From looking at the gently rolling topography of North Central Texas one would not realize that the
geologic history of Texas is complex and somewhat violent.

About 1.2 billion years ago, fragments of continental crust, pushed together by plate tectonic motion,
formed a giant supercontinent (Rodinia). As this occurred portions of what would become Texas
collided with a piece of South America forming rock that occurs today at the surface in central Texas
(Llano Uplift) and to a lesser degree in west Texas. The best examples of this are exposed on the surface
near Inks Lake and Enchanted Rock in the Texas hill country. The next closest outcrop of rocks of the
same age is over a thousand miles northeast in Ontario and Quebec. This uplift is part of an ancient
system of rocks that in Texas is buried almost entirely beneath younger sedimentary strata. Erosion of
the younger surrounding strata has exposed portions of this system. The area is termed an “uplift” due to
the raised status of the rocks in comparison to adjacent strata. Evidence suggests that this early
supercontinent began to rift apart no later than 750 million years ago.

This rifting caused the crust to thin and subside. Over the next couple of hundred million years the
resulting transgression eventually covered all of Texas with a shallow sea. Initially, weathering
produced a beach or near shore environment that formed sand-stones. These sand-stones contain
abundant trilobite fossils. As the transgression progressed the resulting warm, shallow ocean caused
calcareous algae to thrive. Their accumulation in bottom sediments produced thick lime-stones. These
rocks were rich in algae-derived organic matter and today are an important source of oil and gas.
By approximately 300 million years ago North America had moved to near the equator and was uniting with other land masses to form another supercontinent (Pangea). As North America collided with South America and Africa the resulting uplift produced a vast mountain range. It stretched from Arkansas through Oklahoma, to Sherman, Dallas, and Austin to past San Antonio, and into Mexico. Today, remnants of the ancient Ouachita Mountain chain are exposed only in southwestern Arkansas, southeastern Oklahoma, and the Big Bend Region of Texas. Most of these ancient mountains were eroded and are now buried under younger rocks. To the west of these mountains basins formed creating shallow inland seas that were part of the vast Permian Ocean. Collectively these basins are known as the Permian Basin. Near the border of one of these seas a reef developed. Known today as the Capitan Reef, this massive complex formed an arc that stretched from west Texas through southeastern New Mexico. As the seas retreated, water trapped in the basins evaporated leaving salts behind. These basins eventually filled with sediment covering the salt beds and the reef complex. These deep sediments form the world-famous oil-bearing layers of West Texas.
About 220 million years ago Pangea began to break up. As the continents drifted apart a basin formed in East Texas. This basin filled with water forming a shallow sea that would eventually become the present-day Gulf of Mexico. For tens of millions of years this sea repeatedly advanced and retreated over much of Texas. It extended to the Big Bend area and at times through the middle of the continent all the way to the Arctic Ocean. The marine waters laid down a number of different layers; in North Texas all of these near the margin of an ocean that can be though of as a greatly expanded Gulf of Mexico. Limestone, marl, shale, and sand were deposited over the area depending on factors such as water depth and distance from the shore. As a result of these depositional processes, nearly all surface rocks in North Central Texas are of marine origin dating to about 80-100 million years ago.

Around 65-70 million years ago mountain building in the western United States began forming the Rockies. This was also a time of extensive volcanism in the Trans-Pecos area of Texas. As the inland seas retreated large river systems draining from the Rockies to the southeast produced deltas and alluvial fans that covered older sediments and extended the Gulf Coast shoreline. The millions of years of erosion that followed have removed much of this sand and gravel re-exposing the older deposits. Evidence of these alluvial deposits remains as the High Plains of the Texas panhandle. The eastern margin of this eroding plain is seen as a bluff, know as the Caprock Escarpment. The western edge of the plateau is known as the Mescalero Escarpment.
The most recent chapter in Texas’ natural history was the result of periods of recurring glaciation in North America. Although the continental glaciers never reached as far south as Texas, their presence had a dramatic affect upon the state’s climate. Generally conditions were cooler and moister. Evidence indicates that open woodlands extended across much of Texas with the High Plains region a grassland/savanna. The Gulf coast area was most likely a pine woodland.

Collin County is found within an ecological region known as the Blackland Prairie. The Blackland Prairie of Texas stretches from just south of the Red River in Grayson County to near San Antonio. It coincides almost exactly with a belt of outcropping marine bedrock that dips gently to the east. This outcropping produces one of the most prominent geologic features in Collin County, the White Rock Escarpment which runs through the western part of the county. This ridge of relatively resistant Austin Chalk was deposited about 90 to 85 MYA. Austin Chalk is also commonly seen in deep cut stream channels. Although extremely white, upon weathering it weathers to produces a thick, black, sticky soil that is found throughout the county. Topographically, the Blackland Prairie is a nearly level to gently rolling plain with elevations that range from about 300 to 800 feet. The Blackland Prairie of Texas has changed dramatically in the last 150 years. Early settlers upon arriving at its northern edge describe it as a vast expanse of tall grass and flowers. Trees were rare except along streams or in isolated groves on uplands that were protected from fire. Although initially used for grazing cattle, extensive farming began in the late 1800’s. Soils of the Blackland Prairie are incredibly rich and in a very short time most of the available land was put into cultivation. This resulted in the virtual destruction of the native prairie so that almost nothing of it remains today.