United States Department of the Interior

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May 28, 2020

Colonel Daniel Hibner
U.S. Anny Corps of Engineers
Savannah District - Regulatory Division
100 West Oglethorpe Avenue
Savannah, Georgia 31401-3640
Attention: Ms. Holly Ross

Re: USFWS File Number 2020-1618

Dear Colonel Hibner:

The U.S. Fish and Wildlife Service (Service) has reviewed the U.S. Army Corps of Engineers (USACE) Joint Public Notice (JPN) SAS-2018-00554 and associated information concerning the proposed Twin Pines demonstration mining project (project) in Charlton County, Georgia. The project was proposed after a similar larger mining project application was withdrawn. We again appreciate the efforts expended by USACE to include the extensive supporting information in the JPN to aid in the review. As with the previous mining application, we have concerns that the proposed project may pose risks to the Okefenokee National Wildlife Refuge (OKENWR) and the natural environment due to the location, associated activities, and cumulative effects of similar projects in the area. We opine that the impacts are not sufficiently known and whatever is done may be permanent.

We provide the following as information on issues to be considered in your decision on the level of environmental review that is appropriate for this proposed project. Our comments are submitted in accordance with provisions of the Endangered Species Act (ESA) of 1973, as amended; (16 U.S.C. 1531 *et seq.*) and the National Environmental Policy Act of 1969, as amended; (42 U.S.C. 4321 *et seq.*).

Project Description Overview

The proposed project is mining that would occur on Trail Ridge. Geologically, Trail Ridge is one of the historical sand beachfronts that are inland and generally parallel to the current beachfront of coastal Georgia. To the west, or inland of a portion of Trail Ridge is a large depression; the

Okefenokee Swamp. Trail Ridge serves as the eastern hydrological barrier of the swamp. These beach fronts contain heavy minerals as a small portion of their volume (2- 9%). These metals and minerals are valuable and can be mined with current technology.

The project is similar to the previously submitted one, just smaller in the size of area mined and the supporting information is more complete. The previously proposed mine site was 2,414 acres with approximately 1,300 acres to mine. The demonstration mine site is 1,042 acres with 898 acres to be mined. This is a reduction of 402 acres to be mined over an estimated 6 year mine life. The acreage reduction is on the eastern side of the previous application site, furthest away from the OKENWR and swamp. This area slopes down toward the east, away from the swamp. The northwest boundary of the current project is approximately 2½ miles from the OKENWR boundary and north and west of the St. Mary's River. The project site is upslope of both of these features. Operationally, dredging of targeted minerals containing titanium and zirconium will be limited to maximum depths of 25 and 50 feet depending on the location on the project site. This is likely not representative of future mining as the previous application stated a maximum depth of 70 feet. Using the applicant's numbers of a 100 foot wide pit of new ground being mined at a time, traveling at 115 feet per day, the rate of mining of new ground will be approximately 8 acres per month. The rate of mining of the previous mine application was approximately 25-40 acres per month. This mine application reports that tailings will be returned to the pit within 5 to 7 days. Recontouring, topsoil replacement, and revegetation will occur sometime after that.

Issues Overview

Although the size of the mine has been reduced, our concerns about risk of impacts to the OKENWR and the natural environment due to the location, associated activities, and cumulative effects remain. As such, much of what follows is similar to our previous letter. We have revised our comments for this currently proposed project and expounded upon our hydrology comments. The project applicant states that the proposed demonstration project will be used to validate a previously completed groundwater model which predicted that mining will have a negligible impact on local groundwater resources, surface water resources, and the Okefenokee Swamp. As far as we know, the model only recently became available on January 14, 2020. We remain unconvinced and concerned that impacts will be negligible as this model has not been widely peer reviewed by experts.

The Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500 - 1508) Section 1502.3 'Statutory requirements for statements' includes the following: "As required by 102(2)(C) of NEPA, environmental impact statements are to be included in every recommendation or report on proposals for legislation and other major federal actions *significantly affecting the quality of the human environment* (italics added)."

The Service recommends USACE consider the information that follows in developing a determination as to whether the proposed action meets the definition of the term 'significantly' as described in the terminology section, 1508.27, both in (a) context and (b) intensity.
As you are aware, "context" refers to scope of the proposed action, i.e. nationally, regionally, or locally. With this in mind, the future of the Okefenokee Swamp, surrounding landscape and the

species that depend on them are directly tied to maintaining the integrity of the ecosystem's complex ecological processes. The Okefenokee Swamp represents one of the very few selfcontained, naturally functioning wetlands in the world. Recognizing the need for federal protection, the majority of the Okefenokee Swamp was set aside as a National Wildlife Refuge (Refuge) in 1937 by Executive Order. The Refuge, currently 406,650 acres in size, was designated a National Natural Landmark in 1974 and a Wetland of International Importance by the Wetlands Convention in 1986. The Okefenokee Wilderness Act of 1974 designated the majority of the Refuge as a National Wilderness Area. The Okefenokee Swamp has shaped the culture of southeast Georgia. Many local residents have ancestors who once lived or worked in the swamp as a part of their heritage.

Today, the Refuge receives more than 600,000 visits annually. Visitors come from all 50 states, Puerto Rico and more than 46 countries. Ten percent are international visitors. The 2017 Banking on Nature Report (Caudill and Carver 2019) identifies the total recreational expenditures for the four counties surrounding the refuge to be $64.7 million with non-residents accounting for $59.8 million. This was associated with the creation of about 753 jobs, $17.2 million in employment income generated, and $5.4 million in total tax revenue for the counties. The future of people and communities surrounding the swamp is dependent on conserving this popular natural landmark.

"Intensity" refers to the severity of the impact and has a number of considerations. The regulation identifies several items in section 1508.27(b), including:

- Item 3; the unique characteristics of the area. The swamp is of national importance as described above and is the largest National Wildlife Refuge and the third largest nationally designated Wilderness area east of the Mississippi River.

- Item 4; controversial effects of the proposed action. Although the applicant has provided hydrologic modeling and analysis that indicates that the project impacts will be negligible, we are not convinced. The information supporting this conclusion has not been independently peer reviewed. We opine that a wide range of possible outcomes may result, and possibly impact surrounding areas. If an effect of mining is a water level change in the swamp, it may not only affect the swamp, but the surrounding area including Trail Ridge and the St. Mary's River. Based on currently available information, a likely outcome appears to be some impacts to the hydroperiod of the 're-created' wetlands and the general area. These changes could indirectly result in modifications to fire behavior, hydrology, and vegetation; thereby impact wildlife and recreational opportunities within the NWR and the surrounding area. While the applicant may opine that these concerns have been adequately addressed in the permit application, we opine that the evaluation and results so important that they need to be independently peer-reviewed as part of a rigorous NEPA process.

Based on information provided in the JPN and other information currently available to the Service (Hyatt 1984; Rykiel 1977, Blood 1981, Burklew 1988, Yu 1986), there appears to be great uncertainty regarding the extent to which alteration of hydrologic processes that sustain the entire area and/or project site ecosystem may occur.

The range of possible impacts includes moderate to intermittent alteration of hydrologic processes which could result in seasonally lowered water tables. Lowered water tables within the Okefenokee basin could elevate fire frequency and intensity and alter fire behavior due to increased exposure of traditionally wetted areas. Further, even slight changes in the low mean water table or altered seasonal hydrology could result in a reduction of organic peat soils that dominate the basin. Slight changes in soils, hydrology, and fire behavior would result in changed vegetative patterning that govern habitat conditions. Ultimately, these environmental factors (fire, soils, vegetation) and associated habitat conditions define the ecological and recreational value of the OKENWR. To date, model results seem to be based on data collected over a small time period and therefore we opine that the most likely direct and indirect impacts of the proposed project have yet to be determined.

Several state and federally-listed and federal candidate species may be present or occasionally utilize habitat within the proposed mine footprint. It is unknown how long the effects of the mining will affect these species and the habitats that are currently on and near the site. The effects to the habitat may be permanent and thereby eliminating the species from the local landscape. We opine that this concern should be evaluated in a thorough effects analyses or disclosed through a NEPA process. Also, based on currently available peer reviewed information, it is unknown if the water level and holding capacity of the Okefenokee Swamp will be altered and what impacts this might have to species in the swamp and surrounding natural features, such as the St. Marys River.

Because of the uncertainty of impacts, the Service cannot definitively say that the mining proposal will significantly *affect* the environment. However, we have concerns that the proposed project could pose substantial risks for adverse impacts to OKENWR and the surrounding environment that may be irreversible even with mitigation.

Twin Pines proposes to use this “demo” project to the collect data that can be used to evaluate the veracity/reliability of their model, or improve it. Our concern is carrying out this “demo” project without knowing with a reasonable degree of certainty what the impacts of the proposed “experiment” will be. That is, whether the hydrologic modeling provided in the permit application is capable of reliably predicting the impacts of the proposed “demo” mining project. The impacts may be irreversible to a valuable resource, the OKENWR and swamp.

• Item 6; establish a precedent. Though USACE will be primarily considering the impacts of the proposed action from the standpoint of wetlands impacts and compliance with the Clean Water Act; overall, considering the entirety of the project footprint (1,042 acres - uplands included), the mine footprint (898 acres) and timeframe (6 years) are large and impactful. Future mining projects in adjacent portions of Trail Ridge, where there has been mineral interests in the past, could further magnify any environmental impacts by impacting a large portion of the eastern side of the swamp that is adjacent to the sand ridge known as Trail Ridge. The previous Twin Pines mining application referenced a total of 12,000 acres of mining, that would be a logical next step should the current 898-acre area demonstration site be approved.

These and other concerns are further described below.

Hydrologic Alterations

As we indicated earlier, the project applicant states that the proposed demonstration project will be used to validate a previously completed groundwater model which predicted that mining will have a negligible impact on local groundwater resources, surface water resources, and the Okefenokee Swamp. As far as we know, the model only recently became available on January 14, 2020. We remain unconvinced and concerned that impacts will be negligible as this model has not been widely peer reviewed by experts.

The permit application (Section 3.1 and Figure 4) postulates that a groundwater divide currently exists coincident with Trail Ridge which persists to all depths within the Surficial Aquifer; such that groundwater at all depths on the west side of the ridge flows west toward the Okefenokee Swamp and OKENWR, and groundwater at all depths on the east side of the ridge flows east in the direction of lower ground (i.e., under natural conditions). Section 3.1 asserts that the water table mimics the land surface in the vicinity of the ridge, as well as west and east of the ridge, as evidence for this conceptual model (hypothesis); notwithstanding that the shape of the water table is only indicative of directions of groundwater flow at or near the water table, as is wellknown. At greater depths within the Surficial Aquifer, specifically between the Okefenokee Swamp and lower lands east of the ridge, directions of groundwater flow may differ significantly from those at the water table (the latter strictly a manifestation of local topography and recharge of precipitation at the land surface).

Moreover, whereas contour maps of water level measurements in selected piezometers and monitoring wells across the project site are also presented in Figures 37-39 (for three isolated dates in 2019) in support of this conceptual model, the measurements appear to be available at most at two depths within the Surficial Aquifer at any particular location, and at many locations a single depth (Table 5). Therefore, it is unclear whether the groundwater flow field hypothesized in Figure 4 (the proffered conceptual model) is supported, or can be supported, by the available hydraulic head (groundwater level) measurements, or by measurements obtained in the existing piezometers and monitoring wells at some point in the future (e.g., postreclamation/backfilling of the proposed pit). In the absence of the groundwater divide postulated in Figure 4, which appears to be foundational to any analysis of the impacts of the project on the Okefenokee Swamp, Section 3.1 correctly implies that groundwater flow through the Surficial Aquifer (under natural or post-project conditions) would be, or at a minimum is likely to be, west to east through/beneath Trail Ridge from the Okefenokee Swamp (where it cites water levels are about 120 feet above mean sea level, ft amsl) to lower ground in the east (where groundwater levels are cited to be about 80 ft amsl). Given that the veracity of this proffered conceptual model cannot be readily evaluated using information provided in the permit application, and in view of its importance to any adequate assessment of the impacts of the proposed project on the Okefenokee Swamp and OKENWR, significant additional analysis by the USACE of this particular question/issue is merited.

Some studies have examined the hydrology of the Okefenokee Swamp and Trail Ridge; Hyatt 1984; Rykiel 1977, Blood 1981, Burklew 1988, and Yu 1986. These limited number of hydrologic studies are inconsistent in their conclusions regarding the hydrologic connection

between the swamp and Trail Ridge. As far as we are aware, the age and number of hydrogeologic/groundwater studies of the swamp and Trail Ridge are limited. We consider this to highlight the need for a through NEPA analysis before permitting any potential impacts, especially permanent ones, to the ecosystem.

Trail Ridge forms a rim or geomorphological "dam" on the east side of the swamp contributing to the water level and hydrologic budget of the swamp. The soil of Trail Ridge has a profile or distinct layers, the characteristic of which influence the capacity of water to move through it, or more specifically impede the movement of water through the ridge in its natural state. The proposal to mine to a maximum of 50 feet below ground surface is lower than current levels of water in the swamp and, in fact, is lower than the Okefenokee Swamp depression. After heavy mineral removal the soil will be returned to the site. It will have been homogenized or mixed, and no longer have the same distinct layers it had before mining. This will likely change the hydrological properties both temporally and spatially of the entire area. There is much uncertainty as to how dramatic and far reaching these changes will be. Similarly, it is uncertain what effects such hydrologic changes may have on area ecosystems.

Alteration of surface water drainage patterns and hydroperiod associated with soil disturbance on the project site could also occur. Destruction of soil strata that contain and channel surface and subsurface waters may change the habitat properties of the site and those that they flow into. Impacts to groundwater characteristics including water table elevation and changes in rates and directions of groundwater flow are also possible as soil strata are permanently homogenized up to 50-foot depths within Trail Ridge. Changes to hydrology could result in the potential for increased fire frequency and intensity on surrounding private commercial forest, alteration of the hydroperiod of the wetlands on and near Trail Ridge, vegetation communities, and habitat suitability for wildlife species. We opine that this is not sufficiently considered in the application.

Similarly, we have concerns regarding potential impacts on the swamp and local environment as a result of pumping groundwater for mine processes. Depths to the water table and the movement of groundwater may be disrupted by groundwater withdrawals. Homogenization of sediment strata along with water withdrawals may impact the hydrology of the area which maintains natural habitats. Similar to other concerns expressed, disrupted seasonal hydrology can influence fire frequency and behavior, ecosystem health, and plant and animal communities, some of which may contain ESA listed species.

Although a hydrologic analysis is included in the application, there has not been sufficient review of the analysis, results, and conclusions. The time period of the data used to perform the analysis is short compared to the variety of hydrological conditions that occur and will continue over the timescale of the project and periods of interest thereafter, all of which affect the local environment; examples include multi-year droughts, long-term wet periods, and extreme storm events.

Black humate-cemented consolidated sands or humates are discussed in the application. However, the hydrologic characteristics of materials that would be used to backfill the pit are not clear, including how they would compare to that of the original soil. The supplemental information provided in the section titled Vertical Hydraulic Conductivity Analysis of

PostProcessed Sands (pdf page 26 of 219) seems to indicate that 10 to 12.5% bentonite would be required to be added to the tailings sand after processing to approximate the permeability of existing natural black humate-cemented consolidated sand at the site; but the application does not state that this would be done. Elsewhere it is stated in the application that the mine pit will be filled with homogenized sand spoil (pdf page 34). Pdf page 50 of the same document states "In TPM's (Twin Pines Minerals') process, the recycled process water quality is improved as they will be separating the humate in the process and burying it in the open pit *below (italics added)* the quartz sand tailings." These statements seem to be in conflict. Additionally what would a layer of humates across the bottom of the mine pit do to the hydrology of the site? Would it be expected to 'cement' over time? Would this change its characteristics and/or the hydrological characteristics of the area?

It is our understanding that many, if not all of the wetlands on the site are currently underlain with humates that form a barrier that hold water near the surface or perch it. This along with slight elevation changes influences the properties of the wetlands, soil moisture, what vegetation is found in them, and suitability for animal species. The sandy soil in uplands adjacent to these wetlands allows water to move more quickly down from the surface through them. The homogenization of humate sediment strata may impact the occurrence of perched water, disrupting the hydrology of the area which maintains the natural habitats.

A Service in-house groundwater hydrologist is currently reviewing the hydrology section of the application and may make comments separately from this letter. We recommend the USACE evaluate our hydrology concerns with both in-house expertise, possibly ERDC, and by considering the comments of experts who have had sufficient time to review the application.

ESA Concerns

The best available scientific information indicates single-event surveys for at-risk and federallylisted plants may be incomplete in the area of the proposed mining activity. Similarly, surveys for at-risk and listed animal species are limited to recent records and may insufficiently represent possible occurrence of these species on and near the proposed mining area. We do acknowledge that species surveys have been done for two years now at the project site. Based on the best available scientific information, we offer the following comments.

The gopher tortoise *(Gopherus polyphemus)* has been observed on the proposed mine site. Based on recently conducted surveys by applicant sub-contractors, 118 (active, inactive) gopher tortoise burrows that were found in 4-5 areas along the crest of the ridge. While not listed as threatened or endangered under the ESA in Georgia, the gopher tortoise is a candidate species, meaning listing has been determined to be warranted but such listing has been precluded by higher priorities. The gopher tortoise is considered a keystone species as its burrow can be home for up to 250 other species. After the mining activity has occurred, the soil will have been homogenized and its properties (such as temperature, humidity, structure and texture) changed. As a result, it is unknown whether this area may still be suitable as gopher tortoise habitat.

Suitable habitat for the gopher tortoise also requires herbaceous forage for tortoises. The viability of herbaceous species seed can vary from less than a year to decades. Anecdotal information

indicates that herbaceous species seed that are acceptable to gopher tortoises do not survive when the topsoil they are contained in is stockpiled for longer than 9 months.

The JPN supporting information states ' ... the gopher tortoise has successfully recolonized areas that were previously mined for heavy mineral sands.' Areas known to the Service were recolonized greater than 15 years after reclamation and after numerous and repeated prescribed burns and silvicultural thinning to create conditions suitable for herbaceous vegetation growth. The applicant does not propose any assurances that the site will become suitable habitat for gopher tortoises or when this may likely occur.

The Service recommends that a habitat restoration plan/vegetation management plan is developed to; 1) improve fire/fuel conditions to minimize wildfire impacts in the future, and 2) develops a vegetation management plan composed of native species that is a) conducive with prescribed burning and b) facilitates the development of pine savanna habitat that will support gopher tortoise as well as other listed and at-risk species.

The federally-threatened eastern indigo snake *(Drymarchon couperi),* is known to occur on the Trail Ridge, and utilize gopher tortoise burrows during cold winter months and to avoid summer heat. It is known to move as much as five miles from known locations. Information in the JPN indicates no indigo snakes were detected on the site and states " A lack of indigo snake observations during focused surveys doesn't demonstrate that the species is never present ... " Individual eastern indigo snakes are large with extensive territories (> 1,000 ac.). Because of the large acreage utilized and the ability to diurnally and seasonally adapt their use of the habitat within each territory, individual snakes are difficult to detect or capture in any given area on any given day. Therefore, documentation of presence and abundance is difficult. The Service recommends that the applicant closely adhere to standard avoidance and minimization measures that can be used to avoid and minimize potential impacts to individual eastern Indigo snakes that may occasionally pass through the project area.

The Trail Ridge is part of a recovery unit for the indigo snake. Eliminating a significant area of habitat from a recovery unit may eliminate the value of the entire unit, and delay species recovery. Again, the Service recommends that a habitat restoration plan is developed to support pine savanna species as well as connectivity in mined over areas as well as with other adjacent habitats. The development of these habitat restoration plans should be closely coordinated with Service personnel.

One of our greatest concerns is that, following post-mining restoration activities, tortoises will prematurely attempt to burrow, but the homogenized soils will no longer be structurally capable of sustaining a burrow. If this were to happen, tortoises would dig out of a collapsed burrow, but other commensal species would not be able to; therefore becoming entombed and die, and leave little to no evidence of what has occurred. The Service recommends that the mining community, including this applicant, should investigate the following question; 1) once the landscape has been restored following mining, how much time is needed before a) gopher tortoises will resume burrowing, and b) how sustainable are newly created burrows in these post-restoration project areas. The Service recommends that such studies be conducted as part of the permitted project.

The gopher frog *(Lithobates capito)* (another candidate species) was documented during species surveys of the site. The gopher frog is one of the commensal species that utilizes gopher tortoise burrows. It also utilizes shallow isolated wetland habitats in part of its lifecycle. These wetlands appear to be present in the proposed mining area. The mining will homogenize the soil in these areas and would likely cause the hydrology and hydroperiod of these isolated ponds to change permanently. This would likely permanently destroy the habitat of these amphibians. This should be considered by the applicant and the USACE.

Other Okefenokee National Wildlife Refuge Related Concerns

The demonstration mine may establish a precedent to allow for cumulative impacts of other mining on Trail Ridge adjacent to the OKENWR. As the current demonstration mine is limited to 50 feet deep, it may not be representative of future mining impacts. Additionally future mining to the north of the demonstration area will be closer and closer to the refuge and swamp. There seem to be differences in hydrology, confining layers, and depth of the underlying aquifer along the length of Trail Ridge (Hyatt 1984; Rykiel 1977, Blood 1981, Burklew 1988, Yu 1986). This demonstration mine may not show all the cumulative impacts of mining along Trail Ridge due to these variations. Impacts may become evident in the OKENWR, which as stated earlier is recognized nationally and internationally of value to the public interest.

The Refuge includes a designated National Wilderness area where solitude is emphasized. Potential light, noise, dust, smoke, and exhaust pollution from operations may affect the wilderness resource itself, Refuge visitors' experiences, and natural inhabitants and ecosystems/environments.

We appreciate the opportunity to provide comments on this project. If you have any further questions, please contact Donald W. Imm, Field Supervisor, Georgia Ecological Services at 706-208-7501.

Sincerely yours,

Donald W. Imm, Ph.D.
Field Supervisor

cc: Eric Somerville, EPA, Athens, Georgia
Bradley Smith, GADNR-EPD, Brunswick, Georgia
Jason Lee, GADNR-WRD, Brunswick, Georgia
Michael Lusk, Okefenokee Refuge Manager, USFWS Folkston, Georgia

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