

**Iluka Resources Inc. Concord Mine  
Conditional Use Permit Support Document**

Submitted To:

**Dinwiddie County Board of Supervisors  
Dinwiddie County Planning Department  
P.O. Drawer 70  
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## **1.0 INTRODUCTION**

Mineral sands are the name most often given to sands containing titanium and zircon. These sands occur in economically viable concentrations in Coastal Plain sediments adjacent to a geologic feature known as the Fall Zone which runs from Virginia to Florida primarily west of Interstate 95. Iluka Resources Ltd. (together with its subsidiaries) (collectively and individually herein referred to as “Iluka”) is one of the world’s leading producers of zircon and titanium dioxide minerals. Iluka’s operations in the United States presently are conducted by its subsidiary, Iluka Resources Inc. and include: a mineral separation plant in Stony Creek, Virginia; two active mine sites, the Brink mine in Greensville County, Virginia and the Concord mine in Sussex County, Virginia, including a wet concentrator plant at each site; a future mine site, the Hickory mine in Dinwiddie County, Virginia; and three former mine sites in final reclamation located in Dinwiddie County, Virginia, Clay/Putnam Counties, Florida, and Brantley County, Georgia.

Iluka is proposing the expansion of their Concord mine into Dinwiddie County, Virginia (Figures 1 and 2). This expansion will be a continuation of mining and reclamation activities from Sussex County. The proposed expansion includes one, 302-acre parcel that lies within both Dinwiddie and Sussex Counties (Figure 4). The parcel is assigned Dinwiddie County parcel identification number (PIN) 101-10, and Sussex County has relinquished all land use control for the entire parcel to Dinwiddie County per their attached letter in Appendix A. Disturbance activities will include discreet active mining areas within the parcel.

## **2.0 CURRENTLY APPROVED CONDITIONAL USE PERMITS**

Iluka, and its predecessor in U.S. RGC Mineral Sands (RGC), have conducted mining and reclamation activities in Dinwiddie and Sussex Counties since the mid 1990’s. Two Conditional Use Permits (CUP) have been issued for mining and reclamation of lands for mineral sands in Dinwiddie County (Figure 3) as summarized below:

- CUP C-95-02 was approved unanimously by the Dinwiddie County Board of Supervisors (BOS) on October 4, 1995 for the project known as the Old Hickory mine and encompassed approximately 1,700 acres located near SR 40 between I-95 and I-85.
- CUP C-13-2 was approved unanimously by the Dinwiddie County BOS on July 16, 2013 for the a future project called the Hickory mine and will encompass approximately 2,250 acres located north and south of SR 40 between I-95 and I-85.

Reclamation is currently ongoing and mining and related operations will continue to occur on parcels currently approved.

## FIGURES

### **3.0 PROPOSED CONDITIONAL USE PERMIT**

Iluka proposes to continue mining and reclamation for mineral sands as part of the Concord mine operations in the Dinwiddie County area on parcel 101-10. The property information is listed in Table 1, and the adjacent owners are listed in Table 2.

### **4.0 MINING, PROCESSING, AND RECLAMATION OPERATIONS**

#### **Mine Area Overview**

The proposed expansion of the Concord mineral sands mine will be located in a rural area of Dinwiddie County, Virginia, west of Interstate 95. The area can generally be described as rolling hills interspersed with small drainage features and wetlands. Predominant land uses in the area are agriculture and silviculture. Agricultural operations are primarily cash crops and include tobacco, peanuts, cotton, soybeans, corn, wheat, and rye. Silviculture operations consist of harvesting of local pines and hardwoods on a 30 to 35 year rotation. Single-family housing primarily associated with farming and silviculture is scattered at very low densities.

#### **Mining Method**

The mining method to be used is similar to what has been successfully used at the existing Old Hickory and Concord operations. The current Virginia Department of Mines, Minerals, and Energy (VDMME) Permit and Operations Plan for Concord will be expanded to include the proposed new mine area. The mining activity on the parcel will be initiated by installation of erosion and sediment control devices in accordance with the present state-approved sediment and erosion control plan approved by VDMME. These devices include silt fencing, hay bales, diversionary berms, and sediment traps located around the proposed mine cells. These devices have been successful in the previous and on-going mining efforts and will be continued in the new mining areas. Clearing of vegetation is the next step with crops or timber harvested, followed by root-raking (as necessary) to expose the topsoil. Any remaining brush and tree material are burned under appropriate burn regulations, or recycled. Topsoil is typically removed and used to create berms around the mine cells for further erosion and sediment control, storm water management and to isolate the mine cell from surrounding areas. These berms also provide for visual screening, noise attenuation, and dust suppression. These activities are initiated from six (6) to 24 months prior to excavation, with mine cells varying in size based on the localized ore body.

The exposed ore body is a mixture of mineral sands (up to 5%), quartz sand (approximately 65%) and kaolinite clay (approximately 30%). Depths of mining average 30 to 35 feet, with maximum depths of 50 to 60 feet. Track-mounted excavators unearth and place the ore into a mobile mining unit, which mechanically breaks up clay and adds water to create slurry. The mining unit then hydraulically transports (pumps) the slurry via an HDPE piping system to a mobile trommel to screen out roots and oversized materials.

In some areas, interception of the surficial water table may occur at lower elevations in the mine cell. In these instances, the cell will be dewatered by either a surficial shallow well system or by sumps and pumps. Water that is captured will be utilized for make-up water in the mining process.

### **Process Method**

The ore will be transported as slurry to the existing Concord wet concentrator plant located at 16474 Walkers Mill Road in Sussex County. The slurry will be passed through a trommel screen to remove rocks, gravel, roots, and clay balls. This is used for back-fill in the mine cells and for road stabilization. The retained material is then pumped through cyclones to separate kaolinite clay from the mineral sands and quartz sands. The clay is then pumped to a thickener where non-toxic, biodegradable flocculant is added to increase the percent solids of clay from 5% to 30%, which effectively dewateres the clay material. Excess water released by flocculation is directed to a clarifying pond for reuse. The sand fraction is pumped through a series of spiral separators, which separate quartz sand from mineral sands based on specific gravity. These spiral separators upgrade the mineral sands concentrate feed from approximately 10% to 90% producing mineral sand concentrate. The mineral sand concentrate is then directed to a hydrosizer, which removes additional fine to very fine quartz sand grains. The mineral sand is then be loaded onto trucks and hauled for processing at the mineral separation plant located in Stony Creek, Virginia. Quartz sands from the spiral separators and hydrosizer are then directed to a sand tailings cyclone which dewateres the sands to approximately 75% solids with excess water directed back to the clarifying pond. Tailing sands are then combined with the thickener underflow (clays) to create a sand-clay mix and are pumped back to the mine cells for use in reclamation activities. Ultimately, all water used in these processes is returned to the clarifying pond for reuse, with make-up water coming from capture of stormwater in the mine cell, surficial water table dewatering in the mine cell, decanting from reclamation activities, and other sources such as groundwater wells and surface water bodies.

### **Reclamation Method**

Mine cells are backfilled with the sand-clay mix (tailings) pumped from the wet concentrator plant. Excess water from tailings is decanted and pumped back to the clarifying pond for reuse in the process. Due to the minimal volume of mineral sands extracted there are few voids remaining after mining, and post-mining topography will generally mimic pre-mining topography. In some cases, grades may be approximately 20% to 30% higher than pre-mining conditions due to swell factors associated with the clay content. Unless otherwise approved by the landowner and regulatory authorities, topsoil used in containment berms around the mine cell or in stockpiles is then used during the final grading of the reclaimed mine cells to provide a suitable growing medium as well as a "seed bank" for native vegetation. The reclaimed area will be plowed and harrowed to prepare for site planting and appropriate soil tests conducted for lime and fertilizer application. Temporary vegetation will be used for soil stabilization with final

vegetative cover being either pasture/grassland and or crops. After soil stabilization, all erosion and sediment control devices installed at the initiation of mining will be removed.

Iluka has partnered with Virginia Polytechnic Institute and State University (“Virginia Tech”) for over 12 years in research on soil stability and soil productivity for reclamation and hopes to continue this partnership through the continued mining activities.

### **Land Disturbance Summary**

The intent of the mining and reclamation process utilized by Iluka is to minimize the total acres of disturbed land at any one time and still maintain efficient operations. At any given time, a number of acres will be disturbed and will include:

- clearing areas: areas cleared in advance of mining and will vary with season, weather, and topographic conditions;
- production areas: areas that are being actively mined and areas where tailings are being disposed;
- post-tailing areas: areas where tailings are being graded and topsoil is being returned;
- reclaimed areas: areas that have been seeded and returned to the landowner; and
- mining support areas: areas including the concentrator location, storm water ponds, laydown areas, stockpile areas, pipeline corridors, utility easements, process water ponds, and water source areas.

## **5.0 CONDITIONAL USE PERMIT SITE CONDITIONS**

### **Physical Environment**

#### **Physiography**

Dinwiddie County is divided by the “Fall Zone” into two physiographic provinces, the Piedmont and the Coastal Plain. The Fall Zone is a north-south-trending geologic transition zone that represents the boundary between the older metamorphic rocks of the Piedmont to the west and the younger unconsolidated sediments of the Coastal Plain to the east. In Dinwiddie County, the Fall Zone lies approximately 10 miles west of, and roughly parallel to Interstate 95. Parcel 101-10, like the currently approved Concord project, is located within the Fall Zone.

#### **Topography**

A review of the USGS quadrangles for the parcel area indicate elevations range from approximately 180 feet above mean sea level (msl) to less than 160 feet msl. The topographic contours indicate gently rolling terrain over most of the parcel. Spring Meadow Branch is the lone drainage feature on the property and crosses at the southern extent. Any areas of relatively steep slopes will be addressed during mine cell preparation and reclamation to ensure proper sediment and erosion control measures are implemented. Erosion and sediment control will be

carefully planned around steeper slopes adjacent to drainage features (streams and wetlands) to avoid erosion and sedimentation into these features during the mining and reclamation process. Upland buffers adjacent to wetland and drainage features will also be utilized. These buffers are typically 50 feet in width from the wetland edge to the limits of disturbance. Due to the relatively small amount of material extracted during the mining process and the natural “swell” of clay minerals during tailings placement, post-mining topography generally mimics pre-mining topography, resulting in nominal alterations to the general land form of the project area.

### **Floodplains**

The Flood Insurance Rate Map (Map Number 51183C0175D) was reviewed for floodplain occurrences on the subject parcel. A portion of Spring Meadow Branch has been mapped within the 100-year floodplain. No impacts to the 100-year floodplain are anticipated as these mapped areas are associated with drainage systems which are not proposed to be mined. No change in the 100-year flood plain storage capacity is anticipated because typical pre-mining contours are restored during reclamation.

### **Soils**

There are 17 soil types and water as mapped by the National Resources Conservation Service (NRCS). The majority of the soil types can be characterized as sandy or clay or a combination of sandy and clay loams.

As described in the mining process (Section 4.0), and unless otherwise agreed to by the landowner and regulatory authorities, the topsoil is removed prior to excavation and utilized in the reclamation process as a growing medium and “seed bank.” As indicated previously, Iluka continues to partner with Virginia Tech to research advances in rapid soil stabilization and enhanced soil productivity during the reclamation process.

### **Drainage Basins**

The parcel drains to the north, west, and south includes Spring Meadow Branch along the southern extent. Drainage features throughout project site eventually report to the Nottoway River which forms the southern boundary of the western portion of Dinwiddie County. As indicated above, careful planning of mining activities and reclamation activities near steep slopes adjacent to drainage features will be instituted to avoid sedimentation and erosion into these features, and no decrease in the 100-year floodplain storage or drainage basin dimensions is anticipated. In addition, use of upland buffers to riparian resources will be used for protection from possible sedimentation and erosion.

## **Biological Environment**

### **Land Cover**

The USGS National Map Viewer identifies land cover per the National Land Cover Database as primarily evergreen forest, cultivated crops, and pasture within the parcel. Wetland areas, primarily woody wetlands, are associated with the major drainage features in the project area. Review of recent aerial imagery confirms that the dominant land use is agriculture and silviculture.

### **Wetland Communities**

No wetland impacts are anticipated from the proposed activity.

### **Upland Communities**

The vast majority of disturbance proposed will be to upland communities, primarily agricultural lands. These areas will be rehabilitated to these same land uses following reclamation.

### **Protected Species**

No individuals of rare or protected species were observed and no adverse impacts are expected. Suitable habitat that may be impacted by this project is expected to be returned to pre-project conditions. Long-term loss of suitable habitat is not expected and impact to rare and protected species is not anticipated.

### **Significant Biological Features**

There were no identified significant biological features within the project area.

## **Cultural Environment**

### **Prime Farmland**

One of the dominant land covers within the parcel is agricultural crops. This is due to the fact that many of the soils located in the project area are suited for these activities. The majority of the parcel is located in prime farmland soils categorized as prime farmland and farmland of statewide importance. Classification of these soils is based on physical and chemical characteristics as a growing medium for food, feed, forage, and fiber. This classification does not have a regulatory implication but serves to identify those resources that are best suited as farmland. The impact to these farmland resources will be minimized as the topsoil is removed prior to mining and then replaced over the sand-clay mix tailings to provide a suitable growing medium, for agriculture and silviculture at the post-mining phase of the project. Reclamation efforts in these types of areas have proven to be successful to maintain the characteristics for prime farmland.

### **Archaeological/Historical Sites**

No archaeological or historical sites have been identified on the subject parcel.

### **Sensitive Site Receptors**

Sensitive site receptors are those that would experience “quality of life” impacts such as noise, light, dust, traffic, and general aesthetics. These sites typically include schools, medical facilities such as hospitals, nursing homes, specialty farms such as horse farms, and historical sites. These sites also include local gathering spots such as local community stores, post offices, fire halls, and other areas where individuals of the community gather. In addition, individual residences in the project area could be considered sensitive site receptors in some cases.

The mining operations will operate 24 hours per day, 365 days per year. During the 12+ years of mining and reclamation activities within and adjacent to the project area, adverse impacts to these the local areas and minimal impacts to “quality of life” issues have occurred. Iluka will continue to utilize best management practices (BMP’s) during operation in these proposed areas to minimize disturbance to sensitive site receptors. These BMP’s have been continuously improved since the inception of mining activities in the mid-1990’s. Dust will be suppressed using BMP’s such as watering of roadways and open areas. Berms and vegetative buffers will be incorporated for aesthetics and noise attenuation. In some areas, flashing or strobe lights as well as directional back-up alarms will be used during evening hours instead of omni-directional back-up alarms to reduce evening noise. Directional lighting will be used during evening hours to minimize off site glare.

### **Infrastructure**

#### **Water and Sanitary Sewer Systems**

There is no public water or sanitary sewer system located within the project area. Single family residences and small businesses within the project area operate on individual wells and septic tank systems. Water will be required for the slurring operations for the mine. Both ore and tailings are hydraulically (slurried) moved from the mine pits to the wet concentrator plant and then back to the mine pits. Current operations located in Sussex and Dinwiddie Counties utilize withdrawal from the Nottoway River, a well-field located in Sussex County, and collected stormwater captured at the mine areas and at the wet concentrator plant.

#### **Safety Facilities**

The proposed project will not be a burden on local safety resources as the project is not residential-based.

### **School Systems**

The project is not a residential-based project and there will not be an impact to the local school system.

### **Road Network**

The parcel abuts Walkers Mill Road (SR 665). The road network in the project area consists of primarily two-lane paved roadways with the exception of I-95 and I-85. There is acceptable access to the majority of the project area by these roadways. Roadway conditions are variable within the project area. Traffic is not anticipated to change or increase as a result of the Concord mine expansion into this parcel as access to the parcel by mining equipment will be through Iluka's internal network of access roads.

Iluka has had a continuous working relationship with Dinwiddie County and the Virginia Department of Transportation (VDOT) to preclude and or address road issues during the previous mining and reclamation efforts. Iluka will continue this coordination for the expansion of the Concord mine.

## **6.0 PREFERRED CONDITIONS**

Iluka offers the following conditions as part of the CUP approval with Dinwiddie County.

1. All required state (VDMME, VDEQ, and VDOT) and/or Federal permits governing this operation in Dinwiddie County shall be provided to the County.
2. Coordination with the VDOT and Dinwiddie County shall be a continuous effort in order to preclude and/or correct any road problems arising from this operation.
3. Iluka will consult with Virginia Tech or other soil and farming expert to address issues related to soil productivity and soil stabilization.
4. Setbacks from road right-of-ways, property lines, and residences will be based on Dinwiddie County zoning criteria and VDMME criteria.
5. Signage must be maintained on all four sides of the property being mined.
6. Develop a plan to mitigate impacts to adjacent water well users, which will include well repairs and well replacement where such issues are directly attributable Iluka's operations.

## TABLES

Table 1  
Concord Mine Conditional Use Permit Parcel List

Property Owner Name	Property Owner Mailing Address	Tax Parcel #	Acreage
HARRIS FRANCES PARSON	2104 COTTAGE ROAD, BLACKSTONE, VA 23824	101-10	302.00

**Table 2  
Concord Mine Conditional Use Permit Adjacent Parcel List**

<b>Property Owner Name</b>	<b>Property Owner Mailing Address</b>	<b>Property County</b>	<b>Tax Parcel #</b>
ABERNATHY ANNIE C	1520 WALKINS DR, EMPORIA VA 23847	SUSSEX	101-A-22
CROSHAW ERNEST R	5301 PLAZA DR, HOPEWELL VA 23860	SUSSEX	101-A-24
JONES CORINE EST	1526 FLOYD ST, PETERSBURG, VA 23803	DINWIDDIE	101-9A
KIDD CHRISTOPHER R &	3415 LINDBERG CT, DISPUTANTA VA 23842	SUSSEX	101-A-23
KVASNICKA MICHAEL DAVID	20745 DOUBLE BRANCH RD, STONY CREEK, VA 23882	DINWIDDIE	94-23
PARSON FREDERICK PARHAM	16003 PARSONS LN, STONY CREEK VA 23882	SUSSEX	101-A-11
PARSON FREDERICK PARHAM	16003 PARSONS LN, STONY CREEK VA 23882	SUSSEX	101-A-9
SPIERS DOUGLAS WAYNE & ALICE	25713 COURTHOUSE RD, STONY CREEK VA 23882	SUSSEX	82-A-8
SPIERS FAYE C	21018 DOUBLE BRANCH RD, STONY CREEK, VA 23882	DINWIDDIE	101-8
SPIERS LAWRENCE JR & MARY G	18814 HARDWOOD CREEK RD, STONY CREEK, VA 23882	DINWIDDIE	94-22
SPIERS ROBERT H JR OR FAYE C	21018 DOUBLE BRANCH RD, STONY CREEK VA 23882	SUSSEX	82-A-9
SPIERS ROBERT H JR OR FAYE C	21018 DOUBLE BRANCH RD, STONY CREEK VA 23882	SUSSEX	82-A-1
WINN NANCY C	244 WINNAWAY LN, RICH SQUARE, NC 27869	DINWIDDIE	101-11
WINN NANCY CARRAWAY	244 WINNAWAY LN, RICH SQUARE, NC 27869	DINWIDDIE	101-7