**Attachment 1A**
**JOINT MEETING SUMMARY**
**DIRECTORS OF UTILITIES COMMITTEE**
**DIRECTORS OF HEALTH**
**December 1, 2010**
**HRPDC - Chesapeake**

1. **Summary of November 3, 2010 Meeting of the Directors of Utilities Committee**

   The Summary of the November 3, 2010 meeting of the Directors of Utilities Committee was approved.

2. **Summary of the June 2, 2010 Joint Meeting of the Directors of Utilities Committee and Health Directors**

   The summary of the June 2, 2010 joint meeting of the Directors of Utilities Committee and Health Directors was approved.

3. **VDH Regulatory Update**

   Mr. Dan Horne, VDH, briefed the group with a state and federal legislative update on items pertaining to drinking water and water utilities. Items discussed include:
   - EPA approved VDH's Arsenic rule on November 8, 2010 granting VDH primary enforcement responsibility. EPA granted VDH interim primacy on rules for Long Term 2 Enhanced Surface Water Treatment Rule and Stage 2 Disinfectants/Disinfection By-Products Rule on November 16, 2010. VDH's draft Groundwater Rule is currently under EPA Review.
   - EPA Revised Total Coliform Rule
   - Expansion of Eastern Virginia Groundwater Management Area
   - Ground Water Withdrawal Regulations
   - Biosolids
   - Water Reuse

   Handout from Mr. Horne attached.

   Mr. Dan Dietrich, VDH, briefed the group on EPA's current efforts to revise recreational water quality standards.

   Presentation from Mr. Dietrich attached.

   **ACTION:** No action taken.

4. **HRSD Program Update**

Mr. Jay Bernas and Mr. Bruce Husselbee, HRSD, provided an update on current programs, including HRSD's Capital Improvements Plan, GIS/Envista resources, and the training program for construction inspectors.

Presentation from Mr. Bernas and Mr. Husselbee attached.

**ACTION:** No action taken.

5. **Staff Reports**

A. Capacity Team Update: The Committee was briefed on the Capacity Team efforts to develop sewer system rehabilitation guidelines to ensure consistent efforts across the various localities.

B. Urban Areas Security Initiative (UASI) Grant Update: HRPDC staff indicated that funds were allocated for the UASI grant for the Water Supply Assessment and Emergency Response Training project, and staff will begin drafting the RFP. The draft RFP will be sent to the Committee for review.

C. Groundwater Program Update: HRPDC staff consulted with DEQ. The agency expects to use the new Virginia Coastal Plain groundwater model for permit evaluations after the regulations are updated. Staff also discussed the potential for an HRPDC-DEQ cost sharing project to fund additional USGS modeling work. Further discussion with DEQ is pending.

D. Regional Water Supply Plan: HRPDC staff will distribute for Committee review the first draft section of the Regional Water Supply Plan. Staff indicated that work is continuing on schedule and the consultant's tasks are anticipated to be completed by the end of 2010.

E. Infiltration and Inflow (I/I) Ordinance Brief to HRPDC: Regarding the private sewer system infiltration and inflow (I/I) abatement program, the Committee agreed that the Capacity Team should discuss the potential for addressing private-side I/I by applying HRSD's "enabling act," which allows HRSD to access private property. Following consideration by the Capacity Team, a brief should be prepared for review by the Directors of Utilities Committee prior to presentation to HRPDC, tentatively in March 2011.

6. **Roundtable Discussion**

The Committee roundtable discussion included mosquito abatement and alternative onsite sewage (AOSS) disposal regulations. Newport News indicated receiving criticism for mosquito spraying from a few individuals and an environmental group. The health directors recommended that consistent use of data-driven, evidence-based mechanisms

to mitigate risk of mosquito-borne diseases remains in the best interest of public health. As for AOSS disposal regulations, the Committee discussed the key components of the proposed final AOSS regulations, and the Committee noted the change that localities cannot prohibit AOSS under the new rules, that existing system repairs and new system installation costs will increase, and that development of rural areas may increase.

**ACTION:** No action taken.

7. **FY 2012 Budget**

The HRPDC staff discussed the proposed water and wastewater budgets for next year. The Committee directed HRPDC to develop budgets to accommodate a potential 5% reduction.

**ACTION:** HRPDC will distribute a revised budget to the Committees for review.

Committee Meeting Sign-In Sheet

| Locality/Agency | Representative | Representative | Representative | Representative |
|---|---|---|---|---|
| HRSD | Jay Bernas | Bruce Husselbee | Ted Henifin | |
| Chesapeake | Jim Walski | | | |
| Franklin | | | | |
| Gloucester | | | | |
| Hampton | | | | |
| Isle of Wight | | | | |
| James City County | Larry Foster | | | |
| Newport News | Eileen Leininger | Joe Du Rant | Reed Fowler | Everett Skipper |
| Norfolk | | | | |
| Poquoson | Bob Speechley | | | |
| Portsmouth | Bryan Foster | | | |
| Smithfield | | | | |
| Southampton | | | | |
| Suffolk | Craig Ziesemer | | | |
| Surry | John Edwards | | | |
| Virginia Beach | Tom Leahy | | | |
| Williamsburg | | | | |
| Windsor | | | | |
| York | | | | |
| HRPDC | Jennifer Tribo | Whitney Katchmark | John Carlock | Tiffany Smith |
| New Kent | | | | |
| DEQ | | | | |
| EPA | | | | |
| USGS | | | | |
| VDH | David Trump | Venita Owens | Erin Sutton | John Schellenberg |
| VDH | Agnes Flemming | Jay Duell | Nancy Welch | Dan Dietrich |
| VDH | Dan Horne | | | |
| AECOM | Gary Heisler | Peter Oram | | |
| AquaLaw | | | | |
| Brown & Caldwell | | | | |
| CH2M-Hill | | | | |
| Christian Barton | | | | |
| Hurt & Proffitt, Inc. | W. Page Cockrell | | | |
| McGuire Woods | | | | |
| Troutman Sanders | | | | |
| URS | | | | |

# VDH – Office of Drinking Water
# Update Items for HRPDC Meeting
# 1 Dec 2010

1. **Regulations Status Update**
   - **Arsenic – primacy granted 8 Nov 2010**
   - **Long Term 2 Enhanced Surface Water Treatment Rule – interim primacy granted 16 Nov 2010**
   - **Stage 2 Disinfectants/Disinfection By-Products Rule – interim primacy granted 16 Nov 2010**
   - **Ground Water Rule being implemented – regulations drafted, currently under review by EPA**
   - **What's coming from Feds?**
     - **Revised Total Coliform Rule – proposal published 14 July 2010**

2. **DEQ Regulations**
   - **Expansion of the Eastern Virginia Groundwater Management Area**
     - **NOIRA stage completed (published 6 July 2009)**
     - **Proposed amendments prepared, under review at Governor's Office**
     - **Next step will be publication of proposed amendments in *Virginia Register*, followed by public comment & public hearing**
   - **Ground Water Withdrawal Regulations**
     - **NOIRA stage completed (published 6 July 2009)**
     - **Proposed amendments prepared, under review at Governor's Office**
     - **Next step will be publication of proposed amendments in *Virginia Register*, followed by public comment & public hearing**
   - **Biosolids (amendment to reflect move from VDH to DEQ)**
     - **NOIRA stage complete (published 23 June 2008)**
     - **Proposed amendments prepared, under review at Governor's Office**
     - **Next step will be publication of proposed amendments in *Virginia Register*, followed by public comment & public hearing**
   - **Water Reuse**
     - **NOIRA has been prepared, is under review at Secretary's Office**
     - **Next step will be review at Governor's Office**
     - **22 items specifically identified as potential amendments – "Other amendments…may be considered…based on comments received in response to NOIRA or discussions of the regulatory advisory panel (RAP)."**

# Recreational Water Quality Criteria Update

Dan Dietrich, MS
Beach Monitoring Program Coordinator



## Background

EPA directed to

- Review recreational water quality standard
- Evaluate water quality and illness
- Evaluate "rapid methods"

Epi studies in Great Lakes, Gulf of Mexico, California, and Atlantic—illness rates seem to match initial studies

Rapid methods—Previously, EPA had not come forward with a preference. It now seems that the method will be qPCR

Question was, will qPCR relate to illness. Answer seems to be yes

## October 2010

- EPA is finalizing epidemiology results
- It appears qPCR (rapid methods) is a suitable method
- It appears criteria numbers will remain the same
- At present, EPA is not considering bacteria source

EPA reports are scheduled to come in Dec. 15, 2010

EPA evaluated sources with qPCR methods—

Found that sources other-than-human were difficult to isolate (cross reactions, interference, portion human, etc)

Could not readily determine risk of illness from these sources

Not anticipating any "discounting" of these sources from criteria



## Up and Coming:

- Criteria 2012
- Implementation 2013
- EPA modeling tools
- US Congress determination of "rapid method" definition (ranges between 2-6 hours)

EPA is scheduled to put out their rec water criteria in October, 2012. Before that, there will be a comment period in the fall of 2011

States are expected to use the criteria starting in 2013

EPA is working on modeling tools that may aid in forecasting or site-specific criteria development

EPA is not able to increase funding or define the "rapid" part of "rapid methods." Congress will need to do that.

## Considerations

- EPA is considering states' concerns
- Some flexibility envisioned
- Laboratory costs and personnel requirements

EPA has been surprisingly engaged with states and appear to be listening to concerns.

EPA worked to clarify "rapid method" of 2-6 hours "once the sample made it to the lab."

EPA anticipates leaving current "site specific standards" options open to states, some flexibility in implementation, and consideration of approving new methods as they arise

Sample collection techniques will be the same-–analysis will be very different

Molecular techniques more expensive (at least initially) than microbiology-petri dish methods

Personnel will need to be trained and/or able to run qPCR



## Questions?

HRSD's Update to the
Director of Utilities Committee

December 1, 2010

## Outline

- Capital Improvement Program (CIP)
- GIS/Envista
- Construction Inspection Program



## FY2011 to FY2020 Capital Improvement Program

- CIP is a plan, not an approval of funds
- Ten-year program
- 187 projects
- Total est. cost = $1.45 billion
- FY2011 to FY2020 est. cost = $1.1 billion
- Decision analysis method for CIP prioritization



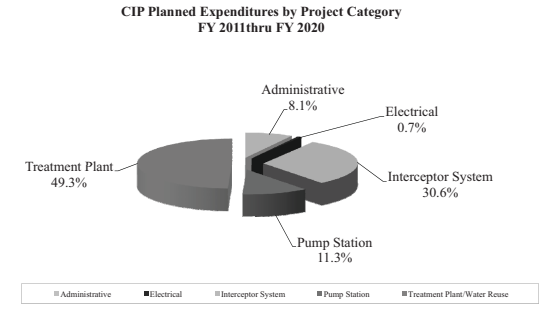
## HRSD's Nutrient Reduction Program

- In 2006, Waste Load Allocations (WLAs) were assigned
- Deadline – 2011

Total Capital Expenditures = $250 M
WQIF Grant Reimbursements = $ 75 M*
HRSD Expenditures = $175 M



## Projects by Category






## Typical CIP Summary

## CIP by Jurisdiction

**CAPITAL IMPROVEMENT PROGRAM**
**FY 2011 TO FY 2020**
**CIP Jurisdiction Summary**

| Virginia Beach | | Project Status |
|---|---|---|
| AT-107-2A | East Princess Anne Trunk Force Main Reinforcement (VDOT 0165-134-V05) | Design |
| AT-107-2B | East Princess Anne Trunk Force Main Reinforcement (VDOT 0165-134-108) | Design |
| AT-108 | Eastern Branch Sections A & B, Green Run Section C, and 24-Inch Kempsville Road Force Main Replacements | Construction |
| AT-112 | Hilltop Point O'Woods Interceptor Force Main Replacement - Phase I & II | Construction |
| AT-114 | Providence Road Pressure Reducing Station Modifications | Proposed |
| AT-115 | Shipps Corner Pressure Reducing Station Modifications | Proposed |
| AT-117 | Arctic Ave Pump Station Environmental Assessment and Improvements | Study |
| AT-118 | Kempsville Road Interceptor Force Main Replacement - Phase I | Proposed |
| AT-120 | Atlantic Treatment Plant Administration Building Renovation and Expansion | Proposed |
| AT-121 | Atlantic Treatment Plant Secondary Clarifier Renovation | Proposed |
| AT-122 | Atlantic Treatment Plant Digester Gas Combined Heat and Power | Design |

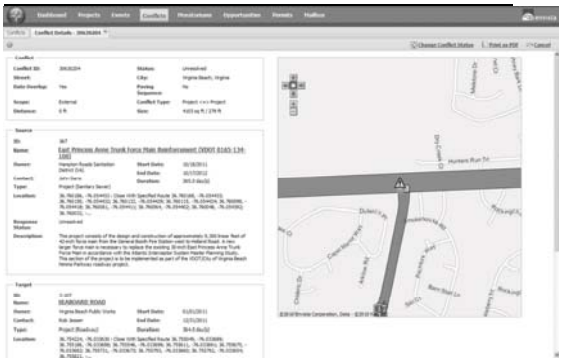


## HRSD's Online Public GIS

## HRSD's Online Public GIS

## HRSD's Online Public GIS

## Envista - Conflicts



## Construction Inspection Program

- Improve the consistency of pipeline construction inspection
- Partnership with ODU
- 18 hours (Fri/Sat)
- Initial Program - Dec 10th and 11th



## Envista Utility Coordination Software

- Web based project mapping software
  - Improves project coordination between utilities and jurisdictions
  - Identifies and notifies stakeholders of conflicts
  - Provides a tool for timely resolution of issues due to project conflicts
  - Reduces costs through improved communication and project coordination

## Envista Utility Coordination Software

- Current local subscribers to Envista System
  - HRSD
  - City of Virginia Beach
  - City of Norfolk
  - City of Portsmouth
  - Columbia Gas of VA
- Prospective Subscribers
  - City of Newport News
  - Virginia Natural Gas



## Construction Inspection Course

- Construction Orientation
- Understanding the Design/Construction Process
- Construction Site Safety
- Construction and Construction Management Basics
- Records, Documentation, and Communication



## Questions

- Contact info for the CIP and GIS
  Jay Bernas
  jbernas@hrsd.com
  318-4335
- Contact info for the Construction Inspection Program
  Bruce Husselbee
  bhusselbee@hrsd.com
  460-7012

# HRPDC - Virginia Coastal Plain Groundwater Modeling
# FY2011 Work Plan

**Work Period:**
January 1, 2011 through June 30, 2011

**Questions to be Answered:**

1) What will groundwater levels be in the Coastal Plain aquifer system in 30 and 50 years under various withdrawal scenarios?
2) How will groundwater levels respond to changes in pumping rates at the IP mill in Franklin?
3) What loss of non-recoverable storage will occur in the aquifer system under likely future groundwater withdrawals?

**Work Plan:**
The questions will be answered by performing simulations with the recently revised Virginia Coastal Plain Groundwater Model (VCPGM). The study will focus on 3 of the confined aquifers; the Piney Point, Aquia, and Potomac. Analyses performed for each model run will include:

- Determination of 80% criterion violation areas and dewatered aquifer areas.
- Calculation of the percentage loss of non-recoverable storage in the aquifer system.
- Calculation of water budgets for the aquifers of interest.

**Tasks:**
To answer the study questions, the following tasks will be performed for each of the 3 questions, using different data and model runs for each question.

Task 1: Refine the list of model conditions to be simulated as shown in Table 1.
Task 2: Develop pumping data to express the desired scenarios.
Task 3: Construct model input files.
Task 4: Perform model simulations.
Task 5: Analyze output.
Task 6: Prepare maps, tables, figures, and slides to document findings.

**Deliverables:**

1) Slide presentation – fully annotated
2) Begin the documentation of these simulations of aquifer system response to pumping with the updated VCPGM.

**Funding:**

| | |
|---|---|
| HRPDC: | $36,420 |
| USGS: | $33,600 |
| Total | $70,020 |

**Table 1 – Model Scenarios to be Simulated**

| Run # | Time Component | | | Groundwater Withdrawal Rates | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Transient (Year) | | IP - Franklin Withdrawals (% of 2008 rates) | | | Other Water Use | | |
| | Steady State | 2040 | 2060 | 100% | 50% | 0% | None | Business as usual (+3%/yr) | Total Permitted |
| 1 | | | | | | | | | |
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| 18 | | | | | | | | | |
| 19 | | | | | | | | | |
| 20 | | | | | | | | | |

* - cell shading indicates which options are in effect for each model run

# Water and Wastewater Programs – Retreat

## Summary of FY 2010-11 projects and tasks:

HR WET

1. Admin and staff support for HR WET
2. HR WET advertising
3. Website
4. Mini-grants
5. Giveaways
6. Trailer Maintenance
7. Displays
8. HR Green

Groundwater Mitigation

1. mitigation claims – none filed
2. reviewed draft regulations, attended RAP, developed comment letter sent to DEQ
3. managed USGS contract and confirmed method for using new model for permit evaluations and mitigation claims
4. analysis of USGS work on water budget and thin aquifers
5. part of water supply plan funded with this task – long term availability of groundwater and estimates of domestic use are significant planning issues
6. attend quarterly USGS / DEQ meetings and quarterly GW Steering Committee meetings
7. discuss technical issues related to permit program with DEQ and foster partnership and information sharing; for example - updates on International Paper's permit

Groundwater – USGS contracts

1. Water Level Network
2. Chloride Monitoring Network
3. Completed documentation for VCP model use
4. Evaluated vertical heads in VCP model
5. Evaluated VCP model performance in thin aquifers
6. Estimated water budget with VCP model

Water Technical Assistance

1. represented region on Pesticide TAC (July – August)
2. drafted FCC Bandwidth comment letter
3. collaborated with EM on utility critical infrastructure, FRAC cards
4. developed DUC agendas
5. VDH coordination and joint meeting agendas
6. provided utility data for Sustainability grant and Gloucester Comp Plan
7. attend State Water Commission meetings
8. Legislative tracking

Water Priority Projects

1. water supply plan
2. RFP development for UASI grant
3. update Water Quality Response Plan POCs in February
4. collect Water and Sewer Rates in July
5. Help to Others - staff support to program
6. Researched and collaborated with HRPDC planning staff regarding climate change impacts to water supply
7. Committee researched and discussed regional billing systems for water and wastewater

Water Quality Advertising

1. Short, annual ad campaign on WQ Reports

Source Water Protection

1. Map updates were part of water supply plan
2. Source education via HR WET

Help To Others (H2O)

1. Legal support to program

Wastewater

1. SSO Consent Decree coordination
2. Host and manage SSORS
3. Admin and staff support for HR FOG
4. brief DUCs on Water Quality issues (analyzed draft Bacteria TMDL for Elizabeth River and submitted comments on SSO impacts)
5. Peninsula grit and grease disposal

HR FOG Program

1. Website
2. Informational materials for Restaurants
3. Giveaways
4. Advertising
5. Minigrants
6. Displays
7. HR Green

## Proposed FY 2011-12 projects and tasks:

HR WET

1. Admin and staff support for HR WET
2. HR WET advertising
3. Mini-grants
4. Giveaways
5. Trailer Maintenance
6. Displays
7. Develop messages under HR Green umbrella
8. Web updates and enhancement
9. Targeted informational materials
10. Focus on value of water and sources of water

Groundwater Mitigation

1. mitigation claims
    a. initial setup of model input files
    b. number of claims depends on drought conditions
2. review draft regulations and TAC might reconvene
3. manage and analyze USGS work on water budget
4. simulate water level impacts of IP permit, if permit conditions change
5. part of water supply plan funded with this task
6. quarterly USGS / DEQ meetings and quarterly GW Steering Committee meetings
7. develop maps of the Area of Impacts for localities' permits with new model

Groundwater – USGS contracts

1. Water Level Network
2. Chloride Monitoring Network
3. additional analysis of long-term groundwater yield using VCP model
4. fund USGS evaluation of subsidence and relative sea level rise
5. fund model update or recalibration if DEQ will jointly fund effort

Water Technical Assistance

1. draft comment letters for emerging regulatory issues
2. collaborate with Emergency Management on Utility issues
3. develop DUC agendas
4. VDH coordination and joint meeting agendas

Water Priority Projects

1. water supply plan
    a. revise after localities review; revise if required by SWCB
    b. develop briefs for localities / public meetings
2. UASI grant management and liaison between contractor and localities
3. update Water Quality Response Plan POCs in February

4. collect Water and Sewer Rates in July and expand data collected to include water use by category based on billing
5. Help to Others
    a. Kickoff meeting
    b. Website development
    c. Confirm locality allocation tracking responsibility
    d. Design / order bill inserts and posters for agencies
6. provide input to planning report on climate change impacts to water supply

Water Quality Advertising

1. Short, annual ad campaign on WQ Reports

Source Water Protection

1. develop metadata for maps in water supply plan
2. integrate watershed protection into Green Infrastructure and TMDL programs to increase planning and potential land acquisition or easements

Help To Others (H2O)

1. Legal support to program
2. Contribution envelopes
3. Promotional materials

Wastewater

1. SSO Consent Decree coordination
2. host and manage SSORS
3. admin and staff support for HR FOG
4. brief committees on Water Quality issues, i.e. Bacteria study
5. Peninsula grit and grease facility
6. foster communication between wastewater and stormwater utilities regarding I/I reductions, TMDLs, etc.
7. management and maintenance of online training database

HR FOG

1. develop messages under HR Green umbrella
2. web updates and enhancement
3. targeted informational materials

**Determination of Sea-Level Rise in the Virginia Coastal Plain and Development of Planning Tools**

**Work Proposal**

| | |
|---|---|
| Date : | December 14, 2010 |
| Prepared By: | U.S. Geological Survey – Virginia Water Science Center (USGS-VWSC) |
| Cooperator: | Hampton Roads Planning District Commission (HRPDC) |
| Project Period : | January 1, 2011 to February 28, 2013 |

## Introduction

Land surface elevations are declining relative to sea level in the Coastal Plain of Virginia, with the highest rates of decline seen in the Hampton Roads region. The decline of land elevations relative to mean sea-level has been documented for over 80 years in Norfolk and is at least partially attributable to observed global sea-level rise during that time. (Together, land subsidence and global sea-level rise are called 'relative sea-level rise'). However, the global sea-level rise rate of 1.8 mm/yr can account for only roughly half of the 4-5 mm/year of relative sea-level rise observed in the Hampton Roads area.

Prior studies and more recent work by the USGS-VWSC in collaboration with HRPDC indicate that rates of relative sea-level rise above 1.8 mm/year are likely caused by groundwater withdrawals from the Virginia Coastal Plain aquifer system. Land subsidence commonly occurs when pumping lowers water pressures in thick sedimentary deposits, as it has in Virginia's Coastal Plain. Unlike sea-level rise, groundwater pumping can be managed and controlled, which potentially provides a method of reducing relative sea-level rise.

It is important to understand rates of relative sea-level rise because the majority of Hampton Roads communities are in low-lying areas that are at clear and substantial long-term risk of flooding and inundation from relative sea-level rise. Much of the Hampton Roads area is less than 5 feet above sea level and when hurricanes or other major storm events cause flooding, relative sea-level rise will increase the area that is flooded.

Long-term planning can do much to mitigate the societal and financial impacts of relative sea-level rise. The plan of study described here will lead to an understanding of sea-level rise in Hampton Roads that can be used in planning efforts to prevent and prepare for relative sea-level rise.

## Objectives

The objectives of this study are as follows:

1) Compile existing data that describe historical rates of sea-level rise in Hampton Roads and determine what additional data should be collected to track future sea-level rise.

2) Compile existing predictions of future global sea-level rise.

3) Extend the new Virginia Coastal Plain Groundwater Model (VCPGM) by adding land subsidence simulation capabilities.

4) Run groundwater withdrawal scenarios using the model to simulate future land subsidence.

5) Develop a spatially detailed understanding of future relative sea-level rise in the Hampton Roads area by combining predictions of global sea-level rise and land subsidence.

Work Plan

The study will be phased over several years to facilitate scheduling of USGS resources and cooperator funding. A technical advisory committee will be formed and hold regular meetings/conference calls to inform and guide the study so that study results will have the most use and value to HRPDC in its planning efforts.

Task 1: Subsidence data compilation and review

- compile existing studies and publications on relative sea-level rise in Hampton Roads
- review capabilities of various geodetic survey methods, including extensometers, GPS CORS, LIDAR, and InSAR
- communicate with agencies and experts about the availability, cost, and analysis requirements of various datasets and measurement methods
- build a database of existing high resolution geodetic data

Task 2: Global sea-level rise data compilation and review

- compile, where possible, sea-level rise data for Hampton Roads area that excludes the land subsidence component
- compile, in cooperation with the USGS National Research Program, the most up-to-date predictive studies of global sea-level rise
- develop a list of global sea-level rise scenarios to be used in the final set of tasks

Task 3: Addition of subsidence simulation to the VCPGM

- gather compressibility coefficient data for use in the VCP groundwater model
- build input data sets for the MODFLOW-SUB package
- modify existing model input

Task 4: Simulation of land subsidence

- update the VCP groundwater model with the most recent groundwater withdrawal data
- project population growth and groundwater use in consultation with state agencies
- choose groundwater withdrawal scenarios to simulate
- preparing model input files

- run VCP groundwater model simulations
- process model output

Task 5: Mapping and analysis

- combine global sea-level rise predictions with spatially detailed land-subsidence data
- construct subsidence and land elevation maps
- construct shoreline maps

Task 6: Report writing

Schedule

| | | Federal Fiscal Year | 2011 | | | | | | | | | 2012 | | | | | | | | | | | | 2013 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Task | | Month | J | F | M | A | M | J | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D | J | F |
| Task 1: Subsidence data compilation & review | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Task 2: Sea-level rise data compilation & review | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Task 3: Addition of subsidence simulation | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Task 4: Simulation of land subsidence | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Task 5: Mapping and analysis | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Task 6: Report Writing | | VACPGM report | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Relative sea-level rise report | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Deliverables

Public presentations of study results will be made annually during a HRPDC Utility Directors meeting and to other meetings as requested by the cooperator.

USGS reports will be prepared. Report 1 will document updates and changes to VCP groundwater model and present results of the simulation scenarios. A draft of this report will be completed in Year 2 of the study. Report 2 will document results of the relative sea-level rise analysis and a draft of this report will be completed in Year 3 of the study.