PROPOSAL

DEVELOPMENT OF A LAND SUBSIDENCE MONITORING PLAN, HAMPTON ROADS PLANNING DISTRICT

Prepared By:	U.S. Geological Survey – Virginia Water Science Center (USGS-VWSC)
Cooperator:	Hampton Roads Planning District Commission (HRPDC)
Project Period:	January 1, 2014 to October 2014
Cost:	Total – $86,000: HRPDC - $50,000 + USGS - $36,000

Problem

Land subsidence contributes to rising water levels in the Hampton Roads Planning District (HRPD)[1]. Since 1930, relative sea-level has risen 14.5 inches in the HRPD, the highest rate on the US Atlantic Coast[2]. More than half of relative sea-level rise in the HRPD is attributable to land subsidence[1]. Land subsidence in the HRPD can be at least partly controlled or mitigated if land subsidence patterns and rates are better known and resources managed appropriately. But very little subsidence monitoring has taken place over the past 20 years in the HRPD. This proposed study will determine the best options for subsidence monitoring and estimate costs and requirements.

Objectives

Objectives of the study are to describe land subsidence monitoring options and produce a ranked list of options with associated costs that Hampton Roads Planning District Commission can use to guide decisions about investment in land subsidence monitoring.

1. Describe available techniques and methods for measuring land subsidence in the HRPD
2. Inventory existing monitoring data, infrastructure, and ongoing data collection efforts
3. Organize meetings of a stakeholder group of public officials and scientists
4. Develop a matrix ranking monitoring options according to data needs
5. Develop cost estimates for the most promising monitoring options

Workplan and Schedule

The workplan consists of 5 work components to be completed over a 10 month period (Table 1).

1. Describe techniques and methods for measuring land subsidence - Various methods are available to measure land subsidence, each producing different data and having different benefits, costs, and uncertainties. These methods will be described in terms of their capability to meet HRPDC needs.
2. Inventory existing monitoring activities, infrastructure, and data - A USGS expert (Michelle Sneed) will be flown from California to HRPD to assess two abandoned extensometers for possible rehabilitation. Benchmarks from a 1970s geodetic survey will be field scouted to assess suitability for a resurvey. InSAR satellite data availability and processing errors will be assessed.
3. Organize stakeholder advisory group - A stakeholder advisory group will be organized to aid communication between scientists and public officials who will use the subsidence data. Officials will learn about subsidence monitoring and scientists will learn about public use of subsidence data.
4. Rank monitoring options according to data needs – Rankings will be developed in coordination with the stakeholder group to guide future decisions about investment in subsidence monitoring.
5. Estimate monitoring option costs – Preliminary scopes of work and preliminary budgets will be developed for each of the monitoring options.

Table 1. Schedule

Work Component	Month									
	1	2	3	4	5	6	7	8	9	10
1: Describe Methods										
2: Inventory Activities, Data, and Infrastructure										
3: Stakeholder Group										
4: Rank Options According to Need										
5: Estimate Costs										
6: Prepare Information Product and Present Results										

Products

Findings from the study will be presented to the HRPDC and also compiled in a general information product. The information product will be reviewed by HRPDC and USGS prior to final drafting and will contain at a minimum:

- Descriptions of stakeholder group discussion about how subsidence monitoring data will or could be used to guide policy decisions.
- Listing of available land subsidence monitoring methods, including description of past and current use in the Hampton Roads Planning District, the types of data each produces, and their suitability for future use.
- Ranking of each land subsidence monitoring method and associated cost estimates

Budget

The budgeted cost is $86,000, with HRPDC contributing $50,000 and USGS $36,000 (subject to availability). The majority of the budget pays for the time of a hydrologist and the remainder pays for travel and field work costs.

Category	Cost	
Travel	$	14,500
Personnel	$	67,500
Science Support	$	4,000
Total	$	86,000

References Cited

1) Eggleston, Jack, and Pope, Jason, 2013, Land subsidence and relative sea-level rise in the southern Chesapeake Bay region: U.S. Geological Survey Circular 1392, 30 p., http://dx.doi.org/10.3133/cir1392.

2) Thieler, ER, and Hammar-Klose, ES, 1999, National assessment of coastal vulnerability to sea-level rise; U.S. Atlantic Coast, USGS Open-File Report 99-593.