TILLAMOOK COUNTY

DRAFT

A History of the Oregon Solutions Southern Flow Corridor Project – Landowner Preferred Alternative, A Review of the Alternatives and a Summary of Public Involvement

By: Paul Levesque

Tillamook County Chief of Staff and
Oregon Solutions Project Manager

November 1, 2013

Table of Contents

1.0 THE WETLAND ACQUISITIONS

Tillamook Bay entered the National Estuary Program in 1993 and over the next five years developed a Comprehensive Conservation Management Plan (CCMP) designed to improve water quality, enhance critical habitats, reduce sediment loading and reduce the effects of flooding in the Tillamook Bay watersheds.

In December 1999, the Tillamook Bay National Estuary Project (TBNEP) published its CCMP. Among the 63 actions designed to enhance water quality, improve salmonid habitats, reduce excess sedimentation, mitigate the natural and human impacts of flooding, and involve the public were several actions aimed at reconnecting intertidal wetlands and enhancing tidal marsh. The purpose of these actions was to improve estuarine wetland habitat in order to benefit imperiled fish and wildlife species and to improve the overall ecological function of the bay. Toward these ends, the TBNEP established an objective of acquiring and restoring 750 acres of inter-tidal wetland habitat in the Tillamook Bay.[1]

Dale Buck, Tillamook County Farm Bureau member, had been intimately involved in the TBNEP nomination process and the development of the CCMP. He was concerned that the objective of restoring 750 acres of intertidal wetland was at odds with the Tillamook County Creamery Association's (TCCA) policy of "no net loss of farmland," and that if not properly managed, could be harmful to the dairy industry. Working with NRCS, Mr. Buck identified approximately 375 acres located along Tillamook Bay that had the potential to be restored to intertidal wetland without adversely impacting the dairy industry.[2]

The three contiguous properties identified by Mr. Buck are located at the confluence of Wilson, Trask and Tillamook Rivers. Two of the properties (Farris, 142 acres, and Fuhrman, 81 acres) were unsuitable for agriculture having been converted to duck hunting preserves and were already burdened with conservation easements. The Wilson property (154 acres) was a neglected dairy farm. White it was unlikely that a dairy facility would ever be reestablished on the property, the land was suitable for grazing and forage production.[3]

The matter was brought before the TCCA Board of Directors during 1999. Not only did the board authorize Dale Buck to continue pursuit of the acquisition, it also authorized Shawn Reiersgaard, TCCA employee, to facilitate a community process for development of a management plan for the properties that was eventually adopted by the County.[4]

---

[1] Tillamook Bay National Estuary Project, *Tillamook Bay Wetlands: Management Plan for the Wilson, Fuhrman and Farris Wetland Acquisition Properties* (November 2001), 1; also see CCMP Goal Hab 19.
[2] TBNEP, *Tillamook Bay Wetland Issue Update*, June 2009.
[3] Id.
[4] Id.

In pursuit of these acquisitions, TBNEP, in collaboration with the Oregon Watershed Enhancement Board (OWEB) and Oregon Wetlands Joint Venture, submitted a proposal to the U.S. Fish and Wildlife Service (USFWS) for grant funding under the Coastal Wetland Planning, Protection, and Restoration Act (CWPRA). The USFWS awarded $750,000 for estuarine wetlands acquisition, which OWEB matched with $250,000 for restoration and enhancement of acquired properties; $25,000 was also provided for project administration (Grants #99-804 and #99-421). By acquiring and restoring roughly 350 acres, this project was viewed as a significant step toward the CCMP objective of 750 acres.[5]

However when the grant came before the Board of County Commissioners for consideration, lingering public concerns about the proposed acquisitions prompted a special Board meeting on January 31, 2001. By that time a group of landowners had formed an ad hoc group known as the North Highway 101 Flood Mitigation Group. At the meeting, TCCA was asked to weigh in. Harold Schild, TCCA President and CEO, prefaced the discussion on the land acquisition grant by emphasizing the value of each of the 33,000 agricultural acres in Tillamook County and reaffirming TCCA's policy of "no net loss of farmland." Referring to the properties under consideration for acquisition, Schild said, "I believe that there were once four farms down there below the slough bridge, but only one farm is used for agricultural purposes today. While the agricultural industry does not want to lose anymore agricultural land, it must concede to the loss of marginal lands." Schild emphasized that, "the agricultural industry wants to be involved as advisors on any acquisition proposals, expects that any deals made will protect adjacent farmland, and recognize the agricultural industry's commitment to environmental stewardship."[6]

Part of the concern voiced by those in attendance was that the lands to be acquired would be owned by the Oregon Department of Fish and Wildlife. Doug Rosenberg spoke on behalf of the Tillamook County Flood Control Group and the North Highway 101 Flood Mitigation Group. These two groups supported local control of land for flood control projects and voiced concern about implementing and permitting flood control projects on lands owned by ODFW. Representatives from several land use agencies assured Mr. Rosenberg and the flood control groups that his concerns would be met during the development of a management agreement.[7] The decision was subsequently made that the application would be amended to provide that the county would become the owner of the acquired properties. Work on a proposed management plan for the site got underway.

In order to accomplish broad-based community support, it was critical that the TBNEP establish a forum through which community stakeholders could not only participate in, but in fact, drive the plan development process. In the spring of 2001, the TBNEP hosted the first meeting of the Wetlands Management Plan Development Team. At this

[5] *Tillamook Bay Wetlands,* 1.
[6] Tillamook Headlight Herald, *"County Commissioners Hold Workshop on Land Use,"* by Tilda Chadwick-Jones, January 9, 2001.
[7] Id.

meeting, stakeholders ranging from private citizens and business owners to elected officials and agency representatives sat down and identified the stakeholders to be represented on the Team. TBNEP staff members, land use/resource agency representatives, and invited guests were designated to provide technical expertise and staffing support throughout the plan development process. [8]

After a second meeting in which members discussed generally: 1) the goals and scope of the grant, 2) the properties proposed for acquisition, 3) preliminary management ideas and concerns, and 4) other relevant matters, it became clear that the primary obstacle in developing the plan would be to reconcile the interests of those members primarily interested in habitat enhancement with those primarily interested in flood mitigation. To address this, the Team was separated into two subcommittees, one representing flood interests and the other habitat enhancements. At the next team meeting, each subcommittee presented its plan, and the Team as a whole worked to identify areas of agreement and those which required additional discussion.[9]

This plan also contemplated that the levees surrounding the site would be breached to restore tidal hydrology and reconnect cutoff sloughs on the acquired lands. However, in the midst of the planning process, such levee breaching was shown to be problematic. During the initial engineering design by Philip Williams & Associates (PWA) computer modeling revealed that proposed levee breaching and conversion to tidal inundation would produce increased flood elevations within the City of Tillamook and was, therefore, not allowable.[10]

Subsequent meetings of the Wetland Plan Development Team then sought to resolve this potential for the project to affect off-site flood elevations as well as issues that included access to flood mitigation infrastructure, the location of dike breaches and long-term maintenance of floodways. In the final draft plan the issue of off-site flood rises was addressed as follows:

> "Ensuring the conveyance of floodwaters from upstream areas, through the project area, and out to Tillamook Bay is an issue of critical importance to the safety and welfare of the local community. Mitigating against flood hazards to upstream areas, including the City of Tillamook and the adjacent North Highway 101 business district, is an issue of essential consideration in the development of the management strategy for the project area. Structural alterations to the levee system will be analyzed by engineering and hydrologic experts to ensure that they have a net positive benefit for flood mitigation.
>
> . . . . .
>
> A detailed hydrological analysis will be completed prior to implementing proposed structural modifications. No modifications to the existing levee

[8] Tillamook County Performance Partnership, *Management Plan for the Wilson, Fuhrman and Farris Wetland Acquisition Properties*, November 2001, pp 1- 2.
[9] *Management Plan for Wilson, Fuhrman and Farris Wetland Acquisition Properties*, p. 2
[10] PWA , *Project Report #1561*, November 19, 2001.

system will occur without strong evidence demonstrating that these alterations will not worsen, and hopefully will be beneficial in reducing, flood hazards."[11]

The final November 2001 Plan was adopted by the county and represented a consensus document, agreed to by all the stakeholders serving on the Wetlands Management Plan Development Team.[12] The acquisitions moved forward. Tillamook County had for a long time owned one acre in the midst of the proposed acquisition area.[13] Throughout the three-year period during which the Corps Feasibility Study was conducted, Tillamook County acquired title to 377 acres within the wetland acquisition area consisting of three separate parcels. In January 2002 the 154-acre Wilson parcel was acquired, followed by the 81-acre Fuhrman property (land only) in June 2002 and the 142-acre Farris land and house in October 2003.

The latter acquisition was accomplished with a $596,000 grant under the Coastal and Estuarine Land Conservation Program (CELP) (Award #NA03N054190117 for fiscal year 2003).

2.0 THE TILLAMOOK BAY HABITAT AND ESTUARY IMPROVEMENT DISTRICT (TBHEID)

What had previously been known as the North Highway 101 Flood Mitigation Group became a legal entity in 2002 with the formation of the Tillamook Bay Habitat and Estuary Improvement District (TBHEID). Initially formed in June 2002 as a Water Control District under ORS Chapter 554, it was made up of 64 voting and nine associate members consisting largely of landowners and businesses within or adjoining the present Southern Flow Corridor (SFC) project area. Today it is a voluntary self-taxing 501(c)(12) non-profit with 51 members including about 3,000 acres/$50 million of real property between the Hoquarten Slough and the south Bay City area. It was one of the 25 original members of the Oregon Solutions project having signed a Declaration of Cooperation. It meets at least four times each year and usually more often. In the last four years, the SFC has been on its agenda at virtually every meeting and it has hosted public meetings focused on the SFC project.

3.0 THE CORPS OF ENGINEERS FEASIBILITY STUDY

3.1 Reconnaissance Phase

While work on the CCMP was underway, major flooding in February 1996 caused $53 million in damages within Tillamook County, the highest per capita loss in the history of Oregon and equivalent of 148 percent of the county's annual budget.[14] As a result of this flood loss, the Army Corps of Engineers (COE) undertook a Reconnaissance Study

[11] *Management Plan for the Wilson, Fuhrman and Farris Wetland Acquisition Properties*, p. 9.
[12] *Management Plan for the Wilson, Fuhrman and Farris Wetland Acquisition Properties,* P. 2
[13] Tax Lot 1S10 23 300 was acquired in 1958 for county park purposes from Walter and Margaret Naegeli.
[14] U.S. Army Corps of Engineers, *Tillamook Bay and Estuary, Oregon, General Investigation Feasibility Report*, (Portland District, February 2005), 44.

of the Tillamook Bay and Estuary to determine if there was a federal interest in developing a comprehensive plan for ecosystem restoration and flood damage reduction.

The reconnaissance phase of the Corps of Engineers (COE) study was completed in August 1999. Key areas addressed in the report included opportunities to modify existing flood plain features, stream channels, and the estuary in order to restore natural wetlands, high value estuarine habitats, and coastal salmonid habitats while reducing flood damages. Some of the measures included reconnecting wetland and floodplain areas with the rivers to absorb greater flood flows, channel modifications to restore flood capacity, restoring structural complexity in stream channels and the estuary and riparian habitat development.[15] A Feasibility Cost Sharing Agreement was executed in July 1999 with the Tillamook County Soil and Water Conservation District (TCSWCD).[16]

3.2 Public Involvement in the Corps Feasibility Study

In an unprecedented move, the COE deviated from its standard study process at the insistence of the Tillamook County Board of Commissioners to ensure substantial public involvement. A Feasibility Study Advisory Council led by Tillamook County Commissioner Tim Josi was established and held its first meeting on May 17, 2000. Members of the public made up the Advisory Council, supported by public agency staff, all of whom were formally appointed by the Tillamook County Board of Commissioners. Formal meetings were held once a month through April 21, 2004, for the purpose of analyzing and formulating policy recommendations and alternative proposals. Advisory Council members also functioned in focus groups dealing with the following aspects of the feasibility study.

- Public Involvement/Website
- Model Development/Oversight
- Historical Conditions
- Water Quality and Land Use Impacts
- Alternative Project Formulation
- Fish and Wildlife Habitat
- Budget/Fiscal Management

However, as the study progressed, these focus groups were combined into a larger Biological Focus Group, chaired by the Corps, and a Flood Damage Reduction Focus Group, chaired by the County.

[15] U.S. Army Corps of Engineers, Analysis, *Tillamook Bay and Estuary, Oregon* (Portland District, August 1999), Section 905(b).

[16] Due to a provision of federal law at that time, Oregon counties were unable to enter into such agreements until the Oregon Congressional Delegation subsequently succeeded in an amendment to remedy that provision. Tillamook County thereafter to become the formal sponsor, to which TCSWCD agreed on February 17, 2000, p 42.

Numerous presentations were given by the Corps study team to the Advisory Council:

- November 20, 2001 – MIKE11 model presentation.
- March 27, 2002 – Geomorphologic analysis presentation.
- March 27, 2002 – Preliminary modeling results presentation.
- April 30, 2003 – Study status/modeling results presentation.
- September 4, 2003 – Continuing authorities program presentation.

A *Notice of Intent to prepare a Draft Environmental Impact Statement for the Tillamook Bay and Estuary Flood Damage Reduction and Ecosystem Restoration Project* appeared in the *Federal Register* on May 30, 2000. Two initial public scoping meetings were held on July 25, 2000, at the Tillamook County Courthouse. The Corps and Tillamook County discussed the work plan for the feasibility study, model development, and elements of the Environmental Impact Statement. The public was encouraged to provide comments on the scope of the Environmental Impact Statement.

Two public meetings also were held on July 25, 2002, at the Tillamook County Courthouse to discuss the status of the feasibility study, including development of the hydrodynamic model and potential alternatives being considered. At the public meetings held for the study, local citizens voiced concerns on several issues. The most significant issues are discussed below.

Issue: Dredging at the River Mouths

Response: The model analysis showed that dredging to increase the depth of the rivers had a less significant reduction on flood levels than increasing the width of the channels. It also was more localized in its effects. Also, dredging to increase channel depths was not expected to provide ecosystem benefits, unless it resulted in opening up on old slough or channel that had become disconnected from a river. Therefore, the project would have to be economically justified from a flood damage reduction standpoint, which was not likely. In addition, even if it were economically justified, the sponsor would be required to provide funding for channel maintenance over the life of the project. Because of these reasons, dredging to deepen the channels was not considered a viable option in the feasibility study.

Issue: Increasing the Width of River Channels

Response: This would require willing landowners to provide some land that would cease to be available for current uses. The local issues concerning the loss of grazing lands would have affected the amount of land available for a potential project. However, obtaining land for additional width was a key issue for providing both flood damage reduction and ecosystem restoration benefits.

Issue: Eliminating the Kilchis River from Further Consideration

Response: Modeling analysis showed that changes to the Kilchis River to reduce flows in Squeedunk Slough would not affect flood levels at the Highway 101 business district. In addition, the flood reduction benefits would be localized in the immediate area of the project. Because of these reasons, all potential measures on the Kilchis River were eliminated from further consideration in the feasibility study.

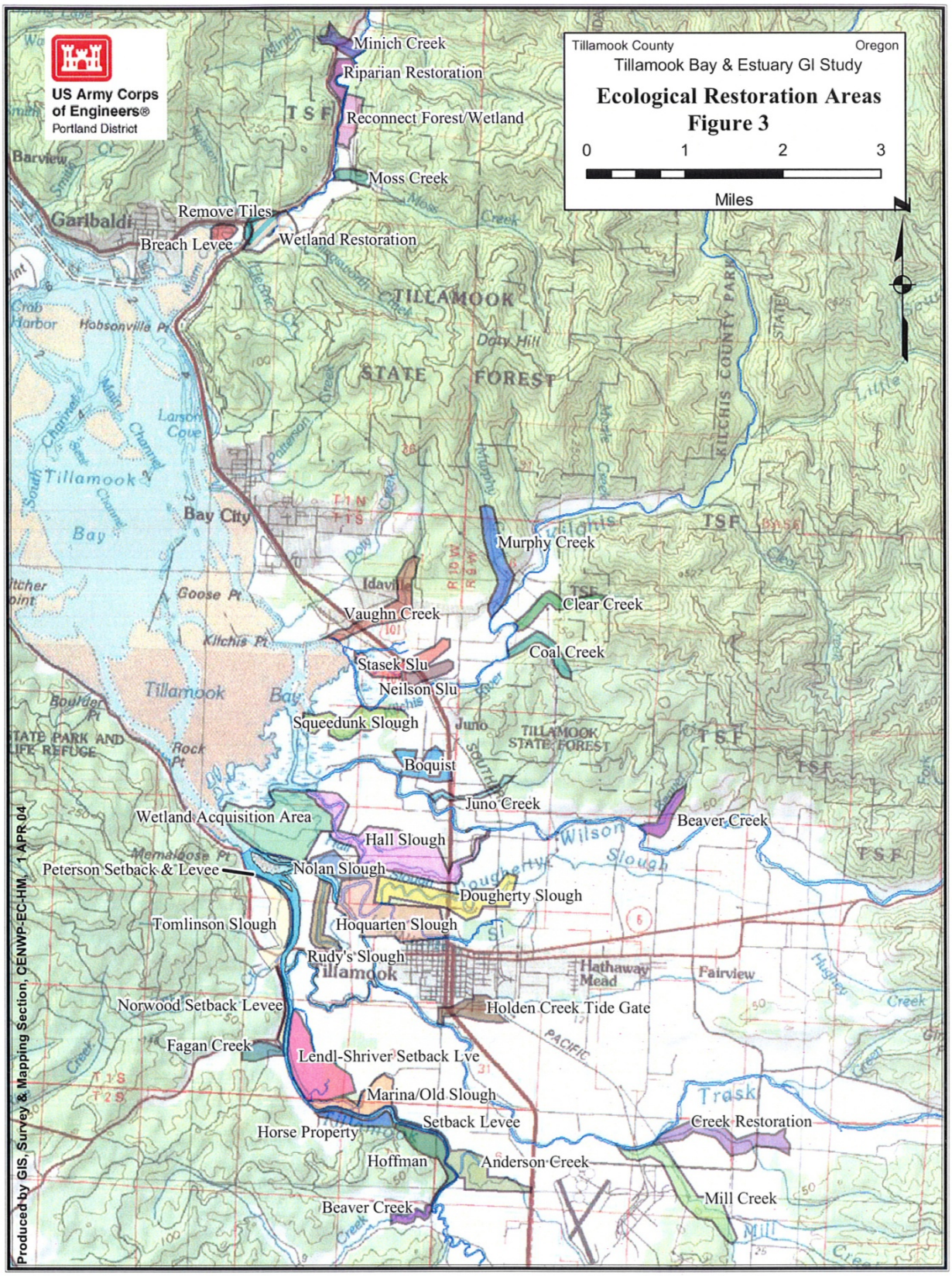
3.3 Alternative Analysis

Fifty-nine potential alternative measures were identified for the feasibility study though a number of forums. Formulation of alternatives was based on the four main study objectives: reduced flooding, improved salmonid and wildlife habitat, reduced sedimentation, and improved water quality. One list was generated from local interests through a number of local groups including public meetings. The NOAA Fisheries, Oregon Department of Fish and Wildlife (ODFW), USFWS, NRCS, and the Corps, in conjunction with biologists from Tillamook County and the TBNEP, developed another list of potential ecosystem restoration projects for the study area. The Biological Focus Group played a significant role in this process. The Corps study team generated a list of potential ecosystem restoration and flood damage reduction measures (See Figure 3). Provided below is a listing of the 59 potential alternative measures:

Tillamook River

- Tomlinson Slough connection
- Peterson setback levee
- Norwood setback levee
- Fagan Creek setback levee, tide gate modification
- Lendl-Shriver setback levee, slough and riparian restoration
- Halthaway Marina restoration, enhancement, fencing
- Horse property purchase, restoration
- Setback levee
- Hoffman land purchase, restoration
- Anderson Creek restoration
- Beaver Creek restoration, tide gate evaluation/modification
- Setback levee along entire river, where possible

Figure 3 – Ecological Restoration Area



Wilson River

- Wetland Acquisition area (includes Nolan Slough)
- Hall Slough restoration
- Restoration of approximately 0.5-0.75 miles of channel off Hall Slough northeast of the main channel, below Highway 101
- Bud Gienger riparian restoration/tide gate modification
- Makinster setback levee
- Reconnect old slough to Dougherty Slough
- Lower Dougherty Slough riparian restoration
- Yankee Branch Creek fish passage evaluation/enhancement
- Beaver Creek restoration/passage evaluation
- Hoquarten Slough/wetland restoration

Trask River

- Rudee's Slough restoration/tide gate evaluation/restoration
- Setback/breach dike, restoration
- Holden Creek tide gate modification
- Unknown creek enhancement, restoration, fencing
- Mill Creek restoration
- Riparian restoration across from fish hatchery

Miami River

- Riparian restoration along entire corridor including tributaries
- Estuarine/wetland restoration to Ellingsworth Creek
- Breach dike and restore
- Punch hole in old channel of Miami River upstream of Highway 101
- Remove tile system upstream of Highway 101
- Identify and replace all priority culverts, especially in tributaries
- Reestablish meanders in Minich Creek
- Reestablish meanders in tributary to Moss Creek
- Reconnect forest and wetland
- Placement of large woody debris
- Enhance, restore, and reconnect channels and backwater areas in historic channel
- Riparian planting and fencing

Kilchis River

- Squeedunk Slough reconnection, restoration, passage modification; lower river, large area between Squeedunk Slough and Kilchis; potential levee modifications on east side of Squeedunk and northeast to Kilchis
- Gienger dike restoration; approx. 0.2-mile section on lower river, wooded section
- Vaughn Creek restoration, enhancement, passage modification; fish passage improvement, potential dike breach or setback levee
- Stasek/Neilson Slough restoration, passage modification

- Dooher setback levee, riparian enhancement; approximately 0.5 mile area west of Stasek Slough on the east side of Kilchis River
- Coal Creek and Clear Creek channel restoration, enhancement; habitat improvements just above confluence of creeks and Kilchis River
- Murphy Creek restoration, channel relocation
- Oxbow reconnection, enhancement
- Mapes Creek restoration, passage evaluation
- Kilchis River off-channel rearing
- Mrytle Creek fish riparian and passage enhancement

During the process to narrow alternatives, Tillamook County decided to only support ecosystem restoration alternatives that also provided flood damage reduction benefits, and that were of sufficient size to justify the steps required to receive Congressional authorization for project implementation. Another goal of the County was to achieve general public commitment to the process and the alternatives developed. In addition, the County made written contact with all landowners in the area of the initial 59 measures, and 9 landowners stated that they were not willing to participate in the study. Based on these County requirements, the initial list of 59 measures was reduced to 33 measures that had the potential to provide dual benefits (flood damage reduction and ecosystem restoration).

The remaining 33 alternatives were evaluated based on engineering and biological evaluation as to their ability to provide dual benefits. Because Tillamook County determined that the area of focus should be in and around the City of Tillamook, the alternatives on the Miami and Kilchis Rivers were dropped from further consideration, with the exception of evaluating the lower Kilchis River. This left 14 alternatives for modeling with the MIKE11 model.

3.4 The MIKE11 Computer Model

The MIKE11 model was a one-dimensional, unsteady flow model developed by the Danish Hydraulic Institute. The hydrodynamic model solved Saint Venant equations for fluid momentum and continuity by a finite difference scheme utilizing an alternating grid. At each point in the model grid, the model solved for either stage (H) or flow (Q) on an alternating basis. The model also was able to solve general hydraulic equations for hydraulic structures as internal boundary conditions such as weirs and culverts. Basic input to the model included river cross-sections, structural geometries and geographical networks. The model utilized branches for rivers and floodplains that consisted of nodes (points along the branch) with corresponding cross-sectional dimensions. Like all unsteady flow models, the MIKE11 model required a boundary condition at all upstream branches and downstream branches of a model network. In the case of Tillamook, flow gauges were utilized at all upstream ends of the five rivers and the downstream boundary consisted of tidal conditions in Tillamook Bay.

Geometric data collection done by the Corps included river cross sections; floodplain mapping; river structures (cross sections of bridges, culverts, dikes, levees, and tidegates); boundary condition data (hydrologic data for each point within the model that is either an end to a reach, a beginning of a reach or a source or sink of water within a reach); crest stage gauge data; highwater mark surveys; and tributary inflows.

Interior drainage in the Tillamook region is provided by hundreds of tide-gated culverts throughout the lower river system. As there are so many private culverts, it was impossible for this study to survey them all. However, the Tillamook County Watershed Council in cooperation with the Tillamook Bay NEP completed a cursory inventory of all culverts in the area. This data was used to develop the initial models. Some culvert lengths and most elevations of culverts were estimated from floodplain mapping. For 20 culverts, a local contractor, Nehalem Marine, was hired to survey culvert properties. Other data was gathered from Nehalem Marine's records of recent culvert replacement and installations.

Prior to the MIKE11 model study, the most recent hydraulic modeling study of the Tillamook area was performed in late 1960s and early 1970s by the Corps and CH2M Hill in development of the 1978 FEMA Flood Insurance Report for Tillamook County. This modeling utilized 2-foot topographic data and cross-sectional data gathered in 1965. The study evaluated the rivers with the one-dimensional, steady-state model HEC-2. As all the rivers of Tillamook Bay are tidally influenced, it was readily apparent that the only way to develop a good understanding of flood behavior in the Tillamook area was to develop an unsteady flow model of the rivers.

Initial scoping efforts for the MIKE11 model study included the development of the Corps' one-dimensional, unsteady-flow model, UNET. However, during the scoping phase for the study, the Danish Hydraulic Institute was in the region promoting their unsteady flow model MIKE11. At the time, their model boasted the ability to create flood area maps and slide shows. Also, their model was integrated in a system that allowed the user to incorporate multiple modeling modules such as sedimentation, water quality, and hydrologic models. Tillamook County supported the use of the MIKE11 model for the feasibility study.

WEST Consultants Inc., under contract by the Corps, developed the MIKE11 one-dimensional, unsteady-flow model of the combined Tillamook, Trask, and Wilson River systems for the study. Surveyed cross-section information was provided for the Tillamook, Trask, Wilson and Old Trask Rivers; Hall, Dougherty, and Hoquarten Sloughs; and the 'Little Cut' and 'Big Cut' branches between the Wilson and Kilchis Rivers.

A geographic information system (GIS) triangular irregular network (TIN) was used to define overbank features including floodplain geometry and dike/levee heights for the model, and to delineate flooding extents and depths. Aerial mapping for two-foot contour accuracy of the TIN was conducted by the Corps in September 1999 and May 2000. Bathymetric data for Tillamook Bay was collected by the Corps in 1995 and 2000.

Wilson and Trask River hourly stage and flow data, gauges #14301500 and #14302480, respectively, were obtained from the USGS. Tillamook River flows, gauge #14302700, were collected by the OWRD. Fifteen-minute tidal information at Garibaldi (located near the north end of Tillamook Bay), as well as 15-minute hourly stage data at Kilchis Cove and Dick Point (both in Tillamook Bay), Gienger Farm (on the Wilson River), and Carnahan Park (on the Trask River) were recorded at Corps gauges.

Bridge information was supplied from Corps surveys, Oregon Department of Transportation bridge scour reports and bridge plans, and the 1999 FEMA Flood Insurance Restudy. Culverts included in the model typically connect the overbank areas to the rivers or sloughs. Culvert data were collected and supplied by Tillamook County. Upstream and downstream invert elevations were estimated from the TIN when survey data were not available.

Orthophotos (color photos dated 2000, black and white photos dated 1995) were supplied by the Corps. A photo album by the Best Impressions Picture Company in Rockaway, Oregon and an aerial video of the November 1999 flood event also were provided. Highwater marks for the November 1999, May 2001, and November 2001 flood events were provided by the Corps and Tillamook County. The stage data at Dick Point, Gienger Farm, and Carnahan Park, as well as the imagery of the November 1999 event, also were used in calibrating the hydraulic model.

The MIKE11 model was calibrated to an in-bank event (May 2001) and out-of-bank event (November 1999). In both cases, the simulated versus observed peak values compared relatively well, differing by ±0.4 and ±0.8 feet, respectively, for the two events. The verification run (November 2001) using the November 1999 Manning's 'n' values and geometry varied by ±2.1 feet. However, the November 2001 discharge values were between those in the November 1999 and May 2001 simulations, and different Manning's 'n' values were used when calibrating these two latter events. Therefore, it was determined that the Manning's 'n' values should be modified as well to better calibrate this 'in-between' flow. A verification run of magnitudes similar to those of the November 1999 and May 2001 events was thought to better verify the MIKE11 model parameters.

Areas of potential improvements to the model included making modifications and additions to the culverts and dikes/levees. Only the significant culverts were added to the model, and many of the invert elevations of these were estimated from the TIN. Additional culverts and surveyed invert elevations were believed to be necessary to perform more detailed modeling in any specific location. Dike/levee ('link channel') elevations were also estimated from the TIN. Surveying the dike/levee elevations and modifying the MIKE11 model accordingly was thought to yield more accurate results.

3.5 Preliminary Computer Modeling

Preliminary modeling of alternatives took place to evaluate each area's effectiveness on reducing flood impacts on Tillamook County. Preliminary alternatives were minimally designed to show greatest possible benefits for evaluation. The alternatives were modeled with MIKE11 for the November 1999 flood. Model results were compared to base condition results for the November 1999 flood. After running several scenarios in each alternative area, results were summarized and discussed with the Feasibility Advisory Council.

The following alternatives were evaluated with the MIKE11 model for their effectiveness in reducing flood stages in the Tillamook area. Alternatives were initially modeled with trapezoidal channel cuts and large channel changes. This was done to analyze the alternative's effectiveness in providing flood benefits. If it appeared that flood benefits did exist, then the alternative was kept in the process and further refined. If flood benefits were minimal or did not exist, then the alternative was dropped from further study. The following summary describes each of the alternatives initially modeled and its flood reduction potential.

3.6 Wetland Acquisition Area/Nolan Slough

The Wetland Acquisition area purchased by Tillamook County was already slated for ecosystem restoration. The Feasibility Study found that this area was critical in terms of flooding in the Tillamook area. This area was modeled with MIKE11 by Philip Williams and Associates, Ltd. (PWA) for Tillamook County. The area is cut-off from the rivers and bay by dikes that surround the property. The measures modeled with MIKE11 included dike removal or setback. Environmental restoration benefits included fish and wildlife habitat, fish passage, tidal wetland, ecosystem function, floodplain function, and water quality.

Initial modeling results showed that dike removal or setback in this area resulted in slightly increased peak flood stages at the Highway 101 business district. As this area recently had 10 tidegate culverts installed in the dike bordering Tillamook Bay, it was determined that the area helped alleviate flooding by storing floodwaters during flood tide and releasing floodwaters during ebb tide. It was determined that this area could be included in other alternatives and possibly move favorable results would occur with some modifications (see discussion of Wetland Acquisition/Swale in Section 3.18).

3.7 Hall Slough

Hall Slough is a side channel of the Wilson River. The slough's origins are upstream of Highway 101 near the Wilson River Loop Road, and its downstream end comes back into the Wilson River about 2 miles downstream (near the mouth of the Wilson River). Hall Slough was connected to the Wilson River at its upstream end before 1950. At that time, a bridge was in place that crossed Hall Slough on the Wilson River Loop Road. Since then the slough was filled at its upstream end, the bridge removed, and a small

culvert placed through the Wilson River Loop Road to drain the area behind it. This area represents the area of the Wilson River that overtops first during a flood event. Floodwaters flow over along the left bank of the river near the historic Hall Slough entrance and flow down the Wilson River Loop Road to Highway 101, where they flow south along the highway and eventually cross and flood the highway. These nuisance floods occur frequently and may be controlled by reestablishing the historic slough connection to the Wilson River. The measures modeled with MIKE11 included connecting the slough to the Wilson River at the upstream end, setting back dikes, establishing new levees along the slough, and deepening the slough. Environmental restoration benefits included fish and wildlife habitat, fish passage, tidal wetland, ecosystem function, floodplain function, and water quality.

Initial modeling results using the November 1999 flood event showed that the slough would carry approximately 1,000 cubic feet per second (cfs) of floodwater that would have previously flooded Highway 101. This alternative also lowered the duration of flooding on Highway 101 by approximately 4 hours. Although this alternative would not control flooding for all floods in excess of the nuisance floods, it would help to control the common flooding in the Highway 101 area.

3.8 Lower Trask River

This alternative is located along the Trask River between river mile (RM) 2 and the downstream confluence with the Tillamook River. This area represents a constriction in the Trask River because the lower river was rerouted and channelized. The river channel has a much lower capacity in this reach than both reaches upstream and downstream from it. Furthermore, this reach of the river lacks riparian habitat and channel complexity. This reach is essentially a tidal flume devoid of riparian vegetation other than grazed, trapezoidal banks. The measures modeled with MIKE11 for this reach included setting back dikes and widening and deepening the channel. Environmental restoration benefits included ecosystem function, floodplain function, and water quality.

Initial modeling results showed that modifying the channel had the most profound effects on flood stages, whereas dike modification provided minimal flood reduction. Channel modifications were initially modeled as large cuts on the extreme side of what would be realistic to perform. However, this was done to determine the largest flood reduction benefit and to determine if further development of the alternative was warranted. For the November 1999 flood, water surface elevations were significantly reduced in the reach, as well as upstream of the reach. Stages in the Tillamook-Trask Drainage District, an upstream area frequently flooded, were reduced by about 1.3 feet. At the same time, the Trask River was carrying approximately 6,000 cfs more flow through this reach of river. From a flooding standpoint, this alternative increased flow through the reach and decreased flood stages. Although the channel modification was modeled on the extreme side in terms of channel geometry, the possibilities for minor flood reduction benefits in this area were shown.

3.9 Old Trask River

The Old Trask River is a branch of the Trask River, possibly representing the former mouth of the Trask River. This reach flows between the Trask River and the Tillamook River near Trask RM 1.8, and helps alleviate flooding on the Trask River. The reach currently has levees/dikes along both sides. The Stillwell Drainage District is on the north side of the channel and the Tillamook-Trask Drainage District is on the south side. The Stillwell levee provides approximately 50-year protection while the Tillamook-Trask dike only protects for tidal flows. Therefore, the area to the south is often flooded. The measures modeled with MIKE11 included modifying the channel by widening and deepening, as well as setting back the levees/dikes along the channel. Environmental restoration benefits included ecosystem function, floodplain function, and water quality.

Initial modeling results showed that this alternative had similar results as the Lower Trask River alternative, but on a smaller scale. Setting back only the levees/dikes showed minimal benefits, whereas setting back both the levees/dikes and modifying the channel provided the greatest flood reduction benefits. Channel stages were only slightly reduced; however, an increase in channel capacity of about 2,400 cfs was obtained from the combined measures when modeled using the November 1999 flood event.

3.10 Dougherty and Hoquarten Sloughs

Dougherty and Hoquarten Sloughs below Highway 101 represented a critical area in terms of both flood problems in the Highway 101 business district and environmental concerns. Several alternatives were evaluated with the MIKE11 model to assess possible solutions to flood problems in this area. The measures modeled included removal and/or setback of dikes, channel modifications, and a combination of alternatives in downstream reaches. Channel modifications included benching one side of Dougherty and Hoquarten Sloughs from the bridge at Highway 101 to the Trask River, lowering cross dikes along Hoquarten Slough, and setting back the Trask River dike in the Wetland Acquisition area. Also, an alternative was modeled with the channel modifications in the Trask River alternative. Environmental restoration benefits included spawning habitat, tidal wetland, ecosystem function, floodplain function, and water quality.

Initial modeling results showed that if modifications were only performed within Dougherty and Hoquarten Sloughs, very little effect would occur to flood levels at Highway 101. However, if the alternative incorporated dike setbacks and channel modifications, then significant flood reductions could be achieved at Highway 101.

3.11 Lower Wilson River Channel Modification

The objective for this alternative was to increase flood conveyance to Tillamook Bay in the lower reach of the Wilson River. The lower reach is between the railroad bridge over the lower Wilson River and Tillamook Bay on the Wilson River mainstem. The channel

was modified throughout this reach to increase channel conveyance by a combination of deepening and widening. Environmental restoration benefits include ecosystem function, floodplain function, and water quality.

The channel was initially modified as a trapezoidal channel with a bottom width of 80 feet and 2:1 side slopes. This modification was only performed for narrow areas as some areas of the reach were already this large. The bottom was deepened such that a positive slope occurred throughout the reach. Most of the deepening was located where sedimentation has occurred below the 'Big Cut' branch between the Wilson and Kilchis Rivers to Tillamook Bay. Model results showed that flows could be increased by approximately 2,000 cfs in this reach and channel stages could be reduced by 0.3 foot at the railroad bridge to 1.3 feet near the bay. Flood cells adjacent to this reach also had reduced water surface stages and flood durations. This channel modification showed some flood benefits to the lower Tillamook region.

3.12 Lower Wilson River Dredging

The Wilson River branches into three reaches before its terminus into Tillamook Bay. Bathymetric data and historic accounts show that this area has been aggrading for some time. Sediment and woody debris deposits have been left in the area. This reach represents a very dynamic area in terms of sedimentation and planform morphology. At the tidal interface, sediments are deposited as the Wilson River slows. Historically, the river would have aggraded and changed course as a delta was formed. However, development created a condition where the river was not allowed to change course. To determine the extent of impact on flood conditions from sedimentation, the area was dredged and the three channels deepened in the MIKE11 model to determine if sedimentation was causing flooding problems upstream, and if dredging would alleviate the problems.

Using a trapezoidal channel, the 'Little Cut' and the 'Big Cut' branches between the Wilson and Kilchis Rivers were dredged with an 80-foot bottom width and the mainstem of the Wilson was dredged with a 100-foot bottom width. Side slopes were 2:1. Dredging depths ranged from zero to 5.5 feet to achieve a positive slope to the bay. Dredging was performed from RM 0.25 to the mouths of the three branches. Initial modeling results showed that there was stage reduction in the Wilson River at the dredge location and in nearby flood cells of up to 1 foot. Upstream, however, the stage reduction was reduced until it was null at Highway 101 across the Wilson River. This appeared to be caused by the existing channel constraints between Highway 101 and the mouth of the Wilson River. These constrictions in the channel control the water surface slope during flood conditions.

3.13 Lower Wilson River Channel Modification/Dredging

This alternative combined the channel modification from the railroad bridge at RM 2 to the mouth and included full dredging of the Wilson and the 'Big Cut' and the 'Little Cut' branches as described for the dredging alternative. Modeling results using the

November 1999 flood event showed that no further stage reduction was realized at Highway 101 during flood conditions. Some minor stage reduction did occur near the dredged area. These results show that water surface stages at or above Highway 101 during high water conditions are controlled by the capacity of the Wilson River channel, not by tidal conditions or sedimentation at the mouth of the river.

3.14 Lower Trask and Tillamook Rivers Dredging

Similar to the Wilson River, the Lower Trask and Tillamook Rivers have been aggrading at their tidal interface with Tillamook Bay. This alternative analyzed dredging the sediments in the Lower Trask and Tillamook Rivers to view the effects on flooding at upstream locations in the Tillamook region. The Tillamook River was dredged from RM 0.86 to the bay and the Trask River was dredged from RM 1.14 to the bay. The Tillamook River was dredged with a bottom width of 215 feet and depths varying from 0.6 to 5.2 feet. The Trask River was dredged with a bottom width of 80 feet and depths varying from zero to 3.0 feet.

Initial modeling showed results that were similar to those of the Lower Wilson River Channel Modification/Dredging alternative. Water surface stages during flooding were reduced in and near the dredged area. This included stage reductions of up to 1.6 feet on the Tillamook River near the Netarts Highway bridge and up to 0.8 feet on the Trask River near its mouth. Adjacent flood cells had a reduction in flood stage from 0.3-0.5 feet. Also, the Trask River had an approximate 1,200 cfs increase in flow at it peak. However, at locations upstream including Highway 101 at Hoquarten Slough, impacts from dredging were minimal. From these results, it appeared that a project on the Trask River may be beneficial to flood stages if it included either the Lower Trask River or Dougherty/Hoquarten Sloughs alternatives, or some combination of the alternatives.

3.15 Refined Alternative Analysis

The initial MIKE11 model results described above showed that the greatest flood damage reduction benefits could be achieved by increasing the capacity of the existing channels or by providing additional channels. The most effective way to increase the capacity of the channels would be to increase the width of the channel. Increasing the depth of the channel did have an effect and may be effective in conjunction with increased channel width based on the specific river under consideration. However, increasing channel depth had a much less significant impact on flood levels and is more localized in nature. The key for both ecosystem restoration and flood damage reduction benefits appeared to be associated with increasing channel width or providing additional channels.

Initial modeling results were presented to the Feasibility Advisory Council and interested citizens on March 27, 2002. From these preliminary results, discussions ensued as to which alternatives were to remain for further evaluation and cost analysis. From the modeling results, it appeared that some alternatives likely would not provide many flood damage reduction benefits to the Tillamook area. Therefore, Tillamook County decided

that these alternatives would no longer be studied. Through a long process and much discussion, three alternatives remained for detailed evaluation because they had the greatest potential to provide dual ecosystem restoration and flood reduction benefits. The alternatives considered for further study included Dougherty Slough, Hall Slough, and the Wetland Acquisition/Swale area.

3.16 Dougherty Slough

The Dougherty Slough alternative would reconnect the slough to its floodplain from Highway 101 downstream to the Trask River. Dikes would be removed and the top 2 feet of soil would be scraped from the banks to reconnect the slough to the floodplain. Riparian vegetation and fencing would be placed adjacent to the slough channel, and some large wood would be placed in the slough for habitat complexity. To achieve more than incidental flood reduction, it would be necessary to increase channel capacity, a measure which would be unlikely to be economically justified. Because this alternative was the County's lowest priority of the three alternatives being considered for further study, this alternative was not developed further, although the study concluded that it remained a viable ecosystem restoration alternative.

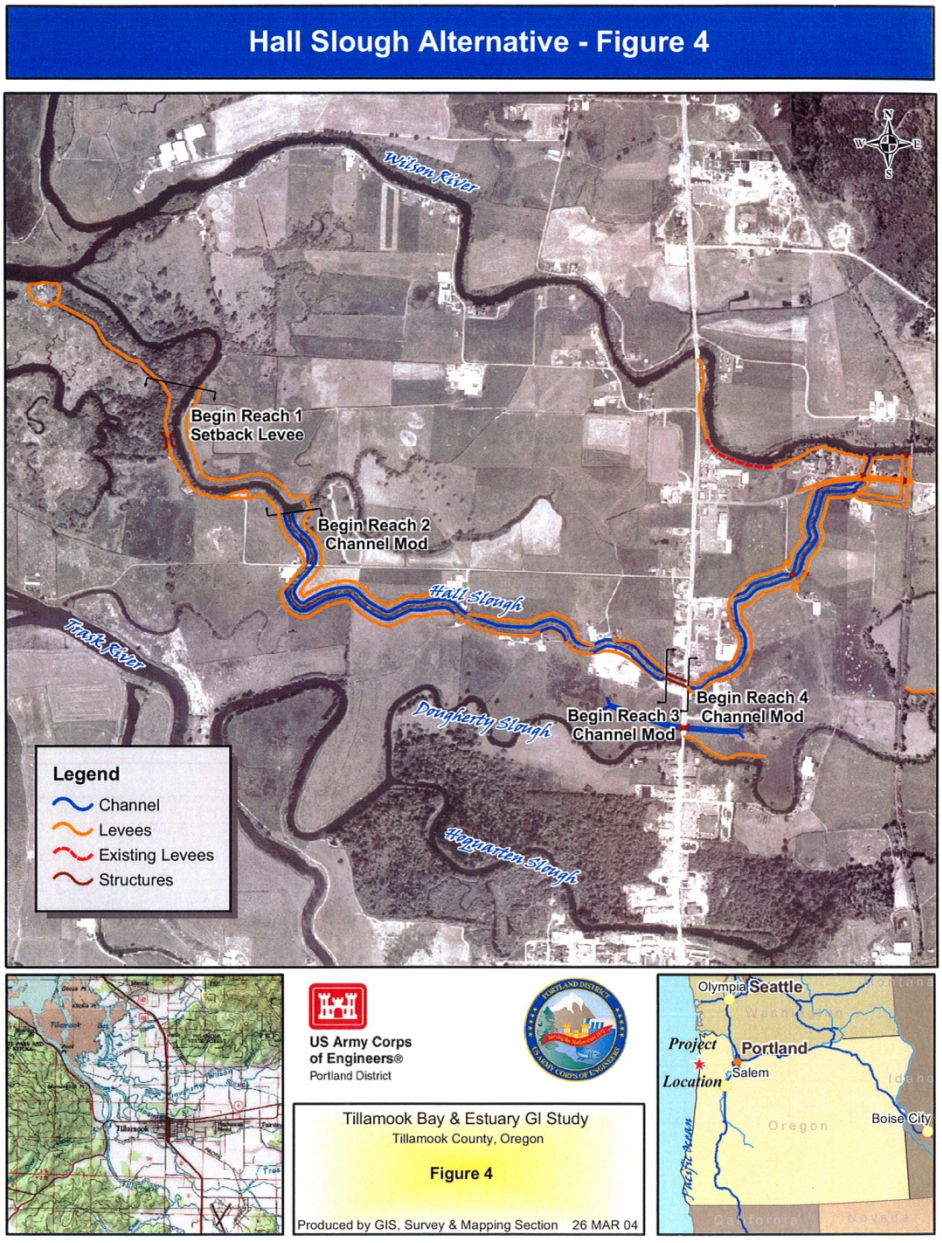
3.17 Hall Slough

The goals for the Hall Slough alternative were to restore upper Hall Slough to conditions that would be ecologically beneficial, especially to salmonids, as well as collecting overflow from the Wilson River into a channel for passage to Tillamook Bay. Hall Slough was disconnected from the Wilson River at its upper end and floodwater has since filled much of the historic upper channel with sediment. As floodwater overflows the Wilson River, it flows out towards the historic upper slough connection, but ends up flowing down roads and fields including down and across Highway 101. Hall Slough is not large enough to contain all the floodwater, but it could contain flows of up to about 1,000 cfs, which is approximately the amount of overflow that occurs with an annual flood. These nuisance floods disrupt Highway 101 could be completely controlled. Also, another goal was to take excess floodwater (above 1,000 cfs) from this area and direct it around Highway 101 to the greatest extent possible.

In the MIKE11 model, the slough was deepened throughout to maintain a positive slope to the bay and to be tidally active throughout its length. A conceptual overflow structure also was placed at the slough's upper end to allow flows from the Wilson River to enter Hall Slough when the river reached an elevation of 15.4 feet NAVD88 (North American Vertical Datum of 1988). Wilson River flows would then be allowed in Hall Slough via a weir structure. In order for increased flows in Hall Slough to remain within the slough, the slough was widened and deepened from its upstream end down to the Goodspeed Road bridge. Also, small levees were needed in a few low spots along the slough. The Hall Slough bridge at Highway 101 was lined with vertical concrete walls and deepened to pass flows of 1,000 cfs. Hall Slough downstream of Goodspeed Road was unchanged other than the dike on the right bank was setback for riparian plantings.

Modeling was performed using the January 25, 2002 flood which represented an annual event on the Wilson River. Modeling results showed that overflows from the January 2002 flood that had flowed across Highway 101 and into the fields behind Fred Meyer were contained in Hall Slough.

In summary, the Hall Slough alternative consisted of reconnection of tidal flows in the historic slough, high flow flushing from the Wilson River, and setback levees with riparian plantings (See Figure 4). It was a high priority ecosystem restoration action and would eliminate flooding in the Highway 101 business district up to approximately the 2-year flood event. A preliminary cost estimate for this alternative was approximately $7.5 million. To meet the 35% cost-share requirement, the County would need approximately $1.5 million in cash plus donated land (approximately $1 million) for implementing the alternative. Because the County indicated that it did not have adequate funds for implementation, the alternative was not developed further.



3.18 Wetland Acquisition/Swale

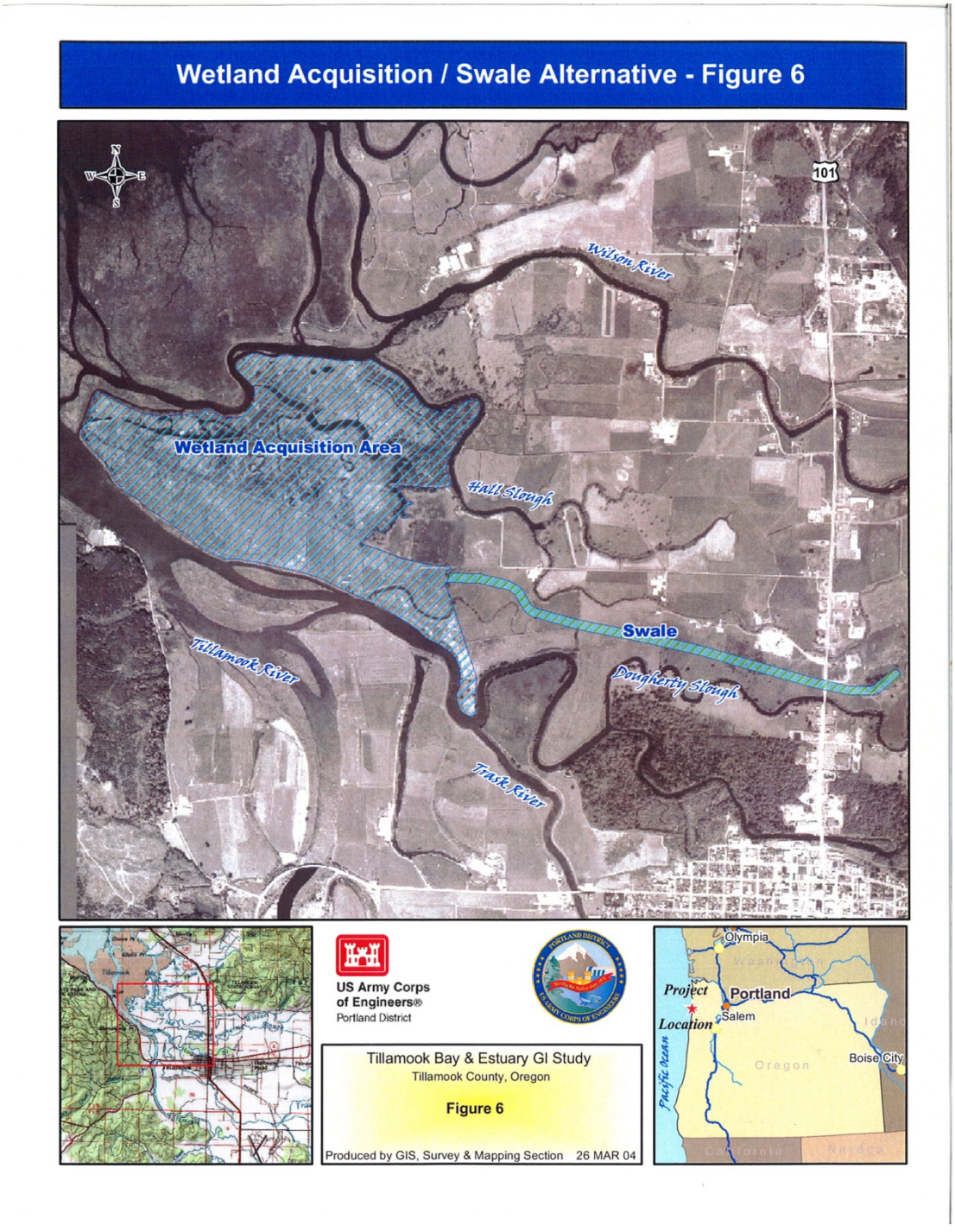
The Feasibility Study report found that the wetland acquisition/swale alternative represented a unique area in the Tillamook Bay watershed. Not only is it at the tidal interface of the two largest rivers in the area (Wilson and Trask Rivers), it sits at the downstream end of the area's greatest flood prone properties, the Highway 101 business district. It appeared to be an area with a good likelihood of providing both flood reduction and ecosystem restoration benefits.

During initial MIKE11 modeling, it was shown that opening up the diked area to tidal conditions would increase flooding conditions at Highway 101. Since this would not be acceptable, other alternatives were considered. One of these alternatives showed some positive results for allowing the wetland acquisition area to be reconnected to tidal conditions of Tillamook Bay by setting back the existing dikes, while also reducing flooding at Highway 101. This alternative included a large swale that would begin upstream of Highway 101 and continue downstream to the edge of the wetland acquisition area (See Figure 6). The swale concept was simple in that it would be a large depression that would remain dry for most of the year. However, during flood conditions, overflows from Dougherty and Hall Sloughs would end up in the swale and be swiftly evacuated to Tillamook Bay during ebb tide. The current situation allows for these overflows to find their way to the bay through businesses, farm fields, and dikes. The swale was located in fields used for grazing of dairy cattle, and it was assumed this use could continue with the swale.

The initial swale design consisted of a long, shallow depression that would have a minimal slope and invert elevation of 5 feet NAVD88. The depression had a bottom width of 50 feet and a top width of 150 feet with varying side slopes of 10- to 25-feet horizontal to 1-foot vertical. The intention of the swale would be to collect overflows from Hall and Dougherty Sloughs in a central location and to evacuate those overflows in the most expedient manner possible. The swale included a bank of ten 6- feet in diameter tide-gated culverts at its downstream end in the levee for the wetland acquisition area. It also included culverts under Highway 101. Initial modeling results for this concept showed that during the November 1999 flood, maximum flood elevations at the swale just upstream of Highway 101 would have been 0.3 feet lower and the duration of flooding would have been 5 hours less with the swale in place.

A geotechnical investigation was undertaken by the Corps along the proposed alignment of the swale. Hand auger borings were made at each end of the swale and at six intermediate points. The borings were taken to a depth of 4 feet. Materials recovered in all borings were generally plastic silts and clays, except for peat that was found at approximately elevation 3.4 feet NAVD88 at the western end of the swale alignment. The soils were brown, with no signs of mottling which indicates that they were generally above the water table. In general, the soil in all borings had a medium consistency between the surface and a depth of 2 feet, but below about 2 feet the strength of the soil declined dramatically and the consistency dropped to very soft. The FS report concluded that this rapid change in soil strength was probably the result of cyclic

saturation and drying which tends to cause plastic soils to develop high negative pore pressures that consolidate the soil. Compaction of the upper surface of the soil also was a function of it use by farm equipment and grazing animals.



The lack of soil strength below a depth of 2 feet would impact construction. It also would take some time for the soil to gain sufficient strength to support livestock once construction was complete. As would be expected, the soil moisture content increased with depth. Water was encountered in the last four borings at the western end of the swale, and depth to water was estimated in the remaining borings. Groundwater was estimated to be at about elevation 6.5 feet NAVD88 on the east side of Highway 101, and varied between about elevation 6 feet NAVD88 just west of the highway and elevation 4.5 feet NAVD88 at the west end of the swale. Groundwater in the western half of the swale alignment appeared to be controlled by drainage ditches. It could not be determined if any agricultural drainage tile had been installed in any of the areas. The study concluded that if this was so, it was probable that it was helping control the groundwater elevation.

Therefore, with the swale at elevation +5 feet NAVD88, the study concluded it was possible to keep the groundwater sufficiently low enough to allow beneficial use of the swale if a drainage ditch is incorporated into the swale design. The ditch would need to be tied to a local drainage system, which has a tide gate to control water levels to about elevation 3.5 to 4 feet NAVD88. Also, the soil below a depth of 2 feet had insufficient strength to support conventional construction equipment. The study also concluded that special considerations would be needed when planning the construction period and sequence. It was recommended that construction be scheduled for late summer, and that low soil pressure construction equipment would be necessary.

In summary, the study found that the Wetland Acquisition/Swale alternative restored tidal marsh/wetlands with actions to offset flood increases. It was a high priority ecosystem restoration action that would reduce flooding for lower flood events. However, the County requested that remaining study funds focus on developing the Modified Wetland Acquisition alternative endorsed by the Tillamook Bay Habitat and Estuary Improvement District (TBHEID). This modified alternative met ecosystem restoration requirements without causing an increase in flood elevations, met the requirements of the County, and was acceptable to the community. After initial evaluation and modeling, the County requested that the Modified Wetland Acquisition alternative be transferred to either the Continuing Authorities Program (CAP) or to Section 536 of the Water Resources Development Act of 2000 (Public Law 106-541) for further evaluation and implementation.

3.19 Conversion to the HEC-RAS Model

With the decision to transition from the GI feasibility study process, a decision also was made to convert the existing MIKE11 model to the Corps' HEC-RAS model. At the time the MIKE11 model was selected for use in the study, it had a solid reputation, whereas not enough information was available for the HEC-RAS model. Subsequently, a newer version of the HEC-RAS model was developed, which was more sophisticated than MIKE11 and more capable of addressing the complex nature of flooding in the Tillamook area. The HEC-RAS was at that point the most common river analysis model used. It was believed that the HEC-RAS model would be able to serve the Tillamook project in an easier and less expensive manner. WEST Consultants Inc., under contract by the Corps, performed the conversion of the MIKE11 model to HEC-RAS.

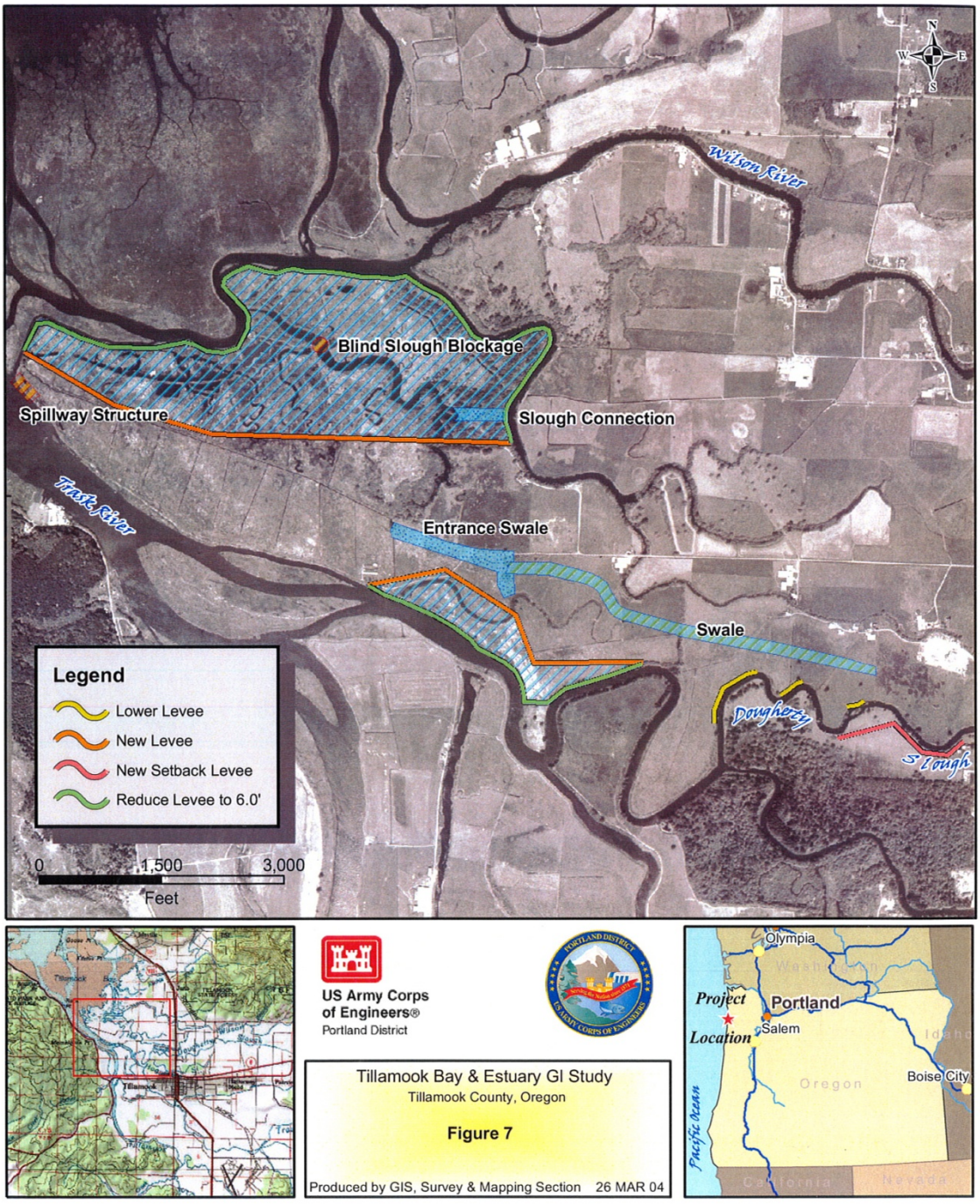
3.20 Modified Wetland Acquisition Alternative

The TBHEID provided Tillamook County with four documents suggesting numerous concepts to modify the Wetland Acquisition/Swale alternative. The goals for the alternative were to form a large area of fully tidal saltwater marsh including two major slough systems, a large area of enhanced regulated tidal wetland for juvenile salmon habitat, and enhancement of an area for Aleutian Canada Goose habitat, as well as providing flood damage reduction benefits. The concepts were incorporated into the Wetland Acquisition/Swale alternative by the study team to develop the Modified Wetland Acquisition alternative. A preliminary cost estimate for the Modified Wetland Acquisition alternative was approximately $4.5 million. The Modified Wetland Acquisition alternative was modeled and analyzed with the HEC-RAS model.

The dominant new feature included a new levee dividing the area in half, east to west, separating a fully tidal area to the north with a flood storage area to the south (See Figure 7). Agreement was reached that while flood storage area could be used for ecosystem restoration, it could not be fully tidal and it must be reserved for flood storage and conveyance during flood events. A muted tide concept was discussed. The muted tide gate would allow the flood tide to rise to a specified elevation, for example 5 feet NAVD88, but the tide gate would shut at the specified elevation. The muted tide would allow partial saltwater intrusion on the wetland acquisition property and prevent seawater from reaching the landowners beyond the project boundaries.

The full-time saltwater marsh to the north would be reconnected to the Wilson River by removing the plug in Blind Slough, removing the levee at several historic sloughs, and creating an overflow from the left bank of Hall Slough. Beyond the wetland acquisition property a swale would be required from the project boundary to Averill's property boundary but would not be required to extent upstream of Highway 101. Without the swale, the project caused a rise in 100-year flood elevations at several locations. The swale was included to ensure that the project did not increase flood elevations. An additional ecosystem restoration feature of the flood storage area could be an excavation of the existing drainage ditch and additional excavation to create saltwater marsh that would be inundated with the muted tide.

Modified Wetland Acquisition - Figure 7



Following completion of the HEC-RAS modeling of the Modified Wetland Acquisition Alternative, it was contemplated that the property acquisition costs would be used as local match for the $4.5 million Corps project costs, supplemented by the balances remaining in the OWEB acquisition and restoration grants.

In July 2004, Tillamook County was notified by OWEB that OWEB grants #99-421 and #99-804 must be completed on or before December 31, 2004. At about the same time, Tillamook County also learned that Corps of Engineers funding would not be available for the Modified Wetland Acquisition Alternative under either the Section 206 program or PL 1-6-541 in the current federal fiscal year, and that future funding was uncertain. Congress had swept the Corps budget to pay for the war in the Middle East.

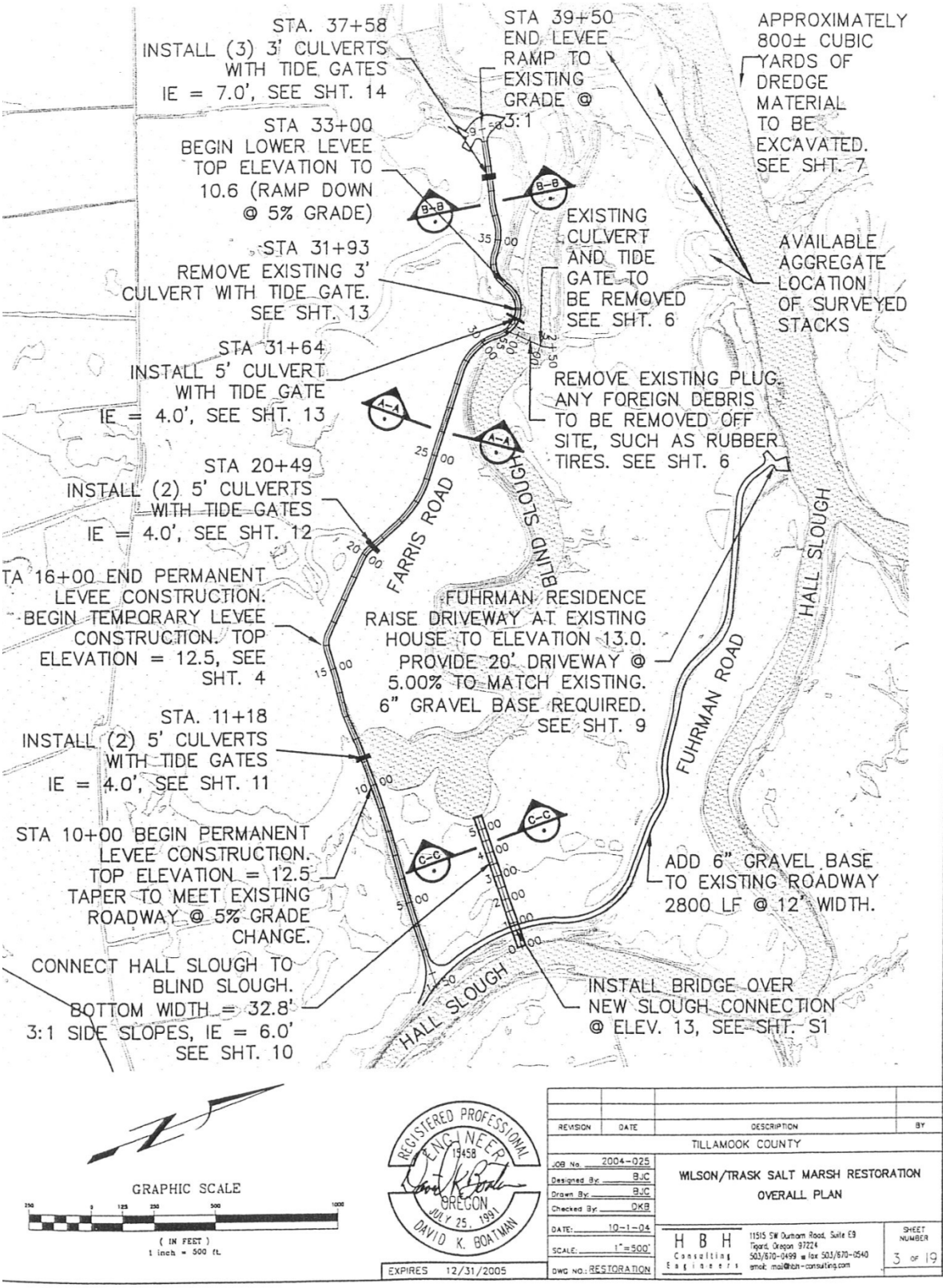
The loss of Corps funding dealt a devastating blow to the community. In a March 15, 2005 letter to the Corps' Civil Works Deputy in Washington DC, County Commissioner Tim Josi noted that the County was now strapped by the $420,000 loan to pay for its cost share of the Feasibility Study and was in danger of having to also pay back another $420,000 grant because no project was forthcoming. He reminded the Corps that it had encouraged the County to join in the Feasibility Study with the promise of a 75 percent match for a project once the study was completed. Calling the situation "...fundamentally unfair and misleading...," Commissioner Josi admonished the Corps to honor its commitment and find a way to fund the project.

After consulting with OWEB staff and holding a meeting with agency regulators, it was decided to proceed on a reduced project that would at least involve a partial wetland restoration project, breach some of the levees, and reconnect the major ancient slough by utilizing the balance of the grant funds prior to year's end. Consequently, the County utilized the remaining balance of its share of the Corps Feasibility Study fund to have the Corps model a modified ecosystem restoration project that would not cause an increase in flood elevations. The result was the Tillamook County Summer '04 Project dated 15 June 2004.[17] (See Wilson/Trask Salt Marsh Restoration Overall Plan.)

The next step, after consultation with OWEB staff, was to hire a consulting firm that could complete the permit applications and design work required for the project. Tillamook County contracted with Landlinks Consulting for preparation of permit applications and construction engineering and bid documents. The biggest portion of that cost was $21,025 for final engineering design, construction drawings, and bid documents. The total cost for this work amounted to $30,742.49.[18]

[17] Paul Levesque, *Narrative Report,* (March 18, 2005).
[18] *Narrative Report.*

Wilson/Trask Salt Marsh Restoration Overall Plan



Bids were opened on October 19, 2004. Only one bid was received in the amount of $589,218.00 from Nehalem Marine, an amount well in excess of the remaining grant funds available. At that point, after consultation with OWEB staff, the decision was made to conduct value engineering negotiations with the bidder to reduce project costs, execute a contract and apply for additional funding. The executed contract allowed the County to cancel all or part of the contract at the County's discretion and further provided that the contractor would not incur any costs, including bonding and insurance, unless or until notice to proceed was provided on those elements by the County. The contract did provide for a design build on the bridge footings based on the results of geotechnical investigations. The County provided notice to proceed on that element at a cost of $4,000.[19]

In the acquisition of the three parcels constituting the 377 acre wetland area, one of the sellers (Fuhrman) elected to retain his house and 1.48 acres upon which it was situated. Consequently, it was necessary to design the wetland project around this house. The Corps of Engineers' design for this project area contemplated that a ring levee be constructed around the house with a pump system for dealing with water that would collect inside the levee. The County's project manager investigated an alternative for elevating the house, thereby eliminating long-term maintenance costs associated with a levee and pump system. An elevated parking area would be added.[20]

The County solicited a construction cost estimate for a ring levee for comparative purposes which came in at $44,204 paid at prevailing wage rates. Three bids were solicited from contractors in Tillamook County with extensive experience in elevating structures. One bid proposal was received in the amount of $59,942. The property owner preferred having the home elevated and therefore agreed to reimburse the County the difference between the bid amount and the estimated cost of the ring levee (i.e., $15,737 reimbursement). Therefore, the actual cost to the County for elevating the house was $44,204.[21]

One of the proposed major restoration features was to reconnect an ancient slough network. More particularly, the Blind Slough was proposed to be reconnected to Hall Slough. This reconnection crossed an existing roadway that provided access to the house retained by Fuhrman. Consequently, the restoration design required that a bridge be constructed at the point where the Blind Slough reconnection crossed the access road. Due to the nature of the soils at that location, the engineering specification necessitated geotechnical investigation (borings) and the report be provided as part of a design-build solution. A $7,950 contract was executed with Squier/Kleinfelder to perform the geotechnical investigation and report. After completing two borings (one to 20 feet and another to 50 feet), it became obvious that the soil had a high potential for liquification. At this point the county discussed with the geotechnical engineers the risks

[19] *Narrative Report.*
[20] *Narrative Report.*
[21] *Narrative Report.*

associated with earthquakes versus designing only of an 80,000 pound static load. To protect the County's liability, an additional $3,500 contract modification was made for deeper explorations in hopes of finding a stiff or dense layer in which to embed foundation pilings. A larger drilling rig was moved to the site. A boring was drilled to 100 feet deep where material encountered beyond 100 feet had a high potential for liquification. The geotechnical engineers evaluated how the bridge foundations would perform under different earthquake magnitudes in order to give the County a better sense for the risk involved with designing the bridge foundations for only static loading. They also performed preliminary evaluations of several foundation alternatives outside of piling or spread footing options and provided this information to the construction contractors' structural engineer.[22]

With the completion of the geotechnical investigation, all preliminary work was completed. The executed construction contract had this project ready to proceed once funding was secured and Corps of Engineers' consultation with NOAA Fisheries was completed. However, time ran out before permits could be secured, so the balance of the remaining OWEB funds was returned to the USFW following the December 31, 2004 deadline.

4.0 THE 2006 FLOOD SUMMIT

In late 2005, major flooding once again visited the area. Beginning December 22nd, and continuing into January, heavy rains caused flooding, landslides and erosion throughout western Oregon. By January 13, 2006, Governor Kulongoski made an emergency declaration by executive order.

Floodwaters only served to exacerbate community resentment that the $3,382,000 cost of the Corps Feasibility study, including the 20-year County loan to help cover the County's matching costs, had produced no tangible results.

Due in large measure to this growing frustration, local and state leaders decided to convene a "Flood Summit." Widespread advertising and local press coverage was undertaken for the event. The Tillamook *Headlight Herald* ran an advance story noting that the County Commissioners were hosting the meeting in collaboration with TBHEID, TBNEP, and the City of Tillamook.[23] Written invitations were extended to key local, state, and federal stakeholders. Additionally, a core group of 20 participants was invited by Tillamook County Commissioner Mark Labhart to serve as a panel.

The group convened on April 3, 2006, and included a broad range of private and public interests including: federal, state and local agencies; the TBHEID; TBNEP; dairy farmers; and local businesses. State Senator Betsy Johnson and Representative Debbie Boone also attended, along with staffers from the Oregon Congressional delegation.

[22] *Narrative Report.*

[23] *Tillamook Headlight Herald*, posted online, March 28, 2006, 12:00 a.m.

5.0 THE OREGON SOLUTIONS PROJECT

It was at this April 3, 2006, meeting that Senator Johnson posed the possibility of seeking designation of the Tillamook flooding issues as a possible Oregon Solutions project. With passage of Oregon's Sustainability Act in 2001, the Governor's office had launched the Oregon Solutions Program. Under the community governance model, Oregon Solutions brings together federal, state and local government agencies with community leaders to seek collaborative solutions.

Following the Flood Summit, County staff worked with TBNEP to prepare and submit grant applications for the Modified Wetlands Alternative project. But beginning November 6, 2006, more than 20 inches of rain fell in portions of Tillamook County within a 48-hour period. The Wilson River crested at a record high level of 38,000 cfs. Over 100 homes and businesses were evacuated. Portions of Highway 101, Oregon Highway 6, Oregon Highway 53 and numerous local roads were closed due to high water and slides. The Governor declared an emergency on November 7, 2006.[24] While still in the flood recovery phase, the county applied to the Governor on December 18, 2006, for designation as an Oregon Solutions project.

Following an assessment by Portland State University, flooding in central Tillamook County was designated by Governor Kulongoski as an Oregon Solutions project in April 2007. State Senator Betsy Johnson and County Commissioner Mark Labhart were designated by the Governor as co-conveners. The first meeting was held May 23, 2007, project goals and evaluation criteria were established over the summer and by September a list of nine priority projects was agreed upon.[25] In November 2007 a Declaration of Cooperation was executed by 24 federal, state, and local agencies, nonprofit organizations, and local business interests including members of the congressional delegation, state legislators, the Governor's Office, the Port of Tillamook Bay, the Tillamook Creamery Association, and Tillamook Farm Bureau. Each participant also signed a Statement of Assurances affirming their commitment to the process and identifying the resources they would bring to the table. A 34-member Project Team was assembled, led by the co-conveners and including local representation from the farm community, businesses, landowners and fishing guides. A variety of workgroups was established and a Design Committee was assembled from the participants. The Design Committee was formulated to review project alternatives, develop their design and devise a process to obtain permits. The co-conveners appointed one representative from each of the following interests to serve on the Design Committee: USACE, ODOT, National Marine Fisheries Service (NMFS), ODF&W, Department of State Lands (DSL), Farm Community, Tillamook County and the City of Tillamook. Rick Klumph, ODF&W North Coast Watershed District Manager was appointed as Design Committee Chair.[26]

---

[24] Executive Order No. 06-15, signed by Governor Kulongoski, November 7, 2006.

[25] *Wilson/Trask Spillway; Tone Road Spillway; Dougherty Slough Permanent Structure; A Comprehensive Community Vision and Strategic Plan; the Trask Hook; Implementation of City/County Flood Mitigation Plans; Completing the Mediated Gravel Agreement/Stream Corridor Management Plan; the USACE Feasibility Study Hall Slough Project; and the Modified Wetlands Restoration and Swale Project.*

[26] Tillamook Basin Flooding Reduction Project, *Declaration of Cooperation* (November 2007).

A November 13, 2007, editorial in the Tillamook *Headlight Herald* described this as "A Flood of Opportunities."

Due largely to the efforts of Senator Johnson, the project received a $1 million legislative appropriation. Another $33,000 was raised through contributions. Following another major flood on December 3, 2007, Tillamook Oregon Solutions completed a number of major projects during 2008.

5.1 Dean Dirt Pile[27]

The prior year, the City of Tillamook, in cooperation with the County, had acquired a former car dealership and commercial property located in North Tillamook City flood plain under the FEMA Repetitive Loss Buy-Out Program. The parcel was situated in the lowest area of this flood cell and contained 12,000 cubic yards of fill material placed on the property in prior decades. This fill was a substantial impediment to the discharge of flood water and removal of the fill was identified as an Oregon Solutions priority project.

The Oregon National Guard (ONG) participated in this project under its Innovative Readiness Program. The project was initiated in the Spring of 2008 under very wet weather conditions that prevented trucks from operating on the fill. Consequently, ONG bulldozers pushed fill material to the site entrance where an ONG bucket loader filled the dump trucks. A water pumper truck had to be used to wash down the dump trucks before they entered US Hwy 101. The material was transported by local trucking companies approximately five miles to a fill site where the owner waived the $3 per yard "push fee" since ONG bulldozers also pushed the delivered material into place. By the time the ONG had used up its allotted time for this project, approximately 8,500 cubic yards had been relocated.

In the Summer of 2008, after the site had dried out, the project was completed by a local contractor, Nehalem Marine. The site was graded and seeded with native grasses.

Total Oregon Solutions costs were $71,639 for the project with an additional $49,840 in matching funds and in-kind expenditures.

5.2 The Wilson/Trask and Tone Road Spillways[28]

Two gated spillways were identified by Oregon Solutions as high priority projects. Initially, the US Army Corps of Engineers (Corps) explored the projects as Advance Measures. Although the projects did not qualify as such, the preliminary Corps modeling produced valuable elevation data for two proposed gated spillways: one on private property on the Tillamook River in the Trask Drainage District (Tone Road) and the other on County wetland acquisition property at the confluence of the Trask and Wilson Rivers. The County undertook public contracting procedures for a design-build project using the Corps design criteria. As part of the ONG project described above, ONG

[27] Paul Levesque, *Tillamook County Oregon Solutions Project Report* (December 31, 2008).
[28] *Tillamook County Oregon Solutions Project Report*.

personnel reopened the road to the Wilson site that had been covered with flood debris from the December 2007 storm. A phased contract was awarded to Nehalem Marine for the design-build of both spillways, while the County undertook permit applications for both projects. Geotechnical investigations and detailed engineering design were completed at a cost of $18,000. Issues that arose during permitting required design modifications that resulted in a $10,000 change order that was paid on final completion. Permits were secured for the Wilson Spillway and construction was completed in September 2008 at a total project cost of $317,845. A $10,000 cash contribution for this project was made by the Tillamook Bay Habitat and Estuary Improvement District. Following completion of the Wilson/Trask Spillway, two significant flooding events occurred that winter and the spillway performed extraordinarily well resulting in water draining form the North Hwy 101 shortly after the high tide turned and significantly shortening the inundation duration of the lands west of the highway.

The Tone Road Spillway projected a positive benefit for farm land where excessive loss of dairy cows occurred in two floods in the prior decade. The project installed a second gated spillway to carry flood water into Tillamook River. By October 2008, all permits were secured for the Tone Road Spillway. Pursuant to the original contract provisions with Nehalem Marine, a contract modification in the amount of $276,000 was executed and a Notice to Proceed was issued. An additional contract was made with Professional Services Industries (PSI) in the amount of $6,450 for materials testing and special inspections. The project was completed in April 2009.

5.3 Implement City/County Flood Mitigation Plans[29]

The City of Tillamook Flood Mitigation Action Plan, dated November 2003, provided short and long term goals to reduce or eliminate risk of flood damage on property under the National Flood Insurance Program (NFIP). The plan called for a revision to occur every five years.

Since Tillamook City had limited resources to do an in-house update of the Flood Mitigation Plan, several inquiries were made for outside assistance. The original plan was prepared by the Community Service Center at the University of Oregon. They expressed an inability to assist with this project. Another inquiry was made to the Oregon Consensus Program (OCP) at PSU and a proposal for services was submitted to the City. A third proposal was submitted to the City from VLG Consulting in Tillamook. At the May 21, 2008 Project Team meeting it was suggested that the OS Design Committee pursue a discussion with the City on options to assist in the Plan's required five year update/revision. In early December, the Tillamook City Council passed a motion to use VLG Consulting to assist with a plan update along with implementation of projects. The Council further directed staff to pursue funding assistance from Oregon Solutions. On December 11, 2008 the Design Committee passed a motion to provide $27,500 in OS funds toward the cost of the VLG services. Originally, the priory project listed both City and County Flood Mitigation Plans. The Tillamook County Flood Mitigation Plan was a very comprehensive document and no items in the County plan

[29] *Tillamook County Oregon Solutions Project Report.*

were selected by the Project Team for implementation. The revision of the City plan was completed in 2009.

5.4 Gravel Agreement: Stream Corridor Management Plan[30]

In 1991 Oregon Department of Fish and Wildlife (ODF&W) requested that the Department of State Lands (DSL) deny new permits or requests for renewal of existing permits for commercial gravel operations on numerous rivers, including the Wilson, Trask and Kilchis because of the critical status of Tillamook Bay chum salmon and the importance of gravel in their life history. A mediated agreement with affected parties was initiated in 1992 to set policies for in-stream removal, including research and monitoring. Modifications to the agreement were developed in 1999 and in 2005.

Mediation and facilitation services were needed to bring the parties together to determine any issues to be addressed in order to execute a new document. The Oregon Consensus Program (OCP) at Portland State University (PSU) through the services of Turner Odell, Natural Resources Program Manager for OCP, offered to assist with facilitation services for the gravel agreement. Funding for facilitation services was requested from the Samuel Johnson Foundation; the aggregate industry and the OCP at PSU. Oregon Solutions funds were not needed, despite the fact that completion of the Plan and a modified agreement were an Oregon Solutions priority project.

On May 27, 2008, local, State and Federal parties assembled in Tillamook for their first meeting. The agenda was to identify remaining or new issues and concerns about the draft document and determine steps needed to move forward with the Mediated Agreement or identify alternative approaches to achieve the desired outcomes. Subsequent meetings were held and a consensus on wording to a revised Plan and Agreement was achieved. In February 2009, the document was finalized with the signature of all parties at a celebratory signing in the County Courthouse.

5.5 Trask Hook[31]

This project envisioned installation of a culvert, or other type of bypass, to remove the hydraulic pressure created by the Trask River Hook channel. The Old Trask Channel directs flood waters against the flow of Tillamook River, creating a headwall of water and increasing flood water levels in the lower Trask Drainage cell. Due to conflicting hydraulic analysis presented to the Design Committee and the relatively high cost, the project was tabled in December 2008.

5.6 Project Exodus

As part of the 2007 formulation of priority projects by the Oregon Solutions Project Team, three of the priority projects identified were originally described in the Corps Feasibility Study and consisted of the Dougherty Slough Permanent Structure (Priority

[30] *Tillamook County Oregon Solutions Project Report.*

[31] Tillamook Basin Flooding Reduction Project, *Declaration of Cooperation* (August 2009).

#3), the Hall Slough Project (Priority #8, See Section 3.17) and the Modified Wetland Restoration and Swale Project (Priority #9, See Section 3.20). However, by the time the OS participants established its November 2007 Declaration of Cooperation, the Project Team was asked to explore modifications to projects #8 and #9 and possibly merge them into a new and more complex project that would dramatically improve flood conditions as well as improve ecosystem restoration in the floodplain. This suggestion was made by the Corps of Engineers, agreed to by the Project Team and dubbed as "Project Exodus."[32] A year later, the Project Team also added the Dougherty Slough Permanent Structure (Priority #3) and the Blind Slough reconnection to be considered as part of Project Exodus.[33]

Throughout 2008 the OS Design Committee put together a Scope of Work for Project Exodus that would drive the modeling services for the most workable solutions and elements and that would be incorporated in professional services to be sought from a consulting/engineering firm. A Request for Proposals (RFP) was subsequently developed by the County for computer modeling and preliminary design services. While Project Exodus was aimed at optimizing the movement of floodwater to the bay, the RFP requested that proposers break down the measures into the smallest projects that could be implemented independently in the short or long term to mitigate flooding. The RFP also documented that the Corps of Engineers would be working with the OS Design Committee for modeling input, modeling quality assurance and assistance with storm surge analysis.

On November 12, 2008, as authorized by ORS Chapter 279C, Tillamook County issued a qualifications-base Request for Proposals (RFP) with a detailed scope of work. The RFP sought proposals to conduct HEC-RAS modeling in the north Tillamook City floodplain. In addition to details on a firm's qualifications and proposed approach, prospective proposers were asked to include provisions to update the existing model, undertake modeling of three specific alternatives identified in the recently completed Corps Feasibility Study, and model two iterative series of other measures that would show the maximum possible flood reductions. Detailed specifications and requirements were included within the RFP document.

By the December 5, 2008, RFP deadline, proposals were received from Entrix, Inc. of Portland, Oregon; West Consultants, Inc. of Salem, Oregon, and Northwest Hydraulic Consultants (NHC) of Seattle, Washington. Pursuant to state contracting law, the RFP document and local rules, an RFP Review Committee was assembled which rated and ranked the three proposals under specific criteria identified in the RFP. The firm of NHC came out as the top-ranked proposer. The Board of County Commissioners issued its Notice of Intent to Award on December 17, 2008. The following day, the Project Team agreed with the recommendations of the Design Committee to use the firm of NHC for the Project Exodus work.

[32] Tillamook Basin Flooding Reduction Project, *Declaration of Cooperation* (November 2007).
[33] Oregon Solutions Project Team, *Minutes* (December 18, 2008).

However, on December 12, 2008, West Consulting, through its attorney, filed a protest of the proposed award, complaining primarily that NHC had not included within its proposal a not-to-exceed fee as required by the RFP. In County Counsel's December 26, 2008, response to the protest, it was pointed out that NHC's $112,975 fee recited in its proposal was expressed in the proposed contract as a "not-to-exceed" fee. The matter was concluded in a January 2, 2009, letter from West's attorney stating they would hold the county to the "not-to-exceed" $112,975 fee. The County Professional Services Agreement was signed with NHC on January 14, 2009. At the same public meeting, the Commissioners signed an agreement with the Corps of Engineers for conducting computer modeling oversight on Project Exodus.[34]

The goal of Project Exodus was to use the HEC-RAS model to develop a series of proposed measures within the north Tillamook City floodplain that would maximize the reduction in flood damages for flood frequencies between two-year and ten-year events, while incorporating additional measures that were identified in previous modeling.[35]

As designated in the contract documents, NHC was to design and model a first series of measures that would:

- Incorporate design for Dougherty Slough
- Incorporated new causeways, overflows and swales both upstream and downstream of Dougherty Slough
- Investigate opportunities for east-west channels for flood waters between Hoquarten and Dougherty Sloughs
- Investigate new ways to make flood waters cross the Highway 101 strip
- Incorporate and maximize the Hall Slough alternative (see Corps Feasibility Study Report and related modeling)
- Incorporate and maximize the wetland restoration alternatives (see Corps Feasibility Study Report, related modeling, the October 1, 2004, HBH plans and specifications for the modified wetland restoration and related Corps modeling
- Incorporate concepts received at the kick-off meeting

The very detailed scope of work also contained a number of requirements for fish passage, incorporated the USACE geomorphologic study, and subsequent modeling requirements.

5.7 Update of the HEC-RAS Model[36]

One of the first tasks NHC had to undertake for Project Exodus was to update the HEC-RAS hydraulic model developed for the Corps Feasibility Study. Updating consisted of developing new floodplain cross sections using LiDAR data acquired in 2008. The geometry of berms and levees along the various channels were also updated from the

[34] Tillamook County Board of Commissioners, *Minutes,* January 14, 2009.
[35] Project Exodus Scope of Work (January 2009).
[36] Northwest Hydraulic Consultants (NHC) and Tetra Tech Inc., *Southern Flow Corridor Benefit-Cost Analysis*(Revised May 2011); also see NHC, *Project Exodus Final Report,* (February 2010), pp3-4.

LiDAR. In many areas these were covered in dense brush or under tree canopy, and the accuracy of both the LiDAR and Corps photogrammetric data was lower. No channel cross sections were resurveyed.

The basic structure and naming convention of the existing model was kept. Only the Wilson River portion of the model was updated – the Tillamook and Trask River systems did not have new LiDAR coverage available. In addition to topographic updates, some reaches were adjusted to better match flood flow paths, and extensive work was put into creating a numerically stable model that could reliably run under a variety of flood scenarios. The model was also extended down the bay to use the NOAA Garibaldi tide station as a lower boundary condition.

The sensitivity of the model to the tidal boundary condition was tested by running the 1999 (~5-year) flood with the observed tides increased by one foot and decreased by two feet. Changes to maximum water surface elevations only extended up to around the junction of Hoquarten Slough and the Trask River under either scenario.

A series of observed floods was simulated in the model, along with a synthetic 100-year event. Hydrology was already defined for the 1999 and 2001 events from the Corps study. Gage data for the 2006 and 2007 floods was obtained from the USGS. The main inflows for the Wilson, Tillamook and Trask systems were obtained from the ongoing Flood Insurance Study for the 100-yr flood. Estimates of tributary inflows were derived independently using scaling factors based on Oregon regional flow regression equations from the USGS.

The model was calibrated by adjusting in-channel roughness values within physically plausible limits in order to match observed high water marks. The model was calibrated against the 1999 and 2001 floods. The 2006 and 2007 floods, which were substantially larger, were then simulated to verify the calibration. In addition to the high water marks supplied by the Corps of Engineers, a set of oblique aerials taken of the 1999 flood by George Best in conjunction with the LiDAR data, enabled the development of further high water marks as well as validation of flow paths. Finally, model results were compared with qualitative witness observations of various floods to ensure flood behavior was being modeled correctly. Mr. Leo Kuntz was of invaluable assistance in this regard.

Calibration focused on ensuring the model reasonably simulated the full range of floods rather than trying to exactly match one specific event. In general, calibration within the main Wilson River channel was consistent over the range of floods, and less so in the overbanks.

The preliminary Flood Insurance Study essentially used the Corps of Engineer HEC-RAS model for hydraulic analysis. While very similar in structure, the NHC model was selected for use as providing the best available data for the following reasons:

The NHC model was updated with new LiDAR overbank and Tillamook Bay data. The NHC model was modified specifically to better simulate smaller, more frequent floods where the greatest annualized damages are caused. The NHC model included results for small floods, whereas the smallest flood in the FIS was the 10-yr event.

By April, however, the County decided to expand NHC's Scope of Work beyond what had been included in the RFP/NHC Response and January contract by adding the requirement for 30 percent design, attendance at Design Team meetings and assistance with a NOAA grant application. Such amendments are authorized by ORS 279C.115(2) where the additional work is a continuation of an earlier project by that consultant. The County and NHC executed the modification on May 6, 2009, adding the expanded scope and $20,000. Another 90 days to complete the work was added on July 22, 2009.

5.8 First Series of Project Exodus Modeling

Once the model update was completed, NHC undertook the first series of modeling/design pursuant to the Scope of Work. NHC issued a Report on July 29, 2009 and presented its findings on August 4; first to the Design Committee during a morning meeting, then again that afternoon to the full Project Team.

NHC evaluated projects from the mouth of the Wilson River canyon to Tillamook Bay, and proposed three projects to address flooding in the Wilson River.

The three projects together provided significant flood relief for the lower river valley, and up the Tillamook and Trask River systems a short distance (See Figure 1 – Project Exodus Overview).

- Project Exodus: This was the core project proposed that provided the greatest benefits in both flood level reduction and area over which it was effective. NHC proposed two alternatives for consideration. (Alternatives 3 and 4 described in Section 5.9.)
- South Bank Wilson River Berm: Two alternatives for berms were presented to control flooding overtopping along the south bank of the Wilson River and flowing west over 101 in the Fred Meyer store area (Alternative 1).
- North Bank Wilson River – Field Grading: This alternative was a simple lowering of a portion of existing pasture that acts as a control on water levels north of the Wilson River (Alternative 2).

While NHC evaluated alternatives in the upper valley, no solutions presented themselves – either there were significant adverse impacts in one area while providing benefits in another or the projects simply were ineffective.

There were several key decisions that had to be made on project alternatives before further work could be done. This report provided the construction costs, flood benefits

and real estate needs associated with each alternative in order to allow the Oregon Solutions group to make informed decisions.

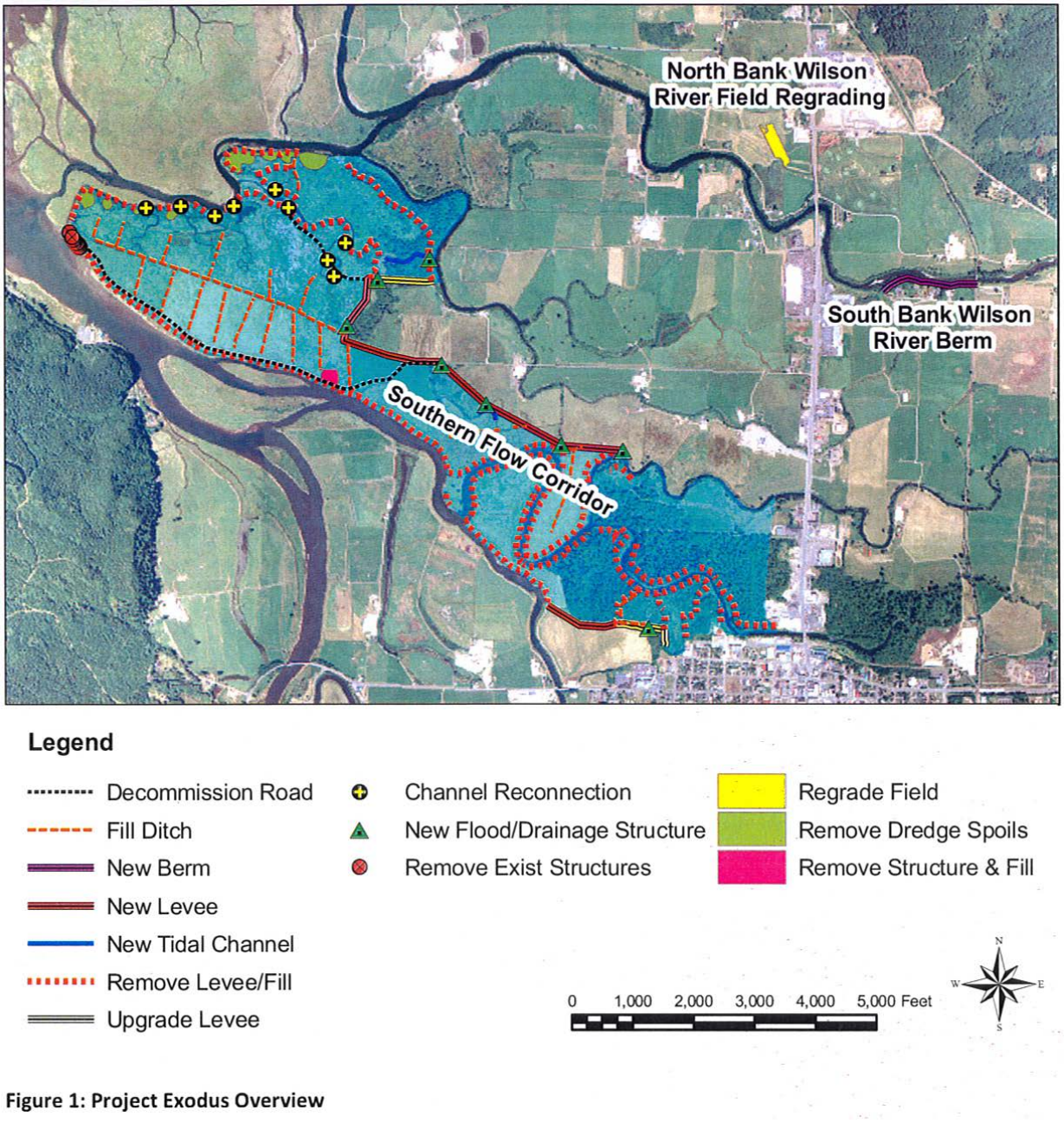


Figure 1: Project Exodus Overview

5.9 Project Exodus Alternatives

The largest and most important project identified was the Project Exodus alternative. The southern portion of the project consisted of creating a flow corridor beginning downstream of SR101 between Hoquarten and Dougherty Sloughs and running westward to the Tillamook River. The flow corridor was created by constructing setback levees and removing existing levees within the project area. In the northern half of the Wetlands Acquisition Area further levee removals were proposed. Two versions of Project Exodus were presented. They differed in how the southern half of the Wetlands Acquisition Area was treated.

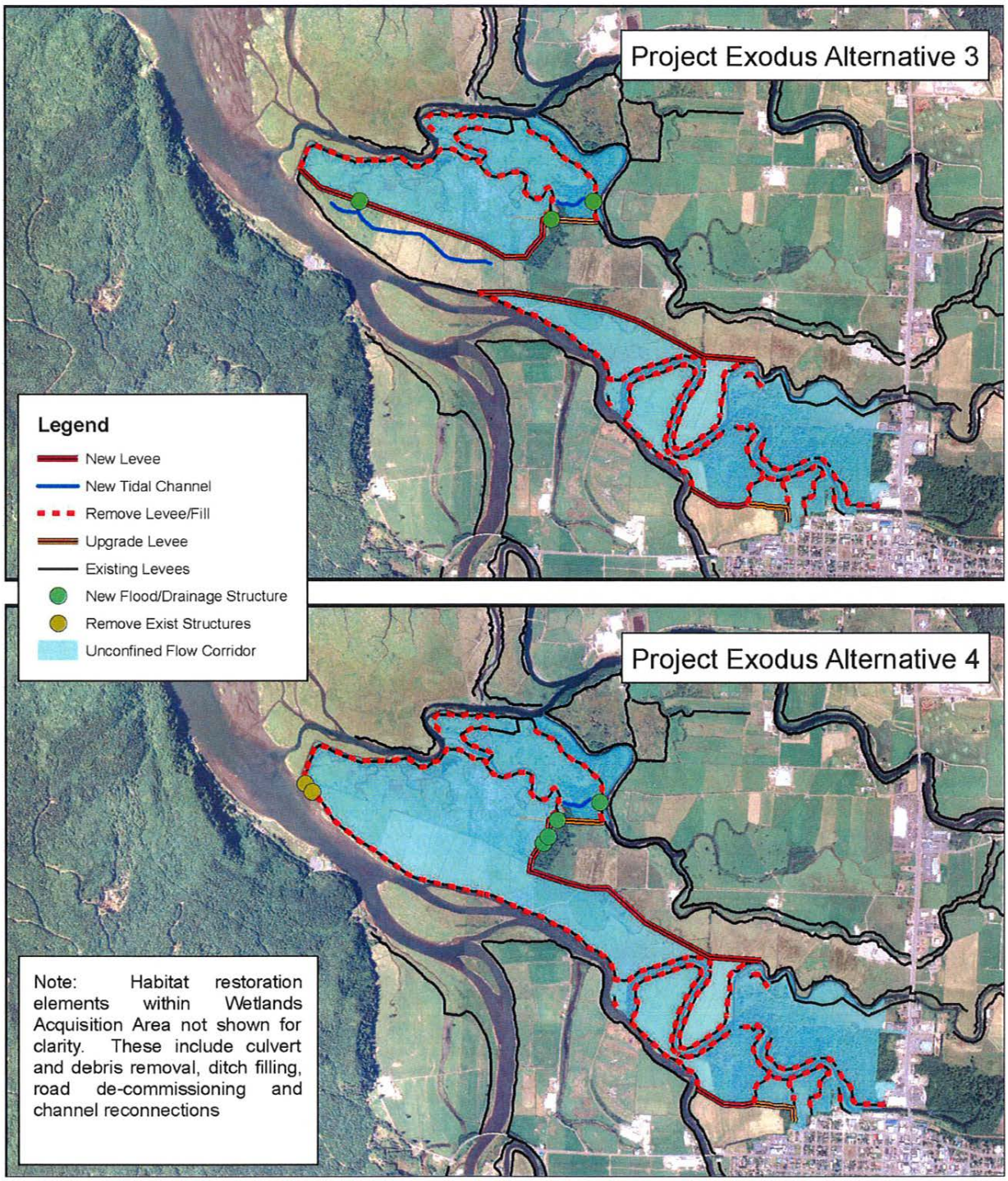
The two alternatives shared mostly common features and required the same land footprint. Key differences were in the length of new levee required and the area used for unconfined conveyance open to tidal influence. Alternative 3 was presented previously to the Oregon Solutions Design Team, but Alternative 4 was a new option. The alternatives are shown on the following page.

5.10 Alternative 3

Alternative 3 consisted of merging the southern flow corridor with the Modified Wetlands Acquisition Alternative recommended in the Corps Feasibility study. It continued to utilize the existing conveyance path out to the flood gates at the mouth of the Wilson River. Additional flood gates would be added to the new northern levee. The public lands within the leveed conveyance corridor would be restored to a regulated tidal wetland system designed to ensure continued effective flood conveyance to the gates.

5.11 Alternative 4

This alternative combined the Project Southern Flow Corridor with building a shorter levee system east of the current alignment. Virtually all of the Wetland Acquisition Area would be opened to flood conveyance and tidal influence. This reduced the new levee length substantially. It required the removal of all the existing flood gates at the mouth of the Wilson and construction of new gates within the new levee. The proposed design would reuse all the existing gates now located at the mouth of the Wilson, but the culvert pipes and concrete structures would be removed.


Project Exodus Alternative 3
Legend
New Levee
New Tidal Channel
Remove Levee/Fill
Upgrade Levee
Existing Levees
New Flood/Drainage Structure
Remove Exist Structures
Unconfined Flow Corridor
Project Exodus Alternative 4
Note: Habitat restoration elements within Wetlands Acquisition Area not shown for clarity. These include culvert and debris removal, ditch filling, road de-commissioning and channel reconnections

5.12 Comparison of Alternatives

The two alternatives shared many elements in common. Both the work within the southern flow corridor and within the northern half of the Wetland Acquisition Area was the same. While Alternative 4 required more new flood gates, levee earthwork costs were much less, resulting in the lower cost estimate.

Item	Alternative 3	Alternative 4
Length of New Levee needed (ft)	14,700	9,600
Volume of new levee needed (cy)	118,000	74,000
Estimated construction costs	$9,250,863	$7,173,290

Both alternatives showed good flood reduction benefits throughout the lower Wilson River floodplain. However, Alternative 4 generally showed several tenths of a foot greater reduction than Alternative 3 over most of the area. Further analysis also showed that removing the berm that protects the Fuhrman Road and providing a larger opening between Hall and Blind Sloughs showed further significant flood reductions in the south bank of Wilson River. This recommendation was presented in both Alternatives 3 and 4. Also Alternative 3 showed a rise in the 100-year water level at the confluence of the Trask and Tillamook Rivers, whereas Alternative 4 did not show the same rise.

Several comments at the afternoon August 4 meeting expressed disappointment that the project would only result in a 1-2 foot flood reduction at the lowest point along Highway 101, despite substantial reductions along the remainder of Highway 101 north of Dougherty Slough.

The NHC report was taken under advisement to be further evaluated by the Design Committee.

About the time of the August 4, 2009, meeting, a concern was raised by an email as to what effect Alternative 4 might have on flood duration in certain areas of the floodplain. The concerns related to possible adverse impacts on water levels in the lower Tillamook and Trask Rivers due to removing the levees that currently act to separate the Wilson River form the Tillamook-Trask.

Vaughn Collins of NHC subsequently investigated the hydrology of the Wilson and Trask River systems to characterize their differences in flow durations and volumes and also model results in the lower reaches of these rivers to see if the complex interactions and flow transfers that occur during floods are important factors.

NHC presented its findings in a September 1, 2009, report. In summary, most of the observed differences between Wilson River and Trask-Tillamook flows and durations are caused by the hydraulic interactions and flow transfers in the lower valleys, not differences in flows generated in the upper basins.

The Tillamook River and the Wetlands Acquisition Area convey far more flow than the Wilson near the Bay. The combined flows from the Trask, Tillamook and most of the overbank flows from the Wilson must drain through this area. This is the reason Alternatives 3 and 4 showed the effectiveness they do; they address the most important conveyance paths for flood flows.

The large increase in conveyance area under Alternative 4 more than compensated for the additional Wilson River flows that now interact with the Tillamook system across the Wetlands Acquisition Area. The net result is Wilson River stages are lowered significantly with very little change to Tillamook River stages.

Alternative 4 showed greater benefits than Alternative 3 because it completely removed the confined flow corridor in the lower Trask and Tillamook Rivers. While the new spillways that have been constructed are highly efficient high capacity structures, the conveyance gained by removing or setting back levees is much greater still.

Alternative 4 provided a greater hydraulic connection between the rivers, and resulted in slightly faster peak arrival time in the Tillamook-Trask confluence area, and slightly delayed ebb tides after the flood peak is passed. NHC found no evidence that Alternative 4 could cause adverse impacts within the range of variation of flows shown in the historic record.

NHC agreed with Leo Kuntz's comments regarding northbound flood water flows. Big Cut and Little Cut are less effective than might be expected given their position. NHC believed this is likely due to the fact they flow to the mouth of the Kilchis system. This likely causes backwater effects up Big and Little Cut due to coincident flooding that reduces their conveyance. NHC also noted sensitivity in the model to bank elevations in the lower reaches of the Wilson below the cuts. This indicated that project elements that lower bank elevations here could be effective in getting Wilson River floodwaters into the Bay more directly.

The Blind Slough project proposed several years earlier (See Section 3.20) developed plans to remove some fill in this area and lower the bank to natural elevations. In its September 1, 2009, report, NHC suggested this could be added as an element to either Alternative 3 or 4.

NHC also stated that another small project that could be tried would be to cut some small notches in the north bank of the Wilson. These would initially spill water northward when the Wilson was high. NHC saw this as somewhat experimental – the notches may develop into tidal channels and continue to convey flows or they may refill with sediment and build back up to natural bank height relatively rapidly, but NHC concluded it would be a low-risk, low-cost project to implement.

In preparation for the September 2, 2009, Design Committee meeting, Project Manager Paul Levesque prepared a list of the Pros and Cons for Alternatives 3 and 4 (see Pros

and Cons Chart). At that meeting, Vaughn Collins first presented his duration analysis referenced above, stating as he did in the report that neither Alternative 3 nor 4 would have adverse impacts on duration. Design Committee member Denny Pastega indicated he remained skeptical.[37]

Oregon Solutions ALTERNATIVES 3 AND 4 PROS AND CONS			
ALTERNATIVE 3			
PROS		CONS	
1	Closer to existing conditions	1	Will cost $2,000,000 more than Alternative 4
2	Retains the investment in the new gated spillway	2	Requires 5,100 lineal feet more levee than Alternative 4 resulting in higher long-term maintenance costs
3	Provides a recreational loop trail	3	Results in the loss of 103 acres of farmland
4	Due to the net benefit from resulting habitat values of the overall project, we may be able to negotiate with the granting agencies for continued use of larger portions of the Wilson property as farmland	4	Causes flood rise during smaller floods in the river channel at the confluence of the Trask and Tillamook Rivers
ALTERNATIVE 4			
PROS		CONS	
1	Will cost $2,000,000 less than Alternative 3	1	Results in loss of 103 acres of farmland
2	Requires less levee than Alternative 3, resulting in lower maintenance costs for levees	2	Requires removal of existing flood gates and new gated spillway
3	Full restoration of the original 377 acre wetland acquisition	3	Loses recreational loop trail
4	Full connectivity between Trask and historic sloughs		
5	Levees are located further from river and would be less prone to erosion		
6	Does not cause flood rise at confluence of Trask and Tillamook Rivers during smaller floods		

[37] Design Committee, *Minutes*, September 2, 2009.

Following a presentation of the Pros and Cons by Paul Levesque, there was a wide-ranging discussion on the two alternatives. The major issues revolved around the loss of the recent major investment of the gated spillway with Alternative 4 and the loss of 103 acres of farmland in both alternatives. Following this discussion, there were eight votes in favor of Alternative 4 and three in favor of Alternative 3, the latter by Chad Allen, Dale Buck, and Denny Pastega, representing the landowner/business interests. It was also at this meeting that there was an 11-0 vote in favor of dropping the Dougherty Slough project from further consideration inasmuch as it would produce little, if any, additional benefit and the current anchoring system appeared to be working well.[38]

Also at the September 2, 2009, Design Committee meeting, consideration was given to Alternatives 1 and 2, the North Bank of Wilson and the South Bank of Wilson proposed projects. Both were smaller projects and dealt with more localized flooding. Since neither would be eligible for FEMA funding, the committee agreed these could be done after the Southern Flow Corridor was completed.[39]

However, when Alternative 4 was presented to the 32-member Project Team for a vote on September 14, 2009, there were 21 members who voted yes, one voted no, six did not respond to the email poll, and four abstained from voting.[40]

A draft Project Exodus Report was circulated for comment in late September 2009.[41] A Final Report was issued in February 2010.[42] The final report included a discussion on how the prior Corps Feasibility Study projects were evaluated for inclusion as possible alternatives, including the Hall Slough Project, Wetlands Acquisition Area Projects, and the Blind Slough Project.[43]

The Project Exodus Report reiterated that several options in the upper valley between the mouth of the canyon and the head of Dougherty Slough were evaluated, including building an extensive overtopping levee system to keep more flow in the Wilson River channel and a spillway to divert flow out of the channel in a controlled manner. The Report concluded that none of the options evaluated provided much flood reduction benefit, or in doing so had significant adverse impacts elsewhere, so they were not pursued further.[44] The Report also noted that options to convey water under Highway 101 were also evaluated, but it was apparent that any proposed structural modifications to the highway would cost $2-3 million at a minimum and that flood level reductions were moderate at best. The Report did note, however, that ODOT was planning a new Hoquarten Slough Bridge that offered the opportunity to increase conveyance through

[38] *Minutes*, 7.
[39] *Minutes*, 6.
[40] Rick Klumph, email, September 14, 2009.
[41] Northwest Hydraulic Consultants (NHC), *Project Exodus Draft Final Report,* October 2009.
[42] Northwest Hydraulic Consultants (NHC), *Project Exodus Final Report,* February 2010.
[43] *Project Exodus Final Report*, 5.
[44] *Project Exodus Final Report*, 5.

that slough.[45] After also describing the two Southern Flow Corridor Alternatives that were each evaluated, the Report described the Recommended Southern Flow Corridor Project (See Recommended Project). The Report provides a description of the project elements,[46] flood reduction benefits,[47] and construction cost estimates and other project details.[48]

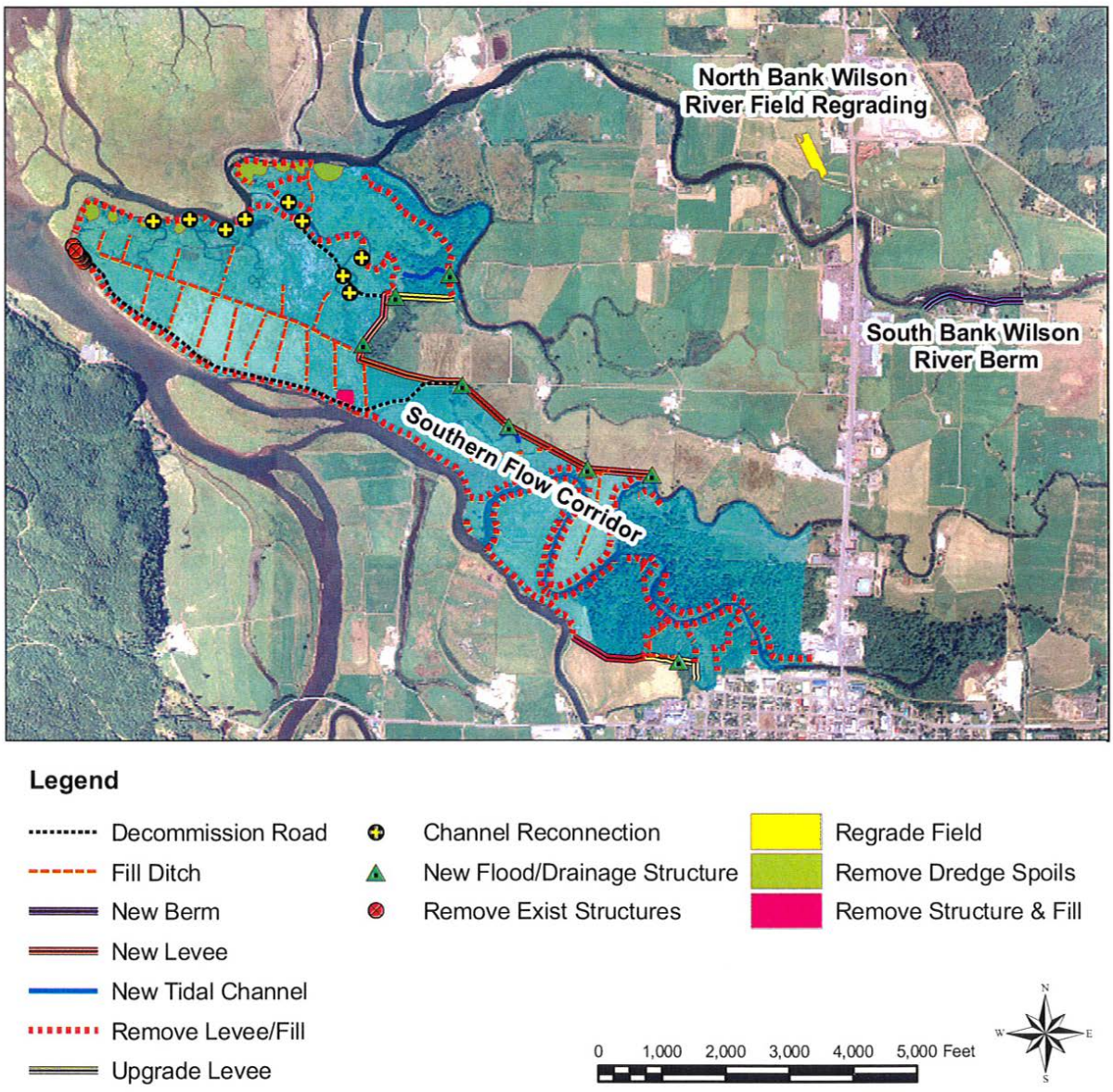


Figure 1: Project Exodus Overview

[45] *Project Exodus Final Report*, 5.
[46] *Project Exodus Final Report* ,8-9.
[47] *Project Exodus Final Report*, 10-14.
[48] *Project Exodus Final Report*, 15-26.

Subsequent to the selection of Project Exodus, the OS Design Team decided to pursue implementation of the Southern Flow Corridor as a priority. Among the reasons were that the SFC provides by far the largest benefits in flood damage reduction, both in terms of flood levels and area benefitted, and that the Southern Flow Corridor had potential significant funding available in the form of FEMA alternate project funds through the Port of Tillamook Bay.[49]

In April 2010 the County prepared and submitted an OWEB application for the funds necessary to acquire the full 184 acres from seven property owners as contemplated by the original SFC project. Despite lingering concerns about the amount of farmland involved, including the proposed full acquisition of the Beeler and Aufdermauer properties, letters of support came from many quarters. NRCS State Conservationist provided a supporting letter on April 19, 2010. While expressing reservations over the loss of 103 acres of farmland, the Tillamook County Soil and Water Conservation District provided a letter of support on April 16, 2010, citing the project's help in reducing flooding on adjoining farmland. Similarly, an April 16 letter from TCCA Director of Environmental and Political Affairs, Shawn Reiersgaard stated in part:

> "As an active participant in the Oregon Solutions Project, TCCA supports the process through which flood reduction projects have been developed. Further we support the recommendations described in the NHC report. It is our belief that these projects represent the best opportunity to achieve meaningful flood reduction from our community.
>
> It is clear from the NHC report that to maximize the effectiveness of the identified flood control projects, additional lands will need to be acquired. It is also clear that acquisition of these lands will foster the fulfillment of the community's commitment to restore the wetlands on the Trask/Wilson property. For these reasons, TCCA supports the grant request to OWEB for funding to acquire these lands."

The April 2010 OWEB grant application was never funded likely due to two factors. First, the ongoing FEMA appeal over the eligibility denial for the $4.3 million in alternative project construction funds weighed heavily. Second, and perhaps more importantly, the size and scope of the project began to migrate as the loss of farmland issue steered the project design toward what would eventually become the Southern Flow Corridor – "Landowner Preferred Alternative." The first unraveling occurred on May 15, 2010, when Mark Wustenberg, a ranking VP from TCCA sent a "clarification" of its letter of support to OWEB, stating:

[49] Northwest Hydraulic Consultants (NHC), Southern Flow Corridor, *Landowner Preferred Alternative Preliminary Design Report*, May 2011

> As an active participant in the Oregon Solutions Project, TCCA supports the process through which possible flood reduction strategies have been developed. The recommendations set forth in the current NHC report represents consensus as to what are likely the best alternatives for impacting flooding in the Tillamook basin. It is clear from the work done that any significant flood mitigation effort in the Tillamook basin will likely include impacts to land that is currently in agricultural use.
>
> TCCA has a long history of collaborating with efforts such as these when they benefit the greater community and there are numerous examples where collaborative efforts have resulted in agricultural land being used not only for agricultural use but also for environmental mitigation. It is important to clarify however that TCCA's current policy of no net loss of farm ground is not consistent with any strategy that would completely remove any land that is currently used as agricultural ground from agricultural use.
>
> TCCA supports the efforts of the Oregon Solutions project; however, we take no position on the individual farmer's right to sell their land for use in this project.

The farmland concerns found their focus when two project contracts came before the Board of Commissioners for execution at its May 12, 2010, meeting. In addition to the NHC design contract, an additional agreement with Right-of-Way Associates (ROWA) was proposed for conducting appraisals and negotiations for the proposed property acquisitions. Despite unanimous approval by the Design Committee on May 3, the NHC contract provided the platform at the May 12 Tillamook County Board of Commissioners' meeting for the project's impact on farmland. Chad Allen, TBHEID President, although supporting the Oregon Solutions concept and goals, continued to be concerned about the loss of farmland and suggested a decision be delayed on a final project. He was supported in testimony from Don Averill, Don Burden, and Gus Meyer. These voices found support with County Commissioner Chuck Hurliman whose family had for generations operated a dairy farm along the Nestucca River where he grew up. He expressed his general concerns that the County Comprehensive Land Use Plan was intended to protect farmland but yet allowed wetland use as an outright use not requiring permits or approvals when it involved farmland. When the NHC and ROWA contracts came to a vote, they were approved with two ayes and Commissioner Hurliman voting nay.

Also on May 12, 2010, TCCA issued yet another statement, further backing away from the project stating:

> The Tillamook County Creamery Association is interested in helping to reducing flooding for the betterment of our community and our member farmers. As a committed participant in the Oregon Solutions

process TCCA has supported the efforts of the community to reduce flooding including supporting the county application for the funding necessary to implement flood reduction actions.

TCCA has been a supporter of the Oregon Solution process from its inception, and has understood that any flood mitigation activities resulting from the Oregon Solutions process will likely impact farmers and farmland, and that any proposed mitigation activities could be in conflict with our existing policy of no net loss of farmland. It is important to note that at this time no strategy has been brought before the TCCA board for consideration.

Because it is unclear how the developing flood control strategy and the TCCA policy of no net loss of farmland will interact TCCA has abstained from directly supporting specific flood control measures until more information is developed. Once the impact of a community supported flood control strategy is better known, the Tillamook County Board of directors will consider the issue and its possible interaction with the TCCA policy of no net loss of farmland.

The May 12, 2010, contract directed NHC to proceed with final design, permitting and project management of the Southern Flow Corridor component of Project Exodus. Under ORS 279C.115(2) a new Scope of Work for these elements had been negotiated in the amount of $640,122 to be executed on the basis of individually authorized Task Orders. This contract remains in place today.

Included in Task Order #1 was the amount of $46,897 providing for a series of hydraulic analysis to evaluate whether the SFC could be completed on a standalone basis without the other two projects identified in Product Exodus (the North Bank and South Bank of Wilson River alternatives). To address the concerns over the loss of farmland, NHC also was to model whether the SFC could be done with only flood easements instead of acquiring title to the Beeler and Aufdermauer properties (the landowner preferred alternative). Finally, both alternatives were to be analyzed for compliance with federal flood regulations and “zero rise.”

NHC presented its findings in June 2010, which demonstrated that the Southern Flow Corridor did indeed provide flood level reduction benefits on its own, and that alternatives were available that allowed some of the originally targeted agricultural lands to remain as such rather than being acquired and converted to salt marsh.[50]

More particularly, given the large uncertainties in the timeline of implementation of the full Project Exodus, including the Southern Flow Corridor North and South Bank Wilson River Projects, there may be some time when only the Southern Flow Corridor is

[50] Northwest Hydraulic Consultants (NHC), *Southern Flow Corridor, Landowner Preferred Alternative Preliminary Design Report,* May 2011.

implemented. Therefore, understanding the flood impacts of the Southern Flow Corridor individually was important.

The project as originally proposed required the acquisition of private lands including about 115 acres of agricultural lands. Acquisition was proposed as full removal of the levees on these lands would render the ground unusable for farming.

A modification to the Southern Flow Corridor was proposed that would lower, but not remove, the protective levees surrounding about 85 acres of these agricultural lands belonging to Beeler and Aufdermauer. The intent was to allow flood flows to convey over the top of the levees while keeping them just high enough to keep out high tides and allow continued use as pasture. The agricultural lands immediately adjacent to the Wetlands Acquisition Area south of the proposed levee must be acquired for the Southern Flow Corridor and no change from the original design was proposed on this area of about 30 acres.[51]

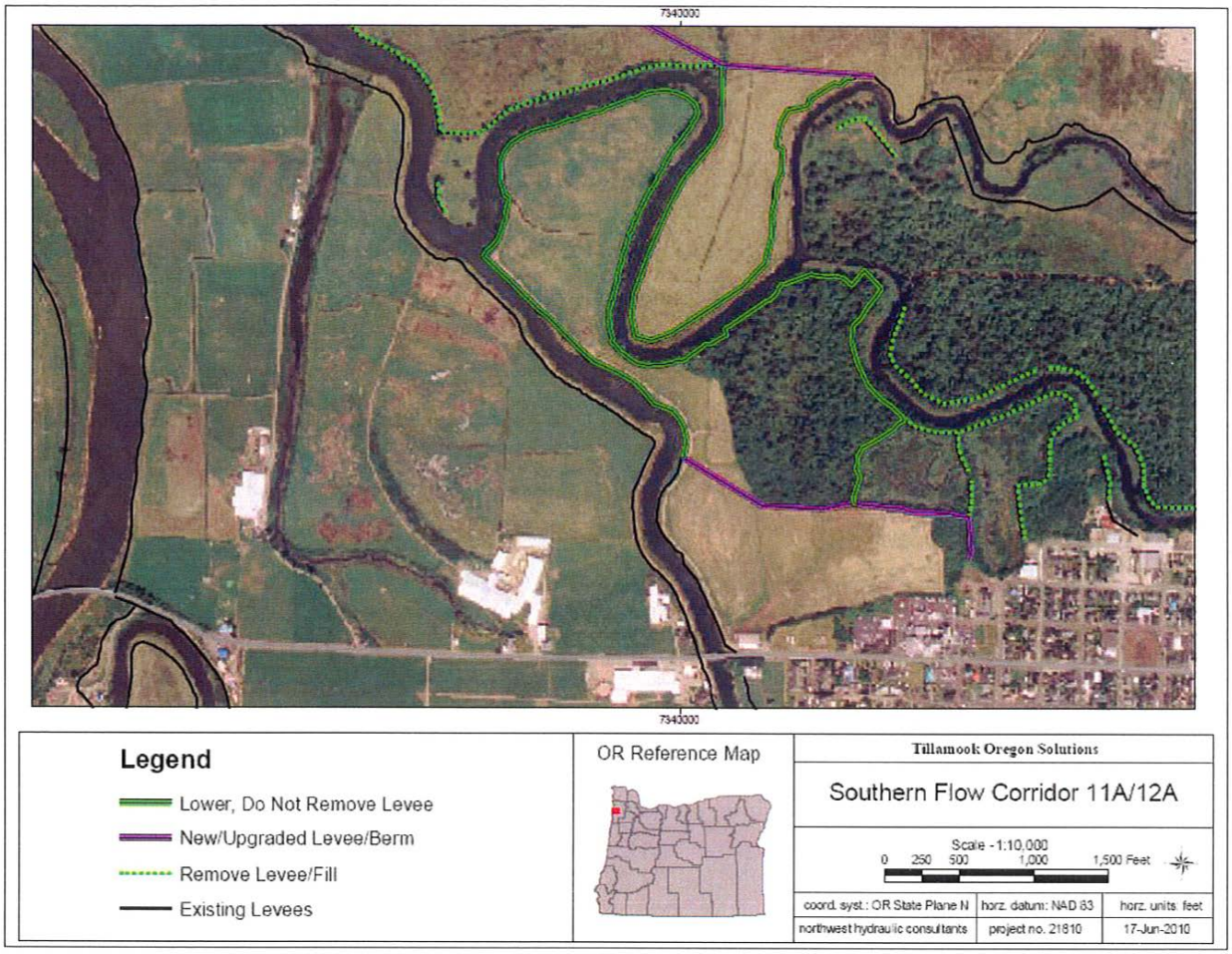
Under Task Order 1 of the Southern Flow Corridor design contract, NHC was directed to model the Southern Flow Corridor as a stand-alone project and also develop and model two variants of the Southern Flow Corridor that would protect the identified farmland.

5.13 Alternative 11A/12A

The first two alternatives modeled changed the original Southern Flow Corridor concept as little as possible. The effects of lowering, rather than fully removing 14,500 feet of levee surrounding the targeted agricultural lands were modeled. Both lowered levee elevations of 11.0 and 12.0 feet were modeled. In Figure 11A/12A, the proposed Southern Flow Corridor corridor setback levees are shown in purple. The existing levees shown in solid green were proposed to be lowered rather than removed under this alternative.

[51] Northwest Hydraulic Consultants (NHC), *Tillamook Oregon Solutions, Project Exodus Southern Flow Corridor, Southern Flow Corridor Stand-Alone/Modifications Analysis,* June 2010.

Figure 11A/12A



5.14 Alternative 12B

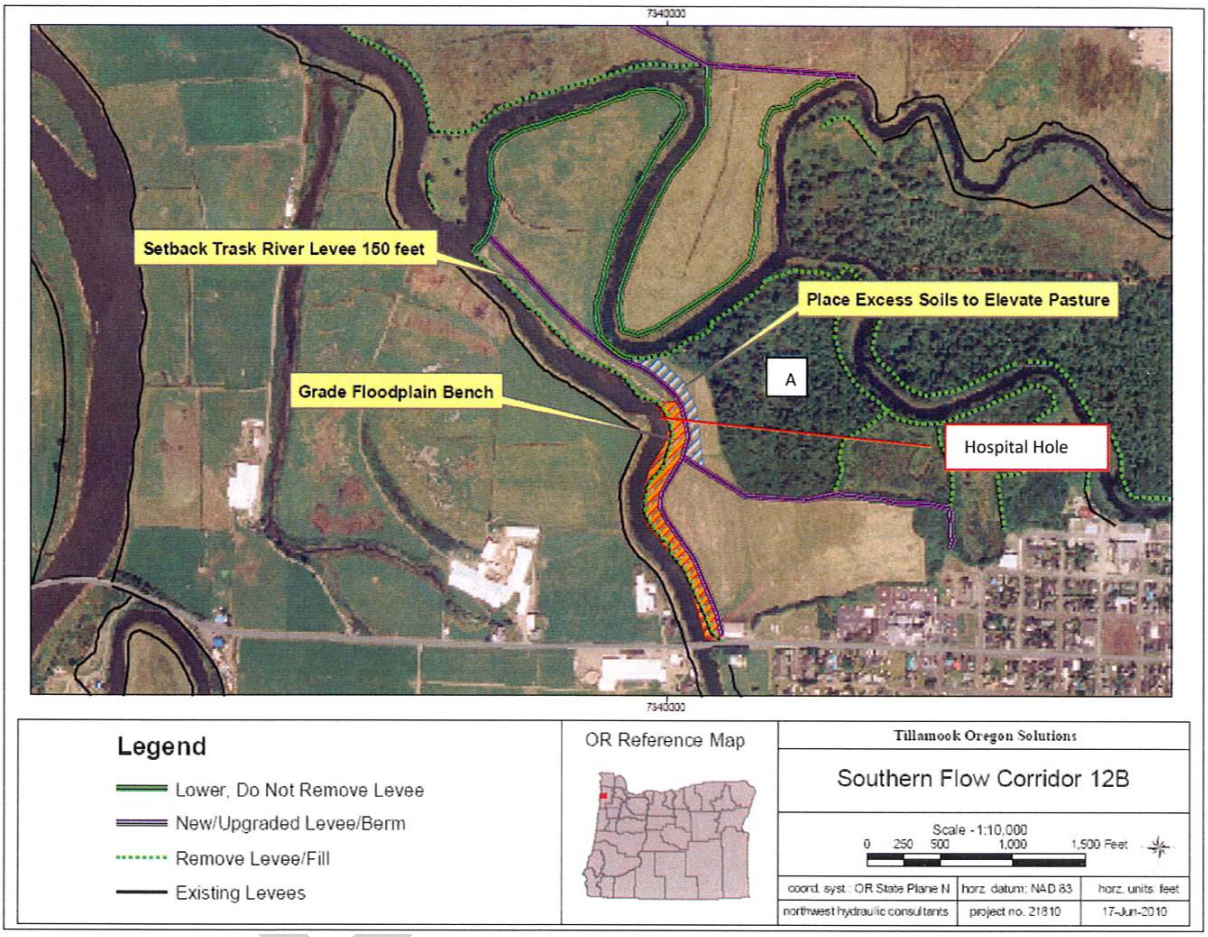
A third alternative was developed based on hydraulic results from the initial modeling and to maximize restoration benefits while still meeting the intent of farmland preservation.

The original Southern Flow Corridor and Alternatives 11A and 12A show projected increases in 100-year flood levels in one location on the lower Trask River, the Hospital Hole, as compared to the baseline conditions. This increase was small, but deemed that it could be a FEMA regulatory issue. Field observations showed this bend is a constriction of flood flows under current conditions.

Alternative 12B sets back and lowers the existing levee along the Trask River and excavates a floodplain bench to increase conveyance in this reach. It also allows more levee removal for improved conveyance and better restoration benefits on the adjacent spruce forest wetland (“A”) by allowing full hydrologic connection (See Figure 12B). The floodplain bench as modeled was set to an elevation of 12.0 feet. The Report indicated

it was likely that the bench area could continue to be used as pasture at this elevation. The pasture just east of the Hospital Hole would be outside the levees and the lower elevations near the spruce forest would likely become too wet to use. The floodplain benching would generate excess quantities of fill that could be used to raise the ground elevation here in order to minimize both construction costs and loss of pasture. The Report concluded that up to five acres of pasture may be impacted under this alternative.

Figure 12B



In summary, the June 2010 NHC Report found that implementation of only the Southern Flow Corridor provided significant flood benefits over much of the southern floodplain of the Wilson River. Existing flood levels north of the Wilson River were not affected by the Southern Flow Corridor; this area required implementation of the North Bank Wilson River Field Grading project to reduce flood levels. Without implementation of a rebuilt Shilo structure and extension of a berm up to the railroad (the South Bank Wilson River project), flood flows would also continue to overtop the south bank frequently and flow west through the commercial area just south of the Wilson River.

The Southern Flow Corridor and Alternatives 11A/12A showed a small rise in the 100-year flood at the Hospital Hole on the Trask River. Alternative 12B removed this rise and provided small additional benefits to the Trask River by setting back the levee along it. As expected, lowering the levees to 12 feet rather than 11 resulted in slightly higher water levels due to the increased blockage the higher levee represented. In general, the Ag protection alternatives resulted in slightly less flood level reduction than the original Southern Flow Corridor proposal, typically on the order of 0.1 to 0.2 feet in the Southern Flow Corridor. Compared to existing conditions, all Southern Flow Corridor alternatives (including the original) showed similar benefits.

Land use changes for each alternative are summarized in the following table.

	Southern Flow Corridor	SFC 11A/12A	SFC 12B
Conversion of Ag Land to Tidal Marsh	115 acres	30 acres	30-35 acres
Ag Land Remaining in SFC	0	85 acres	80-85 acres

Construction easements would be required from any lands that were to remain in agricultural production. Permanent conveyance easements were also recommended to be acquired at the same time to ensure long term function of the Southern Flow Corridor.

Preliminary Cost Estimates

	Southern Flow Corridor	SFC 11A/12A	SFC 12B
Construction Cost Estimate	$7,170,000	$7,120,000-$7,260,000	$8,000,000

The preliminary construction cost estimates for Alternatives 11A/12A and 12B assumed excess soils could be placed on the fields within the project area. If the materials had to be trucked off site, costs would be higher. The relative costs of each alternative will remain the same.

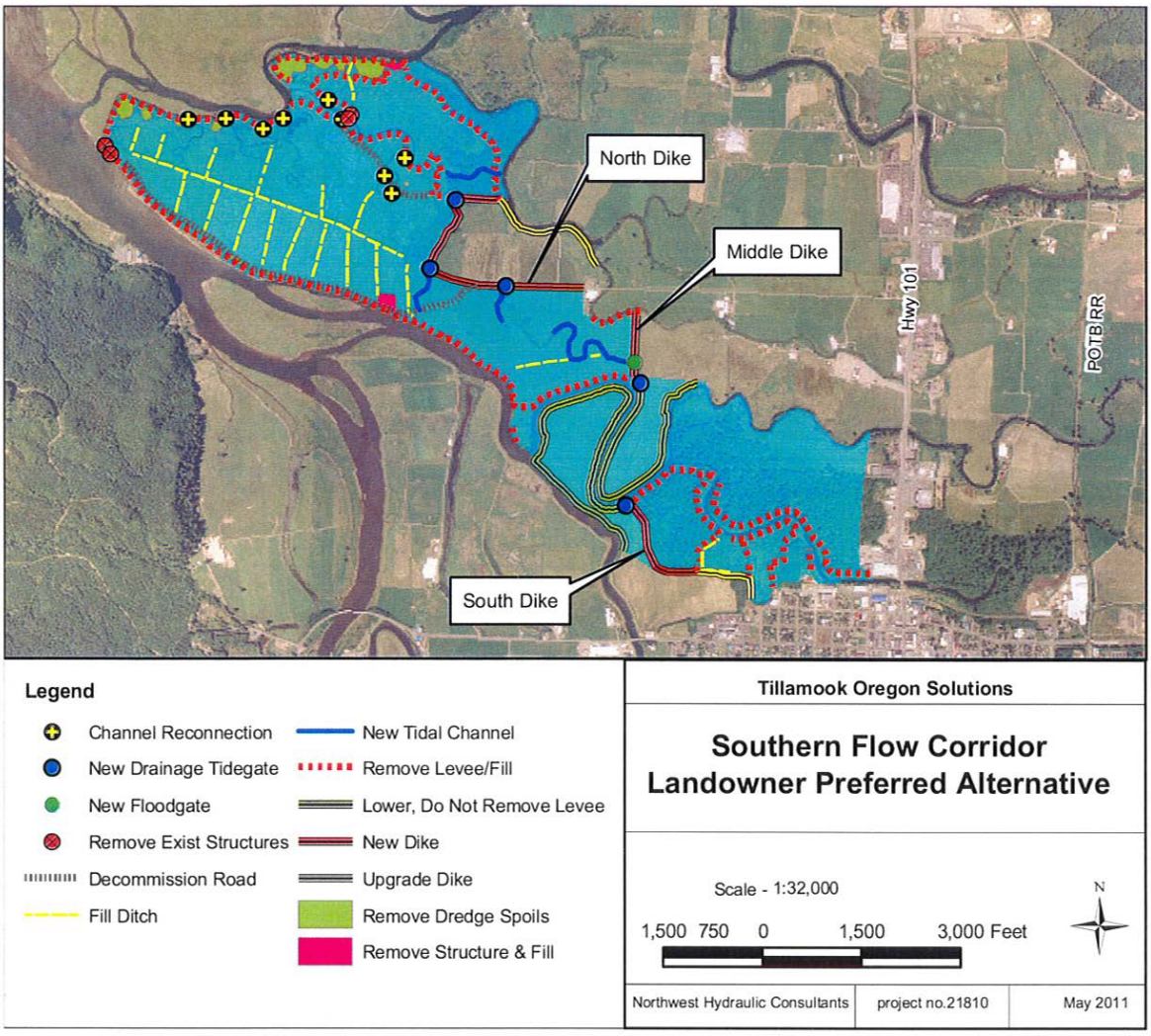
With this information, Tillamook County began real estate discussions with landowners whose properties were required to be purchased outright for the project. Leo Kuntz of Nehalem Marine began discussions with adjacent landowners and those whose lands were identified as needing dike modifications but not acquisition. As a result of these discussions, the project was slightly modified to match landowner desires. As such, the project was named Southern Flow Corridor – Landowner Preferred Alternative. At the May 13, 2011 OS Design Committee meeting, this modification was unanimously approved.

Members of the Project Team were then asked by email to weigh in on this Landowner Preferred modification. At that time there were 37 members on the Project Team. Twenty-four voted in favor of the project. No one voted against it. The newly appointed college president and the USFWS representative abstained. Most of the eleven persons

who did not respond were congressional staffers, state representative Deborah Boone, and the representative from the Governor's office. It is notable, however, that among the eleven who did not respond were the Tillamook County Creamery Association (TCCA) and Soil and Water Conservation District (SWCD) representatives on the Project Team.[52]

The final "Southern Flow Corridor, Landowner Preferred Alternative Preliminary Design Report" was issued by NHC in May 2010, basically defining the project that is currently being implemented (see Figure Southern Flow Corridor, Landowner Preferred Alternative).

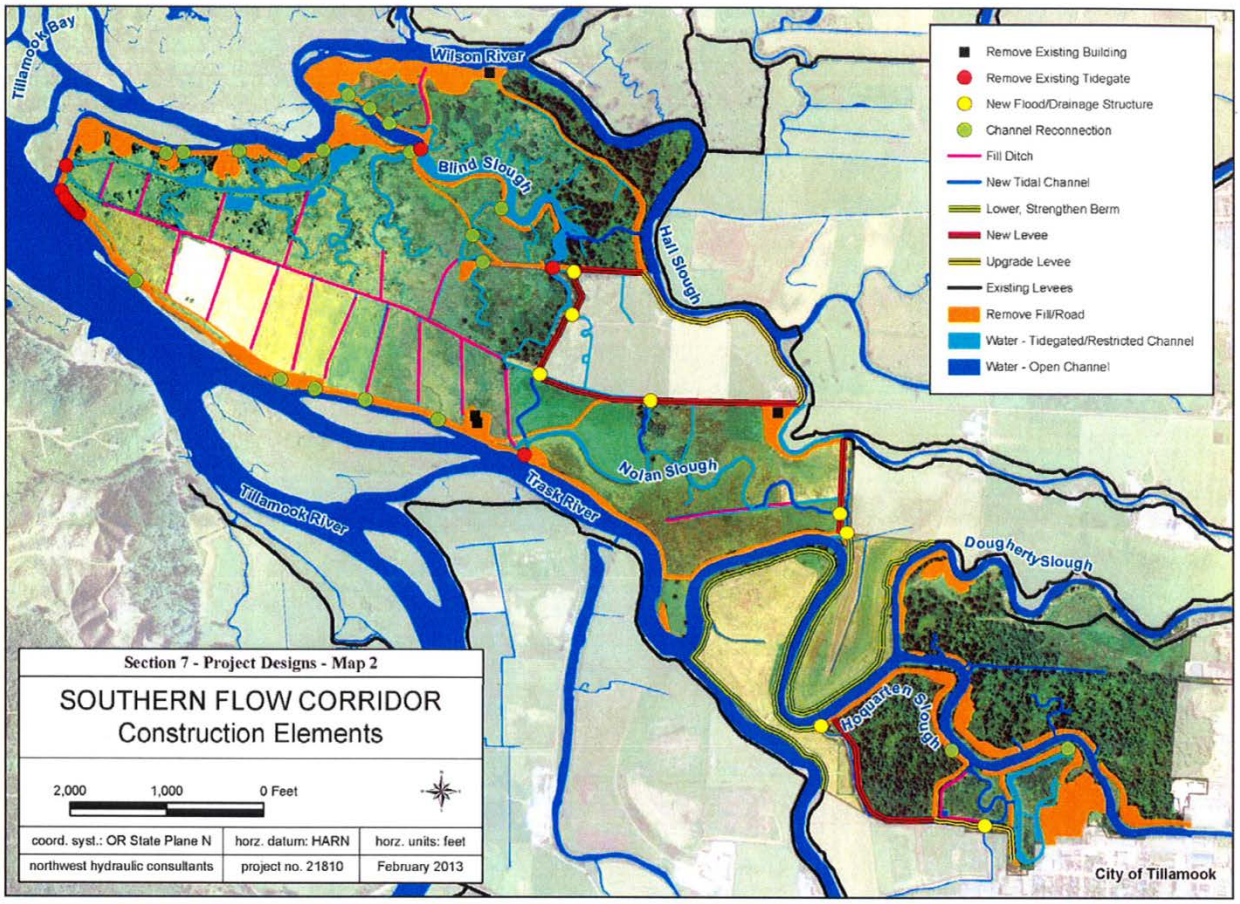
Southern Flow Corridor – Landowner Preferred Alternative



[52] Email, Rick Klumph to various recipients, July 30, 2013.

In the intervening period since the May 2010 Preliminary Design Report was issued, the design has been developed in further detail as now shown on Figure Southern Flow Corridor – Construction Elements.

Southern Flow Corridor – Construction Elements



According to NHC, computer modeling predicts water level reductions of up to 1.5 feet will be achieved for all floods from small frequent events through a 100-year event. The area of flood level reduction is over 3,000 acres and encompasses the lower Wilson, Trask and Tillamook River floodplains. There are 540 residential, commercial and agricultural structures located in the area of benefit. Total estimated economic benefits accrued from avoided flood damages over a 50-year project life are $9.2 million.

6.0 ADDITIONAL NHC TASK ORDERS

Technical assistance has been needed from NHC on design refinement for grant applications and on benefit/cost analysis in support of the FEMA appeals.

Task Order #2, on February 7, 2011, added $25,000 for additional technical assistance with two additional grant applications. On July 25, 2011, assistance was authorized in Task Order #3 ($25,000) the benefit/cost analysis (B/C-A) for the SFC.

Further work on the B/C-A and continued technical assistance with grants, stakeholder requests and project updates produced Task Order #4 on December 31, 2011, for another $25,000.

Another $5,000 was authorized under Task Order #5 on December 31, 2012, for assistance with the final FEMA appeal and continued technical assistance.

By early February 2013, the need to advance the level of design work needed for the NOAA grant (subsequently awarded) and follow-up work on the final FEMA appeal produced Task Order #6 in the amount of $30,103.

To date, $157,000 has been spent on task orders leaving a $483,122 balance available to complete work under the May 13, 2010, contract with NHC. Task Order #7 is now pending.

7.0 ADDITIONAL ELEMENTS OF PUBLIC OUTREACH AND INVOLVEMENT

7.1 Oregon Solutions (OS) Public Involvement

Although the Southern Flow Corridor – Landowner Preferred Alternative (SFC) is designated by FEMA as the Port of Tillamook Bay (POTB) Alternative Project #13, it has been spawned, matured, and emerged in the larger context as an Oregon Solutions Project. As such, the depth and breadth of public outreach and involvement has been so much greater than any of the other POTB alternative projects. The 37 public agencies and other organizations involved in OS have produced an unprecedented array of venues and opportunities for public input not only within the OS Project Team and Design Committee framework but also at each level of the 37 participating members. Because they are too numerous to include here, the remainder of this paper will summarize the major venues of local public involvement.

One of the expressed outcomes anticipated in forming the 37 member OS Project Team was to "...raise awareness of the project at local, regional, state and federal levels."[53] In pursuit of this outcome, Tillamook County created two sets of databases: one containing contact information for participants and their alternatives and one for interested parties for both the Project Team and the Design Committee. Both sets are maintained and used not only for providing meeting notices but also providing updates and other communications. In turn, each of the 37 OS participants signed a Statement of Assurances, a number of which contain commitments to further propagate public information and community outreach. As a consequence, OS meeting notices issued by the County using these databases receive further dissemination by participating agencies and organizations. This process for providing public notice was used for each

[53] Oregon Solutions Declaration of Cooperation, Tillamook Basin Flooding Reduction Project, November 2007, p.3.

meeting of the Project Team[54] and Design Committee.[55] The major issues raised and the actions at these meetings are described in prior sections of this paper.

7.2 Tillamook County

With Tillamook County Commissioner Mark Labhart as one of the two co-conveners of OS, Tillamook County has played a pivotal role in administering and facilitating the OS process. From the onset, the County served as the pass through agent for project funding, recordkeeping for project team meetings, and accepted the responsibility for keeping the community, Project Team, news media and other parties informed.[56] When OS Project Manager Dick Townsend retired from his work at Portland State University in April 2009,[57] Paul Levesque thereafter assumed the duties as local OS project manager.[58] Mr. Levesque had up to that time been a member of the Project Team and as the County's contract officer, had handled all of the public contracting requirements on OS projects. Consequently, throughout the entire OS process, all contract matters involving OS were regularly scheduled on the Board of Commissioners' meeting agendas and acted on in those public meetings. By way of examples, beginning in 2009, regularly scheduled OS matters during these public meetings included the NHC initial contract for Project Exodus[59] HEC-RAS modeling as well as Corps of Engineers oversight of that modeling;[60] 2009 NOAA grant application which involved extensive public testimony;[61] Modification #1 to the NHC discussed in Section 5.7;[62] an extension of the NHC contract;[63] the 2010 OWEB application that was not funded;[64] an Intergovernmental Agreement with the Port of Tillamook Bay concerning Project Exodus;[65] the Notice of Intent to Award the contract to Right of Way Associates (ROWA) for property appraisals and negotiations involving the SFC;[66] the May 12, 2010 meetings described in Section 5.12 where there was substantial testimony spawned by the ROWA and NHC contracts;[67] discussion concerning the removal of the blue barn on the 377 acre county-owned portion of the SFC;[68] execution of the Sadri purchase

[54] May 23, 2007; June 27, 2007; July 25, 2007; September 12, 2007; April 11, 2008; May 21, 2008; September 23, 2008; December 11, 2008; April 23, 2009; August 4, 2009; and March 8, 2012.
[55] February 6, 2009; September 2, 2009; May 3, 2010; June 24, 2010; May 13, 2011; and April 20, 2012
[56] Tillamook County OS Statement of Assurances, October 27, 2007.
[57] OS Project Team, Minutes, April 23, 2009, p. 5.
[58] OS Declaration of Cooperation, August 2009, p. 6.
[59] Tillamook County Board of Commissioners, Minutes, January 14, 2009, Item #15.
[60] Tillamook County Board of Commissioners, Minutes, January 14, 2009, Item #14.
[61] Tillamook County Board of Commissioners, Minutes, April 6, 2009, Item #7.
[62] Tillamook County Board of Commissioners, Minutes, May 4, 2009, Item #11 and May 6, 2009, Item #13.
[63] Tillamook County Board of Commissioners, Minutes, July 20, 2009, Item #7; July 22, 2009, Item #8.
[64] Tillamook County Board of Commissioners, Minutes, April 14, 2010, Staff Meeting Item #7c; Board Hearing Item #7.
[65] Tillamook County Board of Commissioners, Minutes, April 14, 2010, Staff Meeting Item #7d; Board Hearing Item #8.
[66] Tillamook County Board of Commissioners, Minutes, April 28, 2010, Staff Meeting Item #13a; April 28, 2010 Board Hearing, Item #14.
[67] Tillamook County Board of Commissioners, Minutes, May 12, 2010, Staff Meeting Item #14 and #14b; May 13, 2010, Board Hearing Items 11 and 12.
[68] Tillamook County Board of Commissioners, Minutes, October 20, 2010, Staff Meeting Item #6b.

option;[69] execution of the Fuhrman option where testimony was offered that, "...this acquisition is supported by the Tillamook Bay Habitat and Estuary Improvement District since it is part of their preferred alternative that grew out of the Corps Feasibility Study;"[70] a modification of the ROWA contract to provide additional appraisal work associated with "the newest landowner alternative" where Commissioner Labhart offered comments how the Oregon Solutions process had resulted in what seemed to be a collaborative solution that appeared to hold community support;[71] and action on various IGAs concerning the FEMA appeal.[72]

Another County Commission meeting of some significance occurred on November 9, 2011, when the Jones purchase option came before the board at its public hearing. Following a report from Paul Levesque stating that he had attended a TBHEID meeting the prior day where the group had reaffirmed their earlier support of the SFC project and had no objection to the Jones option agreement, Commissioner Hurliman renewed his objection to the loss of this farmland that he had initiated a year earlier (See Section 5.12). Stating that flood reductions would not be changed, Commissioner Hurliman listed a number of conservation acquisitions in recent years that he felt were similarly in violation of the County Comprehensive Land Use Plan. The Agreement passed on a 2-1 vote with Commissioner Hurliman voting nay.[73] During 2012 other OS matters continued to come before the board at its public hearings, such as the Jones purchase option[74] and a $22,000 grant for the SFC from the Wild Salmon Center (WSC) which Commissioner Hurliman also voted against due to his mistrust of the WSC on certain forest issues.[75] Following Commissioner Hurliman's departure from public office, OS matters that came before the County Commission were all approved unanimously, including a two-year extension of the Sadri option agreement;[76] the application for the recently awarded NOAA grant;[77] a $7,000 grant from ODFW for the SFC;[78] a two-year

[69] Tillamook County Board of Commissioners, Minutes, Feb. 23, 2011, Staff Meeting Item #11a; February 23, 2011 Board Hearing Item #11.
[70] Tillamook County Board of Commissioners, Minutes, March 9, 2011, Staff Meeting Item #6a; also see March 9, 2011 Board Hearing, Item #4.
[71] Tillamook County Board of Commissioners, Minutes, May 11, 2011, Board Hearing Item #9; also see may 11, 2011 Staff Meeting Item #10b.
[72] Tillamook County Board of Commissioners, Minutes, May 18, 2011, Staff Meeting Items #8b and 8c; May 18, 2011 Board Hearing Items #10-11.
[73] Tillamook County Board of Commissioners, Minutes, November 9, 2011, Board Hearing Item #15; also see November 9, 2011, Staff Meeting Item #13f.
[74] Tillamook County Board of Commissioners, Minutes, March 7, 2012, Staff Meeting Item #16b; March 7, 2012, Board Hearing Item #19.
[75] Tillamook County Board of Commissioners, Minutes, December 19, 2012, Board Hearing Item #8; also see December 19, 2012, Staff Meeting Item #7b.
[76] Tillamook County Board of Commissioners, Minutes, January 2, 2013, Staff Meeting Item #8b; January 2, 2013, Board Hearing Item #9.
[77] Tillamook County Board of Commissioners, Minutes, January 13, 2013, Staff Meeting Items 6c and 6d; January 13, 2013, Board Hearing, Items #6 and 7.
[78] Tillamook County Board of Commissioners, Minutes, January 20, 2013, Staff Meeting Item #7a; January 20, 2013, Board Hearing Item #7.

renewal of the Diamond F purchase option agreement;[79] a two-year extension to the NHC contract;[80] a purchase option agreement with Gienger;[81] a budget amendment for the recently awarded NOAA grant;[82] an MOU with TBNEP for a grant of up to $9,000 for the SFC;[83] and a declaration of a sole source procurement for the Institute for Applied Ecology (IAE).[84]

As noted by the entries cited above, each item comes before the Commission at two separate public meetings. The first is a Board of Commissioners staff meeting open to the public where the agenda items are discussed by the board and the person(s) or department bringing the items forward. Opportunity for public comments is afforded at staff meetings. Each item requiring formal action by the Board is then moved to the second public meeting known as the Commissioners' Hearing, which is not only open to the public but is also televised as described in more detail below.

Agendas for both meetings are prepared and posted several days in advance of the meetings. Additionally, the agendas are placed on the County's website with hyperlinks to the documents that will come before the Board. As such, any member of the public with computer access can review in advance and in detail all matters that are scheduled for Board action.

Since 2002, Jane Scott Video Productions has videotaped virtually every Board of Commissioners' Hearing for rebroadcast on the Charter Cable PEG Government channel. Each weekly meeting is then rebroadcast once per day for seven consecutive days, at varying timeslots each day, to the 10,418 subscribers in Tillamook and Lincoln Counties. Also, since 2012 all meetings are available for viewing on the Internet on tctvonline.com for an entire year.

The importance of this television coverage to public outreach is not so much the fact that it memorializes Board actions, but is the fact that at the end of each televised meeting, the Board chair reports on the dates, time, locations and subject matter for upcoming meetings on matters of public importance. It is this dimension of continuing outreach to more than 10,000 local residents, involving seven repetitions for opportunities of public involvement that has contributed to an unprecedented transparency to this OS project.

[79] Tillamook County Board of Commissioners, Minutes, January 20, 2013, Staff Meeting Item #7c; January 20, 2013, Board Hearing, Item #9.
[80] Tillamook County Board of Commissioners, Minutes, March 6, 2013, Staff Meeting Item #10a; March 6, 2013, Board Hearing Item #11.
[81] Tillamook County Board of Commissioners, Minutes, March 6, 2013, Staff Meeting Item #10b; March 6, 2013, Board Hearing, Item #12.
[82] Tillamook County Board of Commissioners, Minutes, June 5, 2013, Staff Meeting Item #13a; June 5, 2013 Board Hearing, Item #11.
[83] Tillamook County Board of Commissioners, Minutes, July 10, 2013, Staff Meeting Item #91; July 10, 2013, Board Hearing Item #8.
[84] Tillamook County Board of Commissioners, Minutes, September 14, 2013, Staff Meeting Item #8a; September 4, 2013, Board Hearing Item #5.

7.3 Tillamook Bay Habitat and Estuary Improvement District (TBHEID)

The importance of the TBHEID as a component of public involvement cannot be overstated. The benefitted area of flood level reduction from the SFC project covers over 3,000 acres and encompasses the lower Wilson, Trask and Tillamook floodplains. There are 540 residential, commercial and agricultural structures located in this area of benefit. It is also from within this area that most of the TBHEID 64 members reside, work or conduct their businesses. Not only did TBHEID serve as an initial contributing sponsor to the OS Project, but it committed within its Statement of Assurances to "...assist in working with property owners as needed, for project completion" and to "...lead efforts to unite the community and participants in moving forward collaboratively."[85] To that end, the SFC has been on its agenda for virtually every meeting it has held over the last four years.[86] For each of the last three years at its annual meeting, the SFC-Landowner Preferred Alternative has been voted as its top priority project. TBHEID has also conducted special public meetings with extensive outreach and invited speakers to keep the public informed. The OS project manager, County personnel or other project representatives have attended every meeting to provide project updates.

7.4 Port of Tillamook Bay (POTB)

Although Oregon Solutions meetings, Tillamook County proceedings and hearings and TBHEID workshops and meetings have each represented major components of public involvement, other Oregon Solutions participants such as the Port of Tillamook Bay have also played a significant role in public involvement opportunities. The following are examples.

At its October 16, 2007, meeting the POTB's Port Commissioner, Art Riedel, was appointed to represent the Port on the Oregon Solutions (OS) Project Team.[87] Notice of the April 23, 2009 OS meeting was included in the POTB's agenda and proceedings on April 21, 2009.[88] Extensive discussion and public testimony took place during the april 12, 2010 POTB board meeting when State Senator Betsy Johnson, County Commissioner Mark Labhart and OS Project Manager Paul Levesque were present for a proposed Intergovernmental Agreement (IGA) between the County and POTB concerning the Southern Flow Corridor Projec t (SFC). Following a detailed presentation on the project and discussion about the loss of farmland issue, "everyone agreed" this project would hopefully help reverse the effects of the recent FEMA remapping that designated most of the north Highway 101 area as floodway. In considering the provisions of the proposed IGA, the board also discussed public access, property

[85] Declaration of Cooperation, Tillamook Basin Flooding ReductionProject, November 2007, p 25; Statement of Assurances, October 5, 2007.

[86] TBHEID Minutes and Agendas January 19, 2010; June 3, 2010; June 24, 2010; September 15, 2010; March 22, 2011; May 13, 2011; June 23, 2011; November 8, 2011; January 4, 2012; March 7, 2012; april 20, 2012; October 18, 2012; January 9, 2013; February 9, 2013; March 26, 2013; July 8, 2013; August 21, 2013.

[87] PL 40

[88] PL 41

ownership and the project benefits to fish habitat. The IGA was then unanimously approved by the POTB board.[89] This was followed on September 18, 2012, with a presentation to the Port board on the status of the appeal.[90] A status report on the project was given by the Port General Manager on July 16, 2013.[91]

On March 16, 2011, FEMA Region X determined that the OS SFC Project was ineligible for Public Assistance (PA) program grant funding. In assisting the POTB in its appeal fo this decision, Mr. Levesque brought two additional IGAs for consideration by the Port board at its May 17, 2011, meeting. Although the Port Board agreed these IGAs were ready for signing after legal counsel approval, the IGAs were not used as part of the appeal and thus were never executed.[92]

Following FEMA's January 2012 denial of the first appeal, the OS Project Team recommended to the POTB that it file a second and final appeal to FEMA HQ. When the POTB considered this matter at its March 8, 2012, meeting, County Commissioner Mark Labhart and OS Project Manager Paul Levesque were in attendance to present the recommendation. Following a discussion by Port Commissioner Olsen concerning the Port's historical commitment to the project, the Port Board unanimously approved the filing of the second appeal.[93]

7.5 Other Local Public Involvement

Each local agency and organization represented on the OS Project Team executed a Statement of Assurances in 2007. All of these contain commitments to remain engaged through its appointed representative on the Project Team and most provide a conduit for continuing public information. For example, the City of Tillamook, through its mayor and city manager, stated they would "...keep all parties informed of activities related to flood mitigation efforts. The City will champion efforts of the Project Team and provide an informational conduit to community groups and news media."[94] Tillamook Bay Community College would "...look for ways to enhance a 'community conversation' that will take place to form a strategic plan...."[95] The Tillamook County Creamery Association vowed to "...converse with landowners and work to resolve conflicts."[96] The Tillamook County Farm Bureau stated it would "...converse with landowners and work to resolve conflicts."[97] The Tillamook Bay National Estuary Partnership committed to "...assist in the communication of projects to its members and the Tillamook Basin Community at large."[98]

---

[89] PL 42
[90] PL 45
[91] PL 46
[92] PL 43
[93] PL 44
[94] OS Declaration of Cooperation, November 2007; City of Tillamook Statement of Assurances, October 1, 2007.
[95] OS Declaration of Cooperation, November 2007; TBCC Statement of Assurances, October 31, 2007.
[96] OS Declaration of Cooperation, November 2007; TCCA Statement of Assurances, October 23, 2007.
[97] OS Declaration of Cooperation, November 2007; Tillamook County Farm Bureau, Statement of Assurances, October 31, 2007.
[98] OS Declaration of Cooperation, November 2007; TBNEP Statement of Assurances, October 31, 2007.

Finally, co-conveners, Commissioner Mark Labhart and Senator Betsy Johnson, have each engaged in presentations within a variety of local and statewide forums, too numerous to mention here. But, by way of example, Tillamook County Commissioner Mark Labhart has attended virtually every monthly meeting of the Tillamook County Farm Bureau where he has made PowerPoint presentations, provided project updates and answered questions or concerns about the SFC Project.[99]

[99] Personal Communication, County Commissioner Mark Labhart.