

Ms. Wanda Washington
FOCUS
PO Box 28
Tallevast, FL 34270

Re: Localized settlement of the land surface within portion of the Tallevast neighborhood

Date November 3, 2020

Dear Ms. Washington,

At your request I recently met with you to inspect certain areas of the Tallevast neighborhood where unusual settlement of the land surface has been observed. Our inspection included several residential properties along 17th Street south of Tallevast Road just south of the Lockheed Martin Corporation (LMC) facility, and a property just north of your personal residence along 16th Street, on the north side of Tallevast Road. At one residence (7816 17th St.) I observed an area of shallow subsidence (est. 10-12 inches deep) along the south wall of the foundation of the home, extending across a portion of the adjoining side yard. This area measured approximately 500-600 square feet in size. The subsidence I observed had exposed and undercut a portion of the foundation of the home, leading to an attempt to underpin the exposed foundation with a concrete patch to prevent the structure from settling. Nearby areas of the property also had a "hummocky" appearance. Immediately to the east, across 17th Street (7813 17th St.) I again observed a similar shallow area of subsidence in the side yard, and also a deeper more-pronounced "sinkhole" like feature in the rear yard of the property. Based on our discussion at the time, I understand this latter depression has gradually grown in size and depth. Similarly, on another vacant property immediately adjoining and to the north of your home on 16th St. (7616 16th St), I observed a pronounced depression in the otherwise level land surface in the rear portion of the lot.

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In none of these three instances did I observe any conditions consistent with surface erosion from runoff that would explain the localized low areas of the properties. Rather, the conditions I observed are more consistent with localized areas of land subsidence. Based on our discussion I understand that settlement in these areas has been a gradual process over time, unlike what might be expected, for example, from the sudden collapse of a sinkhole. I note also that this area of Sarasota County does not have a geology favorable to sinkhole development, so it seems unlikely that the observed conditions would have been caused by natural sinkhole development.

I understand that these land subsidence conditions were first observed by residents in the community after pumping of ground water began within the Tallevast neighborhood by the Lockheed Martin Corporation (LMC) ground water remediation system. It is potentially noteworthy that the shallower ground water units (the USAS and the LSAS) are heavily pumped in the immediate area of these three properties, as they fall within the general region of ground water contamination that LMC is attempting to remedy with a pump and treat system.

Research published in the scientific literature and readily researchable on the internet has demonstrated there is sometimes a nexus between ground water pumping and land subsidence. When the pumping is in deep regional aquifers, this subsidence can cause a broad lowering of the ground elevation across large areas. Houston, TX is a good example of this type of condition. When the pumping is from shallower ground water units, particularly those that also contain finer grained, plastic soils, localized areas of settlement are possible, even in the absence of a broader ground subsidence. Pumping of ground water systems lowers the pore pressure within the soils that comprise an aquifer zone. As a result, a greater portion of the weight of the overlying soils is transferred to the skeleton of the soil matrix, a condition that can cause gradual consolidation of the soil material, leading to land subsidence. This condition is most pronounced in finer-grained, more-plastic soils such as clays and sandy clays.

There is no question that the wide-scale pumping of shallow ground water in the Tallevast community has lowered shallow ground water levels to some degree. Some of the ground water records I have reviewed, for example, indicate that the water levels near the base of the USAS are being lowered by 10 feet or more by the pumping system, in comparison to what likely would exist in the absence of pumping. Soils in the lower portion of the USAS are generally more clayey than those found near the ground surface. It is potentially also noteworthy that there are shallow pumping wells operating within relative proximity of those properties where you were able to show me examples of the localized land subsidence conditions. Such evidence is at the least circumstantial in suggesting there could be a nexus between the land subsidence in the community and the operation of the LMC remediation system.

One piece of before (pumping) and after information that might be useful in examining this issue further would be a comparison of the reference elevations of the monitoring well network in these areas to see if there is a pattern of lower Top-of-Casing elevations in wells that were built before the remediation system began operation, as compared to the elevations of the same casing as measured today. If a pattern of lower wells casing in the USAS over time is found, even if only in localized areas nearest the actual pumping wells, this would more directly demonstrate that pumping is likely to have caused these local subsidence areas. It strikes that a resurvey of the USAS and LSAS monitoring and remediation wells within these areas that LMC is actively pumping would be a relatively low cost next step to further investigate this concern, and I would recommend that LMC and the FDEP move forward with this investigation.

In so far as a remedy for these conditions might be considered in the future, it is unfortunate that land subsidence is largely an irreversible process. Even with a cessation of pumping, these localized lowered areas will likely remain in the future. To the degree this creates concerns for standing water or wet conditions in the yards, this could be remedied by placement of new fill in the low areas and reseeded to restore proper drainage. Any additional concerns with the stability

of the homes or other structures on the affected properties would need to be addressed by a case-by-case evaluation of the need for foundation and subsurface utility (water and sewer line) stabilization.

Please call me if you want to discuss my thoughts on this issue further.

Very truly yours,

A handwritten signature in black ink that reads "Robert L Powell". The signature is written in a cursive style with a large, sweeping initial "R".

Robert L Powell, PhD, PE
Principal