SCHREUDER, INC. WATER-RESOURCES & ENVIRONMENTAL CONSULTANTS
13412 N. Lincoln Ave., Tampa, FL 33618
SCHREUDER, INC. WATER-RESOURCES & ENVIRONMENTAL CONSULTANTS
13412 N. Lincoln Ave., Tampa, FL 33618
813-695-308

October 13, 2018

SCHREUDER INC.

RESPONSES AND COMMENTS ON MINING AND MITIGATION INFORMATION PREPARED AND SUBMITTED BY KLEINFELDER ON BEHALF OF HPS Il ENTERPRISES FOR A PROPOSED PHOSPHATE MINE IN BRADFORD COUNTY

General Introduction

Schreuder Inc. (Sl) received 16 files from OES in Jacksonville with the request to evaluate and comment on the graphical and text information regarding a newly proposed phosphate mine in Bradford and Union Counties. The Sl assessment focuses on the proposed phosphate mine in Bradford County only. All the submitted information was prepared for HPS Il Enterprises (HPS) by their consultant Kleinfelder. The focus of the Sl assessment is on the possible impacts of the proposed phosphate mining operation and subsequent reclamation on the environmental and water resources in Bradford County outside the actual HPS property.

In conducting this assessment, Sl was guided by the State of Florida rules in Chapter 62C-16 "Bureau of Mine Reclamation — Mandatory Phosphate Mine Reclamation".

Information Attachments Provided

The following documents were provided:

A) Post-Mining Topography and Land-Use Map

B) ERM QAMP

C) Potentiometric Maps

D) Stormwater plan for Select Area

E) Stormwater Report for Select Area

F) Existing Topography and New River

G) New River Flow Information

H) Water Balance

I) Existing Land-Use Map

J) Monitoring Plan (Figure 14)

K) Stream Identification and Restoration Approach

L) HPS Bradford MMP OP Support Document 081618

M) Notes from HPS Mine Plan

N) HPS Bradford County RAI Response 081618

O) HPS Bradford County RAI Cover Letter

[The assessment which follows is presented in an order which facilitates the technical assessment, and not in the order that the information was provided in the list above. The figures referenced in the Assessment are presented at the end of the document.]

Introductory Comments

A substantial amount of information was provided by the HPS consultant. The Sl assessment indicated that it was difficult, and in some cases not feasible, to use the provided information to answer the main question, which is how the proposed mining operation would affect the environment outside of the project area and what the effects and impacts could be on the groundwater and surface-water resources in the areas surrounding the proposed phosphate mine. Particular examples are: 1) a lack of information about the depth of each mine cut; 2) the NGVD elevation of the bottom of the matrix throughout the entire property to be mined; 3) a detailed description of the geology, in particular the geology of the sufficial sediments which contain the surficial aquifer. No data were provided on the transmissivity of the surficial sediment, although calculations must have been made using a transmissivity value to determine the rate of shallow groundwater inflow (1 ,738 gallons per minute) into a 100 acre mine cut (see Attachment H).

Information Assessment

F. Existing Topography and New River

The graphical quality of the maps is excellent. This map shows that the elevations of the New River stream channel range from approximately 75 ft NGVD at the point where the River enters the property to about 65 ft NGVD where the New River leaves the property. The elevations along the southern edge of the New River riparian wetland areas

fluctuate from approximately 100 to 85 fi NGVD. This indicates that there is a gradient of approximately 35 to 20 ft in the surface of this riparian wetland.

A. Post Mining Topography and Land-Use Map

The concern is that when mining along the northern boundary occurs in years 4, 5, and 6-8 (see J Monitoring Plan; Figure 14), the groundwater level in the Surficial Aquifer will be lowered to 30 ft NGVD because of mine dewatering operations. This will be 35 ft below the elevation of the bottom of the New River. The mine dewatering operations have the potential to substantially lower the groundwater levels in the surficial sediments under the riparian wetlands, and therefore could potentially divert surface water flow from the New River. No assessments of these potential impacts to the wetlands and/or the New River were provided in the data submittal.

G. New River Flow Information

The information provided as .pdf files were copied from the USGS gauging station web site. The upstream gauging station is on the New River where SR 100 crosses the River. The location of the other gauging station is on the Santa Fe River where SR 121 crosses the River. Sl had requested surface water flow data for the New River to determine the possible rate of inflow into the New River for that section of the River flowing through the proposed mine in Bradford and Union Counties. Such data does not exist. Hydrographs of the surface water flows in the New River and the Santa Fe River have been created and are submitted herewith.

J. Monitoring Plan (Figure 14)

Surface Water Flow Measurements New River

HPS proposes to install two (2) surface-water flow gauges on the New River, and both locations are suitable. The upstream gauge is scheduled to be installed where CR 231 crosses the New River. The downstream gauge is scheduled to be installed where the New River exits the property. Although no information was provided on the data collection schedule, Sl presumes that the gauging station recorders will provide at least hourly measurements.

Sl suggests that the installation of these gauging stations be completed as soon as possible and that stream-flow data be collected as soon as possible. Analysis of the stream-flow data will enable Kleinfelder to classify the New River segment between these two (2) gauging stations as either influent or effluent segments. The analyses of the surface water flow data will assist in the assessment of the bank storage and the

quantification of groundwater flow in the Surficial Aquifer under the riparian wetland. It will allow the evaluation of the possible impacts of dewatering in the mine cuts along the boundaries with the riparian wetland in mine years 5 and 6-8.

Ground-Water Monitoring Wells - Sufficial Aquifer

Sl generally agrees with the proposed ground-water monitoring well locations. Sl further recommends the installation of two paired ground-water level monitoring wells in the riparian wetland between CR 231 and the western property boundary (see the attached Figure S-1). Because no stratigraphic data were provided by HPS, no assessment could be made to identify zones in the sufficial overburden sediments and in the matrix with the highest transmissivity values. If two distinct higher transmissivity zones are present, Sl recommends the installation of paired monitor wells. One well should be screened in the overburden interval and one well should be screened in the matrix.

No information was provided on the data collection and data processing methodology. Sl presumes that ground water-level readings will be scheduled on a continuous 10minute interval.

Ground-Water Monitoring Wells - Intermediate Aquifer

Sl could not determine the locations and depth of the monitor wells for the Intermediate Aquifer from the information provided by HPS.

Ground-Water Monitoring Wells - Upper Floridan Aquifer

Sl could not determine the locations and depth of the monitor wells for the Upper Floridan Aquifer from the information provided by HPS.

C. Potentiometric Maps

July and January 2018 Sufficial Aquifer Potentiometric Sufface Maps

The two maps showing the ground water level contours of the Surficial Aquifer show the locations of 11 monitor wells in the Bradford County part of the project. Sl analyzed the contour data in an attempt to map the gradient of the water table from the south part of the property northward towards the New River.

Table 1: Ground-Water Levels in Sufficial Aquifer at Monitor Wells on Site

Monitor Well Designation	WL January 2018 (ft, NGVD	WL July 2018 9ft, NGVD)
Western Transect		
MW-28	136	136
MW-23	127	130
MW-22	94	95
Mw-21	65	70
Middle Transect		
MW-34	136	136
MW-38	136	140
MW-26	94	98
Eastern Transect		
MW-33	136	135
MW-32	107	107
Wetland Bounda Transect		
MW-22	94	95
MW-26	94	98
MW-31	110	110
MW-37	85	93

The water table elevation at the New River channel is represented by the data from MW-21. In January it was 65 ft NGVD, and in July it was 70 ft NGVD. The western transect data indicate a slope in the water table from the southern part of the property towards the New River of 71 ft. The gradient for the Middle and Eastern Transects is similar. To assess the actual water table gradient from the southern boundary of the New River riparian wetland, Sl analysed the water table elevation numbers from the monitor wells along that boundary (see Table 1 Wetland Boundary Transect). The water table elevation along that wetland boundary ranged from 85 ft NGVD to 110 ft NGVD. The gradient in water levels ranges from a low of 20 ft to a high of 45 ft.

The HPS conceptual Mine Plan documentation submitted to Sl for review did not contain any information that could be used to assess the impacts that mine dewatering operations from mine cuts along the riparian wetland boundary will have on the groundwater conditions in the Surficial Aquifer under the wetland. If the bottom of the

mine cuts is lower in elevation than the New River channel, the mine-cut dewatering operations may "capture" surface water flow in the New River.

In summary, the submitted data does not allow for a complete and accurate assessment of the environmental and water resources impacts from the proposed mining operations on the wetlands along the New River on the Bradford County proposed mine property.

July and January 2018 Upper Floridan Aquifer Potentiometric Sufface Maps

The January 2018 potentiometric surface map of the Upper Floridan Aquifer (UFA) is not an acceptable data map; there are presumably only two data points on the map (Jim Cason and Jefferson Smurfit Corp.). The ground water level contours drawn on the map were apparently based on these two points- This is not a scientifically defensible level of data validity.

The July 2018 potentiometric surface map of the IJFA has apparently been prepared from data collected at 7 wells. The water level contours indicate that the general direction of ground water flow in the UFA is from East to West. The UFA has a major groundwater discharge point at the Wodhington Spring along the Santa Fe River. This spring is located just downstream of the confluence of the New River and the Santa Fe River. It is reasonable to assume that groundwater in the UFA underlying the proposed mine may flow to Worthington Spring.

The map indicates that the groundwater level in the UFA underlying the proposed mine site is slightly elevated, which indicates a zone of recharge. No data have been submitted to assess whether the mining operations and subsequent reclamation will affect this recharge zone. During mine-cut drainage operations, however, the gradient between the groundwater level in the drained mine cut and the groundwater level in the UFA will be substantially reduced and possibly even reversed.

B. ERM QAMP

The report provided for review is entitled: "HPS Enterprises Il, LLC HPS Mine Engineered Reclamation Material Quality Assurance Monitoring Plan Bradford and Union Counties, Florida August 2018". In paragraph 7 in the Introduction of the report, it is stated that "This ERM Quality Assurance Plan provides processes and procedures to confirm that the ERM will be suitable for use in reclamation and will support the proposed reclamation landforms." According to illustrations Al though A5, overburden will be placed in the bottom of the mine cut. After the overburden fill is leveled, the

remaining mine cut will be filled with the overburden sand-clay mixture (OSC). According to section 4.3 in the ERM QAMP report, post-reclamation groundwater tables will be restored to approximately pre-mining conditions. Kleinfelder apparently prepared a numerical flow modeling simulation of the saturated zone to evaluate the groundwater associated with post-reclamation conditions and used hydraulic conductivity values verified in field measurements.The post-reclamation analysis consisted of applying the expected hydraulic conductivity for the ERM which was determined based on the results of extensive evaluation of the subsurface conditions pre- and post-mining.

Sl has not received any information to assess any of the claims made in section 4.3 of the QAMP report provided by Kleinfelder. Sl has a serious concern about the statements made in this section. For example Sl could only find one (1) hydraulic conductivity data set prepared by Madrid Engineering Group (pages B-2 and C-4). They listed the four test values of a dark brown silty fine sand sample from Box 5. The average hydraulic conductivity value determined by Madrid was 12 ft/day. This appears to be a rather high hydraulic conductivity value for a mixture containing so much clay (see Figure 4 on Page 12 in the FIPR Publication no. 02-191-256 included in the QAMP report as Appendix C). According to the Pilot Plant Process Flow Diagram and Material Balance for October 21 2016 on Page 32 of the FIPR publication No 02—191-256, the OSC mix contains 30% clay; 45% overburden; and 38% Sand Tailings and 13% moisture. Sl doubts that the OSC sample (Dk brn silty sand) collected by Madrid Engineering Group from Box 5 is a representative sample of the OSC mix. It is doubtful that a soil sample which contains 30% clay can have a permeability of 12 ft/day.

Sl questions whether the proposed ERM reclamation sequence of putting overburden in the bottom of the mine cut followed by filling the remaining vertical space with the OSC mixture will provide a conductive horizontal medium to move groundwater at the same rate and extent as before mining took place. It should be clearly noted that no information has been provided to determine the pre-mining rate and extent of the groundwater movement in the Surficial Aquifer. No reliably tested data have been provided to determine the rate and extent of the groundwater movement in the reclaimed surficial sediments

In conclusion, Sl could not find any valid and scientific surficial aquifer assessment data to verify that the proposed reclamation process will restore groundwater flow in the Sufficial Aquifer to pre-mining conditions. If the groundwater flow in the post-mining reclaimed upland area is changed, it will impact the riparian wetland between the proposed Bradford mine and the New River.

D. Stormwater Plan for Select Area

Sl evaluated the three drawing C-1 through C-3. Sl does not provide engineering services, thus it will not comment on any of the engineering features presented in these drawings. Sl has however a very long experience with hydrologic and water quality aspects of water table recharge operations and water quality treatment issues.

Drawing C-1

The information in C-1 indicates that the proposed NPDES outlet B-3 will discharge to a surface-water channel which flows directly to the Santa Fe River. SI is familiar with the NPDES outfalls listed in the Areawide Environmental Impact Statement on Phosphate Mining in the Central Florida Phosphate District, issued by the US Army Corps of Engineers in 2013. The values for Turbidity in Table 4 are significantly less than 29 NTUs above background. Sl has worked on many of these NPDES outfalls in the past and is familiar with their operation and performance. It should be noted that all of these NPDES outfalls have been in operation for a long time and that extensive marshes and other biological features have been created which help in the reduction of suspended solids and particles which create the NTIJ values.

Drawing C-2

As shown in C-2, care should be given to the final design of the NPDES treatment pond. Sufficient detention time and natural filtration/deposition should be included in the design to aid in the clarification of the stormwater prior to discharge through the NPDES outfall to the Santa Fe River.

Drawing C-3

Based on extensive field experience with several phosphate mines in the Central Florida Bone Valley Phosphate Mining District, Sl believes that the operation and effectiveness of recharge ditches is questionable. The suspended solids load in the recirculation water will progressively impede the recharge from the ditch into the surficial sediments. The use of spray irrigation on the set-back strip of land between the propeny boundary and first mine cut has proven to be more effective to recharge the water table in the surficial sediments. Surface application of water is not typically very effective in recharging the groundwater in the matrix zone- The proposed use of a recharge well system was indicated, but no further information was provided to assess its effectiveness. The installation on recharge wells must be permitted by the FDEP under Chapter 62-528.600. Furthermore, no data were provided on the quantity and quality of the source water for the injection well system. No data were provided on the

hydrogeologic parameters to determine the rate of injection, the depth and screen settings of these well, and the placement distance between the wells.

E. Stormwater Report for Select Area

No comments. l.

Existing Land-Use Map.

No Comments

A. Post Mining Topographv and Land-Use Map

Post Mining Topography

No data have been provided to assess an overall mine sized material balance. Phosphate minerals will be mined and extracted and moved off-site. According to information in section 3.2 Estimated Quantities of Reclamation Materials in the ERM QAMP report, a total of 78,221 ,225 tons of materials will be dug up and redeposited on the Bradford mine. No data were provided to assess the need for the creation of the two lakes on the southeastern site of the property to accommodate the loss of fill material.

The map of the largest lake has inconsistent and confusing perimeter contour-line labels (147, 145, 143, etc.), whereas the interior-most contour line is labeled 108, calling into question the actual depth of the lake. A similar problem occurs for the smaller lake. These maps should be corrected; otherwise an assessment cannot be completed.

Flocculant Consumption

According to Table 1 (De-Watering Process Results), a polymeric flocculant compound will be added to the mixture of clay and tailings sand. It might require between 0.8 lb/t to 1.5 lb/t to achieve the consistency of the OSC before deposition into the mine cut during reclamation. The total amount of material at the Bradford County mine is 78,221 ,225 tons. Thus a total ranging from 62,576,980 and 117,331 ,830 lbs will be required to achieve the ERM as envisioned. No cost data were available for this flocculant compound; therefore, the total cost for this new ERM approach to phosphate mine reclamation could not be determined but could play a role in the assessment of the economic feasibility of the mining operation.

K. Stream Identification and Restoration Approach

No Comments

H. Water Balance

The flow into a 50-acre mine pit is shown to be 869 gallons per minute. This value is difficult to evaluate. Public information sources indicate that the mine pit bottom may be at approximately 30 ft NGVD at the northern boundary of the mine site. The width of the proposed mine pit is listed at 150 feet. If this is correct, the rectangular mine pit will be 14,520 ft long (2.75 miles). This seems a bit impractical. Presuming a ground water seepage flow through the pit wall of 29,340 ft length the ground water flow per foot of pit wall is 0.03 gallons per minute per foot, which seems low. It would have been very helpful if detailed field lithologic and hydrogeologic test data were available to determine the hydraulic conductivities of the soil horizons which will be penetrated as part of the mining process.

N. HPS Bradford County RAI Response 081618

Much discussion has been provided about how adaptive management will be used to ensure that the ERM has the appropriate hydraulic conductivity; however, no hydrogeologic test data were collected from the Surficial Aquifer prior to mining. Therefore the placement and mixing procedures of the ERM cannot be "calibrated" to actual pre-mining field data. In paragraph 2 on Page 2 of 11 it is mentioned that "FDEP will require wetland reclamation hydroperiod modeling to finalize the design of the subsufface lithology." The information package provided to Sl did not contain any information or data on the subsurface lithology of the proposed mining areas.

On page 6 of 11 in paragraph 4 in section d, mention is made of ground water modeling. The information package provided by Kleinfelder did not include any modeling information. It appears that ground water flow modeling will be performed at some time in the future. Data from existing monitor wells and others shall be used. No information was provided about the location of these wells, their construction diagrams, nor the description of the hydrogeologic testing to obtain the appropriate aquifer parameters and the results of these aquifer performance tests.

Closing Comments

The practical feasibility of the proposed mining operation in Bradford County is based entirely on research conducted for the Florida Industrial and Phosphate Research Institute (FIPR) by Julian Hazen, Jack Schedeman, Hassan El-Shall, and Glenn Gruber. The results of their scientific investigations and pilot plant operations are described in the report "Pilot Plant Demonstration of Sand-Clay-Overburden Mix for Accelerated Reclamation". The proposed phosphate mining operation will remove the entire thickness of the Surficial Aquifer in mined parcels. After the phosphate mineral

components are removed, the remaining soil materials (sand tailings and clay) will be mixed together again with the addition of a man-made chemical. The chemical will allow this mixture to gel, making it possible to add the overburden soils to the mixture. This Overburden-Sand-Clay (OSC) mixture will then be placed into the mined cut along with overburden which was removed during mining to get to the matrix. The matrix is the soil layer which contains the phosphate minerals.

During the pilot plant demonstration one sample of the OSC was tested to determine the permeability (hydraulic conductivity) of the OSC mixture (Page B-2 of the report). Part of the OSC mixture from the pilot plant was deposited on land and left to weather (Figure 15). It should be noted that the material exposed to weather for 69 days appears fairly sandy and not much vegetation has colonized the surface. The purpose of our comments is to express our doubt about whether this newly created OSC material which the mine cuts will be filled with can provide the same transmissivity as the Sufficial Aquifer provided prior to mining. If it will be not the same, it may substantially affect the riparian wetland along the New River. Another question which has not been addressed by the applicant relates to the long-term stability of the organic bonding agent added to keep the clay bonded. If this manmade organic material decays, the clay fraction in the mixture (which is approximately 30%) will significantly reduce the hydraulic conductivity. If that happens, groundwater flow in the surficial sediments will significantly decline or may even cease.

Conclusion

In conclusion, it should be noted that in addition to the concerns expressed above, no information was provided on the geology, no data were provided to illustrate that watersheds shall be restored, and no information was provided on the dimensions (width, length, and depth) of the mine cuts. The SI review of the submitted information concludes that these important data gaps must be filled before mining can proceed.