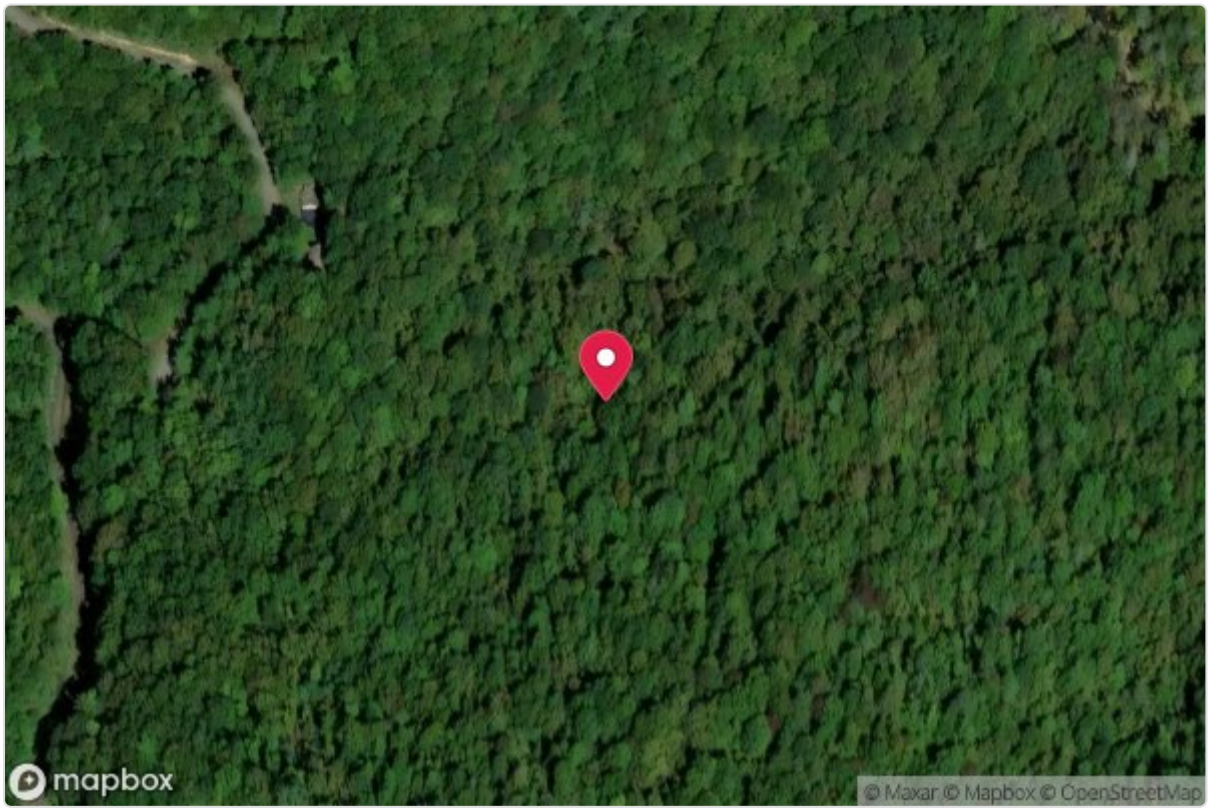
Charles Hill Production

36.381301, -81.905823 · 2026-07-27



Selected location — satellite view · 36.381301, -81.905823 · Satellite © Mapbox, © Maxar · © OpenStreetMap

PRELIMINARY HYDROGEOLOGICAL ASSESSMENT (AI-ASSISTED) — LOCATION PROSPECTIVITY FOR DRILLING A WELL

1. Basic location parameters

Parameter	Value
Coordinates	36.381301°, -81.905823°
Ground Elevation	781 m above sea level
Estimated Depth to Water Table	~151.3 m
Suggested Drilling Depth	~176.3 m
Distance to Erosion Base	468 m, river
Climate Zone	Humid temperate

2. Location prospectivity and expected yield

The analyzed site is classified as a **Favourable location** within a **karst terrain (pronounced morphology)**.

In hydrogeology, karst environments consist of soluble carbonate rocks (such as limestones and dolomites) where water flows through interconnected fractures, joints, and solution cavities. Because these rock structures generally feature high secondary permeability, the location offers **high prospectivity for well drilling**.

When a borehole successfully intersects an active water-bearing fracture or solution conduit, expected well yields can exceed **4 l/s (240 l/min, 63.4 GPM, 14.4 m^3/h)**.

Key Hydrogeological Risks & Considerations:

- **Significant Depth to Water:** The estimated static water table lies deep at approximately **151.3 m**. Drilling to the recommended depth of **176.3 m** requires heavy-duty drilling rigs equipped for deep bedrock penetration.
- **Subsurface Heterogeneity:** Karst aquifers are naturally irregular. While the regional bedrock is overall permeable, local deviations occur. If a borehole penetrates dense, massive rock between primary fracture paths, local yield can be significantly lower until a major water-bearing void is struck.

3. Regional experiences and local context

The target coordinates are situated in northeastern Tennessee (Appalachian / Blue Ridge transition zone). Regional hydrogeological studies confirm that carbonate bedrock formations (such as the Shady Dolomite and associated limestones) act as prominent regional aquifers.

Throughout this geographic region, groundwater movement is strongly governed by tectonic fracturing, jointing, and solution-enlarged bedding planes. Well yields in these geological formations are typically generous where boreholes strike open fracture networks. However, because groundwater flow is concentrated within discrete conduits rather than evenly distributed, production rates can vary depending on exact micro-location placement.

4. FINAL RECOMMENDATION

- **Prospectivity: Favourable.** The site exhibits strong potential for securing a reliable groundwater supply.
- **Drilling Depth Strategy:** Do **not** cease drilling as soon as the first water inflow is encountered around ~151 m. Continue drilling to the recommended depth of **~176.3 m**. This additional depth creates a necessary water column (~25 m) and pump placement sump, allowing safe dynamic drawdown during pumping so the well does not run dry during dry seasonal periods.
- **Contractor Advice:** Engage a licensed driller with expertise in deep rock/karst drilling who can perform air-lift yield testing during drilling to verify flow rates from struck fractures.

Disclaimer: This report provides a preliminary hydrogeological assessment based on regional geological data, surface elevations, and hydrological principles. Because direct visual observation of subterranean water conduits is impossible from the surface, localized geological variations remain possible. The final decision and risk regarding drilling rest entirely with the user.
