



L to R are examples of Subsidence Orleans Parish

## ASK-A-PRO SERIES: SUBSIDENCE AND GREEN INFRASTRUCTURE

**Q:** *I've seen some news stories about subsidence in Greater New Orleans. Sounds complicated. Can green infrastructure really reduce subsidence?*

**A:** Subsidence is complicated and can be the result of a number of conditions. Here we will discuss regional subsidence that occurs at different rates across the Greater New Orleans area. To be clear, green infrastructure cannot stop or reverse subsidence, but green infrastructure can have positive impacts with regard to localized subsidence. In particular, it can minimize settlement of the upper soils layers, which can improve the stability of our homes, roads, and utilities.

In our region, and particularly south of Lake Pontchartrain, three general types of soils can be found: clay, sand, and organic. Even among these many variations occur, but the characteristics of each of the general soil types is comparable. Clay soils are low in porosity, and dry out and shrink when water is drained out of the subsurface. When water returns to clay soils, they swell back in volume. Sandy soils maintain their volume whether wet or dry and are highly permeable. Organic soils have various levels of porosity, but are more porous than clay soils. When water is drained out of the soils, the organic material is exposed to oxygen, resulting in oxidation of the organics. This is a chemical process, which means that organic soils do not return to their original volume when water is added back again.

Groundwater levels keep subsurface soils saturated and can be compromised in two ways. Impervious surfaces, such as rooftops, roads, and parking lots prevent rainwater infiltration, which would occur in natural conditions (e.g., a field, or swamp). The second cause is our drainage systems in New Orleans that drain and pump rainwater out of urban areas, which is necessary to prevent flooding in many instances,

but these systems have also caused, to some degree, the depth of our groundwater to drop below natural levels. Subsidence is primarily caused by the loss of buoyancy of near-surface soils as groundwater lowers. This increases the weight of the near-surface soil and results in additional loading of the underlying soils (i.e., the near-surface soils become heavier). This new load compresses the underlying soils and results in subsidence. This is an inevitable consequence of area drainage and a constriction of our city existing at or below sea level.

Both conditions result in lowering the water table, even for only a period of time, which over many years has caused subsidence in New Orleans. Subsidence, consequently affects our walkways, roadways, underground utilities, building foundations, and other infrastructure.

We know that natural groundwater levels cannot return fully. However, green infrastructure can retard groundwater level declines. So it is important to allow as much rainwater as possible to infiltrate our soils, rather than pumping water into Lake Pontchartrain, and to also reduce the impervious surfaces we build at our homes and at our work places.

*Further reading:*

“Special report: How New Orleans is making a ‘serious problem’ worse with its levees, pumping stations”

<http://www.theneworleansadvocate.com/news/11707631-171/special-report-how-new-orleans>