation, and at one point owned nearly two million acres in Florida alone.

Old-growth pine was removed during this period by Dowling & Camp, successor to McWilliams Lumber that had operated an immense sawmill complex at Slater in North Fort Myers.

In the mid-1950s Consolidated was apparently the largest landowner in Lee County. The precise nature of its Lee County operations are not known; turpentine camps, which were common elsewhere into the 1930s, have not been reported in southeast Lee County. In addition to harvesting gum from live pine trees, naval stores began to be produced from stumps that were removed from logged forests and transported to factories for processing into tar, pitch, turpentine, pine oil, and charcoal.

The first wave of land uses in southeast Lee County included logging, turpentine extraction, plume gathering, and harvesting of alligators and deer.

A second wave began in 1953 when Florida's Game and Fresh Water Fish Commission established a Wildlife Management Area on cut-over tracts to begin restoring wildlife habitat. This was an early example of a public-private partnership using agricultural land for additional public purposes (a model that also has promise for the future).

Figure A-2: Undated land ownership map, with the DR/GR perimeter superimposed in red (assembled from map panels preserved by the Southwest Florida Historical Society).

Further expansion of agriculture was aided by the resurrection of an early road from Fort Myers to Immokalee along the broad ridge that now separates Lehigh Acres from the DR/GR area. This road had seen cattle drives and ox teams and had been one of the first roads in Lee County to be graded and covered with shell. It fell into disuse after a hard-surfaced road was built from Fort Myers to Buckingham. In 1948, Lee County began reconstructing what is now known as Immokalee Road and SR 82.

The only other route into the DR/GR started as a path and wagon trail from the original Corkscrew settlement (just east of what is now the Collier County line) to coastal Estero where goods could be shipped in and out. Years later Corkscrew Road replaced this route. Early routes of the road from Fort Myers to Immokalee are visible in Figure A-2 on the previous page. One early path of "Corkscrew Grade," also known as "Estero Grade," is visible in Figure A-3 below.

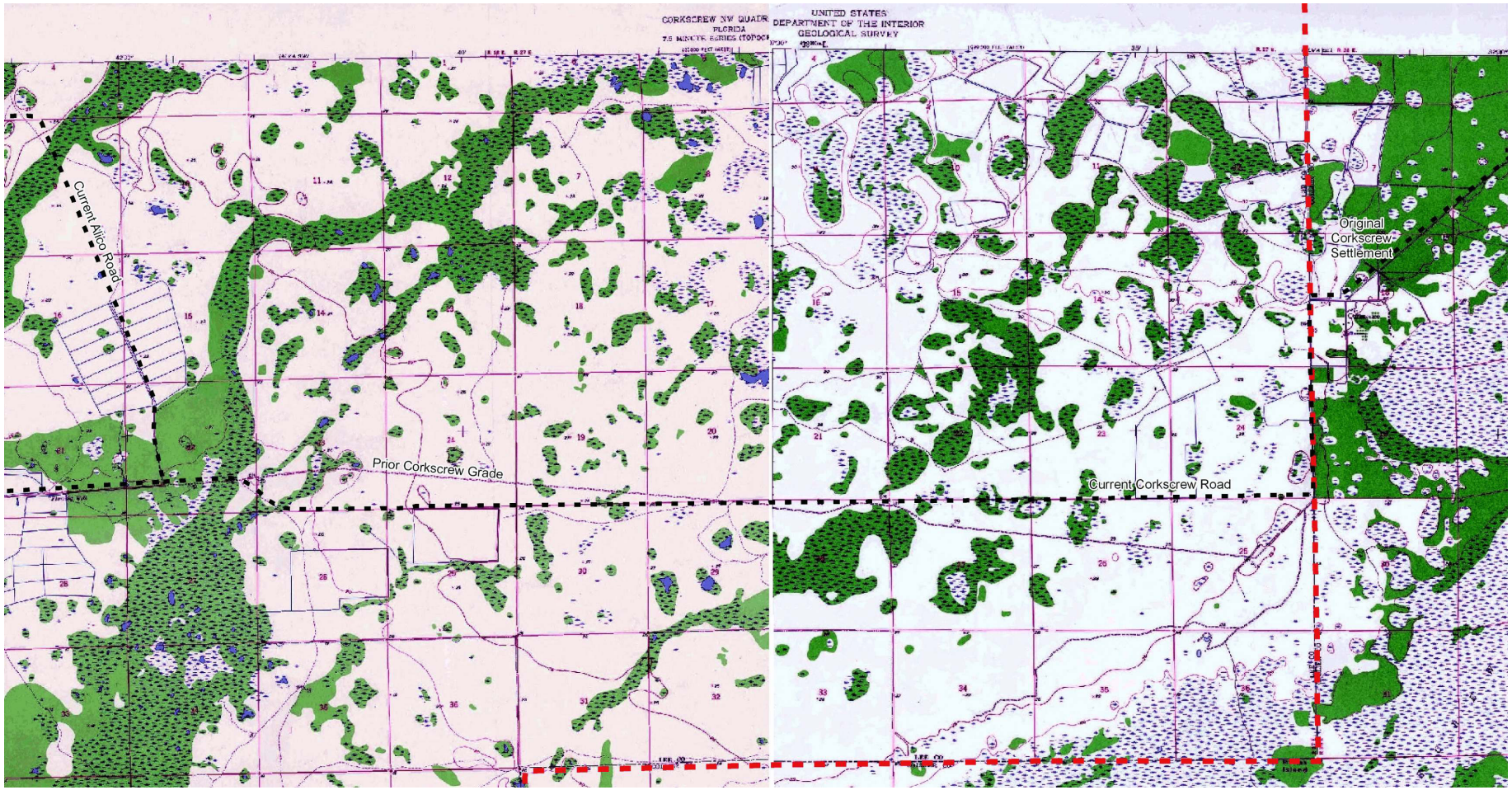


Figure A-3: 1958 topographic maps from USGS (digital copies obtained from PALMM, State University Libraries of Florida). The red dashed line indicates the perimeter of today's DR/GR area; the black dotted line shows the current route of Alico and Corkscrew Roads.

In 1952 the Collier family sold off their Flint Pen Strand holdings to Pioneer Game Farms. After selling its pine stumps for conversion to turpentine in 1963, Pioneer sold seven sections south of Corkscrew Road to Florida Farm Development Corp., which is still farmed today as Six *L*s Farms.

During the 1960s Consolidated quickly sold off its remaining Lee County land. Demand for naval stores from pine trees had declined nationally after a short resurgence during World War II. Consolidated's northern holdings were sold off to become the community of Lehigh Acres.

Agriculture as it is known today in southeast Lee County emerged when large tracts south of SR 82 were sold to local operators. Row crops and citrus groves were planted and harvested; the Flint family and others acquired large parcels to graze cattle.

Repeating a pattern seen throughout the century, citrus expanded rapidly in southwest Florida beginning in the late 1980s after repeated freezes damaged groves in central Florida. Citrus expansion has now stopped due to changing economic conditions and the appearance of new citrus diseases. At this time the potential for highly profitable uses such as mining has at least temporarily driven up land values beyond what can be supported by most forms of agriculture.

Figure A-4 shows the major agricultural landowners in southeast Lee County today. Other agricultural activity takes placed on leased land, with a concentration on land surrounding Florida Rock's Green Meadows Mine that has been partially approved for mining, plus on proposed mine sites east on Corkscrew Road.

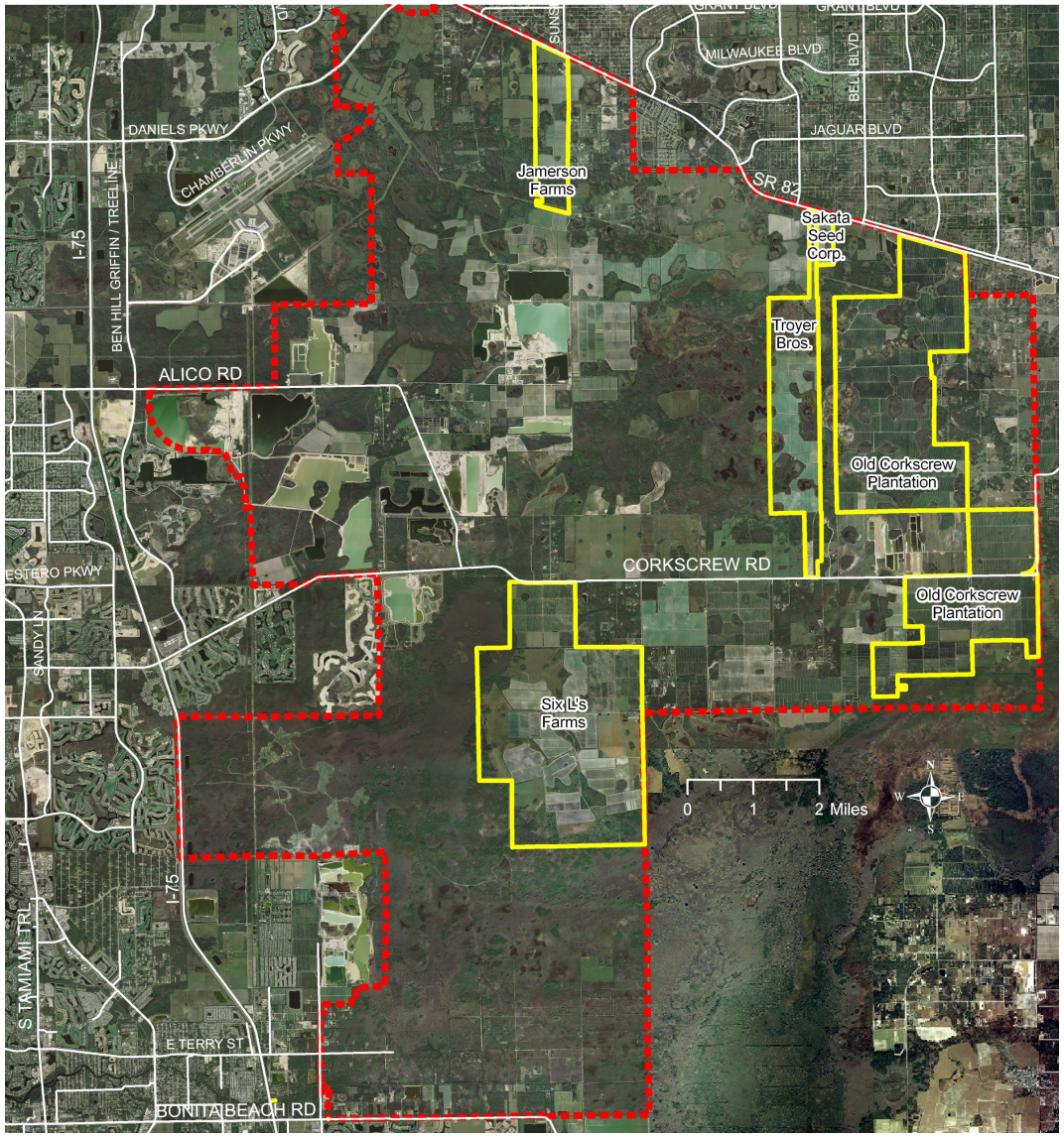


Figure A-4: Areas of major agricultural land ownership

During the course of this study, major landowners in the DR/GR area declined to be interviewed about their agricultural activities. Fortunately county officials can learn about the future of agriculture by reviewing a 2007 report by FGCU business school professors Dr. Stuart Van Auken and Dr. Howard Finch entitled *Ag Business in SW Florida: Present and Future*.

This report identified strengths and weaknesses of agriculture as viewed by fourteen agricultural executives active in southwest Florida. Responses were not attributed to individual participants to encourage frank responses. Interviews were also conducted with environmental advocates, political leaders, and real estate developers; those comments are not included here.

The executives did not express the doom-and-gloom prognosis for agriculture that is often portrayed by landowners seeking rezoning from agriculture to mining or development. If this report had separated Lee County farming from interior counties such as Hendry and Glades County, the conclusions may not have been as positive about the future of agriculture due to greater potential for mining or development in Lee County.

Although opinions varied widely among the executives that were interviewed, many common themes emerged.

Major weaknesses included constant labor shortages, foreign competition (especially citrus from Brazil), citrus diseases such as greening and canker, rising costs for fuel and chemicals, and burdensome regulations.

Despite these weaknesses, the long growing season is invaluable. Up to three crops of vegetables are possible each year, with winter season yielding the highest prices. The rarity of freezes compared to central Florida is a continuing strong point.

The expected appreciation in land values over time provides strong security to landowners. The potential use of farmland to grow organic foods, ornamental plants, and alternative fuels are potential bright spots. Scientific advances are expected to manage citrus diseases such as greening, and better promotion can increase demand for citrus products.

Opportunity is also seen for new cooperation with environmental interests that could support agriculture for its contribution to food independence, for containing urban sprawl, and for natural services agriculture can provide such as open space and water retention.

The increasing statewide prominence of southwest Florida agriculture was a common theme. Little agricultural reinvestment is taking place on the east coast or in central Florida; most activity today is south of Highlands County. Even if farming in southwest Florida merely maintains its current presence, it will grow in relative importance as agricultural production statewide continues to shrink.

Figure A-5, citrus grove just south of SR 82

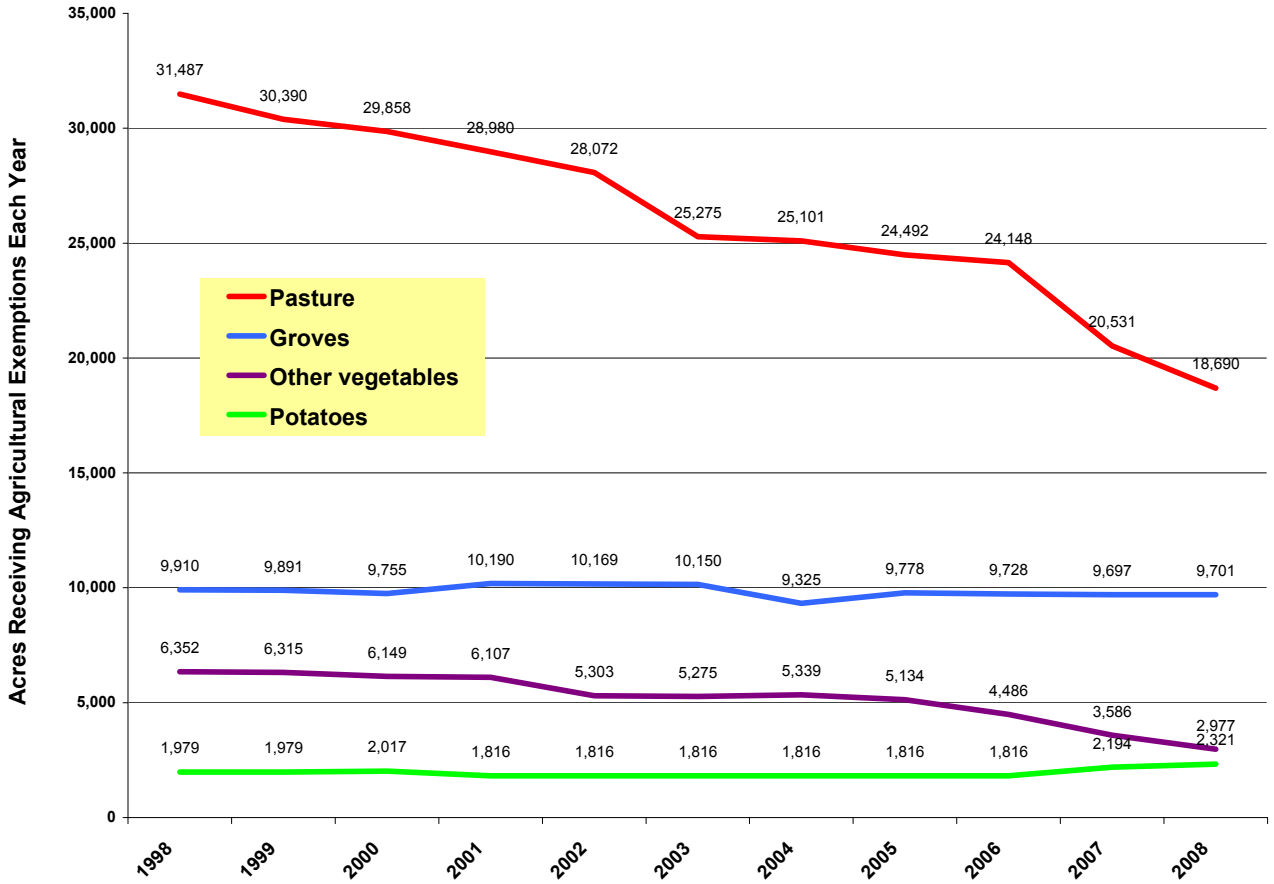
Recent agricultural trends can be assessed using data maintained by the Lee County Property Appraiser, whose office administers the property tax roll including agricultural exemptions.

Exemption data for the past eleven years was extracted from the tax rolls for all DR/GR lands. Figure A-6 provides a summary of that data.

During this period, the acreage in citrus groves and potatoes remained fairly constant, down 2% and up 17% respectively. Significant reductions are evident for pasture land (41%) and vegetables other than potatoes (53%).

About a fourth of the decrease in pasture land resulted from tax changes rather than land use changes, primarily on the Agripartners/Edison Farms properties. Most of the remaining decrease was conversion of farmland to mining, but some was a result of farmland being acquired for residential development or purchased for conservation purposes.

Most of the decrease in vegetables resulted from conversion of farmland to mining.



CONSERVATION LAND

Southeast Lee County has been the focus of extensive preservation efforts due to its groundwater resources, wetlands, and wildlife habitat.

Figure A-6 identifies land that has already been acquired for conservation purposes:

- Green cross-hatching indicates land that has been acquired by the South Florida Water Management District and/or the state of Florida.

- Blue cross-hatching indicates land that has been acquired by Lee County. This land has been acquired through Conservation 20/20 except the following tracts, which are outlined on the map:
  - Lee County Utilities wellfield
  - Airport mitigation park (7,000 acres including the Imperial Marsh, the largest freshwater marsh in Lee County)
  - A Conservation 20/20 purchase that is still pending (542 acres just west of the Wild Turkey Strand Preserve)

- Tan cross-hatching indicates land that is being permanently preserved through private efforts. The largest area is the Corkscrew Swamp Sanctuary, which is owned and managed by the National Audubon Society. The other area is the Panther Island Mitigation Bank just across the Collier County line, which is being integrated into the Corkscrew Swamp Sanctuary as restoration proceeds.

- Pink cross-hatching indicates land that is owned by private parties but is subject to a conservation easement. The largest conservation easement, granted by Florida Rock, will only be valid if mining approvals are granted by the state of Florida and if mining actually commences on the remainder of the property.

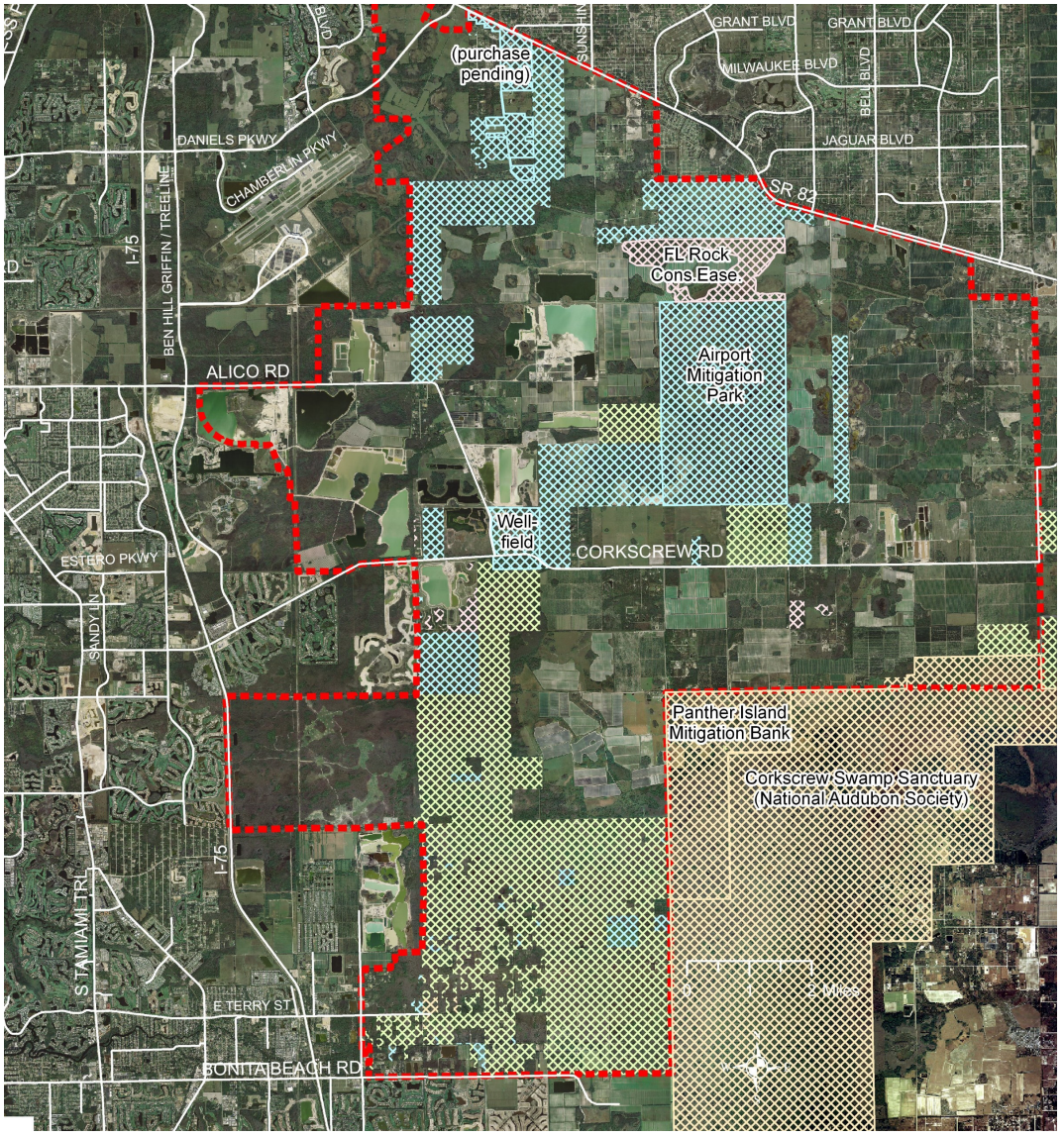


Figure A-6:
Land acquired for conservation purposes

- Land acquired by Lee County
- Land acquired by South Florida Water Management District and/or the state of Florida
- Land permanently preserved through private efforts
- Land owned by private parties but subject to conservation easement

RESIDENTIAL LAND

The DR/GR area now contains about 1,582 residential parcels. The majority are 5 to 10 acres in size. Table A-1 summarizes the number and distribution of parcels. Each parcel is outlined in yellow on Figure A-7; parcels with a residence also have diagonal hatching.

Of these parcels, 313 are in two new small-lot subdivisions that are related to recent mining activities, Corkscrew Ranch and Corkscrew Woods. All of these lots are still held by the mining operators who platted the subdivisions.

Another 289 parcels are east of Bonita Springs. The Kehl Canal was dug to provide navigable access to an ill-fated 1960s rural subdivision called Sun Coast Acres. The Kehl Canal, which lies north of Bonita Beach Road, never provided any boating access; it did drain surrounding land, although not enough to convert most of this extremely wet land into habitable home sites. Most of the remaining 289 privately owned parcels are vacant and have been the target of an ongoing acquisition program by state and regional agencies that began after the devastating floods of 1995.

The remaining 980 parcels are in rural subdivisions created largely in the 1970s when they were marketed as "ranchettes." Many of these parcels are used for small-scale agriculture; about 42% have been improved with a residence. Despite the challenges of coexisting with intrusive uses such as the airport and mines, these rural neighborhoods have continued to grow. However, the vacancy rate suggests that there is little demand for additional ranchette subdivisions at current land and development costs.

One new subdivision was approved in the DR/GR area in 2005, the Ginn Company's proposed "Lago" resort community. The 3,683-acre tract had been leased for limerock mining since the mid-1980s. That mine, operated by Florida Rock Industries and later Rinker Materials, was identified by Florida DOT's Strategic Aggregates Study (2007) as Lee County's only "mega-mine," whose closing would trigger major shifts in aggregate distribution throughout southwest Florida. Mining recently ceased on this site to allow residential development to proceed, although mining continues on other land acquired by the Ginn Company on the north side of Alico Road.

The Lago community will have several hundred single-family lots laid out in a ribbon around the former mining pits. Lee County has allowed the acreage in the mining pits to be counted in residential density calculations, resulting in small lots in Lago despite the DR/GR's one-unit-per-ten-acre density cap. A 447-acre unmined tract north of Corkscrew Road is also proposed as a golf course for Lago residents.

An application is pending for a Development of Regional Impact (DRI) known as "The Fountains" (see Figure A-8). This tract is at the northern tip of the DR/GR area on both sides of Daniels Parkway near SR 82. About 133 acres at this intersection is outside the DR/GR; the proposed mixed-use town center can be constructed there once rezoning and DRI approval is obtained. The remainder of this proposal would require a comprehensive plan amendment to remove the land from its DR/GR designation.

The overall Fountains request is for the following levels of development:

- 3,678 residential dwelling units
- 2,800,000 square feet of retail, office, and industrial space
- 18-hole golf course and 350-room hotel

NAME OR LOCATION	Section-Twp-Range	Number of Parcels	Parcels with Residences	Vacant Parcels
Timber Trails	10,15,22-45-26	262	54	208
Willowbrook/Sunnybrook Farms	13,24,25-45-26	143	76	67
Wildcat Farms	1, 2, 11, 12,13-46-27	253	125	128
Corkscrew Estates	21-46-27	14	3	11
Carter Road	28, 33-46-27	102	33	69
Six L's Farms Road	25, 31-46-26	87	43	44
Burgundy Farms	23-46-26	34	14	20
Mallard Lane	9, 10-46-26	44	34	10
Devore Lane	9-46-26	41	32	9
Corkscrew Ranch	21-46-26	59	0	59
Corkscrew Woods	21, 28-46-26	254	0	254
Sun Coast Acres	9 thru 34-47-26	289	23	266
TOTALS:		**1,582**	**437**	**1,145**

Table A-1: Number and Distribution of Residential Parcels in the DR/GR

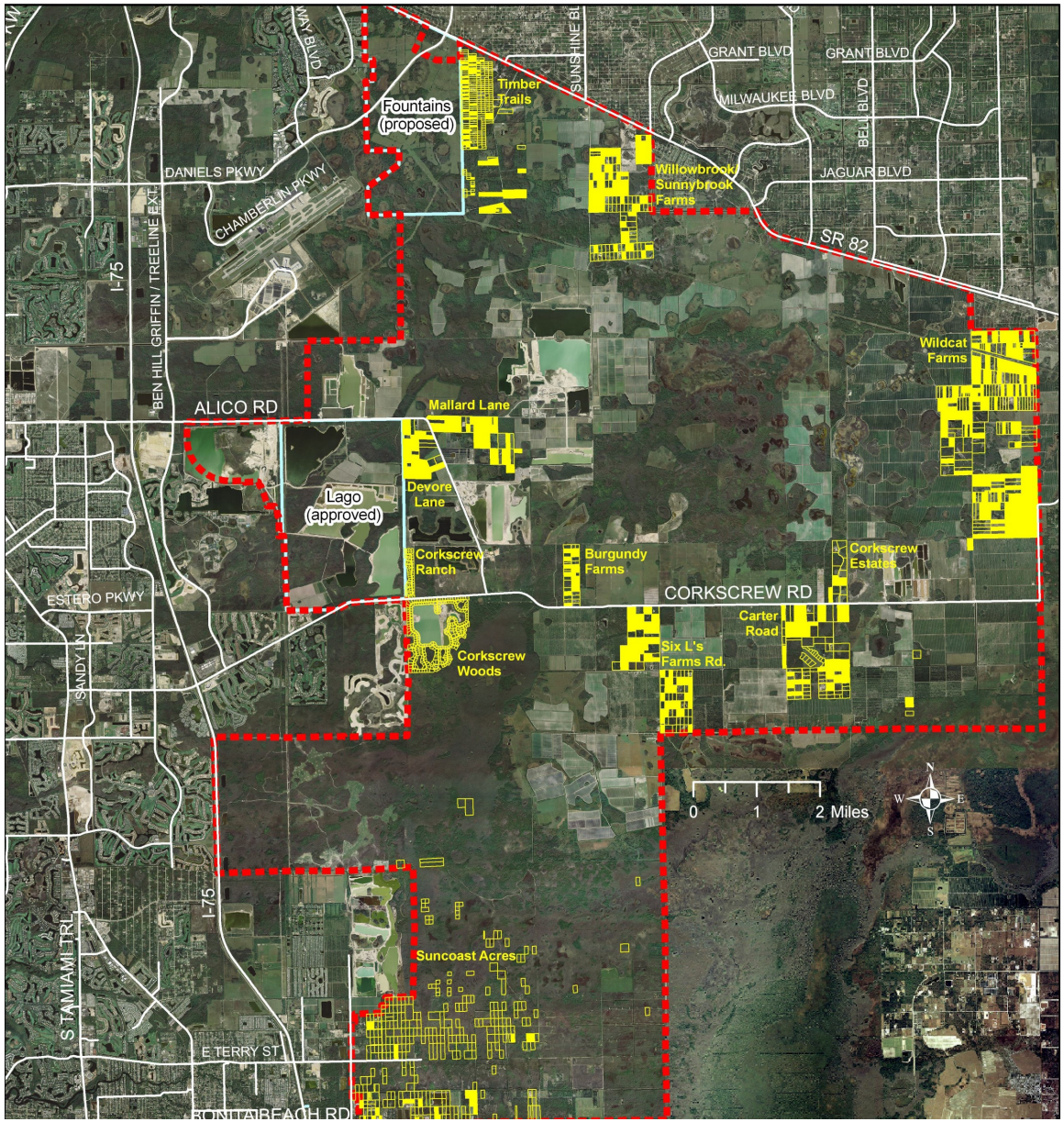


Figure A-7: Residential parcels in the DR/GR. Solid yellow indicates those parcels with a residence.

Figure A-8: Pending Development of Regional Impact (DRI) known as “The Fountains.”

FUTURE RESIDENTIAL DEVELOPMENT

State law requires every county to adopt and enforce a "Future Land Use Map" (FLUM) that controls how future development will be distributed. The number of people to be accommodated is generally based on medium-range projections provided by the Bureau of Economic and Business Research at the University of Florida.

Lee County's creation of the DR/GR designation in 1990 implemented a settlement agreement with the state planning agency that resolved their charge that the Lee Plan FLUM allocated too much land for urban growth. The prior plan could accommodate as much as 70 years of growth, compared to the 20- or 25-year allocation that the state thought appropriate.

Much of the over-allocation was caused by the pre-platted subdivisions of Cape Coral and Lehigh Acres. However, to resolve the litigation, in addition to the new DR/GR designation Lee County agreed to create an overlay that adjusted the capacity of the FLUM to match the population forecasted for the plan's target year (originally 2010). The overlay breaks the county into "planning communities" and allocates the county's total development for the target year into those communities. At present there are 22 planning communities.

This overlay has been extended forward to the year 2030 to keep pace with other portions of the Lee Plan, for instance the transportation maps that show future road construction. Table 1(b) of the Lee Plan lists the total capacity of each planning community through 2030.

A development order can be issued only when capacity remains in a project's planning community. To allow developers to assess remaining capacity, county staff carefully monitors all new development so that a running total is available of existing development in each planning community, which can be compared to total allowable development to determine "remaining capacity."

The database that is used to implement this allocation method can also be used to assess the total capacity of the FLUM (by temporarily ignoring the timing of development and the regulatory purposes of the overlay). This is normally a difficult task because the Lee Plan FLUM allows higher densities in urban areas than most developers are willing to build. This database provides a computation of actual density levels for each planning community, which can be extrapolated into the future to project total build-out at density levels that are realistic for each planning community.

This analysis shows that the current Lee Plan could accommodate about 1,430,000 people if existing density levels were to stay constant until build-out. This number exceeds the 2030 population projection on which the Lee Plan is based by 46%, again largely due to the remaining capacity of the platted lots in Cape Coral and Lehigh Acres. Any attempts to further increase the amount of developable land in Lee County or to increase overall densities in the DR/GR area should be expected to be met with strong resistance by the state for the same reasons that led to the 1990 litigation.

Nonetheless, there are situations where density increases may still be acceptable or even desirable in order to further the planning principles set forth in state law and in the Lee Plan. In some cases density increases could be offset by corresponding decreases; in other cases that would not be practical.

Some examples of density increases that may be warranted are described on the next page.

Density Bonuses

Carefully crafted density bonuses can help carry out important public policy without additional regulations or financial incentives. For decades Lee County has offered density bonuses if development rights are transferred off of wetlands or if bonus dwelling units are tied to affordable housing.

These programs have never reached their potential. Rights to build about 600 dwelling units have been transferred off wetlands; all but 50 to 70 have been used to date. These programs show that density bonuses can be used to carry out public policy without having any measurable impacts on the Lee Plan's accommodation of future growth.

Density bonuses have been a critical tool in revitalizing downtown West Palm Beach over the past dozen years. Overly generous density bonuses have had some undesirable effects in revitalizing downtown Fort Myers. Lessons learned from these two experiences should guide the evolution and expansion of density bonuses in Lee County.

One potential use for density bonuses would be in an expanded TDR program in the DR/GR area. At present, landowners who agree to transfer development rights from wetlands to uplands get to multiply their density by a factor of 4.00 (from 1 DU/20 acres to 1 DU/5 acres). However, transfers from uplands get no bonus whatever. St. Lucie County allows density multipliers of 1.25 to 2.50 for transfer from rural uplands under carefully defined circumstances that carry out public policy goals established by St. Lucie County.

Reducing Travel Demand

High fuel prices are already affecting where people can afford to live and work. Commuting from Lee County to a job in Collier has gone from commonplace to a financial burden.

Communities such as Lehigh Acres and Cape Coral have a particularly poor balance of jobs and shopping given their very large residential populations. This balance can be improved by replacing vacant or underutilized land with higher-intensity buildings that can include residential units.

Density restrictions that would prohibit these practices should be modified. Encouraging development patterns that reduce the distance that residents must travel to meet daily needs should become a high priority of Lee County government.

Mixed-Use Overlay

In 2007 the Lee Plan was amended to include a mixed-use overlay that identifies areas for building traditional neighborhoods and transit-oriented development (see Figure A-9). This overlay is an important step toward modifying the Lee Plan in the direction of more compact development patterns.

At present these areas may not exceed pre-existing density levels. However, they are likely candidates not only for mixed-use development but for considerably higher residential densities inasmuch as they are located along transit routes and are closer to jobs, shopping, and services than outlying locations. The benefits of creating compact walkable communities would greatly outweigh any impacts on the quantity of future growth that the Lee Plan can accommodate.

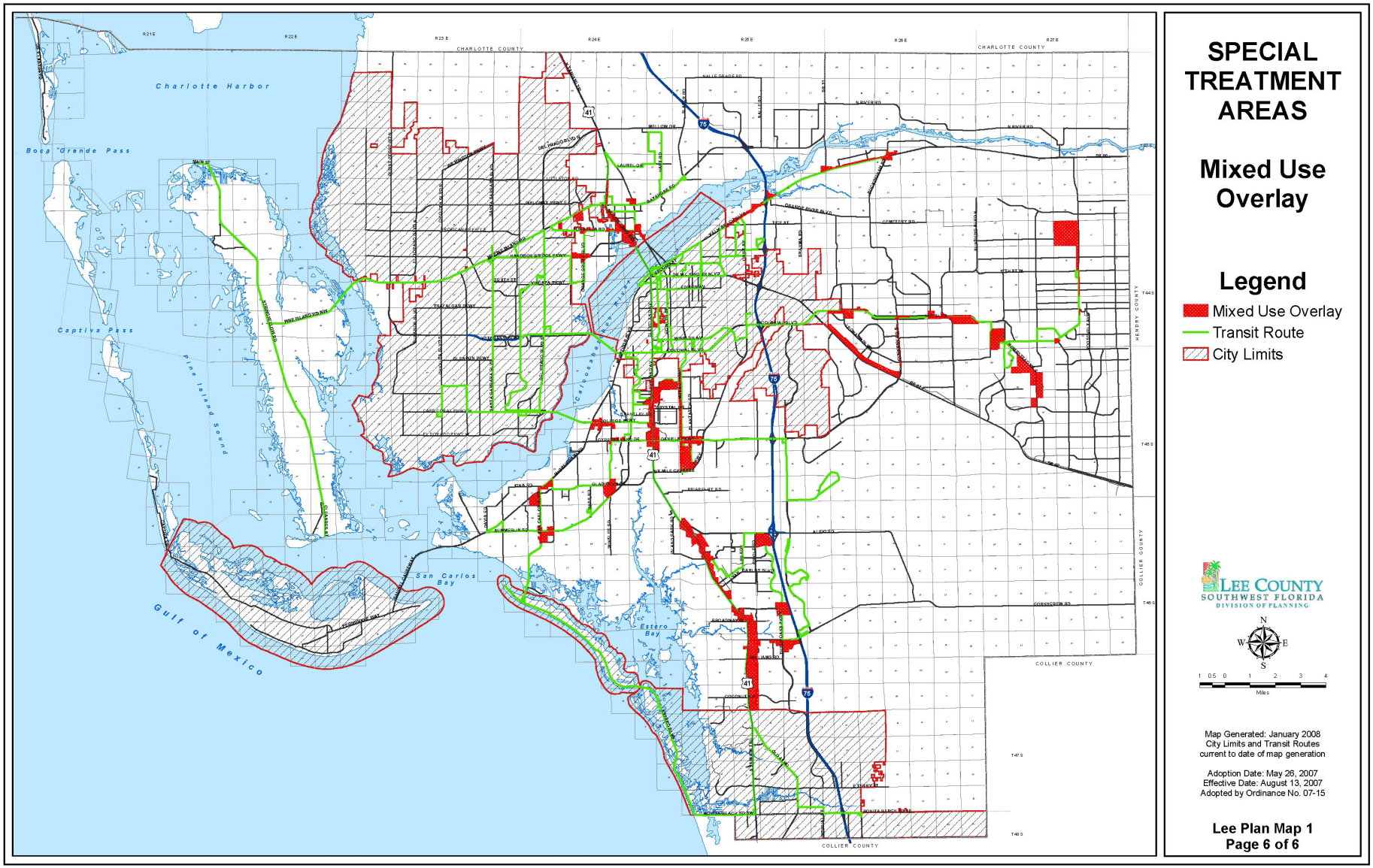


Figure A-9: Mixed Use Overlay (part of Lee Plan's future land use map series)

limerock production and demand B

INTRODUCTION

Lee County has a majority of the commercially valuable limerock deposits in southwest Florida. These deposits are mined as raw material for building products such as concrete, asphalt, and concrete block.

The amount of additional limerock already approved for mining in Lee County has never been estimated, making it difficult for county officials to determine if more DR/GR land needs to be converted to limerock mining. Until now, the best data available has been the "expected life of the mine" information in Florida Department of Environmental Protection (FDEP) permit files. These estimates are self-reported by mining applicants and range from 10 to 25 years for Lee County's active mines and 42 years for a mine expansion that has not begun operation due to federal permitting issues.

The overall absence of statewide data on rock reserves was a major concern of the Strategic Aggregates Review Task Force. One of its consensus recommendations (in February 2008)[1] was for the state to provide an estimate of the rock volume available from already permitted mines in order to compare it to projected demand. Such an analysis is provided here for mines in Lee County's DR/GR area.

Knowledge of permitted reserves is essential to future DR/GR planning. Limerock products are an important resource to the local and regional economy and the best deposits are somewhat limited in geographic area. Reserving sufficient land for mining is critical to the economy, yet avoiding over-allocation is also critical because mining is an industrial process that unavoidably destroys natural resources and is not compatible with most other uses of nearby land. In addition to permanent removal of all vegetation, limerock mining physically removes significant portions of the porous rock that stores and protects groundwater that flows into Lee County's potable water wellfields.

Mining companies generally consider information on their rock quality and reserves to be proprietary business information. Florida's most recent report on mining, the Strategic Aggregates Study,[2] claimed that data on rock reserves was available only for a few properties across the entire state that had revealed their reserves through public documents.[3] That study apparently based its conclusions about mining reserves in Lee County on a 2001 News-Press article about a zoning hearing,[4] reaching the following conclusion about the future of mining in Lee County:

> *The Rinker mega-mine complex in Lee County produces at least 5 million tons of construction aggregates each year for growth and development, maintenance and repairs in Southwest Florida. The Rinker mine complex will exhaust reserves by 2015. New mines to replace the mega-mine capacities of this facility will be difficult, if not impossible to permit in this area. When the mine reserves are gone, aggregates will be imported at greater expense.*[5]

This conclusion completely misrepresents Lee County's mining reserves. It was given prominent attention in the Strategic Aggregates Study and was relied on by Florida legislators to justify attempts to preempt local governments from regulating mining throughout the entire state.

This appendix includes an analysis of limerock resources in the DR/GR area that have already been permitted for removal or could be permitted for removal if current applications are approved. Future demand for limerock is then assessed, allowing a comparison to reserves that have been already permitted for removal and rezoning requests for additional mines.

LIMEROCK MINING IN THE DR/GR AREA

Limerock is the common name for products made from naturally occurring limestone. In Lee County, most of the commercially valuable limestone comes from the Ochopee geological unit, which is the most productive shallow aquifer and the primary aquifer tapped for public water supply in Lee County at this time.[6]

Limerock is relatively soft compared to some types of rock but is plentiful in several parts of Florida. Hauling costs make up such a large proportion of the cost to purchasers of fill dirt and rock products that local sources are a great economic advantage where products must be hauled by truck.

A few products, such as the top layer of asphalt paving known as the "friction course," are more durable when made with extremely hard rock. For instance, the friction course on I-75 generally uses crushed granite from quarries in Georgia, Alabama, and Canada. The Strategic Aggregates Study concluded that the Rinker mine complex was the only quarry in Lee County that produced crushed stone for roadbuilding,[7] but although no mines in Lee County produce friction course aggregate, they do produce crushed stone products that meet numerous FDOT quality standards.

FDOT sets standards for rock quality but does not monitor which mines have certain materials for sale at any given time. When improving state roads, FDOT contractors can purchase stone products from any FDOT-certified supplier who can meet the specifications for a particular project, regardless of the original source of the products.

Limerock products from mines in the DR/GR area are primarily crushed stone, and include the following types:

- Rip-rap – large pieces of stone that are used to protect embankments and shorelines from erosion.
- Base rock – partially crushed limestone that includes a uniform mix of small and large pieces (up to 3½" in diameter). Base rock is later compacted in place to provide the support for asphalt paving.
- Graded aggregate – course pieces of crushed limestone that have been washed and then sorted according to size. This becomes a major component of concrete and asphalt.
- Sand – Some mines in Lee County wash and sort very small pieces of crushed stone which is then sold as screenings, fine aggregates, or manufactured sand. Sometimes this material is instead discarded by backfilling it into quarry pits, especially the smallest particles. Florida DOT has not certified any Lee County mines to produce the kind of natural sand that is mixed with cement and crushed stone to make concrete; that type of sand is currently being mined in Glades County.
- Aggregates – This is a broad term that can include all of the other products listed above.

No mines in southwest Florida produce blocks of stone that can be used whole for construction purposes.

Limerock deposits in southwest Florida are not limited to Lee County; southern Charlotte County has limerock that is mined commercially. Collier County has several limerock mines in operation and others have recently been approved at locations shown on Figure B-1.

About half of the limerock produced in Florida comes from the Lake Belt which is located at the northwestern edge of Miami-Dade County's urban area, about 135 miles from Fort Myers. The Lake Belt is linked to a major

Rock is extracted from a mining pit in the right side of the above image; aggregate processing is taking place in the upper right corner of the image.

rail network, allowing those mines to economically supply aggregate to distant markets including Orlando and Jacksonville. Although Lee County is much closer to the Lake Belt than Orlando or Jacksonville, the absence of a convenient rail link to southwest Florida keeps Lake Belt aggregate from being available locally at competitive prices.

Figure B-1 shows major sources for limerock products in south Florida. These include large limerock mines, aggregate terminals at ports where rock products arrive by ship, and rail terminals where limerock products arrive by rail from the Lake Belt. Major sources are surrounded by rings with a radius of 25 and 50 miles. Most deliveries from mines or terminals are less than 30 miles, but some deliveries from regional mines can be as long as 80 to 100 miles one way with no back-haul opportunities.[9]

In April 2008 Palm Beach County approved 11,000 more acres (about 75 years' worth) of limerock mining in the Everglades agricultural area just south of Lake Okeechobee, in addition to the 4,000 acres approved two years earlier. These mine sites are about 80 miles by road from Fort Myers, too distant to replace DR/GR mines but within economical trucking distance of some Hendry County and Glades destinations.

Lee County's flat topography requires extensive use of fill material to elevate roads, parking lots, and buildings. For new developments, fill material is usually produced on-site by excavating stormwater detention areas, often beyond minimum requirements. Fill obtained in this manner (which may also contain some limerock) typically cannot be sold to others due to county regulations that define off-site sale as commercial mining.

Demand for fill material that cannot be obtained on-site is purchased from commercial "borrow pits" or from limerock mines whose operators must remove what they consider "overburden" that lies over more commercially valuable limerock. This analysis does not attempt to quantify fill material that is excavated specifically for resale or that is available commercially as overburden from limerock mines.

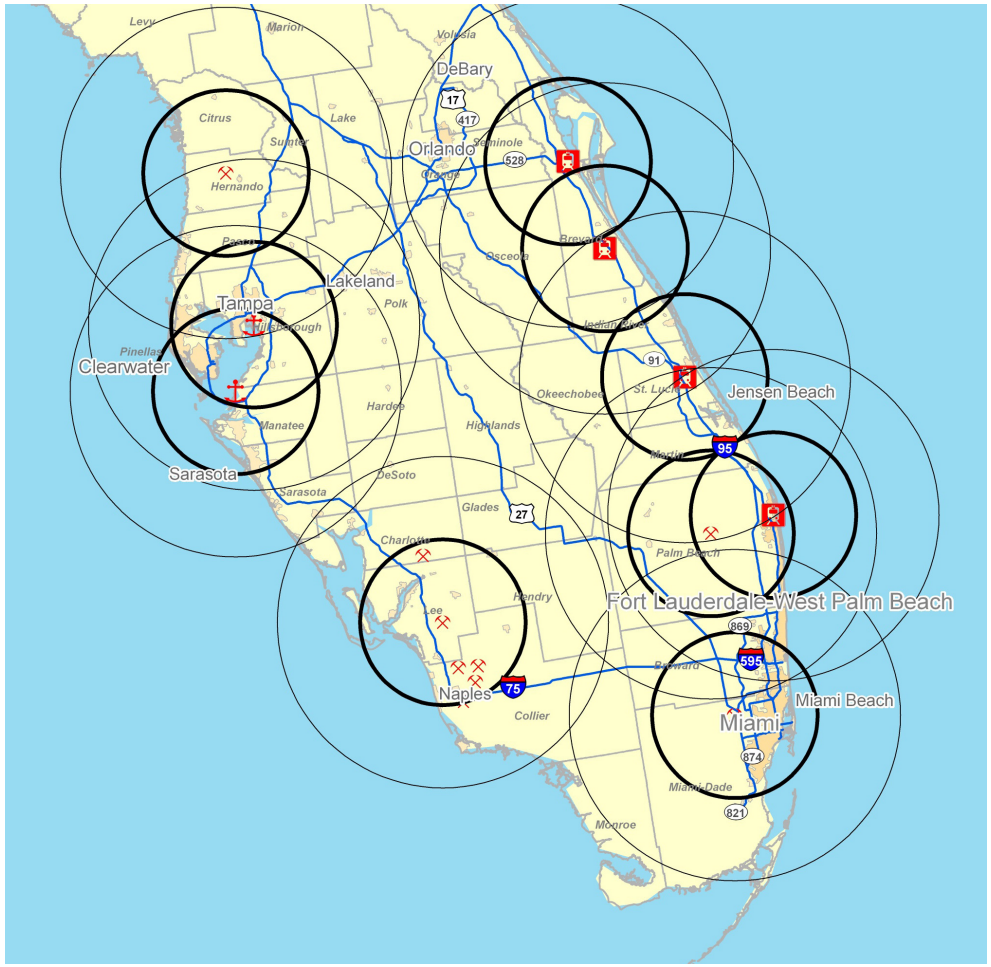


Figure B-1: Major sources for limerock products in South Florida, as identified in public records of Lee and Collier Counties; web sites of individual suppliers; FDOT databases of approved aggregate sources; and Strategic Aggregates Study (FDOT, March 2007)

Legend

- Limerock Mines
- Aggregate Terminals at Ports
- Rail Terminals
- 25 Mile Radius
- 50 Mile Radius

ESTIMATES OF PERMITTED LIMEROCK RESERVES

A previous analysis of limerock reserves in the DR-GR area was performed for Lee County by Greg F. Rawl, P.G. That analysis sought to determine the potential amount of limestone that could be mined from the DR/GR area in the future. Rawl estimated that 160 million cubic yards of limerock had been excavated in Lee County through 2001 and that 1,800 million more cubic yards were available in the DR/GR area alone,[10] even after excluding potential preservation areas. The resource itself is sufficiently plentiful in Lee County that the existence of limerock alone should not be a justification for approval of mining if surface or environmental conditions would make it unwise.

The new analysis described here begins with a more specific focus: to determine the amount of limerock that has already been permitted for removal or may be permitted for removal if additional approvals are obtained.

This analysis is based on data in the public record, primarily Lee County zoning and development order files, but in some cases permit files of the Department of Environmental Protection (for most commercial mines) and the South Florida Water Management District (for excavations that received permits as early phases of residential developments). Where these files did not provide sufficient data (e.g, the average depth to the top of productive limerock deposits or the average thickness of limerock), estimates were taken from Rawl.[11]

This analysis includes the entire Rinker mine complex that straddles the DR/GR boundary just north of Florida Gulf Coast University. It also includes the Bonita Grande Aggregates mine that was annexed into the city of Bonita Springs DR/GR area in 2003;

MINE NAME	FORMER NAME OR LOCATION	SEC-TWP-RGE	PROJECT ACRES	MINE ACRES
Approved Mines				
Rinker Materials (s. of Alico)	Florida Rock Ph. 1-A (northerly)	11, 12-46-25	915	537
Rinker Materials (n. of Alico)	Florida Rock Ph. 3-A, 3-B	5, 6-46-26	1,194	622
Rinker Materials (Ginn Lago)	Florida Rock Ph. 1-B, 2-A, 2-B	7, 8, 17, 18, 19, 20-46-26	3,560	1,357
Florida Rock (Miromar Lakes)	Florida Rock Ph. 1-A (southerly)	13, 14-46-25		
Florida Rock Greenmeadows	Harper Bros. Green Meadows	35-45-26; 2, 3-46-26	1,521	1,075
Florida Rock Greenmeadows exp.	SE expansion of Green Meadows	1, 11, 12-46-26	1,529	1,132
Youngquist Brothers	West Lakes; University Lakes	9, 10, 11, 15, 16, 21-46-26	1,955	1,511
Cemex/RMC	Corkscrew Woods (s. of Corkscrew)	28-46-26	309	228
Westwind Corkscrew	(n. of Corkscrew; far east)	22, 23-46-27	603	299
Bell Road	(replaces Sunstate; s. of 82)	27, 34-45-27	504	265
Bonita Grande Aggregates	Bonita Farms I & II	17, 20-47-26	1,321	557
Bonita Land Resources	Highgate Corp.	33-47-26	48	32
Plumosa Farm	Sanfilco	33-47-26	37	30
		TOTALS:	**13,496**	**7,645**
Partially-Approved Mines				
Florida Rock Mine #2	(IPD vacated; no ACOE permit)	26, 27, 28, 33, 34, 35, 36-45-27; 28, 31, 32, 33-45-27	4,839	2,471
Mine Applications that are Pending or in Litigation				
Corkscrew Excavation	(n. of Corkscrew)	19-46-27; 23, 24-46-26	1,366	840
Golfrock	(n. of Corkscrew)	22-46-27	253	142
Estero Group	(n. of Corkscrew)	23-46-27	318	251
Schwab 640	Corkscrew Lakes	30-47-26	644	378
Schwab II	(also s. of Corkscrew)	29-46-27	600	318
Cypress Bay	(s. of Corkscrew)	27, 33, 34-46-27	953	267
Ibis Lake Estates	(s. of SR 82)	34-45-27	93	61
		TOTALS:	**4,227**	**2,257**

Table B-1: Mines in southeast Lee County; approved, partially-approved, and applications in process or litigation.

Legend

- Approved mines
- Partially approved mines
- Applications in process or litigation

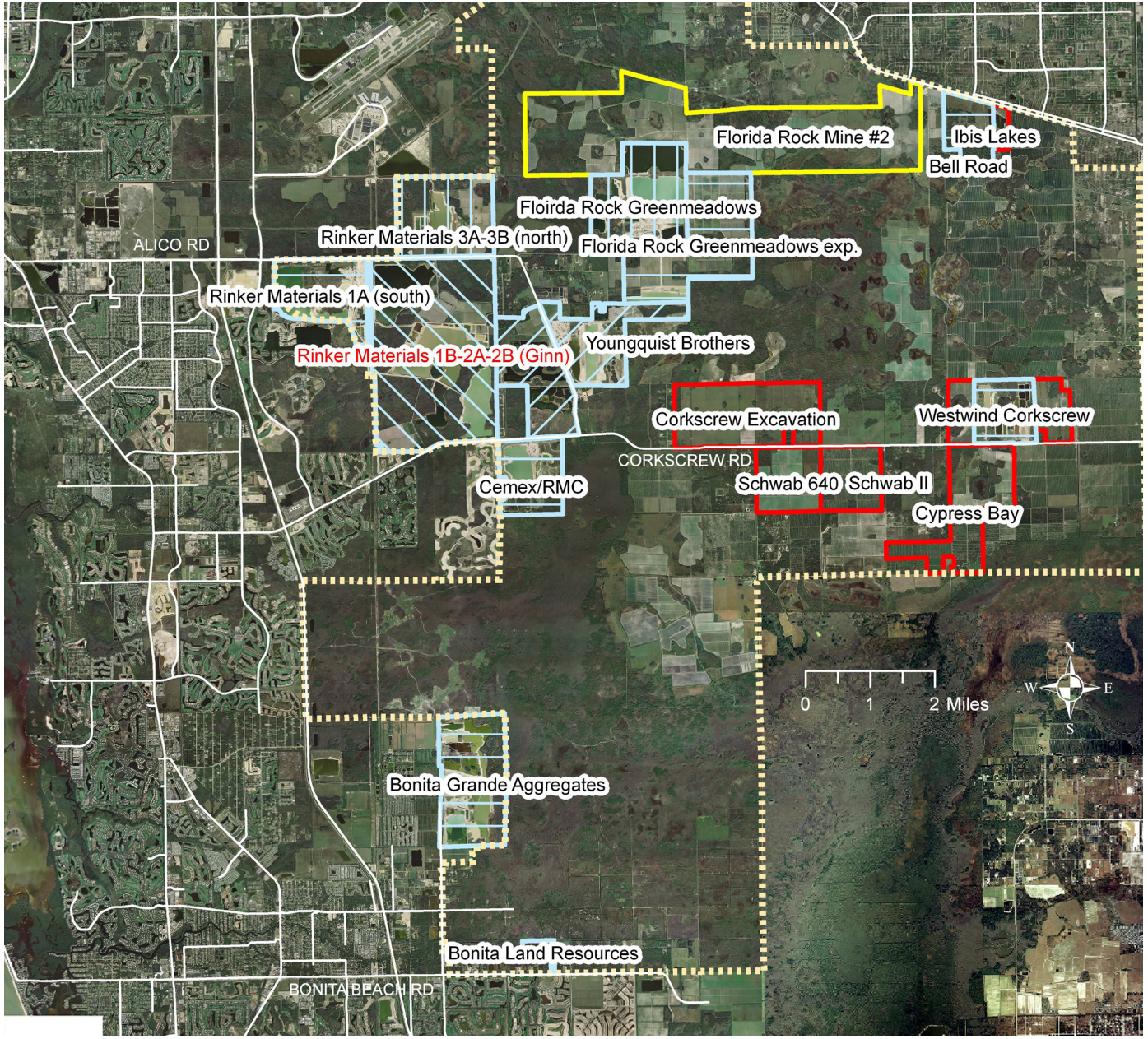


Figure B-2: Limerock permitted for removal (or may be permitted depending on additional approvals)

an annexation agreement stipulates that this mine must cease operations after 2018, but mining can continue under its county approval until then. For purposes of this analysis, each mine has been assigned to one of three groups: approved; partially approved; or application in process or in litigation. Mines are listed by their current names or owners even though their approval documents often reflect names of prior owners. Boundaries of existing and proposed mines are shown on Figure B-2; summary information for each mine is provided in Table B-1.

Figure B-3 shows mines that have already been approved. The geographic extent of limerock mining through 2006 is shown in light blue and the approved limits of mining are shown in medium blue. Mines that are approved to remove fill-dirt only are shown in dark blue. Two mines have light blue outlines that identify the original edges of mining pits that have since been backfilled with unsalable material. A portion of two mines are outlined in black to indicate the edges of shallow lakes from prior fill dirt operations on those sites that will be re-excavated to recover limerock. Acreages from Figure B-3 are tabulated in Table B-2. Table B-2 also contains estimates of limerock volume in cubic yards of material removed from the ground. The actual volume of limerock extracted depends on many factors, most importantly the thickness of the mineral deposit and the permitted excavation depth. The finished volume also varies by the type of product; for instance, rip-rap has more space between stones while fine aggregates have less.

Reliable date on limerock thickness is sometimes available in public records. For instance, when renewing mining permits, each mine must now submit to Lee County a survey of the area and depth of mine pits. The pits are assumed for this analysis to have been excavated to the bottom of the limestone layer; the "average depth" of limestone reported in Table B-2 is based on these

	Mine Acres Approved 1980-2006	Mine Acres Dug 1980-2006	Details of Acres Dug, 1980-2006:			Acres of Rock Excavated 1980-2000	Avg. Rock Thickness	C.Y. of Rock Excavated 1980-2006	Tons of Rock Excavated 1.35 tons / C.Y.	Remaining Limerock Acres	C.Y. of Rock To Be Excavated 2007-Future
			fill-only pits	open rock pits	refilled rock pits						
Rinker Materials (s of Alico)	537	537	0	336	201	537	23	19,926,280	26,900,478	0	0
Rinker Materials (n. of Alico)	622	189	0	189	0	189	17	5,183,640	6,997,914	433	11,875,747
Rinker Materials (Ginn Lago)	1,357	1,209	0	1,209	0	1,209	23	44,861,960	60,563,646	149	5,528,893
Florida Rock (Miromar Lakes)		191	0	191	0	191	25	7,703,667	10,399,950	0	0
Florida Rock Greenmeadows	1,075	765	0	679	86	765	25	30,855,000	41,654,250	310	12,503,333
Florida Rock Greenmeadows exp.	1,132	184	0	184	0	184	25	7,421,333	10,018,800	948	38,236,000
Youngquist Brothers	1,511	554	350	204	0	204	30	9,873,600	13,329,360	1,307	63,258,800
Cemex/RMC	228	181	0	181	0	181	30	8,760,400	11,826,540	9	435,600
Westwind Corkscrew	299	240	240	---	---	---	---	---		---	---
Bell Road	265	6	6	---	---	---	---	---		---	---
Bonita Grande Aggregates	557	430	293	137	0	137	30	6,630,800	8,951,580	420	20,328,000
Bonita Land Resources	32	26	26	---	---	---	---	---		---	---
Plumosa Farm	30	8	8	---	---	---	---	---		---	---
TOTALS:	**7,645**	**4,520**	**923**	**3,310**	**287**	**3,597**		**141,216,680**	**190,642,518**	**3,576**	**152,166,373**

Table B-2: Capacity of mines already approved

Legend

- Geographic extent of limerock mining through 2006
- Approved limits of mining
- Mines approved to remove fill-dirt only
- Original edges of mining pits backfilled with unsalable material
- Edges of shallow lakes from prior fill dirt operations

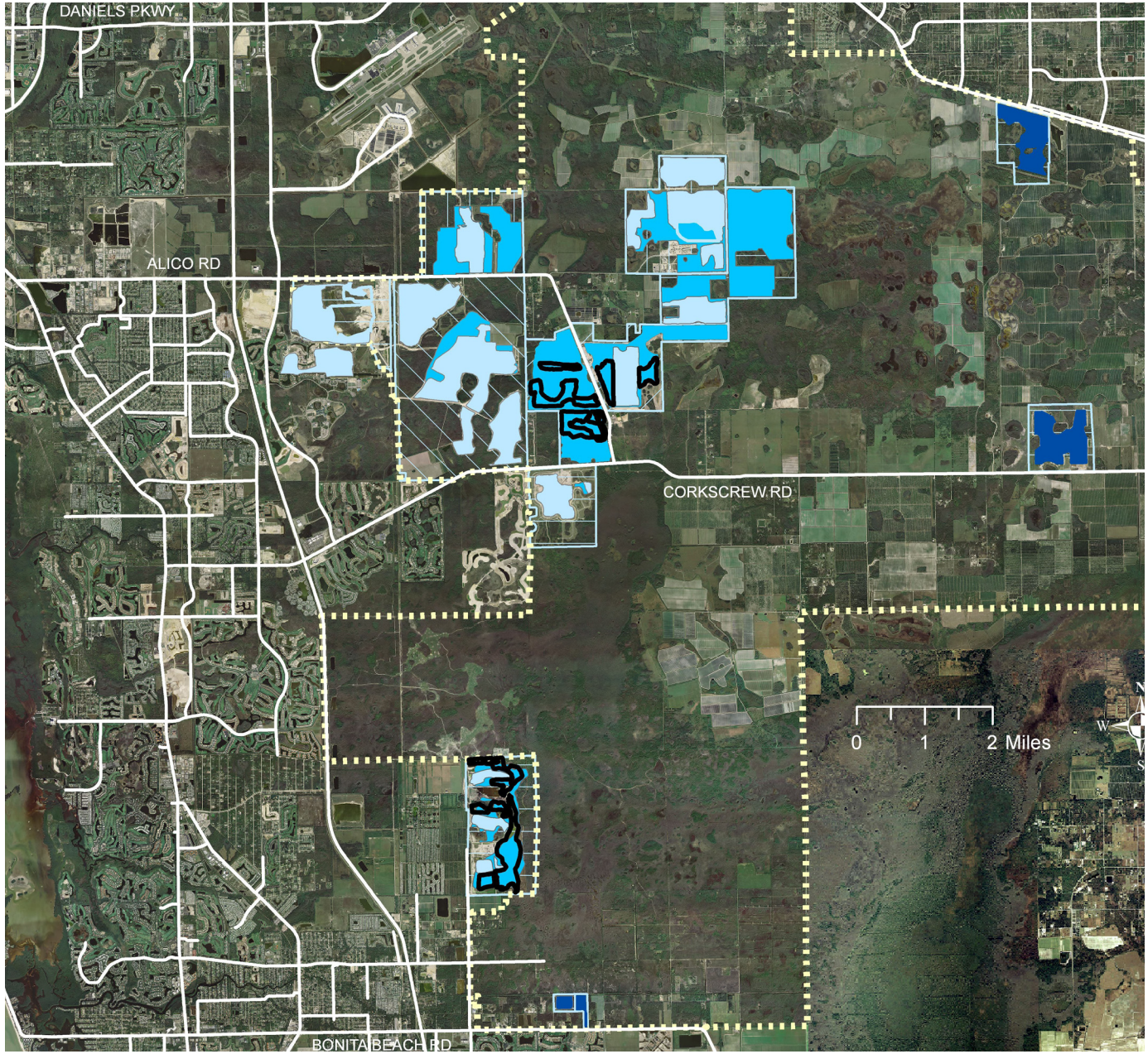


Figure B-3: Mines already approved

surveys when they are available. In some cases, soil borings are also in public records indicating the elevation of the top of the limestone layer. In other cases, both the top and bottom of the limestone layer has been estimated from soil borings or from regional geological data.[12] The accuracy of this analysis will be improved if mine operators are willing to provide additional data in their possession that can improve these estimates of limerock thickness.

Limerock volumes are sometimes expressed in either "short tons" or metric tons. Table B-2 converts cubic yards to "short tons" to allow comparisons with other statewide data sources. Each short ton equals .9072 metric tons.

Additional permitted mining acreages for each mine are also included in Table B-2, along with an estimated quantity of limerock yet to be mined, using the methodology just described.

Figure B-4 shows proposed mines now in the application process. For each, the proposed mining tract is outlined and the size of the proposed mining pit is indicated by solid color. Most are currently at some stage in Lee County's application process and are shown in red. One of these mine sites (Schwab 640) had been approved in 1989 for fill-dirt mining and a subsequent residential development; that approval has lapsed. A later request to mine that entire site for limerock was denied by the County Commission in 2002 and is the subject of ongoing litigation.

One mine, shown in yellow, is indicated as "partially approved." This extremely large mine is proposed by Florida Rock with an expected lifespan of 56 years.[13] IPD zoning, along with a site and phasing plan, was approved by the County Commission in 1993. State environmental permits were issued in 2000. Federal dredge-and-fill permits could not be obtained due to potential impacts on the Florida panther; Florida Rock later agreed to maintain a wildlife corridor through the mine and received their federal permits in 2003. A judge revoked those permits in 2004, ruling that the cumulative impacts on the Florida panther from this mine and nearby development activity had not been considered by federal agencies. Later in 2004, Lee County determined that the site plan approved in 1993 had been "vacated" because further county approvals had not obtained with specified time periods. Florida Rock is now in the federal permitting process and presumably will ask Lee County to reinstate the site plan if federal permits can be obtained.

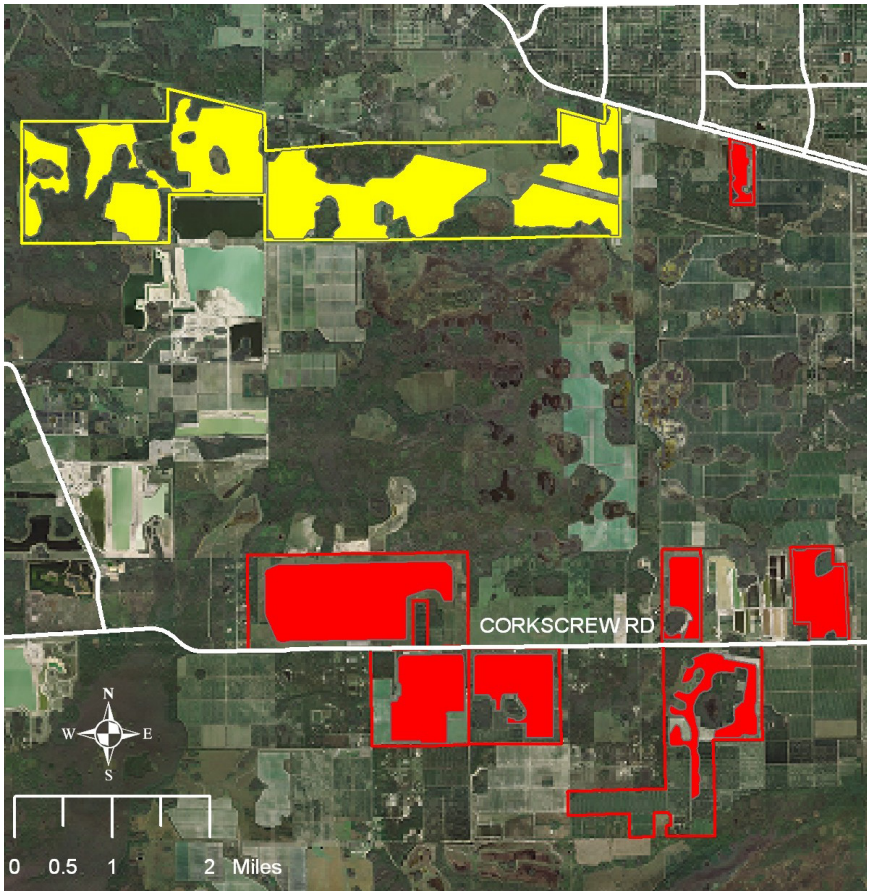


Figure B-4: Proposed mines now in the application process

DISCUSSION OF FUTURE AGGREGATE DEMAND

Limerock products are essential building materials in Florida. A thick layer of compacted limerock supports every asphalt road and parking lot. Asphalt and concrete are both made with large quantities of crushed stone, as is concrete block and pipe. Although out-of-state substitutes are available, locally-produced limerock products have strong economic advantages. Additional recycling of asphalt and concrete is highly desirable but will never fully replace mining of new limerock.

National trends have shown an increasing reliance on crushed stone to replace naturally occurring sources of gravel. Crushed stone consumption has also been increasing as new homes become larger, new roads are built to serve spread-out development patterns, and infrastructure built in prior generations needs to be replaced.

The recent building boom overtaxed every segment of the construction industry. Even plentiful products like limerock skyrocketed in price, due mainly to limited processing facilities rather than any shortage of raw material. These price increases triggered major investments for additional mining capacity in Lee County at the same time that major corporate entities worldwide have been consolidating their ownership. Even though new residential construction is nearly at a standstill in Lee County, mine investors expect it to resume at some point and intend to be ready to compete to supply whatever demands emerge.

The potential effect of litigation over mining in Miami-Dade County's Lake Belt has also fueled the recent influx of mining proposals in Lee County. Another factor fueling the recent influx of mining proposals in Lee County is the potential effects of litigation over mining in the Miami-Dade County Lake Belt. Although this decision has been overturned, a federal judge had ruled in July 2007 that environmental regulators failed to properly protect the county's public water supply. The judge temporarily shut down mining in a portion of the Lake Belt with the greatest potential to contaminate Miami-Dade County's wellfields. This decision affected 20%-30% of the Lake Belt according to various reports, forcing production to move to other approved areas of the Lake Belt that were not affected by the ruling. The construction downturn was already in full motion at the time so it

Large stockpiles of aggregate have accumulated since the building downturn in 2007.

is unlikely that there have been any direct impacts on Florida's economy or other limerock suppliers. However, that could change if construction reverts to boom levels before the public water supply issues have been resolved.

Most aggregate data is published only at the national or regional level, but Florida-specific data has been located for the years 1976 through 2006.[14] Figure B-5 shows annual production in Florida of "crushed stone" (aggregates made from limerock) and "construction sand and gravel" (from natural sources).

Also shown on Figure B-5 is Florida's population during that same period. The amount of aggregate produced annually in Florida has increased at about the same rate as Florida's permanent population. This relationship has caused a number of industry observers to express future aggregate demand at the current annual consumption rate, which for Florida is about 9 tons per permanent resident.[15]

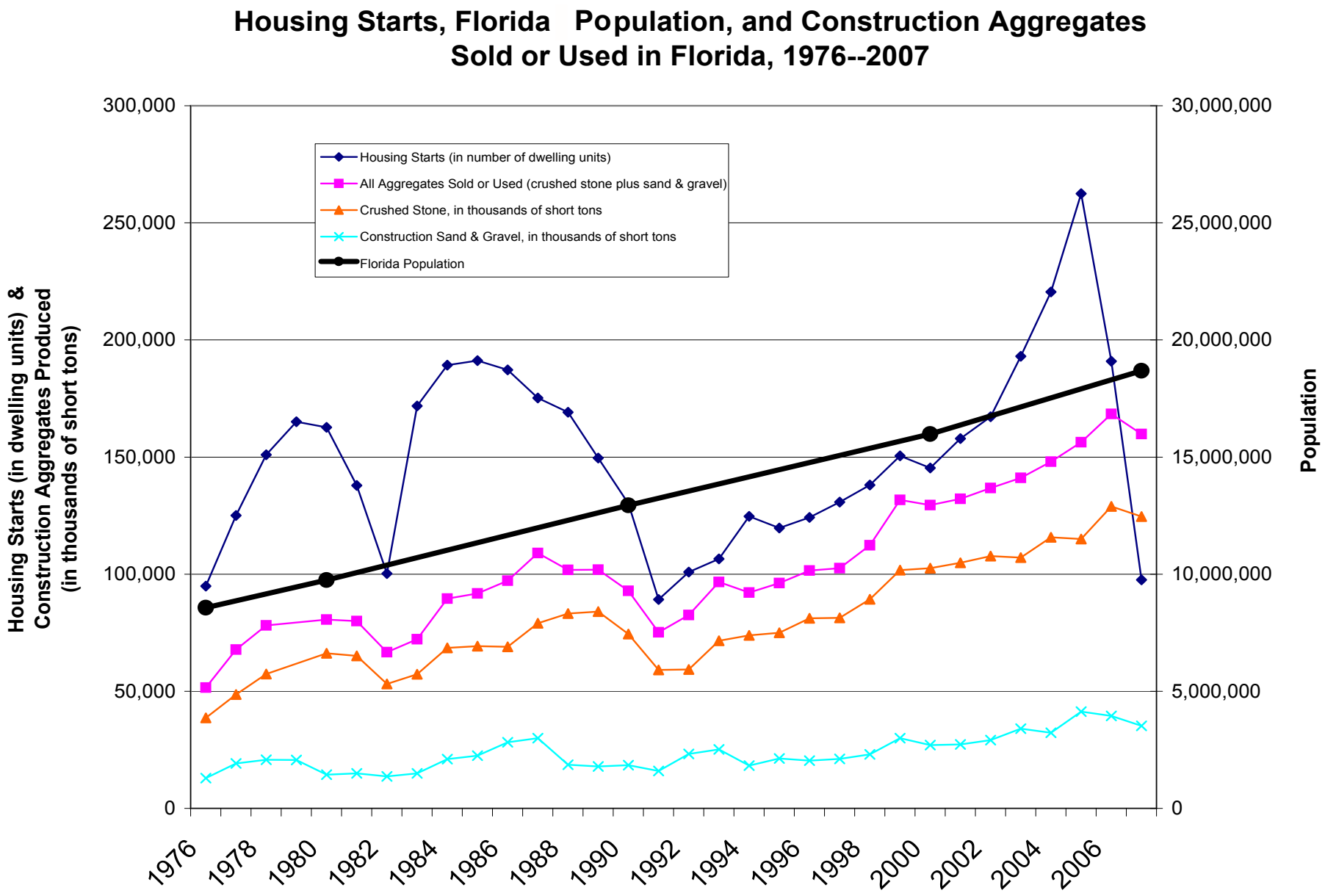

Housing Starts, Florida Population, and Construction Aggregates Sold or Used in Florida, 1976--2007
Housing Starts (in dwelling units) & Construction Aggregates Produced (in thousands of short tons)
Population
Housing Starts (in number of dwelling units)
All Aggregates Sold or Used (crushed stone plus sand & gravel)
Crushed Stone, in thousands of short tons
Construction Sand & Gravel, in thousands of short tons
Florida Population
300,000
250,000
200,000
150,000
100,000
50,000
0
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
5,000,000
0
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006

Figure B-5

This ratio between aggregate production and permanent population may not hold in future years. It disregards the impact of part-time Florida residents, who are not counted in the permanent population but who are responsible for a significant share of the building and road construction that consumes aggregates. When this method is scaled down to the county level, it is even more unreliable because the precise service area for regional mines such as those in the DR/GR area is not known.

Other indicators of aggregate demand have been rising at rates similar to Florida's permanent population, as shown in Figure B-6. The average size of new houses and the mileage of roads have risen at slightly lower rates than the population since 1975, while the number of miles traveled by all vehicles has risen at a slightly higher rate. The increasing rate of travel is an indicator of prosperity, low oil prices, and spread-out development patterns, thus creating a demand for additional road construction.

A better way to assess future demand for construction aggregates would tie demand more closely to expected growth instead of cumulative permanent population. Florida comprehensive plans already are based on accommodating expected growth; each plan must be based on growth

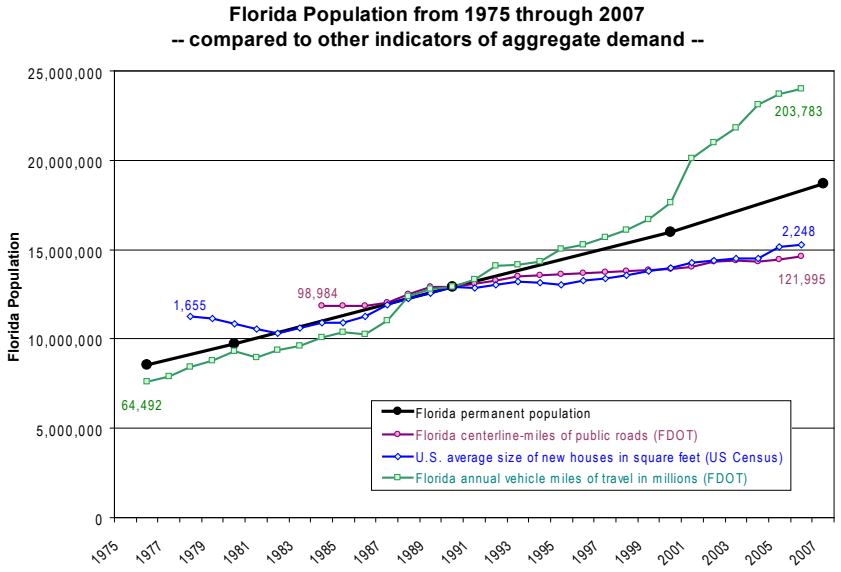


Figure B-6

forecasts that can also be used to evaluate potential demand for aggregates.

These estimates are generally based on population projections created by the Bureau of Economic and Business Research (BEBR) at the University of Florida. Because these forecasts are for the permanent population only, they are commonly adjusted with recent census data to reflect the peak season population in order to be useful in forecasting peak demand for public facilities. The same adjustments are needed to accurately forecast demand for limerock.

To evaluate this methodology, the number of housing starts in Florida has been obtained back to 1976.[16] Housing starts are tracked carefully because building permit statistics include buildings that are never constructed. The number of housing starts each year is also shown on Figure B-5.

It is clear from Figure B-5 that an increase in the number of housing starts causes an immediate increase in aggregate production; however, this impact is not proportional to the number of housing starts. Aggregates are also used in commercial construction, which often lags but occasionally leads residential construction; and aggregates are needed in large quantities for infrastructure, which may lag the residential development it supports by many years. These and other uses for aggregates smooth out the annual demand for aggregates; yet in the longer run the demand is probably more closely related to the number of housing starts than to the cumulative number of permanent residents.

Any useful methodology should allow a direct comparison to the acreage needed for future mining in Lee County (initially by assuming that the amount of the regional market served by Lee County mines would stay the same in future years). If this regional market assumption should change for any reason, such as new mines outside Lee County, or a new rail line that can transport aggregate, or the availability of alternate materials that could replace aggregate, then these forecasts can be adjusted accordingly.

The following analyses apply to each methodology separately.

RESERVE ESTIMATES COMPARED TO FUTURE DEMAND

One basic way to assess demand for limerock products is to assume continuing annual consumption at today's rate of nine tons per permanent resident. This method was used by Rawl to compute expected demand for limerock for Lee County's population through 2030.[17] The total projected demand through 2030 for each county in southwest Florida is computed in Tables B-3 and B-4 using this approach.

REGIONAL POPULATION						
	Estimated	Projected				
County	2005	2010	2015	2020	2025	2030
CHARLOTTE	154,030	175,400	192,800	208,600	222,700	235,900
COLLIER	317,788	379,200	440,100	497,500	549,200	598,500
DESOTO	32,606	35,700	39,900	42,600	45,100	47,300
GLADES	10,729	11,600	12,100	12,600	13,000	13,400
HENDRY	38,376	41,400	44,600	47,600	50,400	52,900
LEE	549,442	676,500	782,600	881,700	970,700	1,053,900
SARASOTA	367,867	413,000	451,400	486,500	517,400	545,700
TOTALS:	**1,470,838**	**1,732,800**	**1,963,500**	**2,177,100**	**2,368,500**	**2,547,600**

Table B-3: Projected population increase in Southwest Florida ("Projections of Florida Population by County, 2006-2030," Bureau of Economic and Business Research, University of Florida, February 2007)

Table B-3 assumes the permanent population for each county will match the medium population projections from BEBR.[18] These projections have been broken down into five-year increments, with the average annual aggregate demand for each county during each increment shown in the first five columns of Table B-4 (based on nine tons per person per year). The sum of the annual demands for 2007 through 2030 are provided in the sixth column.

If each county had suitable mineral reserves and produced its own aggregate, these totals could be used to determine the amount of land that would be needed for mining in each county. Although Collier County has substantial reserves, nearby counties to the east and north have only minor reserves or none at all. A look at the recent past provides some guidance as to what percentage of the demand from these seven counties might be supplied by Lee County mines in the future.

There is no data that assesses what percentage of their limerock demand is met from sources other than mines in Collier, Lee, and Charlotte Counties such as aggregate terminals at Port Manatee or the Port of Tampa or the mines near Brooksville (see Figure B-1).

TOTAL PROJECTED LIMEROCK DEMAND BASED ON PER CAPITA RATE								
	Annual demand					Demand in tons	Demand in tons at 80%	Demand in CY at 80%
County	2007-2010	2011-2015	2016-2020	2021-2025	2026-2030	2007-2030	2007-2030	2007-2030
CHARLOTTE	1,482,435	1,656,900	1,806,300	1,940,850	2,063,700	43,268,490	34,614,792	25,640,587
COLLIER	3,136,446	3,686,850	4,219,200	4,710,150	5,164,650	101,450,034	81,160,027	60,118,539
DESOTO	307,377	340,200	371,250	394,650	415,800	8,839,008	7,071,206	5,237,931
GLADES	100,481	106,650	111,150	115,200	118,800	2,660,922	2,128,738	1,576,843
HENDRY	358,992	387,000	414,900	441,000	464,850	9,974,718	7,979,774	5,910,944
LEE	5,516,739	6,565,950	7,489,350	8,335,800	9,110,700	179,575,956	143,660,765	106,415,381
SARASOTA	3,513,902	3,889,800	4,220,550	4,517,550	4,783,950	101,114,856	80,891,885	59,919,915
TOTALS:	**14,416,371**	**16,633,350**	**18,632,700**	**20,455,200**	**22,122,450**	**446,883,984**	**357,507,187**	**264,820,139**

Table B-4: Total projected limerock demand for Southwest Florida's population through 2030 using a per capita rate (see text for explanation)

However, the percentage of the regional demand for limerock can be inferred from following methodology. Table B-2 estimates that the total limerock production from DR/GR mines since 1980 has been 141,216,680 cubic yards, which equates to 190,642,518 tons (based on 1.35 tons per cubic yard). This material was mined over approximately a 26-year period, yielding an average annual tonnage of 7,332,405. At the average Florida rate of nine tons per person per year, this tonnage would serve a permanent population of about 812,000, which is about 80% of the average population for these counties during the same period (1,014,809).

The final two columns in Table B-4 adjust the future demand for all seven counties by this 80% factor to estimate the amount of limerock that may be needed from DR/GR mines based on this methodology, expressed in tons and in cubic yards. For the entire region, this total is 174% of the amount of aggregate produced by DR/GR mines from 1980 through 2006 (as computed in Table B-2).

An alternative method of assessing future demand for construction aggregates would reflect the peak-season population and expected growth rates rather than cumulative permanent population.
Table B-5 summarizes the results of this method for each county in southwest Florida. It compares the total number of dwelling units built from 1980 through 2006 to the number expected to be built from 2007 through 2030, to help estimate whether more or less limerock might be needed during this next planning period.

This method begins by adjusting census data and population forecasts to reflect the total number of dwelling units built during each period (rather than just the number of dwelling units occupied by permanent residents). Source information is available variously from BEBR and the American Community Survey (part of the U.S. Census Bureau). For the rural counties, some extrapolation from 2000 U.S. Census data was required.

Based on this analysis for the entire region, Table B-5 estimates that 105% of the amount of aggregate produced by DR/GR mines from 1980 through 2006 will be needed to accommodate growth from 2007 through 2030. This method understates the likely need for limerock mining by

PEAK-SEASON POPULATION AND EXPECTED GROWTH RATES

County	Total DUs in 1980	2006 Population	Percent of DUs Occupied, 2000	Household Size, 2000	Total DUs in 2006	Total DUs in 2006	DUs Built 1980-2006	2030 Population	Add't Pop. 2007-2030	Add't DUs 2007-2030	% increase over '80-'06
CHARLOTTE	34,798	160,315	80.1%	2.18		96,060	61,262	235,900	75,585	43,286	71%
COLLIER	50,743	326,658	71.2%	2.39		187,615	136,872	598,500	271,842	159,749	117%
DESOTO	7,458	33,164	79.0%	2.70	15,548		8,090	47,300	14,136	6,627	82%
GLADES	3,475	10,796	66.5%	2.51	6,468		2,993	13,400	2,604	1,560	52%
HENDRY	7,032	38,678	88.3%	3.09	14,176		7,144	52,900	14,222	5,212	73%
LEE	111,013	585,608	76.9%	2.31		341,117	230,104	1,053,900	468,292	263,620	115%
SARASOTA	113,355	379,386	82.2%	2.13		216,926	103,571	545,700	166,314	94,990	92%
TOTALS:	**327,874**	**1,534,605**			**36,192**	**841,718**	**550,036**	**2,547,600**	**1,012,995**	**575,045**	**105%**
source:	*Census*	*BEBR*	*Census*	*Census*		*Amer.Comm.Survey*		*BEBR*			

Table 5: Peak-season population and expected growth rates in Southwest Florida

basing demand on expected growth, disregarding the demand that the existing population would create as existing homes and infrastructure need to be rebuilt. The first method has the opposite problem, overstating the likely need for limerock mining by disregarding the impacts of growth on the demand for aggregates.

No actual data is available to determine the portion of aggregate production that is attributable to new growth versus routine rebuilding. This study assigns a subjective factor of 3/4 to the growth factor and 1/4 to the rebuilding factor, resulting in an assumed need for 2007 through 2030 of 122% of the aggregate production from 1980 through 2006.

The amount of aggregate that can be produced from an acre of land depends on the quality and consistency of the limestone and the thickness of its layer. Assuming that future mining in the DR/GR encounters conditions that are similar to the mining of 3,597 acres from 1980 through 2006, the 122% increase suggests that 4,397 acres would need to be mined from 2007 through 2030. This equals about 183 acres per year averaged over this entire planning period — in total, about 22% more land than has already been permitted by Lee County.

This figure of 4,397 acres has a contingency factor because, as shown in Table B-2, much of the land already permitted has a thicker layer of limestone than land that was mined through 2006. Limestone thickness can be taken into account directly by taking the amount mined through 2006 (141,216,680 cubic yards) and applying the 122% factor for the planning period from 2007 through 2030. This results in an expected demand of 172,284,350 cubic yards, about 13% more than Table B-2 suggests can be removed from land that already is permitted for mining.

These methodologies can be extended beyond 2030 but with decreasing reliability. Current population projections for 2030 did not assume that Florida's recent hypergrowth would continue indefinitely but they did not anticipate anything like the extended period of very low growth that is now being experienced. Also, reliance on the ratio of nine tons per permanent resident per year becomes increasingly problematic as Florida's population continues to increase, for the reasons discussed earlier in addition to the generally slowing rate of growth expected in southwest Florida through 2030 and beyond.

Special caution must be attached to attempts to forecast regional growth through 2060 based on numbers in two recent statewide planning studies.[19] [20] BEBR's official projections for the future population of counties end at the year 2030. To reach the year 2060, these reports made the assumption that statewide growth from 2030 to 2060 would be at the same rate as growth from 2005 through 2030. For the hypothetical statewide purposes of those particular studies, that assumption was acceptable. However, extending that assumption to coastal counties where most of the developable land is already occupied would lead to extremely unrealistic growth scenarios.

CONCLUSION ON AGGREGATE DEMAND

Two methods of projecting future demand for aggregate were presented in this appendix. The first method assumes that aggregate demand will remain at its current rate of 9 tons per year per permanent resident and that total annual demand will rise proportionately with the number of permanent residents. The second method assumes the aggregate demand will be more closely related to growth than to cumulative permanent population.

Both methods are complicated by two essential facts:

- Lee County mines are a primary supplier of aggregate products for much of southwest Florida.
- The thickness of the limestone layer and the quality of aggregate that can be produced vary from site to site across the DR/GR area.

The forecast recommended by this study relies more heavily on the second method (growth) than the first (cumulative population). A subjective factor of 3/4 has been assigned to the growth factor and 1/4 to the cumulative population factor. The resulting forecast is that 4,397 additional will need to be mined from 2007 through 2030. This equals about 183 acres per year averaged over this planning period — in total, about 22% more land than the 3,576 acres that have already been permitted by Lee County.

UNCERTAINTIES

Many factors would cause these estimates of limerock reserves to vary. Reliance on these estimates must be tempered by awareness that they can be affected by factors that can be anticipated but not predicted. Here are some such factors:

Factors that could shorten or lengthen the predicted reserves:

- Actual growth rates in southwest Florida could be considerably faster or slower than the official state projections.
- If an adequate rail line were built to serve Lee County and DR/GR mines, aggregate could be shipped much further at competitive costs. A rail line to Florida ports or the Miami-Dade County Lake Belt could import products that would reduce production in DR/GR mines, but it could also open up DR/GR mines to a larger market than is now possible, depleting reserve capacity more quickly.

Factors that could increase pressure on DR/GR mines, thus using up reserves more quickly:

- If the temporary restrictions on Lake Belt mining near Miami-Dade County's wellfields become permanent or expand to a larger area, increased pressure could be felt on DR/GR mines even though, for the most part, the Lake Belt mines serve a different market.
- If Charlotte County were to prohibit limerock mining, its demand would be met almost entirely by DR/GR mines. If Collier County were to prohibit mining, its demand would be met by a combination of DR/GR mines and mines in the Lake Belt and the Everglades Agricultural Area.

Factors that could decrease pressure on DR/GR mines, thus prolonging reserves:

- The state legislature may preempt local control of mining. Although Lee County applies stringent standards to all mines, the county has never tried to stop mining and in fact continues to be the regional supplier for aggregate. The direct effect of preemption would have little, if any, effect on the amount of limerock mined in Lee County. However, preemption could shift more mining to Collier County or to environmentally sensitive areas further east in the DR/GR area, or could re-start mining in Lee County's urban areas, which would also reduce demands on existing DR/GR mines.
- Growth in southwest Florida may never recover to the rates that had been forecast in recent years. The state's rapidly increasing cost of living, its property tax treatment of newcomers, and rising insurance costs could permanently slow the migration of new residents, thus decreasing pressure on DR/GR mines.
- Alternate sources for construction aggregates could reach the market. If these products were durable and cost-effective, pressure on DR/GR mines would be decreased.
- New mines could be opened within or outside Lee County. As recently as 1990, the Florida Geological Survey (FGS) believed that commercially usable limestone didn't exist as far south and east in the DR/GR as is now known to be the case (the blue area in Figure B-7 indicates areas where FGS believed limestone would be economically feasible to mine).[21] Further subsurface explorations throughout southwest Florida may identify more land that could be mined for limerock.
- Current plans to improve the aggregate-handling capacity of Florida ports could be accelerated. Without an active rail connection to Lee County, this capacity probably would not directly serve Lee County, but it could reduce demand from DR/GR mines in the outer portions of their service area.

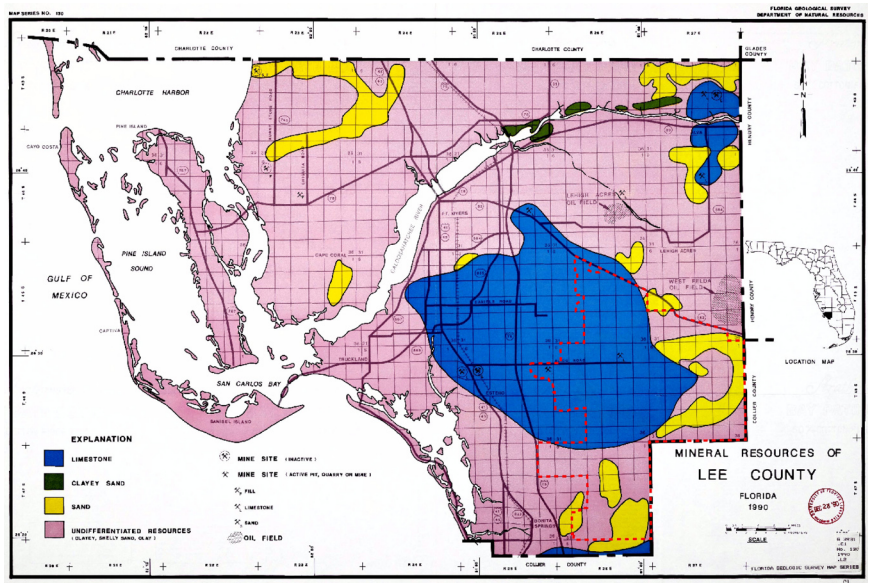


Figure B-7: Solid blue indicates areas believed to be economically feasible to mine limerock according to the Florida Geological Survey's analysis in 1990

NOTES

1. Strategic Aggregates Review Task Force Final Report, February 1, 2008, page 15, published on-line at: www.dot.state.fl.us/statematerialsoffice/administration/resources/library/issues-trends/aggtaskforce/meetingfour/finalreport.pdf – accessed May 5, 2008.

2. Strategic Aggregates Study: Sources, Constraints, and Economic Value of Limestone and Sand in Florida, March 12, 2007, published on-line at: www.dot.state.fl.us/statematerialsoffice/administration/resources/library/issues-trends/documents/aggregatestudy.pdf – accessed May 5, 2008.

3. Strategic Aggregates Study, part II, page 22.

4. Strategic Aggregates Study, part II, page 22.

5. Strategic Aggregates Study, part I, page 38.

6. Lee County Groundwater Resource and Mining Study, Greg F. Rawl, P.G. and Michael Voorhees, P.E., page 82 (June 2005 draft).

7. Strategic Aggregates Study, part I, page 36.

8. Official test data indicates that aggregate from the Rinker mine is slightly harder, denser, and less absorbent than crushed stone from other Lee County mines, all qualities that improve its performance in asphalt (personal communication from John Shoucair, FDOT Geotechnical Materials Engineer, March 28, 2008).

9. Strategic Aggregates Study, part I, page 23.

10. Lee County Groundwater Resource and Mining Study, chapter VIII, section E.

11. Lee County Groundwater Resource and Mining Study, appendix IV.

12. Lee County Groundwater Resource and Mining Study, appendix IV.

13. Testimony of Russell Schropp to Lee County Hearing Examiner, January 14, 2005, case ADM-2004-00011.

14. Historic data compiled by Construction Market Research, 508 Edgewood Road, Pittsburgh, PA 15221.

15. Lee County Groundwater Resource and Mining Study, pages 96-97.

16. Annual State and County Building Permits and Housing Starts in Florida, 1976-2007, Bureau of Economic and Business Research, Warrington College of Business, University of Florida, 2008.

17. Lee County Groundwater Resource and Mining Study, page 95–99.

18. Projections of Florida Population by County, 2006-2030, Florida Population Studies Volume 40, Bulletin 147, Bureau of Economic and Business Research, Warrington College of Business, University of Florida, February 2007.

19. Florida 2060: A Population Distribution Scenario for the State of Florida, prepared for 1000 Friends of Florida by the GeoPlan Center at the University of Florida, August 15, 2006

20. An Alternative Future: Florida in the 21st Century 2020 2040 2060, prepared for the Metropolitan Center for Regional Studies at the University of Central Florida by the City Planning 702 Urban Design Studio at the University of Pennsylvania.

21. Mineral Resources of Lee County, Florida, Florida Geologic Survey Map Series No. 130, 1990 (with current DR/GR boundary superimposed).

mine reclamation C

ECOLOGICAL IMPACTS & RECLAMATION OF MINES IN SOUTHEAST LEE COUNTY

The contents of this appendix are subject to revision upon completion of the environmental mapping and hydrologic modeling that are also being conducted as part of this study.

An evaluation of the expected ecological impacts from natural resource extraction mining and the reclamation of the mined lands was conducted through review of approved Lee County development orders, also known as Mining Operations Permits; Lee County zoning resolutions; and State ERP permits.

OVERVIEW OF CURRENT MINING APPROVALS AND PROPOSALS WITHIN STUDY AREA

Mining operations for fill dirt and limerock have been occurring in southeast Lee County for over twenty years. There are currently full or partial permit approvals for over 9,000 acres of mine excavation within approximately twenty percent of the southeast Lee County DR/GR study area. The approved mining depths range from 25 feet to 108 feet. (Table D-1) Applications have been submitted to the county for an additional excavation of approximately 1,900 acres. One proposed mine for the excavation of 315 acres was denied by the Lee County Board of County Commissioners due to compatibility issues, and this decision is currently under litigation. Lee County Department of Community Development staff has had potential mining proposals brought to their attention for project areas encompassing another 20 sections of land or approximately 12,800 acres (Pers. Comm.). If all of these proposals move forward, the mining project area within southeast Lee County will encompass approximately 32,425 acres of the 83,000 acre DR/GR.

Mines with Lee County Mining Operations Permit Approval (Development Order) Within the Southeast Lee County Study Area	Project Acreage	Maximum Permitted Excavation Acreage	Maximum Permitted Mining Depth[1]
Bell Road	503.75	265.36	40
Bonita Land Resources	47.80	32.47	25
Cemex/RMC	308.64	32.47	70
Florida Rock Green Meadows	1520.80[2]	1075.00[2]	68
Florida Rock Green Meadows Expansion	1528.77	1132.29	68
Plumosa Farm	36.82	29.70	30
Rinker Materials (Phase 1A)	915.01[3]	471.21	45[3]
Rinker Materials (Phases 1B, 2A & 2B)	1,750.39[4]	1,455.01	45
Rinker Materials (Phases 3A & 3B)	1,193.60	622	45
Westwind Corkscrew	602.72	298.8[5]	50
Youngquist Brothers	1955.27	1511.10	90 (East of Alico) 108 (West of Alico)
TOTAL MINES with FULL APPROVAL	**10,363.57**	**7,120.78**	
Mines with FDEP-BMR ERP Permit (Partial Approval)	**Project Acreage**	**Maximum Permitted Excavation Acreage**	**Maximum Permitted Mining Depth[1]**
Florida Rock Mine #2[6]	4839.17	2,471.2	45-60
TOTAL MINES with FULL & PARTIAL APPROVAL	**15,202.74**	**9,591.98**	

1. Maximum permitted mining depth or confining layer, whichever comes first. Measured as feet below land surface.
2. Unable to obtain all the information from Lee County Mining Operation Permit; Information from SFWMD Permit 360260-S
3. Information from FDEP Permit 0166176-0014.
4. Based upon FDEP Permit 0166176-001 and DOS2004-00334.
5. Information from SFWMD Permit 36-03663-P
6. Considered to have partial approval with having obtained the FDEP ERP permit. There is a vacated Industrial Planned Development Master Concept Plan with Lee County. The Army Corps of Engineers (ACOE) approved permit was over turned by a Federal judge due to the necessity to address cumulative impacts to Florida panther habitat.

Table C-1: Approved & Partially Approved Mines Within Southeast Lee County DR/GR

POTENTIAL ECOLOGICAL IMPACTS OF MINING

- **Lowering of the surficial ground water levels**
  - Alteration of hydrology within the project
  - Alteration of hydrology on offsite properties
  - Alteration of watershed dynamics (flows & levels)
  - Extent of impact unknown due to lack of appropriate baseline data, mining and post mining monitoring
- **Interruption or alteration of surface and ground water flow**
- **Alteration of surface and ground water quality**
- **Increased susceptibility of aquifer to contamination**
- **Fragmentation of natural ecosystems**
- **Reduction in listed species habitat**
  - Direct removal of habitat
  - Alteration of habitat due to changes in hydrology
  - Eliminating or reducing interconnectivity of habitats
- **Reduction in non-listed species habitat could lead to significant changes in:**
  - Natural food web
  - Local wildlife population dynamics
  - Wetland dependent species may be displaced
- **Increase in evaporation rate, which may increase in the future as a result of global climate change**
- **Loss of opportunity to restore natural historic flow ways, wetlands, and wildlife corridors.**

MINE RECLAMATION PLAN ANALYSIS

The goal of mine reclamation should be to replace or offset the ecological benefits lost through the mining excavation and to insure ecologically balanced lakes. Fill dirt and limerock mines remove land area creating deep lakes and permanently changing the landscape. This alteration of the landscape has impacts on the connectivity of the land for both water and wildlife resources, leading to changes in the area's ecological functions, such as distribution of water resources and wildlife.

In evaluating the effectiveness of current reclamation standards, it is important to understand the structure of naturally-occurring lakes. Natural lakes are very rare in Lee County. Only a few exist in all of south Florida. Lake Trafford (Collier County), Deep Lake (Collier County), and Lake Okeechobee are the natural lakes occurring in the nearest proximity to Lee County.

Most Florida lakes are shallow, with about seventy-five percent listed in the Florida Lakes Data Base (FLADAB) as being less than fifteen feet in depth (edited by Ronald L. Myers and John J. Ewel. 1990. Ecosystems of Florida. University of Central Florida Press). Lake Trafford has a maximum depth of approximately 10-12 feet (Pers. Comm. SFWMD Staff), and Lake Okeechobee has an average depth of 8.9 feet (Lake Okeechobee Protection Program – Lake Okeechobee Protection Plan Evaluation Report. February 2007. FDEP, FDACS & SFWMD). These natural shallow lakes will have a mixing of the entire water column. In contrast, lakes created through limerock mining are substantially deeper, with excavation approvals within Lee County. Fill dirt mine operations have permitted depths from 25 to 50 feet. Limerock mining operations have permitted depths from 45 to 108 feet. It is doubtful that these deeper lakes have a mixing of the water that extends to the bottom of the excavation. Most likely, the formation of a hypolimnia or layer of water occurs, which "sits" on the bottom of the lake and may either have lower oxygen levels than exist near the surface or become anaerobic. The mixing of the hypolimnia with the upper levels of the lake during extreme storm events may create fish kill problems.

The littoral zone of a lake is defined as "the area of a lake that is suitable for emergent aquatic plant growth, and is shallow enough for light penetration to reach the lake bottom." Littoral zone areas vary greatly

between natural lakes. Wetzel (Limnology, 1975) notes, "Most lakes of the world are relatively small in area and shallow. As such, the littoral flora constitute a major source of synthesis of organic matter that contributes significantly to the productivity of lakes and the regulation of metabolism of the whole lake ecosystem." A literature search was conducted to find information on the littoral zone area of Florida lakes. Very little information was available. However, one source of information indicated Lake Trafford's littoral zone as covering approximately 25-30% of the surface area of the lake (Pers. Comm. SFWMD Staff).

Lee County Reclamation Plan Standards

The reclamation standards for mining excavations are set forth in the Lee County Land Development Code (LDC) Sections 34-1675(b)(8) and 34-1871(c). There is no definition or purpose specified for reclamation within the LDC. The only discussion of the purpose of the mine reclamation is found within the Lee County Comprehensive Plan, which states reclamation plans must be designed to minimize the possibility of contamination of the ground water during mining and after completion of reclamation (Policy 10.1.3).

The LDC requires a preliminary reclamation plan to be submitted as part of the planned development zoning application and a final reclamation plan as part of the local development order. The reclamation standards include the establishment of a planted littoral zone, the final sloping of the lake, and the stabilization of areas disturbed by the mining operations [LDC Section 34-1681(c)(1)]. The following summarizes the reclamation standards:

- minimum 10-feet wide, planted littoral shelf along 25% of linear shoreline of the lake
  - minimum of 4 species of native herbaceous wetland plants
  - number of plants calculated on 1 plant per linear foot of shoreline
  - maximum 6:1 slope unless a deviation is granted for a 4:1 slope
- typical cross section of the lake, including the shoreline slope with the depth of the mine; proposed elevations; and final grading plan.

The mine reclamation standards do not include the replacement or building of soils; replanting of native plant communities or listed species habitat landward of the excavated lake; or any mitigation for natural resource impacts. The reclamation standards do not address the loss of wildlife habitat or interconnectivity of habitats onsite or linking to offsite.

The Lee County Land Development Code also includes environmental requirements for minimum open space and tree planting, which are not directly part of the reclamation plans but do contribute to the design of the mining operations. The following summarizes the open space standards:

- minimum of 20% of the project area must be provided as open space [LDC Section 10-415(a)]
  - 25% of required open space may be provided as lake [LDC Section 10-415(d)(2)(c)]
  - 50% of the required open space must be provided through the onsite preservation of existing native plant communities, also referred to as indigenous preservation [LDC Section 10-415(b)]

Requirements are currently not in place for replanting with native trees or shrubs or recreating native ecosystems within the open space areas. However, the general tree requirement to provide one tree per 3,500 square feet of development area, which includes the total project acreage [LDC Section 10-416(a)], would apply to mines. Upon review of the approved mining operations permits or development orders, it was discovered that the general tree requirement has not always been applied to mines.

Reclamation Plan Evaluation

The mine lake reclamation standards contained in the Land Development Code can be evaluated in two different ways. The first is to evaluate actual reclamation sites for compliance with regulations, for instance: the percent or area survival rate of planted littoral vegetation; the actual shoreline slopes and water levels compared to the approved permit; and actual wildlife use of the littoral areas. Water quality may also be monitored prior to and after the reclamation for comparison. The second method of evaluation is to examine the reclamation regulations to determine if the requirements contain appropriate and ecologically sound standards.

Review of local development order plans confirmed that reclamation plans were submitted and approved for all the currently active mines. The details contained within varied from simple narrative to more detailed plant lists and planting locations. All the reclamation plans included cross-sections of the lake to demonstrate compliance with the final slope standards.

The reclamation plans for approved mines within Lee County were researched through the zoning resolutions and development orders for the mines. These reclamation plans typically include a 4:1 or 6:1 slope for the finished shoreline. This results in a littoral zone (i.e., from wet season water level to -3.0 feet) of 12-18 feet in width. The planting plans are most often based on one littoral plant per linear foot with a minimum of four native herbaceous wetland species, which is the county's development standard for stormwater lakes (LDC Sect 10-418).

Two methods of creating the post-mining or reclaimed lake shoreline and littoral zone were found within the Lee County approved development orders, otherwise referred to as mining operations permits. The first method is to excavate a littoral zone landward of the mining excavation limits. The second method is to backfill the littoral zone to achieve the post-mining shoreline slope.

The most recent Lee County staff-recommended mining approval includes a reclamation plan with a large contiguous marsh area equivalent to a one hundred (100) feet wide littoral zone at a 50:1 slope around fifty percent (50%) of the lake shoreline. The remainder of the shoreline would have a final slope of 4:1. The required littoral zone vegetation must provide fifty percent (50%) coverage of the littoral zone at the time of planting. The purpose of this recommended littoral shelf was to provide a wood stork foraging habitat as well as a source of organics for the lake to have a healthier lake system upon completion of mining. This proposal is tentatively scheduled to be heard before the Board of County Commissioners in August, 2008.

Compliance with the LDC-required mine reclamation was not able to be evaluated on a site-specific basis, as there has not been a completed reclamation to date. This was verified with Lee County Department of Community Development compliance staff (Pers. Comm. 2008). The LDC requires that reclamation must commence within thirty (30) days after completion of mining in any phase that will not be disturbed by future operations, and will be completed within twelve (12) months or whenever the permitted operations have been completed or the general excavation permit expires, whichever comes first [LDC Section 34-1675(b)(8)(c)]. Currently, the mines do not fully complete the excavation of one phase of a mine before commencing the next phase; therefore, the "trigger" to require the commencement of reclamation is not reached until the excavation is completed for the entire mine or the general excavation permit expires (i.e. zoning)(Pers. Comm.).

To more thoroughly evaluate the Lee County mine reclamation standards and the implementation thereof, studies were performed on those mines with approved reclamation plans that included the slope of the reclaimed shoreline, the acreage of the excavated lake, and the number of littoral plants to be installed (Westwinds LDO2001-00093; Bell Road Mine LDO2003-00403; University & West Lakes LDO2006-00071; and Plumosa Farms LDO2001-00028). Quantifiable information was compiled for acreage of littoral shelf created; percentage of surface area of the mine lake provided as littoral shelf; and the number of required littoral plants based upon foot-on-center quantities so as to compare the mines

of various sizes. The percentage of surface area of the lake provided as littoral zone for these mines equated to 0.14 – 1.51 percent. The larger the mine lake, the lower the percentage of surface provided as littoral zone. The littoral shelf is required to be planted with native herbaceous wetland plants (2-inch liner size) based on one plant per linear foot of final shoreline [LDC Section 34-1681(c)(3)], which equated to the littoral shelf being planted with vegetation approximately 1 – 1.75 foot on center for these approved mines.

Conclusions

The current Lee County reclamation standards do not replace or offset the ecological benefits lost to mining excavations or provide ecologically balanced lakes. The amount of planted littoral shelf is insignificant in relation to the size of the mining lakes, with less than two percent of the lake surface area being provided as planted littoral zone. The ecological benefits of the required littoral shelf are minimal at best. Additionally, the loss of wildlife habitat or lands that large ranging mammals, including the Florida panther, can traverse is not included in the current reclamation standards. The standards do not address the connectivity of wildlife habitat or the replacement or enhancement of critical wood stork foraging areas. Another concern with the current reclamation standards is the lack of mitigation or compensation required for impacts to ground water levels or water quality onsite or on adjacent properties.

The Lee County LDC standards need major revisions to provide ecologically sound designs that compensate for the permanent loss of land area and insure the viability of large, deep lakes created through mining operations - while also providing for protection of the quantity and quality of water resources. Alternative reclamation scenarios are discussed in the following section.

OVERVIEW OF RECLAMATION STANDARDS FOR OTHER AGENCIES

FDEP Reclamation Standards

The FDEP-BMR reclamation program has been overseeing the mining reclamation activities since 1995. Projects where natural resource extraction was conducted prior to 1989 are not required to provide reclamation for lakes resulting from the mining. Some mines that were permitted prior to 1995 have SFWMD Management and Storage of Surface Water (MSSW) permits, even for limerock mines. These permits remain valid.

The Florida State Statutes Chapter 378 establishes the provisions for land reclamation with general provisions in Part I (F.S. 378.011-378.038) and resource extraction reclamation provisions in Part IV (ss. 378.401-378.901). Reclamation standards for mines may be found in Florida Administrative Code Rule 62C-36.008 for limerock excavations and Rule 62C-39.008 for sand and gravel mines.

According to FDEP-BMR, reclamation is defined as "the reasonable rehabilitation of land where resource extraction has occurred" (F.S. 378.403.16). Prior to mining, the operator must provide a conceptual mining and reclamation plan or a reclamation notice. Areas disturbed by mining operations, and subject to the reclamation requirements, must be reclaimed after mining is complete - including uplands and the littoral zone of any lake created through mining. However, revegetation is not required in "those areas where revegetation is impractical or not in accordance with good land management practices" (F.S. 378.503.6). However, reclamation activities must be consistent with all applicable local government ordinances (F.A.C. 62C-36.008 & 62C-39.008).

The final side slope of the lake created through mining excavation and the area to be planted are different for limerock excavations and sand and gravel mines. There are a number of shoreline reclamation options for limerock excavations, ranging from the creation of a minimum 18-foot wide littoral shelf to fences and other shoreline structures proposed by the applicant. Lakes created through sand and gravel excavation must have a final side slope consistent with the type of sand or gravel material present but no steeper than 2:1. The zone of water fluctuation should be vegetated with native species and provide coverage of at least fifty percent (50%) of this littoral zone with established wetland plants. This should be done for a period of not less than one year after the initial appearance from the use of wetland muck or installation of plant material. Both limerock and sand and gravel mines must recontour and stabilize the land to control erosion within one year of ceasing mining operations. Revegetation must begin as soon as it is practicable - within one year of completing final grading and contouring and with revegetation completed within three (3) years of the final cessation of mining operations. (F.A.C. 62C-36.008 & 62C-39.008)

Other Florida Counties Reclamation Standards

The reclamation standards for fill dirt and limerock mining operations that have been adopted by other counties within Florida were reviewed to obtain a broader understanding of the requirements currently applied to these mining pits. The regulations for reclamation range from zero requirements to those accepting FDEP-BMR approved plans and others with specified standards. Glades County does not have any mining reclamation standards. Alachua and Charlotte Counties require a reclamation plan as part of the mine design but do not include specific standards within their land development codes. Collier and Hendry Counties accept reclamation plans included within FDEP-BMR Environmental Resource Permits. Manatee County, Palm Beach County, and Sarasota County have more detailed requirements regarding final shoreline slope and littoral shelf parameters as shown in Table D-2.

Collier County, Hendry County, and Hernando County have provisions to eliminate the littoral shelf requirement in certain circumstances.

The application and implementation of the reclamation standards for other counties were not included as part of this evaluation.

OTHER MINE PIT DESIGNS IN SOUTH FLORIDA

Lake Webb, Babcock-Cecil Webb Wildlife Management Area

Lake Webb is located in Charlotte County within the Babcock-Cecil Webb Wildlife Management Area. This lake was constructed in conjunction with the construction of I-75 and served to provide base materials for the road construction. It was also a fill dirt mine with a maximum depth of approximately 14-feet. The design of the mine pit lake was a combined effort between the Florida Department of Transportation (FDOT) and the Florida Fish and Wildlife Conservation Commission (FWC). The design goal was to establish waterfowl habitat. The emergent vegetation littoral area was established with native, non-nuisance species and intensive cattail management. However, low nutrient content of the open water has made it difficult to maintain submersed vegetation. According to FWC staff, this fill dirt lake requires continued management that is both timely and expensive, and awareness of these factors when designing littoral areas for mine pits cannot be emphasized enough. (Pers. Comm. 2008)

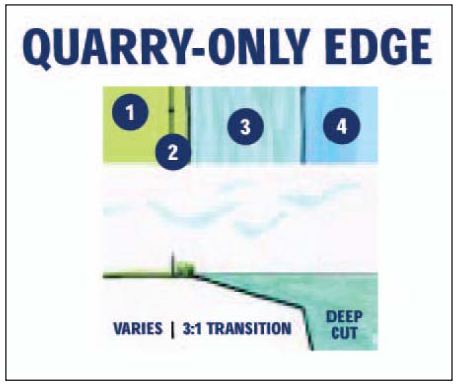
The design of Lake Webb has limited applicability to the deep limerock mine pit reclamation.

Miami-Dade Lake Belt Phase II Study

The Miami-Dade Lake Belt Plan Phase II (2001) includes a recommendation for four reclamation plan designs, which are the most detailed found to date. The littoral wetland design is determined by each land owner, with review and approval made by the permitting agencies. The quarry edge reclamation plan only includes a fence for safety and a 3:1 slope grade for a 100-foot width into the mine pit (Figure D-1A). This design provides safety measures and an option to meet any future well field protection regulations that limit littoral plantings for any Comprehensive Everglades Restoration Plan reservoirs. The typical littoral area reclamation plan consists of a 100-foot wide littoral marsh with a protective berm between the marsh and the borrow pit (Figure D-1B). The diversified littoral area reclamation plan includes a 100-foot wide area with a mosaic of upland planting areas, natural elevation seasonal wetlands, littoral marsh, deep cut areas (10-20 feet), fish refugia, forage pockets, and tree islands set apart from the main deep borrow bit by a protective berm (Figure D-1C). The expanded littoral area reclamation plan consists of varied habitats similar to the diversified littoral zone but on a larger scale between two borrow pits. This provides a wider littoral area, such as the 400-foot width shown in the illustration (Figure D-1D).

The Miami-Dade Lake Belt Phase II standards indicate that littoral shelves may be inappropriate around lakes located within the public potable water well field protection area due to the possible contamination of the water by mammals utilizing the littoral areas - more specifically the potential introduction of the parasite *Cryptospiridium*. This issue has not been studied beyond the information contained within the Technical Report: Northwest Wellfield Watershed Protection Plan, Miami-Dade County, Florida (2000). The littoral designs for mine lakes within the Miami-Dade Lake Belt have not been established, as this is a minor issue compared to other unresolved issues (Pers. Comm. Miami-Dade Department of Environmental Resource Management staff).

Figure D-1: Miami-Dade Lake Belt Mine Reclamation Plan Designs (from Miami-Dade Lake Belt Phase II Plan, 2001).



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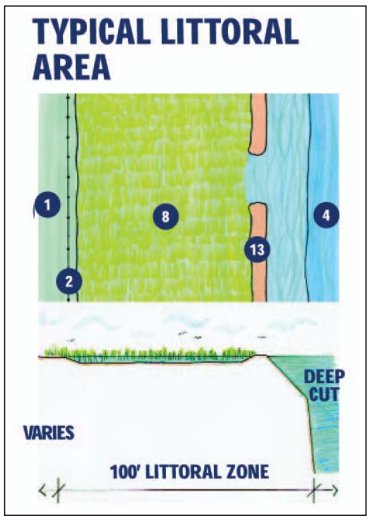

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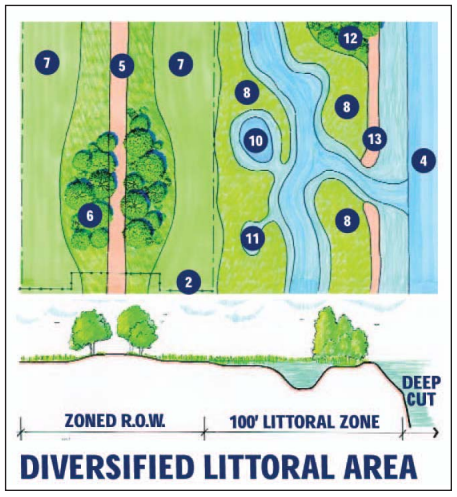

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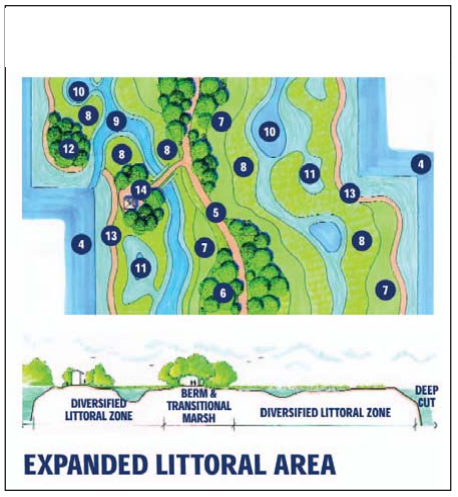


D

Key:

1. Adjacent Property of Right of Way (conditions vary)
2. Fence
3. Minimum Safety Slope
4. Deep Borrow Pit
5. Maintenance Road/Berm/Potential Greenway
6. Upland Planting
7. Natural Elevation Seasonal Wetland
8. Littoral Marsh
9. Deep Cut (10-20')
10. Fish Refugia
11. Forage Pocket
12. Tree Island
13. Protective Berm
14. Observation Area

ALTERNATE RECLAMATION CONCEPTS

A literature search was conducted to locate research papers regarding ecologically based reclamation plans for limerock mines. Neither published or "grey" literature was found. However, mine reclamation standards from other counties within Florida and the FDEP-BMR were reviewed, though there is no consistency in the standards and no "state-of-the-art" design standards available for limerock mine reclamation.

When recommending reclamation plan concepts or standards, it is important to define the purpose of the reclamation to insure the design accomplishes the desired outcome. The DR/GR mine pits are located or proposed within non-urban portions of three watersheds that include public potable water supplies and important wildlife habitat. Therefore, the mine pit design including the reclamation plan must provide protection or enhancement of the watershed, the public potable water supply, and wildlife. Limerock mines encompass large expanses, leaving a permanent foot print on the landscape. The mine pit reclamation cannot be equated with restoration due to the nature of the permanently removed habitat. However, the reclamation plan may be designed to create valuable wildlife habitat and enhance the ecological diversity in the DR/GR.

The issues regarding watershed and public potable water supply protection will need to be addressed through appropriate hydrogeologic studies, including the 3-dimensional modeling that is occurring as a part of this study and through specific mine design requirements based on site-specific data.

Alternate reclamation concepts are based on the creation of viable lake ecosystems that use the best available information and aim to insure that inappropriate or incompatible future uses do not occur in areas adjacent to mined lakes.

A. Maximize Mining In A Preferred Area That Is Well-Buffered

In order to maximize the excavation of limerock within preferred mining areas, the property would be excavated with relatively minimal setbacks that are established by modeling to protect nearby resources. On-site wetlands could be removed as a matter of public interest, with compensation occurring through off-site mitigation within the same watershed.

The reclamation of the mine would include both planting and contouring within the lake and the adjacent unmined portions of the property. Ten percent (10%) of the surface area of the lake would be provided as a littoral shelf with native vegetation installed to create freshwater marsh areas. The littoral shelf will be considered as the area from the average water level of the lake to a three foot depth below the average water level. The minimum width of the littoral shelf would be 100 feet. The slope of the littoral shelf would be established on the width and design of the littoral shelf. The plantings would include a minimum of six species of native wetland plants with no one species covering more than 20% of the littoral shelf. The herbaceous wetland plants will be installed 3 feet on center. An invasive exotic and nuisance management plan must be included for the long-term maintenance of created wetlands.

The non-excavated portions of the property would be enhanced or restored by seeding with native vegetation and planting a mixture of 1-gallon and 3-gallon native trees to achieve a density of 400 trees per acre within 5 years of planting. Trees must be planted in appropriate soil. However, a maintenance access for the lake and to any public well sites will be established per site-specific design with access areas being stabilized, grassed or crushed shell and including a maximum width of 20 feet.

Future use of the site would be limited to water supply, with Class I water quality standards to be maintained after completion of mining.

A perpetual conservation easement would be required for the entire property upon completion of mining to insure the protection of the water quality, created wetlands, and planted uplands. An extended maintenance and management plan would be provided for all areas to be placed under the conservation easement.

B. Limited Mining Outside Of A Prefered Mining Area

The County should consider limiting mining to a design that does not lower the offsite surface and ground water levels. Three years of baseline surface and ground water level data would be required along with 3-dimensional hydrologic modeling to demonstrate that the proposed design would not lower offsite surface and ground water levels. Monitoring plans would need to be established to insure that surface and ground water levels are not lowered.

The reclamation standards would be based on the establishment and maintenance of a viable lake able to sustain appropriate aquatic flora and fauna. The reclamation must include 25% of the surface area of the lake to be provided as littoral shelf with native wetland vegetation installed to create freshwater marsh areas. Topsoil (A & B horizon) must be used to enhance, restore and create the wetland habitats. The littoral shelf will be considered the area from the average water level of the lake to a three-foot depth below the average water level. The minimum width of the littoral shelf would be 100 feet. The slope of the littoral shelf would be established by the width and design of the littoral shelf. The plantings would include a minimum of fifteen species of native wetland plants with no one species covering more than 20% of the littoral shelf. The herbaceous wetland plants will be installed 3 feet on center. An invasive exotic and nuisance management plan must be included for the long-term maintenance of the created wetlands.

Future use would need to be determined prior to designing the excavation area in order to insure the design includes measures for the private potable drinking water wells and septic systems for any residential or commercial uses. These measures would address how systems will be designed to maintain the off-site surface and ground water levels; avoid impacting the required created wetlands within the reclaimed lake; and maintain the surface and ground water quality.

C. Littoral Shelf Design Factors

In order to maximize the ecological benefits of reclaimed mine pit shorelines, the following should be included in any littoral area design:

- Non-linear form
- Varying depths with foraging pockets created for low water levels
- Some open sand substrate
- Diversify species
- Wetland trees
- Wetland shrubs & herbaceous species
- Native soil
- Exotic and nuisance species control (<1% cover maintained)
- Erosion control measures along interface with mine pit lake

D. Non-traditional Solutions

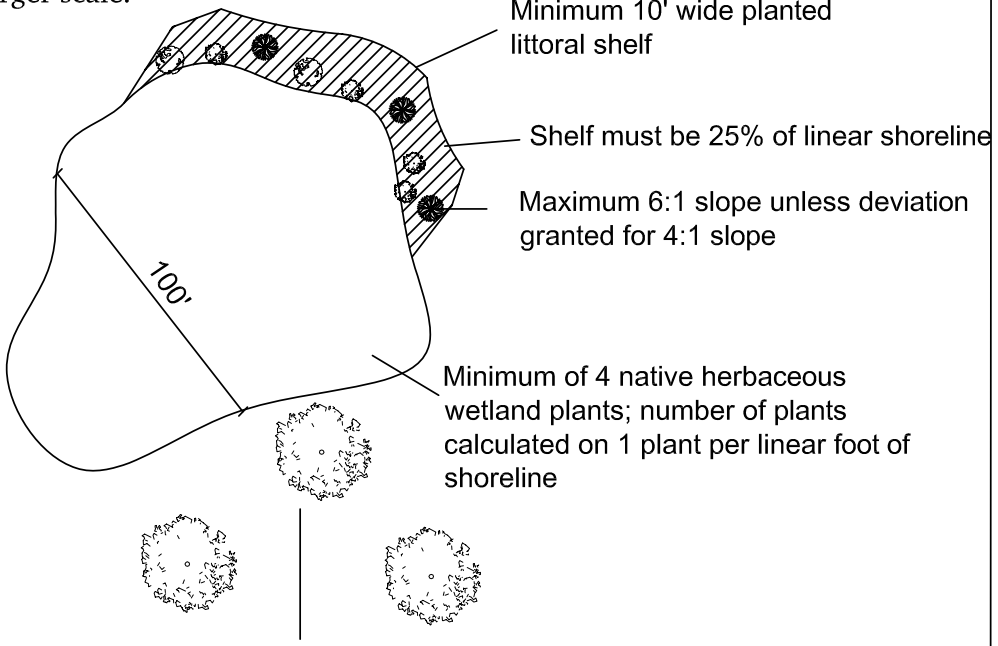
a. Airport Area: In order to address potential conflict between birds and the Southwest Florida International Airport flights, an option to allow rip-rap shorelines with steep slopes with offsite habitat mitigation should be considered.

b. Flowway Restoration: Alternate reclamation plans may be considered when the enhancement or restoration of a flow-way is deemed necessary or important to the watershed. In these cases, the emphasis would be on enhancing or restoring the hydroperiod and vegetation within the flowway in lieu of either eliminating or reducing the required amount of planted littoral shelf around the mine pit.

CURRENT STANDARDS

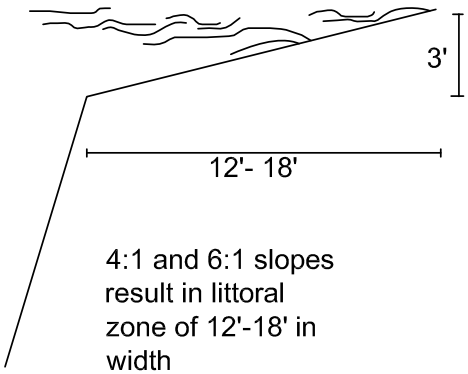
Lee County Land Development Code (LDC)
Sections 34-1675 (6)(8) and 34-1871(c)

Current standards as set forth in the LDC are insufficient to meet the reclamation needs of larger mine operations. These standards, which were originally intended for borrow pits and very small dirt mines in areas around SR82, are designed to facilitate recreational restoration such as kayaking and fishing. While fitting for an excavation of this size, the ecological impact of these standards is minimal if applied to sites of a much larger scale.



Development requirements of 1 tree per 3,500 square feet of development area also apply to mines (this should be planned when designing mining operations)

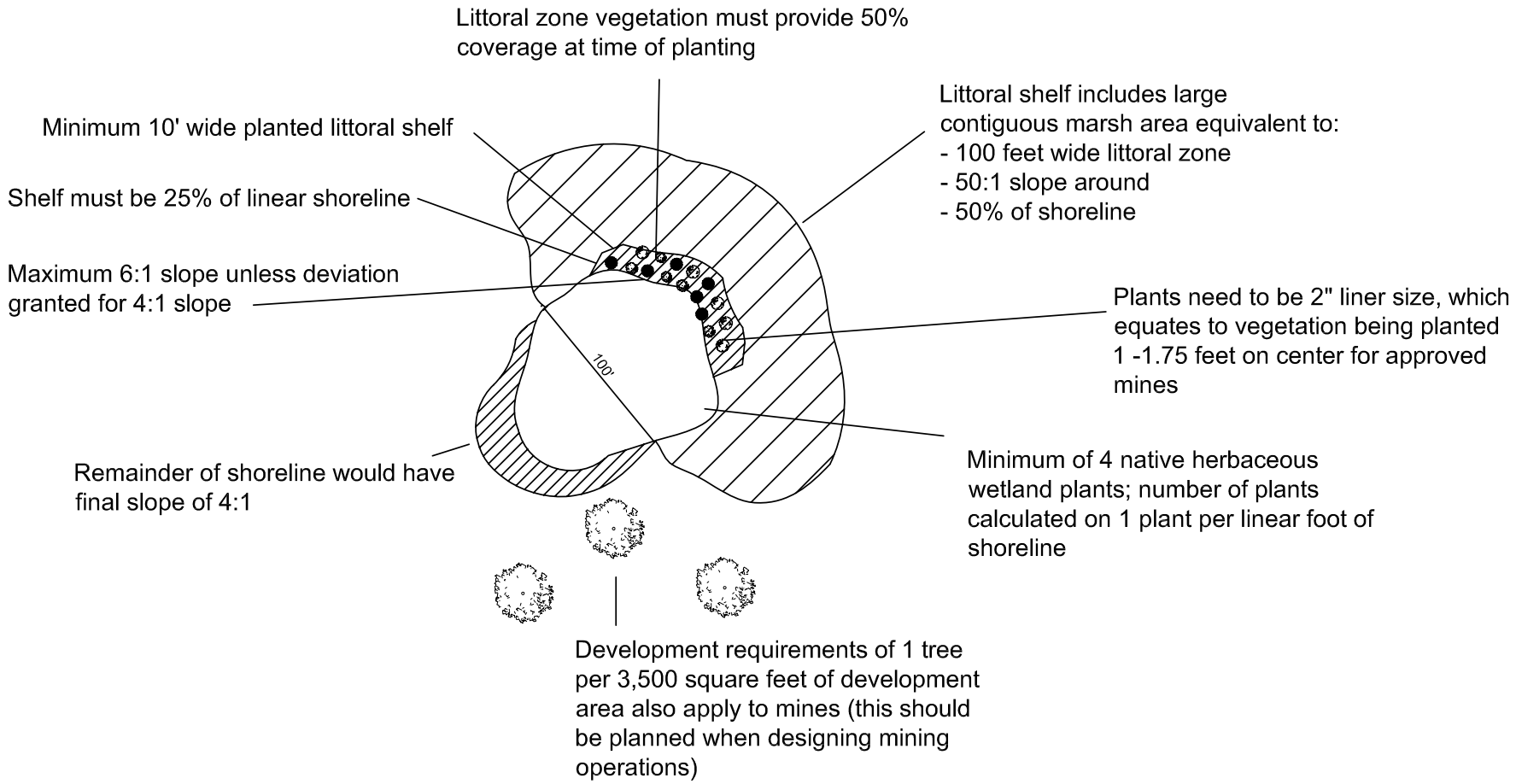
Cross Section



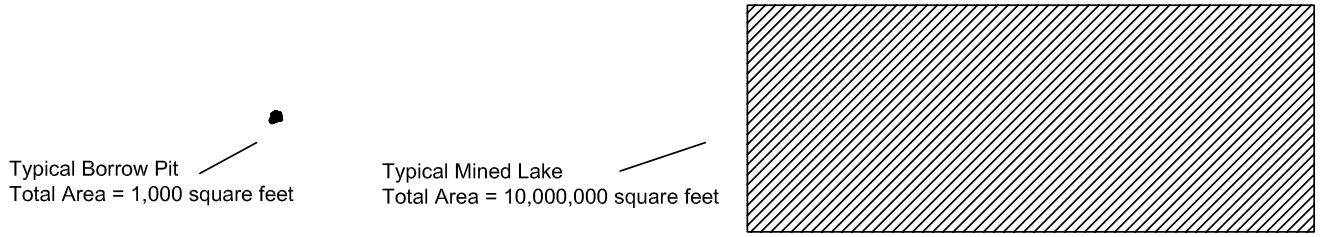
4:1 and 6:1 slopes result in littoral zone of 12'-18' in width

CURRENT STANDARDS AND LEE COUNTY STAFF-RECOMMENDED ADDITIONS

Lee County staff, recognizing the shortfalls of the current standards, has proposed some additions to the reclamation regulations, which would provide the following:

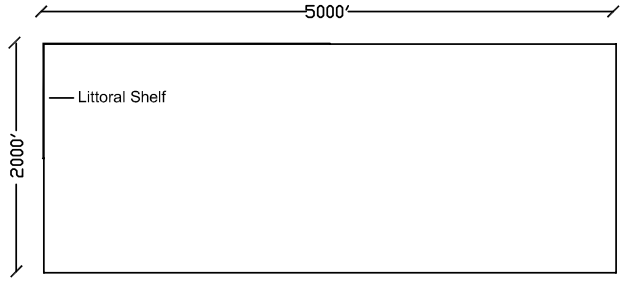


APPLICATION OF STANDARDS AT DIFFERENT SQUARE FOOTAGES

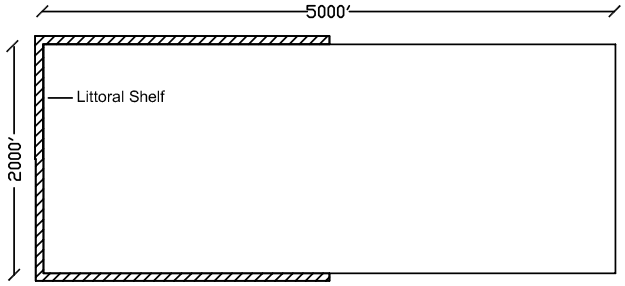


When current reclamation standards are applied to areas larger than borrow pits and small dirt mines, the impacts are insignificant.

Current Standards

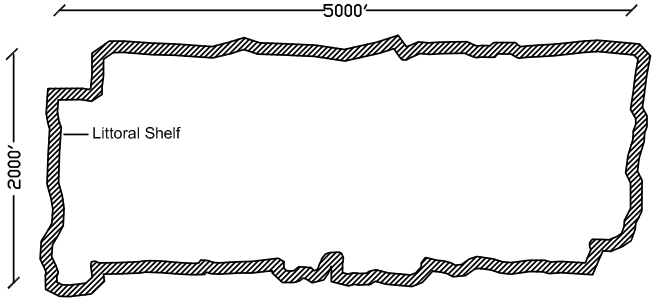


Current standards require a littoral shelf to be 10' wide along 25% of the shoreline (in this case, creating a littoral shelf **35,000 square feet)**

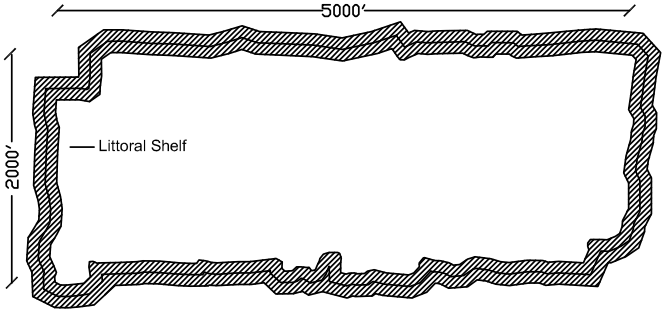


Current standards with Lee County staff-recommended additions require the littoral shelf to be 10' wide along 25% of the shoreline and includes a contiguous 100' wide marsh covering 50% of the shoreline (for a total of **105,000 square feet** of combined reclaimed and restored areas)

Alternate Scenarios



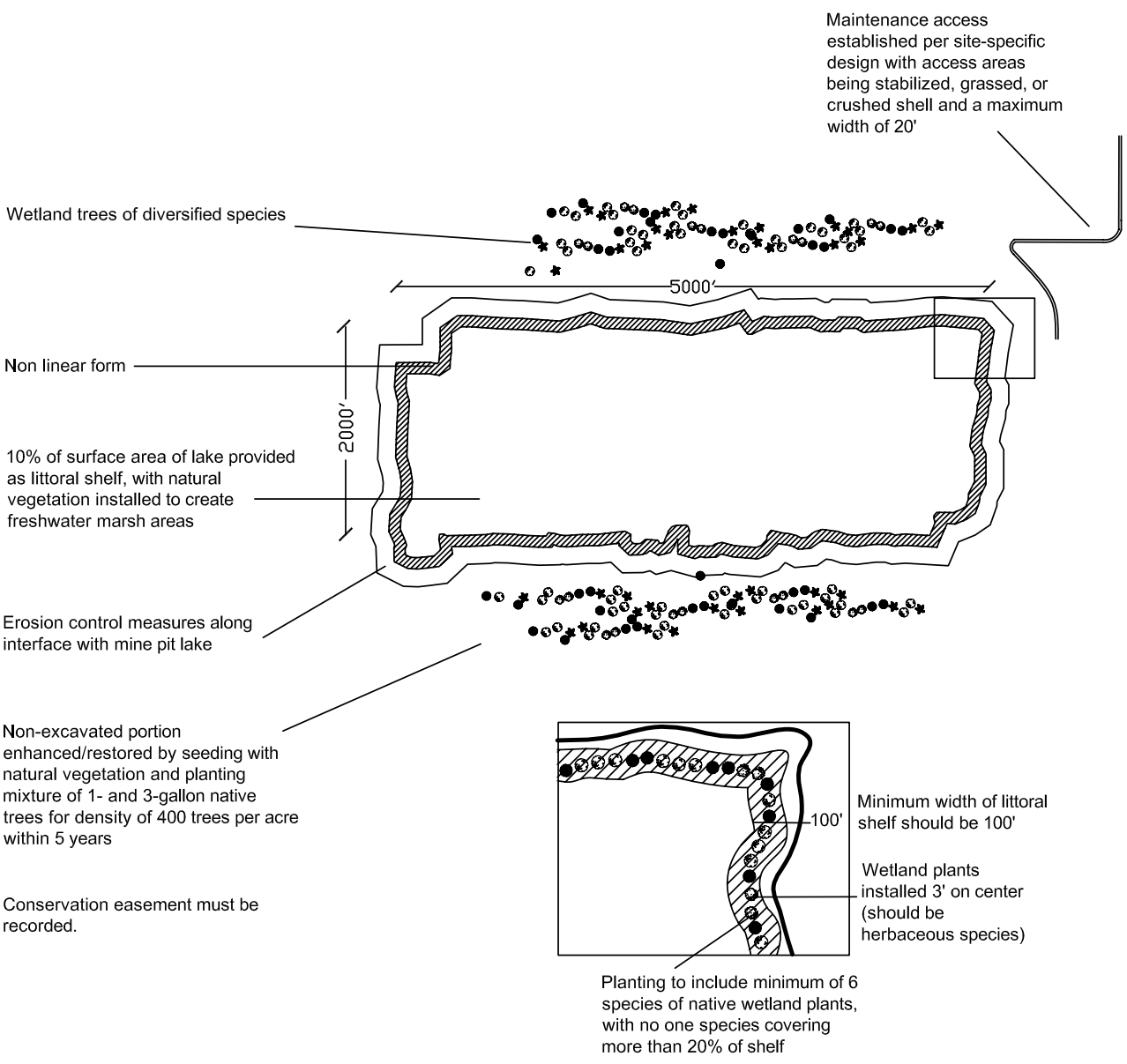
A. The proposed alternate scenario requires a 100' wide littoral shelf covering 10% of the surface area of the lake (in this case, **1,000,000 square feet**)



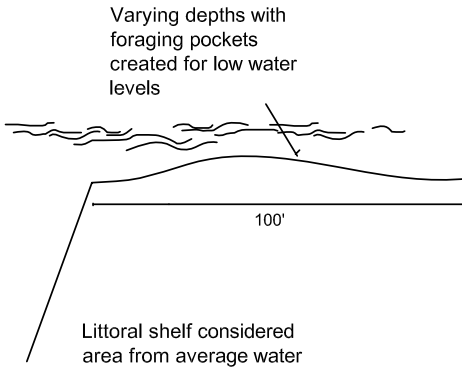
B. The proposed alternate scenario requires a 100' wide littoral shelf covering 25% of the surface area of the lake (in this case, **2,500,000 square feet**)

ALTERNATE SCENARIOS

A. MAXIMIZE MINING IN A DESIGNATED AREA THAT IS WELL-BUFFERED

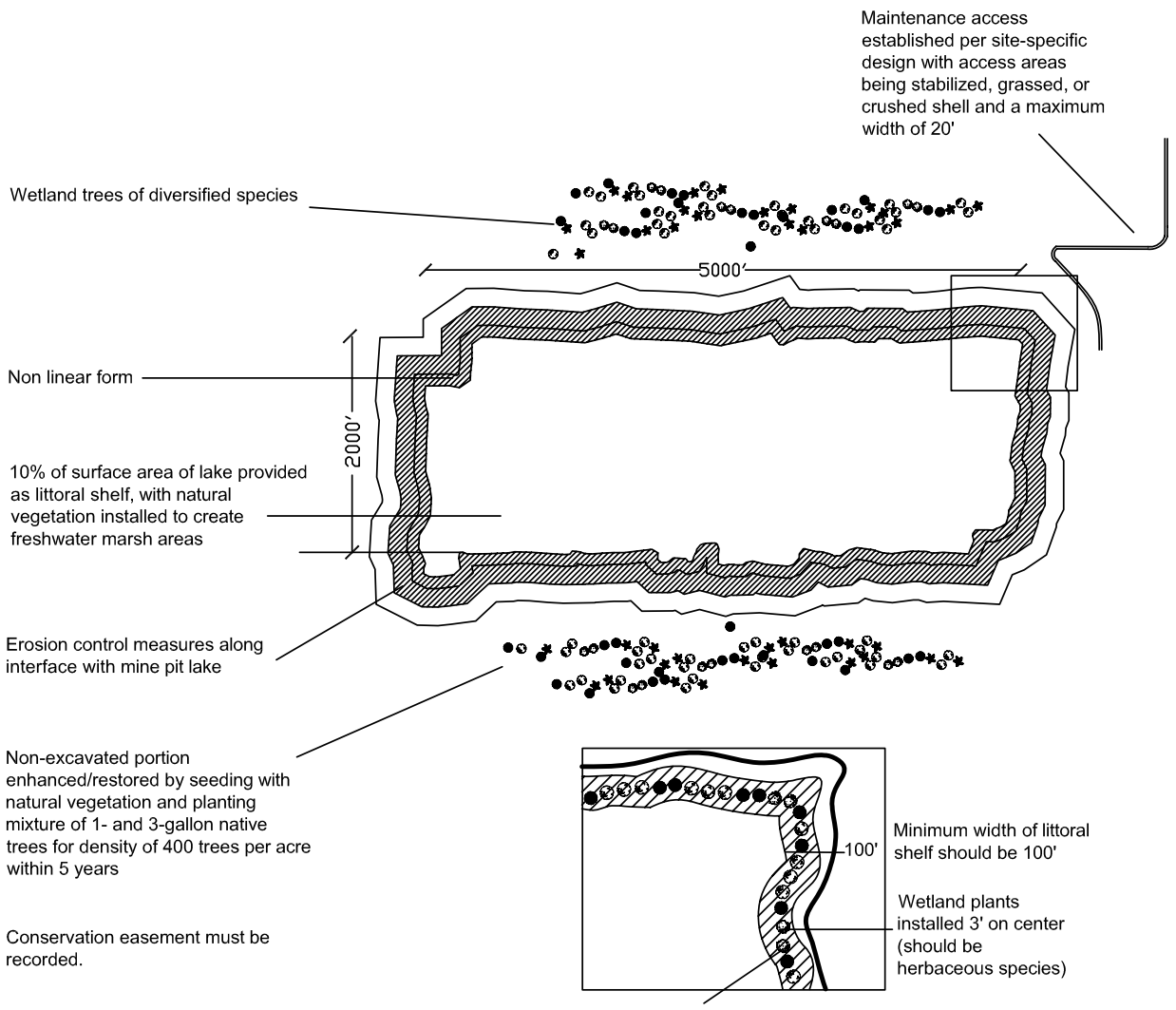


Cross Section

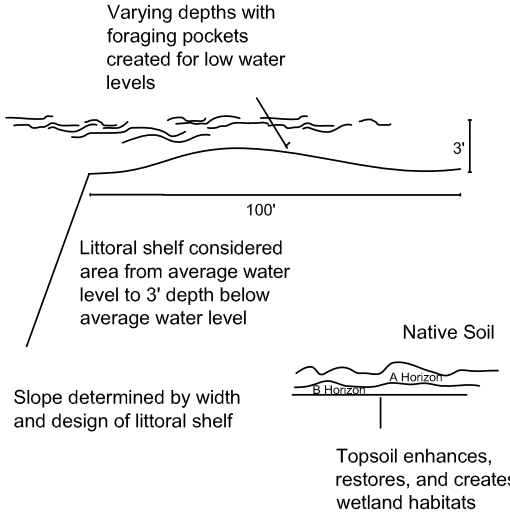


ALTERNATE SCENARIOS

B. LIMITED MINING OUTSIDE OF A DESIGNATED MINING AREA



Cross Section



NON-TRADITIONAL SOLUTIONS

AIRPORT AREA

Rip-rap shorelines with steep slopes and offsite mitigation should be considered to address potential conflict between birds and the Southwest Florida International Airport flights

COUNTY	LITTORAL SHELF SLOPE (maximum)	LITTORAL SHELF WIDTH[1]	NO LITTORAL SHELF OPTION	LITTORAL SHELF	LITTORAL SHELF % OF LAKE	LITTORAL PLANTS SPECIES	PRESERVATION OF NATIVE HABITAT	UPLAND PLANTING	TIMING OF RECLAMATION
ALACHUA	(2)			(2)					(2)
CHARLOTTE	(2)			(2)					(2)
COLLIER	4:1	(3)	Yes (3)	(3)				20-foot width landward of control elevation sodded or seeded	(3)
DESOTO	4:1							Sod or equivalent for erosion control	Begin when 50% of the excavation completed or 50% of the life of the permit
HENDRY	(3)	(3)	Yes (3)	(3)				20-foot width landward of control elevation sodded or seeded	(3)
HERNANDO Option 1		18 feet	Yes				Min. 20% preserved or replanted		Completed within 3 years of cessation of mining
HERNANDO Option 2	4:1	12 feet	Yes				Min. 20% preserved or replanted		Completed within 3 years of cessation of mining
MANATEE	5:1	15 feet		Maximum 80% of lake shoreline	10%				
MIAMI-DADE	(2)			(2)				(2)	Upon completion of the excavation operation or if the operation is discontinued, abandoned or time expires under 10-year rock mining certificate of use
PALM BEACH	10:1	30 feet		8 square feet per linear foot of shore		5		75% 180 feet; 25% 100 feet; seeded with native vegetation	Within 6 months of completion of a phase & during the wet season (June-Oct)
SARASOTA	7:1	21 feet			15%			To be planted with native indigenous species to provide for natural vegetation associations which will mature to productive wildlife habitat. Detailed table included in code.	Final grading within 2 years of completion of a unit

1. Littoral shelf is defined as the area from average water level to a water depth of three feet.
2. Required as part of the plan design but no specific standards within regulations.
3. State Standards

Table D-2: Other County Fill Dirt And Limerock Mine Reclamation Standards

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the Lee Plan's treatment of environmental issues

D

LEE PLAN EVALUATION OF ENVIRONMENTAL ISSUES

The contents of this evaluation are subject to revision upon completion of the environmental mapping and hydrologic modeling that are also being conducted as part of this study.

Lee Plan Vision

The Lee Plan is Lee County's state-mandated comprehensive growth plan, which sets forth parameters for appropriate development patterns that also serve to protect the citizens and environment. One goal within the vision statement is to maintain the clear distinction between urban and rural areas. This aim is achieved by the promotion of viable agricultural uses and acquisition of publicly-owned lands in the outlying areas. Additionally, the plan recognizes the importance of protecting Lee County's natural resource base as a way of maintaining a high quality of life for residents and visitors. Aggressive public land acquisition, cost-effective land use, and environmental regulations supplementing federal, state, and regional regulatory programs will all aid in this endeavor.

The Southeast Lee County Community Planning Area described in the Lee Plan encompasses the same area as the southeast Lee County Density Reduction/Ground Water Resource study area. This area contains DR/GR, Wetlands, and Public Facilities land use categories, and a low-density residential community use for very large lots (1 dwelling unit per 10 acres), mining operations, and agricultural uses.

This portion of the study evaluates the details of the Lee Plan goals, objectives and policies to insure that the environmental quality is protected within the southeast DR/GR. Environmental protection is of high importance in the DR/GR, as the study area contains the majority of Lee County's unincorporated public water supply wells as well as other natural resources including limerock, wetlands, and wildlife. This evaluation addresses Lee Plan Goals pertinent to environmental protection within the southeast Lee County DR/GR.

Future Land Use Map – Goal 1

The DR/GR land use category is often misidentified as the "Density Reduction/Ground Water Recharge" area. It is important to understand that the land use category is the "Density Reduction/Ground Water *Resource"* area. The Lee Plan description of the land use category begins with the discussion of the public water supply and ground water recharge aspects of this area, noting that "Land uses in these areas must be compatible with maintaining surface and ground water levels at their historic levels." The currently-proposed, staff-initiated amendment through Smart Growth changes "historic levels" to "pre-development" levels, and while both terms may have the same intent, neither is defined within the Lee Plan. "Historic levels" have been interpreted by staff to mean ecological conditions prior to land alterations that were constructed to alter the surface and ground water levels. Except for the removal of pine and cypress trees through logging operations, the DR/GR area's "historic" natural state can be evaluated through historic aerial photographs from the 1940's and 1950's. The 1950's aerials are readily available at the Natural Resource Conservation Services (previously known as the USDA Soil Service) in North Fort Myers. (Policy 1.4.5)

The DR/GR land use category also establishes the density of 1 dwelling unit per 10 acres of land with up to 2 acres of the land area consisting of wetlands if no wetland alteration is proposed. All other wetlands on the property are available for 1 dwelling unit per 20 acres. (Policies 1.4.5 & 1.5.1) The application of these policies allows for future lakes produced by mining to be counted as upland, resulting in an allowed 1 dwelling unit per 10 acres of lakes.

The Wetland land use category limits permitted land uses to very low density residential uses and recreational uses that will not adversely affect the ecological functions of the wetlands. Mining is usually not included in the permitted uses within the Wetland land use category. The Lee County Future Land Use map (FLUM) delineates some portions of the DR/GR as Wetland. However, these are general locations and the actual field-verified, state-jurisdictional wetlands are considered to be within the Wetland land use category by staff. There is a policy differentiating between Wetland land use category and Conservation Wetlands land use category. All public lands required to be used for conservation purposes by some type

of legal mechanism include wildlife preserves, and wetland and upland mitigation areas. The FLUM is to depict the Wetlands and Conservation Wetlands land use categories separately. (Objective 1.5; Policies 1.5.1 & 1.5.3)

Lee County's DR/GR designation originated from desires to protect valuable groundwater resources and limit suburban sprawl. It may be useful to clarify the meaning of the phrase "historic levels" in Policy 1.4.5. In similar contexts, the term historic is sometimes used interchangeably with "pre-development," yet some agencies regrettably have interpreted "pre-development" to mean before the particular development under review, rather than before development of the site affected historic conditions, for instance through agricultural conversion and drainage. That interpretation would run directly counter to the plain meaning of Policy 1.4.5.

A suggested definition for "historic surface and groundwater levels" is as follows:

> *The surface and ground water levels needed to sustain native plant communities present prior to land alterations that resulted in the artificial lowering of the surface and ground water. The accepted standard for water levels is based on available information and scientifically-based assumptions of 1953 historic aerials, which are made available at the local Natural Resources Conservation Service office or electronically through Lee County. Pre-development aerial photography prior to and after 1953 may be utilized to clarify native land cover and hydrology.*

Currently, density calculations accept open water (including mining pits) as the same as land when determining how many residential lots could be created around former mine pits, not even taking into account any wetlands that may have been destroyed by mining. The typical agricultural zoning in the DR/GR is AG-2, which would allow lots to be as small as 39,500 square feet. Lots of this size usually rely on individual wells and septic systems, which have potential impacts on water quality and water levels in nearby mine pits. Lots around mine pits become a particular issue when public drinking water supply wells are located near the mine pit.

The residential lots created after the completion of mining would only need to meet the minimum AG-2 lot size of 39,500 square feet for typical lots and 33,600 square feet for corner lots, or whatever lot size was adopted through a residential planned development zoning. While this may be an acceptable planning calculation within urban areas, such density calculations within the DR/GR have ecological implications. One ecological issue is the potential impact on maintaining the water quality and water level of large, deep mine lakes that rely on private potable wells and septic systems to service these residential lots. This kind of density calculation also poses a public health and safety issue, considering the public drinking water supply wells are located within the DR/GR. The county should require the use of sewer systems for any new residential subdivisions as a means of protecting the DR/GR water resources and native habitats. Sewering, however, can not be allowed to result in sprawl development as often follows the extension of public utilities. One benefit of utilizing sewer in place of septic is a reduction in the amount of fill required on individual lots, which also preserves native vegetation and protects water quality. Additionally, a fill-reduction requirement would maintain more of the natural soil conditions for ground water recharge and decrease storm water runoff.

The majority of existing mines within Lee County are now regulated under an industrial planned development (IPD) resolution. To gain the residential use upon completion of the mining, the property would need to be rezoned either back to AG-2 or to a residential planned development. The Lee Plan should be revised to clarify the density calculation for lands that have been mined for fill dirt and limerock. The density should be based on existing upland and wetland areas, not including the mine lake, though residential use of a property containing a reclaimed mine lake may be appropriate. This clarification supports the intent of the Lee Plan, which is to protect the water resources within the DR/GR and maintain very low-density residential uses while also allowing for natural resource extraction. Additionally, amending the Lee Plan to include an objective about the future use of natural resource extraction properties, as well as actual implementation policies, would insure the protection of

water resources in this critical area of the county while providing reasonable assurance to property owners as to their expected post-mining uses.

The following objective and policies are recommended. Note that the ** is a placeholder for the appropriate place these items are to be located in the Comprehensive Plan as determined by Planning Staff.

Objective 10.**: Future Uses of Natural Resource Extraction Developments.

The future uses of any new or renewed natural resource extraction project must be evaluated at the time the property undergoes planned development review.

*Policy 10.**: Natural resource extraction operations must be designed to incorporate any proposed future uses, so as to insure the protection of surface and ground water resources, wildlife, and native plant communities.*

*Policy 10.**: New residential developments must utilize a central sewer system to protect water quality and reduce the amount of fill required on individual lots. This policy will maintain more natural soil conditions for ground water recharge and reduce stormwater runoff.*

*Policy 10.**: Natural resource extraction operations must be designed to provide open space appropriate for the proposed future uses.*

*Policy 10.**: Buffers, indigenous preservation, and reclaimed littoral shelves required for the natural resource extraction must be placed under a Conservation Easement in order to maintain these areas in perpetuity regardless of future land uses.*

If natural resource extraction continues as an allowable use within the Wetland future land use category, the Lee Plan should be amended to include mining as an allowable use.

Growth Management – Goal 2

The Lee Plan requires any revisions to the FLUM only be approved when the Board of County Commissioners makes a formal finding that no significant impacts on present or future water resources will result from the change. (Policy 2.4.2)

FLUM amendments to the existing DR/GR areas south of SR 82 and east of I-75, which propose to increase the current allowable density of intensity of land use, will be discouraged by the county. (Policy 2.4.3).

Development Design – Goal 4

The Development Design section of the Lee Plan states the importance of the current planned development rezoning process, which combines site planning flexibility for the land owner with rigorous review by County staff as a means of insuring that all aspects of the Lee Plan are met. Part of the staff review includes evaluation of the proposed project's design as it relates to the topographic and natural features of the site. (Objective 4.1 & Policy 4.1.1)

The Development Design portion of the Lee Plan adequately addresses the DR/GR at this time.

Industrial Land Uses – Goal 7

Natural resource extraction projects commonly referred to as "fill dirt" or "limerock mines" are considered industrial operations. Although the Lee Plan Industrial Land Use category was established for typical urban area industrial developments, the provisions of this section of the Lee Plan have been integrated into the Land Development Code (LDC) mining standards with regard to environmental assessment (Policy 7.7.1). However, revisions to LDC Section 34-1675(b)(3) are needed to clarify the information necessary to evaluate the impact and effect on environmental and natural resources. Revisions to the entire Chapter 34, Division 15 are also needed to clarify the information required for zoning and at development order level. This would help reduce staff review time and provide for consistent, scientifically-based decisions.

In addition, industrial uses located within the DR/GR should have different standards than urban areas, given the environmental sensitivity and importance of protecting the public water resources. The LDC development standards for open space, indigenous preservation, wildlife protection, littoral zones and buffering should be evaluated with consideration of mining within the DR/GR, as this use has very different impacts than urban industrial uses and is allocated for rural areas.

Agricultural Land Uses – Goal 9

The provisions of this section of the Lee Plan address the needed protection of existing agricultural lands from the following: conversion to other land uses; impacts from new natural resource extraction operations; new recreational uses; and new residential developments (Policies 9.1.1 & 9.1.4). Additionally, the County is directed to work with the agricultural community to establish incentives that encourage the continuation of existing agricultural operations (Policy 9.1.7).

The importance of agricultural operations as way of protecting the environmental integrity of an area is often overlooked. It is critical to include the agricultural community and provide protection to their livelihood when addressing the surface and ground water and wildlife issues within the southeast Lee County DR/GR. Many agricultural lands may be maintained and enhanced with best management practices (BMPS) while protecting, restoring, and enhancing the surface and ground water storage capacity and flows. Additionally, agricultural lands can provide critical links between various publicly-owned conservation areas, which allows for wildlife movement and interconnection. Agricultural operations do impact the natural systems, but it is possible to manage these lands in a way that not only conserves natural resources but also readily restores the historic hydrology. This is true even if the agricultural use is no longer viable - whether that be today or 50 years from now. Sustainable agricultural operations that maintain the hydrology and water quality may require retrofitting some existing agricultural operations in order to store and treat water. The implementation of Policy 9.1.7 should involve an ongoing, active interaction between the County and agricultural interests to insure that the integrity of the DR/GR is maintained through a mixture of land uses.

Policy 9.1.7 directed the county to investigate the feasibility of a Purchase of Development Rights (PDR) program no later than 1995. This study was not conducted (Pers. Comm.). A PDR program should still be investigated.

The following revision to Policy 9.1.7 is recommended:

> **POLICY 9.1.7:** *Lee County will work with an agricultural advisory committee and landowner farmers to establish incentives to encourage the continuation of existing agricultural operations, and the improvements to existing agricultural operations as needed to store and treat water and improve ecological values. The county, with the assistance of the committee, will investigate the feasibility of a Purchase of Development Rights (PDR) program for agricultural property by ~~1995~~ 2010. (Added by Ordinance No. 94-30, Amended by Ordinance No. 00-22)*

Natural Resource Extraction – Goal 10

This section of the Lee Plan was evaluated by the Smart Growth Committee and resulted in a staff-initiated amendment through Wayne Daltry, Smart Growth Director. The proposed amendment was approved for transmittal to the State Department of Community Affairs (DCA) by the BOCC on February 25, 2008. Both the proposed amendment and existing language for Goal 10 have been evaluated for this study.

The current and proposed language is presented in its entirety for this portion of the Lee Plan as it directly addresses Natural Resource Extraction:

GOAL 10: NATURAL RESOURCE EXTRACTION. To protect areas containing identified natural resources from incompatible urban development, while insuring that natural resource extraction operations minimize or eliminate adverse effects on surrounding land use and natural resources. (Amended by Ordinance No. 02-02)

OBJECTIVE 10.1: Designate through the rezoning process sufficient lands suitable for providing fill material, limerock, and other natural resource extraction materials to meet the county's needs and to export to other communities, while providing adequate protection for the county's natural resources. (Amended by Ordinance No. 94-30, 02-02)

POLICY 10.1.1: Natural resource extraction operations intending to withdraw groundwater for any purpose must provide a monitoring system to measure groundwater impacts. (Amended by Ordinance No. 02-02)

This policy needs to be revised to insure protection of ground water levels and quality as follows:

Natural resource extraction operations ~~intending to withdraw ground water for any purpose~~ must provide a monitoring system to measure surface and ground water levels and quality to insure there is no degradation to the ground water resources ~~impacts.~~

POLICY 10.1.2: Applications for natural resource extraction permits for new or expanding areas must include an environmental assessment. The assessment will include (but not be limited to) consideration of air emissions, impact on environmental and natural resources, effect on nearby land uses, degradation of water quality, depletion of water quantity, drainage, fire and safety, noise, odor, visual impacts, transportation including access roads, sewage disposal, and solid waste disposal. (Amended by Ordinance No. 00-22, 02-02)

LDC Section 34-1675(b)(3) needs to be revised to provide more detailed requirements to adequately address the potential impacts on the environment, especially in relation to surface and ground water resources.

POLICY 10.1.3: Applications for natural resource extraction permits for new or expanding sites must include a reclamation plan which provides assurance of implementation. Reclamation plans in or near important groundwater resource areas must be designed to minimize the possibility of contamination of the groundwater during mining and after completion of the reclamation. (Amended by Ordinance No. 00-22, 02-02)

LDC Sections 34-1675(b)(8) & 34-1681(c) need to be revised to include a comprehensive reclamation plan that addresses both the finished lake and the land surrounding the mine to insure protection of the surface water in the lake and the ground water levels of the surrounding lands.

POLICY 10.1.4: Natural resource extraction activities (and industrial uses which are ancillary to natural resource extraction) may be permitted in areas indicated on the Future Land Use Map as Rural, Open Lands, and Density Reduction/Groundwater Resources, provided they have adequate fire protection, transportation facilities, wastewater treatment and water supply, and provided further that they have no significant adverse effects such as dust and noise on surrounding land uses and natural resources. In order to reduce transport costs and minimize wear on the county's roadways, the extraction and transport of fill material may also be permitted as an interim use in the Future Urban Areas provided that the above requirements are met; however, special restrictions may also be applied to protect other land uses. These determinations will be made during the rezoning process. (Amended by Ordinance No. 94-30, 00-22, 02-02)

~~**POLICY 10.1.5:** Lee County will support efforts by government, community leaders, and the extractive industry owners and businesses to seek incentives that will help to facilitate the connection of natural resource extraction borrow lake excavations into a system of interconnected lakes and flowways that will enhance wildlife habitat values, provide for human recreation, educational and other appropriate uses, and/or strengthen community environmental benefits. (Amended by Ordinance No. 99-15, 02-02)~~

Policy 10.1.5 should be stricken from the Lee Plan because interconnecting the mining lakes would have detrimental ecological impacts. The difference in the topography of the land results in the excavated lake leveling off at the lowest elevation of the excavation area and drawing down ground water at the higher elevation side of the excavation area. The expanse of the ground water drawn down both vertically and laterally outside of the mined land is not known due to the lack of monitoring requirements. Additional draw down in ground water will affect the adjacent ecosystems, which in turn affects the wildlife habitat.

OBJECTIVE 10.2: Determine and maintain a balance between the County's petroleum resources and the health, safety and welfare of the residents of its Future Urban Areas. (Added by Ordinance No. 98-09)

POLICY 10.2.1: By 2000, the county will conduct a study to determine the appropriateness of oil exploration, drilling, or production. The study will address the issues of the compatibility of oil-related activities with the environment and urban uses. This study will include recommendations regarding the appropriateness of such activities within Lee County as well as guidelines under which such activities should be regulated under the Lee County Land Development Code. (Added by Ordinance No. 98-09, Amended by Ordinance No. 00-22)

Proposed New Objective And Policies Under Element II – Future Land Use, Goal 10: Natural Resource Extraction
by Smart Growth Committee/Wayne Daltry; LPA approved transmittal to BOCC 2/25/2008

OBJECTIVE 10.3: Coordinate mining activities, evaluation, monitoring, restoration and redevelopment plans with water supply planning activities, surface water management, wetland protection, wildlife conservation and future and existing residential activities, and review the cumulative regional and watershed impacts.

POLICY 10.3.1. Mining applications areas will include design features and supporting data to maintain or enhance the pre-development surface and groundwater levels, hydroperiods and flows for the appropriate watersheds and sub-basins and surrounding properties.

The term pre-development should be changed to historic to be consistent with the DR/GR Future Land Use Category under Goal 1 with the definition of "historic surface and ground water levels" added to the Glossary of the Lee Plan as noted above.

POLICY 10.3.2. Mining applications in *pre-designated areas* will *include a minimum of three years* baseline monitoring, onsite and regional assessments of the change in flow, timing of travel, and direction of surface and groundwater systems in the impacted area. Particular attention will be given to connectivity and the potential travel time to wellfields and concentrations of domestic, self-supplied users and protection for single residential wells.

The proposed language for Policy 10.3.2 should be revised to include a minimum of 3 years of baseline monitoring as noted by the italicized language above.

POLICY 10.3.3. Mining applications will include assessments of the potential impact on the aquatic ecology and water quality of the quarry pits, which result from quarry pit design and post mining impacts such as runoff or groundwater flow. This also includes likely land uses surrounding the site and consideration of the primary and secondary impacts *at the local and watershed levels.*

A clarifying phrase is recommended by the italicized language above.

POLICY 10.3.4. The depth of mining for any proposed excavation will be limited to that necessary to prevent the breach of aquicludes or change in water quality within the aquiclude, and separating the aquifer that the mining is within from any other aquifer. Other limita-

tions on mining setbacks or depths will be determined on a case-by-case basis, tied to existing neighboring uses, specific hydrogeologic, wetlands *and watershed* protection, and wildlife conservation issues. This will also take into consideration transportation routes and the impacts mining will have on those routes.
This policy should be revised to include watershed protection as noted by the italicized language above.

POLICY 10.3.5 Annual reports on mining will be required in any permit approval. Reports will include a continuation of the staff recommended baseline monitoring, the areas under active mining, depths being mined, the quantity and type of mined materials, estimated reserves left for mining, and the annual volume, direction and destination of the material being transported.

The following revision is recommended:
Annual reports on mining will be required in any permit approval, which will include a continuation of the staff recommended ~~baseline~~ surface and ground water monitoring of water quality and quantity, the areas under active mining, the areas where reclamation is completed, the areas where invasive exotic removal is completed, depths being mined, the quantity and type of mined materials, estimated reserves left for mining, and the annual volume, direction and destination of the material being transported.

POLICY 10.3.6 Any significant adverse mining impacts identified during mining or post-mining will be subject to adaptive management and corrective measures.

POLICY 10.3.7. Any restoration activities required of a mining permit (and any proposed redevelopment of a mined site tied to a mining permit) must consider the restoration and sustainable management of all quarry pits, preserves and buffer areas as well as the timing of development - including mining - of surrounding sites. Residential uses, when deemed appropriate, will be limited in the timing of their placement until surrounding mining operations cease creating groundwater or geological impacts that affect the foundations of structures.

Water, Sewer, Traffic, And Environmental Review Standards – Goal 11

Goal 11 establishes the requirement for an environmental assessment whenever a proposed project is located in an existing or probable environmentally sensitive areas. The assessment must examine existing conditions, address environmental problems, and propose means and mechanisms to protect, conserve, or preserve the environmental and natural resources.

No revision to Goal 11 is needed regarding environmental review standards. However, the implementation of this standard regarding mining applications is located in LDC Section 34-1675(b)(3), which should be reviewed for text revisions that may clarify the specific needs of the environmental assessment report.

Coordinated Surface Water Management And Land Use Planning On A Watershed Basis – Goal 60

The overall goal is to protect or improve surface and ground water at the local and watershed level while also providing flood protection for developments. The implementing objectives and policies emphasize the need to manage water in a way that would utilize and restore natural systems, particularly storage areas and flow ways. The DR/GR is noted as a "critical area for surface water management," for which the County needs to maintain existing regulations to protect its unique environmental and water resource values (Objective 60.4). The County is directed to "maintain the elimination of the exemptions in its development regulations for agricultural uses and small subdivisions within the 'critical areas for surface water management,' and to continue to subject these uses to an appropriate review process" (Policy 60.4.2). LDC regulations implementing Policy 60.4.2 were not located. The LDC should be evaluated further to determine if Policy 60.4.2 has been implemented through development regulations, or if an amendment to the development regulations is necessary.

Protection Of Water Resources – Goal 61

Protection of the county's water resources is discussed through water supply planning, designing surface water management systems that mimic natural systems, and establishment of performance and/or design standards that protect natural drainage system functions (Objectives 61.1, 61.2, 61.3). An important component of water resource management and allocation of water resources is to provide sufficient water to maintain or restore valued natural systems (Policy 61.1.1). Additionally, development in the rural areas is required to integrate areas where soils, vegetation, hydrogeology, topography, and other factors indicate that water flows or ponds into an area-wide coordinated stormwater management scheme (Policy 61.2.1). An important policy regarding mine reclamation states "The county will maintain regulations that require reclamation standards for future excavation that mimic natural systems through the techniques that improve water quality, wildlife utilization, and enhance ground water recharge" (Policy 61.26.).

Goal 61 includes adequate language to protect the water resources in the DR/GR. However, the LDC should be evaluated to insure the appropriate development and zoning standards have been established to implement the objectives and policies of Goal 61.

Ground Water – Goal 63

Goal 63 establishes the means to protect the County's ground water supplies from activities that have the potential to deplete or degrade the ground water supplies. A staff hydrogeologist is required to review all development applications near public utility potable water wellfields with particular attention to proposed land uses within a 10-year travel time from the wellheads (Policy 63.1.2). The well field protection map included in the Lee Plan is out of date and needs to be replaced with the new well field protection zone map adopted December 5, 2007.

The 10-year travel time area does not include the entirety of the DR/GR as shown on the current well field protection map (Fig. 2.6.1A); therefore a revision to Policy 63.1.2 is recommended as follows:

The staff hydrogeologist will review and comment on all development applications near public utility potable water wellfields, with particular attention to proposed land uses within a 10-year travel time from the wellheads and all development applications proposed within the DR/GR.

The 2005 3-dimensional model conducted for the County, as it pertains to updating the well field protection ordinance, did not include the existing mine pits as a parameter of the modeling. The 10-year travel time limits should be re-examined with the 3-dimensional MIKE SHE model that is being compiled as a part of this DR/GR study, where the land use component includes the presence of mine pits. Additionally, the LDC development and zoning standards should be evaluated so that Policy 63.1.2 is adequately implemented.

Development Design Requirements – Goal 77

The development design requirement determines that adequate open space, preservation, and landscaping must be included in all new development. The county is directed to continue to review the open space requirements in the LDC within new industrial developments (Policy 77.2.1).

No revisions are recommended to Goal 77. However, the LDC open space requirements for mining projects should be reviewed to determine if the standard industrial open space requirement meets the overall intent of the Lee Plan regarding the DR/GR and protection of the County's resources.

Regional Parks – Goal 84

Goal 84 establishes the importance of regional parks in the preservation of natural habitats, protection of water supply, and preservation of the natural heritage. In addition, regional parks also create passive recreational opportunities to the general public.
No revision is recommended to this language. The County should evaluate the benefits of creating a regional park or other recreational opportunities in the southeast DR/GR area between SR 82 and Corkscrew Road.

Resource Protection – Goal 107

This portion of the Lee Plan establishes the objectives and policies to insure the County's native habitats, diverse wildlife and vegetation, water quality and natural surface water characteristics are maintained or enhanced. No revisions are recommended to Goal 107 or its implementing objectives and policies.

Wetlands – Goal 114

The Wetlands goal establishes that Lee County will maintain and enforce a regulatory program for development in wetlands that is cost-effective, complements federal and state permitting processes, and protects wetland systems. Wetlands include all lands that meet the State of Florida definition [F.S. 373.019(17)]. The Federal jurisdiction over wetlands may include areas that are not covered or claimed by the State agencies.

Policy 114.1.1 states "Development in wetlands is limited to very low density residential uses and uses of a recreational, open space, or conservation nature that are compatible with wetland functions." There is no provision that allows mining as a use within wetlands.

In 1994, the county's wetland definition was changed to the state-adopted definition, and the county staff no longer verified the delineation of jurisdictional wetlands or permitting of wetland impacts. At this same time, the Lee Plan was revised to include Policy 114.1.2(1), which states "In accordance with F.S. 163.3184(6)(c), the county will not undertake an independent review of the impacts to wetlands resulting from development in wetlands that is specifically authorized by a DEP or SFWMD dredge and fill permit or exemption." The Florida Statute that is referenced pertains to processes for the adoption or amendment of a comprehensive plan. It does not limit the county's ability to independently review the impacts to wetlands. However, this policy has been used by applicants to try to limit the ability for County staff to implement other portions of the Lee Plan regarding protection of wetlands. It is important to note that F.S. 373.414(1)(b)(4) does state that mitigation imposed by a local government for surface water and wetland impacts of an activity regulated by the State may not differ from an issued state ERP permit. It appears the Florida Statutes limit the role of local government in mitigating wetland impacts. However, it does not appear the local government is limited as to whether impacts to wetlands are consistent with their comprehensive plan. Policy 114.1.2(1) should be stricken as currently written. The county attorney's office should determine if there are legal limitations within the Florida Statutes in regard to the county's ability to review impacts to wetlands for consistency with the Lee Plan. Additionally, it is recommended that this policy be re-examined due the deficiencies in current FDEP-BMR and SFWMD mining regulations.

Water Quality And Wastewater – Goal 115

Goal 115 adequately addresses the need to maintain high water quality that meets or exceeds water quality standards, and requires new developments and expansions of existing developments to not degrade surface and ground water quality.

This goal allows the LDC requirements to include water quality baseline data and monitoring. Lee County Natural Resources staff has in the past required water quality monitoring of mines (Florida Rock Green Meadows Mines), and are currently recommending water quality base line and monitoring through mining operation permit renewals and zoning applications (Pers. Comm.).

Water Resources – Goal 117

The water resource provisions include objectives and policies to insure the conservation, management, and protection of the natural hydrologic system of Lee County for a continued water resource supply. The importance of maintaining or improving existing surface and ground water levels and flow within drainage basins is included in the subsequent policies.

Goal 117 adequately establishes the policies to insure protection of the County's water resources.

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EFFECTIVENESS OF THE STATE ENVIRONMENTAL RESOURCE PERMITTING IN REGARDS TO WETLAND PROTECTION & MITIGATION IN RELATION TO FILL DIRT AND LIMEROCK MINING

The contents of this evaluation are subject to revision upon completion of the environmental mapping and hydrologic modeling that are also being conducted as part of this study.

This task aimed to determine the effectiveness of the State's Environmental Resource Permit (ERP) program, which identifies, protects and mitigates wetlands within the DR/GR study area, in relation to the Lee Plan goals, objectives, and policies. The State's review focuses on regional issues, whereas the county's comprehensive plan specializes in local issues. The State Environmental Resource Permit (ERP) is part of a regulatory program covering alterations to uplands and wetlands that may affect surface water flow and surface water resources. The protection of listed species and ground water levels are also part of this regulatory program. These issues overlap with the Lee Plan's emphasis on protecting, enhancing and restoring the wetlands, flow-ways and water resources in southeast Lee County.

Existing permits and permit files from the Florida Department of Environmental Protection-Bureau of Mine Reclamation (FDEP-BMR) and the South Florida Water Management District (SFWMD) were used to evaluate the ERP regulatory system. In addition, The Florida State Statutes, Florida Administrative Code, and the SFWMD Basis of Review provided information regarding ERP permitting requirements, while FDEP-BMR and SFWMD staffs assisted with details regarding specific permits and regulations.

Time constraints and access to permit files limited this analysis. The FDEP-BMR files are located in Tallahassee and are not available on-line at this time. The permits and annual status reports were obtained from FDEP-BMR staff. However, time and budget did not make it feasible to obtain full copies of the permit files from FDEP. SFWMD permit files were reviewed at the local office or online.

The focus of the evaluation is to review the effectiveness of the State's ERP permitting system in relation to wetlands protection as part of an ERP permit obtained for dirt fill and limerock mining excavations. This evaluation includes a summary of the ERP process and specific information regarding permitted mines in the DR/GR. Additionally, the ERP standards are analyzed by the following groupings: wetland identification; wetland impacts; wetland mitigation; wetland monitoring; watershed analysis; surface and ground water levels; and water quality. A brief discussion of the conversion of mines to residential development is included to document any differences in wetland protection when the use is converted. Deficiencies in the process are identified. Findings and recommended action items are provided as guidance to the county for improving the wetland and water resources protection, enhancement and restoration within the DR/GR as is required by the Lee Plan.

State Agency Review: FDEP-BMR Vs. SFWMD

As of 1995, an ERP must be obtained from the appropriate State agency for proposed fill dirt or limerock mining operations. FDEP-BMR currently reviews proposed fill dirt and limerock mine excavations for projects that have on-site sorting or grading facilities. SFWMD will review the ERP if the mine is a borrow pit for fill dirt excavation, and will not have on-site material grading or sorting facilities. However, there are SFWMD Management and Storage of Surface Water (MSSW) permits that were issued prior to 1995 that include limerock excavations which are grandfathered and remain valid. Additionally, if the applicant indicates the final phase of the mining is a residential development, then SFWMD reviews the mining application.

Southeast Lee County DR/GR Mines

State permits for the approved mines within the southeast Lee County DR/GR study area (Table F-1) were reviewed to ascertain information regarding the preservation and mitigation of wetlands within mining projects. The permits, exhibits, and staff reports, when available, were utilized to compile information regarding existing wetland acreage; preserved wetland acreage; excavated wetland acreage; wetland mitigation acreage or mitigation bank credits; location of mitigation (i.e., onsite, offsite, within the watershed, within the DR/GR); methodology utilized to determine mitigation acreages; surface and ground water level monitoring; and surface and ground water quality monitoring.
The mines in southeast Lee County have typically obtained permits from SFWMD for excavation of fill dirt resources for the initial phase and then

later obtained FDEP-BMR permits for limerock mining. However, one mine was able to convert from a fill dirt mining operation to a limerock excavation project through a letter of modification to their SFWMD permit in 2002. A series of letters documents this revision, first noting the initial request to revise Special Condition 20 (which prohibited the mobilization and operation of sorting, grading or crushing equipment), to stating the final permitting of these operations. An updated letter requesting the deletion of Condition 20 was submitted as well. A letter to FDEP-BMR was also located, which indicated that the applicant intended to apply for an FDEP-BMR permit and that the SFWMD would only continue to be involved with de-watering permits. FDEP-BMR did not receive an application for limerock excavation (Pers. Comm. with FDEP-BMR staff). However, two months after the letter was sent to FDEP-BMR, SFWMD staff approved the removal of Condition 20 to allow limestone sorting, grading, and crushing. (SFWMD Permit 36-03663-P File). It is unclear why this mine was able to convert from fill dirt to limestone excavation through a letter of modification from SFWMD instead of a full ERP review by the FDEP-BMR.

Environmental Resource Permit Standards

The State's review of ERP applications are based upon standards established for surface water management systems as part of a development. No separate specific standards were established for reviewing the impact of mine excavations on wetlands, the watershed, ground water, or wildlife. Many of the ERP standards of review are based upon assumptions made about surface water management systems, which include storm water ponds/lakes much smaller in acreage and in depth than the fill dirt or limerock mining pits.

The SFWMD and the FDEP-BMR staff determine if the application meets the ERP Criteria of Issuance according to the following State standards:

- The project will not cause adverse water quantity impacts to receiving waters and adjacent lands
- The project will not cause adverse flooding to on-site or off-site property
- The project will not adversely impact the value of functions provided to fish and wildlife and listed species by wetlands and other surface waters
- The project will not adversely affect the quality of receiving waters such that state water quality standards will be violated
- The project will not cause adverse secondary impacts to water resources
- The project will not adversely impact the maintenance of surface or ground water levels or surface water flows
- The project will not adversely impact a work of a water management district
- The project will be capable, based on generally accepted engineering and scientific principles, of being performed and of functioning as proposed
- The project will be conducted by an entity with the financial, legal, and administrative capability of ensuring that the activity will be undertaken in accordance with the terms and conditions of the permit, if issued
- The project will comply with applicable special basin or geographic area criteria adopted by rule
- Proposed activities in wetlands and other surface waters must not be contrary to the public interest

If the proposed project does not meet these criteria, then the agency will determine if the adverse effects may be mitigated. [F.S. 373.414(1)]

The SFWMD Basis of Review document is also utilized by both SFWMD and FDEP-BMR in reviewing ERP applications as established in Florida Administrative Code (F.A.C.) 62-330.200(4). Additional regulations regarding mine reclamation, contained F.A.C. Chapter 62C-36 and 62C-39 for fill dirt and limerock mining, are considered as well. Mine reclamation standards are evaluated under Task 2.2.2 of this study.

Table E-1: Mine Activity And Permit Status

PROJECT NAME	MINING ACTIVITY STATUS	STATE PERMIT-TING AGENCY	STATE PERMIT DATE of ISSUANCE	STATE PERMIT DATE OF EXPIRATION	CURRENT MINING OPERATIONS PERMIT (DEVELOPMENT ORDER)	DURATION of MINING OPERATION PERMIT	MINING OPERATION PERMIT STATUS
Bell Road Mine	Active	FDEP	April 13, 2006	April 13, 2016	LDO2003-00403 Approved Oct 2006	5 years Oct 2011	Current
Bonita Land Resources	Inactive	SFWMD	December 10, 1998		LDO2000-00153 Approved Oct 2000	2 years Oct 2002	Expired
Cemex/RMC	Excavation Completed	SFWMD	February 3, 1997		96-09-256.08L Renewal Approved June 2003	5 years June 2008	Current
Florida Rock Industries (Greenmeadows Mine)	Active	SFWMD	October 11, 1984		LDO97-05-074.08 Approved Sept 1997; 1st Renewal Approved Feb 2003 LDO97-05-073.08 Approved Sept 1997; 1st Renewal Approved Feb 2003	5 years Sept 2002 Feb 2008 Sept 2002 Feb 2008	Expired; Renewal #2 Pending Expired; Renewal #2 Pending
Florida Rock Industries (Expansion of Greenmeadows Mine)	Active	SFWMD	November 15, 1989		LDO2001-00034 Approved May 2001	5 years May 2006	Expired; Renewal #1 Pending
Plumosa Farm	Inactive	SFWMD	April 6, 2000		LDO2001-00028 Approved Jan 2003 LDO2007-00214 Under Review	2 years Jan 2008	Expired; Renewal Pending
Rinker Materials (Ph 1A South of Alico)	Excavation Completed	FDEPs	FDEP June 13, 2006 Superseding SFWMD MSSW Permit 36-00681-S July 1986	June 13, 2026	N/A	N/A	N/A
Rinker Materials (Ph 1B, 2A & 2B South of Alico)	Excavation Completed	SFWMD (MSSW); FDEP; SFWMD1	SFWMD MSSW Permit 36-00681-S July 1986 (Ph I-B & IIB); FDEP August 12, 2002 (Ph 2B)	FDEP August 12, 2022 (Ph 2B)	DOS2004-00334 Approved Dec 2006 LDO2001-00419 Ph 2B Approved Dec 2002; Renewal Approved July 2005 LDO98-03-261.08L Ph 1B & 2A Approved July 1998; Renewal Approved July 2003 LDO89-12-107.08L Ph 2B Last Renewal Approved Dec 2004	5 years Dec 2011	N/A
Rinker Materials (Ph 3A & 3B North of Alico)	Active	FDEP	September 21, 2000 Superseding SFWMD MSSW Permit 36-00681-S	September 21, 2013	LDO2007-00214 Approved Sept 2007 LDO99-11-021.80L LDO96-05-098-08L	5 years Sept 2012	Current Superseded Superseded
Westwinds	Active	SFWMD	September 9, 1999		LDO2001-00093 Approved Nov 2001; 1st Renewal Approved July 2007	5 years Nov 2006 July 2012	Current
Youngquist Quarry	Active	FDEP	January 12, 2007 (University Lakes Mine) June 16, 2003 (West lakes Excavation)	December 17, 2021 (University Lakes Mine) June 16, 2023 (West Lakes Excavation)	LDO2006-00071 Approved July 2007; Amendment Pending	5 years July 2012	Current

1.Original permit was issued by FDEP, but was superseded by SFWMD when the property was permitted for the continuation of mining with an end use of residential development.

A. Wetland Identification

Delineation of State Jurisdictional Wetland areas as defined in Florida State Statute (F.S.) 373.019 (Appendix 2.7.1A) are conducted by environmental consultants following the methodology adopted by rule and ratified pursuant to F.S. 373.421(1) (Appendix 2.7.1B). The limits of the wetland are flagged in the field and shown on a Florida Land Use Cover Forms and Classification System (FLUCFCS) map or aerial photograph as part of the ERP application. The FDEP or SFWMD staff are to field verify the wetland limits during the ERP application review.

The evaluation of the effectiveness of the State agencies' jurisdictional wetland determinations was limited by the time line of this study and lack of access to properties for field verifications. It is important to note that State staff relies on information supplied by environmental consultants and "spot checking" the project sites. Therefore, wetlands that are more difficult to delineate, such as hydric pine flatwoods, hydric melaleuca, or hydric pasture, may not be properly identified or field verified. This is a major concern within the DR/GR, as areas historically prevalent with hydric pine flatwoods were often converted to agricultural uses as they were considered less wet than the surrounding lands.

The ERP review process is based upon current conditions; however, the Lee Plan emphasizes the importance of restoring and enhancing wetlands in the DR/GR. The county must consider the historic conditions in order to meet the Lee Plan goals for protecting and enhancing the water resources within the DR/GR.

B. Wetland Impacts

Currently, the State ERP process relies on a zero net loss in wetland function (Basis of Review Section 4.0), though there may be a loss in actual wetland acreage. The State does not require a hydrogeomorphic analysis to be submitted when evaluating the wetlands value and function, and the evaluation is based on "best professional judgment." (Summary of the Wetland and Other Surface Water Regulatory and Proprietary Programs in Florida. Oct. 2007. FDEP). The ERP permitting standard for all developments requires no adverse impacts on the wetlands however, there is no definition of "adverse impacts" contained within the Florida State Statutes, Florida Administrative Code, or Basis of Review for the ERP review process. The SFWMD staff has indicated the reviewers determine whether there will be an adverse impact on the wetlands based upon if the proposed project will alter water quality and/or water quantity resulting in changes to the wetland system. The determination of any adverse impacts relies on the staff's scientific knowledge and resources (Pers. Comm.). FDEP staff indicated they rely on the Basis of Review for determining adverse impacts to wetlands, surface water and ground water including the parameters for lake and wetland separation in Section 6.12 (discussed below) (Pers. Comm.).

Review of secondary or indirect impacts to the wetlands retained onsite and to wetlands located offsite are also required (Basis of Review Section 4.2.7). The secondary impact criterion are based upon adverse impacts to water quality standards; adverse impacts to the functions of wetlands or other surface waters; adverse impacts to habitat function of wetlands associated with upland activities; and adverse impacts to the ecological value of uplands in relation to existing denning or nesting of aquatic or wetland listed animal species. The habitat functions of wetlands associated with upland activities will not be considered to have adverse secondary impacts if buffers, with a minimum width of 15 feet and an average width of 25 feet, are provided abutting wetlands to be preserved. No background information is contained within the Basis of Review that supports establishing this standard or assumption.

Cumulative impacts to wetland and other surface waters are also evaluated through the ERP process. However, wetland impacts that are mitigated within the same drainage basin as defined by SFWMD are not considered to have cumulative impacts (Basis of Review Section 4.2.8). The DR/GR study area falls within the Estero Bay Watershed Basin as defined by SFWMD. This drainage basin includes Ten-Mile Canal Watershed; Hendry Creek Watershed; Six-Mile Cypress Slough Watershed; Spring Creek Watershed; Mullock Creek Watershed; Corkscrew Swamp Watershed; Estero River Watershed; Lake Trafford Watershed; Imperial River Watershed; Barrier Islands Watershed; and Cow Creek Watershed (Estero Bay and Watershed Assessment. 1999) (Figure 2.7.1A). This means that a wetland within the Estero River Watershed may be mitigated within the Corkscrew Watershed because the State considers the larger, regional Estero Bay Watershed basin rather than local watershed basins when re-

viewing for mitigation occurring within the same drainage basin. Therefore, if the wetlands are mitigated following the Basis of Review criteria, the cumulative impacts of the mining pits on the watershed's hydrology are not evaluated.

If a proposed man-made lake, including a mine pit, has the potential to adversely affect wetland areas, then a minimum separation distance is determined according to the design options stated in the Basis of Review criteria (Section 6.12). The separation distances are based upon an allowed 1-foot vertical drop in elevation between the edge of the wetland and the control elevation of the lake. The first design option assumes that a 200-foot separation between the wetland boundary and the control elevation of the lake will not have an adverse impact on the wetland. The second design option allows for a 66-199 foot separation, as long as calculations demonstrate the drawdown in adjacent wetlands will not result in adverse impacts to the wetlands (defined under this standard as a drawdown of more than 12 vertical inches in a 90-day period with no recharge). Additional design options allow for a separation distance of less than 66-feet if an impermeable barrier or equivalent is used, or modeling results demonstrate this separation will not have an adverse impact on the adjacent wetland.

These standards are based upon assumptions in design of surface water management lakes that are smaller in size and depth than excavated mine pits and fluctuate according to input from the accumulated storm water within the project. In addition, these surface water management lakes have control structures that may be altered or redesigned when appropriate due to changes in design standards, operational data or adaptive management needs. Unlike these lakes, mining pits are large, deep permanent features that do not have outfall structures that can be altered to adjust the lake level. The impact to the ground water table is a drop in elevation to the lowest point of the mining pit. This pit then becomes a "sink," where ground water from the surrounding area is drawn for an unknown distance into the mining pit to fill the area previously occupied by rock or sand.

Furthermore, the hydrologic dynamics of a mining pit are different from a typical surface water management lake. Mine pits are typically "leaky systems" with water levels responding to ground water flows down gradient. The water levels of surface water management lakes are regulated by water control structures with fixed elevations and discharge rates of surface flow. Therefore, the standards to review impacts of mining pits and the evaluation of proposed mitigation should be based upon mine designs instead of a surface water management lake design for other types of development.

Both FDEP and SFWMD ERP permits for the mines within the DR/GR include conditions that allow the State agency to require additional measures or mitigation if the mining activity causes adverse impacts to onsite or offsite wetlands. However, the ERP permits did not include any requirements for monitoring offsite areas for hydrology or conducting functional ecosystem assessments. Therefore, it is unclear how the agencies would even become aware of offsite impacts or how they would be able to document the impact caused by mining.

It was not possible to compile the existing or pre-mining wetland acreage for the permitted mines within the DR/GR, as permits did not state the existing wetland acreage for five of the twelve mines, and other information was not always available within the documents in the permit files. This lack of available information on the acreage and the functional assessment of the existing wetlands resulted in an incomplete evaluation of the effectiveness of the ERP process in protecting wetlands and in mitigating wetland impacts.

The approved mining projects located within the study area have wetland impacts ranging from no direct impact to those with approximately 264 acres of wetlands removed (Table F-2). The trend is to preserve the onsite wetlands when obtaining a SFWMD permit for fill dirt mining. Subsequently, the mining operations are revised by obtaining a FDEP permit for limerock mining - where only the wetlands at the perimeter of the property are preserved, and the other previously preserved onsite wetlands are excavated to reach the limerock resources. The mines within the DR/GR study area have State ERP permits that directly impact 534 acres of State Jurisdictional Wetlands (Table F-2), though the acreage of wetlands that are indirectly affected as a result of hydrologic impacts are still unknown.

PROJECT NAME	PROJECT SIZE (ACRES)	EXISTING WET-LANDS (ACRES)	EXCAVATED WET-LAND (ACRES)	MITIGATION ASSESSMENT METHOD	MITIGATION REQUIRED BY STATE PERMIT
Bell Road Mine	503.75	(1)	6.89	(1)	189.76 acres wetland + upland onsite conservation area
Bonita Land Resources	47.80	31.25	23.55	(1)	5 credits purchased from Panther Island Mitigation Bank
Cemex/RMC	308.64	0	0	(2)	(2)
Florida Rock Industries (Greenmeadows Mine)	1520.8	185.46	68.0	1:1 Ratio	91.3 acres onsite
Florida Rock Industries (Expansion of Greenmeadows Mine)	1525.0	175.79	0.35	(1)	11.5 acres onsite wetland hydrologic enhancement
Florida Rock Mine #2[4]	4839.17	(3)	263.8	WRAP	797.3 acres wetland + upland onsite creation, enhancement & restoration; 487.66 acres of lake & shoreline
Plumosa Farm	36.82	0	0	(2)	(2)
Rinker Materials (South of Alico)	2665.24	(1)	13.24 + 3.72 temporary	(1)	36.59 acres + 13.8 acres onsite enhancement and restoration
Rinker Materials (North of Alico)	1193.60	(1)	0.7	(1)	4.0 acres wetland + upland onsite conservation area
Westwinds	602.72	68.53	0	(2)	(2)
Youngquist Quarry (University Lakes)	667.10	82.4	57.8	(1)	143.59 acres wetland + upland onsite conservation area + offsite land funding donated to CREW
Youngquist Quarry (West Lakes)	1048.30	(3)	99.71	(1)	121.4 acres wetland + upland onsite conservation area + offsite Panther Island Mitigation Bank credits purchased

Table E-2: ERP Mitigation Data

1.Information not in Permit
2. Not Applicable
3. FLUCCS map illegible in permit file

C. Wetland Mitigation

In April 2005, the State adopted the Uniform Mitigation Assessment Method (UMAM) as the "standardized procedure for assessing the functions provided by wetlands and other surface waters; the amount that those functions are reduced by a proposed impact; and the amount of mitigation necessary to offset that loss." Prior to 2005, ratio guidelines or requirements were used to determine the amount of mitigation required to offset an impact to wetlands or other surface waters.

The evaluation of the permitted wetland mitigation for the twelve existing mining operations (Table E-1) within the study area was limited by the fact that only two of the permits indicated the methodology used in conducting the functional assessment of the existing wetland and the proposed mitigation area. Additionally, the proposed mitigation included the combination of wetland and upland conservation areas for five of the mining projects without a clear indication of the acreage of wetland within the preserved conservation areas.

The majority of the wetland mitigation for those State Jurisdictional Wetlands impacted through mining excavations in the DR/GR study area is occurring on project sites with 1,405 acres of wetland and upland conservation areas (Table E-2). The wetland mitigation predominantly occurs within the boundaries of the project even though the mining pit may permanently alter the surface and ground water levels in an unknown area surrounding the mined lake. This creates alterations to the hydrology of the ecosystems and results in failed mitigation.

The onsite mitigation typically includes the preservation and enhancement of existing wetlands. The enhancement is mainly defined by the removal of invasive exotic vegetation, which normally improves the functional value of the wetland. Some of the onsite mitigation includes wetland restoration and/or creation to provide larger, contiguous preserves onsite at the perimeter of the property and for connectivity to offsite conservation areas. The viability of the onsite wetland preserves is monitored according to site-specific permit conditions, which require a range of three to five years in annual monitoring. The ERP permits also stipulate that if the onsite wetland preserves do not meet the permit success criteria, then the applicant must propose alternate means to reach that criteria or propose offsite mitigation. However, the lack of required base line or post project hydrologic data limits the ability of agency staff to identify hydrologic alterations and impacts. Field inspections would allow the gathering of forensic ecological evidence of hydrologic impacts, but site-specific hydrologic data presented in hydrographs would provide a more reliable evaluation.

The methodology used in determining the type and quantity of mitigation required to offset wetland impacts is rarely stated in the permit. Ratios were used in one case, and the Wetland Rapid Assessment Procedure (WRAP) was cited for another project. The other seven permits with identified wetland impacts did not include information regarding the mitigation assessment. It appears that if preserves are larger than the wetland impact, these are accepted without any functional assessment evaluation of the wetland impacts or the proposed mitigation area.

Conservation easements for the preserved or mitigation wetlands may be required as part of the mitigation plan through specific permit conditions; however, conservation easements are not required by the Florida Administrative Code or Basis of Review Rules. The recorded conservation easement is provided as an attachment to the FDEP-BMR ERP permits with a condition included in the permit that the easement may be released if the project does not obtain all the necessary permits from other agencies to proceed with the mining. SFWMD ERP permits include schedules under the specific conditions that will indicate a specific date for the submission of a recorded conservation easement. The Conservation Easements are dedicated to the State agency issuing the ERP.

One of the older mines permitted within the study area did not place the wetland preserves under a conservation easement, indicating to the SFWMD that the county's special exception document approving the mining would insure the long term preservation of these wetland areas (SFWMD Permit 36-0681-S File). However, when the mining operation was proposed for conversion to a residential development, the applicant argued that the wetland preservation and other requirements of the special exception for mining did not apply to the new proposal, and that it should receive a new review under the current regulations (Lee County Development Order File DOS2004-00334). The residential development

was issued a SFWMD ERP allowing the impact of 398 acres of wetlands that were presumed not to be directly impacted and preserved during the mining operations (SFWMD Permit 36-05075-P).

Even with the requirement for a conservation easement, the preserve areas would not be protected in perpetuity. The conservation easements do not prevent degradation of the wetland preserves from mining operations. Additionally, the conservation easements may be modified or eliminated through modifications to the permit or when a new permit is obtained. An example of this is one mine (Lee County Zoning File DCI2004-00019) within study area that revised the mine pit size, resulting in the impact to wetlands previously placed under conservation easements dedicated to the State. The new impacts to the previously preserved wetlands were mitigated through onsite wetland preservation and creation and the purchase of mitigation credits at Panther Island Mitigation Bank. This conservation easement was not to Lee County; therefore, the county was not involved in the review of replacing the preserved wetlands under the conservation easement with a mining pit and the revised preservation, creation, and mitigation areas.

The agency has approved offsite wetland mitigation for mining projects within the study area where there has been a purchase of land within the Corkscrew Regional Ecosystem Watershed (CREW) or a purchase of mitigation credits from the Panther Island Mitigation Bank. The CREW lands are within the DR/GR and Panther Island Mitigation Bank abuts the DR/GR to the south in Collier County. One limerock mine partially mitigated wetland impacts through a donation to CREW (FDEP Permit 0176063-003), and Panther Island Mitigation Bank credits were purchased for partial mitigation of wetland impacts for two mines (FDEP Permit 0194206-004 & SFWMD Permit 36-03511-P). One mine site, which converted to a residential development, has also partially mitigated wetland impacts through the purchase of Panther Island Mitigation Bank credits (SFWMD Permit 36-05075-P).

FDEP does not maintain a central database of mitigation projects documenting the amount of wetland impacts and loss or gain of wetland functions for permitted wetland impacts. The State previously compiled overall wetland gain or loss reports based upon tracking the acreage of wetlands that were permitted to be dredged, filled and mitigated. These reports did not account for the gain or loss of wetland functions, only actual acreage. However, the last report was compiled fifteen years ago - in 1993 - “due to the limitations on staff resources” and the elimination of the State law requiring these reports in that same year. Reports on the actual acreage of permitted impacts may be requested from the FDEP and water management districts. (Summary of the Wetland and Other Surface Water Regulatory and Proprietary Programs in Florida. Oct 2007. FDEP)

The appropriateness and effectiveness of the wetland mitigation program could not be thoroughly evaluated due to the lack of available information regarding the actual acreage and the functional analyses of the permitted impacts and approved mitigation areas.

D. Wetland Monitoring

Monitoring of onsite wetland preserves is required when enhancement activities or wetland creation areas are included in the permit. The monitoring requirements are site-specific in regard to documentation of wetland vegetation, wetland hydrology (monthly staff gauge readings), and wildlife utilization. This information is compiled into monitoring reports submitted to the State permit agency on an annual basis for the duration indicated in the permit.

The SFWMD ERP permits require monitoring of enhanced or created wetlands for a period of five consecutive years to confirm the site-specific success criteria are met. A baseline report is compiled and submitted after the permit is issued but prior to any enhancement or maintenance activities. Once the success criteria stated in the ERP permit are met, the monitoring and maintenance activities are no longer required (Basis of Review Rule 4.3.6).

Records were obtained from SFWMD compliance files to determine the adequacy of the required monitoring and if the permitted mines were up to date with the required monitoring reports. Three mines have SFWMD permits that require onsite wetland monitoring. The annual monitoring report schedules have been revised for permits because of gaps in the submittal of the reports, which may be blamed on changes in operation scheduling or a lack of follow through on the permit conditions (SFWMD

Permits 36-00260-S; 36-00612-S & 36-03663-P). When SFWMD staff recognize that a monitoring report is overdue, a non-compliance letter is sent to the permit holder, and the staff work with the permit holder to obtain the reports and conduct reviews of the reports to determine if revisions are needed to meet the success criteria. Wetland monitoring reports were not required for two mines that did not have any identified wetland impacts. Also, monitoring reports were not required for one mine that mitigated the wetland impacts through offsite mitigation.

SFWMD staff conduct a helicopter site inspection of Lee County each month. No set standards are in place that outline the frequency of onsite inspections needed to verify that environmental permit conditions are being fulfilled on the mining project sites. (Pers. Comm. SFWMD staff) The last field inspection conducted for the two mines that have not yet completed the permit success criteria was in 2006, and the annual monitoring reports are overdue (SFWMD Compliance File for Permit 36-00260-S).

FDEP-BMR requires annual reports for mining operations that include rainfall and water level data. FDEP-BMR was unable to locate the annual reports for one of the permitted mines (FDEP Permits 0166176-001; 0166176-002; & 0166176-005). The monitoring reports for two other mines (FDEP Permits 0176063-003 & 0194206-004) were obtained from the FDEP records. The reports indicate baseline monitoring (prior to any enhancement or restoration work, but post permit issuance); time zero monitoring (after enhancement or restoration work); followed by five consecutive years of annual monitoring; and a final site inspection of the preserves in the sixth year after time zero. The annual status reports included discussion of water quality within the wetlands in relation to turbidity; microbial monitoring; erosion & sedimentation control; water levels within preserves; vegetation coverage within preserves; and photos taken at set photo stations. The location of monitoring transects were not included. Discussion of each monitoring transect was limited, but one area was cited as possibly creating hydrologic impacts. The water level data was presented in tabular form without reference to what the numbers represented. No hydrographs were included. Rainfall data was not included; yet the statement "water levels are consistent with rainfall patterns and adequate to maintain vigor and health of the wetlands" was included in the report. The information provided does not completely document whether or not the appropriate hydrology was maintained. Additional information including the following would be needed to conduct analysis of the hydrology within the wetland preserves: rainfall data, clarification of hydrology data, topography, and transect locations. An additional FDEP permitted mine (FDEP Permit 225217-001) has not had an annual report due as of yet (Pers. Comm. FDEP staff).

FDEP-BMR has a goal of conducting site inspections of mines on an annual basis. However, it has been two to three years since field inspections were conducted on mines within the study area. Two mines were last inspected by FDEP-BMR staff in 2006 (FDEP Permits 0176063-003 & 0194206-004). One mine was inspected FDEP-BMR in 2005 (FDEP Permits 0166176-001; 0166176-002; & 0166176-005). Rinker Mine Phases 1B, 2A and 2B portions of the FDEP-BMR permit (0166176) were superseded by the SFWMD Permit (36-05075-P), which was issued in 2004 for the Lago residential development. Therefore, FDEP staff no longer field inspect these areas for compliance with environmental conditions. (Pers. Comm. with FDEP staff).

E. Watershed Analysis

A requirement to evaluate a proposed project's impact on the alteration of the watershed was not located within the Florida State Statutes, Florida Administrative Code, or the SFWMD Basis of Review. As previously indicated, a cumulative impact evaluation does not need to be included for wetland impacts if the mitigation occurs in the same watershed. This has implications within the DR/GR as the State accepts mitigation anywhere within the regional Estero Bay Watershed, instead of the local watershed basins that are within the DR/GR limits. The local watersheds are commonly referred to as Six Mile Cypress, Estero River, Flint Pen (Imperial River) and Corkscrew.

Additionally, the ERP process does not include mitigation for impact or alteration to the watershed caused by the mining pit. Large acreages of land are converted to deep lakes through these extractive operations, permanently altering the hydrology of the watershed. The quantity and dynamics of the water flowing through the watershed will be changed and the direction of movement altered since the mining pit may draw in water from the adjacent areas. Most mining pits in the DR/GR do not

discharge surface water into adjacent wetlands or flow-ways. The mining pit has a multiple impact on the watershed with the drawdown of ground water, alteration in direction of flow, and the interruption of surface water or sheet flow. These effects will likely be amplified with multiple mines.

F. Surface and Ground Water Levels

Establishing Existing Water Levels

A specific regulation requiring the documentation of the surface or ground water levels was not located within the Florida State Statutes, Florida Administrative Code, or the SFWMD Basis of Review. However, the ERP water quantity criteria (Basis of Review Section 6.10) states surface water management systems shall be designed to:

1. Maintain existing water table elevations in existing well field cones of depression, and
2. Preserve site environmental values, and
3. Not waste fresh water, and
4. Not lower water tables, which would adversely affect the existing rights of others, and
5. Preserve site ground water recharge characteristics.

No specific requirements are given regarding the information an applicant needs to submit to demonstrate the project design meets these criteria. The ERP application does indicate that the following information must be submitted:

1. The seasonal high water and normal pool for each wetland along with how these were determined (Section I: Site Information)
2. Wet season high water tables need to be identified along with how these elevations were determined (Section I: Site Information)
3. A description of how water quantity, quality, hydroperiod, and habitat will be maintained in onsite wetlands to be preserved or remain undisturbed (Section II: Environmental Considerations)
4. Existing topography extending at least 100 feet off the project area, and including adjacent wetlands (Section III: Plans)
5. Water table elevations (normal and seasonal high) including aerial extent and magnitude of any proposed water table draw down (Section V: Drainage Information)
6. Results of any percolation tests and soil borings that are representative of actual site conditions (Section V: Drainage Information)

Monitoring Water Levels

The surface and ground water monitoring requirements contained within the conditions of approved ERPs are different between the FDEP-BMR and SFWMD mining permits. Most SFWMD permits issued for mines within the DR/GR study area do not have any hydrologic monitoring required. FDEP-BMR permits have staff gauge monitoring requirements within selected preserved, restored or created wetlands onsite. Some of the FDEP-BMR permits require staff gauge monitoring of the lake water level. Neither agency requires offsite monitoring.

FDEP-BMR permits require hydrological monitoring if a permitted limerock mine will be operating for more than five years. The parameters of the hydrologic monitoring are site-specific. The monitoring may include surface water level of the mine lake; shallow ground water level adjacent to the mine lake; shallow ground water level within wetland preserves; and/or water quality of the mine lake.

In general, the FDEP-BMR permits issued for mines within the study area require minimal surface and ground water level monitoring through the use of staff gauges within preserved or created wetlands. The FDEP-BMR permits require bi-weekly monitoring of surface water levels within the wetlands during the wet season (June-October) and monthly monitoring during the dry season (November-May). If no standing water exists for a period of 60 days, then the permit requires the applicant to ascertain the depth of the surficial ground water. FDEP-BMR may increase the frequency of monitoring if data does not provide reasonable assurance that there are no significant hydrological impacts to wetlands as a result of mining. After 3 years of monitoring, modifications to monitoring frequency may be requested by the applicant. The records obtained from FDEP-BMR do not indicate that such a request has been submitted for any Lee County mines. Rainfall data is also required to be monitored. Annual status reports are required to be submitted to FDEP that include the hydrologic monitoring data.

None of the FDEP-BMR permits for projects within the study area required ground water level monitoring beyond the surficial aquifer also referred to as the water table aquifer.

The SFWMD ERP permits (36-00260-S; 36-00612-S & 36-03663-P) for the mines within the study area contained requirements for water level monitoring in enhanced or restored wetlands for five consecutive years. This time period for monitoring does not document the effects of the completed mining pit on the wetlands. Additionally, ground water monitoring is not typically required through the SFWMD ERP permits, but is more likely to be a condition of approval for de-watering or consumptive water use permits, which were not reviewed as a part of this study. Therefore, the impact of the mining pits on the ground water level is not known.

G. Water Quality Monitoring

Water quality does affect the ecological integrity of wetlands. Nonetheless, water quality monitoring is not required unless the data can be used to determine if the pollution abatement practices incorporated into the design for the drainage system are functioning properly, or if there is a real and immediate concern regarding the degradation of quality in the receiving waters. (Basis of Review Section 5.9.3)

Surface water quality is required to be monitored for turbidity where it is discharging into wetlands through specific permit conditions (FDEP Permits 0166176-002; 0134874-001; 225217-001; 0176063-003 & 194206-004). Additionally, any water discharged from the project sites are required to meet the State water quality standards for Class III waters (FDEP Permits 0166176-007; 0134874-001; 225217-001; 0176063-003; & 194206-004). Yet, pursuant to F.S. 403.031, the lakes created through the mining excavation process do not have to meet any State water quality standards because these waters are privately owned.

Currently, only the mine just north of the Lee County well field on Alico Road is required through ERP permit conditions to install and monitor ground water quality monitoring wells to the depth of mining (FDEP Permit 0176063-003). However, FDEP-BMR staff indicated that new permits for mines include requiring the permit holder to drill and install a ground water quality well 100 feet from the maximum excavation limit or the property line, whichever is less [F.A.C. Rule 62-520.420(1)].

Conversion Of Mines To Residential Developments

Two approved mining operations within the southeast Lee County DR/GR study area had residential development as their final phase. The University Lake Mine was originally approved as a Residential Planned Development (RPD) with mining as phase 1 of development. However, the owner later revised the plan through the public hearing process to expand the mining excavation limits and eliminate the residential use to convert the project to an Industrial Planned Development (IPD). The other project, the Corkscrew Woods Mine, was permitted under SFWMD (36-03178-P) for a 173.70 acre project area with a mine excavation of 149.60 acres. The mining operation did not directly impact any wetlands. A second application (960516-6) was submitted to SFWMD for the approval of a residential development project consisting of 571.33 acres including the 173.70 acre Corkscrew Woods mine project area. These 571.33 acres include 132.03 acres of wetland.

Conversion of approved mining excavations to residential developments also occurred with portions of the Florida Rock Fort Myers Mine #1 being converted to the Miromar Development of Regional Impact (DRI) and the Lago residential development. The conversion of both projects from mining to residential resulted in a decrease in the mining excavation area. However, both residential projects obtained SFWMD ERPs, allowing wetlands that were avoided by the mining operations to be directly removed for the residential development. The approved Lago residential development impacts approximately 390 acres of wetlands that were preserved by the mining operations. However, the developer is currently evaluating how the mine lakes are or will affect adjacent preserves and onsite mitigation areas in order to address long term management and viability. The mining has continued under the approved Lago residential development order including mine Phase 3A and 3B north of Alico Road.

Conclusions

The protection and management of both wetlands and water resources are overriding elements of the Lee County Comprehensive Plan as it pertains to the Density Reduction/Ground Water Resource land use area. However, the State ERP process is based on typical surface water management systems, not mine pits, therefore severely limiting the effectiveness of evaluating a proposed mining project's affect on wetlands, watersheds, and ground water resources. The State standards within the SFWMD Basis of Review, which is utilized by both the SFWMD and FDEP in reviewing ERP applications, was based on shallower lakes (e.g., ≤12-foot depth) for stormwater detention within developments. These standards do not specifically address how to design and monitor fill dirt or limerock excavation pits to insure the protection of wetlands, surface and ground water quantities and quality.

The identification of both current and historic wetlands within the DR/GR is important to achieve the county's comprehensive plan goals, objectives and policies to protect, enhance and restore wetlands, flow-ways and ground water levels in this specified ground water resource area. The ERP process is based on current conditions; therefore, the county needs to be actively involved in the review of proposed mines to insure the local comprehensive plan issues are addressed in the design and implementation of the mining operations.

The State's Basis of Review for ERP permitting includes many regulations that assume that the designed surface water management system does not have any adverse impacts on wetlands or water resources. The only clarification or definition of adverse impact that was located within the Basis of Review, Florida Administrative Code, or Florida State Statutes states "a drawdown of more than 12 vertical inches in a 90-day period with no recharge shall be presumed to be an adverse impact" (Basis of Review Section 6.12). This raises concerns about wetland protection, considering a drawdown of just a fraction of a foot for a three-month period will impact the ecological integrity of some wetland habitats in southeast Lee County. Additionally, the absence of a requirement to collect baseline data does not allow for the establishment of pre-permit conditions for permit application analysis or for a comparison to future monitoring data when required.

It is important that the appropriateness and effectiveness of the wetland mitigation be documented. The available information was not adequate for such an evaluation to be conducted at this time.

The current ERP related monitoring is inadequate for determining what, if any, impacts the existing and proposed mining projects have on wetland, water and wildlife resources within the DR/GR. The effectiveness of wetland monitoring would be improved with comprehensive and uniform methodologies and specific requirements for the monitoring reports for preserved, enhanced, created or mitigation area wetlands. These reports should not only include the raw data but should include a complete analysis including hydrographs of the data in relation to the specific preserve area being monitored. Additionally, field inspections should be conducted annually to verify the current condition of the wetland preserves and mitigation areas. The monitoring should be required at least through the completion of mining and reclamation activities to verify that the conditions of the ERP permit have protected the wetland and/or conservation areas.

The impact of the mining excavation on the watershed must be a part of the analysis in determining appropriate design and location of fill dirt and limerock mines. The mine lakes are often self-contained with no outfall structures to contribute to the surface water or sheet flow in the watershed. In essence, the mined lake plus surrounding project area within the surface water management system become an anomaly within the watershed. There may be interaction between the mined lake and ground water, but any water that would have been present above ground is now displaced down gradient in the watershed, interrupting any sheet flow from the property to the watershed. Additionally, when the lake created through the extraction of these natural resources, will be the lowest topographic feature within the project, the surface and ground water will naturally seek the lowest point and be "drawn" to fill the lake and directed down gradient as ground water flow. The individual and cumulative extent of effects and impacts this has on adjacent wetlands and ground water is unknown due to the lack of data. Watershed analysis for wetland, wildlife, surface and ground water impacts, alteration and mitigation should be required as part of the review for proposed fill dirt and limerock mines in order to protect the natural resources within the

DR/GR and the ecologically significant areas interconnected with the DR/GR through the watersheds such as Estero Bay Aquatic Preserve and Corkscrew Swamp Sanctuary.

A detailed review of the ERP program's protection of wildlife was not conducted as a part of this study; however, wildlife are likely to be affected by the loss or alteration of wetlands and the changes in overall watershed dynamics. The removal of wetlands will result in the loss of wetland dependent species (e.g. otter; waterfowl; amphibians) within the vicinity of the wetland impact. A change in the depth of inundation and/or the hydroperiod within preserved wetlands may be detrimental to the foraging and/or breeding success of wetland dependent species (e.g. American wood stork; American alligator; amphibians) resulting in a potential reduction in wildlife population. Additionally, if the mosaic of wetland and upland landscape in the DR/GR is fragmented through wetland and/or upland impacts, then the territories of listed species such as the Florida panther, Florida black bear, and Big Cypress fox squirrel will be reduced, which may result in adverse impacts to the sustainability of these species within southeast Lee County. It is important to evaluate the impact of proposed altered water levels and flows, as well as removal of habitat (whether upland or wetland as well as the interconnectivity of the two), on the wildlife resources to insure the preservation of ecosystems and sustainability of wildlife populations. Appropriate regulations for habitat protection are needed at a local level to insure the continued presence of the diverse wildlife occurring in the DR/GR.

Source water protection is an additional issue that concerns water resources in the DR/GR created by the presence of public potable water well fields. Three public well fields are found within the DR/GR study area: Lee County Utilities Corkscrew Well Field, Lee County Utilities Green Meadow Mine Well Field, and Bonita Springs Utilities Well Field. Lee County Utilities provides approximately 70% of its potable water supply from wells located within the DR/GR study area. Bonita Springs Utilities has the capacity to provide 53.5% of its service area from its well fields within the DR/GR (37% within the study area; 16.5% within the City's DR/GR), excluding its reverse osmosis production wells. The Lee County Utility wells are drawing water from both the surficial aquifer and the sandstone aquifer. The Corkscrew wells range from a 40-150 foot depth in the surficial aquifer and a 243-315 foot depth in the sandstone aquifer. The Green Meadows wells are shallower, with the surficial aquifer wells ranging from a 24-45 foot depth, and the sandstone aquifer wells ranging from a 180-235 foot depth. The lakes created through limerock mining are located within the same aquifer as the surficial aquifer wells. (Pers. Comm. Lee County Utilities Staff). Furthermore, given that State water quality standards do not apply to the lakes created through mining, and Lee County's potable water supply wells are located adjacent to many of these mines, it is important that Lee County require the establishment of base line water quality as well as real time water quality monitoring in perpetuity of the surface and ground water within the mining projects boundaries. The Bonita Springs Utilities wells within both the Lee County and City of Bonita Springs DR/GR are approximately 80-100 feet in depth. Their reverse osmosis production wells extract water from a 800-1100 foot depth, well below the influence of the surface water or mining pits. The Bonita Springs Utilities well fields are not directly adjacent to approved or proposed mining pits. Additionally, the City of Bonita Springs' comprehensive plan prohibits the establishment of new mining operations.

The county needs to continue to review development applications within the DR/GR to insure appropriate protection, enhancement, restoration and management of the wetlands and water resources. The important connection of the DR/GR to potable water supply, conservation lands, and wildlife needs to be protected through ecologically-based local regulations. The surface waters leaving the DR/GR via sloughs, flow-ways, ditches, and streams ultimately reach the Estero Bay Aquatic Preserve, placing an additional local value and responsibility in maintaining and enhancing wetlands and the surface and ground water levels and quality within the DR/GR.

Findings & Action Items

1. The appropriateness and effectiveness of wetland protection and mitigation within the DR/GR through the State ERP process was not able to be thoroughly evaluated due to the nature of monitoring and the lack of available information.

    a. Detailed functional assessments of existing wetlands and mitigation areas need to be required for the ERP permit applications.
    b. "Adverse impacts" need to be clearly defined by the State with specific means of quantifying impacts based on scientific standards.
    c. Preserved, enhanced, restored and created wetlands must be properly monitored to determine if appropriate vegetation, hydrology, water quality, and wildlife usage are maintained or established. The monitoring reports must include a full analysis, including hydrographs of the data collected in relation to the specific preserve area in addition to the data alone. Monitoring needs to be performed annually for a minimum of five years after the completion of excavation and reclamation activities with perhaps less intensive monitoring required after success criteria are satisfied.
    d. Monitoring that documents the success or failure of all mitigation through annual functional analysis reports is necessary.
    e. A database of permitted wetland impacts and mitigation, including actual acreage and functional analyses, must be developed and maintained to provide regular reports on the amount of permitted wetland impacts including acreage and functional value; the amount of mitigation including acreage and functional value; and the success or failure of the permitted wetland mitigation on a regular basis whether annually or biannually.

2. The county needs to evaluate if the State's "no net functional loss of wetlands" policy provides enough protection for wetlands within the DR/GR or if additional wetland protection is necessary to protect the water resources within the DR/GR as is directed within the Lee Plan.

3. The ERP process is based on existing conditions, whereas the Lee Plan emphasizes the importance of restoring and enhancing wetlands within the DR/GR.

    a. The county must consider the historic conditions when identifying wetlands to be preserved, enhanced or restored.

4. The ERP standards are based on surface water management systems with relatively small and shallow storm water ponds/lakes.

    a. Establish ERP rules specific to mine excavations, which are more appropriate than rules based upon surface water management systems for development.
    b. Evaluate impact of the mining pit on the surface and ground water levels and quality, and determine the effects of any changes in onsite and offsite conservation areas (e.g. changes in depth of inundation and hydroperiods).
    c. Evaluate the cumulative impact of the mines on the local watershed (i.e. Estero River; Flint Pen; Corkscrew) water budget.

5. Conservation easements may be eliminated through permit revisions.

    a. Conservation easements need to be dedicated to Lee County in addition to any other appropriate State or Federal agency to insure Lee County is included in the review and approval or denial of any revisions to conservation easements.

6. Ground water levels within and adjacent to the onsite preserves and at the property boundaries need to be monitored through the completion of the mining and reclamation activities.

7. Water quality monitoring of the mined lake and ground water for each aquifer must be made a requirement in the LDC with active mines being required to install monitoring wells within 6 months of adoption of the revised standard. The monitoring wells need to be maintained in perpetuity and provide real time data.

8. Wildlife may be affected by the loss or alteration of wetlands and the overall watershed landscape.

    a. Proposed changes in the depth of inundation and/or hydrology of preserved wetlands must be evaluated for their impact on wetland dependent species foraging and breeding success.
    b. The Lee County Land Development Code should be evaluated to insure the inclusion of project design regulations and requirements. These requirements will maintain or enhance the mosaic of interconnected wetland and upland areas so as to provide wildlife corridors.

ENHANCING WETLAND PROTECTION

The Lee Plan places emphasis on protecting the water resources within the DR/GR as an area of critical surface water management concern. Evaluation of wetlands, surface and ground water are all important components of maintaining the integrity of the DR/GR. The State ERP program focuses on surface water management which does not fully address the goals of the Lee Plan. The following methods may be utilized to enhance the protection and mitigation of natural resources within the DR/GR:

Project Design and Permit Review:

A. Obtain delegated authority from FDEP & SFWMD for ERP review, issuance & compliance for projects within the DR/GR

Florida Administrative Code (FAC) 62-344 indicates that a local government may seek "delegation of all or a part of the environmental resource permit (ERP) program from the Department and water management districts." Lee County could petition for delegation of the ERP program for mining projects, agricultural operations, residential developments, and roadways within the DR/GR study area, which is a critical location for surface water management as determined by the county (Lee Plan Objective 60.4). This delegation would allow the State and County regulations to be reviewed simultaneously, reducing the time involved in obtaining separate permits and modifications. Such an integrated review would allow the special issues and requirements of the Lee Plan regarding the DR/GR protection of water resources to be addressed more thoroughly while the wetland and surface water management issues are also reviewed for compliance with the ERP standards. Additionally, the county staff would be able to insure that permit conditions are met in a timely manner with regularly scheduled field inspections. If delegation were granted, staff members would be needed within the Divisions of Zoning, Development Services, Environmental Sciences, and Natural Resources who would specialize in the review of mines to cover the complex State and local issues and requirements.

The scope of this evaluation did not include review of the ERP permits issued outside of the DR/GR, therefore, the effectiveness of the State's protection of wetlands outside the DR/GR study area is not included and would involve different Lee Plan goals, objectives, and policies. The county should conduct an evaluation of the ERP program in relation to the Lee Plan for the area outside of the DR/GR before seeking delegation to include the entire county.

Any request for delegation of authority needs to be specific to the areas the county wishes to be directly involved, as the ERP program also includes review of solid waste management facilities, hazardous waste management facilities, domestic wastewater treatment facilities, and industrial wastewater treatment.

B. Require base line hydrological information for both quality and quantity of surface and ground water

Site-specific base line data is critical in establishing the design of any new or expanded development within the DR/GR. This will insure that alteration to land associated with the development does not lower the existing surface and ground water to levels that are detrimental to maintaining the ecological integrity of habitats, water resources, and the watershed. A series of piezometers and wells should be used to establish site-specific information on water levels for the water table aquifer as well as other aquifers deemed necessary by the county. The monitoring plan must be coordinated with the county prior to commencing the installation of wells. The use of continuous monitors would provide detailed documentation of seasonal and event fluctuations. The appropriate water quality analysis would be determined by the Lee County Division of Natural Resources staff.

C. Watershed analysis

The permit review process needs to include an analysis of how the proposed project impacts, alters, restores, or enhances the watershed as defined by the DHI, Inc. Mike She Model completed as a part of this study. The items to be reviewed must include surface and ground water quality and quantity; surface water flows; wetlands; upland habitat; wildlife; and water budget. The DHI, Inc. model should be utilized with site-specific data to demonstrate the effects of the proposed development on the watershed through running pre- and post-development scenarios.

D. Require appropriate hydrologic monitoring of surface and ground water quantity

The series of piezometers and other monitoring wells established to gather the base line hydrological information should also be used to monitor the water levels during construction for a minimum of five years beyond completion of the project. Continuous monitoring should occur year-round, with monitoring reports and data submitted quarterly to the county. Some appropriate level of post construction monitoring may continue indefinitely.

E. Require appropriate water quality monitoring of surface and ground water

The appropriate water quality monitoring analysis established by the Lee County Division of Natural Resources staff for the base line information should be required as ongoing water quality monitoring for a specified number of years as determined by the county staff. The county would determine the appropriate report submittal timeline, with at least one report submitted annually. It may be beneficial to have reports submitted biannually, with one report submitted at the end of the dry season (i.e. May) and the other report submitted at the end of the wet season (i.e. October).

F. Establish an open space and preservation requirement specific to the DR/GR study area

The Lee Plan recognizes the value of the open space within the DR/GR as being different from other portions of the county through the limitation of potential land uses. However, only private recreational facilities have DR/GR specific open space and preservation requirements. Lee Plan Objective 77.2 emphasizes the importance of open space as part of the development design. The Lee Plan (Policy 77.2.1) also directs staff to "continue to review the open space requirements of the Land Development Code to determine if these requirements should be modified in any way to best meet the objectives of open space requirements within new commercial and industrial developments."

The following points detail the existing Land Development Code (LDC) open space and preservation requirements for private recreational facilities, residential lots, mines, and agricultural operations, which are the developments allowed within the DR/GR land use category:

1. When private recreational facilities were added as an allowable use within the DR/GR land use category, stringent open space and preservation requirements were established. Eighty-five percent of a private recreational facility planned development must be open space [LDC Sect. 34-941(d)(2)(d)]. Additionally, golf courses must provide a minimum of 200 acres of habitat preservation or creation for every 150 acres of impact [LDC Sect. 34-941(e)(5)(e)]. All other private recreational facilities must preserve 50% of the onsite indigenous upland habitat [LDC Sect. 34-941(d)(4)(b)].

2. Residential lots within the AG-2 zoned portions of the DR/GR must have a maximum lot coverage of 25% [LDC Table 34-654]. This results in a minimum of 75% open space on the residential lots. Currently, there is no minimum native habitat preservation requirement in place for residential lots.

3. Mines are considered an industrial use that must provide a minimum of 20% open space [LDC Sect. 10-415(a)]. Fifty percent of the required open space, or 10% of the project area, must be provided through the preservation of the existing indigenous habitat [LDC Sect. 10-415(b)]. There is no minimum requirement for restoring habitat if none currently exists. These industrial standards were established for urban and suburban industrial centers. The county should re-evaluate the open space and preservation requirements for mines to insure the protection and enhancement of the DR/GR natural resources.

4. Agricultural uses do not have any open space or preservation requirements. The conversion of land to agricultural use requires a Notice of Clearing (Lee County Administrative Code 13-15), which allows the Division of Environmental Sciences staff to conduct a field inspection of the property to determine if any listed species or wetlands are present. The applicant is then advised to secure the appropriate State and Federal permits for any observed environmental issue. No surface water management review is conducted. Lee County should develop standards for sustainable agriculture in the DR/GR.

Establishing DR/GR specific open space and preservation requirements will provide protection of the water resources, wildlife, habitat, and green space. The wetlands and uplands in the DR/GR need to be an interconnected system to provide an appropriate surface water flow that maintains the ecological health of the watersheds and the continued existence of listed wildlife such as Florida panther, Florida black bear, American wood stork and Big Cypress fox squirrel.

Land Use:

A. Strict interpretation of Lee Plan Future Land Use Category for Wetlands, to not allow mining within wetlands
The Lee Plan Policy 1.5.1 states "Permitted land uses in Wetlands consist of very low-density residential uses and recreational uses that will not adversely affect the ecological functions of wetlands." Objective 1.5 indicates that the Wetlands land use category will be defined by the unified state delineation methodology contained in the Florida Administrative Code, meaning that any State jurisdictional wetland is considered to be within the Wetlands land use category whether it is identified on the future land use map or not.

If no mining is allowed within the Wetlands land use category, there may be negative consequences to protecting the overall water resources within the DR/GR. This could create greater fragmentation of natural systems than already is occurring by forcing mines to excavate around the wetlands. In essence, this would create "mining sprawl," to obtain the same quantity of limerock that is being excavated under current designs or future maximized, limited location mines. Additionally, maintenance of the hydrology of wetlands encircled by mining pits would be difficult, resulting in the reduction in wetland function and value.

It is typically more ecologically sound to allow critically-evaluated wetland impacts within a mining designated area in order to preserve or restore larger contiguous systems within the DR/GR for water storage, water conveyance, wildlife usage, and maintenance of the native habitats. However, a conservation and mitigation plan to insure the appropriate lands are acquired, restored and managed to meet the needs for water storage, water conveyance, wildlife, and ecosystems must be developed and strictly adhered to for the overall ecological benefits to be achieved.

B. Concentrate mining within a designated portion of the DR/GR
Designating a mining area within the DR/GR will allow the mining operations to continue without creating "mining sprawl," while also reducing the expanse of ecological impact. Limiting the location of mining operations allows improved protection and management of the wetlands, water resources, and wildlife in the remainder of the DR/GR through concentrating the footprint of the mining impacts on the landscape. As noted above, a conservation and mitigation plan must be adopted and strictly adhered to for the overall ecological benefits to be achieved.

C. Partner with agricultural interests to insure the continuation and enhancement of agricultural operations
Agricultural operations do not typically leave a permanent alteration to the land as they do not remove the native soil; do not create large areas of impervious surface; and do not permanently alter the surface and ground water characteristics. Additionally, agricultural operations may be managed in a manner that does not have adverse impacts on ground water. Southwest Florida farmers traditionally farmed during the late fall, winter and early spring. This farming practice meant the lands were fallow during the rainy season, allowing for the storage of water within and on top of the land and resulting in recharge of the ground water levels, sheet flow through the watershed, and maintenance of appropriate base flows in the rivers and streams. Agricultural operations also provide open space and corridors for wildlife movement.

Establishing partnerships with agricultural operations will insure those operations are able to maintain their businesses and prevents the land from being permanently altered through mining or other development. The partnership may involve the transfer of development rights. The owner may sell his/her rights to insure the continuation of farming while protecting the water resources; conservation easements; and/or purchase options so that the county may have the first right of refusal if the land owner decides to convert the land from agricultural operations into another allowable use.

The continued use of the land for agricultural operations encourages a local food supply, preserves the native soil, and allows for restoration of native habitats, and surface and ground water. This process continues, even if the agricultural use is terminated 10, 25, 50 or more years from today.

Natural Resource Protection:

A. Require conservation easements dedicated to Lee County
Conservation easements may be adjusted or eliminated through future permitting reviews. Therefore, in order to insure that Lee County's regulations pertaining to the protection of natural resources are maintained in perpetuity, it is necessary to have conservation easements dedicated to Lee County for preserved, enhanced, created, and restored habitats within developments including the planted littoral areas of mine lakes.

Other permitting agencies may require conservation easements as part of their permit approval. Each agency has its own criteria and format for conservation easement documents; therefore, it will be important for Lee County to obtain an agreement with the FDEP, SFWMD, and ACOE to adopt standardized conservation easement language and a format covering all the pertinent requirements. Such an agreement will avoid multiple conservation easements over an individual parcel. Additionally, Lee County should have an agreement with these agencies to accept conservation easements dedicated to Lee County as part of their permit issuance. If Lee County obtains delegation for ERP reviews, then no additional agreement will be needed between the State agencies and Lee County regarding the dedication of conservation easements.

Natural Resource Restoration:

A. Delineate potential, appropriate restoration areas within the DR/GR
Kevin L. Erwin Consulting Ecologist, Inc. (KLECE) is determining the most appropriate areas for ecosystem restoration within the DR/GR, reestablishing flowways and wildlife corridors. Within these areas, the functional capacity of wetlands, water quantity and quality may be enhanced. Adopting a watershed based ecosystem restoration plan is consistent with Lee Plan Objective 107.1, which states "the county will continue to implement a resource management program that ensures the long-term protection and enhancement of the natural upland and wetland habitats through the retention of interconnected, functioning, and maintainable hydroecological systems where the remaining wetlands and uplands function as a productive unit resembling the original landscape."

The potential land uses within the DR/GR include agriculture, natural resource extraction and related facilities, conservation uses, public facilities, publicly-owned gun range facilities, private recreation facilities, and low density residential uses. Existing agricultural operations that utilize best management practices to protect water resources do not create a permanent foot print on the landscape, nor do they remove the native soils. Therefore agriculture is often an acceptable use within the designated restoration areas. However, natural resource extraction of fill dirt and limerock should be prohibited within the delineated restoration areas as the mining results in a permanent alteration to the land and watershed.

The allowable residential uses are limited to low-density (i.e. one dwelling unit per 10 acres) developments in the DR/GR with a further restriction within wetlands to one dwelling unit per 20 acres. New residential developments should be given incentives to be located outside of the delineated restoration area, such as the ability to transfer development rights from lands within the restoration area to land outside of the restoration area. Public facilities in the DR/GR are currently related to potable water and transportation. The potable water wells should continue to be managed to insure the protection of surface and ground water quantity and quality. Any expansion of facilities into the designated restoration area must be carefully designed and managed to be consistent with restoration efforts.

Ecological concerns exist with the development of additional roads within the delineated restoration area, as they may interrupt or alter the water flow and wildlife movement as well as fragment the ecosystem. Therefore, new or expanded roads should be prohibited within the delineated restoration area. Existing roads adjacent to the delineated restoration areas may need to be retrofitted to provide appropriate hydrologic and wildlife connections to conservation and restoration areas. Wildlife fencing may be necessary in certain areas to reduce the potential conflict between vehicles and wildlife.

B. Require hydrologic restoration of wetlands as included in Lee Plan Policy 1.4.5:
"Land uses in these [DR/GR] areas must be compatible with maintaining surface and groundwater levels at their historic levels."

The surface and ground water resources within the DR/GR study area have been altered and drained from their historic levels as is evident when comparing the differences in land use cover between 1953 and 2007. However, opportunity still exists to implement Lee Plan Policy 1.4.5 and enhance the currently drained surface and ground water levels.

One manner in which the water levels were lowered was through the construction of agricultural ditches. The water table levels can be restored either when agriculture ceases by filling the ditches (as has been done on the Corkscrew Regional Mitigation Bank site) or when the agricultural fields are allowed to go fallow in the summer months. This may allow for redesign and adaptive management of water storage and aquifer recharge during the rainy season instead of the channelized discharge that is detrimental downstream to the rivers and estuary. Additional means to increase the storage of water within the agricultural lands while maintaining viable crops are potentially available. The county should work with the agricultural community to determine the best options for maintaining viable agricultural operations while improving water storage, aquifer recharge, and water conveyance within the DR/GR.

Mining pits permanently alter the surface and ground water resources. Recognizing both the need for limerock within the construction and transportation industry and the importance of the potable water resources and fresh water input into the watershed, it is important to develop and adhere to a plan that allows mining in a designated area, as this insures the protection and enhancement of the water resources. Through concentrating the mining within a designated area, the impacts to the water resources and watersheds are isolated to a single portion of the DR/GR and concurrently offset the impacts in other portions of the DR/GR.

Residential uses, even at low density, have altered surface water flows and patterns through the ditching of properties and excavation of ponds. These alterations must be more thoroughly reviewed with regard to the cumulative impact to the natural resources in the DR/GR. In addition, future residential areas need to be designed in a manner that is not detrimental to the functionality of wetland and upland ecosystems or the water table aquifer. The use of septic tanks within the DR/GR may also alter water quality; therefore, any options for transferring residential density and/or clustering development needs to consider sewer systems. Private wells can also lower the surface and ground water levels. Private wells need to be evaluated for cumulative impacts, and any options for transferring residential density and/or clustering development need to include a centralized potable and irrigation water system.

Private recreational facilities may be designed to enhance the surface and ground water levels to a more appropriate historic level. Site-specific water quantity and quality data will need to be collected to insure the proper design of golf courses and other private recreational facilities. This will also improve the native ecosystems and enhance wildlife habitat.

Public facilities in the DR/GR include public potable water wells, the Port Authority mitigation park, conservation lands, and roadways. The public potable water wells are located on various size properties. The larger property at the corner of Alico and Corkscrew Roads provides a wildlife habitat and flow-way connections that should be maintained and enhanced. The Port Authority mitigation park has undergone some restoration and may be available for additional restoration of surface and ground water quantities to more historic levels as part of the upper reaches of the Flint Pen watershed. The Conservation 20/20 lands that have been acquired provide opportunities for restoration of the historic water levels as part of the ecosystem restoration as offsets or mitigation for public works projects elsewhere in the county. The existing roadways may need to have improvements in order to restore historic flow-ways and allow wildlife movement.

A comprehensive and cumulative impact analysis of proposed development within the DR/GR will provide a means to implement Lee Plan Policy 1.4.5 to restore the surface and ground water levels to more historic levels. In turn, this process will improve the water storage, native ecosystems, and the watersheds.

C. Encourage/require ecosystem preservation and restoration
The DR/GR area historically consisted of a wetland-dominated ecosystem. Hydric pine flatwoods and the cypress swamp were the predominant wetland habitats, and slash pine flatwoods were the predominant upland habitat. The mosaic of wetland and upland habitats form ecosystems allowing for the storage of surface and ground water and sheet flow within the watershed. The restoration of the ecosystems will allow a greater quantity of surface and ground water storage, resulting in enhanced water resources within the DR/GR and in the larger, Estero Bay watershed. Additionally, these habitats provide foraging and nesting or denning areas for listed species including Florida panther, Florida black bear, Big Cypress fox squirrel, American wood stork, indigo snake, and American alligator. The Florida panther and Florida black bear need to have large, connected habitats away from the urban and suburban development to continue to be present within Lee County. The DR/GR is within the critical habitat areas for the Florida panther and American wood stork.

Natural Resources Impact & Mitigation:

A. Require wetland impact mitigation to occur within the DR/GR
Requiring that mitigation for wetland impacts in the DR/GR area be provided within the DR/GR is consistent with the Lee Plan and would provide opportunities to improve water storage and conveyance where needed. Also, this would allow for the maintenance or improvement of wildlife habitats for listed species such as the American wood stork, Big Cypress fox squirrel, Florida black bear and Florida panther. The implementation of the restoration plan compiled by KLECE as part of this study will allow an interconnection between existing conservation lands within the DR/GR and CREW lands to the east, creating a large wildlife loop in southeast Lee County and directing wildlife away from the urban centers to the west and north of the DR/GR.

B. Establish a regional offsite mitigation area (ROMA) within the DR/GR
Establishing a Regional Offsite Mitigation Area (ROMA) through FDEP would allow Lee County to be involved with determining the appropriate areas for wetland mitigation within the DR/GR so as to insure protection of the water supply, watersheds, and listed species. ROMAs operate similarly to a mitigation bank though without the lengthiness of the permitting process.

C. Establish a "natural resource extraction fee" to be utilized to purchase and/or restore lands within the DR/GR
Establishing a Natural Resource Extraction Fee for fill dirt and limerock mining recognizes these materials as valuable natural resources and identifies that the excavation of these materials does have an adverse, permanent ecological and hydrological impact on the DR/GR. Utilizing the generated fees to purchase and/or restore lands within the appropriate areas of the DR/GR will help offset the impacts created through the excavation of the permanent, deep mining pits.

D. Require mitigation for impacts to listed species habitat to occur within the DR/GR
The DR/GR in southeast Lee County provides habitats for listed species including the Florida panther; Florida black bear; American wood stork; Big Cypress fox squirrel; indigo snake; gopher tortoise; Audubon's caracara; American bald eagle; red cockaded woodpeckers; snail kite; wading birds; and American alligator. Lee Plan Policy 107.3.1 requires the county to "participate with the Southwest Florida Regional Planning Council and the Florida Game and Fresh Water Fish Commission in the development of a regional plan that identifies and protects areas utilized by wildlife, including panthers and bears, so as to promote the continued viability and diversity of regional species."

The county did compile an overall county mitigation plan as a long-range planning tool for permitting public works projects with unavoidable impacts to wetlands and/or wildlife. However, this study has provided more detailed information regarding the DR/GR in relation to current and historic wetlands and watersheds. Therefore, the mitigation plan for the study area should be updated to include the KLECE restoration plan.

Also, the county needs to coordinate with the US Fish and Wildlife Service and the Florida Freshwater Fish and Wildlife Conservation Commission to

insure wildlife impacts within the county are mitigated within the county. The adoption and strict adherence to a restoration, conservation and mitigation plan will insure long-the term protection and enhancement of wildlife habitat. Establishing such a plan and partnership with wildlife agencies would also provide a means to keep the mitigation for impacts to listed species habitat within Lee County and more specifically within the DR/GR.

Permit Compliance:

A. Establish a notification system that alerts compliance staff when an annual status or monitoring report is due. This will insure that monitoring is completed on time, and that follow-ups to any issues are addressed in a timely matter

Establishing a system that notifies staff when monitoring reports are due would insure that the permit conditions are met in a timely manner, and that any issues regarding impacts to water resources and conservation areas could be addressed. Additionally, the program could be set up to issue reminder notices to the permit holder prior to the due date of the report. This program would be more effective if the county obtained delegation of the ERP program from the State for projects within the DR/GR, giving direct authorization to enforce ERP permit conditions.

ENVIRONMENTAL RESOURCE PERMITTING & WETLANDS

APPENDIX 2.7.1A

State Definition of Wetlands F.S.S. 373.019

For the sole purpose of serving as the basis for the unified statewide methodology adopted pursuant to s. 373.421(1), as amended, "wetlands" means those areas that are inundated or saturated by surface water or groundwater at a frequency and a duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soils. Soils present in wetlands generally are classified as hydric or alluvial, or possess characteristics that are associated with reducing soil conditions. The prevalent vegetation in wetlands generally consists of facultative or obligate hydrophytic macrophytes that are typically adapted to areas having soil conditions described above. These species, due to morphological, physiological, or reproductive adaptations, have the ability to grow, reproduce, or persist in aquatic environments or anaerobic soil conditions. Florida wetlands generally include swamps, marshes, bayheads, bogs, cypress domes and strands, sloughs, wet prairies, riverine swamps and marshes, hydric seepage slopes, tidal marshes, mangrove swamps and other similar areas. Florida wetlands generally do not include longleaf or slash pine flatwoods with an understory dominated by saw palmetto. Upon legislative ratification of the methodology adopted pursuant to s. 373.421(1), as amended, the limitation contained herein regarding the purpose of this definition shall cease to be effective.

APPENDIX 2.7.1B

F.S.S. 373.421 Delineation methods; formal determinations.
(1) The Environmental Regulation Commission shall adopt a unified statewide methodology for the delineation of the extent of wetlands as defined in s. 373.019(25). This methodology shall consider regional differences in the types of soils and vegetation that may serve as indicators of the extent of wetlands. This methodology shall also include provisions for determining the extent of surface waters other than wetlands for the purposes of regulation under s. 373.414. This methodology shall not become effective until ratified by the Legislature. Subsequent to legislative ratification, the wetland definition in s. 373.019(25) and the adopted wetland methodology shall be binding on the department, the water management districts, local governments, and any other governmental entities. Upon ratification of such wetland methodology, the Legislature preempts the authority of any water management district, state or regional agency, or local government to define wetlands or develop a delineation methodology to implement the definition and determines that the exclusive definition and delineation methodology for wetlands shall be that established pursuant to s. 373.019(25) and this section. Upon such legislative ratification, any existing wetlands definition or wetland delineation methodology shall be superseded by the wetland definition and delineation methodology established pursuant to this chapter. Subsequent to legislative ratification, a delineation of the extent of a surface water or wetland by the department or a water management district, pursuant to a formal determination under subsection (2), or pursuant to a permit issued under this part in which the delineation was field-verified by the permitting agency and specifically approved in the permit, shall be binding on all other governmental entities for the duration of the formal determination or permit. All existing rules and methodologies of the department, the water management districts, and local governments, regarding surface water or wetland definition and delineation shall remain in full force and effect until the common methodology rule becomes effective. However, this shall not be construed to limit any power of the department, the water management districts, and local governments to amend or adopt a surface water or wetland definition or delineation methodology until the common methodology rule becomes effective.

(2) A water management district or the department may provide a process by rule for formal determinations of the extent of surface waters and wetlands, as delineated in subsection (1). By interagency agreement, the department and each water management district shall determine which agency shall implement the determination process within the district. If a rule is adopted, a property owner, an entity that has the power of eminent domain, or any other person who has a legal or equitable interest in property may petition the district for a formal determination. In such rule, the governing board or the department shall specify information which must be provided and may require authorization to enter upon the property. The rule shall also establish procedures for issuing a formal determination. The governing board may authorize its executive director to issue formal determinations. The governing board must by rule prescribe the circumstances in which its executive director may issue such determinations. The governing board or the department may require a fee to cover the costs of processing and acting upon the petition. That fee must be established by rule. A water management district or the department may publish, or require the petitioner to publish at the petitioner's expense, notice of the intended agency action on the petition for a formal determination in a newspaper of general circulation within the affected area. Within 60 days prior to the expiration of a formal determination, the property owner, an entity that has the power of eminent domain, or any other person who has a legal or equitable interest in the property may petition for a new formal determination for the same parcel of property and such determination shall be issued, approving the same extent of surface waters and wetlands in the previous formal determination, as long as physical conditions on the property have not changed, other than changes which have been authorized by a permit pursuant to this part, so as to alter the boundaries of surface waters or wetlands and the methodology for determining the extent of surface waters and wetlands authorized by subsection (1) has not been amended since the previous formal determination. The application fee for such a subsequent petition shall be less than the application fee for the original determination.

(3) A formal determination is binding for a period not to exceed 5 years as long as physical conditions on the property do not change, other than changes which have been authorized by a permit pursuant to this part, so as to alter the boundaries of surface waters or wetlands, as delineated in subsection (1).

(4) The governing board or the department may revoke a formal determination if it finds that the petitioner has submitted inaccurate information to the district.

(5) A formal determination obtained under this section is final agency action and is in lieu of a declaratory statement of jurisdiction obtainable under s. 120.565. Sections 120.569 and 120.57 apply to formal determinations under this section.

(6) The district or the department may also issue nonbinding informal determinations or otherwise institute determinations on its own initiative as provided by law. A nonbinding informal determination of the extent of surface waters and wetlands issued by the South Florida Water Management District or the Southwest Florida Water Management District, between July 1, 1989, and the effective date of the methodology ratified in s. 373.4211, shall be validated by the district if a petition to validate the nonbinding informal determination is filed with the district on or before October 1, 1994, provided:

(a) The petitioner submits the documentation prepared by the agency, and signed by an agency employee in the course of the employee's official duties, at the time the nonbinding informal determination was issued, showing the boundary of the surface waters or wetlands;

(b) The request is accompanied by the appropriate fee in accordance with the fee schedule established by district rule;

(c) Any supplemental information, such as aerial photographs and soils maps, is provided as necessary to ensure an accurate determination;

(d) District staff verify the delineated surface water or wetland boundary through site inspection; and

(e) Following district verification, and adjustment if necessary, of the boundary of surface waters or wetlands, the petitioner submits a survey certified pursuant to chapter 472, which depicts the surface water or wetland boundaries. The certified survey shall contain a legal description of, and the acreage contained within, the boundaries of the property for which the determination is sought. The boundaries must be witnessed to the property boundaries and must be capable of being mathematically reproduced from the survey.

Validated informal nonbinding determinations issued by the South Florida Water Management District and the Southwest Florida Water Management District shall remain valid for a period of 5 years from the date of validation by the district, as long as physical conditions on the property do not change so as to alter the boundaries of surface waters or wetlands. A validation obtained under this section is final agency action. Sections 120.569 and 120.57 apply to validations under this section.

(7) (a) This subsection is intended to restore qualified developments to their pre-Henderson Wetland Protection Act status for contiguous wetlands. This provision will therefore streamline state wetland permitting without loss of wetland protection by other governmental entities.

(b) Wetlands contiguous to surface waters of the state as defined in s. 403.031(13), Florida Statutes (1991), shall be delineated pursuant to the department's rules as such rules existed prior to January 24, 1984, while wetlands not contiguous to surface waters of the state as defined in s. 403.031(13), Florida Statutes (1991), shall be delineated pursuant to the applicable methodology ratified by s. 373.4211 for any development which obtains an individual permit from the United States Army Corps of Engineers under 33 U.S.C. s. 1344:

1. Where a jurisdictional determination validated by the department pursuant to rule 17-301.400(8), Florida Administrative Code, as it existed in rule 17-4.022, Florida Administrative Code, on April 1, 1985, is re-validated pursuant to s. 373.414(13) and the affected lands are part of a project for which a vested rights determination has been issued pursuant to s. 380.06, or

2. Where the lands affected were grandfathered pursuant to s. 403.913(6), Florida Statutes (1991), and proof of prior notification pursuant to s. 403.913(6), Florida Statutes (1991), is submitted to the department within 180 days of the publication of a notice by the department of the existence of this provision. Failure to timely submit the proof of prior notification to the department serves as a waiver of the benefits conferred by this subsection.

3. This subsection shall not be applicable to lands:

   a. Within the geographical area to which an individual or general permit issued prior to June 1, 1994, under rules adopted pursuant to this part applies; or

   b. Within the geographical area to which a conceptual permit issued prior to June 1, 1994, under rules adopted pursuant to this part applies if wetland delineations were identified and approved by the conceptual permit as set forth in s. 373.414(12)(b)1. or 2.; or

   c. Where no development activity as defined in 1s. 380.01(1) or (2)(a)-(d) and (f) has occurred within the project boundaries since October 1, 1986; or

   d. Of a project which is not in compliance with this part or the rules adopted pursuant to 2ss. 403.91-403.929, 1984 Supplement to the Florida Statutes 1983, as amended.

4. The wetland delineation methodology required in this subsection shall only apply within the geographical area of an individual permit issued by the United States Army Corps of Engineers under 33 U.S.C. s. 1344. The requirement to obtain such individual permit to secure the benefit of this subsection shall not apply to any activities exempt or not subject to regulation under 33 U.S.C. s. 1344.

5. Notwithstanding subsection (1), wetland delineation methodology required in this subsection and any wetland delineation pursuant thereto, shall only apply to agency action under this part and shall not be binding on local governments except in their implementation of this part.

History.--s. 7, ch. 91-288; s. 31, ch. 93-213; ss. 6, 18, ch. 94-122; s. 100, ch. 96-410; s. 10, ch. 98-88; s. 170, ch. 99-13; s. 41, ch. 2006-1.

[1]**Note.**--Section 380.01 was transferred to s. 381.492 by the reviser in 1969; it was further redesignated as s. 381.0605 by s. 52, ch. 91-297.

[2]**Note.**--Sections 403.91-403.925 and 403.929 were repealed by s. 45, ch. 93-213, and s. 403.913, as amended by s. 46, ch. 93-213, was transferred to s. 403.939 and subsequently repealed by s. 18, ch. 95-145. The only section remaining within the cited range is s. 403.927.

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restoration funding sources F

The ability to restore natural systems within the DR/GR will largely depend upon Lee County securing funding for both land acquisition and ecosystem restoration. The following sources of funding for land acquisition and restoration are presented in categories of public and private sources. The public sources are further separated into federal, state and local programs. In order to maximize the restoration potential, a variety of funding sources should be used in combination with developing partnerships with other governmental agencies, private organizations, agricultural operators, and private developers.

Public Sources: Federal Funding

US Environmental Protection Agency

Environmental Finance Program

This program assists the public and private sectors in their search for creative approaches to funding environmental programs, projects and activities. The EFP uses leveraging and partnerships to extend the reach and impact of its activities. *www.epa.gov/efinpage*

Five Star Restoration Program

The Five Star Restoration Program brings together students, conservation corps, other youth groups, citizen groups, corporations, landowners and government agencies to provide environmental education and training through projects that restore wetlands and streams. The program provides challenge grants, technical support and opportunities for information exchange to enable community-based restoration projects. Funding levels are modest, from $5,000 to $20,000, with $10,000 as the average amount awarded per project. However, when combined with the contributions of partners, projects that make a meaningful contribution to communities become possible. At the completion of Five Star projects, each partnership will have experience and a demonstrated record of accomplishment and will be well-positioned to take on other projects. Aggregating over time and space, these grassroots efforts will make a significant contribution to our environmental landscape and to the understanding of the importance of healthy wetlands and streams in our communities.

www.epa.gov/owow/wetlands/restore/5star/

Charlotte Harbor National Estuary Grants

Grants are issued annually for a variety of projects with the Research and Restoration Partners projects being the most applicable to the DR/GR. This program serves projects that have long-term applicability and serve as models for addressing habitat improvement and resource management challenges. Considering a continuing objective of the National Estuary Program (NEP) is to inform and educate as many segments of the public as possible, education remains an important component of all projects; therefore, many restoration projects include an educational element. The NEP also requires that restoration projects address at least one NEP goal and one NEP priority problem; be transferable to other locations; demonstrate value to the community; be innovative in design; and incorporate a permanent management strategy.

www.chnep.org/Grants/GrantsSupported.htm

USDA Natural Resource Conservation Service

Conservation planning and technical assistance are provided for individuals wishing to develop and implement conservation plans. Conservation plans protect, conserve, and enhance the natural resources, including soil, water, air, plants, and animals.

Programs include: Conservation Technical Assistance Program and Activities; Environmental Improvement Programs; Stewardship Programs; Water Resources Programs; Easement Programs (farm and ranchland protection program) *www.nrcs.usda.gov/programs*

Wetlands Reserve Program

The Wetlands Reserve Program is a voluntary program offering landowners the opportunity to protect, restore, and enhance wetlands on their property. The USDA Natural Resources Conservation Service (NRCS) provides technical and financial support to help landowners with their wetland restoration efforts. The NRCS goal is to achieve the greatest wetland functions and values, along with optimum wildlife habitat, on every acre enrolled in the program. This program offers landowners an opportunity to establish long-term conservation and wildlife practices and protection.

Wildlife Habitat Incentives Program
The Wildlife Habitat Incentives Program (WHIP) is a voluntary program for people who want to develop and improve wildlife habitat primarily on private land. Through WHIP USDA's Natural Resources Conservation Service provides both technical assistance and up to 75 percent cost-share assistance to establish and improve fish and wildlife habitat. WHIP agreements between NRCS and the participant generally last from 5 to 10 years from the date the agreement is signed.

United States Fish & Wildlife Service

North American Wetlands Conservation Act (NAWCA) of 1989
NAWCA provides matching grants to organizations and individuals who have developed partnerships to carry out wetlands conservation projects in the United States, Canada, and Mexico for the benefit of wetlands-associated migratory birds and other wildlife.
www.fws.gov/birdhabitat/Grants/NAWCA/index.shtm

Partners for Fish and Wildlife Act
The Partners Program provides technical and financial assistance to private landowners and Tribes who are willing to work with USFWS and other partners on a voluntary basis to help meet the habitat needs of our Federal Trust Species.

The Partners Program can assist with projects in all habitat types that conserve or restore native vegetation, hydrology, and soils associated with imperiled ecosystems such as longleaf pine, native prairies, marshes, or otherwise provide an important habitat requisite for a rare, declining or protected species. *ecos.fws.gov/partners*

Endangered Species Grants
www.fws.gov/endangered/grants/index.html

Federal Grant Programs
This website's search engine covers all federal grant programs, and will be a useful resource as the grant programs may change year to year.
www.grants.gov

Public Sources: State Funding

Legislative Water Project Appropriations
These are member projects or "Community Budget Issue Requests (CBIR)" for wastewater, stormwater, surface water improvement, and drinking water. This is an annual process implemented and directed by the Florida Legislature but coordinated with DEP. Local matching funds may be required and are always advisable. The amount of money available each year varies widely and depends exclusively on legislative appropriations.
www.dep.state.fl.us/water/waterprojectfunding/index.htm

Florida Department of Environmental Protection

Florida Forever Fund
The Florida Forever Fund encompasses a wide range of goals, including: restoration of damaged environmental systems, water resource development and supply, increased public access, public lands management and maintenance, and increased protection of land by acquisition of conservation easements.
www.dep.state.fl.us/lands/acquisition/FloridaForever/faq.htm

South Florida Water Management District

Surface Water Improvement & Management (SWIM)
SWIM funds are allocated for the implementation of Water Management District plans and programs to improve, restore and manage priority surface waters within their boundaries. Funds may be made available to local governments. Each district maintains a separate list of priority waterbodies. Funding for the SWIM program is periodically made available through state appropriations; other funds come from district ad valorem revenues.

Alternative Water Supply Funding
Funding for the construction of local alternative water supply projects, including funding for surface water capture, new storage capacity (such as aquifer storage and recovery wells), and other nontraditional water supply sources in a given area. Local matching funds are required. Funds are made available at the state level ($52 million annually at this time) through DEP to Florida's five Water Management Districts and augmented with similar amounts from the districts.

Land Acquisition Program

Florida Department of Agriculture & Consumer Services
Division of Forestry
Forestry Stewardship Program (min. 25 acres of forest land)
www.fl-dof.com/forest_management/cfa_steward_index.html
Other grant programs *are available at www.fl-dof.com/services*

Florida Community Trust Grants
www.floridacommunitydevelopment.org/fct

Public Sources: Local Funding

Lee County Conservation 20/20 Program
The county has acquired 3,730 acres of land within the DR/GR through the Conservation 20/20 program. Additional lands should be acquired to further the protection of the county's water resources and wildlife. Restoration of the acquired land may be utilized to help return the water storage and hydroperiods within the watersheds. Hydrologic restoration will allow for the historic plant communities to be re-established, helping both the water storage, water quality, and wildlife. The 20/20 program criteria should be amended to increase the rankings of potential acquisitions that would carry out the preferred DR/GR land-use scenario.

Lee County Department of Transportation and other Public Works projects' mitigation
(e.g. wetland impacts; impacts to panther or woodstork habitat)
The Conservation 20/20 Program allows for public works projects to mitigate impacts through the enhancement of existing ecosystems and restoration of disturbed areas within Conservation 20/20 properties. This system should be continued and integrated into any future DR/GR restoration program.

Private Sources

Mitigation from development for impacts to wetlands and/or listed species
The county should work with the State and Federal permitting agencies to have impacts within the DR/GR mitigated within the DR/GR to better protect the valuable natural resources by establishing a Regional Offsite Mitigation Area (ROMA).

The Nature Conservancy
Partnering with The Nature Conservancy would enhance the land acquisition and management of conservation lands within Lee County.
www.nature.org/aboutus/howwework/conservationmethods/privatelands

Ducks Unlimited
Funding for land acquisition and restoration of wetlands may be available.
www.ducks.org

Non-traditional Funding Sources

DR/GR Environmentally Significant Lands Bond Program
Instead of modifying the Conservation 20/20 program, Lee County could initiate a special program to help fund DR/GR acquisition and restoration using moderate yield bonds which would be attractive to investors and save Lee County money over time.

Land Swaps
Land within a preferred mining area could be swapped for land outside the mining area to concentrate mining while insuring the protection of interconnected natural lands that are important to water and wildlife resources.