

Sinking Land, Rising Seas

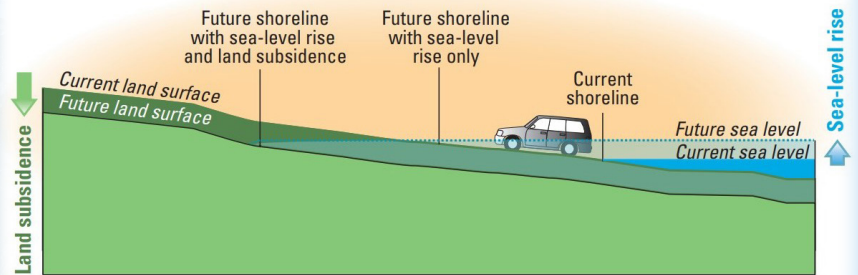
The Problem: Newport News is Sinking

Newport News, along with all of southeastern Virginia, is sinking faster than any other location on the East Coast of the United States.¹

Some of this **land subsidence**, or sinking of the land surface, is caused by deep earth processes which we have no control over; however, about half of the subsidence in this region is caused by **aquifer system compaction**.^{2,3,4,6}

Aquifer system compaction can occur when groundwater is extracted from an **aquifer**, which is an underground layer of rock or sediment containing water. As water is extracted, the water level in the aquifer drops, and the aquifer begins to compact under the weight of the rock and sediment above, causing the ground to sink at the surface.

Because the land surface in Newport News is sinking, sea level is effectively

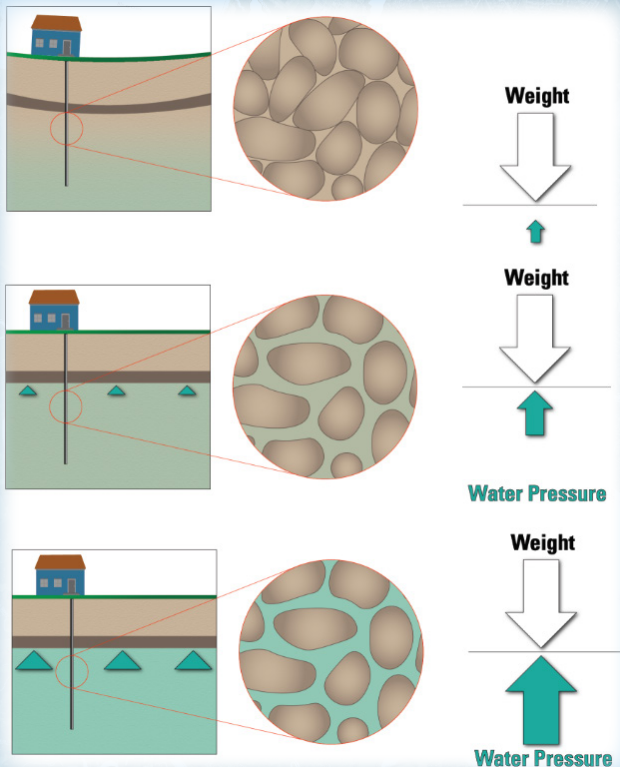


The Solution: Managed Aquifer Recharge

While groundwater extraction can cause aquifer compaction, groundwater recharge could cause the aquifer to expand, slowing rates of land subsidence.

The Sustainable Water Initiative for Tomorrow (SWIFT), powered by the Hampton Roads Sanitation District (HRSD), has the capacity to reduce the current rates of land subsidence through **managed aquifer recharge**.

Managed aquifer recharge is the controlled replenishment of treated water into an aquifer system. This process will begin at the James River SWIFT facility in 2026, with up to **16 million gallons** of water, treated to drinking water standards, replenished to the Potomac aquifer system per day. Research suggests that managed aquifer recharge in the Hampton Roads region could lead to increases in groundwater levels, which in turn could slow land subsidence, and by extension, relative sea level rise in this region.⁶



Measuring Success: The Newport News Land Motion Observatory

How successful will the SWIFT program be at slowing land subsidence and lessening the impacts of sea level rise? Have changes in groundwater levels led to changes in aquifer-system thickness, and if so, have these changes contributed to land subsidence? The only way to find out is by carefully monitoring the land surface in southeastern Virginia.

The U.S. Geological Survey, in partnership with and supported by the Hampton Roads Sanitation District, is currently installing a dual-stage extensometer at James River SWIFT, which will form a crucial part of the *Newport News Land Motion Observatory*.

This state-of-the-art facility will include 5 groundwater observation wells, 3 GPS stations, and 1 synthetic aperture radar corner reflector, in addition to the dual-stage extensometer. The Newport News extensometer will be the first dual-stage extensometer on the East Coast.

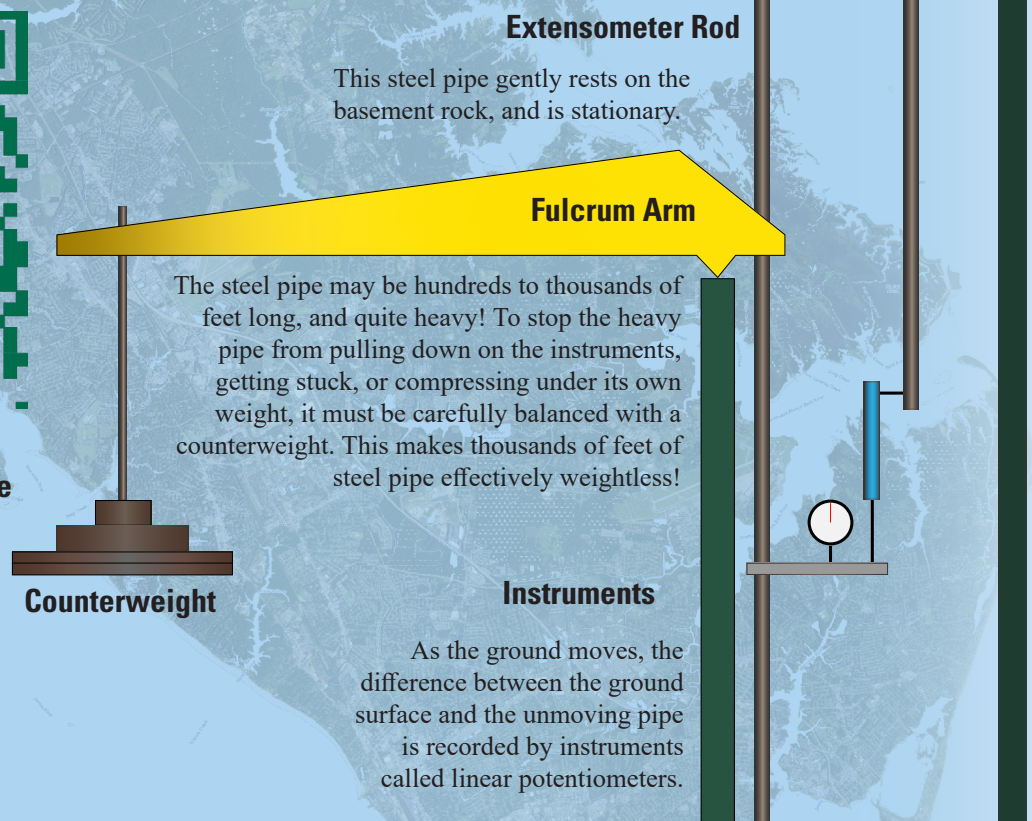
What's an Extensometer?

Extensometers are incredibly sensitive instruments that measure aquifer system compaction. Like an iceberg, most of an extensometer isn't visible because it's below the surface. The Newport News extensometer will be 1,389 feet deep, extending from the ground surface all the way through each below-ground aquifer and down to bedrock.

Extensometers are so sensitive that they can measure changes in land-surface elevation smaller than the thickness of a single piece of paper (like this one!)



Learn More at the USGS
Virginia Subsidence Website



References

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