



March 2, 2024

Hickman County Planning Commission  
114 N. Central Avenue, Suite 101  
Centerville, TN 37022

Re: Preliminary Plat Review of the Pinewood Surf Club

Dear Hickman County Planning Commission and Chairman Callicott:

In conjunction with the public hearing scheduled for March 5<sup>th</sup> on the proposed preliminary plat for the Pinewood Surf Club (PSC), the Harpeth Conservancy (HC) is writing to you with some concerns about this proposal to build a surf club and dense residential development along the Piney River in a predominantly agricultural area. HC is a science-based public interest conservation organization. Its mission is to restore and protect clean water and healthy ecosystems for rivers in Tennessee by employing scientific and policy expertise and collaborative relationships to develop, promote, and support broad community stewardship and action. Our team has extensive experience working on issues related to sewer treatment, water withdrawals, land use impacts, and flooding.

Having reviewed the materials submitted with the preliminary plat, our overarching assessment is that the applicant has provided insufficient details about how it will address drinking water, sewage treatment, and flooding at the site. Without these details, the preliminary plat doesn't satisfy the "Policy and Purpose" of the Commission's review: to ensure that land can be used "without danger of health, fire, flood, or other menace," that land "shall not be subdivided until proper provisions have been made for drainage, water, sewerage, other public utilities, and for other required public services," and that the regulations will "prevent the pollution of air, streams, and ponds" while "assur[ing] the adequacy of drainage facilities" and "safeguard[ing] the water table." (Hickman County Subdivision Regulation 1-104).<sup>1</sup>

1. Significant questions remain about drinking water and wastewater.

The subdivision regulations require the preliminary plat to include "[t]he following notations . . . for any lot where public sewer or water systems are not available . . . areas to be used for sewage disposal and their percolation results . . . [and] water wells (existing and proposed) . . . ." (Hickman County Subdivision Regulation 5-102.2(21)(d)(i)-(ii)). However, except for two notes on

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<sup>1</sup> Intense development and floodplain alteration in an area with little to no sewer or drinking water infrastructure will require a range of review and permitting by the State of Tennessee and its Department of Environment and Conservation (TDEC) and the Federal Emergency Management Agency (FEMA). State and federal permitting processes are often lengthy, and there is no guarantee of approval. Here, the applicant hasn't provided copies of any permit applications, though the Subdivision Regulations say that plats must comply with TDEC's rules, among other standards. Questions about the feasibility of providing sufficient sewer and water services to this development should be answered before approval. See (Hickman County Subdivision Regulation 4-101.1(4)).

the preliminary plat [C-2.1], the applicant doesn't address how a decentralized wastewater treatment system will function on the property (e.g., where a treatment pond would be located or where effluent might be sprayed) or how drinking water will be supplied (e.g., where private wells would be located).

*a) Decentralized sewage treatment requires site-specific analysis, which has not been provided.*

Over the years, HC has worked on issues related to decentralized wastewater systems with the Tennessee Department of Environment and Conservation (TDEC), local jurisdictions, and engineers; that work has covered various issues, including percolation rates, local planning approval processes, state permitting processes, and so forth. Through this experience, we are aware that decentralized sewer systems are regularly permitted by TDEC but also that TDEC requires detailed engineering before approval, including information about soil percolation or application rates for spray, storage of treated effluent, treatment of the raw sewage, delineation of the land used, and other significant design elements. Such information determines whether a proposal is "doable" and what standards apply. For example, sewer systems in flood-prone areas must be floodproofed and floodwaters prevented from infiltrating or for any discharge to floodwaters. E.g., (Hickman County Subdivision Regulation 4-1-107.2(2)).

Two obvious components of a decentralized sewerage treatment system are the treated effluent holding pond/lake and location of drip fields or spray fields. These components are not on the preliminary plat or construction plans. Similarly, the submitted material does not contain percolation studies or plans for where effluent will be sprayed or dripped. (Hickman County Subdivision Regulation 5-102.2(21)(d)(i)). Moreover, as of today, no application for a decentralized sewer system has been submitted to TDEC.

*b) Drinking water is a key consideration for any development, but its source isn't identified.*

The preliminary plat [C-2.1] says, "Subdivision to be serviced by local water utility provider or by private water treatment plant." The applicant does not seem to know how it will provide drinking water. Based on our experience, the Planning Commission should know sooner rather than later if there is a reliable water supply.

Local water utility supply: The concept of providing up to 700,000 gallons a day to the PSC was reported last year.<sup>2</sup> The report outlined a preliminary engineering study that stated a cost of \$25 million in drinking water line upgrades would be required and connections for water to be provided from the Water Authority of Dickson County and Bon Aqua-Lyles Utility District. The submittal does not indicate whether it is going to pursue this connection and, if so, for what percentage of its potable water needs.

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<sup>2</sup> *Water lines to surf park: \$24 million is estimate*, Hickman County Times (Aug. 14, 2023), <https://www.hickmancountytimes.com/edition/2023-08-14/#:~:text=Water%20lines%20to%20surf%20park%3A%20%2425%20million%20is%20estimate&text=Expansion%20of%20the%20water%20system,Club%20%E2%80%94%20is%20to%20be%20served.>

Private water supply: For the “private drinking water treatment plant” referenced on the plat, the applicant may be considering either groundwater wells, springs, or some combination. However, there are no water wells specified on the preliminary plat. (Hickman County Subdivision Regulation 5-102.2(21)(d)(ii)). Such wells would likely need to be located near the Piney River in the alluvial soil (what we understand to be the proposed golf course area). If there is both on-site water and sewer, additional requirements may be triggered. For example, if wells are located near land application of treated sewer effluent, the wells would need to be collared to prevent surface water contamination. Similarly, if any wells are in the floodplain, there are flood protection requirements to be met. (Hickman County Subdivision Regulation 4-106.1(4)).

In any event, the subdivision regulations were adopted “to safeguard the water table.” (Hickman County Subdivision Regulation 1-104(J)). Because the private water treatment plant does not have a specified source or proposed rate of withdrawal, the Planning Commission cannot yet interpret the level of risk to the water table.

One way to calculate risk could be to look at the estimated use of groundwater on the site compared to use of groundwater in Hickman County, more generally. We estimate that the number of wells that might be needed for the PSC to supply daily water usage is at least 11 wells.<sup>3</sup> We did a basic calculation of the number of wells that might be required to supply drinking water to this development and how that amount of groundwater usage compares to the rest of Hickman County.<sup>4</sup> Groundwater information from Hickman County (2015) indicates that the total water supplied from groundwater is 600,000 gallons per day: 470,000 gpd for domestic self-supplied wells and the remaining 130,000 gpd for irrigation purposes from wells. An estimate of the drinking water needs for the entire PSC property is 213,200 gpd,<sup>5</sup> which would equate to over 33% of all domestic groundwater withdrawals in Hickman County. Our assumption is that this water supply would all be coming from the shallow groundwater along the Piney River in one area. Notably, this calculation does not include water needed for on-site fire flow and minimum pressure requirements, which would require storage of an estimated additional 1–1.5 million gallons. On-site storage is not evident on the preliminary plat or construction plans.

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<sup>3</sup> This estimate is based on the average flow from wells in the county of 13 gallons per minute (calculated using TDEC’s water well database for wells drilled in Hickman County over the past 20 years), which equates to 18,720 gpd. Water well information based on TDEC water well database – Hickman County specific: (1) In the past 20 years, 601 wells have been drilled in Hickman County; (2) 12.99 gpm is average well flowrate for wells drilled in the past 20 years in Hickman County; (3) Of the 601 wells drilled in the last 20 years, only 83 of them had flow rates higher than 20 gpm; (4) 100 gpm is highest flow rate of wells in the county (4 wells at this flow rate). For a comparison, some of the highest well flow rates across the state can be as high as 7,000 or 8,000 gpm.

<sup>4</sup> See USGS, *Water Use Data for Tennessee*, [https://nwis.waterdata.usgs.gov/tn/nwis/water\\_use/](https://nwis.waterdata.usgs.gov/tn/nwis/water_use/).

<sup>5</sup> Tennessee residents average 80 gpd of domestic water use per capita. See USGS, *Public Supply and Domestic Water Use in the United States, 2015* (2017), <https://pubs.usgs.gov/of/2017/1131/ofr20171131.pdf>. The estimation of daily water usage for the PSC is based on assuming 335 lots with possibly 220 being condos at 2 dwellings units. Assuming 3 residents per dwelling unit with 555 maximum dwelling units = 1,665 people. Assuming 80 gpd of domestic water use per capita adds up to 133,200 gpd just for the estimated residential area, without accounting for the additional amenities. With 80,000 gpd for the clubhouse and surf lagoon (not the initial filling but the daily amount to maintain), the total is 213,200 gpd as an estimate. [220 of 335 lots could be condos (two dwelling units per lot); 220 x 2 dwellings x 3 residents per dwelling = 1,320 residents; 1,320 residents + (115 dwellings [remaining non-condo units] x 3 residents per dwelling) = 1,665 residents total].

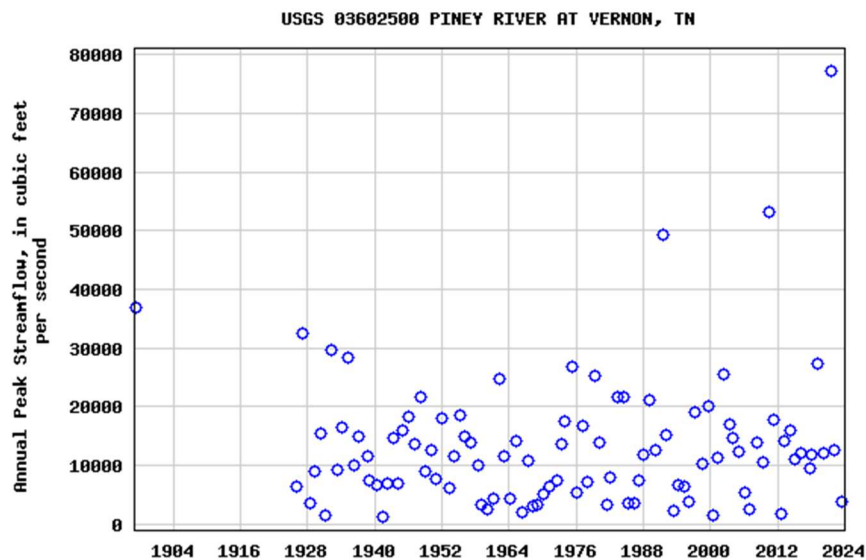
In addition to calculating the potential groundwater needs for a development of this scope, the Commission could think about protecting the water table in terms of whether activities could trigger sinkholes.<sup>6</sup> Likewise, to ensure that the decisions are made with full information, the Planning Commission could consider whether there are adverse impacts on the public water supply knowing that a utility withdrawals from the Piney River just downstream from the proposed PSC.

2. Because of the proposed subdivision’s location, flooding and alterations to the floodplain raise significant issues that have not been fully addressed.

a) *Floodplain analysis is outdated and insufficient.*

HC reviewed the applicant’s floodplain analysis memo and found several inadequacies.

Since the 2010 flood, the U.S. Army Corps of Engineers has undertaken efforts to improve communities’ ability to reduce flood and stormwater damage by updating floodplain maps, river flow statistics, models, and rainfall statistics. Considering recent severe flooding events, it’s no surprise that governmental agencies and communities appreciate the importance of updating flood statistics. Not all communities have updated flood maps yet, though. The current Federal Emergency Management Agency (FEMA) flood map for the Piney River is from 2008 and is only an approximate study based on data from the early 2000s. As such, this flood map fails to incorporate statistics from the two most severe floods on the Piney River in the past 100 years – floods of 2010 and 2021.



*Graph: Peak streamflow events per year along the Piney River. Floods in 2010 and 2021 were the largest flood events along the Piney River in the past 100 years.*

<sup>6</sup> We also find it concerning that, given the nature of geology in Hickman County, sinkholes could occur on the site (also referenced in the geotechnical study provided by the applicant) that could cause issues for neighboring water wells and surface water.

Thus, a critical need for the PSC application (and any dense development along the Piney or any other river) is for the flood models to be updated using the latest procedures outlined in the USGS Publication “Guidelines for Determining Flood Frequency using Bulletin 17C”. This process will incorporate the most recent and relevant flood data for the proposed site and ensure accurate floodplain areas and flood depths. For example, the magnitude of the 100-year flood for the Piney River in 2008 (most recent FEMA map), is closer to a 25-year flood after incorporating flow data through 2023. This would significantly underestimate the flood elevation along the Piney River and PSC, and it could lead to many issues such as incorrect flood mapping, insufficient elevation for bridges or other critical infrastructure, and future destruction of private and public property.

Additionally, the presented floodplain analysis memo provided by the applicant does not:

- Show the regulatory floodway to verify if requirements related to the floodway are being met (for example, “the floodway shall be preserved from any and all destruction or damage from clearing,” (Hickman County Subdivision Regulation 4-105.206));
- State if a hydrologic/flood model was done for Little Spring Creek which is where current floodwaters inundate a section of Pinewood Road in the vicinity of the entrances to PSC and potentially causing impassible conditions to residents trying to enter or leave the property during flood;
- State if a flow analysis was performed using the flow gage nearby on the Piney (USGS gage 03602500 at Vernon, TN with data going back to the 1920s) to update flow data for the model;
- Indicate if bridges are included in the flood model work submitted since bridges are not in the FEMA 2028 model (bridges can have a major impact on flood depths and, if not properly designed, can lead to unsafe and damaging conditions); and
- State how floodwaters on Pinewood Road (depth up to 4 feet estimated, see Map 3 in Appendix A) will be reduced or eliminated to address road safety and public safety.

*b) The Commission must ensure that the plat complies with the Subdivision Regulations for “flood prone” areas.*

Before approving the Preliminary Plat, the Commission must ensure that the applicant has satisfied certain provisions related to flooding. “The planning commission shall disapprove the subdivision of any land containing a flood prone area when the commission determines that the subdivision plans are not consistent with the policy stated in this section.” (Hickman County Subdivision Regulation 2-101.4). The stated policy directs the Commission to consider the overall purpose of the regulations, as well as:

- “The adequacy of proposed water supply, sanitation, and drainage systems, and the ability of these systems to function under flood conditions,” (2-101.4(3));
- “The safety of access to the property for emergency vehicles in times of flood,” (2-101.4(10));

- “The expected heights, duration, velocity, rate of rise, and sediment transport of the floodwaters expected at the site,” (2-101.4(11));
- “The costs of providing governmental services during and after flood conditions, including maintenance and repair of public utilities and facilities such as sewer, gas, electrical, and water systems, public ways, and bridges,” (2-101.4(12));
- “The effect of the proposed subdivision upon the planning commission’s participation in the National Flood Insurance Program, if such planning commission is, or elects to be, in the program,” (2-101.4(13)); and
- “Specific engineering studies are to be formulated, by the developer in those areas in which flood data are not currently available, if deemed necessary by the planning commission.” 2-101.4. The subdivider applicant is also directed to prepare a report on flooding under certain circumstances that include calculating water surface elevations and computing the floodway to avoid increasing flood heights by more than one foot. 2-103.2(1, 2). *See also* 5-102.2(11) (Preliminary Plat Features include “limits of floodway and floodway fringe areas” as determined by flood maps or studies as required); 5-103.2(12) (Construction Plans Features include requirement for developer to prepare specified information for the Planning Commission for “flood prone” areas).

c) *Public Safety Risk from flooding with increased residents:*

Flooding is the number #1 natural disaster in the United States.<sup>7</sup> The Planning Commission has an obligation to consider public safety from floods (Hickman County Subdivision Regulation 1-101(c)) and the costs of providing “governmental services during and after flood conditions, including maintenance and repair” such as for roads during the preliminary plat review (Hickman County Subdivision Regulation 2-104.4(2)(12)). An increasing issue with high density residential development proposals in areas with access roads that have flood water inundation is to consider the public risk and emergency response cost up front during preliminary plat review.

The issue of flood safety has not been fully addressed with this preliminary plat. According to the Federal NOAA National Weather Service *Turn Around, Don’t Drown* flood safety program: 6 inches of flood water will reach the bottom of most passenger vehicles and cause loss of control or stalling. A foot of floodwater will float most vehicles. Two feet of rushing water can carry away most vehicles.

The depth of the 100-year floodplain water on Pinewood Road is estimated to be 4 feet based on the 2008 FEMA flood map (*see* Map 3 in Appendix A). In reality, this depth will be higher and the best way to calculate that height (and determine flood risk) is to use the more appropriate/updated flood statistics. The risk of people being stranded or driving into floodwaters on the road with over 1,000 residents and guests in this flooding area is greatly increased. Of all flood fatalities over the past 11 years (2010-2022), “driving” was—by far—the most common activity victims were performing.<sup>8</sup> In addition, emergency vehicles can get

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<sup>7</sup> National Weather Service, Flood Safety Awareness Week--Turn Around Don't Drown [https://www.weather.gov/shv/awarenessweek\\_flood\\_tadd](https://www.weather.gov/shv/awarenessweek_flood_tadd). 2022.

<sup>8</sup> NWS Preliminary US Flood Fatality Statistics, <https://www.weather.gov/arx/usflood>, 2022.





cc: Dan Mecklenborg, county attorney  
Amanda Siegel, Emergency Management Director  
Robert Atkinson, Building/ADA Coordinator

### **Appendix A**

The August 21, 2021, flood that impacted the Piney River was part of the deadliest flood event to ever affect Middle Tennessee. The flood caused 20 deaths, 19 of which were in Waverly, Tennessee.<sup>12</sup> On the Piney in the exact vicinity of the proposed PSC, floodwaters shattered record flood heights and hit 31.8 feet compared to 20.08 feet set February 2019, according to NWS.



Pinewood Church of Christ in Hickman County on Saturday morning during the flood. *Submitted*



Aerial view of the Pinewood community along the Piney River in Hickman County. *Williamson County Sheriff's Office*

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The Pinewood Church of Christ (photo above) and other nearby buildings were heavily damaged from floodwaters. The floodwaters were approximately 9 feet over the Pinewood Road bridge.

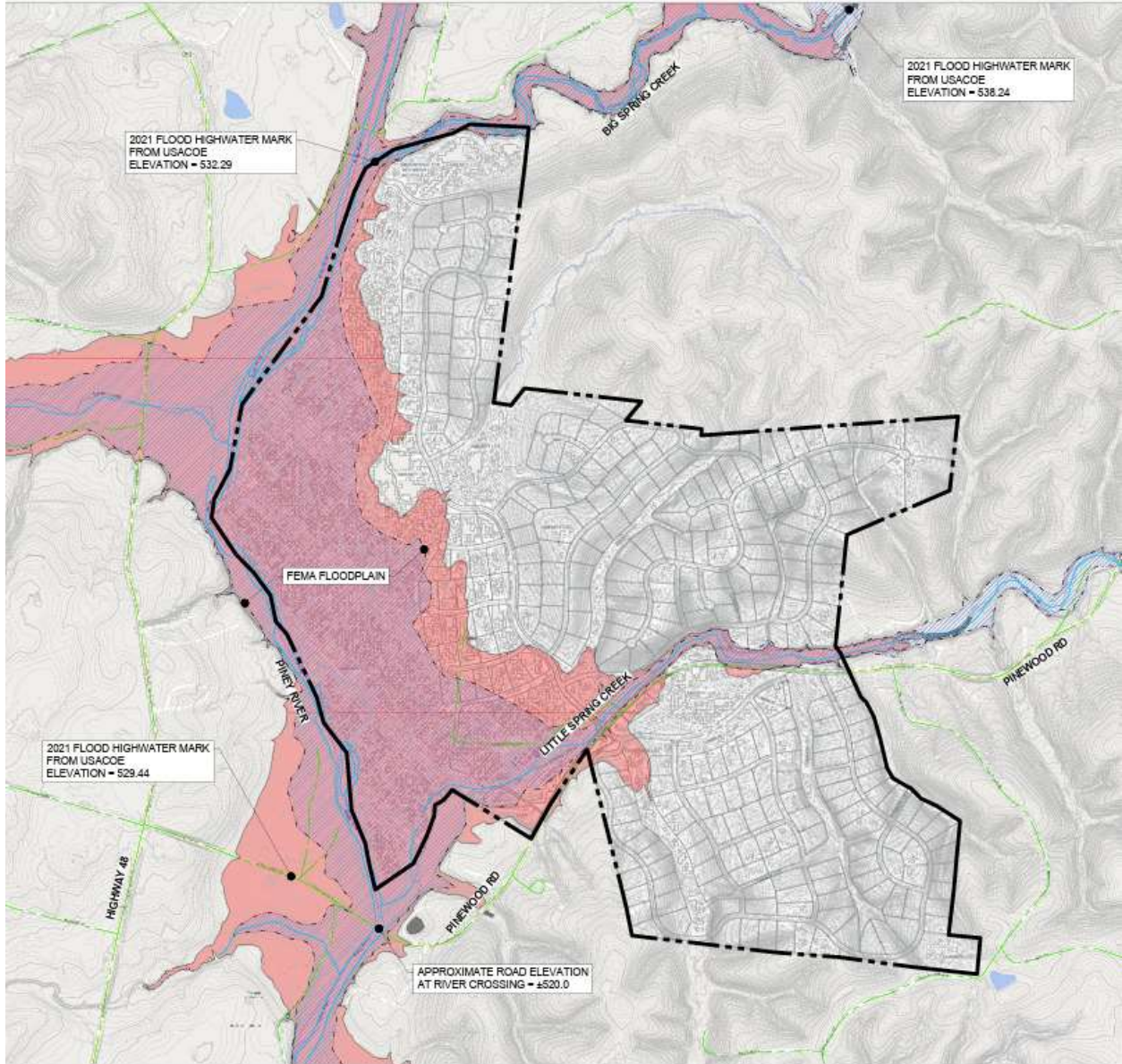
The extent of the 2021 flood was measured by the U.S. Army Corps of Engineers. The maps below show the estimated difference between the 2021 flood in red and the FEMA 2008 floodplain map in blue. The maps have measurements of floodwater depths at key areas such as on Pinewood Road bridge and along Pinewood Road where the proposed entrances are to the PSC.

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<sup>12</sup> National Weather Service, A StoryMap of the catastrophic flooding that impacted western Middle Tennessee, <https://storymaps.arcgis.com/stories/13b68e35b8fd48e0b0188f1645992b98>.

<sup>13</sup> Chris Gadd & Mike Christen, Hickman's Pinewood community rebuilding after flood: 'We will rally' The Tennessean (Aug. 27, 2021), <https://www.tennessean.com/story/news/local/dickson/2021/08/25/hickmans-pinewood-community-rebuilding-after-flood-we-rally/5579392001/>.



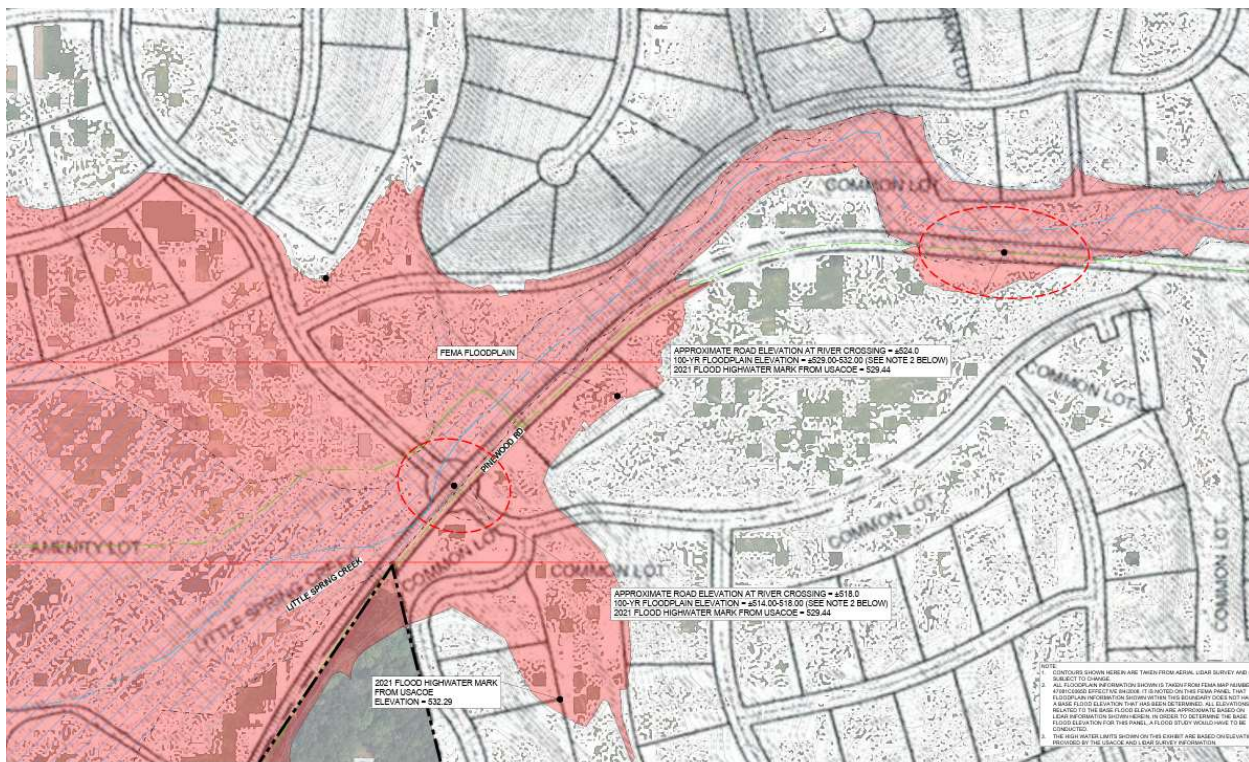


**Map 1:** Maps prepared by CDSG engineering off the sketch plat for Friends of the Piney. Red zone represents the 2021 flood based on flood measurements done by the Army Corp of Engineers. Blue, FEMA 2008 100-year floodplain.





**Map 2:** Close-up around Pinewood Road bridge crossing of Piney River.



**Map 3:** Close-up along Pinewood Road along Little Spring Creek. Showing 100-yr floodplain water inundating the road in one area and elevations at proposed new entrance.



PINWOOD SUBDIVISION  
EXHIBIT 4 - FLOODPLAIN BOUNDARY AT PROPOSED ENTRANCE ALONG LITTLE SPRING CREEK  
PK 234884881 | D:09.17.2023

