Deficiencies of the mitigation plan for TP LLC Saunders Demonstration Mine

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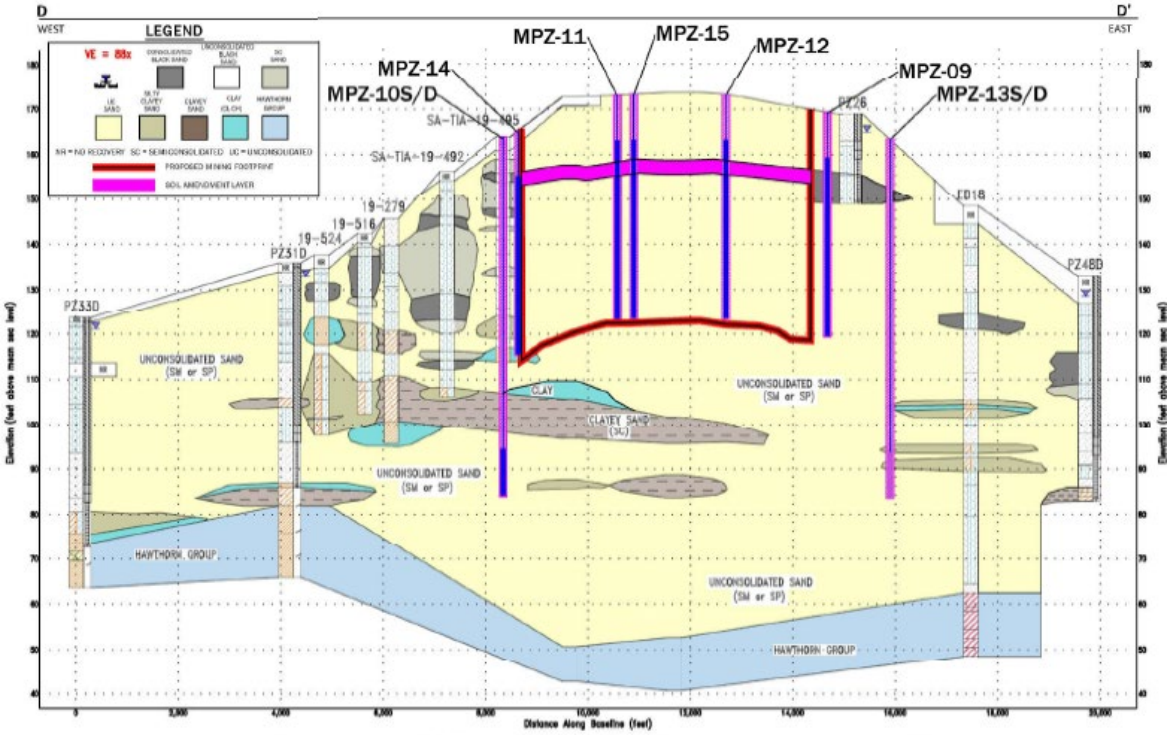
The mitigation plan for the Twin Pines LLC Saunders Demonstration Mine will likely result in a scrubby low productivity forest and the loss of nearly all wetland habitat currently existing in the mining area.

In short, the mitigation plan consists of the following steps (and omissions):

1. Stockpile the topsoils. Note, there is no discussion of separating wetland and upland topsoils, which have very different characteristics, different microbial ecology, and different seedbanks.

2. When returning the sands to the pits, place a bentonite layer approximately 15m below the ground surface to mimic the low conductivity black sands layer in place before mining (see below, from Sheet 7 of the mining land use plan of 5/19/2022. The fushcia layer is the bentonite layer). This seems like a good idea, but it will be very difficult to execute. Excavation and backfill will occur continuously, in a pit approximately 100 feet by 500 feet, and the bentonite layer will be placed piecemeal above and below regular mixed sands. It will be very difficult to create a continuous layer, and thus it is unlikely to work as intended.



POST-MINING GENERALIZED GEOLOGIC CROSS-SECTION OF THE MINE FOOTPRINT

3. Following mining, contour the surface to the pre-existing topography, minus the depth of topsoil. Note, the plan does not mention any effort to map the topsoil depths prior to excavation. Note: there is no mention that the mine will have removed approximately 1.5% of the soils, so the surface elevation will drop ¾ of a foot if the bulk density of the sands is replicated after replacement.

4. Spread the topsoil over the surface. Note, there is no discussion of putting wetland topsoils in the wetland areas or upland topsoils in the upland areas.

5. Seed the bare soils with various grasses to reduce erosion.

6. Allow natural regeneration of vegetation from the seedbank in the soils.

7. Two years following topsoil placement, plant native trees, mostly longleaf pine in the mesic uplands, slash pine in the wet uplands, and pond cypress in the wetlands. Planting plan includes some difficult-to-source trees such as pond pine, and loblolly bay. Sourcing the required number of pond cypress trees will be difficult at best. The market for some of the target tree species is not large.

Details of the mitigation plan can be found on Sheet 9 of the mining land use plan dated 5/19/2022.

Additional notable omissions include:

There is no mention of covering the topsoils to protect them from erosion by rainfall and to reduce volatilization of organic matter.

There is no mention of lining the wetlands with clays to hold water. If the water table drops due to the loss of soil layering and the increased hydraulic conductivity, the post-mining water table will likely be too low to create wetlands on the surface.

There is no mention of the fact that the low-conductivity, poor-infiltration, humic Bh horizon on the upland soils will be lost, so water availability for trees in the summer will be greatly diminished, and tree growth will be very poor. This is what we see on much of the former mined lands in the Florida section of Trail Ridge (see below).

There is no mention of the likely water table drop following mixing of the sands (which increases hydraulic conductivity) and the associated problems with reestablishing wetlands.

There is no mention of re-establishing the drainage swales that connected the wetlands on Trail Ridge to the tributary streams draining east, south, and west.

There is no discussion of whether the replaced sands can be successfully burrowed by gopher tortoise, a T&E species endemic to the region.

The importance of soil texture, structure, organic matter content, and horizonation.

Soil is not dirt that we stand upon. Soil is a complex living system with structure developed in concert with biological communities (plants, invertebrates, burrowing animals) over thousands of years and microbiology developed over decades and centuries. Native plant communities have evolved partly in response to the water holding capacities and nutrient cycling capacities of soils.

Natural soils are layered (below), and the layers have fundamentally different textures, structures, water holding characteristics, organic matter content, and biological function. Soils on the TP LLC mining site are of the Spodosol soil order, meaning that they have developed a concentrated layer of organic matter

called a humic horizon. In the photo of the Lynn Haven series at right, there is a thin dark topsoil layer (A horizon), a light colored E horizon, and a dark humic Bh horizon. These humic B horizons move water slowly, and allow water to pond above them during the winter when evapotranspiration rates are low. These humic horizons are essential to the natural function of both wetland and upland soils of the lower Coastal Plain.

Eliminating the structure and biology of the soils by replacing them with mixed sands from the first 50 feet of Trail Ridge will fundamentally alter the ecosystems founded upon the soil. Revegetation of the reclaimed mine site will be possible, but restoration of the native ecosystem will take thousands of years of soil development.

Right: The Lynn Haven soil series common in wetlands on the site. Image from NRCS.

Summary

The proposed reclamation plan is minimalist. It basically says the mine will destroy all existing soil structure, mix wetland and upland topsoils, regrade the pre-mining surface topography (minus the 1.5% of the soils removed from the site), push the mixed topsoils back in place, and plant some trees. The only nod to the special characteristics of the site is the placement of a deep bentonite layer to mimic the hydrologic effects of the existing black sands layer. This bentonite layer is novel, and it will be difficult to place as a continuous layer. There is no track record of such placement achieving its hydrologic goals.

Employing this style of mitigation at the Trail Ridge mining sites and at nearby phosphate mines in Florida has resulted in very poor soil conditions and very poor vegetative regrowth (see photos below).

It is likely this mitigation plan will result in poor soil conditions, a low-productivity scrubby forest, and few, if any, wetland areas on the ridge top. Before mining, the site is over 50% wetlands.

Reclaimed mine lands on Trail Ridge NE of Starke, FL. Google Earth image. This image taken 20 years after reclamation began.

Reclaimed phosphate mining area near White Springs Florida, March 2020 Google Earth image taken seven years after reclamation began. Land was previously forest, row crops, and wetlands. Forest regeneration is extremely poor.