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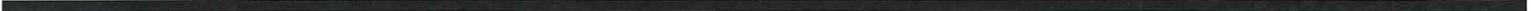
# **Southeast Lee County Density Reduction/Groundwater Resource Mining Study**

**September 2016**

**Prepared For:  
Lee County Planning Division  
Department of Community Development  
1500 Monroe Street  
Fort Myers, FL 33901**



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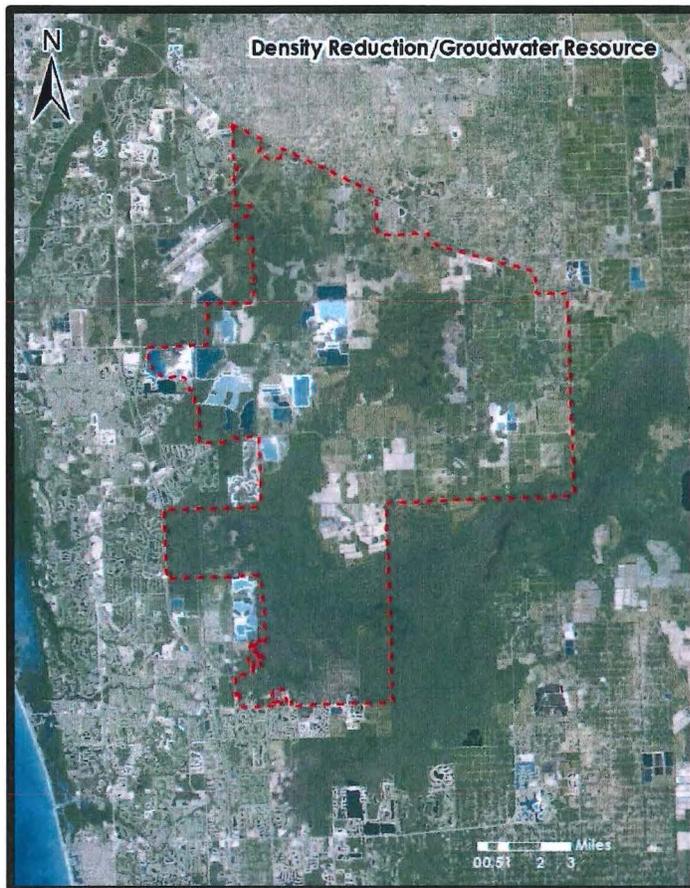
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## I. EXECUTIVE SUMMARY

In 2016, Waldrop Engineering, P.A. was commissioned by the Lee County Planning Division to provide an inventory of existing mining operations, and analyze the supply of limerock materials within these mines in relation to the long-range regional demand for limerock materials through 2030 and 2040. In addition, this evaluation includes a review of potential amendments to Lee Plan Goal 33 and Map 14 to ensure the County provides sufficient land area to meet the regional demands, as stated.

The Southeast Lee County Density Reduction/Groundwater Resource (DR/GR) area ("Study Area") comprises 80,329 acres<sup>1</sup>, and is generally located south of State Road 82, south and east of the Southwest Florida International Airport, and east of Interstate 75 in unincorporated Lee County, Florida. The Study Area borders the Village of Estero to the west, City of Bonita Springs to the south, and Collier and Hendry Counties to the south and east. Lands within the Study Area contain active agricultural uses, commercial mining operations, public wellfields, regionally significant wildlife habitat and wetland areas, in addition to approved/planned large-scale, master-planned communities, and scattered areas of low-density residential land uses.

**FIGURE I. SOUTHEAST LEE COUNTY DR/GR STUDY AREA**



This area has been the subject of extensive study by the County in terms of water resources, environmental preservation and protection, and appropriate land uses. The results of these studies include the DR/GR Action Plan adopted in 2007, the creation of Land Development Code Chapter 12 (Resource Extraction), and numerous amendments to the Lee Plan.

Goal 33 and supporting objectives and policies were added to the Lee Plan in 2010 pursuant to Ordinance No. 10-20, and require the County to designate sufficient land area on the Future Land Use Map for limerock mining to meet regional demands through the long-range planning horizon. These directives also require the County to formally identify such areas on Lee Plan Map 14, "Future Limerock Mining Areas", to locate new and expanded mining operations to those designated areas along Alico Road.

<sup>1</sup> Lee Plan Table 1(b) Year 2030 Allocation (Ord. 16-02)

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The last study initiated by Lee County that assesses long-term limerock supply and demand is "Prospects for Southeast Lee County - Planning for the Density Reduction/Groundwater resource Area (DR/GR)" prepared by Dover, Kohl & Partners in 2008. Appendix B of the Dover Kohl study determined that approximately 22% more land area would need to be mined from 2007 to 2030 to meet the forecasted demand for limerock, beyond the acreage already permitted for mining activities. Since the date of the Dover Kohl study there have been several significant changes that affect the projected supply and demand of limerock in Lee County, and across Southwest Florida as a whole.

The first is the application of the Bureau of Economic and Business Research (BEBR) 2020-2045 population projections published in January 2016, which demonstrates a lower projected population than previously forecasted. In 2008, the 2030 BEBR medium population projection for Lee County was 1,053,900. The current medium projection published in 2016 is 918,300, which represents a 13% decline in projected population through the 2030 planning horizon. When applied on a regional basis, the latest 2030 BEBR medium projection results in a 17% decline in projected population.

The second major change since the 2008 study is the approval of Florida Rock Mine #2, associated with the Green Meadow operation, which authorized an additional 168,819,200 cubic yards of limerock to be excavated (not including anticipated volume loss from extraction, processing and trucking the material). This new mine provides for 90% of the 2030 projected regional demand for limerock, and over 50% of the 2040 projected regional demand, when applying the BEBR medium population projections.

Lastly, several mines listed as "active" or "in process" in the 2008 Dover Kohl report have been converted to residential and mixed-use developments. These mines include the former Rinker Materials (Ginn Lago), currently known as the WildBlue Mixed Use Planned Development; the former Florida Rock Ph. 1-A mine, now CenterPlace Compact Planned Development; and the former Cemex/RMC mine, now Corkscrew Shores Residential Planned Development.

For the purposes of this report, the term "limerock" is based upon the definition of "limestone" found in the Lee County Land Development Code, and incorporates all limestone materials produced from mining operations; including limerock base, fill materials, and fine and coarse aggregates that can be produced as either commercial or FDOT-quality materials. This report does not analyze the quantity of reserves meeting FDOT-quality aggregate, or provide a breakdown of coarse and fine aggregates within the respective permitted mine footprints.

Additionally, this report does not speculate on the approval of potential mining areas to assess long-term supply; appropriate locations for the expansion of existing mining operations; or potential mining areas that may be permitted in the future.

***The results of this analysis demonstrate that Lee County has sufficient limerock supply to meet the regional demand through the 2030 planning horizon. However, there is a deficit of approximately 84 million cubic yards of limerock to meet the regional needs through the 2040 planning horizon, based upon the application of BEBR medium population projections, an annual consumption rate of 9 cubic tons per capita, and utilizing post-excavation supply volumes set forth in Table III-1 of this report.***

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## II. Inventory of Existing Limerock Mines

The following is a detailed inventory of the existing limerock mines in Lee County, including those mines in incorporated areas of the County, specifically the City of Bonita Springs.

For the purposes of this long-range planning study, “existing mines” are defined as those mines that have the appropriate future land use and zoning approvals from Lee County and/or the City of Bonita Springs to allow for mining activities, and include all mines currently identified on Lee Plan Map 14, in accordance with Policy 33.1.4.

Where the future land use and zoning allow mining activities, but additional permits are required that are not subject to Lee County Board of County Commission approval, such as local development order (DO) approval, South Florida Water Management (SFWMD) permits, Florida Department of Environmental Protection (FDEP) permits, and/or Army Corps of Engineers permits, the mine is included as “existing” for the purposes of this long-range land use analysis.

Table II-1 below provides an inventory of existing mines in the Southeast Lee County DR/GR Study Area. The following are other key assumptions utilized to develop the following inventory of existing mines:

- This listing includes existing mines that are inactive, but have not been converted to residential or mixed-use development, such as the Plumosa mine on Bonita Beach Road. While it is understood the current owner is not actively mining the property, the land use and zoning approvals are in place to allow for future mining, should the ownership be transferred to an operator.
- This listing excludes existing mines solely producing fill dirt, or “borrow pits”, and where no limerock is produced.
- Where permits, soil borings, and/or case files indicate that both fill dirt and limerock are being extracted from the existing mine, the mine has been included in the inventory.

Table II-2 provides an inventory of closed mines that have been rezoned for residential or mixed-use development, such as Cemex Ginn Lago, also known as the WildBlue Mixed Use Planned Development.

**TABLE II-1. INVENTORY OF EXISTING MINES**

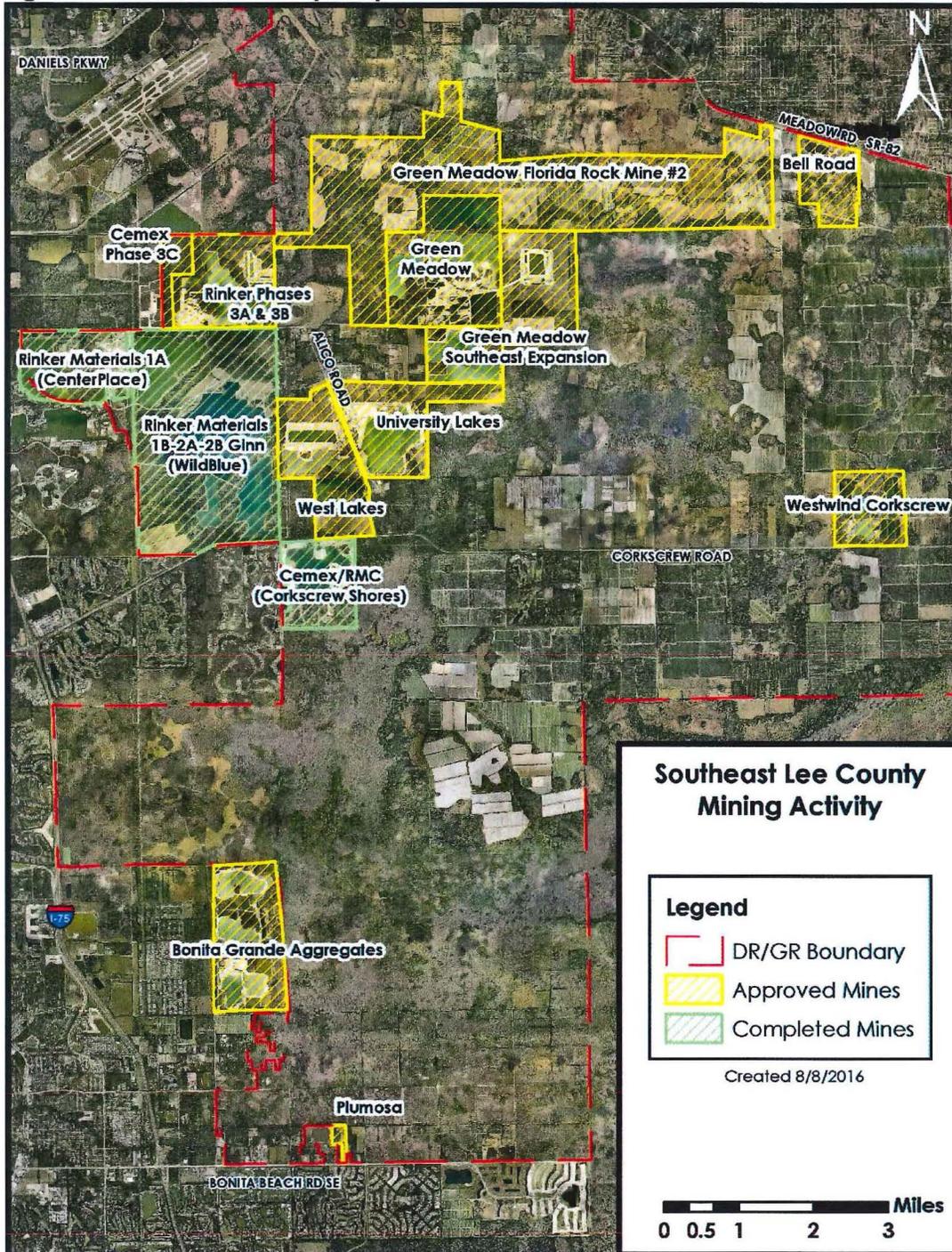
MINE NAME	SEC-TWP-RGE	PROJECT ACRES	MINE ACRES	PERMITS/APPROVALS	STATUS
Rinker Materials 3A & 3B	5 & 6-46-26	1,194 AC	503 AC	AG-2 Zoning	Active/Operational
				LDO2007-00214	
				FDEP Permit No. 166176	
Green Meadow	35-45-26 & 2, 3-46-26	1,521 AC	1,075 AC	AG-2 Zoning	Active/Operational
				-----	
				-----	
Green Meadow (Expansion)	1, 11, & 12-46-26	1,529 AC	1,132 AC	IPD Zoning (Z-07-054)	Active/Operational
				LDO2006-00055	
				FDEP Permit No. 134874	
Green Meadow (FL Rock Mine #2)	26-28 & 33-36-45-27 28 & 31-33-45-27	4,839 AC	2,471 AC	IPD/CFPD Zoning (Z-12-003)	Pending Site Certification
				DOS2014-00062	
				FDEP Permit No. 134874	
West Lakes	9-11, 15, 16, & 21-46-26	1,995 AC	1,511 AC	IPD Zoning (Z-05-088)	Active/Operational
				LDO2006-00071	
				FDEP No. 176063/194206	
Westwind Corkscrew/ Preferred Unlimited Corkscrew	22 & 23-46-27	603 AC	299 AC	IPD Zoning (Z-01-016)	Inactive
				DOS2012-00010	
				FDEP No. 203565	
Bonita Grande Aggregates/ BG Mine	17 & 20-47-26	1,321 AC	557 AC	IPD Zoning (Z-02-047)	Active/Operational
				LDO2000-00058	
				FDEP No. 166246	
Cemex North Quarry 3C	6 & 7-46-26	263 AC	203 AC	MEPD Zoning (Z-13-026)	Pending Development Order Approval
				DOS2015-00078 (Pending)	
				FDEP No. 166176	
Plumosa Farms	33-47-26	39 AC	30 AC	IPD Zoning (Z-01-004)	Inactive
				LDO2007-00063	
				-----	
Bell Road Mine	27 & 34-45-27	504 AC	265 AC	IPD Zoning (Z-04-047)	Active/Operational
				-----	
				-----	
<b>TOTAL</b>			<b>8,046 AC</b>		

**TABLE II-2. INVENTORY OF CLOSED MINES**

MINE NAME	SEC-TWP-RGE	PROJECT ACRES	MINE ACRES	PERMITS/APPROVALS	STATUS
Rinker Materials 1A (CenterPlace)	11, 12-46-25	915 AC	537 AC	CCPD (Z-14-021)	Closed
Rinker Materials Ginn Lago (WildBlue)	7, 8, 17, 18, 19, 20-46-26	3,560 AC	1,357 AC	MPD (Z-15-021)	Closed
Cemex/RMC (Corkscrew Shores)	28-46-26	309 AC	228 AC	RPD (Z-12-021)	Closed

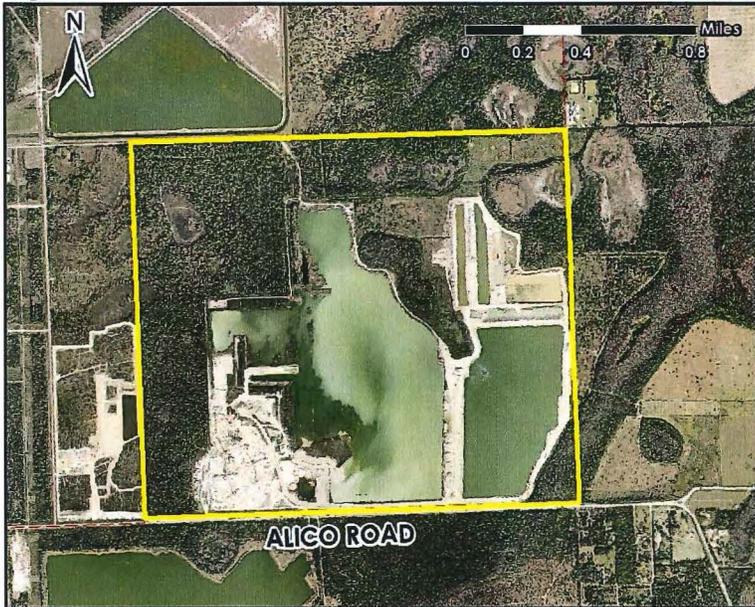
Figure II-1 below provides an aerial map depicting the locations of all mining operations in the above tables. Active mines are shown in yellow; closed mines are shown in green; and pending mines are shown in red. The map depicts a general trend of mining activity extending eastward from I-75 to the Hendry County line. The western-most mining operations have closed and converted to residential or mixed-use development, and the pending/proposed mines are located further east of the active operations.

**Figure II-1. Mine Inventory Map**



The following portion of the report provides a brief summary of each active mine referenced in Table II-1 above, based upon information retrieved from Lee County and Florida Department of Environmental Protection.

**Figure II-2. Aerial of Rinker Material Phases 3A & 3B**

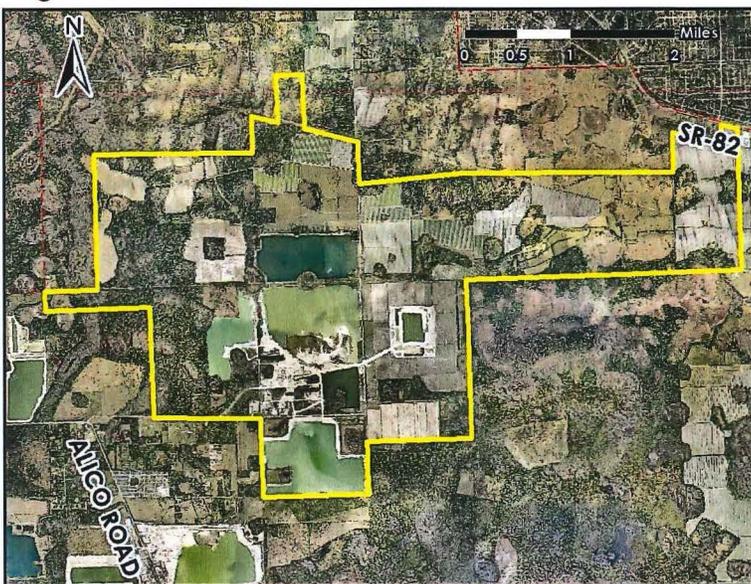


**Rinker Materials 3A & 3B**

Rinker Materials Phase 3A & 3B Mine is located north of Alico Road, approximately 3 miles east of I-75, and south of the Southwest Florida International Airport.

Both Phases 3A and 3B are actively being mined, with significant excavation occurring since 2008 Dover Kohl Report was issued. There is minimal remaining limerock in this mine when compared to the other active, permitted mines, and approximately 80% of the total permitted mining area has been excavated.

**Figure II-3. Aerial of Green Meadows Mine**



**Green Meadows**

The Green Meadows Mine, including Green Meadows Expansion and Florida Rock Mine #2, is generally located north of Alico Road and south of SR 82. This mine represents the largest combined mining operation of all active, existing mines, and has undergone significant expansions since approval. The mine was initially expanded to the southeast of the original mine as depicted in the aerial. This area is simply referred to as "Green Meadow Expansion" throughout this report.

The latest expansion to Green Meadows is the approval of Florida Rock Mine #2 to the north of the original mine, which added 2,400+/- acres of available mining area to the operation. This area is expected to generate 168,819,200 CY of limerock based upon information provided to Lee County as part of the local development order application. Since the 2008 Dover Kohl

Report was completed there has been limited excavation in the original Green Meadows mine, and approximately 126 AC of new excavation in Green Meadows Expansion. As of the date of this study, excavation activities have not commenced in Florida Rock Mine #2.

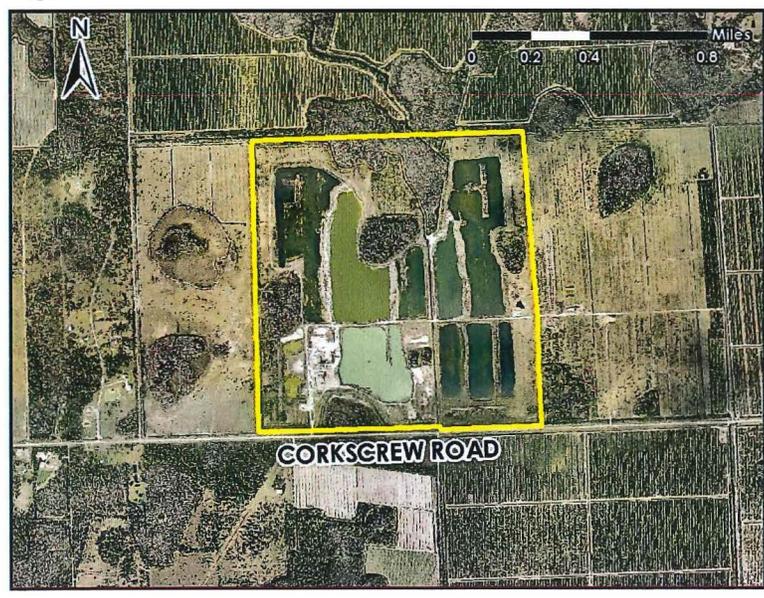
**Figure II-4. Aerial of West Lakes Mine**



**West Lakes (University Lakes & West Lakes)**

The West Lakes Mine is located on both the east and west sides of Alico Road, and immediately north of Corkscrew Road. The overall mine is comprised of two (2) distinctive areas - University Lakes is located on the east side of Alico Road and comprises approximately 947 acres. West Lakes is located on the west side of Alico Road and comprises an area of 1,048+/- acres. Both mines are permitted to continue mining through January 20, 2026, and have significant remaining areas to be excavated.

**Figure II-5. Aerial of Westwind Mine**



**Westwind**

Westwind Mine, also known as Preferred Rock Mine and Corkscrew Mine, is located north of Corkscrew Road, approximately 1.5 miles from the DR/GR's eastern boundary. Westwind is 603 acres and is permitted to mine 767,000 CY of aggregates per year until April 30, 2032. While previous reports have characterized this mine as primarily a fill dirt operation, soil borings provided to Lee County as part of the local development order application indicate limerock is available for excavation within the property.

**Figure II-6. Aerial of Bonita Grande Mine**

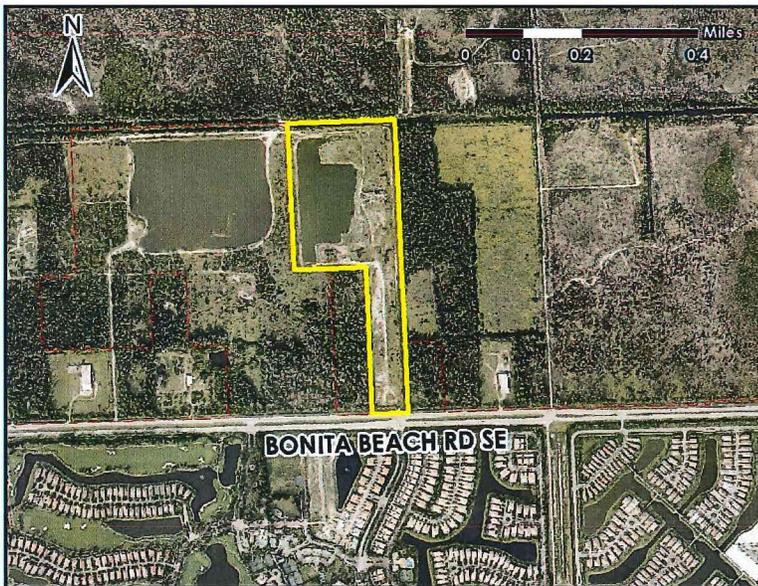


**Bonita Grande Mine**

BG Mine, formerly Bonita Grande Mine, is located within the City of Bonita Springs, directly north of the terminus of Bonita Grande Drive, and approximately 1.5 miles east of I-75. The overall project boundary is 1,321 acres, with approximately 557 acres permitted for mining. Pursuant to an Executive Order extension issued by the City on June 8, 2016, mining operations allowed by the Industrial Planned Development (IPD) zoning have been extended through May 2022. The City's files provide data from the mine operator that an

additional 20 million cubic yards of limerock is available for excavation within the permitting mine area. While the property is subject to a pending Comprehensive Plan Amendment application to allow for redevelopment of the property with residential uses, this mine has been included as active based upon the existing permits for excavation, and the recent extension of that local permit.

**Figure II-7. Aerial of Plumosa Mine**

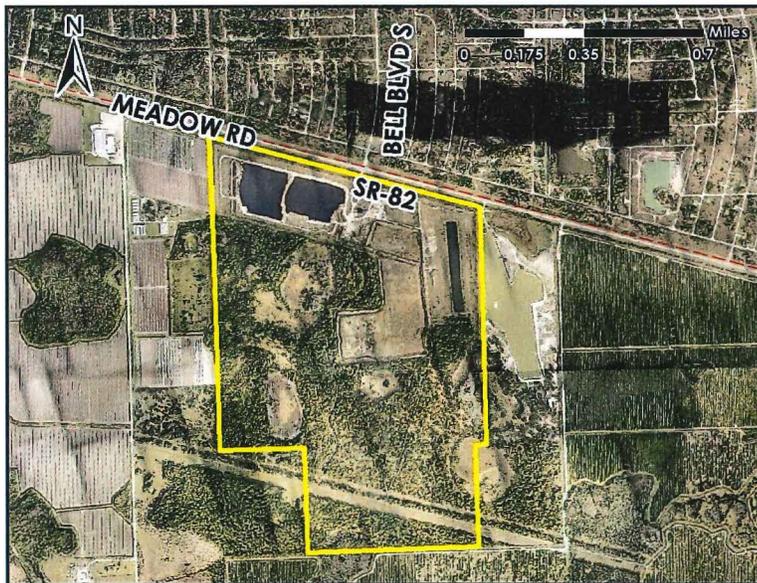


**Plumosa Farms**

Plumosa Farms is a relatively small mine comprising 40 acres in the southern limits of Lee County's DR/GR boundary. The property is located immediately north of Bonita Beach Road and approximately 1.5 miles east of Bonita Grande Drive. While located within Lee County, the mine is immediately adjacent to the City of Bonita Springs' municipal boundary. This mine is approved to excavate an additional 1,306,800 cubic yards of limerock through April 2, 2018. The current owner purchased the property in 2013, and the mine is

inactive. This mine has been included in the list of active mines based upon active permits that allow for continued limerock extraction, as well as evidence of remaining limerock reserves estimated via aerial imagery and local development order plans.

**Figure II-8. Aerial of Bell Road Mine**



**Bell Road Mine**

Bell Road Mine is located south of Meadow Road/SR 82, immediately south of the intersection of Bell Road and Meadow Road/SR 82. This mine was inactive for many years until excavation re-commenced in 2016 pursuant to approval of Mine Operation Permit MOP2016-00001. The total approved mine area is 262 acres, and only 27 acres have been excavated to date. While background data in various reports characterize this mine as solely a fill dirt operation, permit information obtained from Lee County

Development Services indicate limerock mining is actively occurring within the property. This mine submitted a Limestone Mine Annual Mining and Reclamation Report to the Florida Department of Environmental Protection in 2015 which indicated that limerock was mined from at least 23 acres.

**Figure II-9. Aerial of Cemex Phase 3C Mine**



**Cemex Phase 3C**

Cemex Phase 3 is located north of Alico Road, and immediately west of Rinker Phase 3A. This mine is the subject of pending development order application DOS2015-00078. If approved, Phase 3C will consist of two (2) lakes, comprising 203+/-acres, with a maximum permitted mine depth of 45 feet. This mine is included in the list of active mines as the underlying future land use and zoning allow for extraction of limerock, despite the need for additional state and federal permits.

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### III. Projected Supply & Demand Analysis

Lee Plan Policy 33.1.4 requires the County to update the database of existing mining land uses every seven (7) years to reflect current data about limerock mining in Southeast Lee County, including mining acreage zoned (project acres and mining pit acreage), pit acreage with active mine operation permits, acreage actually mined, and acreage remaining to be mined.

The following information is provided in accordance with this policy directive to determine the projected supply of limerock generated by existing mines, and the projected demand for limerock based upon projected population growth across region.

#### A. Projected Lee County Limerock Supply

In addition to the assumptions utilized to develop the inventory of existing mines outlined in Section II of this report, the following assumptions were utilized to calculate Lee County's projected limerock supply:

- The Consultant utilized 2015 aerial imagery to determine the estimated mined area and remaining acreage available for future excavation. This calculation does not account for slopes of excavation pits, or other factors associated with excavation activities that may impact the calculation of existing and future excavation areas for each mine.
- The average limerock thickness was estimated based upon soil borings, Bathymetric surveys, and other data available through Lee County and Florida Department of Environmental Protection permit case files, and then compared to the average limerock thickness utilized in the 2008 Dover Kohl report. The Consultant then applied this information, coupled with the estimated remaining mine acreage available for future excavation, to estimate cubic yards of limerock material remaining for extraction. This method attempts to remove fill dirt, overburden, and other non-limerock materials from the supply calculation, to the extent possible.
- The Consultant did not utilize the maximum depth of excavation permitted by zoning or local development order approvals to estimate remaining limerock materials, as this has no relationship to the known depth and average thickness of limerock.
- The density of limerock is estimated to be 1.35 tons per cubic yard. This density was utilized to convert the volumetric measurement of cubic yards to the weight measurement in tons of materials. This density is comparable to values ranging from 1.25 to 1.35 utilized in other studies commissioned by Lee County, Florida Department of Transportation, and Florida Limerock and Aggregate Institute<sup>2</sup>.
- The process of extracting, processing, and hauling limerock results in a loss of volume. The estimated volume loss varies by study. The Consultant utilized a value of 20% total loss by weight resulting from blasting, processing, operations, and trucking. Other sources are less conservative, such as the 2012 Lampl Herbert Consultants study, and utilizes a value of 10% for blasting loss and 20% for operational loss<sup>2</sup>, for a total combined volume loss of

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<sup>2</sup> Lampl Herbert Consultants, 2012.

30%. This study also notes that additional studies prepared by the University of Florida on behalf of FDOT demonstrates as much as 50% can go unsold.

Table III-1 below provides the estimated limerock reserves remaining for excavation in existing mines based upon the above methodology and assumptions.

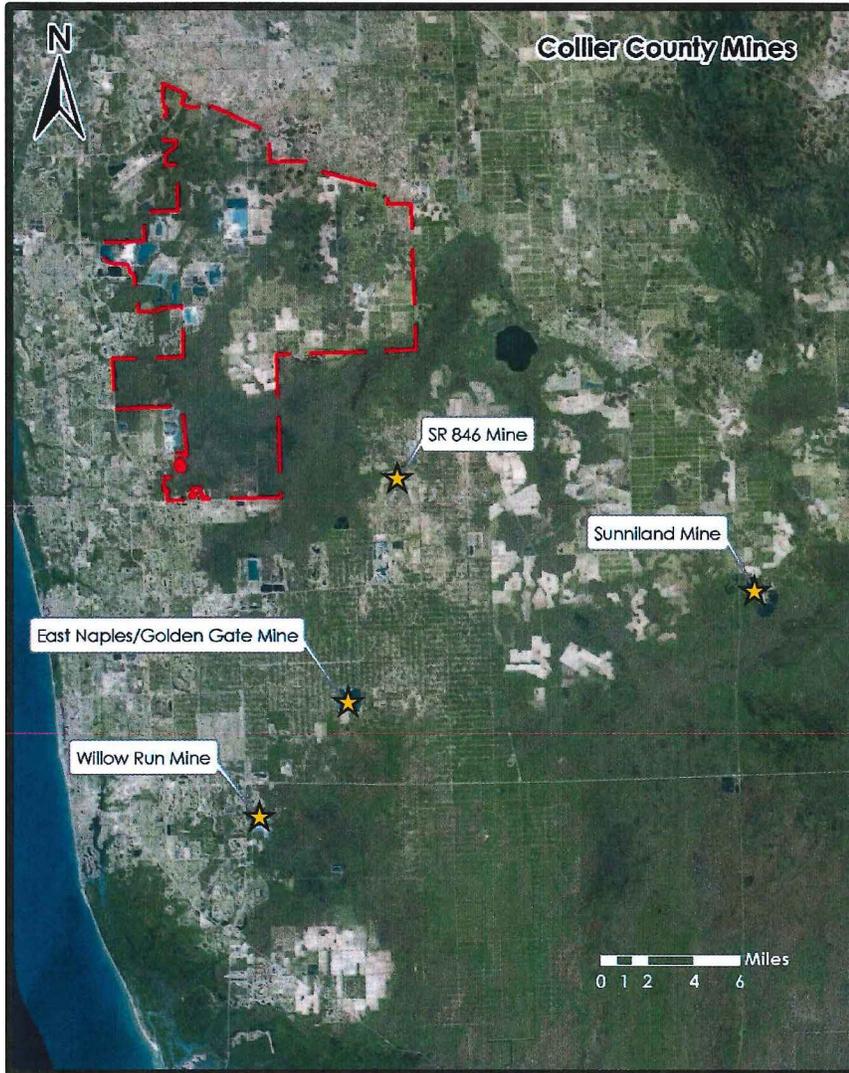
<b>TABLE III-1. LEE COUNTY LIMEROCK SUPPLY</b>								
<b>Mine Name</b>	<b>Approved Mine Acres<sup>1</sup></b>	<b>CY of Excavation Authorized<sup>1</sup></b>	<b>Avg. Limerock Thickness<sup>2&amp;3</sup></b>	<b>EST. AC of Limerock Excavated To Date (2015)<sup>4</sup></b>	<b>EST. CY of Limerock Excavated To Date (2015)<sup>4</sup></b>	<b>EST. AC of Remaining Limerock Excavation<sup>4</sup></b>	<b>EST. CY of Limerock Remaining (Pre-Excavation)</b>	<b>EST. CY of Limerock Remaining (Post-Excavation)<sup>6</sup></b>
Rinker Materials 3A & 3B	503	36,517,800	17 FT	385	10,559,266	118	3,236,346	2,589,077
Green Meadows	1,075	107,651,279	25 FT	690	27,830,000	385	15,528,333	12,422,666
Green Meadows Expansion	1,132	125,175,306	25 FT	320	12,906,666	812	32,750,666	26,200,533
Green Meadows Florida Rock Mine #2	2,471	168,819,200	36 FT	0	0	2,471	168,819,200 <sup>5</sup>	135,055,360
West Lakes	1,511	244,725,888	30 FT	632	37,000,000	879	42,543,600	34,034,880
Westwind Corkscrew	287	24,926,000	44 FT	227	16,113,973	60	4,259,200	3,407,360
BG/Bonita Grande Mine	557	20,000,000	30 FT	440	-----	117	20,000,000 <sup>5</sup>	16,000,000
Plumosa Farms	30	1,306,800	10 FT	10	161,333	20	322,667	258,134
Bell Road Cemex	262	16,907,733	40 FT	27	1,000,000	235	15,165,333	12,132,266
North Quarry 3	203	14,737,800	-----	0	0	203	14,737,800	11,863,044
<b>TOTAL</b>	<b>8,031</b>	<b>760,767,806</b>		<b>2,731</b>	<b>105,571,238</b>	<b>5,300</b>	<b>317,363,145</b>	<b>253,963,320</b>

- (1) Data provided by Lee County Development Services
- (2) Data obtained from 2008 Dover, Kohl & Partners, July 2008. "Prospects for Southeast Lee County Planning for the Density Reduction/Groundwater resource Area (DR/GR)".
- (3) Data obtained from average depth of soil boring log obtained from permit case files.
- (4) Calculation based upon 2015 aerial imagery
- (5) Calculation based upon available permit data
- (6) Post-excavation calculation assumes 20% loss of volume based upon blasting, operational/processing, and trucking losses.

## B. Projected Collier County Limerock Supply

From a regional supply standpoint, the vast majority of limerock is produced from mines in Lee County, and to a lesser extent Collier County. Charlotte, Hendry, Glades, DeSoto and Sarasota Counties have only minor reserves of limerock, or none at all, and therefore do not contribute to local or regional supply<sup>3</sup>.

Figure III-1. Collier County Limerock Mines



For the purposes of this study, the Consultant investigated the projected supply of limerock materials in Collier County based upon their permitted mining operations. Table III-2 demonstrates approximately 54,968,142 CY of limerock is available for excavation from permitted Collier County mines. These figures are solely based upon annual monitoring reports provided to the Consultant by the Collier County Growth Management Department, and have not been independently verified through review of the permit data and/or aerial imagery. Additionally, these calculations do not include reductions for volume loss associated with processing and trucking, as it is unknown whether or not the annual monitoring report includes such assumptions. Please note the Sunniland limerock mine was not included in this inventory as data on excavated and remaining limerock was not provided by the operator.

As outlined in Table III-2, Collier County's permitted mining operations may generate approximately 55 million cubic yards of limerock to support local development and regional supply, without factoring in volume losses from blasting, processing and/or trucking as noted above. It is recognized that relying on Collier County limerock supply, or any portion thereof, to meet long-term needs is a policy decision to be determined by the Lee County Board of County

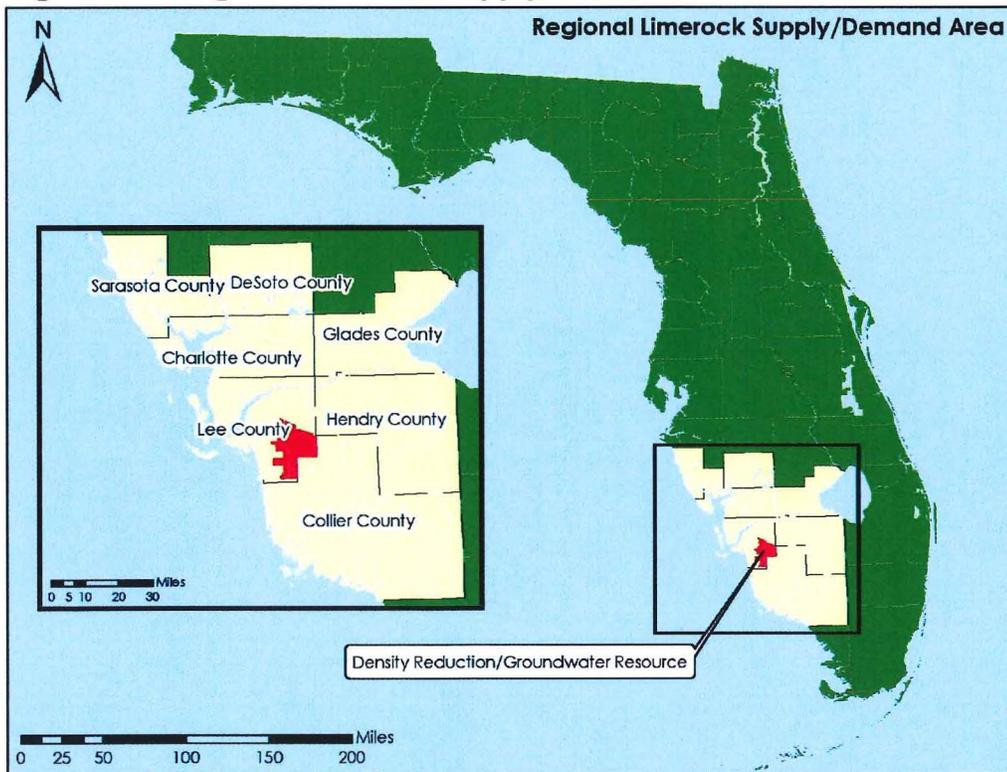
<sup>3</sup> Lampl Herbert Consultants, 2012.

Commissioners, and should take into account the potential impacts associated with importing aggregate from outside jurisdictions, including, but not limited to additional trucking costs, associated impact to transportation infrastructure, and cost of materials. Based upon the adopted 2008 Dover Kohl study, it is also recognized that the Board has historically not included supply generated from mines outside of Lee County for long-range planning purposes.

<b>TABLE III-2. COLLIER COUNTY LIMEROCK SUPPLY PROJECTION</b>			
<b>Mine Name</b>	<b>Sec-Twn-Range</b>	<b>Estimated CY of Limeorck Excavation Authorized</b>	<b>Estimated CY of Limerock Excavation Remaining</b>
East Naples Mine	21 & 22-49-27	25,325,300 CY	25,325,300 CY
Golden Gate Quarry	21-49-27	7,800,000 CY	1,843,254 CY
SR 846 Earth Mine	35 & 36-47-27, 1 & 2-48-27	33,620,000 CY	23,722,588 CY
Willow Run	11, 12, 13 & 14-50-26	8,900,000 CY	4,077,000 CY
Sunniland	13, 23- 29, 33 & 35-48-30	Data Not Available	Data Not Available
<b>TOTAL</b>		<b>75,645,300 CY</b>	<b>54,968,142 CY</b>

**C. Projected Regional Demand**

**Figure III-2. Regional Limerock Supply/Demand Area**



Limerock demand in Florida is affected by the state's population growth and its consequential impact on new development, including but not limited to housing, commercial development and industries, roadways and infrastructure, and civic uses. There are numerous studies and sources that provide consumption rates of limerock on a per capita basis. The 2002 United States Geological Survey

Report utilizes a consumption rate of 10.7 tons of limerock per capita<sup>4</sup>. Based upon research of

<sup>4</sup> Gilpin R. Robinson, Jr., and Brown, William 2002

various sources, including past Lee County studies, the Florida Department of Transportation, and the Florida Limerock and Aggregate Institute, an accepted assumption for calculating limerock demand is 9 tons of limerock per capita<sup>5</sup>. This consumption rate was utilized for the purposes of this study as it is more recent than the USGS report, and is specific to the State of Florida, whereas the USGS report is focused on the Mid-Atlantic region.

The Bureau of Economic and Business Research's (BEBR) Projections of Florida Population by County, 2020-2045, published in January 2016, was utilized for the regional population projections set forth in Table III-3. BEBR projections are categorized into three (3) levels of prospective population growth; low, medium, and high. There are multiple techniques used to estimate "medium" population growth, and when the projected totals do not reflect a county's historic growth, the technique with the highest weight is altered. The 'low' and 'high' categories are determined by a county's population in 2015, as well as the rate of population growth between 2005 and 2015, and the projection horizon. This analysis utilizes BEBR medium projections for Lee, Charlotte, Collier, DeSoto, Glades, Hendry, and Sarasota Counties, in accordance with the accepted methodology for preparation of long-range planning analyses.

<b>TABLE III-3. BEBR MEDIUM REGIONAL POPULATION PROJECTION</b>						
<b>County</b>	<b>Estimated 2015 BEBR Population</b>	<b>BEBR Medium Population Projections</b>				
		<b>2020</b>	<b>2025</b>	<b>2030</b>	<b>2035</b>	<b>2040</b>
<b>Charlotte</b>	167,141	178,200	187,900	195,900	202,700	209,600
<b>Collier</b>	343,802	378,700	409,900	436,800	460,900	482,700
<b>DeSoto</b>	34,777	35,600	36,300	36,900	37,400	37,800
<b>Glades</b>	12,853	13,300	13,700	14,100	14,400	14,600
<b>Hendry</b>	38,096	39,100	39,900	40,600	41,000	41,600
<b>Lee</b>	665,845	754,800	839,500	918,300	991,200	1,055,000
<b>Sarasota</b>	392,090	415,900	436,600	453,900	467,000	478,300
<b>TOTAL</b>	<b>1,654,604</b>	<b>1,815,600</b>	<b>1,963,800</b>	<b>2,096,500</b>	<b>2,214,600</b>	<b>2,319,600</b>

Tables III-4 below provides the projected regional limerock demand through 2030 and 2040 based upon BEBR Medium Projects. As noted above, 9 tons per capita was utilized to calculate demand, with a conversion density of 1.35 tons per cubic yard. Annual populations are estimated by evenly distributing the 5-year population growth across each year. Calculations on a county-by-county basis are provided in Appendix B of this report.

<sup>5</sup> Rawl, Greg and Voorhees, Michael, 2005 and Dover, Kohl & Partners, July 2008.

**TABLE III-4. 2030 & 2040 Regional Population Projections and Limerock Demand**

Year	2030 BEBR Medium Population Projection	Annual Projected Demand (9 Tons Per Capita)	Annual Projected Demand (Cubic Yards)	Cumulative Projected Demand (Cubic Yards)
<b>2015</b>	<b>1,654,604</b>	<b>14,891,436 T</b>	<b>11,030,693 CY</b>	
2016	1,686,803	15,181,229	11,245,355	11,245,355
2017	1,719,002	15,471,022	11,460,016	22,705,371
2018	1,751,202	15,760,814	11,674,677	34,380,048
2019	1,783,401	16,050,607	11,889,339	46,269,387
<b>2020</b>	<b>1,815,600</b>	<b>16,340,400 T</b>	<b>12,104,000 CY</b>	<b>58,373,387 CY</b>
2021	1,845,240	16,607,160	12,301,600	70,674,987
2022	1,874,880	16,873,920	12,499,200	83,174,187
2023	1,904,520	17,140,680	12,696,800	95,870,987
2024	1,934,160	17,407,440	12,894,400	108,765,387
<b>2025</b>	<b>1,963,800</b>	<b>17,674,200 T</b>	<b>13,092,000 CY</b>	<b>121,857,387 CY</b>
2026	1,990,340	17,913,060	13,268,933	135,126,320
2027	2,016,880	18,151,920	13,445,867	148,572,187
2028	2,043,420	18,390,780	13,622,800	162,194,987
2029	2,069,960	18,629,640	13,799,733	175,994,720
<b>2030</b>	<b>2,096,500</b>	<b>18,868,500 T</b>	<b>13,976,667 CY</b>	<b>189,971,387 CY</b>
2031	2,120,120	19,081,080	14,134,133	204,105,520
2032	2,143,740	19,293,660	14,291,600	218,397,120
2033	2,167,360	19,506,240	14,449,067	232,846,187
2034	2,190,980	19,718,820	14,606,533	247,452,720
<b>2035</b>	<b>2,214,600</b>	<b>19,931,400 T</b>	<b>14,764,000 CY</b>	<b>262,216,720 CY</b>
2036	2,235,600	20,120,400	14,904,000	277,120,720
2037	2,256,600	20,309,400	15,044,000	292,164,720
2038	2,277,600	20,498,400	15,184,000	307,348,720
2039	2,298,600	20,687,400	15,324,000	322,672,720
<b>2040</b>	<b>2,319,600</b>	<b>20,876,400 T</b>	<b>15,464,000 CY</b>	<b>338,136,720 CY</b>

The above supply and demand analysis concludes that the regional limerock demand through the 2030 planning horizon is 189,971,387 cubic yards, and the supply from permitted, existing mines totals 253,963,320 cubic yards. Therefore, there is an excess supply of 63,991,933 cubic yards of limerock through the 2030 planning horizon.

When the 2040 planning horizon is analyzed, the regional limerock demand is 338,136,720 cubic yards, resulting in a deficit of 84,173,400 cubic yards of material. This is based upon the post-excavation supply, which accounts for 20% volume loss. This deficit could be partially off-set by the 55 million cubic yards of limerock material available for excavation in permitted mines in Collier County. However, it should be noted the Collier County supply cannot entirely off-set the long-range supply deficiency through 2040.

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#### **IV. Recommended Lee Plan Amendments**

The Consultants scope of work included an analysis of the current Lee Plan Goals, Objectives and Policies relating to limerock mining, including review of Lee Plan Map 14 (Future Limerock Mining Overlay) and Table 1(b) (Year 2030 Allocations relating to Industrial land uses in the Southeast Lee County Planning Community).

The following is a discussion of potential Lee Plan amendments based upon the findings of this report. It is important to note that this report does not speculate on the appropriateness of potential/pending mining applications to address long-term supply; specific locations for the expansion of existing mining operations; or potential mining areas that may be permitted in the future.

The findings of this analysis do not support a recommendation for text amendments to Goal 33, particularly Policy 33.1.4 relating to supply and demand for limerock. The policy, as currently written, provides Staff a clear directive to regularly monitor the supply of limerock based upon local zoning and development order approvals to ensure the allocated acreage of limerock mining pits meet the demand through the planning horizon. This directive is appropriate and sufficiently defines the need to update mining data every seven (7) years as conditions change relating to supply and demand. This policy is also clear in that it requires Staff to analyze the supply and demand based upon regional data, and there is no ambiguity on whether or not to include data from surrounding counties in the analysis. The policy also specifies the 2008 Dover Kohl report as the foundation for the data, and that the data should be expanded as needed to meet the intent of the policy.

In terms of recommended map amendments, all mines included in Table II-1 (Existing Mines) and Table III-1 (Lee County Limerock Supply) are shown on Lee Plan Map 14, with the exception of the Westwind Corkscrew and Plumosa Farms mines. Data obtained from soil borings in Lee County's permit case files support the finding that these mines contain limerock reserves, in addition to fill dirt and sand. Therefore, it is recommended that the Westwind Corkscrew and Plumosa Farms mines be added to Map 14 to accurately depict the locations of permitted future limerock mining activities.

It is also recommended that the BG Mine, or Bonita Grande Mine, located in the City of Bonita Springs be removed from Map 14, as it is no longer under the jurisdiction of Lee County. However, it is recommended that this mine continue to be analyzed as part of the regional limerock supply for future reporting purposes, until such time that existing permits expire, and/or the mining operation is closed.

The addition of other lands to this map for the purpose of meeting the long-range demand for limerock should be analyzed on a case-by-case basis pursuant to consistency with Goals, Objectives and Policies contained in the Lee Plan. Similarly, rezonings to the Mine Excavation Planned Development (MEPD) should be evaluated on a site-specific review of compliance with the criteria set forth in Chapter 12 of the Land Development Code.

Lastly, Lee Plan Table 1(b) currently allocates 7,246 acres for industrial land uses within the Southeast Lee County Planning Community. This represents the available acreage that may

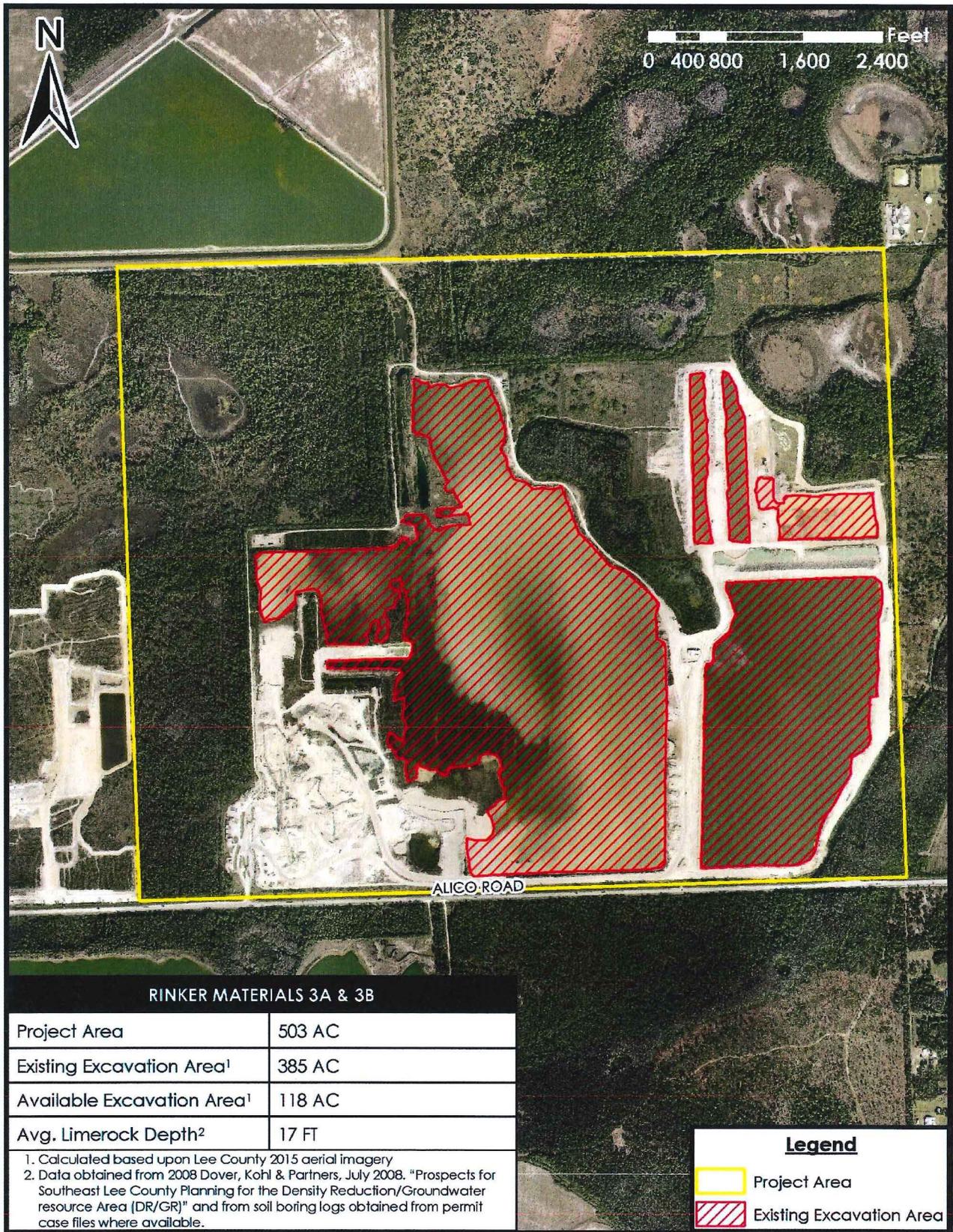
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be issued a local development order approval (or development order amendment) for new or expanded mining activities. It is assumed this acreage does not account for the recent development order issued for 2,471 acres of mining area within Florida Rock Mine #2. Therefore, it is recommended that Staff re-evaluate the acreages within Table 1(b) to account for all existing development order approvals for mining. If Board of County Commissioners add new lands to Map 14 in the future, this Table may also require a corresponding amendment to ensure available industrial acres are allocated in accordance with Map 14.

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**APPENDIX A.**  
**LIMEROCK SUPPLY CALCULATIONS**

# Rinker Materials Phases 3A & 3B



## RINKER MATERIALS 3A & 3B

Project Area	503 AC
Existing Excavation Area <sup>1</sup>	385 AC
Available Excavation Area <sup>1</sup>	118 AC
Avg. Limerock Depth <sup>2</sup>	17 FT

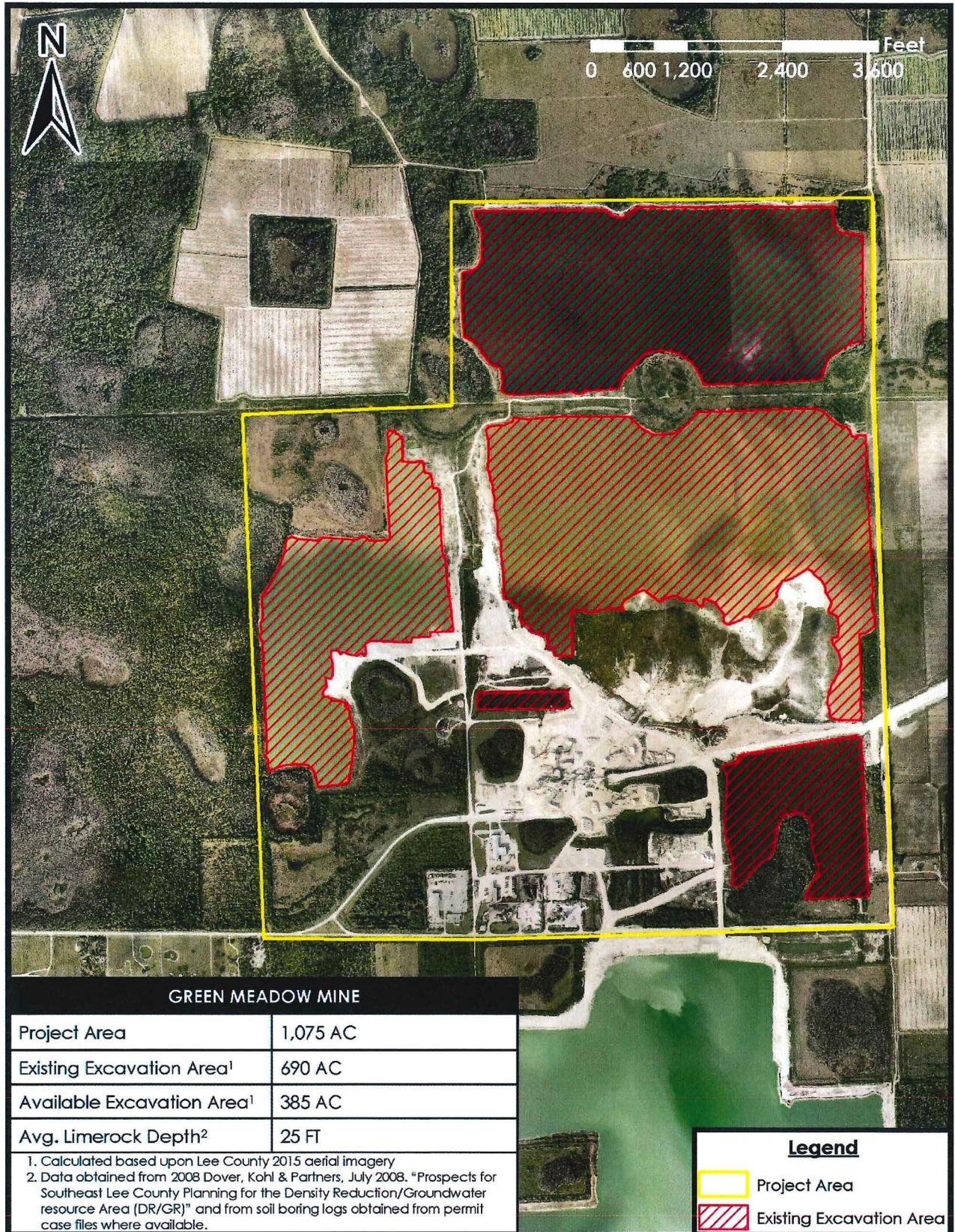
1. Calculated based upon Lee County 2015 aerial imagery  
 2. Data obtained from 2008 Dover, Kohl & Partners, July 2008. "Prospects for Southeast Lee County Planning for the Density Reduction/Groundwater resource Area (DR/GR)" and from soil boring logs obtained from permit case files where available.

**Legend**

 Project Area

 Existing Excavation Area

# Green Meadow Mine



## GREEN MEADOW MINE

Project Area	1,075 AC
Existing Excavation Area <sup>1</sup>	690 AC
Available Excavation Area <sup>1</sup>	385 AC
Avg. Limerock Depth <sup>2</sup>	25 FT

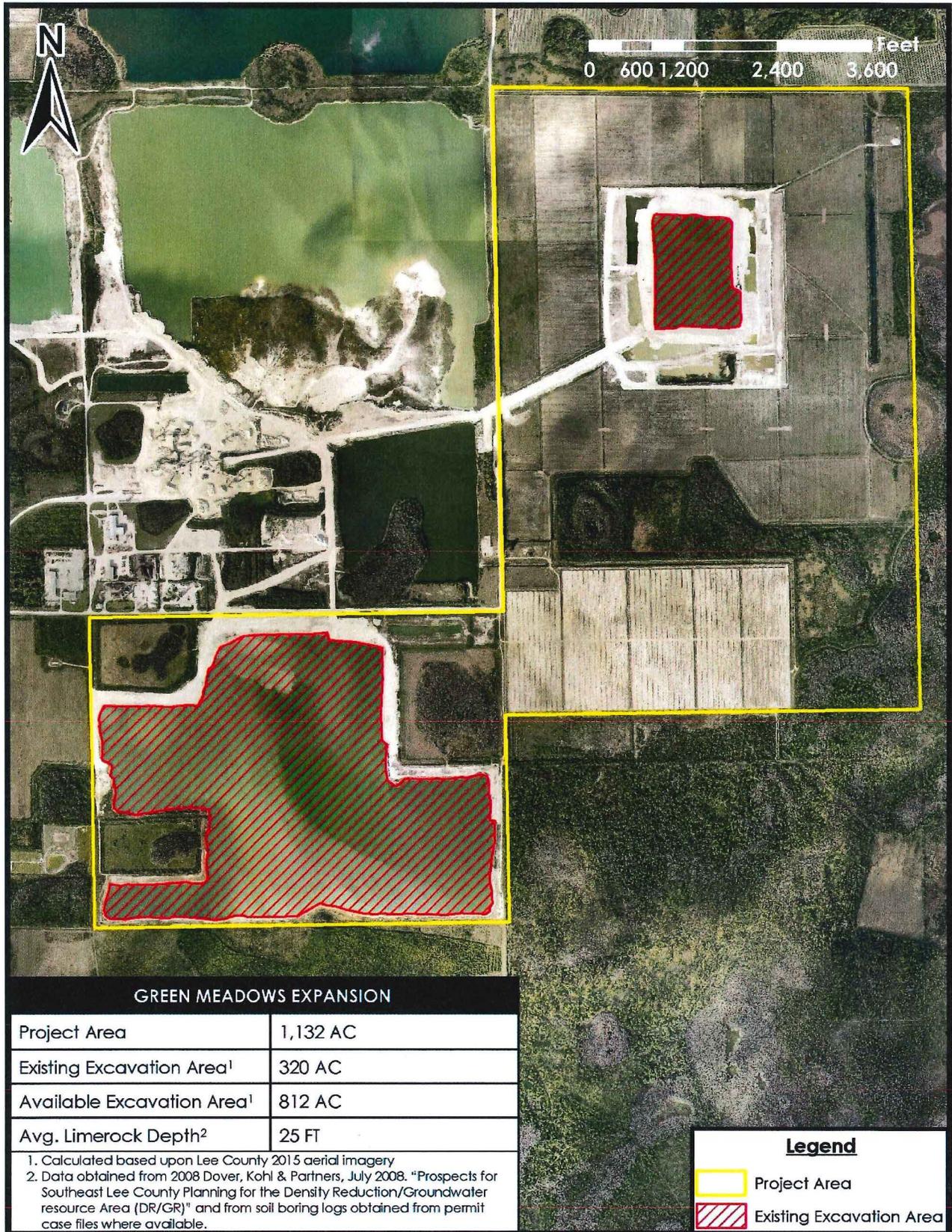
1. Calculated based upon Lee County 2015 aerial imagery  
 2. Data obtained from 2008 Dover, Kohl & Partners, July 2008, "Prospects for Southeast Lee County Planning for the Density Reduction/Groundwater resource Area (DR/GR)" and from soil boring logs obtained from permit case files where available.

**Legend**

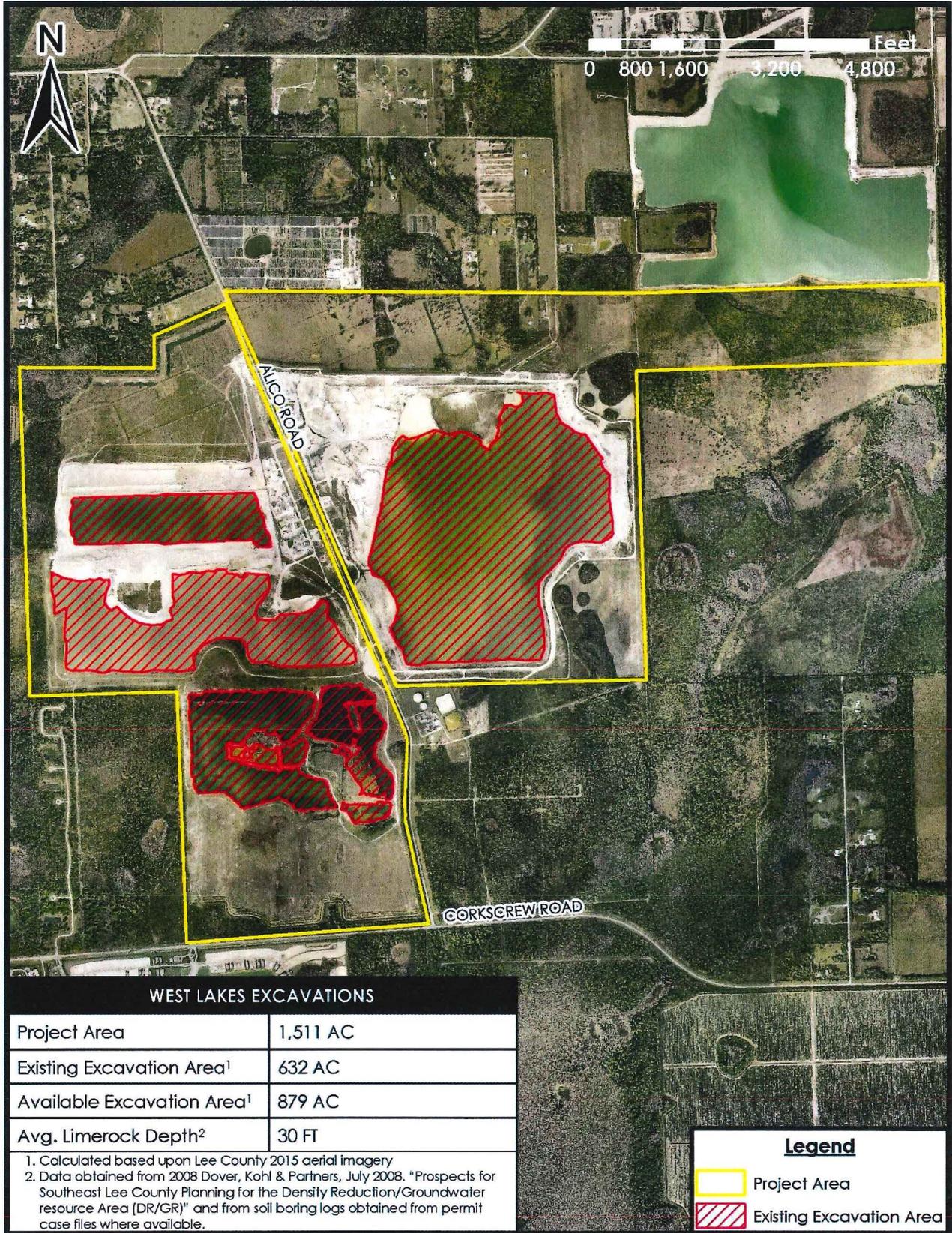
 Project Area

 Existing Excavation Area

# Green Meadows Expansion



# West Lakes Excavation



## WEST LAKES EXCAVATIONS

Project Area	1,511 AC
Existing Excavation Area <sup>1</sup>	632 AC
Available Excavation Area <sup>1</sup>	879 AC
Avg. Limerock Depth <sup>2</sup>	30 FT

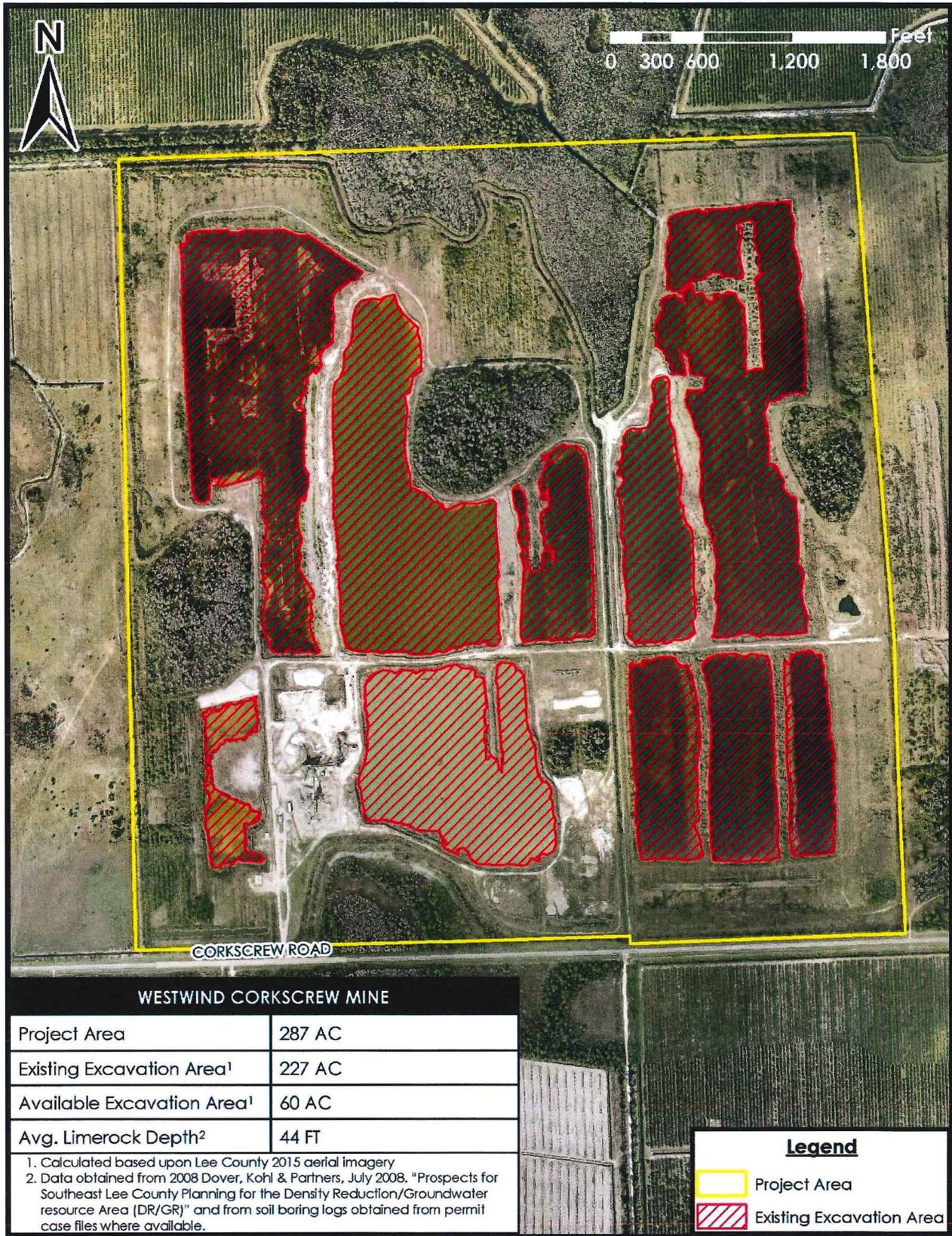
1. Calculated based upon Lee County 2015 aerial imagery  
 2. Data obtained from 2008 Dover, Kohl & Partners, July 2008. "Prospects for Southeast Lee County Planning for the Density Reduction/Groundwater resource Area (DR/GR)" and from soil boring logs obtained from permit case files where available.

**Legend**

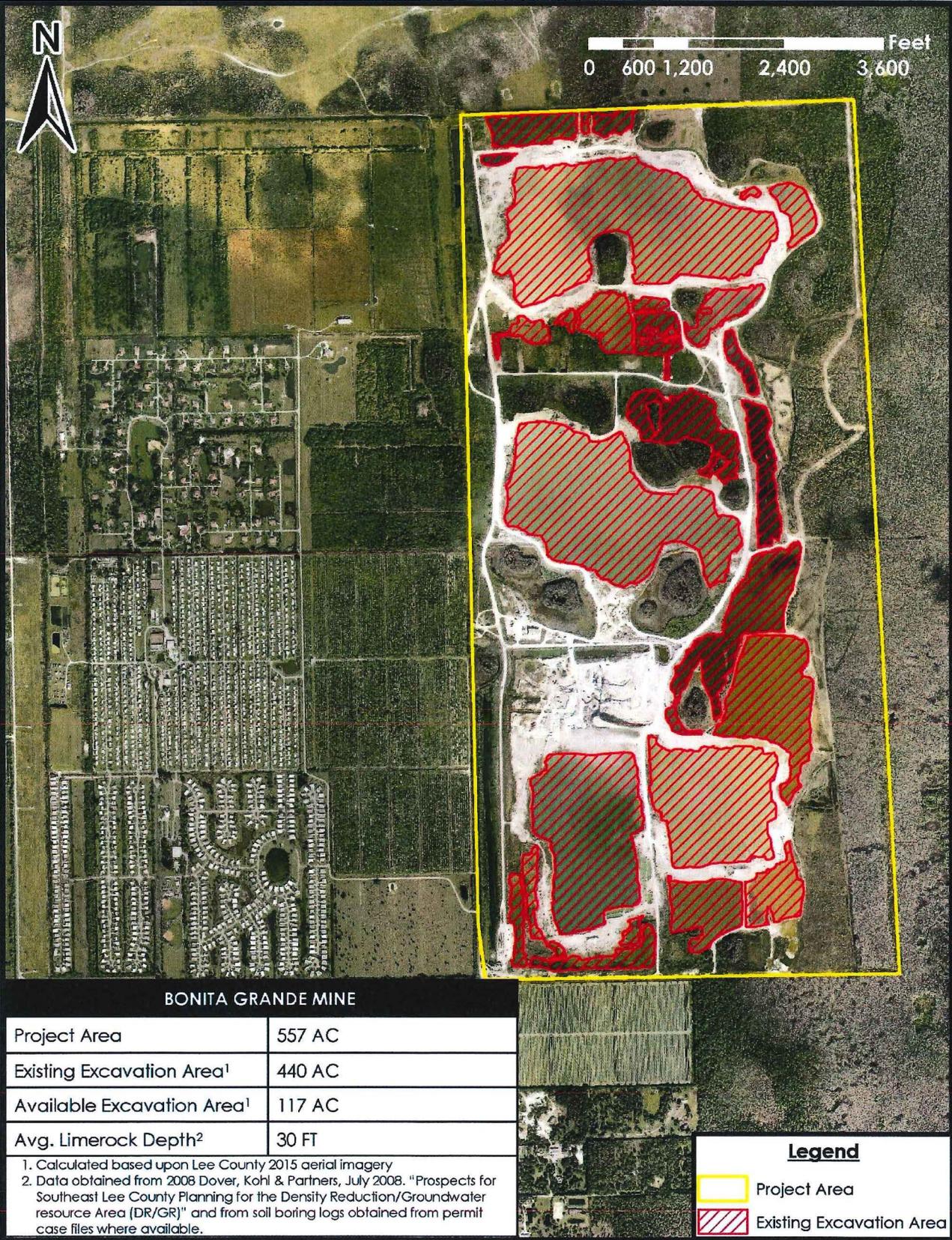
 Project Area

 Existing Excavation Area

# Westwind Corkscrew Mine



# Bonita Grande Mine



# Plumosa Mine



## PLUMOSA MINE

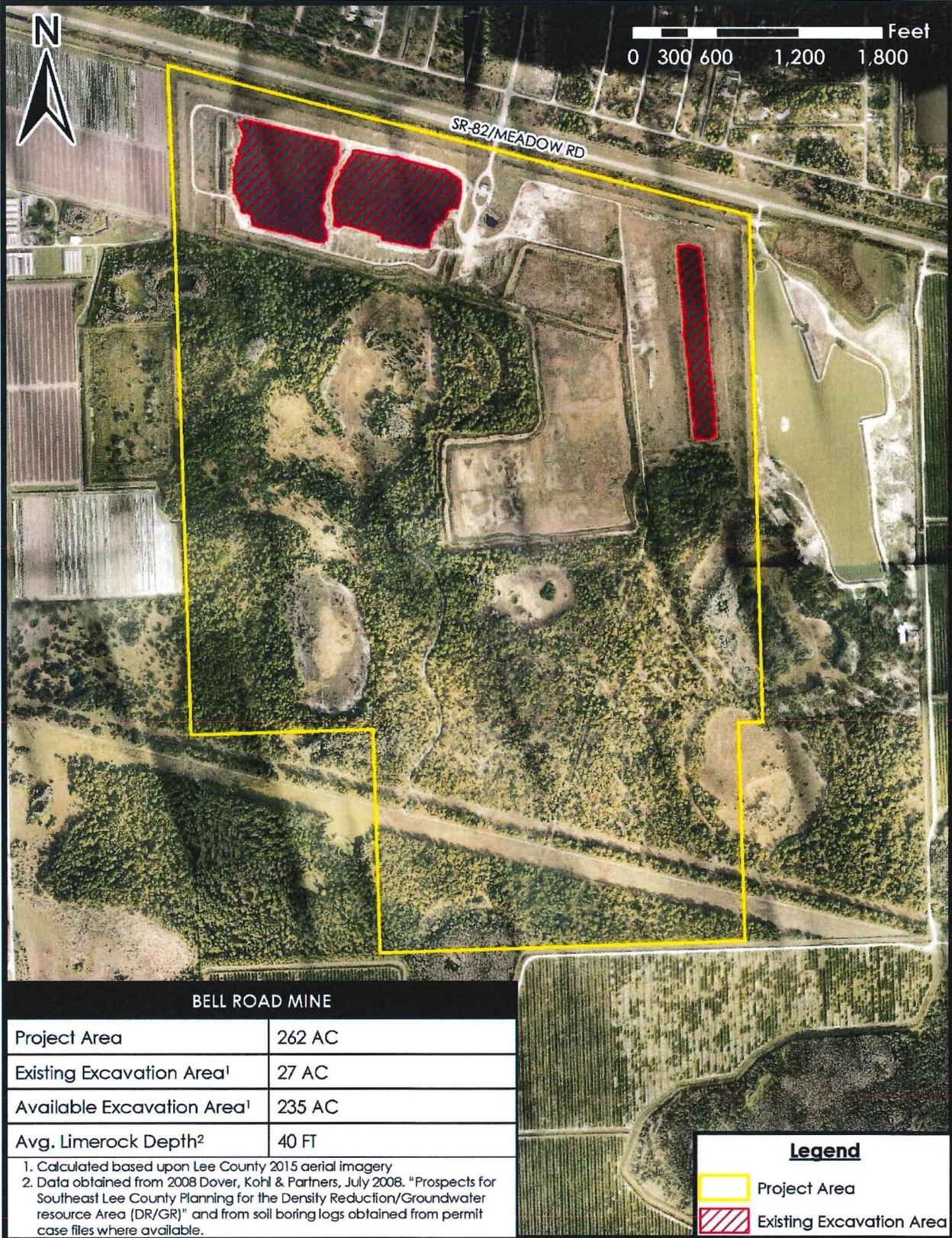
Project Area	30 AC
Existing Excavation Area <sup>1</sup>	10 AC
Available Excavation Area <sup>1</sup>	20 AC
Avg. Limerock Depth <sup>2</sup>	10 FT

1. Calculated based upon Lee County 2015 aerial imagery  
 2. Data obtained from 2008 Dover, Kohl & Partners, July 2008. "Prospects for Southeast Lee County Planning for the Density Reduction/Groundwater resource Area (DR/GR)" and from soil boring logs obtained from permit case files where available.

### Legend

-  Project Area
-  Existing Excavation Area

# Bell Road Mine



**BELL ROAD MINE**

Project Area	262 AC
Existing Excavation Area <sup>1</sup>	27 AC
Available Excavation Area <sup>1</sup>	235 AC
Avg. Limerock Depth <sup>2</sup>	40 FT

1. Calculated based upon Lee County 2015 aerial imagery  
 2. Data obtained from 2008 Dover, Kohl & Partners, July 2008. "Prospects for Southeast Lee County Planning for the Density Reduction/Groundwater resource Area (DR/GR)" and from soil boring logs obtained from permit case files where available.

**Legend**

 Project Area

 Existing Excavation Area

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**APPENDIX B.**  
**POPULATION PROJECTION CALCULATIONS**

### Charlotte County Population Projections and Limerock Demand

Year	2030 BEBR Medium Population Projection	Annual Projected Demand (9 Tons Per Capita)	Annual Projected Demand (Cubic Yards)	Cumulative Projected Demand (Cubic Yards)
<b>2015</b>	<b>167,141</b>	<b>1,504,269</b>	<b>1,114,273</b>	
2016	169,353	1,524,175	1,129,019	1,129,019
2017	171,565	1,544,081	1,143,764	2,272,783
2018	173,776	1,563,988	1,158,509	3,431,292
2019	175,988	1,583,894	1,173,255	4,604,547
<b>2020</b>	<b>178,200</b>	<b>1,603,800</b>	<b>1,188,000</b>	<b>5,792,547</b>
2021	180,140	1,621,260	1,200,933	6,993,480
2022	182,080	1,638,720	1,213,867	8,207,347
2023	184,020	1,656,180	1,226,800	9,434,147
2024	185,960	1,673,640	1,239,733	10,673,880
<b>2025</b>	<b>187,900</b>	<b>1,691,100</b>	<b>1,252,667</b>	<b>11,926,547</b>
2026	189,500	1,705,500	1,263,333	13,189,880
2027	191,100	1,719,900	1,274,000	14,463,880
2028	192,700	1,734,300	1,284,667	15,748,547
2029	194,300	1,748,700	1,295,333	17,043,880
<b>2030</b>	<b>195,900</b>	<b>1,763,100</b>	<b>1,306,000</b>	<b>18,349,880</b>
2031	197,260	1,775,340	1,315,067	19,664,947
2032	198,620	1,787,580	1,324,133	20,989,080
2033	199,980	1,799,820	1,333,200	22,322,280
2034	201,340	1,812,060	1,342,267	23,664,547
<b>2035</b>	<b>202,700</b>	<b>1,824,300</b>	<b>1,351,333</b>	<b>25,015,880</b>
2036	204,080	1,836,720	1,360,533	26,376,413
2037	205,460	1,849,140	1,369,733	27,746,147
2038	206,840	1,861,560	1,378,933	29,125,080
2039	208,220	1,873,980	1,388,133	30,513,213
<b>2040</b>	<b>209,600</b>	<b>1,886,400</b>	<b>1,397,333</b>	<b>31,910,547</b>

### Collier County Population Projections and Limerock Demand

Year	2030 BEBR Medium Population Projection	Annual Projected Demand (9 Tons Per Capita)	Annual Projected Demand (Cubic Yards)	Cumulative Projected Demand (Cubic Yards)
<b>2015</b>	<b>343,802</b>	<b>3,094,218</b>	<b>2,292,013</b>	
2016	350,782	3,157,034	2,338,544	2,338,544
2017	357,761	3,219,851	2,385,075	4,723,619
2018	364,741	3,282,667	2,431,605	7,155,224
2019	371,720	3,345,484	2,478,136	9,633,360
<b>2020</b>	<b>378,700</b>	<b>3,408,300</b>	<b>2,524,667</b>	<b>12,158,027</b>
2021	384,940	3,464,460	2,566,267	14,724,293
2022	391,180	3,520,620	2,607,867	17,332,160
2023	397,420	3,576,780	2,649,467	19,981,627
2024	403,660	3,632,940	2,691,067	22,672,693
<b>2025</b>	<b>409,900</b>	<b>3,689,100</b>	<b>2,732,667</b>	<b>25,405,360</b>
2026	415,280	3,737,520	2,768,533	28,173,893
2027	420,660	3,785,940	2,804,400	30,978,293
2028	426,040	3,834,360	2,840,267	33,818,560
2029	431,420	3,882,780	2,876,133	36,694,693
<b>2030</b>	<b>436,800</b>	<b>3,931,200</b>	<b>2,912,000</b>	<b>39,606,693</b>
2031	441,620	3,974,580	2,944,133	42,550,827
2032	446,440	4,017,960	2,976,267	45,527,093
2033	451,260	4,061,340	3,008,400	48,535,493
2034	456,080	4,104,720	3,040,533	51,576,027
<b>2035</b>	<b>460,900</b>	<b>4,148,100</b>	<b>3,072,667</b>	<b>54,648,693</b>
2036	465,260	4,187,340	3,101,733	57,750,427
2037	469,620	4,226,580	3,130,800	60,881,227
2038	473,980	4,265,820	3,159,867	64,041,093
2039	478,340	4,305,060	3,188,933	67,230,027
<b>2040</b>	<b>482,700</b>	<b>4,344,300</b>	<b>3,218,000</b>	<b>70,448,027</b>

<b>DeSoto County Population Projections and Limerock Demand</b>				
<b>Year</b>	<b>2030 BEBR Medium Population Projection</b>	<b>Annual Projected Demand (9 Tons Per Capita)</b>	<b>Annual Projected Demand (Cubic Yards)</b>	<b>Cumulative Projected Demand (Cubic Yards)</b>
<b>2015</b>	<b>34,777</b>	<b>312,993</b>	<b>231,847</b>	
2016	34,942	314,474	232,944	232,944
2017	35,106	315,956	234,041	466,985
2018	35,271	317,437	235,139	702,124
2019	35,435	318,919	236,236	938,360
<b>2020</b>	<b>35,600</b>	<b>320,400</b>	<b>237,333</b>	<b>1,175,693</b>
2021	35,740	321,660	238,267	1,413,960
2022	35,880	322,920	239,200	1,653,160
2023	36,020	324,180	240,133	1,893,293
2024	36,160	325,440	241,067	2,134,360
<b>2025</b>	<b>36,300</b>	<b>326,700</b>	<b>242,000</b>	<b>2,376,360</b>
2026	36,420	327,780	242,800	2,619,160
2027	36,540	328,860	243,600	2,862,760
2028	36,660	329,940	244,400	3,107,160
2029	36,780	331,020	245,200	3,352,360
<b>2030</b>	<b>36,900</b>	<b>332,100</b>	<b>246,000</b>	<b>3,598,360</b>
2031	37,000	333,000	246,667	3,845,027
2032	37,100	333,900	247,333	4,092,360
2033	37,200	334,800	248,000	4,340,360
2034	37,300	335,700	248,667	4,589,027
<b>2035</b>	<b>37,400</b>	<b>336,600</b>	<b>249,333</b>	<b>4,838,360</b>
2036	37,480	337,320	249,867	5,088,227
2037	37,560	338,040	250,400	5,338,627
2038	37,640	338,760	250,933	5,589,560
2039	37,720	339,480	251,467	5,841,027
<b>2040</b>	<b>37,800</b>	<b>340,200</b>	<b>252,000</b>	<b>6,093,027</b>

<b>Glades County Population Projections and Limerock Demand</b>				
<b>Year</b>	<b>2030 BEBR Medium Population Projection</b>	<b>Annual Projected Demand (9 Tons Per Capita)</b>	<b>Annual Projected Demand (Cubic Yards)</b>	<b>Cumulative Projected Demand (Cubic Yards)</b>
<b>2015</b>	<b>12,853</b>	<b>115,677</b>	<b>85,687</b>	
2016	12,942	116,482	86,283	86,283
2017	13,032	117,286	86,879	173,161
2018	13,121	118,091	87,475	260,636
2019	13,211	118,895	88,071	348,707
<b>2020</b>	<b>13,300</b>	<b>119,700</b>	<b>88,667</b>	<b>437,373</b>
2021	13,380	120,420	89,200	526,573
2022	13,460	121,140	89,733	616,307
2023	13,540	121,860	90,267	706,573
2024	13,620	122,580	90,800	797,373
<b>2025</b>	<b>13,700</b>	<b>123,300</b>	<b>91,333</b>	<b>888,707</b>
2026	13,780	124,020	91,867	980,573
2027	13,860	124,740	92,400	1,072,973
2028	13,940	125,460	92,933	1,165,907
2029	14,020	126,180	93,467	1,259,373
<b>2030</b>	<b>14,100</b>	<b>126,900</b>	<b>94,000</b>	<b>1,353,373</b>
2031	14,160	127,440	94,400	1,447,773
2032	14,220	127,980	94,800	1,542,573
2033	14,280	128,520	95,200	1,637,773
2034	14,340	129,060	95,600	1,733,373
<b>2035</b>	<b>14,400</b>	<b>129,600</b>	<b>96,000</b>	<b>1,829,373</b>
2036	14,440	129,960	96,267	1,925,640
2037	14,480	130,320	96,533	2,022,173
2038	14,520	130,680	96,800	2,118,973
2039	14,560	131,040	97,067	2,216,040
<b>2040</b>	<b>14,600</b>	<b>131,400</b>	<b>97,333</b>	<b>2,313,373</b>

<b>Hendry County Population Projections and Limerock Demand</b>				
<b>Year</b>	<b>2030 BEBR Medium Population Projection</b>	<b>Annual Projected Demand (9 Tons Per Capita)</b>	<b>Annual Projected Demand (Cubic Yards)</b>	<b>Cumulative Projected Demand (Cubic Yards)</b>
<b>2015</b>	<b>38,096</b>	<b>342,864</b>	<b>253,973</b>	
2016	38,297	344,671	255,312	255,312
2017	38,498	346,478	256,651	511,963
2018	38,698	348,286	257,989	769,952
2019	38,899	350,093	259,328	1,029,280
<b>2020</b>	<b>39,100</b>	<b>351,900</b>	<b>260,667</b>	<b>1,289,947</b>
2021	39,260	353,340	261,733	1,551,680
2022	39,420	354,780	262,800	1,814,480
2023	39,580	356,220	263,867	2,078,347
2024	39,740	357,660	264,933	2,343,280
<b>2025</b>	<b>39,900</b>	<b>359,100</b>	<b>266,000</b>	<b>2,609,280</b>
2026	40,040	360,360	266,933	2,876,213
2027	40,180	361,620	267,867	3,144,080
2028	40,320	362,880	268,800	3,412,880
2029	40,460	364,140	269,733	3,682,613
<b>2030</b>	<b>40,600</b>	<b>365,400</b>	<b>270,667</b>	<b>3,953,280</b>
2031	40,680	366,120	271,200	4,224,480
2032	40,760	366,840	271,733	4,496,213
2033	40,840	367,560	272,267	4,768,480
2034	40,920	368,280	272,800	5,041,280
<b>2035</b>	<b>41,000</b>	<b>369,000</b>	<b>273,333</b>	<b>5,314,613</b>
2036	41,120	370,080	274,133	5,588,747
2037	41,240	371,160	274,933	5,863,680
2038	41,360	372,240	275,733	6,139,413
2039	41,480	373,320	276,533	6,415,947
<b>2040</b>	<b>41,600</b>	<b>374,400</b>	<b>277,333</b>	<b>6,693,280</b>

**Lee County Population Projections and Limerock Demand**

<b>Year</b>	<b>2030 BEBR Medium Population Projection</b>	<b>Annual Projected Demand (9 Tons Per Capita)</b>	<b>Annual Projected Demand (Cubic Yards)</b>	<b>Cumulative Projected Demand (Cubic Yards)</b>
<b>2015</b>	<b>665,845</b>	<b>5,992,605</b>	<b>4,438,967</b>	
2016	683,636	6,152,724	4,557,573	4,557,573
2017	701,427	6,312,843	4,676,180	9,233,753
2018	719,218	6,472,962	4,794,787	14,028,540
2019	737,009	6,633,081	4,913,393	18,941,933
<b>2020</b>	<b>754,800</b>	<b>6,793,200</b>	<b>5,032,000</b>	<b>23,973,933</b>
2021	771,740	6,945,660	5,144,933	29,118,867
2022	788,680	7,098,120	5,257,867	34,376,733
2023	805,620	7,250,580	5,370,800	39,747,533
2024	822,560	7,403,040	5,483,733	45,231,267
<b>2025</b>	<b>839,500</b>	<b>7,555,500</b>	<b>5,596,667</b>	<b>50,827,933</b>
2026	855,260	7,697,340	5,701,733	56,529,667
2027	871,020	7,839,180	5,806,800	62,336,467
2028	886,780	7,981,020	5,911,867	68,248,333
2029	902,540	8,122,860	6,016,933	74,265,267
<b>2030</b>	<b>918,300</b>	<b>8,264,700</b>	<b>6,122,000</b>	<b>80,387,267</b>
2031	932,880	8,395,920	6,219,200	86,606,467
2032	947,460	8,527,140	6,316,400	92,922,867
2033	962,040	8,658,360	6,413,600	99,336,467
2034	976,620	8,789,580	6,510,800	105,847,267
<b>2035</b>	<b>991,200</b>	<b>8,920,800</b>	<b>6,608,000</b>	<b>112,455,267</b>
2036	1,003,960	9,035,640	6,693,067	119,148,333
2037	1,016,720	9,150,480	6,778,133	125,926,467
2038	1,029,480	9,265,320	6,863,200	132,789,667
2039	1,042,240	9,380,160	6,948,267	139,737,933
<b>2040</b>	<b>1,055,000</b>	<b>9,495,000</b>	<b>7,033,333</b>	<b>146,771,267</b>

### Sarasota County Population Projections and Limerock Demand

Year	2030 BEBR Medium Population Projection	Annual Projected Demand (9 Tons Per Capita)	Annual Projected Demand (Cubic Yards)	Cumulative Projected Demand (Cubic Yards)
<b>2015</b>	<b>392,090</b>	<b>3,528,810</b>	<b>2,613,933</b>	
2016	396,852	3,571,668	2,645,680	2,645,680
2017	401,614	3,614,526	2,677,427	5,323,107
2018	406,376	3,657,384	2,709,173	8,032,280
2019	411,138	3,700,242	2,740,920	10,773,200
<b>2020</b>	<b>415,900</b>	<b>3,743,100</b>	<b>2,772,667</b>	<b>13,545,867</b>
2021	420,040	3,780,360	2,800,267	16,346,133
2022	424,180	3,817,620	2,827,867	19,174,000
2023	428,320	3,854,880	2,855,467	22,029,467
2024	432,460	3,892,140	2,883,067	24,912,533
<b>2025</b>	<b>436,600</b>	<b>3,929,400</b>	<b>2,910,667</b>	<b>27,823,200</b>
2026	440,060	3,960,540	2,933,733	30,756,933
2027	443,520	3,991,680	2,956,800	33,713,733
2028	446,980	4,022,820	2,979,867	36,693,600
2029	450,440	4,053,960	3,002,933	39,696,533
<b>2030</b>	<b>453,900</b>	<b>4,085,100</b>	<b>3,026,000</b>	<b>42,722,533</b>
2031	456,520	4,108,680	3,043,467	45,766,000
2032	459,140	4,132,260	3,060,933	48,826,933
2033	461,760	4,155,840	3,078,400	51,905,333
2034	464,380	4,179,420	3,095,867	55,001,200
<b>2035</b>	<b>467,000</b>	<b>4,203,000</b>	<b>3,113,333</b>	<b>58,114,533</b>
2036	469,260	4,223,340	3,128,400	61,242,933
2037	471,520	4,243,680	3,143,467	64,386,400
2038	473,780	4,264,020	3,158,533	67,544,933
2039	476,040	4,284,360	3,173,600	70,718,533
<b>2040</b>	<b>478,300</b>	<b>4,304,700</b>	<b>3,188,667</b>	<b>73,907,200</b>

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# **APPENDIX C. REFERENCES**

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