Memo

To	Russ Esses	AMEC#	3-915-17568-0
From	Ryan Bartelheimer	cc	Kersh-Wishkah Flood Levee Project Team
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Date	April 10, 2013		

Subject Kersh-Wishkah Flood Levee Review of Existing Information

The goals and design criteria for the Kersh-Wishkah Flood Levee project were previously documented in a memorandum dated March 5, 2013. Since then, the design team has endeavored to gather available information that could be useful in developing or evaluating alternative strategies to reduce flooding along Wishkah Road. This memorandum summarizes the readily available information that has been reviewed and provides a list of recently gathered data that have been acquired to fill known data needs.

REVIEW OF EXISTING DATA

The following information was collected and reviewed as specifically described below:

- Landowner petition and accompanying materials: *viewed at Frank Kersh's house. Of particular interest were dated photos of different homes along Wishkah Road during various flood events.*
- Anecdotal information on flooding history, road settlement, and road maintenance and Public Works records: *reviewed, including documents, photos (Kersh), road department records, and 1980s design, which will be compared to the topographic survey and road repair records.*
- Soils and geologic maps and accompanying information: *obtained and reviewed soils, geology, seismic, and hazard classification.*
- Parcel boundary maps, records, and markers: *gathered by the surveyor.*
- Historic photos: *viewed photos of floods and aerial photos dating back to 1942.*
- Road, infrastructure, and utilities: *utility locate service called and then surveyed.*
- Maps: *Grays Harbor County GIS data sets downloaded from ghc-gis.org. The data sets include parcel, zoning, roads, hydro, jurisdiction, and PLS (public land survey).*
- Flood maps and profiles: *obtained from FEMA.*

- Topography: *data gathered, including USGS topography, FEMA LiDAR.*
- Bathymetry: *gathered historic bathymetric survey data.*
- Tidal modeling: *compiled existing modeling data produced by Coast & Harbor Engineering, including 3D and 2D hydrodynamics.*
- River modeling: *no existing model is readily available for Wishkah River.*

The specific data acquired and the sources are listed in more detail in Table 1.

ADDITIONAL DATA GATHERED

In addition to reviewing existing data, additional data were acquired as part of this project to fill gaps and support the engineering analysis. This information is in various stages of being finalized, but all of the field work has been completed. The additional acquired data include:

- Topographic survey – A topographic survey was conducted addressing roads, ditches, utilities, high water marks (as observed in the photos viewed at Frank Kersh's house), culverts, tide gates, and other relevant features. Field work was performed by Berglund, Schmidt, and Associates as a subconsultant to AMEC.
- Bathymetric survey – A bathymetric survey was performed at numerous cross-sections in the Wishkah River from its mouth to just upstream of the project site, along with longitudinal profiles in the same area. Field work was performed by HydroGraphix as a vendor to AMEC.
- Geotechnical investigation – Three borings were advanced along the east edge of the road prism. Soil samples were taken and are being analyzed in a laboratory to determine their engineering properties. Field work was overseen by AMEC, and performed by Boretec.
- Water level loggers – Two water level loggers were deployed during the bathymetric survey and for about 10 days afterward to collect water elevations near the mouth of the river and at a point located upstream of the project site. AMEC-owned equipment was deployed and retrieved by HydroGraphix.

A detailed list of the data gathered is shown in Table 1.

Table 1 - List of Data Gathered for Kersh-Wishkah Flood Levee Project

Source	Type	Date (MM/DD/YEAR)	Description
NOAA	Bathymetry	9/1/1956	Bathymetric survey of lower 2.4 miles of Wishkah River
USACE	Bathymetry	2000 - 2012	Bathymetric survey of Federal Navigation Channel
NOAA	Bathymetry	2004 - 2005	Bathymetric survey of Grays Harbor estuary
OR Dept. of Geology and Mineral Industries	Topography	9/26/2009	LIDAR survey of SW Washington
NOAA	Water Levels	2/20/2004 - 12/14/2005	Predicted and Measured Tides @ Aberdeen
NOAA	Water Levels	12/19/1999 - 12/14/2009	Predicted Tide @ Aberdeen
NOAA	Water Levels	04/2004 -11/2005	Monthly Water levels @ Aberdeen (MLLW, MHHW, etc…)
NOAA	Wind	03/26/2008 - 03/28/2013	Hourly wind speed, direction and pressure @ Westport
NOAA	Water Levels	3/23/2006 - 03/28/2013	Predicted and Measured @ Westport
NOAA	Water Levels	12/19/1999 - 11/20/2009	Predicted @ Westport
NOAA	Water Levels	4/2006 - 2/2013	Daily High/Low (Westport)
NOAA	Water Levels	4/2006 - 1/2013	Monthly Water levels at Westport (MLLW, MHHW, etc…)
USACE	Water Levels	9/13/1999 -11/17/1999	Measured @ U.S. Coast Guard Station Westport, WA
USACE	Water Levels	9/12/1999 -11/17/1999	Measured @ Aberdeen, WA
FEMA	Floodmap	9/29/1986	Panel 325 (Unincorporated Gray's Harbor County)
FEMA	Floodmap	9/29/1986	Panel 425 (Unincorporated Gray's Harbor County)
FEMA	Floodmap	9/29/1986	Panel 2 (City of Aberdeen, WA)
FEMA	Floodmap	9/29/1986	Panel 2 rev B (City of Aberdeen, WA)
FEMA	Report	2/16/1990	Flood Insurance Study: Gray's Harbor Unincorporated Areas
FEMA	Report	1/1/1984	Flood Insurance Study: City of Aberdeen
FEMA	Preliminary Report	8/5/2011	Preliminary Flood Insurance Study: City of Aberdeen
FEMA	Preliminary	Not Dated	Preliminary FEMA floodmaps Gray's Harbor County 1-3
NAIP	Aerial Photo	2006	Orthophoto,1.5 ft resolution
NAIP	Aerial Photo	2009	Orthophoto, 1 meter resolution
NAIP	Aerial Photo	2011	Orthophoto, 1 meter resolution
Washington Dept. of Ecology	Streamflow	4/04/2004 - 03/28/2013	Mean daily discharge of Wishkah River @ Nisson
NCDC	Wind	1/8/1991 - 8/01/2009	Hourly wind speed, direction and pressure @ Bowerman Field
Coast & Harbor Engineering	Tidal Model	2011	Hydrodynamic model of Grays Harbor and lower Chelalis River
USDA NRCS	Soils	Not Dated	Nationwide web soil survey
Washington Division of Geology and Earth Resources	Liquefaction	2004	Liquefaction Susceptibility and Site Class Maps of Washington State
Washington Division of Geology and Earth Resources	Site Class	2004	Liquefaction Susceptibility and Site Class Maps of Washington State
Washington DNR	Geologic Map	1986	Geologic Map of the Humptulips Quadrangle and Adjacent
Grays Harbor PUD	Geotechnical Investigation	4/17/2008	Geotechnical investigation for substation at Wishkah Road and B Street
Eastern Washington University	Archaeological Monitoring	1990	Archaeological Monitoring of Wishkah Road
US Army Corps of Engineers	1942 Aerial Photo	1942	Aerial photo, 1:20,000
USGS	Streamstats	Not Dated	Washington StreamStats Web Application
Grays Harbor County (GHC-GIS.org)	GIS data	Varies	Various GIS datasets (parcels, zoning, roads, hydro, jurisdiction, PLS)
Grays Harbor County	Wishkah Road	2/6/1989	Wishkah Road design (drawing no 94311-26)
Grays Harbor County	Wishkah Road	7/11/1983	Wishkah Road design (drawing no 94311-16)
Grays Harbor County	Wishkah Road	Not Dated	Test Hole Logs - at locations shown on 94311-16

The pre-existing data that have been collected, along with the additional information generated by this project, primarily topographic, bathymetric, and geotechnical data, are sufficient to perform the tasks identified in the existing scope of work, dated February 7, 2013.

We anticipate that additional information will need to be gathered during future phases of this project in order to provide the additional details that will be needed to fully design the project and obtain the necessary permits. Those details would more appropriately be described at the end of this phase of the project, after the alternatives are developed and evaluated, and the best alternative is chosen.