

Will bogs keep eating Seattle homes?

City aims to stem damage from wetlands; Greenwood man wages his own battle

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Joshua Trujillo / seattlepi.com

Alan Smith looks at the foundation in the crawl space of his Greenwood home on Tuesday. His home and part of the neighborhood were built on top of a peat bog that is slowly draining and sinking. The sinking earth has left the foundation of his home above ground, resting on piles.

The ground is sinking around Alan Smith's Greenwood home.

The dirt at the bottom of his basement has dropped nearly two feet since the Palatine Avenue North house was built in 2001, half of it in the five years Smith and his family have lived there. He spends a lot of his free time trying to protect the structure, but it's not easy. Gas and water lines have been bent by the ground drops and the top of his fence is no longer straight.

"It's going to keep happening unless I do something about it," said Smith, who has been realigning his downspouts, reinforcing his front steps and getting ready to dig a trench around his home so he can install boards to protect his foundation.

Smith isn't alone. Years of development and diverting of groundwater from the giant Greenwood peat bog have led to sinking and damaged buildings, cracked and collapsed streets and sidewalks and leaning utility poles as the draining away of underground water allowed peat to compress and ground levels to drop.

It may be too late to help Smith and his neighbors, but the city says it's trying to prevent more draining of bogs and settling of ground across Seattle. (Click [here](#) for a city-wide bog map).ⁱ

One of the first tests of its recent regulations will be the proposed expansion of a Fred Meyer store about two blocks from Smith's home.

The company wants to build a bigger store on Northwest 85th Street, part of it below ground in a neighborhood known for spongy, watery soil. It has applied to the city for the necessary permits. A hearing on the proposal is expected before the city Design Review Board in March. Neighbors like Smith, who suspect other recent developments may have added to the settlement problem, will be watching.

Bogged down by bogs

Peat bogs are accumulations of partially-decayed organic plant matter that form in wetlands, and there are dozens of them in hilly Seattle where glaciers left a series of basins where the material could collect. Many of the areas were drained and filled to make way for early development.

Greenwood isn't the only neighborhood with bogs but its history inspired stricter development rules. Neighbors like Diann Knezovich said their homes sustained damage after new apartments, a drugstore and a supermarket were built along Greenwood Avenue and began diverting underground water.

In Knezovich's case it started when a big sinkhole developed in her back yard during supermarket construction. Other parts of her yard began sinking, too, and **eventually she and her husband spent \$25,000** to anchor their home foundation to firmer subsurface soils.

Knezovich was convinced construction of the new Safeway store less than a block away was a cause, because the work dug into a spring that had to be diverted. City officials can't say what developments led to the most recent settling and Safeway spokeswoman Cherie Meyers said her company wouldn't have known about the spring before construction started.

"We don't mislead" anyone, Myers said. But Knezovich and others kept the issue alive and the city eventually was convinced to examine the issue.

"We've had gas lines break because the sidewalk sunk," said Carol Watt, manager of the Baranof Restaurant on Greenwood Avenue. "My basement's sunk 18 inches."

A 2004 report by consultants Shannon & Wilson said settlement had been documented since 1958 and resulted from diversion of groundwater, blaming it on growth of impervious surfaces like roofs and parking lots, installation of storm sewers. It said groundwater removal "should be avoided where settlement could impact structures, utilities, roadways and other improvements."

Once the report was finished, the city began mapping other known bogs and revising requirements for new structures built in them. It developed a 2008 map of **26 areas where peat**

bogs would settle if water was removed from them, and added those as environmentally-critical areas to be protected by developers.

The map includes the Greenwood bog, which supplies water to Pipers Creek and a four-block-long area in the Westwood-Roxhill neighborhood that includes the headwaters of Longfellow Creek. Another major bog is near Union Bay at the University of Washington, where peat deposits are 50 feet deep.

Other settlement-prone bogs, according to the map, are located in smaller locations as far north as Lake City and Matthew's Beach, to the south in Rainier Beach and Coleman Park and to the west at Alki Beach.

"It became very evident that Greenwood was an exemplary issue," Staley said. "It was not a unique condition" confined to that neighborhood.

Builders are given several options to meet the requirement, such as eliminating basements or building water-tight ones, providing for re-introduction of water into the ground or using permeable surfaces that allow water to soak back below the surface.

"The issue is when you lower the groundwater table it could result in settlement," said Brennon Staley, the city planner who helped lead the bog-regulation move. The hope with the new rules is to make sure "we're not going to see really serious settlement continue that is going to threaten people or buildings," he said.

Staley confirmed that its own liability -- for issuing building permits in an area of possible structural damage -- also spurred the city to changes its rules. He said building codes insures new buildings are structurally sound but "we felt we had an obligation to insure that adjacent properties (to a settling structure) were not damaged."

Asked about the cause of the ground settlement, however, Staley said not enough is known about the movement of underground water through the neighborhood to say which construction project caused the most recent problems.

"During review of the Safeway, the hydrology of the area was not clearly known, nor did we have the peat bog development standards that we have in place today," said Bryan Stevens, a city spokesman. "It's difficult to point to just a few projects as the reason for settlement..."

In addition to the recent new development rules the city also said it plans to inspect and clean out perforated catch basins in the neighborhood to keep water flowing into the ground, and may consider other methods for accomplishing this.

While some are glad the city has acted, they're watching to see how well the new law will work. Kate Martin, a former community council leader still monitoring the issue, said the new rules apply just to the biggest projects and don't include smaller ones that also could contribute to settling. She said it also allows re-mapping of bogs on sites where projects over 50,000 square

feet are built, and worries she worries that the rules won't apply to projects outside mapped bog areas that could, nonetheless, also cause problems.

Staley, also at the city, said re-drawing bog boundaries for big projects will let the city better determine how far from a bog a new building can safely be built. He said officials can use state-environmental policy requirements to evaluate smaller project near bogs cases by case -- "an appropriate compromise."

Greenwood residents like Smith and Knezovich are glad the city acted but said it may be too late to help Greenwood. They've heard expert say **once water is removed from a bog and the soil compresses the damage is done.**

"I'm glad that they did it but on the other hand we're probably sitting here on something we can never get out of," said Knezovich, who said she gave up the regulation battle years ago because she felt ignored at the time. "I really feel it's a day late and a dollar short."

Watt, at the restaurant, said it boils down to how well the city enforces the protections. "This is a fine time to do this, now that the open space is filled up (in the neighborhood)," she said. "Why didn't they think of it before? I think it all comes down to the engineers and the building-permit person, don't you?"

ⁱ Mapping

- Peat Settlement-prone Areas Detail Maps (September 2007): These 26 maps delineate the extent of regulated areas at a detailed scale.

(NOTE: Parcels greater than 50,000 square feet may request a parcel-specific delineation of the peat settlement-prone area boundary on the parcel. Consequently, the regulated area on these parcels may be smaller than noted on the detail maps.)

- [Map A1: Greenwood](#)
- [Map A2: Licton Springs/Northgate](#)
- [Map A3: Lake City](#)
- [Map A4: Dahl Playfield and Surroundings](#)
- [Map A5: Matthew's Beach](#)
- [Map A6: Warren G. Magnuson Park](#)
- [Map A7: I-5 and 50th Street NE](#)
- [Map A8: North Union Bay/University](#)
- [Map A9: Portage Bay](#)
- [Map A10: South Union Bay/Arboretum](#)
- [Map A11: South Lake Union](#)
- [Map A12: Madison Valley](#)
- [Map A13: Pioneer Square](#)
- [Map A14: I-90 Bend](#)
- [Map A15: Alki](#)

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- [Map A16: SW Manning Street and 35th Avenue SW](#)
 - [Map A17: South Beacon Hill](#)
 - [Map A18: Colman Park](#)
 - [Map A19: Genesee Park](#)
 - [Map A20: West Seattle Junction](#)
 - [Map A21: Lakewood/Seward Park](#)
 - [Map A22: MLK Jr Way S and S Graham Street](#)
 - [Map A23: S Myrtle Street and Beacon Ave South](#)
 - [Map A24: Westwood/Roxhill](#)
 - [Map A25: South Park](#)
 - [Map A26: Rainier Beach](#)