PORT OF TILLAMOOK BAY

May 14, 2012

Mr. David Stuckey
Deputy Director
Financial and Recovery Services Section
Oregon Emergency Management
P.O. Box 14370
Salem, OR 97309-5062

RE: Disaster No.: 1733-DR-OR
Second Appeal – Port of Tillamook Bay (POTB)
PW No.: Alternate Project #13 to Project Worksheet (PW) 936

Dear Mr. Stuckey:

On March 23, 2012 and pursuant to 44 CFR 206.206, the Port submitted documents representing POTB's second and final appeal of FEMA's decision within the 60-day time period for a second appeal, and which contained the following justifications: 1) Supporting POTB's position (which includes a revised benefit-cost analysis report and the previous comment responses we have sent to FEMA); 2) A specification of the monetary figure in dispute; and 3) The provisions in Federal law, regulation or policy which POTB believes the initial action was inconsistent.

These documents were filed with the understanding that OEM would review the material submitted and, within sixty (60) days, will forward this appeal, through Region Ten, to FEMA's Assistant Administrator, Disaster Assistance Directorate in FEMA Headquarters and that, within 90 days following receipt of the appeal or any requested information, will notify the State of the disposition of the appeal, which decision is final.

During the review period, OEM requested additional information be provided for the Appeal and additionally recommended the Port submit the entire project history in that this project will be reviewed by a new audience at FEMA Headquarters.

Mr. David Stuckey
RE: Disaster No.: 1733-DR-OR, Second Appeal – Port of Tillamook Bay
May 14, 2012: Page Two

The following Attachments represent the project history from the filing of the Alternate Project Request through the Second Appeal:

- Attachment A – Second Appeal dated 03/23/2012;
- Attachment B – First Appeal dated 05/25/2011 (and related correspondence); and
- Attachment C – Alternate Project Request dated 12/30/2009 (and related correspondence).

The Port hereby requests an audience at FEMA Headquarters at the Hearing on the Second Appeal prior to FEMA making its decision.

Please keep us apprised as to the scheduling of that event, for our appearance at same.

If you have any questions, please contact me at 503-842-2413, Ext. 111 or by email to mbradley@potb.org.

Thank you for your consideration.

Sincerely,

Michele Bradley

Michele Bradley
General Manager

Enclosures

ATTACHMENT A

DISASTER NO.: 1733-DR-OR

PW NO.: ALTERNATE PROJECT #13 TO

PROJECT WORKSHEET (PW) 936

SECOND APPEAL

03/23/2012

PORT OF TILLAMOOK BAY

March 23, 2012

Mr. David Stuckey
Deputy Director
Financial and Recovery Services Section
Oregon Emergency Management
P.O. Box 14370
Salem, OR 97309-5062

RE: Disaster No.: 1733-DR-OR
Second Appeal – Port of Tillamook Bay (POTB)
PW No.: Alternate Project #13 to Project Worksheet (PW) 936

Dear Mr. Stuckey:

On January 24, 2012 POTB received by email your letter relating to the Deputy Regional Administrator of the Federal Emergency Management Agency, Region Ten's determination of POTB's June 2011 appeal request for funding consideration for the above-referenced Southern Flow Corridor Project. FEMA denied the first appeal. This denial was based on the criteria stated in FEMA's January 13, 2012 letter to you.

Pursuant to 44 CFR 206.206, enclosed please find documents which represent POTB's appeal of FEMA's decision within the 60-day time period for a second appeal, and which contain the following justifications: 1) Supporting POTB's position (which includes a revised benefit-cost analysis report and the previous comment responses we have sent to FEMA); 2) A specification of the monetary figure in dispute; and 3) The provisions in Federal law, regulation or policy which POTB believes the initial action was inconsistent.

It is our understanding that OEM will review the material submitted and, within sixty (60) days, will forward this appeal, through Region Ten, to FEMA's Assistant Administrator, Disaster Assistance Directorate in FEMA Headquarters and that, within 90 days following receipt of the appeal or any requested information, will notify the State of the disposition of the appeal, which decision is final.

PORT OF TILLAMOOK BAY, 4000 BLIMP BLVD., TILLAMOOK OREGON 97141 • 503/842-2413 • FAX NO. 503/842-3680 • www.potb.org

Thank you for your assistance with this matter.

If you have any questions, please contact me.

Sincerely,

Michele Bradley
General Manager

Enclosures

Final Appeal to Disaster Assistance Directorate, FEMA Headquarters, Washington, D.C.

PW NO.: Alternate Project #13 to
Project Worksheet (PW) 936
FEMA DR-1733-OR

Port of Tillamook Bay

March 23, 2012

The following document addresses the required appeal elements as listed in 44 CFR 206.206. For greater clarity we have re-ordered the response elements.

1 Monetary Figure in Dispute

The Port of Tillamook Bay has requested $ 4,310,000 from FEMA for this alternate project, which FEMA Region X has denied in its entirety.

2 Provisions in Federal law, regulation, or policy with which the appellant believes the initial action was inconsistent

2.1 Compliance with FEMA guidance and policy on Benefit-Cost Analysis

We take the "initial action" in this case to be the letter of denial of the initial appeal from FEMA Region X. The reasons given for denial in this letter are that 1) the project has not been shown to be cost effective, and 2) this is due to the lack of validation of agricultural losses avoided using historical data. Prior responses to the initial denial of the project and further requests for information by FEMA contained other issues deemed lacking by FEMA. As these issues have not been listed in the January 13, 2011 letter, we presume that our responses properly addressed those and they are no longer relevant.

The Port asserts that:

- The Benefit-Cost Analysis (BCA) for this project has been done in full accordance with FEMA policies and guidance, including meeting all the requirements of the Public Assistance and HMGP programs.
- FEMA has required data validation above and beyond that required in the FEMA guidance.
- FEMA has essentially argued against the use of its own loss data functions and methodology, an approach that if applied consistently, would require FEMA to disallow many HMGP grants now awarded.

2.2 Failure to respond in timelines allowed

We also note that it appears FEMA Region X did not meet the timelines specified in 44 CFR 206.206(3) which allows FEMA 90 days from receipt of an appeal or additional information requested to make a determination. In this case, the letter of denial of appeal is dated January 13, 2012, and refers to last receiving information from the applicant on September 6, 2011, a period of 130 days. There are matching funds allocated to the project by the Oregon Legislature in the form of state bonds that were sold in July, 2011. In the event the present appeal is not resolved in a timely manner, the state bond funds may become subject to arbitrage to the financial detriment of the applicant and the project.

3 Justification supporting the appellant's position

We now present our justification why the denial of the alternate project appeal is inconsistent with FEMA policies and guidance.

3.1 Benefit-Cost Analysis performed in full compliance with FEMA procedures

The benefit-cost analysis was performed using standard FEMA tools and methodology, specifically a HAZUS- BCAR Damage Frequency Analysis approach as detailed in section 5.1.3 of the *Supplement to the Benefit-Cost Analysis Reference Guide, June 2011*. The following bullets provide a synopsis of the methods and data sources used in the analysis:

- Flood depths are derived from a HEC-RAS model updated using the latest Lidar data and calibrated to recent floods.
- Project Costs
  - Real Estate costs are based on signed options for all properties to be acquired and hence are considered very firm.
  - Maintenance costs are based on historic levee and maintenance costs in the project area, and estimates of flood damage repair costs based on past repairs and professional judgment.
  - Engineering, permitting and construction costs quantity estimates were developed using detailed topographic information and design considerations. Unit costs were developed using comparisons with recent bids in the region, professional judgment and experience in this type of project.
  - The engineering and construction cost estimate contains a 25% contingency in addition to using conservative unit costs.
- Every structure within the project area of influence was digitized and georeferenced in a GIS. County assessor staff then matched each structure with tax records and ground photographs. 570 individual structures were identified.
- First floor height was determined, in order of precedence by 1) using flood elevation certificates, 2) extracting high accuracy Lidar based ground elevations underlying each building polygon and adding a building first floor height based on photographs, 3) Assigning first floor height above ground based on the average of that structure class in the area.
- Flood depths in each structure were determined by creating 20 foot resolution flood depth grids and subtracting first floor height above ground.
- Building replacement cost used Assessor real market value for all but 96 structures, where values were applied by using the local averages of similar structures per square foot.
- All buildings were classified in into HAZUS occupancy types. Content costs used FEMA default multipliers on building cost.
- Building losses were calculated for pre and post project condition for the three selected floods in HAZUS MR-4. FEMA default depth-damage curves were used in all cases.
- Displacement losses used FEMA default values, with the exception that agricultural structure rental costs were not used, based on the assumption it would not be possible for a farmer to rent equivalent buildings in the area when most agricultural building stock is in the floodplain.

- Residential and commercial damages were validated by comparison of HAZUS outputs with FEMA flood insurance claim data. Commercial damages were also compared with proof of loss statements from 3 structures. Agricultural damages were validated by first verifying that Tillamook County farms have greater economic exposure to flood risk than the national average, and then estimating the percentage damage incurred within the project area for the only available report with agricultural damages given.
- Based on the validation exercise, residential damages were left unchanged, while commercial and agricultural inventory damages for the 6 and 22 year event were reduced by 50%.
- The adjusted damages were loaded into BCAR 4.5.5 along with project costs and a benefit-cost analysis run. The result is a benefit-cost ratio of 1.25.

The entire analysis was performed according to FEMA standards, using the best available data which in most cases is of high quality and recent origin. The BCA report fully documents the process.

3.2 Requirements for Validation of Loss Estimates

Under the standard methods, loss estimates are generated with a combination of project specific data such as floor elevations and water depths, and additional data that is supplied with FEMA default values, the most important for flooding being the depth-damage functions for each structure class.

It is clear from numerous locations in various benefit-cost guidance documents that justification is normally only expected when non-default values are used, presumably in order to prevent analysts from inflating project benefits without reason. For example, the following text is taken from the *Final BCA Reference Guide* (June 2009) Data Documentation Template for Floods (italics added):

> Displacement Costs: Possible documentation *if the default value* is overwritten includes: copies of advertisements.....
>
> Building Depth-Damage Function*: If the default value* is not used, provide complete documentation to support user-entered values.

Numerous other entries throughout the various hazard templates contain the same type of language, and this message is also repeated in other FEMA training classes and products: "*If* a default value is *not* used, you must provide justification...".

Despite using standard FEMA methods and default values throughout, FEMA reviewers requested validation/justification of the flood damages. In a letter dated March 24, 2011, Charles Axton, Recovery Division Director, stated "We find the use of modeled rather than actual historical data results in unrealistic damages. The estimated damages for agricultural and commercial buildings and contents appear to be substantially inflated." No reasoning or data to back up these assertions was provided in the letter.

3.3 Validity of FEMA Depth-Damage Functions

There have been no comments regarding our data inputs for flood depths, building class, floor elevations, or any other project specific items, so we presume these have all been sufficiently justified.

The one variable that remains in determining flood losses are the FEMA depth-damage functions. Therefore, the statement quoted above essentially argues that it is the FEMA default DDFs themselves that result in "unrealistic damages" that are "substantially inflated".

It is our understanding that the DDFs used in HAZUS and BCAR are the result of careful analysis by FEMA and the Corps of Engineers of thousands, if not tens of thousands, of flood insurance claims and other data, with the methods reviewed by expert panels before being loaded in these software packages. It is easily understood why FEMA guidance would allow the use of the default DDFs without additional justification given the confidence in these data the large sample size and extensive review have provided.

Thus the request for validation of the DDFs would seem to go against the guidance discussed above that only requires such information if non-default values are used. If the FEMA default values for depth-damage curves are indeed not to be used without validation, it makes the utility of programs such as HAZUS and BCAR for analysis of cost-effectiveness far more difficult.

Indeed, it is difficult to see how project or structure specific validation data for seismic or wind mitigation projects would be available at all in most cases, yet we presume FEMA has awarded numerous grants for these types of projects with the submittals based on FEMA software and using FEMA default values. In this case, the latest letter claims the percentages of damages that the "unvalidated" Agricultural category is responsible for range from 38%-56% of the totals. We cannot reproduce these percentages with our data, but a better metric is that agricultural damages are responsible for about 30% of annualized pre-project flood losses. In other words, the project has 70% of its losses "validated". When compared to a seismic project that addresses a building that likely has no historical losses whatsoever, and therefore has 100% "unvalidated" damages, this would appear to be a substantially better analysis. As our comments on agricultural damages show, even for flood hazards where there is more likely to be some historical record, certain areas or categories will have limited or no historic damage data to use.

Agricultural damages in particular seem to have been of interest to FEMA reviewers. The latest letter from FEMA Region X denying the appeal continues this theme - "However, a project to reduce flood levels by zero to eighteen inches will not substantially reduce flood hazards to milk parlors, milk tanks, or the risk of cows drowning."

We disagree with the conclusions drawn in this statement. Perusal of the depth-damage functions for any of the structure categories in HAZUS or BCAR will show that 18 inches of flood level reduction will provide significant lowering of damages. There is no reason this would not hold true for agricultural buildings uniquely. The attached revised benefit-cost analysis contains new sections regarding agricultural flood damages in Tillamook County that address this issue directly.

3.4 Use of Conservative and Lower Bounds Analysis

The benefit-cost analysis was approached as a lower bounds analysis: some damages were not calculated at all, and conservative assumptions were used throughout. Key elements include:

- Reducing Commercial and Agricultural Inventory damages by 50% for the 6 and 22 year floods
- Using conservative unit costs for construction
- Applying a 25% contingency to engineering and construction costs
- Assuming no displacement rental costs could be incurred for agricultural structures

Damages not calculated include:

- Functional downtime for roads
- Emergency Response Costs
- Debris Removal

3.5 Revised Benefit-Cost Analysis

We are submitting a revised benefit-cost analysis as part of this appeal. Additional background information and documentation from other reports has been added in order to minimize cross-referencing other material. There are two significant additions in the document. First, we have provided an agricultural damages validation section. This uses the same source and data from the 1996 flood as was discussed in previous versions, but conducts a quantitative assessment of the portion of the reported damages that occurred within the project area, in addition to documentation of the economic value of farms and a discussion of flood damages incurred. Our conclusion from this analysis is that the HAZUS expected damage values for all categories, including agriculture, are validated by the historical damages. Second, we have incorporated displacement losses into the BCA. These were previously calculated independently and supplied in our comment response to FEMA. They are now part of the single BCAR run and the documentation integrated into the BCA report. The addition of displacement costs increases the BCR from 1.14 to 1.25 and the net benefits (avoided losses) from $1,174,000 to $2,046,000.

3.6 Summary

To summarize our findings regarding the denial of the appeal:

- FEMA asserted that flood losses were inflated, with no explanation of how this was determined. By the lack of comment on the methods and project specific data used, FEMA is essentially stating the default depth-damage functions it provides are the cause of the claimed inflated losses.
- The benefit cost analysis is a conservative, lower bounds analysis that still has a BCR well above one. Based on the denial of appeal, the revised Benefit-Cost Analysis report has a revised section that quantifies and validates agricultural flood damages, resulting in validation of all major damage groups in the project.
- In addition to providing widespread flood damage reduction benefits, the project provides large environmental benefits by restoration of hundreds of acres of tidal marsh critical to recovery of federally listed salmon species.

4 Supporting Documentation

All documentation related to the alternate project application and subsequent denials from FEMA and responses from the Port are attached to this final appeal.

Final Southern Flow Corridor Benefit-Cost Analysis

Prepared for:

Tillamook Oregon Solutions Design Team

Under contract to Tillamook County

Prepared by:

Northwest Hydraulic Consultants

16300 Christensen Rd, Ste 350

Seattle, WA 98188

and

Tetra Tech, Inc

90 South Blackwood Avenue

Eagle, ID 83816

REVISED MARCH 2012

TETRA TECH

nhc

Acknowledgements

Project design and this report were prepared by Vaughn Collins, P.E., CFM. of NHC. Sam Gould of NHC performed hydraulic modeling and GIS analysis.

The Benefit-Cost analyses were performed by Rob Flaner, CFM, Hazard Mitigation Program Manager for Tetra Tech, Inc. The HAZUS-MH analysis was performed by Ed Whitford, Senior GIS Analyst for Tetra Tech, Inc.

We wish to thank the numerous staff from Tillamook County, especially the Assessor's Office, that collected needed data for the analysis on very short notice.

Contents

1 Executive Summary

The Port of Tillamook Bay has requested that the Southern Flow Corridor be eligible for FEMA funding under its Public Assistance Alternate Projects authority. A requirement under this program is that the proposed project meets benefit-cost criteria. The purpose of this report is to document the data sources, methods, and results of the benefit-cost analysis.

To measure the cost-effectiveness of the proposed Southern Flow Corridor project, FEMA's Benefit Cost Analysis Re-engineering (BCAR) version 4.5.5 was utilized. The damage frequency assessment (DFA) module within BCAR was utilized. The damages entered into the DFA module were estimated using FEMA's HAZUS-MH (version MR-4) risk assessment tool. Due to the complexity and comprehensive nature of this project, this approach to measuring the cost-effectiveness was deemed appropriate and within FEMA guidelines by the analysts.

This report supersedes all prior versions of this report. The main changes in this version are an updated agricultural loss validation section, and the addition of displacement costs to the analysis.

Historic flood damage data was obtained and the HAZUS predicted damage results compared with the historic data. Comparisons show that HAZUS estimated losses were 40% less than actual flood insurance claims for residential structures, and 50% greater than estimated Replacement Cash Value (RCV) losses for commercial structures. For agricultural losses, using information from the 1996 flood, HAZUS losses were 78% higher than estimated historic losses. HAZUS values are expected to always exceed RCV and claims values because the model estimates additional direct losses (such as displacement costs) beyond the building, content, and inventory losses flood insurance will pay. For the analysis, commercial and agricultural inventory losses for the 6 and 22 year events were reduced by 50%. This resulted in the HAZUS losses being reduced to 18% and 32% higher than historic losses for commercial and agricultural structures, respectively.

The entire analysis was run as a lower bound analysis; that is, using only the largest benefit categories and conservative assumptions. The project was tested to see if the benefit-cost ratio was above 1.0. The lower bound approach leaves unquantified numerous known benefits, as the goal is to determine simply whether or not a project is cost-effective. If shown cost-effective, as this project is, the true benefit cost, while unknown, is guaranteed to be higher than the one calculated. Key conservative assumptions used in the analysis include:

- Commercial and Agricultural Inventory losses for the 2 more frequent floods used were reduced by 50%.
- Residential losses used FEMA default Depth Damage Curves even though HAZUS results were 40% less than historic flood insurance claims and would have justified increases to the DDFs.
- Agricultural Rental Displacement costs were set to zero based on the assumption it would not be possible to rent farm structures after a flood.
- The project construction cost estimate contains a 25% construction contingency.

The lower bound analysis results show that the project is cost-effective. As a result of including displacement costs, the revised benefit-cost ratio is 1.25.

2 Project Description

The Southern Flow Corridor consists of removing existing levees and fill to create an unobstructed flood pathway out to Tillamook Bay. The Southern Flow Corridor – Landowner Preferred Alternative Preliminary Design Report ("SFC Design Report") describes in detail the project elements.

The Southern Flow Corridor project proposes to remove manmade impediments to flood flows to the maximum extent possible in the lower Wilson River floodplain. By doing so, flood level reductions exceeding 1.5 feet in some locations can be obtained in the area.

The Southern Flow Corridor project will:

- Remove approximately 36,000 lineal feet of existing levee
- Lower an additional 11,100 feet of levee
- Construct 7,000 feet of new setback tidal dike and upgrade an additional 3,100 feet of pre-existing tidal dike.
- Replace an existing floodgate structure with a new one
- Provide over 520 acres of restored tidal marsh habitat in a key location of the Tillamook Bay Estuary

The 10,100 feet of new and upgraded tidal dike must be constructed to provide year-round protection to adjacent agricultural lands from twice daily tidal inundation, particularly during the summertime higher tides. It should also be noted that the habitat restoration component of the project is a byproduct of the flood damage reduction benefits. Virtually all the costs related to habitat restoration are either anticipated to be required as permit conditions or benefit the flood damage reduction purpose of the project. For instance, ditch filling is desired to allow the formation of natural tidal channels, but this allows on-site disposal of organic soils that would otherwise need to hauled off site and disposed of at much greater cost. Additionally, the excavated tidal channels shown, function as required flood conveyance or agricultural drainage channels, but are given sinuosity in order to provide habitat benefits.

Figure 1 shows the project elements. The project is described in more detail in the attached Southern Flow Corridor Design Report.

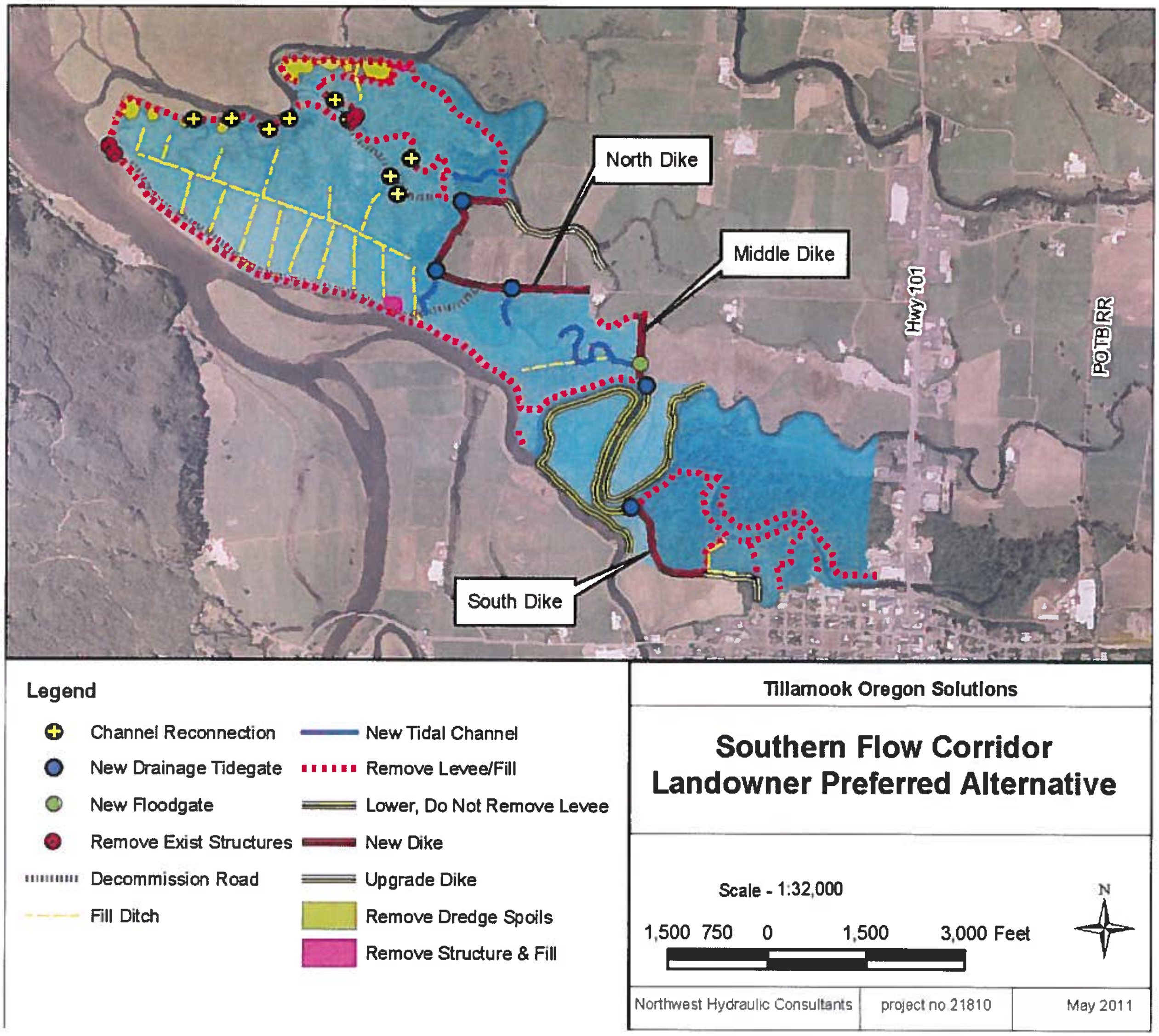


Figure 1: Southern Flow Corridor Project Elements

2.1 Hydraulic Model

The HEC-RAS hydraulic model developed for the Corps of Engineers Feasibility study was updated and used as the primary technical tool in hydraulic evaluation of alternatives for Project Exodus. 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 LiDAR. In many areas these are covered in dense brush or under tree canopy, and the accuracy of both the LiDAR and Corps photogrammetric data is 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-yr) flood with the observed tides increased by 1 foot and decreased by 2 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.

2.2 Comparison with Preliminary FIS model.

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 using new LiDAR for floodplain areas and extended down Tillamook Bay.
- 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 is the 10-yr event.

2.3 Selected Flood Events

Three floods (two historic floods and a synthetic 100-year flood) were selected for use in the Benefit-Cost Analysis. An updated flood frequency analysis for the Wilson River USGS was completed and the published USGS peak flows applied to the curve to generate estimated recurrence intervals for each of the historic floods. The synthetic 100-yr event was taken directly from the Preliminary Flood Insurance Study.

Table 1: Flood Recurrence Intervals

Flood Year	Recurrence Interval	Peak Flow (cfs)	Source
1999	6	25,400	USGS
2007	22	33,100	USGS
--	100	41,400	FEMA FIS

3 Flood Level Reduction Benefits

Implementation of the Southern Flow Corridor will result in reductions in flood levels across the lower Wilson River floodplain and to a smaller degree on the lower Trask and Tillamook Rivers as well. The project does not reduce the frequency of flooding, which is controlled by flows and bank elevations upstream, but reduces the flood levels to more natural levels over a wide range of flood magnitudes.

Flood level reduction and increases for the 1999 (~6-year), and 100-year floods are shown in the following figures. It can be seen that the project provides flood level reductions across most of the lower Wilson River floodplain at all sizes of floods. Some small flood reductions extend up the Tillamook and Trask systems.

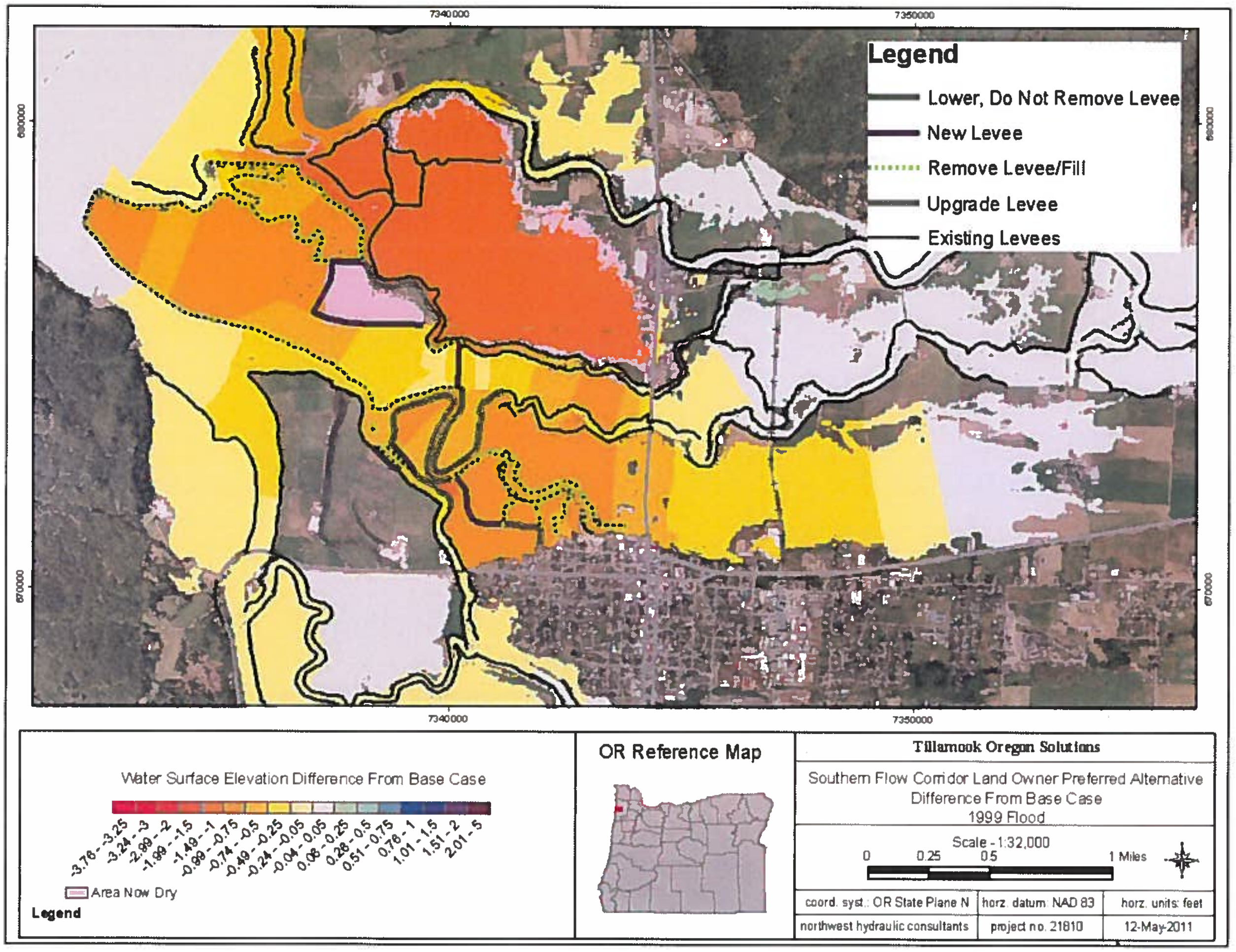


Figure 1: Changes in Flood Levels, 1999 Flood (6-yr Flood)

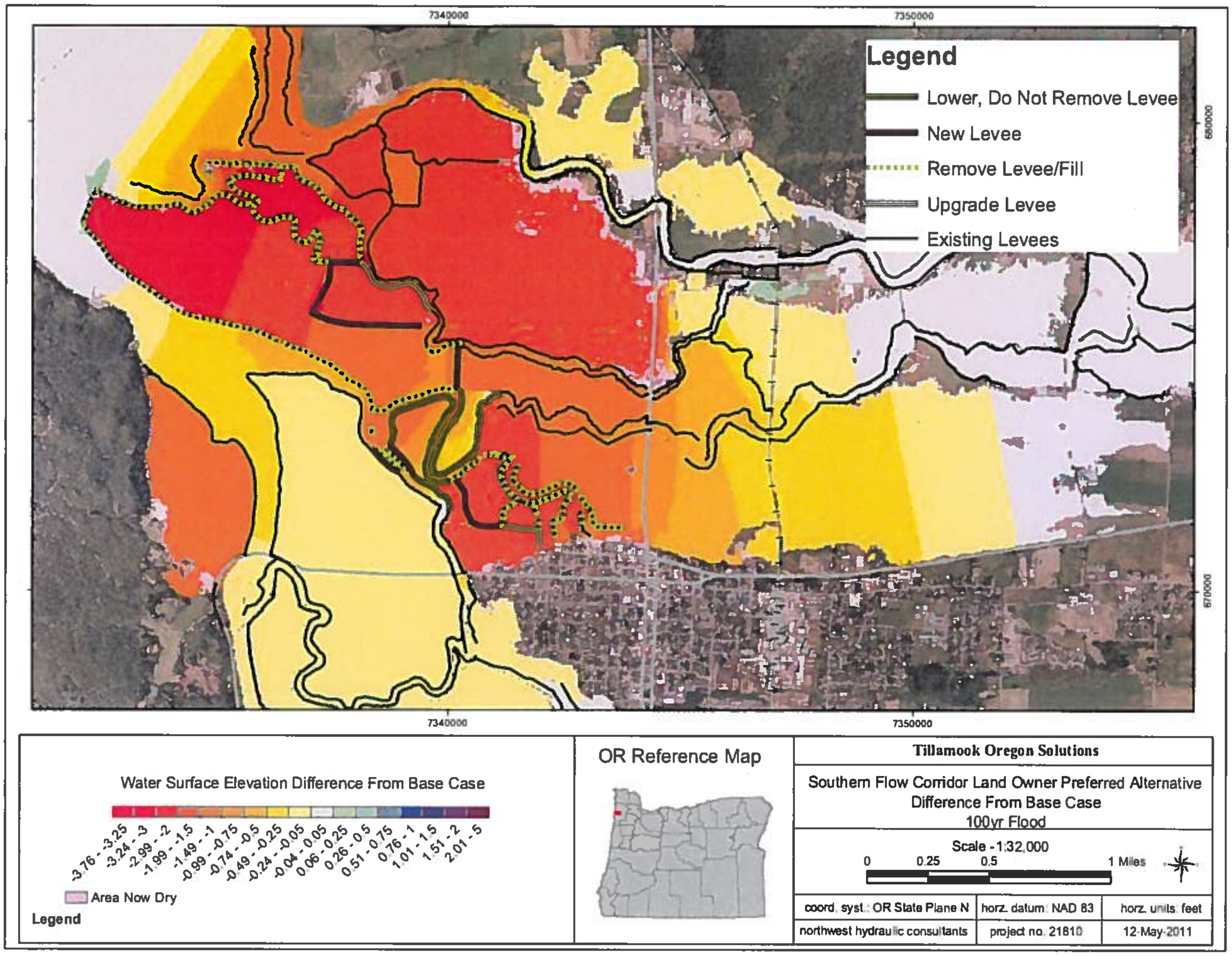


Figure 2: Changes in Flood Levels, 100-yr Flood

Modeled flood depths from the three floods, with and without the proposed project, were extracted and processed in GIS into 20 foot cell size depth grids for the analysis.

4 Project Costs

Project cost details and methods of estimation are described in the SFC Design Report. The summary project costs are shown here. Project costs are lower than the previous report. This is due primarily to two factors. 1) Two parcels that previously were assumed to be acquired will not be; the landowners have indicated they wish to keep the land and this has been reflected in the project layout, hydraulic modeling and costs, 2) As a result of some minor new dike realignment based on landowner negotiations the numbers of new floodgates required is substantially less and hence these costs.

4.1 Real Estate Costs

Real estate needed to implement this element is summarized in Table 2. The entire 384 acres of County owned public lands in the project area (the Wetlands Acquisition Area) are used for flow conveyance and habitat restoration. Around 6 acres of land owned by the City of Tillamook will be needed to tie dikes into high ground and some fill removal. 120 acres of private lands will be acquired from four landowners. Appraisals and negotiations are complete and signed options have been obtained these properties. There are six additional private properties held by four owners where temporary construction and flood easements will be required for either dike upgrades, levee lowering, or fill removal. The flood easements will set the elevations existing dikes on the properties may be maintained at in order to ensure continued function of the Southern Flow Corridor.

The flood control easement costs are based on an estimate of $550/acre considering the benefits accrued and changes to the properties due to the construction and easements acquired. These properties will all benefit from reduced flood levels due to the project, and are all within the floodway and so already have an existing high level of restriction on allowable activities. The temporary construction easements are estimated at $10,000 each.

Table 2: Real Estate Costs

ID	Property	Acres	Cost ($)	Note
A	Fuhrman	1.5	$ 675,000	Signed Option
B	Allen	4.3	$ 0	Land Swap
C	Jones	53.0	$ 238,500	Signed Option
D	Sadri	66.0	$ 485,000	Signed Option
E	Aufdermauer (Flood Easement)	50.5	$ 27,800	Estimate
F	Beeler (Flood Easement)	34.8	$ 19,100	Estimate
G	Temp. Construction Easements (2)	--	$ 20,000	Estimate
		Subtotal	$ 1,465,400	
	Appraisals/negotiations		$ 60,500	
	Title Reports		$ 2,500	
	Surveys for Legal Descriptions		$ 12,000	
	Environmental Assessment		$ 12,500	
	Closing costs/Title Insurance		$ 2,500	
	TOTAL		$ 1,555,400	

4.2 Construction Costs

As part of the reappraisal of the project in preparation for this appeal, the entire project cost estimate was revisited. Levee removal and dike construction quantities were recalculated and all unit and lump sum costs inspected and adjusted where necessary.

Project Design, Permitting and Construction costs are considered to be conservative. Project design and permitting alone have over $1,000,000 budgeted for a $4.2 million construction cost estimate. Given that the project, while large in scale, is a relatively simple earthmoving job without any of the complexities of buildings or urban environments, and that the major ecological benefits and support of resource agencies make permitting the project likely to be fairly easy allowing 25% of construction costs for design and permitting is conservative. In addition, a 25% contingency has been applied to the sum of construction and permitting/design costs.

Construction costs were estimated using a variety of sources. Recent bid prices and experience with similar projects in the region were considered. Nehalem Marine Mfg has been providing construction services on the site for several decades and provided specific construction requirements and conditions for each element considered. Earthwork quantities were based on a Lidar topographic surface which has been checked with GPS based ground survey.

Uncertainties include the amount of additional fill that may be required for dike settlement in soft soils and the extent of work needed to upgrade the existing dikes to design standards. The majority of construction costs are related to earthmoving. Construction costs have fluctuated significantly in recent years, from very high costs due in part to high diesel prices several years ago to very favorable bids typically being received currently due to the poor economic climate. Costs presented here contain a 25% contingency in part to allow for this uncertainty. The full detailed cost estimate is attached as Attachment A.

Table 3: Construction Cost Estimate

Item	Total Amount
Construction Costs	**$4,206,266**
Permitting	$250,000
Engineering, Administration, Construction Mngt @ 18%	$757,128
Subtotal Project Costs	**$5,213,394**
25% Contingency	$1,303,349
Total Project Costs	**$6,516,743**

4.3 Maintenance and Operation Costs

Long term maintenance costs on public lands and dikes are expected to be lower with implementation of the project. Around 45,000 feet of levee, including 30,000 feet that run along river channels and are exposed to higher erosive stresses, will be replaced with 7000 feet of new, wider, better constructed dike, very little of which is near any channel. The new floodgates will all be constructed of corrosion resistant materials and have a longer life span than the numerous older steel culverts now in use.

Maintenance costs are estimated based on actual expenses in maintain the existing levee system, the experience of Nehalem Marine Mfg. in maintaining most of the levees and dikes in the area for over two decades and NHC's experience in the design and repair of overtopping dikes. Annual maintenance will consist of dike and floodgate inspection and mowing of the dike slopes.

Project infrastructure requiring maintenance will consist of 10,100 feet of setback dike and associated flood gates. Annual mowing and inspection of the dike system is assumed to cost $4,000/yr. This is based on the average costs of $5,673/yr incurred from 2002 to 2010 for maintenance of the current levee system (which is over three times longer and substandard in many locations). Floodgate seals and bearings are estimated to have a life of 10 years, and require $4,000 to replace. The dikes are set back from the river channel, built at a low height (most of the system will be only 4-6 feet high) and designed to overtop and allow floodwaters to exit to Tillamook Bay without significant damage under frequent flood conditions. It is assumed that floods greater than 10-year events will cause some damage to the dikes due to greater overtopping depths and durations. Damages are expected to be surface erosion on the downstream dike face. An allowance of $150,000 every 10 years is made for damage repair. Using a conservative value of $30/cubic yard for dike materials delivered, graded, and compacted would provide up to 5,000 cubic yards of dike repair per incident, a volume that is unlikely to be needed based on past experience. Allowing for miscellaneous other costs, maintenance costs are estimated at $20,000/year.

4.4 Summary of Project Costs

Item	Total Cost
Real Estate	$1,555,000
Design/Permitting/Construction	$6,517,000
Maintenance ($/yr)	$20,000
TOTAL	$8,092,000

Note the costs shown here are $15,000 higher than those used in the BCAR model runs, reflecting updated real estate costs from recently signed options.

5 HAZUS-MH Analysis

5.1 Building Inventory

A User Defined Facility (UDF) approach was used to model potential flood loss in the project area.

The project area was determined by using GIS to find all floodplain parcels that had at least a 0.1 foot reduction in flood level during the 100-yr flood as a result of the Southern Flow Corridor. All structures within the project area were digitized using 2009 aerial photographs and an ID number assigned. County Assessor staff then matched each structure with the appropriate structure from the County Assessor database using the parcel number. Assessor data extracted included Use Type, Building Square Feet, Building Construction Class, Year Built, and Assessed Improvement Value. GIS was used to determine the centroid of each digitized structure and coordinates extracted. A limited number of structures use the same coordinates. This occurred where large farm buildings covered by one roof are stored within the Assessor database as multiple individual structures; for instance, there may be a hay shed, equipment storage and milking parlor assessed separately yet under one roof. In these cases all structures under one roof were assigned the same centroid coordinates of the digitized roof polygon.

5.2 First Floor Height

Three methods were used to determine first floor height.

FEMA elevation certificates provided by the County were used to determine the first floor elevation for 16 buildings in the study area. The mean ground elevation for each of these buildings was determined using LIDAR and the first floor height above ground was calculated by subtracting the mean ground elevation from the first floor elevation.

The County provided 285 photos of buildings in the study area from Assessor files. For agricultural buildings, the County Assessor structure database separates different functional areas within a building. Therefore many of the large farm buildings contain up to 10 structures within the Assessors database. It was assumed that all structures covered by one roof contained the same floor elevation. As a result of multiple structures being cataloged within one building, the first floor heights above ground for 361 structures were estimated using these photos.

Based on these photographs, an estimated first floor height was calculated to the nearest 0.5 foot by using points of reference above adjacent grade. For example, standard step and masonry block heights are 8 inches, allowing estimation of flood height by multiplying the number of steps or blocks visible by 8 inches. This approach was utilized using any available visual gauges such as siding, concrete block, bricks, doors etc. For a small number of commercial buildings on or near Highway 101, Google Street View was used to estimate the first floor height above ground using the same techniques.

The first floor heights above ground for the remaining 190 (one-third of the total) buildings were determined using the following assumptions:

- the first floor of farm buildings was assumed to be at grade
- the first floor of single family residences was assumed to be 2.5 ft above grade.

These assumptions were based on typical values noted for structures with photographs.

5.3 *Building and Content Value*

For building replacement cost, the Tillamook County Assessor Real Market Value (RMV) was used when available. 96 of the 570 structures did not have RMV attributed. In these cases, an average value per square foot was applied, based on Occupancy Code/Use Type. For example, if an Agricultural structure was missing an improvement value, the average dollar amount per square foot was applied to that structure to create a building replacement cost. The following percentages were used to create building content costs:

Table 4: Content Cost Multipliers by Occupancy Type

Content Cost Description	
Occupancy/Use Code	Content Cost
RES1 To RES6 & COM10	RMV * 1.0
COM1 To COM5, COM8, COM9, IND6, AGR1, REL1, GOV1 and EDU1	RMV* 1.0
COM6 To COM7, IND1 To IND5, GOV2 and EDU2	RMV * 1.5

After completion and validation of the building inventory, a total 570 buildings were loaded into the HAZUS-MH flood study region as user defined structures (UDF).

5.4 *Flood Depth Grids*

NHC produced six flood depth grids from hydraulic model outputs that were used in the HAZUS Flood analysis. Pre-project and post-project depth grids were provided for flood intervals of 6, 22, and 100 years. All six depth grids were loaded into the HAZUS study region as User Supplied Digital Elevation Models (DEMs).

5.5 *Flood Analysis*

HAZUS Flood Scenarios were created for each of the six events, and results included damage estimates for the 570 buildings in the study regions. For all Scenarios, USACE Generic Depth Damage Functions were used. For this reason, Residential Content Cost was set equal to Building Cost to be more in line with USACE standards. All results were summarized by General Occupancy Type, and included; Building Loss, Content Loss, and Inventory Loss. Inventory Loss was developed for all non-Residential and non-Agricultural structures. Flood loss types are defined below.

5.5.1 Building Loss

Building losses are dependent on depth-related percent damage (depth-damage functions). Building damage includes damages to the structure itself, as well as damages to components such as lighting, ceilings, mechanical and electrical equipment and other fixtures. The USACE generic damage functions for structures contained within HAZUS-MH (MR-4) were applied in this analysis.

Building Content Loss: Building contents are defined as furniture, equipment that is not integral with the structure, computers and other supplies. Contents damage functions are applied in the same manner as building damage functions. Once again, these damage functions are the USACE generic damage functions contained in HAZUS-MH.

Building Inventory Loss: Business inventories vary considerably with occupancy. For example, the value of inventory for a high tech manufacturing facility would be very different from that of a retail store. Thus, it is assumed for this model that business inventory for each occupancy class is based on annual sales. Business inventory losses then become the product of the total inventory value (floor area times the percent of gross sales or production per square foot) of buildings of a given occupancy in a given damage state, the percent loss to the inventory and the probability of given damage states.

Inventory losses in the flood module are determined in a manner consistent with the other building losses, as well as the methodology currently utilized in the HAZUS earthquake module. For occupancies with inventory considerations (COM1, COM2, IND1 - IND6 and AGR1, as defined in the HAZUS99 Earthquake Technical Manual), inventory losses are estimated using USACE-based depth-damage functions, in conjunction with HAZUS default inventory values determined as a percentage of annual sales per square foot.

5.5.2 Displacement Loss

Avoided displacement and disruption losses were calculated using the method detailed on page 5-19 in the FEMA *Supplement to the Benefit-Cost Analysis Reference Guide*, June 2011. Single family residential structures (RES1) used the BCAR default value of $1.44/sf/month for displacement costs. All other costs were generated using Table 11 from the Supplement, updated to 2011 costs using the CPI calculator as recommended, with one exception. Updated displacement costs for agricultural structures were set to zero rather than the table value of $0.77/sf/month. The reason for this is that it is unlikely farmers would be able to find replacement dairy farms for rent during the displacement period, unlike commercial or residential structures where there is extensive non floodplain rental inventory likely to be available. This is also consistent with attempts to remain conservative in the evaluation. One time disruption costs for all categories were applied using updated Table 11 values. All classes used the FEMA default displacement time rate of 1.48 months displacement /foot of flood depth (45 days/ft).

The loss results generated by this analysis can be found in Attachment B of this memorandum.

6 Loss Validation

Loss validation was completed using best available data, including flood insurance claims in the Wilson River floodplain (including the project influence area and beyond) from 1977 through 2008, detailed proof of loss forms received directly from 3 businesses, and a report of agricultural damages from the 1996 flood.

The following analysis presents actual insurance data from two floods, occurring on December 12, 1998 and November 6, 2006. This is compared with HAZUS results from the December 3, 2007 flood. These three floods were all similar in flow magnitude, with flows of 35,300, 38,600 and 33,100 cfs respectively. While the modeled 2007 flood has the lowest peak flow, the hydraulic model under simulates water surface elevation along the Highway 101 corridor to do some degree, such that the high water mark from the November 2006 flood is within 0.3 feet of the model results for the 2007 flood. For the purposes of this validation analysis, the floods can be treated as approximately equal in regards to the flood stages created in the lower Wilson River.

6.1 Residential Properties

Since 1977, sixty-two residential flood insurance claims have been paid within Tillamook County for a total of $1,978,146 based on flood insurance claims data provided by FEMA Region X. This value is not inflated to current valuation. This averages out to be $31,905.58 per claim paid (including both structure and contents, and does not represent costs associated with displacement or loss of rental income from rental property).

Based on claims data filed for the 12/28/1998 flood event, there were seven claims filed for a total of $374,066. There was an anomaly in the data with 2 large claims showing for 1 property on consecutive days, the total of which exceed FEMA specified coverage limits. Therefore, the lesser value of the 2 claims was used to establish the average for the flood event. The average claim paid for the 12/28/1998 flood event, adjusted to 2011 dollar values was $45,215.

Based on claims data for the 11/6/2006 flood event, there were 18 residential flood insurance claims paid for a total of $708,846. This averages out to be $43,960 per claim, adjusted to 2011 dollars.

Table 5 illustrates the results generated by the level 2, user defined HAZUS model, in comparison to the insurance claims data available for Tillamook County. It should be noted that claims data was the only source of data for validation of the residential damage functions for this analysis.

Table 5: Claims versus HAZUS Comparison-Residential Properties

	Insurance Claims		**HAZUS Analysis (December 3, 2007 Flood)**		**% differential**
Event	Total Claims	Average Claim Paid (2011$)	Total Residential Loss	Average Loss	
12/28/1998	$182,405.00	$45,215.00	$1,055,738	$27,070	-40%
11/6/2006	$708,846.00	$43,960.00	$1,055,738	$27,070	-38%

Upon review of this data, the damage estimates generated by HAZUS for the 2007 event about 40% less than the actual claims paid for those historical events. The HAZUS average losses are also less than the average of all residential claims (unadjusted dollars) paid since 1977. As insurance claims pay only a portion of total losses incurred due to coverage limits and claims adjustment policies, the true difference between actual total damages and HAZUS estimates will be greater, i.e. HAZUS underestimates losses by more than 40%. This seems to substantiate that HAZUS does not over state damages to residential properties, and offers a conservative estimate of damage potential, which supports the concept of a lower bound analysis.

6.2 *Commercial Properties*

The commercial loss estimates generated by HAZUS were validated using flood loss data from 2 sources. Proof of loss documentation was provided for 3 commercial properties within the project reach. Additionally, historical flood insurance claims data provided by FEMA Region X was analyzed to establish average claims paid for commercial properties.

Since 1977, 155 commercial property flood insurance claims have been paid in the amount of $6,033,398 (not adjusted to reflect 2011 dollars). This is an average of $38, 925 per claim paid.

Based on claims data filed for the 12/28/1998 flood event, there were twenty-three claims filed for a total of $1,176,731. The average claim paid for the 12/28/1998 flood event, adjusted to 2011 dollar values was $74,535.

Based on claims data for the 11/6/2006 flood event, there were 21 commercial flood insurance claims paid for a total of $1,769,332. This averages out to be $92,125 per claim, adjusted to 2011 dollars.

Table 2 illustrates the comparison of the results generated by the level 2, user defined HAZUS model, in comparison to the insurance claims data available for Tillamook County.

Table 6: Claims versus HAZUS Comparison-Commercial Properties

	Insurance Claims		**HAZUS Analysis 12/3/2007 Flood**		**% differential**
Flood Event	Total Claims	Average Claim Paid (2011$)	Total Commercial Loss	Average Loss	
12/28/1998	$1,176,731	$74,535	$12,150,369	$157,797	+112%
11/6/2006	$1,769,332	$92,125	$12,150,369	$157,797	+71%

To further validate the commercial loss estimates, Replacement Cash Values (RCV) for building and contents damages from Proof of Loss statements filed for 3 properties within the project area were compared with HAZUS generated loss estimates for these specific properties. Table 7 summarizes this analysis.

Table 7: Proof of Loss versus HAZUS Comparison-Commercial Properties

Address	Event	RCV (2011$)	HAZUS Loss Estimate – 12/3/2007 Flood	% Differential
# 1 Main Ave., North	11/6/2006	$232,864	$389,850	+67
#2 Main Ave.	11/6/2006	$536,243	$1,092,045	+103%
#11 Main Ave.	11/6/2006	$290,122	$481,717	+66%

The data show that HAZUS reports loss estimates from 66%-112% higher than either flood insurance payments or total replacement cash value. The most reliable value to use is the data from the November 2006 flood shown in Table 2: There are 21 buildings in the sample, and the data is from a recent flood. The value is close to 2 of the 3 buildings with Proof of Loss statements listed in Table 3.

An estimate of the ratio between replacement cash value and flood insurance payment was made by averaging data from the 3 buildings shown in Table 3. The #11 building had data from both the 2006 and 2007 floods, giving a total of four data points to use. The average ratio of RCV to flood insurance payment was 114% (stated inversely, insurance payments were around 86% of RCV). Adding this 14% increase to the November 2006 flood average commercial flood insurance payment (Table 2) gives an estimated average Replacement Cash Value for commercial buildings of $105,022. Recalculating the HAZUS loss ratio to the estimated average RCV value rather than flood insurance payment results in HAZUS producing values 50% greater than RCV.

6.3 Agricultural Properties

6.3.1 Value of Tillamook County dairy farms

The economic value of Tillamook County farms was compared with national averages as an initial check on the validity of using HAZUS agriculture DDFs for Tillamook County. Statistics were obtained from the 2007 Census of Agriculture issued by the U.S. Department of Agriculture. Of the available statistics, three measurements were selected that are expected to have a correlation with flood damages (Building values were lumped with land values and so were not able to be used). The data show that Tillamook County farms have significantly greater value than the national average, even though farm size is much smaller. When normalized to farm size, the differences are even greater.

Table 8: Selected Farm Economic Statistics

Item	United States	Tillamook County, OR	Percent of U.S. Avg
Total farm production expenses	$ 109,359	$ 286,449	262%
Estimated market value of all machinery and equipment	$ 88,357	$ 134,016	152%
Total sales	$ 134,807	$ 367,072	272%
Average Size of Farm (acres)	418	125	30%
Production Expenses/acre	$ 262	$ 2,292	876%
Machinery & Equipment Value/acre	$ 211	$ 1,072	507%
Total Sales/acre	$ 323	$ 2,937	911%

It is clear that dairy farms in Tillamook County have higher production expenses, higher sales value and more machinery and equipment than the average United States farm. It follows from this that when these farms are located in areas prone to flooding they will be at risk of greater losses than the average farm.

6.3.2 Types of Dairy Farm Flood Losses

Flood losses on dairy farms are incurred from a variety of impacts. Of note is that loss of livestock to drowning is one of the lesser damage categories, which are described here:

- Loss of feed stockpiles: Farmers grow hay through the spring, summer and fall months to feed their herds during the winter. Hay is stored at ground level in large bales. Hay inventory is therefore largest during flood season, unlike crop farms where a product can be grown, harvested and moved offsite outside of flood season. Flood damage to feed stocks requires the farmers to buy feed until they can grow another crop themselves.
- Pasture damage: Pasture damage was extensive in the 1996 flood. Some fields were so heavily damaged that complete renovation was required, incurring costs for equipment, fuel, seed and fertilizer. In addition to these direct expenses, field renovation prevented the harvest of new hay for the entire following growing season. As a result, farmers were required to buy feed for well over a year after the flood occurred.
- Lowered milk production: Dairy cows are sensitive to disturbance, especially in milking routines. Cows that are not milked for over 12 hours typically suffer a loss of production that will take weeks or months to recover, or never in some cases. During floods power failures, livestock evacuations, and stress and sickness to livestock from being held in flooded buildings all make it likely that milking schedules will not be able to be adhered to.
- Damage to Buildings, fencing, utilities, equipment, and machinery: These damages are the typical kind of damages incurred during flooding that similar agricultural or industrial facilities would suffer. It should be noted that dairy farms have a relatively high value of equipment required related to milking and milk storage relative to other types of farms, as shown in Table 8.
- Loss of Livestock: Loss of livestock by drowning is another loss, typically seen only in larger floods.

Feed costs incurred from pasture damage dominated reported losses from the 1996 flood. Simultaneously farm income was reduced from lowered milk production due to stressed, sick, or drowned livestock.

6.3.3 Reasons for Lack of Agricultural Flood Damage Data

In response to the letter of denial from Region X, another search for historic agricultural flood damages was conducted, one of several that have been made seeking data from local, state, and federal sources. Most historic flood damage data is derived from federal assistance or insurance programs; it is clear from the lack of historic data for farms that these programs are either not used or unavailable for the farming community in Tillamook. The most recent attempt to find additional agricultural damage data was similarly unsuccessful: A FOIA request to the USDA provided no usable data. The responding email from Kent Willett of the USDA Farm Service Agency explains why:

> There are lots of situations in which the damage is ineligible for payment (loss thresholds, availability of feed, age of facility, limitation on program, etc.). In many cases producers will not apply for benefits because they do not want to "hassle with government paperwork", they do not feel the need to apply for assistance, or they are unaware of the program.

The only source that has been located is the report referred to in prior versions of this document: the *Tillamook County, Oregon 1996 Flood Damage Assessment & Recovery Plan*, prepared by Tillamook County in November 1996 under a grant from the U.S. Department of Commerce. This report contains extensive documentation of flood damages by category for various public agencies as well as private agricultural losses. The document estimates that nearly 60% of the agricultural damages reported were ineligible for any government aid program, explaining in part why farmers appear to not bother with government aid programs.

6.3.4 Validation Method

In prior submittals, overall damages from this report were noted as qualitative documentation that extensive agricultural damages are indeed incurred at floods of this magnitude. With the recent letter of denial appearing to be based entirely on the lack of validation of agricultural damages, a more quantitative check on the reported damages has been completed which is discussed herein. While not to the level of detail or certainty of the residential or commercial categories, this is the best available data.

For validation of agricultural losses, reported damages from the 1996 event were compared to those from the modeled December 2007 flood used in the HAZUS/BCAR analysis. The 1996 and 2007 floods were of similar peak flow magnitude (35,000 cfs vs. 33,100 cfs for the 1996 and 2007 floods, respectively, at the USGS Wilson River gage).

Total reported agricultural damages for the 1996 event were $9,200,800. Farm home damages were removed from this total as these would fall in the "residential" category of the BCA. This results in a damage total of $8,477,650. Adjusted to 2011 dollars using the CPI factor gives a value of $12,123,040.

The report indicates that 90 of 155 dairies in the County were affected by the flooding, and at the time of the report 9 months after the flood, 25-30 were still "severely impacted". It should be noted that the vast majority of dairies in the County are concentrated around the town of Tillamook within or near the project area. The Southern Flow Corridor project area contains around 10-15 dairies, and many or most of these would have been in the severely impacted category due to their location at the center of the damaging floods. The report indicates that 7,200 acres of pasture were impacted by the flood and 4,900 of these acres were damaged to the point that complete field renovation was required. There are 4,200 acres, the majority of which are pasture, within the Southern Flow Corridor project area, and many of these acres are assumed to have been in the severely damaged category. Based on the ratios of dairies and acreages in the SFC project area versus the countywide damage totals, it was estimated that 20% of the reported damages likely occurred within the SFC project area. Multiplying this percentage by the total damages results in estimated damages within the project area of $2,435,000. These are damages that were incurred on the lands of the subject dairies.

The report also states that there were significant additional losses due to the flood related to milk production that were not included in the total reported above. Virtually all the dairies in the County are members and owners of the Tillamook Creamery Cooperative Association (Co-op). Milk from the dairies is processed into various products, most notably cheese, at the Co-op factory in Tillamook. Losses of $750,000/month in production are reported for the Co-op. These losses were expected to be incurred "for most of next year". There were 155 dairies in Tillamook County in 1996, so 65 of them were not affected by the flooding at all. Therefore, the Co-op production losses were being incurred by loss of milk production from a small subset of the overall dairies – presumably those reported as severely impacted. Based on this, 20% of the loss was apportioned to the dairies within the project area, the same percentage as used for the on-farm damages discussed previously. The report was issued in November, so "most of the next year" is assumed to be until September 1998, a period of 10 months. Multiplying the monthly losses by the project area percentage, and by 10 months, and adjusting to 2011 dollars, gives a total Co-op production loss of $2,145,000.

Summing the individual farm and Co-op based damages gives a total value within the SFC project area of $4,570,000. The HAZUS modeling of the 2007 event has an estimated agricultural damage value of $8,125,000. The historic damages are therefore 56% of the HAZUS estimates, or conversely HAZUS estimates are 78% greater than historic estimates.

6.4 Summary of Findings

- Residential:
  - HAZUS loss values are 40% less than average flood insurance claims
- Commercial:
  - HAZUS loss values are 37% greater than replacement cash value losses
- Agriculture:
  - HAZUS loss values are 78% greater than estimated historical losses

7 Lower Bound Analysis

Lower-bound analysis is a powerful tool that can often demonstrate that projects are cost-effective — in many cases regardless of whether the available data are complete or not. This is an important point, because a project's cost-effectiveness can sometimes be determined by using only one or two key pieces of data. This is because the lower-bound analysis considers only *some* of a project's benefits — those that are the most important or those for which data exist — and ignores other benefits that may be difficult to estimate or for which data may not be available. In other words, this analysis purposely uses only a few data to determine the project's cost-effectiveness and undercounts, or ignores other benefits that will be gained by funding the project. A lower bound analysis indicates whether or not a project is cost-effective, but not the degree to which it may be so.

The analysis performed for the Southern Flow Corridor was a true lower bound analysis. Conservative approaches to estimating losses were utilized and elements of avoided losses were purposely left out of the analysis to measure the level of cost-effectiveness of this project.

7.1 Modified Damage Functions

It is judged that the HAZUS loss values for commercial building being 50% higher than estimated RCV losses from insurance claims validates the HAZUS depth-damage curves. RCV values reflect only direct replacement costs for building, contents, and inventory damages. The HAZUS model reflects additional costs beyond these that are incurred, including relocation expenses, capital related income losses, wage losses, and rental income losses. These losses are time dependent functions incurred during the period required to restore the business to operation. The incorporation of these additional direct losses in HAZUS means HAZUS values should always be greater than RCV losses for a business even where the model perfectly predicts building, content, and inventory losses.

Given the strong indications of underreporting of damages for agricultural losses, HAZUS losses 78% greater than historic estimates appear similarly reasonable. Nevertheless, following a lower bounds approach, it was determined to modify the estimated losses to demonstrate cost-effectiveness even with lower damages.

The approach taken was to reduce the agriculture and commercial inventory losses for the 6-yr and 22-yr events by 50% for entry into BCAR. The values for the 100-yr event were left at the HAZUS calculated values. This approach is based on the theory that being located in an area that frequently floods, floodplain farmers and business owners have taken actions to reduce damages during small events, but very large floods occur too infrequently to change normal human behavior regarding flood mitigation. In terms of overall damage loss estimates, this is approximately a 20% reduction for the two floods modified. For commercial properties, the HAZUS losses are reduced from 50% to 18% higher than historic losses. For agricultural properties, the HAZUS to historic flood difference ratio drops from 78% to 32%. These ratios appear to be well within reasonable bounds of differences between HAZUS and historic damages, therefore the HAZUS model commercial and agricultural expected damage calculations are validated.

7.2 Ignored Damages

The following benefits were not included in this analysis:

Functional Downtime-Roads: No loss of function for Highway 101 was included in this analysis. Highway 101 within the project reach averages between 16, 000 to 18,000 cars per day. The project provides modest reductions in roadway time inundated.

Actual Cash Value versus Replacement Costs: Both HAZUS and BCAR are set up to use replacement costs to determining the value of the structures being protected by a mitigation project. These values can be extracted out of national costs estimation guides such as R.S. Means or the BNI Home Builders Construction Guides. For this analysis, taxed assessed valuations were used to establish these costs. Tax Assessor values tend to be 10% to 30% lower than values taken from cost guides. Use of this value once again supports to concept of the lower-bound analysis.

Emergency Response Costs: No values for emergency response costs were included in this analysis.

Debris Removal: No costs associated with debris removal and/or management were included in this analysis.

8 BCAR Crosswalk

The following discussions will crosswalk the BCAR data entries. The Damage Frequency Analysis (DFA) module of BCAR version 4.5.5 was utilized for this analysis. See attachment C for a copy of the final BCAR report for this project analysis.

8.1 Hazard and Mitigation Information

The hazard to be mitigated is Flood

The Mitigation type is a Drainage improvement.

The basis for the damages is expected damages generated by HAZUS-MH version MR-4

The number of events analyzed will be 3. Probabilities of recurrence will be assigned for all 3 events.

8.2 Cost Estimation information

The project life for this project has been assigned as 50 years based on the guidance provided in BCAR. The value assigned to "Major infrastructure projects" was selected.

The project cost utilized was $8,060,000, based on the detailed cost estimate provided by the study contractor. Documentation of the cost estimate was uploaded into BCAR. The cost estimate represents the total project cost for the Southern Flow Corridor. This includes all property acquisition, permitting, design and construction costs. This cost includes a 25% construction contingency which makes the BCA more conservative.

A value of $20,000 was assigned for annual maintenance costs based on opinion of the project design contractor.

The cost reflects current prices and escalation was not calculated in the BCAR model.

8.3 Type of Services

The type of services category for this analysis was determined to be not applicable by the analysts. The focus of this analysis is on general building stock considering both residential and non-residential properties.

8.4 Expected Damages before Mitigation

Analysis year is 2010

Year Built - not applicable since the analysis will assign recurrence intervals for all events.

Damage year - the historic flood events of 2007 and 1999 were modeled in HAZUS. Depth grids for these 2 events as well as the 100-year flood event were generated.

Recurrence interval - Recurrence intervals were assigned for each event based on the hydrology generated for the flood study.

Damages were estimated for building loss, contents loss and inventory loss where applicable. All damages are based on current dollar values.

8.5 Expected Damages after Mitigation

As with the before-mitigation damages, HAZUS was utilized to model the expected damages after mitigation. The basis for this analysis was the hydraulic and hydrologic (H&H) modeling of the post-project impacts expected from this project. Depth grids were generated for the same hydrologic events modeled in the before-mitigation analysis. Once again, see Attachments A and B for more discussion on the project modeling.

9 Attachment A: Construction Cost Estimate

No.	Item	Unit	Quantity	Unit Price	Total Amount
No.	**North Dike (New) & Wetland Acquisition Area**	**Unit**	**Quantity**	**Unit Price**	**Total Amount**
1	Clearing & Grubbing (Stockpile to Re-spread on Dike Face)	LS	1	$22,000	$22,000
2	Construction Staking	LS	1	$8,000	$8,000
3	Construction Compaction Testing	LS	1	$12,000	$12,000
4	Erosion Control Measures	LS	1	$26,000	$26,000
5	Filter Fabric at Dike Base and Haul Roads	SY	32,600	$2.60	$84,760
6	Spread Organics on Dike Face	CY	10,800	$8	$86,400
7	Temporary Access Road Aggregate Base Improvements	CY	1,800	$30	$54,000
8	Temporary Access Road Pavement Repair	TON	250	$100	$25,000
9	Remove Old Levee and use in New Dike Core	CY	40,000	$22	$880,000
10	Construction Fencing/Protection	LF	10,000	$3	$30,000
11	Dike Finish Slopes	LS	1	$40,000	$40,000
12	Dike Roadway Aggregate Base (12" depth) (4300 lf x 12' wide)	CY	2,000	$30	$60,000
13	Channel Reconnection Excavation & Haul	CY	2,000	$14	$28,000
14	6' Diameter Culverts with Reuse Tidegates	EA	4	$30,000	$120,000
15	Demo Existing Structures and Culverts	LS	1	$24,000	$24,000
16	Removal of Plugs/Tidegates, Disposal of Rubbish, Tires	LS	1	$24,000	$24,000
17	Install Woody Debris	LS	1	$30,000	$30,000
18	Ditch Fill w/ Organics & Levee Spoils	CY	18000	$12	$216,000
19	Floating Sedimentation Fences	LS	1	$50,000	$50,000
20	Excavate Swale at Fuhrman Road and Spread on Dike Sides	CY	1,100	$14	$15,400
21	Temporary Dewatering	LS	1	$28,000	$28,000
22	Armor Protection	CY	400	$32	$12,800
23	Hydroseed Levee	AC	5	4000	20000
No.	**GoodSpeed Road (Upgrade)**	**Unit**	**Quantity**	**Unit Price**	**Total Amount**
1	Clearing & Grubbing (Stockpile to Re-spread on Dike Face)	CY	700	$8	$5,600
2	Construction Staking	LS	1	$3,000	$3,000
3	Construction Compaction Testing	LS	1	$5,000	$5,000
4	Erosion Control Measures	LS	1	$5,000	$5,000
5	Filter Fabric at Dike Base and Haul Road	SY	5,600	$2.60	$14,560
6	Spread Organics on Dike Face	CY	700	$4	$2,800
7	Temporary Access Road Aggregate Base Improvements	CY	1,000	$30	$30,000
8	Haul in Material for New Dike from Spoils Pile	CY	1,600	$22	$35,200
9	Dike Finish Slopes	LS	1	$5,000	$5,000
10	Hydroseed Levee	AC	0.5	4000	$2,000
11	Dike Roadway Aggregate Base (12" depth) (2100 lf x 12' wide)	CY	950	$30	$28,500
No.	**Middle Dike**	**Unit**	**Quantity**	**Unit Price**	**Total Amount**

No.	Item	Unit	Quantity	Unit Price	Total Amount
1	Clearing & Grubbing	LS	1	$9,300	$9,300
2	Construction Staking	LS	1	$4,000	$4,000
3	Construction Compaction Testing	LS	1	$3,000	$3,000
4	Erosion Control Measures	LS	1	$500	$500
5	Filter Fabric at Dike Base and Haul Road	SY	6,800	$2.60	$17,680
6	Spread Organics on Dike Face	CY	730	$4	$2,920
7	Temporary Access Road Aggregate Base Improvements	CY	900	$30	$27,000
8	Temporary Access Road Pavement Repair	TON	50	$100	$5,000
9	Remove Old Levee and use in Ditches on Field (short haul)	CY	900	$22	$19,800
10	Haul in Material for New Dike from Spoils Pile	CY	5,400	$28	$151,200
11	Dike Finish Slopes	LS	1	$5,000	$5,000
12	Dike Roadway Aggregate Base (12" depth) (1100 lf x 12' wide)	CY	500	$30	$15,000
13	New Flood Structure (8) 5x12 S.H. Gates	EA	1	$500,000	$500,000
14	Hydroseed Levee	AC	1	4000	$4,000
15	Armor Protection	CY	200	$32	$6,400
16	Excavate Tidal Channel (Upper Nolan Slough)	CY	8000	$14	$112,000
No.	South Dike New	**Unit**	**Quantity**	**Unit Price**	**Total Amount**
1	Clearing & Grubbing (Stockpile to Re-spread on Dike Face)	LS	1	$28,320	$28,320
2	Construction Staking	LS	1	$4,000	$4,000
3	Construction Compaction Testing	LS	1	$4,000	$4,000
4	Erosion Control Measures	LS	1	$6,000	$6,000
5	Filter Fabric at Dike Base	SY	7,080	$2.60	$18,408
6	Temporary Trestle/Pontoon Bridge	LS	1	$50,000	$50,000
7	Spread Organics on Dike Face	CY	1100	$8	$8,800
8	Temporary Access Road Aggregate Base Improvements	CY	2,000	$30	$60,000
9	Remove Old Dike and use in New Dike Core (South Levee)	CY	2,000	$22	$44,000
10	Haul Excess Material from South Levees to Field	CY	10,000	$14	$140,000
11	Excavate & Haul N. Hoquarton Spoils	CY	2,000	$32	$64,000
12	Haul in Material for New Dike from Spoils Pile	CY	8,300	$22	$182,600
13	Construction Fencing/Protection	LF	2,000	$3	$6,000
14	Dike Finish Slopes	LS	1	$8,000	$8,000
15	Hydroseed Levee	AC	2	4000	$8,000
16	Dike Roadway Aggregate Base (12" depth) (1800 lf x 12' wide)	CY	800	$22	$17,600
No.	South Dike Upgrade	**Unit**	**Quantity**	**Unit Price**	**Total Amount**
1	Clearing & Grubbing (Stockpile to Re-spread on Dike Face)	LS	1	$4,000	$4,000
2	Construction Staking	LS	1	$3,000	$3,000
3	Construction Compaction Testing	LS	1	$3,000	$3,000
4	Erosion Control Measures	LS	1	$2,000	$2,000
5	Spread Organics from Levee Removal on Dike Face	CY	1,100	$8	$8,800

No.	Item	Unit	Quantity	Unit Price	Total Amount
6	Haul in Material for New Dike from Spoils Pile	CY	1,600	$22	$35,200
7	Dike Finish Slopes	LS	1	$10,000	$10,000
8	Dike Roadway Aggregate Base (12" depth) (1200 lf x 10' wide)	CY	450	$30	$13,500
9	6' Diameter Culverts with Reuse Tidegates	EA	1	$30,000	$30,000
No.	**Beeler Levee Lower**	**Unit**	**Quantity**	**Unit Price**	**Total Amount**
1	Clearing & Grubbing	LS	1	$9,000	$9,000
3	Construction Staking	LS	1	$3,000	$3,000
4	Construction Compaction Testing	LS	1	$3,000	$3,000
5	Erosion Control Measures	LS	1	$5,000	$5,000
6	Grade Levee/Place spoils on levee slope	CY	1900	$8	$15,200
7	Levee Finish Slopes	LS	1	$10,000	$10,000
8	Levee Roadway Aggregate Base (12" depth) (4600 lf x 12' wide)	CY	2,050	$30	$61,500
9	6' Diameter Culverts with Reuse Tidegates	EA	1	$30,000	$30,000
No.	**Aufdemeyer Levee Lower**	**Unit**	**Quantity**	**Unit Price**	**Total Amount**
1	Clearing & Grubbing	LS	1	$9,000	$9,000
2	Construction Staking	LS	1	$3,000	$3,000
3	Construction Compaction Testing	LS	1	$3,000	$3,000
4	Erosion Control Measures	LS	1	$8,000	$8,000
5	Grade Levee/Place spoils on levee slope	CY	1900	$8	$15,200
6	Levee Finish Slopes	LS	1	$20,000	$20,000
7	Levee Roadway Aggregate Base (12" depth) (6500 lf x 10' wide)	CY	2,400	$30	$72,000
8	6' Diameter Culverts with Reuse Tidegates	EA	1	$30,000	$30,000
9	Temporary Access Road Aggregate Base (2000 lf)	CY	900	$30	$27,000
10	Temporary Access Road Filter Fabric	SY	2700	$2.60	$7,020
	Mobilization @ 5%				$200,298
	Subtotal Construction Costs				**$4,206,266**
	Permitting				$250,000
	Engineering, Administration, Construction Mngt @ 18%				$757,128
	Subtotal Project Costs				**$5,213,394**
	25% Contingency				$1,303,349
	Total Project Costs				**$6,516,743**

10 Attachment B: HAZUS-MH Loss Estimates

HAZUS OUTPUTS	AGR BUILDING LOSS	AGR CONTENT LOSS	AGR INVENTORY LOSS	COMM BUILDING LOSS	COMM CONTENT LOSS	COMM INVENTORY LOSS	RES BUILDING LOSS	RES CONTENT LOSS	RES INVENTORY LOSS	*OTHER BUILDING LOSS	*OTHER CONTENT LOSS	*OTHER INVENTORY LOSS
100YR PRE PROJECT	$2,208,581	$6,058,512	$8,775,132	$2,039,940	$7,434,477	$6,896,835	$1,546,791	$1,628,429	$0	$306,835	$923,819	$803,716
100YR POST PROJECT	$1,817,151	$5,437,598	$7,792,295	$1,565,129	$5,728,424	$5,138,179	$1,166,609	$1,268,143	$0	$224,408	$631,220	$587,425
22YR PRE PROJECT	$851,293	$3,097,788	$4,176,251	$1,531,120	$5,406,149	$5,213,100	$700,007	$711,462	$0	$246,864	$761,897	$695,768
22YR POST PROJECT	$651,581	$2,584,761	$3,186,041	$1,257,394	$4,302,304	$4,068,218	$500,366	$436,070	$0	$174,983	$383,816	$373,064
6YR PRE PROJECT	$400,456	$1,513,665	$1,719,734	$945,695	$3,067,978	$2,700,866	$432,745	$392,414	$0	$101,043	$146,127	$151,539
6YR POST PROJECT	$270,491	$1,111,591	$1,179,023	$761,129	$2,440,985	$2,077,245	$367,961	$336,010	$0	$14,449	$0	$0

HAZUS OUTPUTS

	TOTALS			
	Bldg	Contents	Inventory	Displacement
100YR PRE PROJECT	$6,102,147	$16,045,237	$16,475,683	$2,665,464
100YR POST PROJECT	$4,773,297	$13,065,385	$13,517,899	$2,123,355
22YR PRE PROJECT	$3,329,284	$9,977,295	$10,085,120	$1,693,572
22YR POST PROJECT	$2,584,323	$7,706,951	$7,627,323	$1,229,518
6YR PRE PROJECT	$1,879,939	$5,120,184	$4,572,138	$ 931,609
6YR POST PROJECT	$1,414,030	$3,888,585	$3,256,267	$ 720,123

ADJUSTED OUTPUTS USED IN BCAR MODEL

	Bldg	Contents	Commercial Inventory Adjusted**	Ag Inventory Adjusted**	Total Adjusted Inventory	Displacement
100YR PRE PROJECT	$6,102,147	$16,045,237	$6,896,835	$8,775,132	$16,475,683	$2,665,464
100YR POST PROJECT	$4,773,297	$13,065,385	$5,138,179	$7,792,295	$13,517,899	$2,123,355
22YR PRE PROJECT	$3,329,284	$9,977,295	$2,606,550	$2,088,125	$5,390,444	$1,693,572
22YR POST PROJECT	$2,584,323	$7,706,951	$2,034,109	$1,593,020	$4,000,194	$1,229,518
6YR PRE PROJECT	$1,879,939	$5,120,184	$1,350,433	$859,866.97	$2,361,839	$ 931,609
6YR POST PROJECT	$1,414,030	$3,888,585	$1,038,622	$589,511	$1,628,134	$ 720,123

**Other Losses include; Industrial, Religion and Government (**) Inventory values were reduced by 50% for the 6-Year and 22-year events based on Historical data. The 100-Year was left at the HAZUS default value based on expected damages.*

12 Attachment C: BCAR Report

Total Benefits:	**$10,382,509**	Total Costs:	**$8,336,015**	BCR:	**1.25**
Project Number:		Disaster #:		Program:	
Agency:	**Northwest Hydraulics Consultants**				
State:	**Washington**	Point of Contact:	Vaughn Collins	Analyst:	Rob Flaner

Project Summary:

Project Number: | Disaster #:

Program: | Agency: Northwest Hydraulics Consultants

Analyst: Rob Flaner

Point of Contact: Vaughn Collins | Phone Number: 206-241-6000

Address: 16300 Christensen Rd, Ste 350, Seattle, Washington, 98188

Email: vCollins@nhc-sea.com

Comments: PA Alternative Project

Structure Summary For:

Copy Of Copy Of Copy Of Copy Of Tillamook county-Project Exodus, 2 Main Ave., Tillamook, Oregon, 97141, Tillamook

Structure Type: Building | Historic Building: No | Contact: Tillamook County

Benefits: $10,382,509 | Costs: $8,336,015 | BCR: 1.25

Mitigation	Hazard	BCR	Benefits	Costs
Drainage Improvement	Damage-Frequency Assessment	1.25	$10,382,509	$8,336,015

Total Benefits: **$10,382,509** Total Costs: **$8,336,015** BCR: **1.25**

Project Number: Disaster #: Program: Agency: **Northwest Hydraulics Consultants**

State: **Washington** Point of Contact: Vaughn Collins Analyst: Rob Flaner

Structure and Mitigation Details For: Copy Of Copy Of Copy Of Copy Of Tillamook county-Project Exodus, 2 Main Ave., Tillamook, Oregon, 97141, Tillamook

Benefits: $10,382,509 Costs: $8,336,015 BCR: 1.25

Hazard: **Damage-Frequency Assessment - Flood**

Mitigation Option: Drainage Improvement

Latitude: Longitude: Project Useful Life: 50

Mitigation Information

Basis of Damages: Expected Damages

Number of Damage Events: 3

Number of Events with Know Recurrence Intervals: 3

Expected Damages Before and After Mitigation

Analysis Year: 2010 Analysis Duration: 21 Utilities ($/day):

Year Built: 1990 User Input Analysis Duration: Buildings ($/day):

Roads/Bridges ($/day):

Damages Before Mitigation

Damage Year:
RI: 22.40
Are Damages In Current Dollars? Yes

Buildings (Days):
Utilities (Days):
Roads (Days):

Displacement ($)	$1,693,572
Inventory Loss ($)	$5,390,444
Content loss ($)	$9,977,295

Damages After Mitigation

RI: 22.40
Are Damages In Current Dollars? Yes

Buildings (Days):
Utilities (Days):
Roads (Days):

Displacement ($)	$1,229,518
Inventory Loss ($)	$4,000,194
Content loss ($)	$7,706,951

Total Benefits: **$10,382,509** Total Costs: **$8,336,015** BCR: **1.25**

Project Number: Disaster #: Program: Agency: **Northwest Hydraulics Consultants**

State: **Washington** Point of Contact: Vaughn Collins Analyst: Rob Flaner

Building Loss ($)	$3,329,284
Total	$20,390,595
Total Inflated	

Building Loss ($)	$2,584,323
Total	$15,520,986

Damage Year:
RI: 5.80
Are Damages In Current Dollars? Yes

Buildings (Days):
Utilities (Days):
Roads (Days):

Displacement ($)	$931,609
Inventory Loss ($)	$2,361,839
Content loss ($)	$5,120,184
Building Loss ($)	$1,879,939
Total	$10,293,571
Total Inflated	

RI: 5.80
Are Damages In Current Dollars? Yes

Buildings (Days):
Utilities (Days):
Roads (Days):

Displacement ($)	$720,123
Inventory Loss ($)	$1,628,134
Content loss ($)	$3,888,585
Building Loss ($)	$1,414,030
Total	$7,650,872

Damage Year:
RI: 100.00
Are Damages In Current Dollars? Yes

Buildings (Days):
Utilities (Days):
Roads (Days):

Displacement ($)	$2,665,464
Inventory Loss ($)	$16,475,683
Content loss ($)	$16,045,237
Building Loss ($)	$6,102,147
Total	$41,288,531
Total Inflated	

RI: 100.00
Are Damages In Current Dollars? Yes

Buildings (Days):
Utilities (Days):
Roads (Days):

Displacement ($)	$2,123,256
Inventory Loss ($)	$13,517,899
Content loss ($)	$13,065,385
Building Loss ($)	$4,773,297
Total	$33,479,837

Total Benefits:	**$10,382,509**	Total Costs:	**$8,336,015**	BCR:	**1.25**
Project Number:		Disaster #:	Program:	Agency:	**Northwest Hydraulics Consultants**
State:	**Washington**	Point of Contact:	Vaughn Collins	Analyst:	Rob Flaner

Summary Of Benefits

Expected Annual Damages Before Mitigation		Expected Annual Damages After Mitigation		Expected Avoided Damages After Mitigation (Benefits)	
Annual:	$3,269,161	Annual:	$2,516,846	Annual:	$752,315
Present Value:	$45,116,862	Present Value:	$34,734,353	Present Value:	$10,382,509

Mitigation Benefits:	$10,382,509	Mitigation Costs:	$8,336,015
Benefits Minus Costs:	$2,046,494	Benefit-Cost Ratio:	1.25

Cost Estimate

Project Useful Life (years):	50	Construction Type:	
Mitigation Project Cost:	$8,060,000	Detailed Scope of Work:	Yes
Annual Project Maintenance Cost:	$20,000	Detailed Estimate for Entire Project:	Yes
Final Mitigation Project Cost:	$8,336,015	Years of Maintenance:	50
Cost Basis Year:		Present Worth of Annual Maintenance Costs:	$276,015
Construction Start Year:		Estimate Reflects Current Prices:	Yes
Construction End Year:		Project Escalation:	

Total Benefits: **$10,382,509** Total Costs: **$8,336,015** BCR: **1.25**

Project Number: Disaster #: Program: Agency: **Northwest Hydraulics Consultants**

State: **Washington** Point of Contact: Vaughn Collins Analyst: Rob Flaner

Justification/Attachments

Field	Description	Attachments
Historic damages before mitigation	See attached BCA methodology memorandum.	
Mitigation Project Cost	See cost estimate contained in BCA Methodology memorandum.	
Project useful life	Used FEMA recommended 50-year project life for major infrastructure projects.	
Unknown Frequency - Damages after Mitigation	See attached BCA methodology memorandum.	
Year Built	This field is not applicable to this analysis since recurrence intervals have been determined for all events analyzed.	

Response to FEMA Comments

September 2011

Comments are shown in brown type and our responses in blue.

COMMENT 1:

The Applicant has submitted with this appeal actual damage costs that FEMA earlier requested. They include three commercial properties that were damaged in two declared flood disasters, occurring in November, 2006 and December, 1998. The Applicant states that these three properties are within the project area. No other actual damage data was provided, including agricultural building damages which initially were attributed to 47 percent of the total flood costs in the first benefit-cost analysis.

Because no actual damage costs were available for agricultural losses, it was assumed by the analyst that agricultural losses equated to commercial losses. This was based upon a 'qualitative check' used but a validation or explanation as to how they can be used equally in a benefit-cost analysis was not provided.

Commercial businesses have inventory losses. Agricultural buildings do not have business inventory, yet there was no distinction of the two, and the benefit-cost analysis did include "Agricultural Inventory Loss." The details of the ratio for agricultural structures versus residential and commercial were included in the initial benefit-cost analysis submitted, which were 47 percent agricultural and 39 percent commercial structures. However, with a new project scope proposed, any changes in this ratio or its impacts was not included. The Applicant did reduce the agricultural inventory values of the lower frequency events in its analysis by 50 percent. However, agricultural buildings have no commercial inventory, and there is no documentation submitted to justify the inclusion of agricultural buildings as having commercial inventory.

Agricultural buildings are comprised of tractors, feed, cows, and milk parlors built of concrete block designed to accommodate high volumes of water for sanitation. A flood depth of 0 to 18 inches will have vastly different impacts between agricultural buildings and commercial buildings with inventory. Documentation of a thorough analysis of how these two different building types could be treated the same is needed to justify inclusion in the analysis.

Removing the avoided future costs due to 'Agricultural Inventory Loss' results in a reduction of $1,748,298 in benefits. The total project cost detailed in the Southern Flow Corridor Design Report is $8,056,943. The benefit-cost analysis lists the project cost as $8,336,015 and the benefits of this project at $9,509,639. Even using the lower project cost estimate, by removing the Agricultural Inventory Loss benefits of $1,748,298, the project is not cost-effective and does not meet a benefit-cost ratio of 1.0. If significant unclaimed benefits exist in the existing lower bound analysis, they should be included.

The review comments seem to assert that 1) agricultural structures do not have inventory and 2) we used commercial structure depth damage functions to model inventory losses for agricultural structures. Both assumptions are incorrect.

HAZUS treats inventory as a direct economic impact and calculates not only the direct replacement cost of the inventory but net economic losses. If you do not have inventory to sell, you cannot generate profit from that inventory. Inventory losses in the flood module are determined in a manner consistent with the other building losses, as well as the methodology currently utilized in the HAZUS earthquake module.

For occupancies with inventory considerations (COM1, COM2, IND1 - IND6 and AGR1, as defined in the HAZUS99 Earthquake Technical Manual), inventory losses are estimated using USACE-based depth-damage functions, in conjunction with HAZUS default inventory values determined as a percentage of annual sales per square foot. To estimate inventory losses, percent damage (determined from the depth-damage function) will be multiplied by the total inventory value (determined according to HAZUS Earthquake Methodology - floor area times the percent of gross sales or production per square foot).

We did not apply commercial business damage functions to the agricultural structures. HAZUS has an occupancy class for agricultural buildings (AGR1) and the associated inventory damage function for this class is based upon data from agricultural operations generated by the USACE. The Tillamook County structure database allowed clear classification of every structure into the correct occupancy class (i.e. residential, commercial, ag etc.). To summarize: HAZUS has a specific classification of agricultural buildings; every agricultural building in the project area was classified as such; and HAZUS automatically calculates agriculture specific inventory losses for these structures. We followed the standard FEMA model for agricultural structures as we did for all structures.

For agricultural structures, inventory is analogous to industrial facilities. There is input inventory – the raw materials needed for production – and output inventory, - the produced material, in this case milk. Dairy farm input inventory items include fuel, bedding, feed, fertilizer, and seed. For dairy farms feed is the single largest inventory expense, and is produced on the farm to the maximum extent possible. Hay and silage are produced over the summer months to provide winter feed for the cows. This means that feed inventories are largest during flood season. The volume of feed required and methods of storage used also mean feed is stored at ground level and is susceptible to flooding – hay is stored in 1400 lb round bales and silage in open sided bins-. Finally, large floods can cause extensive damage to pasture fields which are the source of feed. Due to field damage from the February 1996 flood, it was estimated farmers would need to buy an extra 45,000 tons of dairy hay though April 1997 (14 months) when the first crop on repaired field would be available.

In addition to the loss of input inventory during floods, milk production itself is affected. Cows can drown in flood events. Floods can interrupt milk production in many ways and those impacts can be long term. In fact, according to a post-disaster report of the 1996 flood event prepared by FEMA that impacted the project area:

- 700 dairy animals were lost due to the flood event. (655 drowned, 45 lost due to residual effects)
- Milk distribution was impacted because the trucks could not get to the facilities due to the flooding and the subsequent soft ground once the waters receded.
- Milk production was significantly reduced due to the stress the cows received during the event. Production can be reduced for weeks or months afterwards and in some cases never returns to pre-flood levels.

Inventory losses for dairy farms can therefore extend for than a year after a flood, between reduced milk production and waiting for the next seasons hay production for feed. Note that in Attachment B agricultural inventory losses are higher than content losses, whereas for commercial buildings inventory losses are lower. Most commercial structures have the ability to immediately replace inventory as it is manufactured off-site; as discussed above this is not the case for dairy farms so inventory losses are drawn out over an extended period.

The reviewers also comment about the differences between agricultural and commercial buildings. We agree, and point out that is presumably why the FEMA developers of HAZUS have agricultural buildings as a separate classification with independent depth damage functions.

We reduced both commercial and agricultural contents and inventory losses by 50% for the analysis. Our analysis of commercial buildings showed that HAZUS results for the 2006 flood were 37% higher than estimated replacement cash value for the affected structures. Since HAZUS models economic losses beyond those directly incurred, as we discussed regarding inventory above, this is expected. In other words, for commercial structures it is our opinion that the HAZUS results are in line with actual damages observed and the default depth damage functions are valid. Nevertheless, for the lower bound analysis we reduced content and inventory losses for commercial structures by 50%.

Less data was available for agricultural structures but we did have some numbers to compare using HAZUS outputs and reported damages from the 1996 flood. (Note that although we called it qualitative actual dollar values were generated and compared). Based on this it did appear that agricultural damages were being overstated to some degree. We therefore reduced content and inventory losses for this category by 50% as well.

The reasoning given for removing the agricultural inventory loss seems to be related to the incorrect assumption that there is no inventory for this class of buildings. We do not believe this to be a valid reason for removal. Throughout this analysis we used standard FEMA models and methods and remained conservative on assumptions:

- We did not increase HAZUS values for residential losses even though data showed it was 40% lower than observed losses
- We lowered commercial contents and inventory losses by 50% even though the data shows in our opinion that HAZUS outputs and observed losses are reasonably in line with each other.
- We lowered agriculture contents and inventory losses by 50% based on what data we had that seemed to show HAZUS values were high.
- We used a lower bound analysis and did not include other losses including displacement costs, transportation delays and cleanup etc.

In summary, we stand by our Benefit-Cost Analysis made using FEMA software and damage curves, and believe the lower bounds approach and conservative assumptions validate the project has a BCR above 1.0 as presented.

Nevertheless we did calculate additional benefits in the form of avoided displacement and disruption losses using the method detailed on page 5-19 in the *Supplement to the Benefit-Cost Analysis Reference*

Guide, June 2011 produced by FEMA. Single family residential structures (RES1) used the BCAR default value of $1.44/sf/month for displacement costs. All other costs were generated using Table 11 from the *Supplement*, updated to 2011 costs using the CPI calculator as recommended, with one exception. Updated displacement costs for agricultural structures were set to zero rather than the table value of $0.77/sf/month. The reason for this is that it is unlikely farmers would be able to find replacement dairy farms for rent during the displacement period, unlike commercial or residential structures where there is extensive non floodplain rental inventory likely to be available. This is also consistent with our attempts to remain conservative in our evaluation. One time disruption costs for all categories were applied using updated Table 11 values. All classes used the FEMA default displacement time rate of 1.48 months displacement /foot of flood depth (45 days/ft).

Avoided displacement and disruption costs (benefits) have a net present value of $873,781. While we do not agree with the complete exclusion of agricultural inventory benefits due to the reasons described above, we present the results here with and without this assumption to demonstrate that in both cases the project has a BCR above 1.0.

Case	Project Benefits	Add'l Displacement - Disruption Loss Avoided Benefits	Total Benefits	Project Costs	BCR
As Submitted	$9,509,636	$873,781	$10,383,417	$8,336,015	1.25
W/O Ag Inventory	$7,761,338	$873,781	$8,635,119	$8,336,015	1.04

A spreadsheet and BCAR output file with the Displacement/Disruption Loss calculations are included with these comments.

COMMENT 2: In addition, we'd like some more information about the assignment of 50 years as the project's useful life. Tide gates have no more than 30 years useful life per FEMA's own mitigation guidance, and are frequently assigned the useful life of concrete metal pipe culverts, which is 20 years.

The main high capacity flood gates will be a concrete structure with marine grade structural aluminum gates. The structure will sit within the levee and will only have flow through it every 2-3 years during floods. The design life for concrete pipe and box culverts easily meets the 70 year design life specified for culverts by most state transportation agencies. Similarly, aluminum CMP has a design life of 70+ years. The gates used in this structure are made of much thicker material than aluminum CMP.

There is a set of other minor culverts with tidegates needed for agricultural drainage. These will be constructed with corrugated HDPE plastic pipe that is immune to corrosion and chemical attack. These culverts will also have marine grade aluminum tide gates on the end.

The flood and tidegates will require replacement of seals and bushings during their service life but this is considered a maintenance cost and accounted for as such.

All culvert and gate components will be designed for a design life in excess of 50 years using design guidelines for culverts and bridges in saltwater environments. Salinity at the site does not approach full ocean values due to its location at the head of the estuary and freshwater inputs, during the winter salinities will be near zero much of the time, so this will provide an additional conservative design.

Some references on design life:

WSDOT Accepted Culvert Materials in Corrosion Zone III (Saltwater Environments): Concrete, HDPE, Aluminum. (WSDOT Hydraulics Manual, Ch 8, July 2008).

Estimated Service Life: Concrete, HDPE, Aluminum – 70 years (NYSDOT Highway Design Manual Ch 8 May 1996)

Estimated service life of concrete pipe: 100 years (concrete-pipe.org)

Estimated service life of 12 gage aluminum pipe: 70 years (Michigan DOT)

Estimated service life of HDPE Plastic pipe: > 100 years (plasticpipe.org)

The ongoing maintenance costs for 10,000 feet of levee and tide gates, which was assigned only $20,000 a year, still seems low.

Section 5.5 of the Preliminary Design Report gives details on the estimation of maintenance costs. The project has been designed to minimize maintenance costs. One of the major causes of levee failures and high maintenance costs is scour and erosion from construction directly adjacent to the river channel.

Between the period of January 1, 2002 through December 31, 2010 Tillamook County & the Tillamook Bay Habitat and Estuary Improvement District expended a total of $51,064 for repairs and maintenance on County owned lands in the project area (see Figure 5 of the preliminary design report). This includes everything from tide gate repairs to annual mowings and other miscellaneous levee maintenance. This averages $5,673/yr for maintaining a much longer length of poor quality levee, and more tide gates, than will be required under post-project conditions. As discussed above, all new gates, culverts and other structures will be constructed of corrosion resistant materials for long life, whereas current maintenance includes numerous older steel tidegates that are prone to corrosion and failure.

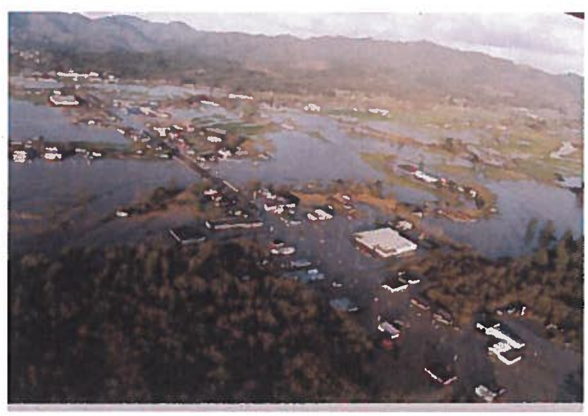
The estimated cost of $150,000 repair costs in a 10 year flood was based on conversations with Mr. Leo Kuntz of Nehalem Marine, who has maintained and repaired virtually every levee in the Tillamook area. In his opinion this is a typical repair cost to expected due to erosion or other levee failure in a large flood. Virtually all the existing levees in the area are constructed on the river bank, have a narrow top width and steep sides. The levees were originally constructed by early settlers as agricultural dikes, and subsequent repairs have not substantially improved them. In contrast, the new and upgraded levees for this project are set back far from the river channels in almost all cases, and will be engineered and constructed in accordance with Corps of Engineer levee design standards. The levees are also very low structures (typically 5 feet high or less) that will have 5:1 backslopes and wide tops in order to withstand overtopping floods without damage. In most cases during the flood peaks the levees will be fully submerged with little to no drop in flood level across them; therefore velocities will be relatively slow. The project designers have extensive experience with design of this type of levee and are confident in the ability of the levees to withstand numerous floods with minimal impact.

COMMENT 3:

For response to this comment we have highlighted and numbered (in brackets) what we see as the key issues in the comment and then address them.

The Applicant's appeal mentions potential confusion over the use of the term 'measure' versus 'alternative.' [1]FEMA's denial related to the inadequate demonstration that this mitigation project is a solution to the threat (flood hazards). While the project may include planning goals and objectives, and meet the desires of private property owners, to be eligible for FEMA funding it must demonstrate that it solves the threat. [2]The appeal documentation does not make clear either what the threat is to the built environment in the project area, [3] or how this project will mitigate that threat (or hazard). Hazard mitigation is the minimization or elimination of risk to the built environment and to lives from a natural hazard, such as a flood. While the proposed project has been revised for the Applicant's appeal, it remains unclear as to how the built environment will be protected from future damages due to this project which lowers the flood level 0 to 18 inches in the project area. The Applicant quotes FEMA in its own Appeal Brief on page 16, which is that a mitigation project must substantially reduce the risk of future damage, hardship, loss or suffering resulting from a major disaster. The Applicant's Project Description demonstrates an expansive alteration of the lower Wilson River floodplain that includes removing 36,000 feet of levee, constructing tidal dikes, replacing a floodgate structure, and restoring 520 acres of tidal marsh habitat. The Applicant writes that 10,100 feet of new and upgraded tidal dike "must be constructed to provide year-round protection to adjacent agricultural lands from twice daily tidal inundation…". There is also a brief mention that flood conditions along the Highway 101 business district will be improved. While the project includes thousands of feet of levees and dikes, and hundreds of acres, [4] there remains insufficient documentation to demonstrate this project directly reduces future costs and hazards to potential flood victims.

Sentence 2 states that the reviewers are unclear what the threat to the built environment is. Clearly the natural hazard being addressed is flooding, and the specific cause of damage is inundation of structures. There are 415 structures within the project effect area that are inundated in a 100-year flood with an average depth of 3.13 feet. This is reflected in the Benefit-Cost Analysis, which shows building structure (without inventory or contents) losses of $6.1 million in a 100-year flood. Flood insurance claims were paid in 1990, 1995, 1998, 2006 and 2007, (five times in less than 20 years) indicating the frequency at which damaging flooding occurs in the project area. The image demonstrates the threat along the north Highway 101 corridor in the 1999 flood.



Sentence 3 implies the reviewers are uncertain how the project will function. We quote from the Appeal Brief p. 7 "The Southern Flow Corridor function is to reduce flood levels to near natural levels by the removal to the maximum extent possible of man-made impediments to flow." The Southern Flow

Corridor is a "natural floodway" currently blocked by numerous levees and dikes. The project proposes to remove these blockages and set back remaining levees in order to provide an unobstructured flow corridor. The net result is that flood levels are reduced over a wide area in the lower Wilson and even to some degree the lower Trask and Tillamook River systems. Figures 2-4 of the SFC design report shows the reductions in flood levels due to the project. The same hydraulic model outputs shown in these figures were loaded into HAZUS for the BCA. Page 9 of the Appeal Brief summarizes project benefits.

Inundation flood losses are directly tied to the depth of flooding; this is reflected in the depth-damage curve approach used in HAZUS and BCAR to model these losses. Reducing depth of flooding in a structure can be accomplished by either elevating the structure or reducing the flood levels, the latter is the approach taken by the Southern Flow Corridor project. We note again that the flood level reduction is not accomplished by traditional flood control measures such as building taller levees or dams, rather the project removes levees and restores natural floodways.

Sentences 1, 3 and 4 basically address the same issue; that there is insufficent/inadequate documentation that the project solves/mitigates/reduces flood hazards and costs. We take this to reflect the criteria listed in 44 CFR 434 (4) and (5) and discuss the project in the context of these here.

(4) [A project must] Solve a problem independently or constitute a functional portion of a solution where there is assurance that the project as a whole will be completed. Projects that merely identify or analyze hazards or problems are not eligible;

Sentence 1 uses wording from this section. We note that the use of the word "solve" implies a more concrete resolution to most hazard mitigation projects than actually is possible. With the exception of acquisition projects, typical mitigation project reduce but do not eliminate risk, be it a flood elevation or seismic retrofit. This is reflected in the reviewers comment that "Hazard mitigation is the **minimization** or elimination of risk" [bold added].

We assert that this project minimizes risk to the built environment within the constraints of the situation. A structure elevation project of similar cost could likely have been formulated. Such a project would provide a high level of risk reduction to a small set of properties. The proposed Southern Flow Corridor project provides a modest level of risk reduction to a far greater number of properties, and provides large additional benefits to the community as a whole as listed in page 9 of the Appeal Brief.

The Southern Flow Corridor is a stand alone, independent project that does not rely anything else for function. Page 18 of the Appeal Brief discusses this, and the SFC Design Report describes the project in detail.

(5) Be cost-effective and substantially reduce the risk of future damage, hardship, loss, or suffering resulting from a major disaster. The grantee must demonstrate this by documenting that the project;

Cost effectiveness is addressed by the Benefit-Cost Analysis. The project substantially reduces the risk of future damage from a major disaster – it provides the greatest flood level reductions in the 100-yr event. We note that "substantially reduce" has not been a project scale dependent issue in past FEMA funded project – we are aware of FEMA funded home elevation projects that addressed less than five homes-.

(i) Addresses a problem that has been repetitive, or a problem that poses a significant risk to public health and safety if left unsolved,

Clearly the flood hazard in Tillamook is repetitive and severe as the frequency of flood insurance claims show. Other evidence can be found in the value of acquisition and elevation funds FEMA has directed to Tillamook County over the past decades. The hazard will continue to cause losses at the same rate in the future if left unsolved.

(ii) Will not cost more than the anticipated value of the reduction in both direct damages and subsequent negative impacts to the area if future disasters were to occur,

The project has been shown to have a positive BCR using a lower bounds approach. This is addressed by our BCA report and response to comment 1.

(iii) Has been determined to be the most practical, effective, and environmentally sound alternative after consideration of a range of options,

The Oregon Solutions stakeholder group considered a range of options for the project area and determined this project to be the preferred solution. Please refer to p.18 of the Appeal Brief and the Project Exodus report for a description of this process.

(iv) Contributes, to the extent practicable, to a long-term solution to the problem it is intended to address,

The project directly contributes to reduction of flood levels in the lower Wilson River floodplain. Removal and setback of existing levees allows a return to more natural flooding patterns which can continue over the long term with minimal future intervention or maintenance.

(v) Considers long-term changes to the areas and entities it protects, and has manageable future maintenance and modification requirements.

Section 4.2 and 4.3 of the SFC Design Report discuss expected long term changes and project sustainability. Maintenance costs are addressed in the response to comment 1.

It is clear from the overall review comments that the greatest concern lies with the Benefit-Cost Analysis. The BCA is the only quantitative element of 44 CFR 434(5) and FEMA relies heavily upon it in all in grant programs. Our BCA included the following keys data sources and steps:

- Hydraulic Data is from a calibrated, Corps of Engineers developed and reviewed model.
- Elevation data is from recent high accuracy Lidar survey of the area
- Structure information is from Tillamook County and contains all detailed information needed for analysis. The great majority of structures analyzed used either elevation certificates or photographs available to accurately estimate first floor elevations

- Loss estimates were developed using FEMA HAZUS and BCAR software packages, with individual structure classification of over 500 buildings. Methods followed those approved in *Supplement to the Benefit-Cost Analysis Reference Guide, June 2011* produced by FEMA.

- Loss estimates were validated and adjusted based on actual claims and damage data

- A lower bounds approach was taken with numerous conservative assumptions. The BCR was 1.14 using this approach.

In our opinion we followed a rigorous and defensible methodology for the analysis. The level of effort to perform this analysis for 570+ structures was extensive and we used all loss data we were able to gather. For agricultural structures where loss data was sparse we reduced contents and inventory values by 50%.

The Southern Flow Corridor project is unusual compared to standard flood mitigation project in that the level of risk reduction is modest. A qualitative comparison of the project against a more typical mitigation project such as a home elevation (which has a much higher level of risk reduction) understandably would make this project appear to be of small value. It is precisely for this reason that we believe the quantitative Benefit-Cost Analysis is critical. The translation to economic costs a BCA performs allows objective comparison and review of mitigation projects, even those that use non-traditional methods or have low net risk reduction. We are aware of many FEMA funded mitigation projects with Benefit-Cost ratios below that we have calculated, as well as many projects with much smaller areas of benefit and scale. We have also looked at projects such as home elevations that clearly provide excellent risk reduction but failed to meet the Benefit Cost criteria. The Southern Flow Corridor project meets the Benefit-Cost ratio because it provides modest loss reduction to a large number of structures.

Response to Initial Denial (First Appeal)

May 2011

APPEAL BRIEF
FEMA: 1733-DR-OR
FEMA No.: 057-U1ZZV-00
Applicant: Port of Tillamook Bay (POTB)
PW No: 946 (Alternate Project #13 to PW936(1))
Southern Flow Corridor Project

STATEMENT OF THE CASE

This Project, entitled "Southern Flow Corridor Project" is one of several alternate projects to DR-1733-OR's Project Worksheet (PW) 936 for the repair of POTB's historic railroad. By letter on March 16, 2011 Charles Axton, FEMA Region X Recovery Division Director, determined that this project is ineligible for Public Assistance (PA) program grant funding for the following reasons:

1. The project does not appear to be cost-effective and has not sufficiently demonstrated to have a Benefit Cost Analysis (BCA) greater than 1.0. This issue was further clarified by Charles Axton in a letter dated March 24, 2011 that identified two key issues:
    a. The lack of use of actual historic damages to validate the FEMA HAZUS model depth damage functions
    b. Failure to adequately document project costs
2. The project does not appear to solve the threat independently or constitute a functional portion of a solution to the threat
3. The project does not appear to have the necessary assurances related to long-term and ongoing maintenance, repairs and operations

For those reasons, FEMA denied POTB's funding request for the Southern Flow Corridor Project. Subsequent discussions with FEMA staff established that FEMA would accept revised documents, including a BCA and Scope of Work, in addition to clarified statements of commitment relating to item 3 above during the appeal period.

POTB files this appeal of FEMA's denial pursuant to 44 CFR 206.440 and has submitted this appeal within the 60-day period required by 44 CFR 206.206.

SUMMARY OF ARGUMENTS

1. This project is demonstrated to be cost effective with a BCA of 1.14.

Per discussions with FEMA staff and the supplementary letter clarifying FEMA's issues with the BCA from Charles Axton dated March 16, 2011 a validation of the modeled damages with actual observed damages was undertaken. The project costs were also reviewed and revised, including construction, real estate and maintenance costs. A revised BCA for the Southern Flow Corridor (Exhibit C) is attached with full details.

2. The Southern Flow Corridor is a standalone, independent project that constitutes the single most cost effective alternative for reducing flooding in the lower Wilson River floodplain. Some confusion may have been introduced on this issue in poorly communicating the difference between Project Exodus and the Southern Flow Corridor, especially as the Project Exodus design report was attached and the Alternate Project Request cover sheet included more than the Southern Flow Corridor.

The issue can best be clarified by using Corps of Engineers definitions from their flood planning guidelines. A "Measure" is a stand-alone, independent project that is economically justified on its own. An "Alternative" is a collection of measures that together seek to maximize meeting the planning goals and objectives.

Using these terms, Project Exodus is the preferred Alternative for meeting the Oregon Solutions goals and objectives for the lower Wilson River. The Southern Flow Corridor is one of three measures that comprise this Alternative.

This Alternate Project Request deals only with the Southern Flow Corridor. However, the Project Exodus Design Report is again submitted as Exhibit B here within this Appeal for the sole purpose of documenting the planning goals, objectives, background information and process used to arrive at the preferred Alternative. Since the Project Exodus Design Report was issued, the Southern Flow Corridor project has been revised to meet the desires and concerns of the private property owners affected by the Project, something that was not done at the initial stage.

Therefore, a new report is included with this brief as Exhibit A – the Southern Flow Corridor – Landowner Preferred Alternative Preliminary Design Report. This report (hereafter referred to as the Southern Flow Corridor Design Report) contains the most up to date information on the Southern Flow Corridor and supersedes any details given in the Project Exodus Design Report. This new report should be used for evaluating the Southern Flow Corridor in terms of scope of work, cost estimates, levee and dike alignments, etc.

3. POTB is committed to providing long-term and ongoing maintenance, repairs and operations of the completed project site. The administrative framework for accomplishing that commitment is described below in Section III General Work Eligibility.

Project maintenance costs previously submitted were also reviewed and compared with current estimated costs incurred by Tillamook County and various private parties in maintenance of nearby dikes and floodgates. The previous maintenance cost used of $20,000 per year remains unchanged based on this review. Details of how the cost was estimated are contained in the Southern Flow Corridor Design Report.

PROJECT SUMMARY AND ELIGIBILITY

A full description of the Project is contained in the Southern Flow Corridor Design Report attached hereto as Exhibit A. By way of summary, the Southern Flow Corridor Project is described below. These sections also address project eligibility as well as respond to the matters that are at issue in this appeal.

I. PROJECT REQUIREMENTS AND SCOPE OF WORK

DAP9525.13 (VII) (G) The proposal must include a description of the project, including the project location, an estimate of costs, a schedule of work, including a starting date for work and a targeted completion date and the necessary assurances to document compliance with special requirements, including, but not limited to floodplain management, environmental review, hazard mitigation, protection of wetlands and insurance.

44 CFR 206.203(d)(2)(v). Historic and any other legal considerations should also be identified. The applicant should identify the source of funding for projects when the cost estimate for the alternate project is greater than the eligible alternate project funding.

(1) Project Description

The Southern Flow Corridor Project proposes to remove manmade impediments to flood flows to the maximum extent possible in the lower Wilson River floodplain. By doing so, flood level reductions exceeding one point five feet in some locations can be obtained in the area.

The Southern Flow Corridor project would:

- Remove approximately 36,000 lineal feet of existing levee
- Lower an additional 11,100 feet of levee
- Construct 7,000 feet of new setback tidal dike and upgrade an additional 3,100 feet of pre-existing tidal dike
- Replace an existing floodgate structure with a new one
- Provide over 520 acres of restored tidal marsh habitat in a key location of the Tillamook Bay Estuary

The 10,100 feet of new and upgraded tidal dike must be constructed to provide year-round protection to adjacent agricultural lands from twice daily tidal inundation, particularly during the summertime higher tides. It should also be noted that the habitat restoration component of the project is a byproduct of the flood damage reduction benefits. Virtually all the costs related to habitat restoration are either anticipated to be required as permit conditions or benefit the flood damage reduction purpose of the Project. For instance, ditch filling is desired to allow the formation of natural tidal channels, but this allows on-site disposal of organic soils that would otherwise need to hauled off site and disposed of at much greater cost. Additionally, the excavated tidal channels shown, function as required flood conveyance or agricultural drainage channels, but are given sinuosity in order to provide habitat benefits.

Figure 1 below shows the Project elements. The Project is described in more detail in the attached Southern Flow Corridor Design Report.

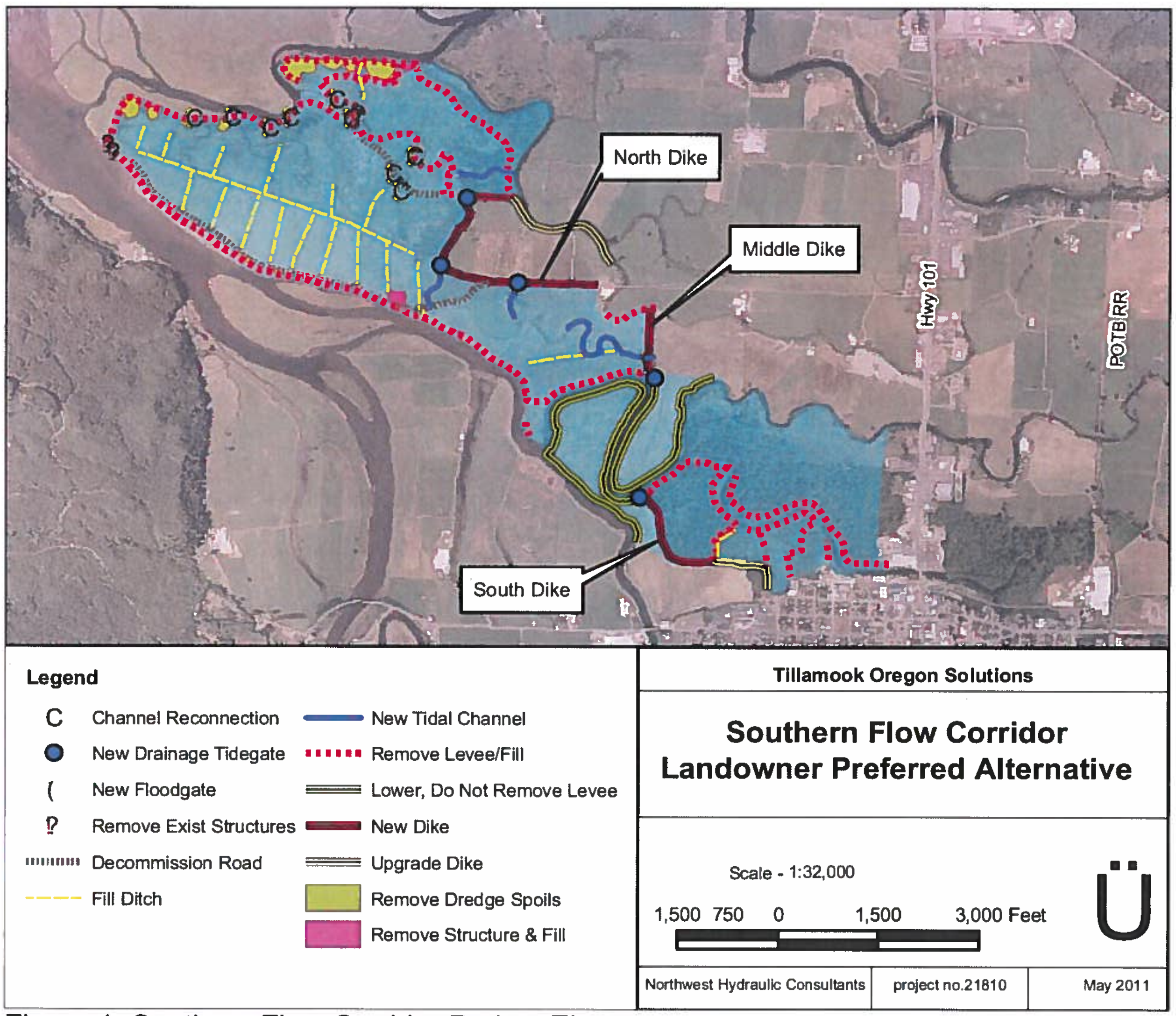


Figure 1: Southern Flow Corridor Project Elements

Also attached is the Project Exodus Design Report, dated February 2010 (Exhibit B). As discussed above, this report is provided here for the sole purpose of providing the background, objectives and methods that were used to investigate possible flood damage reduction measures within the flood plain that lies between Hoquarton Slough, Wilson River and Tillamook Bay. The report also describes various alternatives that were evaluated. Finally, the report presents a preliminary design for a recommended Project, consisting of three independent, standalone project elements, one of which is the Southern Flow Corridor. This report is provided for background and context of the Project, however, all design details, cost estimates and land needs have been refined since the publication of this report. The reader should refer to the Southern Flow Corridor Design Report (Exhibit A) for up-to-date project details.

(2) Project Location

The Southern Flow Corridor Project area is located at the confluence of the Wilson, Trask and Tillamook Rivers on the southern end of Tillamook Bay (see Figure 2 below). These three rivers and multiple sloughs connect in a complex delta system around the City of Tillamook. The area of influence of the Project (i.e. area of flood level reduction created by the Project) extends up the Wilson River east of the POTB railroad, west to Tillamook Bay and up the Tillamook and Trask Rivers to the south. Please refer to the Southern Flow Corridor Design Report (Exhibit A) for figures showing the extents of benefit from this project.

GPS Point #1: 45°27'32.76"N 123°50'45.74"W; then Northwesterly to GPS Point #2: 45°28'32.54"N 123°53'32.83"W; then Northeasterly to GPS Point #3: 45°28'26.69"N 123°52'09.36"W; then Southeasterly to GPS Point #4: 45°28'00.40"N 123°51 '23.24"W.

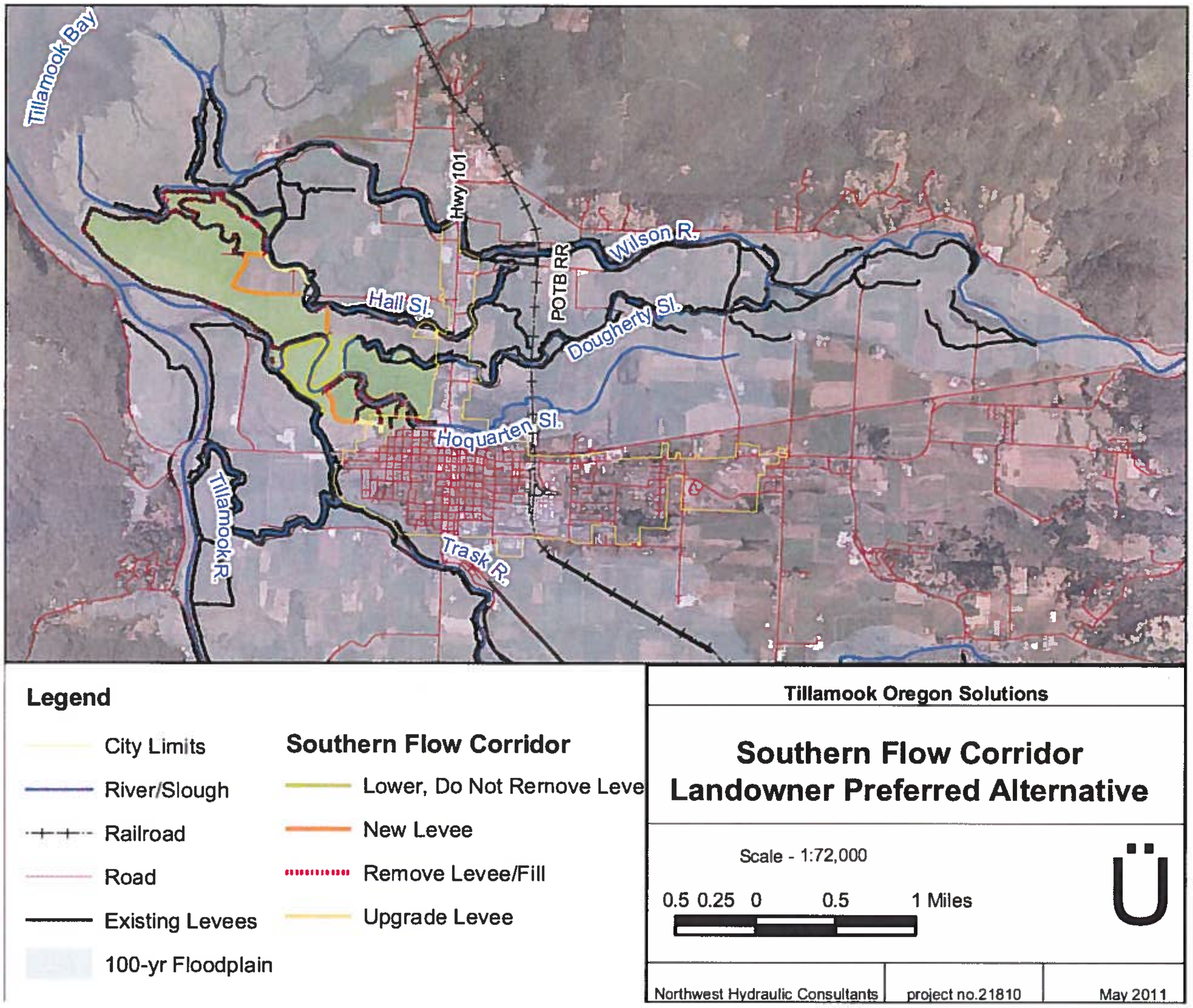


Figure 2: Southern Flow Corridor Project Location

(3) Project Function

The Southern Flow Corridor function is to reduce flood levels to near natural levels by the removal, to the maximum extent possible, of man-made impediments to flow.
The Wilson River flows through a steep canyon out of the mountains where it enters the lower valley about six miles above Tillamook Bay. The river channel meanders along the northern side of the floodplain and is perched - it runs in a channel with natural banks that are higher than the flood plains around it, while the southern side of the flood plain contains the lowest elevations. As a consequence, flood flows that spill over the south river banks never return to the channel, but instead flow south and west across the flood plain, across Highway 101 and mix with Trask and Tillamook River floodwaters at the head of the bay. As Figure 2 shows, below Highway 101 there are numerous levees bounding virtually the sloughs and channels in the area, a legacy of over a century of marsh reclamation, diking and draining. When the westerly flood flows hit

these levees, especially those that run north-south, a back water effect occurs, substantially contributing to the flood conditions along the Highway 101 business district and POTB's railroad. The Southern Flow Corridor project would remove these flow impediments to the maximum extent possible, removing or lowering over 47,000 lineal feet of levee in addition to remnant dredge spoils that were deposited between 1900 – 1973.

The 7,000 feet of new tidal dikes must be constructed to provide year-round protection to adjacent agricultural lands from twice daily tidal inundation, particularly during the summertime higher tides. Unless these dikes are constructed, the daily tidal cycle would convert the lands behind the dikes to salt marsh, making the lands no longer suitable for agricultural uses and necessitating the acquisition of entire farm parcels, together with the farm homes and agricultural buildings, thereby substantially increasing the total project costs. Privately held land in the amount of 119.8 acres will be purchased and flood easements will be acquired on three additional properties, thereby leaving the homes and agricultural operations behind the new setback dikes intact.

It is important to note the new dikes do not function as flood control levees or flood control works designed to exclude riverine floodwaters. Due to the floodwaters that arrive from upstream spillover as described above, the new setback dikes and lowered existing dikes are built as low as possible to pass river flood flows out without restriction while still preventing high tides from getting in. The dikes are designed to function as overtopping spillways during floods. The middle dike also includes a high capacity flood gate structure to pass flows and allow rapid post-flood drainage. Flood flows will pass through this structure every second or third year, a sufficient frequency which to keep the channels open and able to convey flood flows out to the main channels and bay along relic channels where the structures will be placed.

The habitat restoration function of the Project will be enabled primarily by the removal of the existing levees, culverts and other fill. Daily tides will then begin the process of rebuilding natural marsh surfaces, conversion of vegetation to salt-tolerant marsh species and formation of tidal channels. Filling of existing linear ditches provides a disposal location for organic soils and also serves to enhance the creation of natural channels.

A summary of the functions and benefits of the Project is as follows:

- Provides significant flood level reduction to near natural levels over a wide area of the lower Wilson River floodplain
- Provides faster post-flood drainage and consequent road re-openings
- Protects adjacent agricultural lands from tidal inundation and provides improved drainage to these lands

- Removes County obligations to maintain over 30,000 feet of sub-standard levee located on riverbanks and prone to erosion and failure. Replaces this with 7,000 feet of new tidal dike, setback from all main river channels and engineered for long term function with minimal maintenance

- Provides very significant habitat restoration value of critical habitat types in a key ecological location

(4) **Cost Estimates and Financial Assurances**

A summary of estimated costs of the Southern Flow Corridor is presented here. Cost details and methods of development are given in the Southern Flow Corridor Design Report (Exhibit A).

ITEM	COST
Permitting, Design & Construction	$6,517,000
Property Acquisition	$1,540,000
Maintenance	$ 20,000/year

The sources of funding for total project costs, including property acquisition, are described in the table below. These sources include acquisition and development funds from the Oregon Watershed Enhancement Board (OWEB) for which a commitment letter is attached as Exhibit J.

SOURCES OF FUNDING	AMOUNT
FEMA Alternate Project Funds	$3,225,000
OWEB Restoration Funds	$1,625,000
State Bond Matching Funds	$1,075,000
Other grant/loan funding	$2,132,000
	$8,057,000

Additionally, a loan commitment dated May 18, 2011 in the amount of up to $3,000,000 has been provided by TLC Federal Credit Union (Exhibit K). Tillamook County, to whom the commitment is made, has stated that it intends to replace the loan prior to the need for the funds.

More specifically, the Southern Flow Corridor is a flood damage reduction Project. Aside from FEMA, there are few, if any other funding sources available for flood reduction projects. However, the strategic location of the Southern Flow Corridor adjoining the estuary at the confluence of two major coastal salmon rivers, positions this Project to result in one of the largest habitat restoration projects on the Oregon Coast. Initially there was some skepticism that a hazard mitigation project could produce such results. However, the full range of natural resource agencies at the Oregon Solutions table for this Project have come to embrace this project, to the extent that the May 13, 2011 Oregon Solutions meeting produced a unanimous endorsement.

This project will restore natural hydrologic processes to the site. It will re-establish tidal exchange with the bay and hydrologic connectivity between the Wilson and Trask Rivers and their associated flood plains. This will result in a large number of key priority habitats for fish and wildlife, including intertidal mudflats, tidally influenced freshwater wetlands, flood plain lowland riparian and linear wetlands, lowland non-linear forested wetlands and Sitka spruce forest.

For these reasons the Southern Flow Corridor is eligible for a wide array of habitat restoration funding. As soon as property acquisitions are complete, grant applications will be submitted to the National Oceanic and Atmospheric Administration (NOAA), Office of Ocean and Resource Management and the US Fish and Wildlife Service. These agencies have already provided funds for the acquisition of the original 377 acres presently owned by the County and are committed to seeing this project being completed. Although these agencies are represented on this Oregon Solutions Project and Design Teams, program limitations prevented the representatives from making formal commitments outside the grant application process.

Additionally, other funding sources have expressed strong interests in this project and have invited applications. These include the Oregon Department of Fish and Wildlife, the Nature Conservancy, the Oregon Hunters Association and others.

Oregon Solutions has an uninterrupted string of successful projects across the state. Eleven million dollars was just secured last month to make the Vernonia project funding complete. FEMA is involved in that project as well. The POTB and its Tillamook Oregon Solutions partners are confident that this project will be another Oregon Solutions success.

(5) **Work Schedule**

Proposed Work Schedule

ITEM	TIMELINE
Property Acquisition	May 2011 - July 2012
Environmental Assessment & Permitting	August 2011 - February 2013
Preliminary Design	August 2011 - February 2012
Final Design	February 2012 - March 2013
Procurement/Bidding	March - April 2013
Construction	May - October 2013
Project Closeout	December 2013

Property Acquisition is ongoing. Two options have been obtained and appraisals on ongoing on other parcels. Options on all properties and easements are anticipated to have been acquired by August 2011. Funding for property acquisition will be submitted to OWEB when completed. OWEB is waiting to fund the Project once all property details have been fixed. Complete acquisition is anticipated for completion by July 2012.

Environmental Assessment and Permitting: Nineteen months are budgeted for environmental assessment and permitting. As mentioned in the design report, the project has been designed for the ability to obtain a Corps of Engineers nationwide permit. Whether or not a nationwide or individual permit is required, it is an indication of the relative ease of permitting the Project is expected to have given the very large ecological benefits that will accrue.

On April 26, 2011 Mark Eberlein, FEMA Region X's Regional Environmental Officer, discussed this project during his visit to the POTB. Mr. Eberlein indicated an Environmental Impact Study (EIS) would most likely be required for the Southern Flow Corridor Project. Given the additional requirements and time an EIS would require, the project schedule includes a 19-month period for this activity. Work will begin in August 2011 with environmental scoping and field data collection and conclude in February 2013 with the issuance of permits for construction.

Preliminary Design: Preliminary Design will begin concurrently with the environmental assessment as they are complementary. The exact Project feature alignments must be designed and laid out so they can be field marked for wetlands and cultural resource assessments to begin. The extensive involvement of resource agencies in the Oregon Solutions process will be utilized to ensure project design details will maximize habitat restoration benefits and not become issues during permit review. Preliminary design will conclude with the submittal of 30% plans for permit review.

Final Design: Final design will complete the preliminary design and incorporate any permit review and other environmental assessment requirements that may occur. The final construction ready plans, specifications and engineering (PSE) package will be prepared.

Procurement/Bidding: A bid package will be prepared with the PSE and other required bid documents and advertised in April 2013. Bid award will follow shortly thereafter.

Construction: A six-month construction window is allotted from May through October 2013. The majority of the work is anticipated to be completed in the middle of this period during the time of lowest high tides.

Project Closeout: After the end of construction, administrative tasks needed for project documentation, accounting and other items will be completed and necessary reports submitted to the requesting agencies.

(6) Special Requirements, Environmental Reviews and Permitting

The Southern Flow Corridor Project has benefited from a large amount of information generated by previous studies and other efforts in the area, including the US Army Corps of Engineers Tillamook Feasibility Study and various studies completed by the Tillamook Estuaries Partnership. The flood analysis is based on a detailed hydraulic model calibrated and validated against data from four floods of varying sizes. The process of selecting the Project was completed through the locally driven, stakeholder based Oregon Solutions process, with both key resource agencies and local community participation throughout. For these reasons the Project has been well-vetted, has strong community and resource agency support and a strong technical basis to justify each element.

(7) Floodplain Management

The Project is located entirely within the floodplain and floodway of the Wilson River. As such, floodplain management regulations will apply, including zero rise criteria. The Southern Flow Corridor Design Report shows that the Project results in water level reductions across the entire lower Wilson River floodplain in a 100 year flood. During the permitting phase this will be documented using the official FEMA hydraulic model as part of the flood hazard permit.

(8) Environmental Assessment

A fairly extensive discussion on permitting and the favorable environmental consequences of the proposed Project is contained in the Southern Flow Corridor Design Report (Exhibit A). As stated therein, "No major hurdles are anticipated". The Southern Flow Corridor has large ecosystem restoration benefits and would likely qualify for a streamlined restoration permit. The Project has been designed to qualify under the Federal Nationwide Permit (NWP-27) and the General Authorization under the State of Oregon Removal-Fill law. It has also been designed to comport with NOAA fisheries restoration programmatic biological opinion (SLOPES IV).

(9) Hazard Mitigation Plan

Please refer to Section 13(a) and 13(f) of this brief for documentation of compliance with state and local mitigation plans.

(10) Protection of Wetlands

The project will restore or enhance over 520 acres of wetlands through the removal of levees and reconnection of floodplain with the river system.

(11) **Insurance Requirement**

The project reduces 100 year flood levels throughout its area of influence. Therefore, even though the Project is located within the floodway, no flood hazard permit issues are known at this time. This result is determined with the NHC model, which is related to but different from the official FEMA flood model. The Project will be modeled using the FEMA model during permitting to verify the no-rise finding. No structures are proposed that would be subject to flood insurance requirements.

(12) **Property Acquisition**

The Southern Flow Corridor will require the acquisition of title to 119.8 acres and flood easements over another 85.3 acres. The County is presently undertaking the acquisitions. The specific parcels and rationale for these acquisitions is described in the Southern Flow Corridor Project Report (Exhibit A) and is summarized in the table below:

ID	Property	Acres	Cost ($)	Note
A	Fuhrman	1.5	$ 675,000	Signed Option
B	Allen	4.3	$ 31,300	Estimate
C	Jones	48.0	$ 192,000	Scaled Appraisal
D	Sadri	66.0	$ 485,000	Signed Option
E	Aufdermauer (Flood Easement)	50.5	$ 27,800	Estimate
F	Beeler (Flood Easement)	34.8	$ 19,100	Estimate
G	Temp. Construction Easements (2)	--	$ 20,000	Estimate
		Subtotal	$ 1,450,200	
	Appraisals/negotiations		$ 60,500	
	Title Reports		$ 2,500	
	Surveys for Legal Descriptions		$ 12,000	
	Environmental Assessment		$ 12,500	
	Closing costs/Title Insurance		$ 2,500	
	TOTAL		$ 1,540,200	

The status of each of these acquisitions is described as follows:

Sadri: A two year purchase option agreement was executed on February 23, 2011 for this 65.98 acre parcel in the amount of $485,000. The County will exercise its option upon receipt of the OWEB grant funds that have been committed to the Project. This is expected to occur by early 2012. Acquisition will be completed by July 2012.

Fuhrman: This property consists of an approximate 1.48 acre parcel and single family residential structure. A two year purchase option agreement was executed on March 9, 2011 in the amount of $675,000. The County will exercise its option upon receipt of the OWEB grant funds that have been committed to the Project. This is expected to occur by early 2012, with acquisition completed by July 2012.

Jones: This parcel consists of about 48 acres of marginal farmland. The yellow book appraisal is expected to be completed before the end of July 2011. The cost estimate presented here is based on a recently completed appraisal of the property that assumed the purchase of around 30 acres; the unit price from this appraisal was used for the new amount. The property will be under a purchase option agreement by September 2011. Funds for the purchase of this property are earmarked within the OWEB grant funds that have been committed to this Project. The is expected to occur by early 2012, with acquisition completed by July 2012.

Allen: This 4.25 acre parcel consists primarily of a disconnected slough that, once acquired, can be reconnected to further contribute to the flood discharge capacity of the Project. The yellow book appraisal is expected to be completed before the end of July 2011. The current estimate is based on unit acre costs from the Sadri purchase, as both parcels are primarily wetlands and open water. The property will be under a purchase option agreement by September 2011. Funds for the purchase of this property are included within the OWEB grant funds that have been committed to this Project. Acquisition will be completed by July 2012.

Aufdermauer/Beeler: Flood easements will be required over an 85.31 acre portion from the farmlands of these owners. This is due to the fact that these pastures are protected by levees that are slated to be lowered as part of this Project. The parcels will benefit from flood level reduction and drainage improvements due to the project. The flood easements will be negotiated and executed during final design of the Project, once the detailed requirements for drainage elevations and construction needs are determined.

Construction Easements: Three additional parcels owned by two parties will have work completed on their land as part of the Project. This work consists of either a) fill removal in an undiked area where the property will benefit from flood level reduction and will otherwise be unaffected and b) minor dike improvements necessary to tie into a new dike adjacent where the property will receive substantial flood level reduction benefits. In these cases $10,000 for each owner is budgeted for obtaining a temporary construction access easement only.

(13) Guidelines for Mitigation Projects

Under DAP9525.13 (VII) (J) the types of mitigation projects that may be approved for alternate project funds are very broad. Under that guideline, mitigation measures may be the same type as would be eligible for funding under section 404 of the Stafford Act, the Hazard Mitigation Grant Program (HMGP). As such, a project must meet five minimum project eligibility criteria, 44 CFR 206.434(b), as follows:

(a) The Project conforms with the State Hazard Mitigation Plan (HMP):

HMP Goal 1 - Protect life and reduce injuries resulting from natural hazards

Presently, Highway 101 is closed several times each year due to flooding. When Wilson River Loop Road also closes due to high water, access to Tillamook County General Hospital, the County's only hospital, is cut off to ambulances and other emergency vehicles transporting patients from the north end of Tillamook County, the most populous area of the County outside the City of Tillamook. In such cases, access to Seaside Hospital in Clatsop County is also usually blocked south of Seaside, leaving this population at great risk to injury or death without any hospital care. The proposed project will reduce depths and durations of this highway closure due to flooding.

HMP Goal 2 - Minimize public and private property damages and the disruption of essential services

The stretch of commercial property that will be benefited by this Project consists of a swath of businesses 1,000 feet wide along Highway 101 over one mile long. This area represents the business core of Tillamook City's highway commercial district, containing a number of the County's major employers. Even those properties in this area that are elevated sustain damages due to business disruption. A number of the remaining businesses have sustained repetitive loss from direct flood damage. Moreover, when the highway closes there are major disruptions to businesses outside the flood plain due to employees who cannot get to work. The proposed project will have a dramatic effect in reducing property damage and business disruptions. There are over 500 structures in the overall area that receive some benefit in flood level reduction to the project.

HMP Goal 3 - Increase the resilience of local, regional and statewide economies

When Highway 101 closes, some of the County's largest employers have to either shut down or reduce production. Businesses such as Tillamook Cheese, Fred Meyer, Rosenberg's Builders Supply, to name a few, are either forced to close or sustain major disruptions. Moreover, goods in transit over Highway 6 from the Willamette Valley to points in the flood area, in North Tillamook or in Southern Clatsop County are unable to reach their destinations. The flow of feed to farmers and milk to the Tillamook County Creamery Association or bottlers in the Willamette Valley are interrupted. Milk production often has to be dumped. Once again, this Project will have substantial benefits to the resilience of local, regional and state economies.

HMP Goal 4 - Minimize the impact of natural hazards while protecting and restoring the environment and

HMP Short Term Action #3 - Continue seeking effective hazard mitigation opportunities compatible with habitat and fisheries protection via multi-objective mitigation efforts

Out of the 59 project alternatives considered as part of the US Army Corps of Engineers Feasibility Project and the ten project alternatives analyzed under Project Exodus, the Southern Flow Corridor project was not only the most effective at flood mitigation but it is also the one project that provides the most environmental restoration, with approximately 450 acres of salt marsh creation and many miles of stream restoration. Perhaps more importantly, the Southern Flow Corridor Project has substantial benefits to the federally listed threatened and endangered Coho Salmon, benefits to Chinook and Chum Salmon, as well as to Steelhead Trout.

Long Term Action #6 - Assist local communities in securing funding to implement measures to mitigate damage to buildings exposed to or having experienced repetitive losses

Although Tillamook County has done much to relocate National Flood Insurance Program (NFIP) repetitive loss structures, there are still yet other NFIP repetitive loss structures remaining in the Project area. Moreover, there are other repetitive loss structures in the Project area that are not in the NFIP. All of these would be directly benefited by FEMA funding of the proposed mitigation project.

(b) Provides a beneficial impact upon the designated disaster area

Tillamook County was designated as a disaster area under DR-1733-OR that also included a number of Western Oregon Counties and the state. As noted above, there are substantial benefits from this Project locally, regionally and for the State of Oregon.

(c) Conforms to environmental laws and regulations

In addition to the substantial flood mitigation benefits from this Project, it has very large ecosystem restoration benefits and will likely qualify for a streamlined restoration permit. The project has been designated to qualify under the Federal Nationwide Permit (NWP-27) and the General Authorization under the State of Oregon Removal-Fill law. It has also been designed to comport with NOAA Fisheries restoration programmatic biological opinion (SLOPES IV).

(d) Solves a problem independently or constitutes a functional portion of a solution

The Southern Flow Corridor constitutes a standalone, independent solution to flooding in the lower Wilson River floodplain. It provides substantial flood level reduction over a wide area through the removal of man-made flow impediments to the maximum extent possible. No other projects are needed for these benefits to occur.

Oregon Solutions, the locally driven stakeholder group formed after the flood of 2006 to address flooding issues, identified a suite of flood damage reduction measures for implementation. Many measures were immediately implemented, such as removal of fill in the floodway; but in recognition of the complexity of flood issues on the lower Wilson River, an extensive technical alternatives analysis was undertaken with multiple public meetings and input. As a result of this process, Oregon Solutions voted to select Project Exodus as the preferred alternative for implementation. Project Exodus consists of three geographically separated projects, one of which is the Southern Flow Corridor. The Southern Flow Corridor was selected as the first project to implement, due to its standalone nature, availability of FEMA funding and having the widest and most significant flood damage reduction benefits of the three projects.

The Southern Flow Corridor Design Report (Exhibit A) and Benefit-Cost Analysis (Exhibit C) describe and analyze this project on its own, with benefits and costs compared to existing, present day conditions.

(e) Is cost effective

The Stafford Act and its implementing regulations require that HMGP projects be cost effective. 44 CFR 206.434(b). Among the minimum criteria for cost effectiveness is that a project must be "cost effective and substantially reduce the risk of future damage, hardship, loss or suffering resulting from a major disaster".

The cost effectiveness of the Project has been demonstrated by a BCA using FEMA developed software. The Project functions to provide risk reduction over all floods from a two year through 100 year event. The BCA Report (Exhibit C), addresses the concerns raised, including providing validation of the FEMA depth-damage curves with local observed historic damages.

In addition to the five minimum project eligibility criteria addressed above, an HMGP project must also meet three minimum project selection criteria, 44 CFR 206.435(b), as follows:

(f) The project must provide the best fit within the overall development plan and/or the Hazard Mitigation Plan for the area

For more than a decade, POTB, Tillamook County and the City of Tillamook have worked with other local, state and federal partners for flood mitigation and ecosystem restoration planning for this area. Initially, with the US Army Corps of Engineers Feasibility Study and later with the Project Exodus study, HEC-RAS computer modeling was used to identify a series of alternatives which were narrowed down to the preferred Alternative identified in the Project Exodus Design Report (Exhibit B), of which the

Southern Flow Corridor is the more important stand-alone component. This Project has the solid support of the local community and local governments as well as state and federal regulators.

Additionally, this Project fulfills the following goals and actions of the current City of Tillamook Hazard Mitigation Plan.

Goal A: Protect Life and Property

Engage in and promote long-term, cost-effective regional planning and property protection activities that will reduce or eliminate adverse impacts from flooding.

Goal B: Preserve Natural Areas Related to Flooding

Preserve and restore natural areas and water conveyance to enhance flood plain function. Protect or enlarge existing wetlands and open areas to maintain or create additional floodwater holding areas. Preserve and enhance public open space along floodways, rivers, sloughs, tributary streams and the bay to insure adequate floodplain function.

Goal D: Modify existing structures to improve hydrologic function

Develop solutions that ensure all non-emergency flood mitigation maintains or enhances natural resource protection. Implement structural flood mitigation solutions to protect critical structures and infrastructure when other alternatives do not exist.

Goal F: Improve and Promote Partnerships, Coordination and Implementation

Foster on-going community partnerships and forge new links with other agencies and organizations within and outside the city when implementing flood mitigation activities.

(g) Selected projects should be those that clearly reduce loss of life, loss of essential services, damage to critical facilities or severe economic hardship

This Project will substantially reduce the risk of future flood damages to the benefitted section of railroad. As noted elsewhere in this application, the POTB railroad will continue to be an important asset to the POTB. In past years when Highway 101 and Wilson River Loop road closed, the railroad was the only transportation link joining the North and South ends of Tillamook County. Additionally, Tillamook County General Hospital, the County's only hospital, is a critical facility. As indicated elsewhere within this brief, the limited hospital access issue for much of the County's population will be reduced by the project.

(h) Have the greatest potential to reduce losses after examining the alternatives available

As indicated in several locations elsewhere within this brief, this Project has the greatest potential to reduce future losses after examining the 59 alternatives identified in the US Army Corps of Engineers Feasibility Study and the ten alternatives explored in Project Exodus. The HEC-RAS modeling demonstrates between a one foot and one point five foot reduction in flood levels along Highway 101 and a six inch reduction along the POTB's railroad during a 100 year flood event. No other project examined or modeled over the last decade has shown as much potential to reduce future losses.

The HMGP manual (at Page 5-3) also lists a number of other considerations the state may add to its evaluation criteria when selecting an HMGP project. Each of the following criteria from that list is justified by elements of the proposed Project:

- Level of protection provided by the Project
- Measures designed to accomplish multi-objectives, including damage reduction, environmental enhancement and economic recovery
- The applicant community's participation in the National Flood Insurance Program, compliance record and Community Rating System level
- Local commitment and public buy-in

II. Project Eligibility

FEMA's Disaster Assistance Policy for Alternate Projects authorizes an eligible applicant to perform hazard mitigation measures unrelated to the original facility. DAP9525.13 (VI). In order to do so, an applicant must first demonstrate project eligibility under the guidelines of DAP9525.13 (VII). The following section lists each of those guidelines and applicant's documentation of eligibility.

(1) **The applicant may request approval of an alternate project from FEMA through the grantee which an applicant determines that the public welfare would not be best served by either restoring a damaged facility or by restoring the function of a damaged facility. Either one of the two conditions must be met. See 44 CFR 206.203(d)(2).**

The POTB has previously received authorization from FEMA to pursue a series of Alternate Projects in lieu of restoring its damaged railroad facilities. This Project application is one in that series of Alternate Projects.

(2) **The proposed alternate project must be a permanent project that benefits the general public. See 44 CFR 206.203(d)(2).**

The proposed project is permanent and the public benefits are substantial. As shown in the Southern Flow Corridor Design Report (Exhibit A), during the 100 year flood there will be up to a one foot reduction in flood levels at the south end of the Project area along Highway 101 and up to one point five foot flood reduction in flood levels at the north end of the Project area along Highway 101. This portion of the Project area, consisting of 500 feet on each side of Highway 101, contains a major piece of the City of Tillamook's commercial businesses representing millions of dollars in value. This Project will also reduce flooding on POTB's railroad up and downstream of the north-south rail line by about six inches in the 100 year flood. The environmental benefits will also be substantial. Between 500 and 600 acres of salt marsh wetland will be created as a direct consequence of this Project with direct benefit to the federally listed Coho Salmon. Also both Hoquarton and Dougherty Sloughs are currently listed by the Oregon Department of Environmental Quality (DEQ) as water quality impaired streams. According to the Director of DEQ, the beneficial effects on water quality in those streams as a direct result of this Project will be "immediate and dramatic".

(3) **A damaged facility whose repair costs were used for an approved alternate project may be eligible for future PA funding provided that the applicant funded and performed the repairs to the original damaged facility**

This policy guidance does not appear to be relevant to the issue of eligibility of the proposed Alternate Project.

(4) **Funds may be used to repair or expand other selected facilities to construct new facilities, purchase equipment or to fund hazard mitigation measures in accordance with other provisions of this policy**

This policy authorizes the proposed Alternate Project to be funded as a hazard mitigation measure.

(5) **FEMA expects the proposed alternate project to serve the same general area that was being served by the originally funded project**

The proposed Alternate Project is situated entirely within the exterior boundaries of the POTB. The POTB's railroad traverses through the project area.

(6) **The FEMA Regional Administrator must approve all alternate projects prior to the start of construction. See 44 CFR 206.203(d)(2)(v).**

The appeal is an important step in that process.

III. General Work Eligibility

Under 44 CFR 206.223 (a)(3), to be eligible for financial assistance, an item of work must be the legal responsibility of an eligible applicant

The POTB is a district and political subdivision of the State of Oregon organized under ORS 777.010 and 777.050. The State of Oregon has granted to each port, to the full extent possible "... full control of all bays, rivers and harbors within its limits and the sea." **ORS 777.120**. Under Oregon law, the POTB has legal authority and responsibility to:

(1) Regulate the placement or removal of obstructions to navigation from the bays, rivers and harbors; and

(2) Engage in the control and prevention of river and stream bank erosion and the prevention of damage from flood-water and sediment. Id.

The POTB is the owner of the railroad line and has been the owner prior to and since the date of the disaster. According to FEMA policy guidance, an eligible mitigation measure may be distinct from the integral parts of the damaged property. In this instance, the proposed hazard mitigation measure:

(1) Directly benefits the disaster-damaged railroad line owned by the POTB.

(2) Will be conducted within the jurisdictional boundaries of the POTB wherein the POTB has authority under Oregon law to take measures for the prevention of flood-related damage to life and property.

(3) Will be conducted on land to which the POTB has made arrangements to obtain ownership.

Based on a review of Oregon law relating to POTB's, federal law and regulations, hazard mitigation project documentation and FEMA recovery policy guidance documents, including appeal letters construing the requirements for legal responsibility under 44 CFR 206.223(a), both Senior Deputy Legislative Counsel Dexter Johnson and Tillamook County Counsel William Sargent have found that the POTB satisfies the requirement for legal responsibility. Legislative Counsel

Dexter Johnson's August 24, 2010 letter opinion is attached as Exhibit D; and Tillamook County Counsel William Sargent's August 20, 2010 letter opinion is attached as Exhibit E.

As noted above, the POTB has made arrangements to take ownership of the lands and easements upon which the hazard mitigation project will be constructed. More specifically, there are two Intergovernmental Agreements (IGAs) that not only address the process for the POTB's assumption of ownership for the project lands, but that also provide for the necessary assurances related to long-term and ongoing maintenance, repairs and operations for the project site.

Under an IGA effective April 14, 2010 (Exhibit F) between the POTB and Tillamook County, a process is set forth for the transfer of title and easements for the Project Lands upon completion of certain conditions precedent, including approval of the project by FEMA as an eligible FEMA Alternate Project. See Section 1.1, Exhibit F. No transfer of the lands will be made until these conditions precedent have been fully completed. There is also an additional IGA dated July 31, 2002 (Exhibit G) between the County, Soil and Water Conservation District (SWCD) and the Oregon Department of Fish and Wildlife (ODFW) that provides an existing administrative framework for financing on-going and long-term maintenance, repair and operations of the existing 377 acre County-owned wetland. The April 14, 2010 IGA (Exhibit F) provides at Section 2.3, that upon POTB's acquisition of the Project Lands, POTB will enter into an amended version of the July 31, 2002 IGA. This latter Section 2.3 is important because it provides the framework for ongoing and long term maintenance, repair and operations. For example, under the current version of the 2002 IGA, an annual work plan for maintenance is developed (Section 1.2), the County will coordinate and provide for ongoing maintenance and include within its annual budget such amounts as might be required to perform this work (Section 2.5). The County is responsible for making all Project maintenance expenditures (Section 2.3). A fund within the County budget is established for that purpose (Sections 5.1 and 5.2). The addition of the POTB to this financing structure further reinforces the ability of the POTB to carry out its financial assurance for ongoing and long term maintenance, repairs and operations.

Moreover, the Tillamook Bay Habitat and Estuary Improvement District (TBHEID) is an ORS Chapter 554 corporation for flood control that has been involved for more than a decade on project maintenance within the existing 377 acre tract despite the fact that the County tract is not part of its district by way of County membership in the corporation. Not only is TBHEID a member of the management committee that advises on project maintenance as described in Exhibit G, Section 5.3, but it is not subject to the same limitations of Oregon budget law as are the other parties. TBHEID collects approximately $30,000 annually in dues from its members. TBHEID has also provided a letter of financial assurance to assist with the expenses of on-going and long term maintenance, repairs and operations (Exhibit H).

Finally, the POTB has been an enrolled participant with the city, county, state and federal partners in the Oregon Solutions program that led to the proposed Project. This Oregon Solutions Project was established by Oregon Governor Ted Kulongoski, who appointed State Senator Betsy Johnson and County Commissioner Mark Labhart as Co-Conveners. The staff of all of Oregon's congressional delegation are also active participants. The POTB and all other members of the Project Team each signed the Declaration of Cooperation and a separate Statement of Assurances. (Exhibit I). The proposed Project is an important part of applicant's commitment to this Oregon Solutions Project.

EXHIBIT LIST

A. Southern Flow Corridor – Landowner Preferred Alternative Preliminary Design Report, May 2011

B. Project Exodus Design Report, February 2010

C. Benefit Cost Analysis Report for Southern Flow Corridor (Revised), May 2011

D. August 24, 2010 letter opinion by Legislative Counsel Dexter Johnson

E. August 20, 2010 letter opinion by Tillamook County Counsel William Sargent

F. April 14, 2010 Intergovernmental Agreement between Port of Tillamook Bay and Tillamook County

G. July 31, 2002 Intergovernmental Agreement between Tillamook County, Oregon Department of Fish and Wildlife and Tillamook County Soil and Water Conservation District

H. May 19, 2011 letter from the Tillamook Bay Habitat and Estuary Improvement District

I. Oregon Solutions Declaration of Cooperation (with the Port of Tillamook Bay's signature page) and Port of Tillamook Bay Statement of Assurances

J. Letter of Financial Commitment dated May 9, 2011 from the Oregon Watershed Enhancement Board

K. Loan Commitment dated May 18, 2011 from TLC Federal Credit Union

ATTACHMENT B

DISASTER NO.: 1733-DR-OR

PW NO.: ALTERNATE PROJECT #13 TO

PROJECT WORKSHEET (PW) 936

FIRST APPEAL

05/25/2011

DATES OF CORRESPONDENCE:

05/25/2011 – 01/24/2012 (NEWEST ON TOP)

ORIGINAL

Oregon
John A. Kitzhaber, MD, Governor

Military Department
Office of Emergency Management
PO Box 14370
Salem, OR 97309-5062
Phone: (503) 378-2911
Fax: (503) 373-7833
TTY: (503) 373-7857

RECEIVED
PORT OF TILLAMOOK BAY
JAN 27 2012
4000 BLIMP BLVD
TILLAMOOK, OR 97141

January 24, 2012

Ms. Michele Bradley
Port Manager
Port of Tillamook Bay
4000 Blimp Boulevard
Tillamook, OR 97141

RE: Disaster No.: 1733-DR-OR
First Appeal – Port of Tillamook Bay (the Port or POTB)
PW NO.: Alternate Project #13 to Project Worksheet (PW) 936

Dear Ms. Bradley,

Enclosed please find the Deputy Regional Administrator of the Federal Emergency Management Agency, Region Ten's determination to the Port of Tillamook Bay's appeal for the above referenced PW. The appeal has been denied for the reasons noted in the enclosure.

Pursuant to 44 CFR, § 206.206, a second appeal may be made if the Regional Administrator denies the first appeal. The Port may submit a second appeal in writing to the Assistant Administrator, Disaster Assistance Directorate, FEMA Headquarters.

The second appeal must be submitted to Oregon Emergency Management within 60 days of the receipt of this letter. If the Port chooses to appeal, the second appeal must contain the following justifications: 1) supporting its position, 2) specifying the monetary figure in dispute, and 3) the provisions in Federal law, regulation, or policy with which the Port believes the initial action was inconsistent. Upon receipt of the second appeal from the Port, the State will review the material submitted, and within 60 days of receipt will forward the appeal through FEMA, Region Ten, to FEMA's Assistant Administrator, Disaster Assistance Directorate in Headquarters. Within 90 days following receipt of the appeal or requested information, the Assistant Administrator, Disaster Assistance Directorate, will notify the State of the disposition of the appeal. The decision made by the Administrator, Disaster Assistance Directorate is final.

To reiterate, enclosed is the first appeal analysis and letter of notification from FEMA's Deputy Regional Administrator.

Sincerely,

David A Stuckey
Deputy Director

DAS/js/crc
Enclosures

U.S. Department of Homeland Security
Region X
130 228th Street, SW
Bothell, WA 98021-9796

FEMA

JAN 13 2012

Mr. David Stuckey
Deputy Director
Oregon Emergency Management
PO Box 14370
Salem, Oregon 97309-5062

Subject: First Appeal – Port of Tillamook Bay –Alternate Project
FEMA DR-1733-OR; Alternate Project #13 to Project Worksheet (PW) 936

Dear Mr. Stuckey:

This is in response to your June 8, 2011, submittal to the U. S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) of the Port of Tillamook Bay's (applicant) request for reconsideration of an ineligible determination for proposed Alternate Project #13 under PW 936.

The applicant's appeal is denied. The analysis is enclosed. Please inform the applicant of this determination.

The applicant may appeal my decision to the Assistant Administrator, Recovery Directorate, FEMA Headquarters. If the applicant chooses to appeal, the appeal must contain justification: 1) supporting its position, 2) specifying the monetary figure in dispute, and 3) citing the provisions in Federal law, regulation, or policy with which the applicant believes that initial action was inconsistent. A final appeal must be submitted to your office within 60 days of the applicant's receipt of this determination. Subsequent to that, your evaluation of the appeal is required to be submitted through my office to FEMA's Assistant Administrator, Recovery Directorate, within 60 days after you receive the appeal.

Sincerely,

Sharon Loper

Sharon Loper
Deputy Regional Administrator

Enclosure

FIRST APPEAL ANALYSIS
Applicant: Port of Tillamook Bay
Project: Alternate Project #13 to PW936v1
FEMA-1733-DR-OR

BACKGROUND

Flooding during December 1-17, 2007, severely damaged the Port of Tillamook Bay's (applicant) historic railroad. The applicant determined that restoring the railroad facilities to their pre-disaster condition would not best serve the public welfare and requested a series of alternate projects in lieu of the railroad repairs, including Alternate Project #13. The proposed Alternate Project #13 is a mitigation project designed to reduce flood elevations in the project area and restore salt marsh and natural river processes by removing approximately 36,000 linear feet of existing levees and associated fill, lowering approximately 11,000 linear feet of existing levees, constructing 9,600 linear feet of tidal dike, installing ten concrete culverts with tidegates and constructing a spillway structure. The estimated project cost is approximately $8,000,000, of which approximately $3,225,000 is requested from FEMA.

As a mitigation project, an alternate project proposed under the Public Assistance (PA) Program must first meet the PA Program requirements, and then meet the requirements for funding through FEMA's Hazard Mitigation Grant Program (HMGP) in accordance with Response and Recovery Directorate Policy 9525.13, Alternate Projects, dated July 31, 2001, the policy in effect upon the date of the disaster declaration.

On January 13, 2011, the applicant submitted a request for an eligibility determination for Alternate Project #13. On March 16, 2011, FEMA determined that the project was ineligible for PA funding due to three eligibility criteria: 1) Failure to clearly demonstrate that the project was cost-effective; 2) The project does not solve the threat independently or constitute a functional portion of a solution to the threat; and 3) The project does not include sufficient assurances to long-term and ongoing maintenance, repairs, and operations.

The applicant appealed this determination on June 6, 2011. More information was requested of FEMA, which was provided by the applicant on September 6, 2011. The applicant provided information and discussion related to these three requirements, including discussion on the modeling for the benefit-cost analysis and damage impacts, and assurances to fund the entire project and fund the long-term maintenance and repairs.

DISCUSSION

This proposed alternate project is being submitted as a mitigation project, requiring it to meet PA's eligibility criteria, and the eligibility of a mitigation project under the Hazard Mitigation Grant Program (44 CFR Part 206.434), per PA's Alternate Project policy. Following is discussion related to the revised benefit-cost analysis and the cost-effectiveness of this proposed project.

Cost-Effectiveness. Mitigation projects funded by FEMA must "Be cost-effective and substantially reduce the risk of future damage, hardship, loss, or suffering resulting from a major disaster." (44 CFR Part 206.434) These are direct benefits derived from putting in place hazard mitigation measures. On September 6, 2011, the applicant provided a revised benefit-cost analysis (BCA) with a benefit-cost ratio of 1.14. The inclusion of agricultural losses avoided in the applicant's benefit-cost analysis cannot be validated by FEMA Region X.

The May 2011, revised benefit-cost analysis states on page 10, "There was no data available to directly validate the agricultural loss estimates within HAZUS." The applicant nonetheless stresses the significance of agricultural losses, citing the November 1996 'Tillamook County, Oregon 1996 Flood Damage and Recovery Plan' estimate of $9,200,800 in agricultural damages for all of Tillamook County. The applicant uses the examples of hundreds of cows drowned in Tillamook's 1996 flood, as well as the loss of agricultural inventory such as milk. However, a project to reduce flood levels by zero to eighteen inches will not substantially reduce flood hazards to milk parlors, milk tanks, or the risk of cows drowning.

The HAZUS model includes the following assumptions for the ratio of agricultural-related damages to the total pre-mitigation flood costs: Agricultural Buildings damage costs ratio was 38 percent; Agricultural Building Contents was 40 percent; and Agricultural Inventory was assigned a 56 percent ratio for use in the HAZUS model. FEMA cannot accept the assumption that this level of significant agricultural costs will be incurred or mitigated when there is no actual historical data available.

CONCLUSION

The applicant has not provided sufficient data and information for FEMA to confirm the FEMA Public Assistance Program eligibility of this proposed project as being cost-effective.

FINDING

The applicant's appeal is denied.

Oregon
John A. Kitzhaber, MD, Governor

Oregon Military Department
Oregon Emergency Management
PO Box 14370
Salem, OR 97309-5062
Phone: (503) 378-2911
Fax: (503) 373-7833
TTY: (503) 373-7857

June 6, 2011

Mr. Kenneth Murphy
Regional Director
FEMA Region 10
130 228th Street Southwest
Bothell, Washington 98021-9796

RE:	Disaster No.:	1733-DR-OR
	FEMA No.:	057-U1ZZV-00
	Applicant:	Port of Tillamook Bay
	PW Nos.:	Alternate Project #13 to PW 936(1), Southern Corridor Project – First Appeal

Dear Mr. Murphy,

By letter dated March 28, 2011, the State notified the Port of Tillamook Bay (the Port or POTB) that the above referenced Alternate Project #13 was determined ineligible. Pursuant to 44 CFR § 206.206(2)(c), the Port timely filed its appeal from that determination with this office. Pursuant to 44 CFR § 206.206(2), we have reviewed the Port's appeal and hereby forward it to the Regional Administrator for review. Enclosed is the Port's appeal and supporting documentation.

Sincerely,

David A. Stuckey
Deputy Director

DAS/js/crc
Enclosures
cc: Michele Bradley

Aaron Palter

From:	Paul Levesque <plevesqu@co.tillamook.or.us>
Sent:	Friday, September 02, 2011 4:26 PM
To:	Michele Bradley; Aaron Palter; Karin Gitchel
Cc:	Vaughn Collins; Rick Klumph; Mark Labhart; Betsy Johnson; Paul Levesque; Julie Slevin
Subject:	Response to FEMA appeal comments
Attachments:	SouthernFlowCorridor_BCA_DisplacementCosts.xlsx; FEMA Comment Response Sept12011 v2.pdf; BCA Report-Displacement 09022011.pdf

Attached is the proposed response to FEMA's appeal comments that are due by today, September 2.

Paul Levesque
Contracts, Facilities and Fleet Director
201 Laurel Avenue
Tillamook OR 97141
503 842-1809
FAX 503 842-1384

NAME	OCCUPANCY	GENERAL OCCUPANCY COMMENT	BUILDING COST	SQFEET	FIRSTFLOORHEIGHT	Flood Depth PRE5YR_FLOODDEPTH	PRE22YR_FLOODDEPTH	PRE100YR_FLOODDEPTH	POST5YR_FLOODDEPTH	POST22YR_FLOODDEPTH	POST100YR_FLOODDEPTH	Flood Depth in Building PRE5YR	PRE22YR	PRE100YR	POST5YR	POST22YR	POST100YR	Displacement + Disruption Costs PRE5YR	PRE22YR	PRE100YR	POST5YR	POST22YR	POST100YR
																		$851,609	$1,693,572	$2,685,464	$720,123	$1,229,518	$2,123,358 Totals
10	RES1	Resx One s	$94,340	1468	1.5	4.26	4.32	6.15	4.10	4.31	6.05	2.76	2.82	4.65	2.60	2.81	4.55	10001	10191	15808	9503	10162	15567
100	AGR1	Agric Farm	$30,360	14529	0	0.00	1.10	1.88	0.00	0.00	0.36	0.00	1.10	1.88	0.00	0.00	0.36	0	11180	11180	0	0	11180
101A	AGR1	Agric Farm	$45,180	8128	0	0.00	0.81	1.59	0.00	0.00	0.11	0.00	0.81	1.59	0.00	0.00	0.11	0	6250	6250	0	0	6250
101B	AGR1	Agric Farm	$18,180	8946	0	0.00	0.81	1.59	0.00	0.00	0.11	0.00	0.81	1.59	0.00	0.00	0.11	0	6888	6888	0	0	6888
101C	AGR1	Agric Farm	$2,990	3520	0	0.00	0.81	1.59	0.00	0.00	0.11	0.00	0.81	1.59	0.00	0.00	0.11	0	2710	2710	0	0	2710
101D	AGR1	Agric Farm	$32,170	954	0	0.00	0.81	1.59	0.00	0.00	0.11	0.00	0.81	1.59	0.00	0.00	0.11	0	738	738	0	0	738
102	AGR1	Agric Farm	$1,880	1584	0	0.00	0.32	1.10	0.00	0.00	0.02	0.00	0.32	1.10	0.00	0.00	0.02	0	1220	1220	0	0	1220
103	AGR1	Agric Farm	$23,270	1296	0	0.00	0.27	1.05	0.00	0.00	0.02	0.00	0.27	1.05	0.00	0.00	0.02	0	998	998	0	0	998
104A	RES1	Resx One s	$82,520	1798	0	0.00	0.98	1.74	0.00	0.00	0.29	0.00	0.98	1.74	0.00	0.00	0.29	0	6325	8315	0	0	2778
104B	AGR1	Agric Farm	$1,150	585	0	0.00	0.98	1.74	0.00	0.00	0.29	0.00	0.98	1.74	0.00	0.00	0.29	0	450	450	0	0	450
104C	AGR1	Agric Farm	$1,750	900	0	0.00	0.98	1.74	0.00	0.00	0.29	0.00	0.98	1.74	0.00	0.00	0.29	0	693	693	0	0	693
105	RES1	Resx Uniqu	$101,610	1152	2	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
106	RES1	Resx Two s	$195,650	3264	1.5	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
108A	RES2	Resx M S C	$8,400	1611	2.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
108B	RES2	Resx Class	$12,520	1611	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
109A	AGR1	Agric Farm	$46,570	4854	0	0.78	2.26	3.04	0.00	0.56	1.53	0.78	2.26	3.04	0.00	0.56	1.53	3745	3745	3745	0	3745	3745
109B	AGR1	Agric Farm	$40,080	10355	0	0.78	2.26	3.04	0.00	0.56	1.53	0.78	2.26	3.04	0.00	0.56	1.53	7973	7973	7973	0	7973	7973
109C	AGR1	Agric Farm	$33,280	8100	0	0.78	2.26	3.04	0.00	0.56	1.53	0.78	2.26	3.04	0.00	0.56	1.53	6237	6237	6237	0	6237	6237
109D	AGR1	Agric Farm	$21,870	4012	0	0.78	2.26	3.04	0.00	0.56	1.53	0.78	2.26	3.04	0.00	0.56	1.53	3089	3089	3089	0	3089	3089
109E	AGR1	Agric Farm	$5,550	1728	0	0.78	2.26	3.04	0.00	0.56	1.53	0.78	2.26	3.04	0.00	0.56	1.53	1331	1331	1331	0	1331	1331
109F	AGR1	Agric Farm	$89,230	19048	0	0.78	2.26	3.04	0.00	0.56	1.53	0.78	2.26	3.04	0.00	0.56	1.53	14667	14667	14667	0	14667	14667
109G	AGR1	Agric Farm	$25,510	12420	0	0.78	2.26	3.04	0.00	0.56	1.53	0.78	2.26	3.04	0.00	0.56	1.53	9563	9563	9563	0	9563	9563
109H	AGR1	Agric Farm	$7,290	2736	0	0.78	2.26	3.04	0.00	0.56	1.53	0.78	2.26	3.04	0.00	0.56	1.53	2107	2107	2107	0	2107	2107
109I	AGR1	Agric Farm	$8,800	2181	0	0.78	2.26	3.04	0.00	0.56	1.53	0.78	2.26	3.04	0.00	0.56	1.53	1679	1679	1679	0	1679	1679
109J	AGR1	Agric Farm	$2,410	552	0	0.78	2.26	3.04	0.00	0.56	1.53	0.78	2.26	3.04	0.00	0.56	1.53	425	425	425	0	425	425
110 B	AGR1	Agric M S C	$8,740	2286	3	0.00	0.04	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
110A	AGR1	Agric Manuf	$18,010	2286	3	0.00	0.04	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
111	RES2	Resx Class	$4,760	960	1.5	0.00	0.81	1.69	0.00	0.00	0.27	0.00	0.00	0.19	0.00	0.00	0.00	0	0	1034	0	0	0
112A	AGR1	Agric Farm	$21,870	4848	0	0.47	1.70	2.48	0.00	0.30	1.06	0.47	1.70	2.48	0.00	0.30	1.06	3733	3733	3733	0	3733	3733
112B	AGR1	Agric Farm	$18,670	2100	0	0.47	1.70	2.48	0.00	0.30	1.06	0.47	1.70	2.48	0.00	0.30	1.06	1617	1617	1617	0	1617	1617
113	AGR1	Agric Farm	$11,810	3036	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
114	AGR1	Agric Farm	$39,920	4224	0	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0	3252	3252	0	0	0
116	RES1	Resx One s	$83,790	2239	3.5	0.06	1.42	2.20	0.00	0.01	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
118A	AGR1	Agric Farm	$96,890	6118	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
118B	AGR1	Agric Farm	$28,000	2800	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
118C	AGR1	Agric Farm	$22,400	2243	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
118D	AGR1	Agric Farm	$36,040	3604	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
118E	AGR1	Agric Farm	$12,960	1296	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
118F	AGR1	Agric Farm	$2,560	256	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
119A	RES1	Resx One s	$154,790	1548	1							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
119B	AGR1	Agric Farm	$7,790	729	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
120A	RES1	Resx One s	$327,130	4208	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
120B	AGR1	Agric Farm	$14,400	1443	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
121	AGR1	Agric Farm	$16,910	1350	1			6.12				0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
122	RES1	Resx One s	$111,060	1428	1.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
123	RES1	Resx One s	$102,400	1504	1.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
124	RES1	Resx One s	$115,780	1489	2							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
125	RES2	Residential	$8,090	3372	1.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
126	RES1	Resx One s	$112,260	1847	2							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
128	RES1	Resx One s	$102,060	1888	1.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
129	RES1	Resx One s	$120,810	1068	1							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
12A	AGR1	Agric Farm	$37,430	3840	0	0.00	0.00	6.35	0.00	0.00	6.15	0.00	0.00	6.35	0.00	0.00	6.15	2957	2957	2957	2957	2957	2957
12B	AGR1	Agric Farm	$36,280	3520	0	0.00	0.00	6.35	0.00	0.00	6.15	0.00	0.00	6.35	0.00	0.00	6.15	2710	2710	2710	2710	2710	2710
12C	AGR1	Agric Farm	$7,350	2240	0	0.00	0.00	6.35	0.00	0.00	6.15	0.00	0.00	6.35	0.00	0.00	6.15	1725	1725	1725	1725	1725	1725
12D	AGR1	Agric Farm	$5,010	8099	0	0.00	0.00	6.35	0.00	0.00	6.15	0.00	0.00	6.35	0.00	0.00	6.15	6236	6236	6236	6236	6236	6236
13	AGR1	Agric Farm	$2,580	1220	0	3.22	3.31	5.01	3.07	3.29	4.90	3.22	3.31	5.01	3.07	3.29	4.90	939	939	939	939	939	939
130	AGR1	Agric Farm	$16,660	2160	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
131	RES1	Resx One s	$75,520	1000	1							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
132A	AGR1	Agric Farm	$1,000	192	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
132B	AGR1	Agric Farm	$11,770	4320	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
132C	AGR1	Agric Farm	$16,130	8300	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
132D	AGR1	Agric Farm	$10,760	5796	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
132E	AGR1	Agric Farm	$32,230	5715	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
132F	AGR1	Agric Farm	$107,960	1032	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
132G	AGR1	Agric Farm	$1,890	336	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
132H	AGR1	Agric Farm	$2,230	400	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
132I	AGR1	Agric Farm	$3,900	2140	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
132J	AGR1	Agric Farm	$10,830	2880	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
132K	AGR1	Agric Farm	$49,720	6688	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
133	RES1	Resx Two s	$107,210	2224	2							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
134	AGR1	Agric Farm	$125,680	8218	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
135B	AGR1	Agric Farm	$4,190	2484	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
135C	AGR1	Agric Farm	$2,300	1380	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
135D	AGR1	Agric Farm	$3,780	3060	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
135E	AGR1	Agric Farm	$4,590	782	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
136	COM3	Com Servic	$433,040	16875	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
137	AGR1	Agric Utility/	$45,730	9564	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
138	COM2	Com Mini S	$482,180	28955	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
139	COM10	Com Mini S	$364,050	7281	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
14	AGR1	Agric Farm	$1,810	800	0	2.68	2.74	4.89	2.53	2.73	4.77	2.68	2.74	4.89	2.53	2.73	4.77	616	616	616	616	616	616
140	COM10	Com Mini S	$585,550	11311	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
141	COM10	Com Mini S	$201,650	4033	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
142	COM10	Com Mini S	$259,700	5194	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
144	COM1	Com Retail	$130,720	1036	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
145	AGR1	Agric Farm	$2,160	1156	0	0.00	0.00	0.04	0.00	0.00	0.03	0.00	0.00	0.04	0.00	0.00	0.03	0	0	890	0	0	890
146A	RES1	Resx One s	$64,110	1344	2.5	0.00	0.05	0.20	0.00	0.04	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
146B	AGR1	Agric Farm	$9,140	834	0	0.00	0.05	0.20	0.00	0.04	0.17	0.00	0.05	0.20	0.00	0.04	0.17	721	721	721	721	721	721
148	RES1	Resx One s	$119,170	2164	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
149A	RES2	Resx M S C	$72,110	3832	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
149B	RES2	Resx Class	$35,690	1344	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
15	AGR1	Agric Farm	$78,500	7650	0	2.34	2.33	8.90	2.34	2.34	8.70	2.34	2.33	8.90	2.34	2.34	8.70	5891	5891	5891	5891	5891	5891
150	RES1	Resx One s	$178,960	1808	2	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
151	AGR1	Agric Farm	$27,700	1820	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
152A	RES2	Resx M S C	$20,740	2131	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
152B	RES2	Resx Class	$33,190	2131	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
153	AGR1	Agric Farm	$16,820	1152	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
154A	AGR1	Agric Farm	$6,530	2000	0	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0	0	1540	0	0	0
154B	AGR1	Agric Farm	$1,430	640	0	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0	0	493	0	0	0
157	RES1	Resx Two s	$237,640	2500	4	0.31	1.77	2.55	0.00	0.14	1.03	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
158	RES2	Resx Class	$37,090	1556	2	0.00	1.14	1.92	0.00	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
160	AGR1	Agriculture	$17,710	1771	0	0.00	0.00	0.24	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0	0	1364	0	0	0
162	RES1	Resx One s	$138,670	3336	1	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
163	AGR1	Agriculture	$5,530	553	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	426	0	0	0
164A	RES2	Resx Class	$58,610	1566	3.5	0.00	0.00	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
165	RES2	Resx Class	$56,230	1568	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
166	AGR1	Agric M S C	$63,950	1091	0	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0	0	840	0	0	0
167	AGR1	Agric Farm	$68,410	7413	0	0.00	0.35	1.14	0.00	0.00	0.00	0.00	0.35	1.14	0.00	0.00	0.00	0	5706	5706	0	0	0
168	AGR1	Agric Farm	$8,720	4180	0	0.00	0.54	1.32	0.00	0.00	0.01	0.00	0.54	1.32	0.00	0.00	0.01	3219	3219	3219	0	0	3219
169	AGR1	Agric Farm	$9,730	744	0	0.00	0.56	1.09	0.00	0.00	0.09	0.00	0.58	1.08	0.00	0.00	0.09	0	573	573	0	0	573
16A	AGR1	Agric Farm	$30,870	5000	0	0.84	0.83	7.40	0.84	0.83	7.20	0.84	0.83	7.40	0.84	0.83	7.20	3850	3850	3850	3850	3850	3850
16B	AGR1	Agric Farm	$187,590	5000	0	0.84	0.83	7.40	0.84	0.83	7.20	0.84	0.83	7.40	0.84	0.83	7.20	3850	3850	3850	3850	3850	3850
16C	AGR1	Agric Farm	$9,440	5000	0	0.84	0.83	7.40	0.84	0.83	7.20	0.84	0.83	7.40	0.84	0.83	7.20	3850	3850	3850	3850	3850	3850
16D	AGR1	Agric Farm	$64,880	5000	0	0.84	0.83	7.40	0.84	0.83	7.20	0.84	0.83	7.40	0.84	0.83	7.20	3850	3850	3850	3850	3850	3850
16E	AGR1	Agric Farm	$11,080	5000	0	0.84	0.83	7.40	0.84	0.83	7.20	0.84	0.83	7.40	0.84	0.83	7.20	3850	3850	3850	3850	3850	3850
16F	AGR1	Agric Farm	$26,060	5000	0	0.84	0.83	7.40	0.84	0.83	7.20	0.84	0.83	7.40	0.84	0.83	7.20	3850	3850	3850	3850	3850	3850
16G	AGR1	Agric Farm	$23,910	5000	0	0.84	0.83	7.40	0.84	0.83	7.20	0.84	0.83	7.40	0.84	0.83	7.20	3850	3850	3850	3850	3850	3850
16H	AGR1	Agric Farm	$9,900	5000	0	0.84	0.83	7.40	0.84	0.83	7.20	0.84	0.83	7.40	0.84	0.83	7.20	3850	3850	3850	3850	3850	3850
16I	AGR1	Agric Farm	$20,390	5000	0	0.84	0.83	7.40	0.84	0.83	7.20	0.84	0.83	7.40	0.84	0.83	7.20	3850	3850	3850	3850	3850	3850
16J	AGR1	Agric Farm	$24,360	5000	0	0.84	0.83	7.40	0.84	0.83	7.20	0.84	0.83	7.40	0.84	0.83	7.20	3850	3850	3850	3850	3850	3850
16K	AGR1	Agric Farm	$23,900	5000	0	0.84	0.83	7.40	0.84	0.83	7.20	0.84	0.83	7.40	0.84	0.83	7.20	3850	3850	3850	3850	3850	3850
16L	AGR1	Agric Farm	$65,370	5000	0	0.84	0.83	7.40	0.84	0.83	7.20	0.84	0.83	7.40	0.84	0.83	7.20	3850	3850	3850	3850	3850	3850
16M	AGR1	Agric Farm	$44,000	5000	0	0.84	0.83	7.40	0.84	0.83	7.20	0.84	0.83	7.40	0.84	0.83	7.20	3850	3850	3850	3850	3850	3850
17	AGR1	Agric Farm	$260,780	4558	0			3.60			3.40	0.00	0.00	3.60	0.00	0.00	3.40	0	0	3610	0	0	3510
170	RES1	Resx One s	$271,760	2308	1	0.00	0.00	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
171	COM1	Com Marke	$14,840,200	154	0.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
172	COM1	Com Other	$495,820	3612	0	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0	0	4561	0	0	0
173	COM1	Com Row S	$842,800	6363	0.5	0.00	0.27	1.05	0.00	0.00	0.00	0.00	0.00	0.55	0.00	0.00	0.00	0	0	14616	0	0	0
174	COM1	Com Fast F	$605,640	2358	0.5	0.00	0.64	1.42	0.00	0.00	0.00	0.00	0.14	0.92	0.00	0.00	0.00	0	3546	7120	0	0	0
175	COM1	Com Conv	$496,020	4074	2.73	0.00	1.32	2.10	0.00	0.00	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
176	RES1	Resx Misce	$83,560	1775	1	0.29	1.77	2.55	0.00	0.07	1.04	0.00	0.77	1.55	0.00	0.00	0.04	0	4580	7512	0	0	1790
178	RES1	Resx Misce	$178,080	2544	1	0.27	1.75	2.53	0.00	0.12	1.01	0.00	0.75	1.53	0.00	0.00	0.01	0	6412	10642	0	0	3427
179	RES1	Resx Misce	$53,040	941	2	2.18	3.67	4.45	0.75	1.98	2.93	0.18	1.67	2.45	0.00	0.00	0.93	1238	4214	5779	0	0	2740
18	RES1	Resx One s	$54,940	1895	1			3.55			3.35	0.00	0.00	2.55	0.00	0.00	2.35	0	0	12677	0	0	11640
180	COM1	Commercia	$35,200	640	0	0.51	2.00	2.78	0.00	0.29	1.29	0.51	2.00	2.78	0.00	0.29	1.29	1428	3271	4341	0	1149	2357
181	RES1	Resx Misce	$38,820	1152	1	0.38	1.86	2.64	0.00	0.20	1.13	0.00	0.86	1.64	0.00	0.00	0.13	0	3166	5101	0	0	1361
182	RES1	Resx Misce	$59,920	1662	1	0.78	2.27	3.05	0.00	0.58	1.53	0.00	1.27	2.05	0.00	0.00	0.53	0	6020	8784	0	0	3417
183	COM1	Com Misce	$265,470	1406	1.36	0.00	0.43	1.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0

FEMA DEFAULTS

1.48 mo/ft Displacement time

From Table 11 Supplement to BCA Ref Guide July 2011

CLASS	$/sf/mo RENTAL	$/sf DISRUPTION	Ad,$2011
RES1	$ 1.44	$ 0.82	
RES2	$ 0.54	$ 0.82	
RES3	$ 0.68	$ 0.82	
RES4	$ 2.30	$ 0.82	
COM1	$ 1.31	$ 1.23	
COM2	$ 0.55	$ 1.07	
COM3	$ 1.53	$ 1.07	
COM6	$ 1.53	$ 1.53	
COM7	$ 1.53	$ 1.53	
COM10	$ 0.38	$ -	
IND2	$ 0.30	$ 1.07	
GOV1	$ 1.53	$ 1.07	
AGR1	$ -	$ 0.77	
REL1	$ 1.14	$ 1.07	

red=value changed from Table 11

184	COM3	Com Cargo	$234,510	8644	0	0.44	1.87	2.59	0.38	0.60	1.37	0.44	1.87	2.59	0.38	0.60	1.37	17813	45836	60038	16689	21075	38188
185	COM1	Com Fast F	$255,170	1540	0.5	0.00	0.05	0.32	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
186	COM1	Com Office	$256,080	2100	0.5	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
187	COM1	Com Office	$155,100	2820	0.5	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
188	COM1	Com Office	$118,800	2160	0	0.00	0.04	0.56	0.00	0.00	0.00	0.00	0.04	0.56	0.00	0.00	0.00	0	2840	5008	0	0	0
189	COM3	Com Fuel C	$5,394,540	1755	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
19	AGR1	Agric Farm	$2,140	2400	1			3.08			2.88	0.00	0.00	2.08	0.00	0.00	1.88	0	0	1848	0	0	1848
190	COM1	Com Resta	$408,385	7389	1.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
191	RES4	Resi Conv	$2,782,020	40	1.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
192	RES4	Resi Motel	$1,246,560	17805	1.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
193	COM1	Com Car W	$227,210	2446	0	0.00	0.38	0.89	0.00	0.00	0.62	0.00	0.38	0.89	0.00	0.00	0.62	0	4818	7237	0	0	5548
194	COM1	Com Row S	$1,002,870	41	0.88	0.00	0.05	0.54	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
195	AGR1	Agric Farm	$9,890	2650	0	4.28	5.81	6.61	2.84	4.08	5.09	4.28	5.81	6.61	2.84	4.08	5.09	2041	2041	2041	2041	2041	2041
196A	AGR1	Agric Farm	$68,170	6160	0	2.15	3.67	4.48	0.71	1.94	2.95	2.15	3.67	4.48	0.71	1.94	2.95	4743	4743	4743	4743	4743	4743
196B	AGR1	Agric Farm	$28,520	260	0	2.15	3.67	4.48	0.71	1.94	2.95	2.15	3.67	4.48	0.71	1.94	2.95	200	200	200	200	200	200
196C	AGR1	Agric Farm	$31,020	10200	0	2.15	3.67	4.48	0.71	1.94	2.95	2.15	3.67	4.48	0.71	1.94	2.95	7854	7854	7854	7854	7854	7854
196D	AGR1	Agric Farm	$62,470	6000	0	2.15	3.67	4.48	0.71	1.94	2.95	2.15	3.67	4.48	0.71	1.94	2.95	4620	4620	4620	4620	4620	4620
196E	AGR1	Agric Farm	$16,050	2838	0	2.15	3.67	4.48	0.71	1.94	2.95	2.15	3.67	4.48	0.71	1.94	2.95	2185	2185	2185	2185	2185	2185
196F	AGR1	Agric Farm	$59,710	30414	0	2.15	3.67	4.48	0.71	1.94	2.95	2.15	3.67	4.48	0.71	1.94	2.95	23419	23419	23419	23419	23419	23419
196G	AGR1	Agric Farm	$1,850	400	0	2.15	3.67	4.48	0.71	1.94	2.95	2.15	3.67	4.48	0.71	1.94	2.95	308	308	308	308	308	308
197A	AGR1	Agric Two s	$88,590	2376	1	0.38	1.97	2.77	0.00	0.56	1.38	0.00	0.97	1.77	0.00	0.00	0.38	0	1830	1830	0	0	1830
197B	AGR1	Agric Farm	$1,650	192	0	0.38	1.97	2.77	0.00	0.56	1.38	0.38	1.97	2.77	0.00	0.56	1.38	148	148	148	0	148	148
199A	AGR1	Agric Farm	$2,600	486	0	1.79	3.43	4.23	0.82	2.29	2.97	1.79	3.43	4.23	0.82	2.29	2.97	374	374	374	374	374	374
199B	AGR1	Agric Farm	$1,920	528	0	1.79	3.43	4.23	0.82	2.29	2.97	1.79	3.43	4.23	0.82	2.29	2.97	407	407	407	407	407	407
1A	AGR1	Agric Farm	$74,660	5280	0	4.83	4.88	6.85	4.64	4.87	6.75	4.83	4.88	6.85	4.64	4.87	6.75	4066	4066	4066	4066	4066	4066
1B	AGR1	Agric Farm	$1,310	640	0	4.83	4.88	6.85	4.64	4.87	6.75	4.83	4.88	6.85	4.64	4.87	6.75	493	493	493	493	493	493
1C	AGR1	Agric Farm	$31,280	6350	0	4.83	4.88	6.85	4.64	4.87	6.75	4.83	4.88	6.85	4.64	4.87	6.75	4890	4890	4890	4890	4890	4890
1D	AGR1	Agric Farm	$49,380	4850	0	4.83	4.88	6.85	4.64	4.87	6.75	4.83	4.88	6.85	4.64	4.87	6.75	3735	3735	3735	3735	3725	3735
1E	AGR1	Agric Farm	$9,800	980	0	4.83	4.88	6.85	4.64	4.87	6.75	4.83	4.88	6.85	4.64	4.87	6.75	755	755	755	755	755	755
20	AGR1	Agric Two s	$206,600	4727	2.5			2.99			2.80	0.00	0.00	0.49	0.00	0.00	0.30	0	0	3640	0	0	3640
200	AGR1	Agric Farm	$5,470	1680	0	3.42	5.07	5.86	2.62	3.94	4.62	3.42	5.07	5.86	2.62	3.94	4.62	1294	1294	1294	1294	1294	1294
201	RES1	Resi One s	$109,280	1340	5	1.10	2.80	3.55	0.68	1.81	2.49	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
203	AGR1	Agric Farm	$12,970	2115	2.5	0.47	2.24	2.97	0.04	1.18	1.87	0.00	0.00	0.47	0.00	0.00	0.00	0	0	1629	0	0	0
204	AGR1	Agric Farm	$3,450	2000	0	1.21	3.00	3.72	0.61	1.91	2.61	1.21	3.00	3.72	0.61	1.91	2.61	1540	1540	1540	1540	1540	1540
205B	RES2	Resi Class	$34,380	1188	2.5	0.49	2.24	2.92	0.03	1.19	1.87	0.00	0.00	0.42	0.00	0.00	0.00	0	0	1495	0	0	0
206A	AGR1	Agric Farm	$18,810	2194	0	1.06	2.92	3.63	0.37	1.77	2.50	1.06	2.92	3.63	0.37	1.77	2.50	1689	1689	1689	1689	1689	1689
206B	AGR1	Agric Farm	$18,390	1839	0	1.06	2.92	3.63	0.37	1.77	2.50	1.06	2.92	3.63	0.37	1.77	2.50	1416	1416	1416	1416	1416	1416
207	RES1	Resi One s	$34,160	576	0.5	0.37	1.89	2.70	0.00	0.17	1.17	0.00	1.39	2.20	0.00	0.00	0.67	0	2242	3231	0	0	1350
208	RES1	Resi One s	$52,540	1394	0.5	0.29	2.13	2.71	0.00	0.89	1.54	0.00	1.63	2.21	0.00	0.39	1.04	0	6118	7961	0	3441	4371
209A	AGR1	Agric Farm	$126,830	1848	0	0.00	1.01	1.81	0.00	0.00	0.29	0.00	1.01	1.81	0.00	0.00	0.29	0	1423	1423	0	0	1423
209B	AGR1	Agric Farm	$28,600	2860	0	0.00	1.01	1.81	0.00	0.00	0.29	0.00	1.01	1.81	0.00	0.00	0.29	0	2202	2202	0	0	2202
209C	AGR1	Agric Farm	$8,160	816	0	0.00	1.01	1.81	0.00	0.00	0.29	0.00	1.01	1.81	0.00	0.00	0.29	0	628	628	0	0	628
209D	AGR1	Agric Farm	$8,400	840	0	0.00	1.01	1.81	0.00	0.00	0.29	0.00	1.01	1.81	0.00	0.00	0.29	0	647	647	0	0	647
209E	AGR1	Agric Farm	$181,950	18195	0	0.00	1.01	1.81	0.00	0.00	0.29	0.00	1.01	1.81	0.00	0.00	0.29	0	14010	14010	0	0	14010
209F	AGR1	Agric Farm	$74,550	7455	0	0.00	1.01	1.81	0.00	0.00	0.29	0.00	1.01	1.81	0.00	0.00	0.29	0	5740	5740	0	0	5740
209G	AGR1	Agric Farm	$62,700	6270	0	0.00	1.01	1.81	0.00	0.00	0.29	0.00	1.01	1.81	0.00	0.00	0.29	0	4828	4828	0	0	4828
209H	AGR1	Agric Farm	$11,500	1150	0	0.00	1.01	1.81	0.00	0.00	0.29	0.00	1.01	1.81	0.00	0.00	0.29	0	886	886	0	0	886
21	RES1	Resi One s	$97,840	1440	1			2.88			2.69	0.00	0.00	1.88	0.00	0.00	1.69	0	0	7100	0	0	6500
210	AGR1	Agric Farm	$2,050	900	0	1.17	3.28	4.05	0.39	1.97	2.80	1.17	3.28	4.05	0.39	1.97	2.80	693	693	693	693	693	693
211	IND2	Industrial	$1,444,900	14449	0	0.74	3.01	3.83	0.00	1.61	2.50	0.74	3.01	3.83	0.00	1.61	2.50	20299	36043	43441	15475	25973	31746
212	COM1	Com Misce	$18,190	1503	1	2.51	4.04	4.80	2.37	2.86	3.74	1.51	3.04	3.80	1.37	1.86	2.74	6247	10731	12939	5853	7275	9830
213	COM1	Com Comm	$1,576,890	16250	0.5	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
214	COM1	Com Misce	$43,480	1200	0.5	0.74	1.93	2.72	0.66	0.97	1.64	0.24	1.43	2.22	0.16	0.47	1.14	2224	4811	6846	1847	2581	4136
215	COM1	Com Office	$66,000	1684	3	0.12	1.64	2.42	0.04	0.48	1.41	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
216	COM1	Com Misce	$82,500	1500	0	0.00	1.22	2.02	0.00	0.00	0.50	0.00	1.22	2.02	0.00	0.00	0.50	0	5390	7738	0	0	3294
217	COM1	Com Fast F	$89,500	1350	1	0.00	1.26	2.01	0.00	0.00	0.66	0.00	0.26	1.01	0.00	0.00	0.00	0	2345	4308	0	0	0
218	COM1	Com Comm	$40,270	4655	0	0.00	0.04	0.61	0.00	0.00	0.07	0.00	0.04	0.61	0.00	0.00	0.07	0	8067	11206	0	0	6338
219	COM1	Com Misce	$154,980	4349	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
22	RES1	Resi One s	$34,070	797	1.5			3.39			3.20	0.00	0.00	1.89	0.00	0.00	1.70	0	0	3930	0	0	3603
220	RES1	Resi Resid	$107,330	1589	0.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
221	COM3	Com Comm	$212,010	8000	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
222	COM3	Com Servic	$150,130	1458	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
223	COM1	Com Fast F	$332,820	4255	0.5	0.00	0.38	1.11	0.00	0.00	0.01	0.00	0.00	0.61	0.00	0.00	0.00	0	0	10265	0	0	0
224	COM1	Com Fast F	$362,770	2907	0.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
226	COM1	Com Comm	$198,000	3600	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
227	COM1	Com Comm	$283,930	5430	1	0.53	2.35	3.21	0.42	1.64	2.42	0.00	1.35	2.21	0.00	0.64	1.42	0	20839	29083	0	13386	21602
228	COM1	Com Comm	$108,790	1578	2	0.00	1.49	2.35	0.00	0.79	1.58	0.00	0.00	0.35	0.00	0.00	0.00	0	0	3781	0	0	0
229	COM1	Com Comm	$31,160	1000	1.5	0.00	0.07	0.11	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
23	AGR1	Agric Farm	$11,520	1152	0			3.40			3.21	0.00	0.00	3.40	0.00	0.00	3.21	0	0	887	0	0	887
230	AGR1	Agric Farm	$24,220	12760	0	1.24	2.23	2.89	1.21	1.89	2.44	1.24	2.23	2.89	1.21	1.89	2.44	9825	9825	9825	9825	9825	9825
231	AGR1	Agric Farm	$13,180	1410	0	0.30	2.40	3.22	0.00	1.37	2.14	0.30	2.40	3.22	0.00	1.37	2.14	1086	1086	1086	1086	1086	1086
232	RES1	Resi One s	$45,190	1962	2.5	1.14	3.28	4.10	0.54	2.39	3.15	0.00	0.78	1.60	0.00	0.00	0.65	0	6087	6501	0	0	4546
233	COM1	Com Office	$77,120	2437	0	1.82	3.78	4.58	1.01	2.87	3.63	1.82	3.78	4.58	1.01	2.87	3.63	10686	20610	24875	7795	16580	20191
234	COM1	Com Dining	$102,170	3898	0.5	2.10	4.25	5.06	1.49	3.35	4.11	1.60	3.76	4.56	0.99	2.85	3.61	10926	33155	38337	12322	26374	32195
235	COM1	Com Misce	$81,550	1634	0.5	1.08	3.20	4.02	0.48	2.31	3.07	0.58	2.70	3.52	0.00	1.81	2.57	3838	10728	13384	0	7862	10315
236	COM1	Com Row S	$581,890	12398	3.51	2.52	4.68	5.49	1.83	3.70	4.46	0.00	1.17	1.98	0.00	0.19	0.95	0	43295	82982	0	19721	38181
237	COM1	Com Row S	$625,370	13081	5.5	2.85	5.09	5.91	2.32	4.18	4.95	0.00	0.00	0.41	0.00	0.00	0.00	0	0	28529	0	0	0
238	RES4	Resi Comm	$945,810	17338	5.84	1.44	3.60	4.42	0.67	2.75	3.52	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
239	COM1	Com Dining	$155,000	2657	0.5	0.33	2.48	3.28	0.00	1.61	2.39	0.00	1.98	2.78	0.00	1.11	1.89	0	13375	17823	0	9016	12594
240	COM7	Com Veteri	$98,740	1589	5	2.36	4.52	5.34	1.76	3.64	4.42	0.00	0.00	0.34	0.00	0.00	0.00	0	0	3665	0	0	0
242	COM1	Com Retail	$9,330	1062	0.5	2.86	5.02	5.85	2.26	4.14	4.92	2.36	4.52	5.35	1.76	3.64	4.42	7417	11887	13745	6146	10134	11771
243	COM1	Com Fast F	$54,990	1210	2	1.35	3.51	4.33	0.79	2.67	3.44	0.00	1.51	2.33	0.00	0.67	1.44	0	8025	8958	0	3068	4876
245	COM1	Com Marke	$1,923,750	32	0.5	1.86	4.00	4.82	1.32	3.22	3.98	1.36	3.50	4.32	0.82	2.72	3.48	147	306	368	107	247	304
246	COM1	Com Dining	$201,380	3278	4	2.17	4.31	5.13	1.56	3.41	4.18	0.00	0.31	1.13	0.00	0.00	0.18	0	6008	11205	0	0	5142
247	COM1	Com Servic	$73,240	1260	0.5	2.03	4.18	4.99	1.43	3.29	4.05	1.53	3.68	4.49	0.93	2.79	3.55	5300	10646	12548	3622	8386	10233
248	COM1	Com Office	$102,960	1820	4	2.79	4.85	5.77	2.19	4.07	4.84	0.00	0.85	1.77	0.00	0.07	0.84	0	9304	8879	0	2616	5492
249	COM1	Com Office	$90,200	1829	4	3.14	5.30	6.13	2.54	4.42	5.19	0.00	1.30	2.13	0.00	0.42	1.19	0	6642	8734	0	3725	5453
24A	AGR1	Agric Farm	$12,000	1200	0			3.78			3.58	0.00	0.00	3.78	0.00	0.00	3.58	0	0	834	0	0	834
24B	AGR1	Agric Farm	$91,200	9120	0			3.78			3.58	0.00	0.00	3.78	0.00	0.00	3.58	0	0	7022	0	0	7022
24C	AGR1	Agric Farm	$37,100	3710	0			3.78			3.58	0.00	0.00	3.78	0.00	0.00	3.58	0	0	2857	0	0	2857
24D	AGR1	Agric Farm	$37,100	3710	0			3.78			3.58	0.00	0.00	3.78	0.00	0.00	3.58	0	0	2857	0	0	2857
24E	AGR1	Agric Farm	$17,920	1792	0			3.78			3.58	0.00	0.00	3.78	0.00	0.00	3.58	0	0	1380	0	0	1380
24F	AGR1	Agric Farm	$8,160	816	0			3.78			3.58	0.00	0.00	3.78	0.00	0.00	3.58	0	0	628	0	0	628
250	COM1	Com Servic	$165,860	13020	0	1.91	4.07	4.89	1.32	3.20	3.97	1.91	4.07	4.89	1.32	3.20	3.97	64321	118880	139711	48406	97001	116512
251	COM1	Com Utility	$228,800	4160	0.5	0.75	2.89	3.71	0.22	1.88	2.64	0.25	2.39	3.21	0.00	1.38	2.14	7160	24480	31070	0	16225	22434
252	COM1	Com Utility	$132,000	2400	0	0.38	2.54	3.36	0.00	1.54	2.31	0.38	2.54	3.36	0.00	1.54	2.31	4710	14782	16604	0	10148	13726
253	COM1	Com Utility	$152,400	4800	0	0.07	2.23	3.05	0.00	1.27	2.03	0.07	2.23	3.05	0.00	1.27	2.03	5378	29684	34304	0	17706	23555
254	COM1	Com Comm	$211,200	3840	0	1.93	4.09	4.90	1.23	3.10	3.87	1.93	4.09	4.90	1.23	3.10	3.87	19084	38294	41303	13805	27838	33558
255	COM1	Com Comm	$749,100	63	0	1.21	3.36	4.18	0.58	2.44	3.20	1.21	3.36	4.18	0.58	2.44	3.20	228	489	589	146	378	469
256	COM1	Com Deale	$318,900	19188	0	0.35	2.50	3.33	0.00	1.66	2.43	0.35	2.50	3.33	0.00	1.66	2.43	38667	116843	147616	0	85576	114206
257	COM1	Com Office	$415,560	7825	0.5		0.22	1.01			0.00	0.00	0.00	0.51	0.00	0.00	0.00	0	0	16836	0	0	0
258	COM1	Com Storag	$157,830	14225	0		0.00	0.07				0.00	0.00	0.07	0.00	0.00	0.00	0	0	19274	0	0	0
259	COM1	Com Fabric	$40,840	6324	0		1.38	2.17		0.05	0.74	0.00	1.38	2.17	0.00	0.05	0.74	0	34675	34371	0	8368	16670
25A	AGR1	Agric Farm	$189,380	3979	0			3.46			3.26	0.00	0.00	3.46	0.00	0.00	3.26	0	0	3064	0	0	3064
25B	AGR1	Agric Farm	$9,360	936	0			3.46			3.26	0.00	0.00	3.46	0.00	0.00	3.26	0	0	721	0	0	721
26	AGR1	Agric Farm	$25,390	2539	0			2.88			2.69	0.00	0.00	2.88	0.00	0.00	2.69	0	0	1955	0	0	1955
260	COM1	Com Utility	$4,020	1500	0		1.78	2.64		0.47	1.24	0.00	1.78	2.64	0.00	0.47	1.24	0	7506	10164	0	3432	5630
262	COM1	Com Comm	$168,020	6517	1							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
264	COM1	Com Comm	$987,310	22248	0	0.69	2.85	3.68	0.14	2.13	2.92	0.69	2.85	3.68	0.14	2.13	2.92	57114	150857	185216	33482	119587	153317
265	COM1	Com Office	$137,830	2506	2							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
266	COM1	Com Office	$414,770	4819	0.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
267	RES3	Resi Mult R	$368,430	9680	1							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
268	RES1	Resi One s	$125,390	2229	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
270	RES1	Resi One s	$82,530	1098	0.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
272	RES1	Resi One s	$232,770	1820	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
274	RES1	Resi Two s	$92,110	1586	0.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
275	REL1	Relig Churc	$228,440	2880	0.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
276A	AGR1	Agric Farm	$455,020	39	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	30	30	30	30	30	30
276B	AGR1	Agric Farm	$38,830	1087	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	837	837	837	837	837	837
277A	AGR1	Agric Farm	$365,080	3200	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	2464	2464	2464	2464	2464	3464
277B	AGR1	Agric Farm	$2,690	480	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	370	370	370	370	370	370
277C	AGR1	Agric Farm	$131,730	11900	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	9163	9163	9163	9163	9163	9163
277D	AGR1	Agric Farm	$9,750	1008	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	776	776	776	776	776	776
277E	AGR1	Agric Farm	$29,030	2715	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	2091	2091	2091	2091	2091	2091
277F	AGR1	Agric Farm	$53,750	12000	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	9240	9240	9240	9240	9240	9240
277G	AGR1	Agric Farm	$11,900	12000	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	9240	9240	9240	9240	9240	9240
277H	AGR1	Agric Farm	$21,860	12000	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	9240	9240	9240	9240	9240	9240
277I	AGR1	Agric Farm	$34,390	12000	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	9240	9240	9240	9240	9240	9240
277J	AGR1	Agric Farm	$15,760	12000	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	9240	9240	9240	9240	9240	9240
277K	AGR1	Agric Farm	$46,450	12000	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	9240	9240	9240	9240	9240	9240
277L	AGR1	Agric Farm	$44,340	12000	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	9240	9240	9240	9240	9240	9240
277M	AGR1	Agric Farm	$18,730	12000	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	9240	9240	9240	9240	9240	9240
277N	AGR1	Agric Farm	$10,990	12000	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	9240	9240	9240	9240	9240	9240
277O	AGR1	Agric Farm	$80,540	12000	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	9240	9240	9240	9240	9240	9240
277P	AGR1	Agric Farm	$25,470	12000	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	9240	9240	9240	9240	9240	9240
277Q	AGR1	Agric Farm	$61,830	12000	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	9240	9240	9240	9240	9240	9240
277R	AGR1	Agric Farm	$188,530	12000	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	9240	9240	9240	9240	9240	9240
277S	AGR1	Agric Farm	$599,000	12000	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	9240	9240	9240	9240	9240	9240
277T	AGR1	Agric Farm	$258,760	12000	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	9240	9240	9240	9240	9240	9240
277U	AGR1	Agric Farm	$160,250	12000	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	9240	9240	9240	9240	9240	9240
277V	AGR1	Agric Farm	$295,670	12000	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	9240	9240	9240	9240	9240	9240
277W	AGR1	Agric Farm	$167,120	12000	0	1.18	3.42	4.28	0.82	2.98	3.82	1.18	3.42	4.28	0.82	2.98	3.82	9240	9240	9240	9240	9240	9240
278	AGR1	Agric Farm	$14,100	3300	0	2.55	4.79	5.65	2.18	4.34	5.18	2.55	4.79	5.65	2.18	4.34	5.18	2541	2541	2541	2541	2541	2541
279	AGR1	Agric Farm	$70,550	503	0	2.46	4.70	5.56	2.09	4.25	5.09	2.46	4.70	5.56	2.09	4.25	5.09	387	387	387	387	387	387
27A	AGR1	Agric M S C	$82,960	3309	2			5.59			5.40	0.00	0.00	3.59	0.00	0.00	3.40	0	0	2545	0	0	2545

278	RES2	Resi Class	$93,380	1063	2			5.59			5.40	0.00	0.00	3.59	0.00	0.00	3.40	0	0	4006	0	0	3846
27C	RES2	Resi Class	$73,050	1539	2			5.59			5.40	0.00	0.00	3.59	0.00	0.00	3.40	0	0	5803	0	0	5567
280	AGR1	Agric Farm	$12,160	2400	0	0.79	3.03	3.89	0.42	2.57	3.41	0.79	3.03	3.89	0.42	2.57	3.41	1848	1848	1848	1848	1848	1848
281	RES1	Resi One a	$442,210	5734	1.5	0.31	1.39	2.34		0.93	1.77	0.00	0.00	0.74	0.00	0.00	0.27	0	0	14431	0	0	8846
282A	AGR1	Agric Farm	$93,370	10800	0			0.17				0.00	0.00	0.17	0.00	0.00	0.00	0	0	8316	0	0	0
282B	AGR1	Agric Farm	$48,370	5400	0			0.17				0.00	0.00	0.17	0.00	0.00	0.00	0	0	4158	0	0	0
283A	AGR1	Agric Farm	$1,670	900	0		0.48			0.41		0.00	0.48	0.00	0.00	0.41	0.00	0	693	0	0	693	0
283B	AGR1	Agric Farm	$1,000	240	0		0.48			0.41		0.00	0.48	0.00	0.00	0.41	0.00	0	185	0	0	185	0
284	AGR1	Agric Farm	$197,260	16272	0		0.01	0.63			0.28	0.00	0.01	0.63	0.00	0.00	0.28	0	12529	12529	0	0	12529
289	REL1	Relig Churc	$1,244,220	8938	0.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
29	AGR1	Agric Farm	$46,080	4608	0			5.96			5.77	0.00	0.00	5.96	0.00	0.00	5.77	0	0	3548	0	0	3548
290	REL1	Relig Churc	$257,700	4644	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
291	COM1	Com Schoc	$829,990	11970	0.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
292A	AGR1	Agric Farm	$1,210	1210	0	0.00	1.28	2.14	0.00	0.81	1.64	0.00	1.28	2.14	0.00	0.81	1.64	0	832	832	0	832	832
292B	AGR1	Agric Farm	$25,250	5200	0	0.00	1.28	2.14	0.00	0.81	1.64	0.00	1.28	2.14	0.00	0.81	1.64	0	4004	4004	0	4004	4004
292C	AGR1	Agric Farm	$12,020	990	0	0.00	1.28	2.14	0.00	0.81	1.64	0.00	1.28	2.14	0.00	0.81	1.64	0	762	762	0	762	762
292D	AGR1	Agric Farm	$6,010	2250	0	0.00	1.28	2.14	0.00	0.81	1.64	0.00	1.28	2.14	0.00	0.81	1.64	0	1733	1733	0	1733	1733
292E	AGR1	Agric Farm	$50,480	12000	0	0.00	1.28	2.14	0.00	0.81	1.64	0.00	1.28	2.14	0.00	0.81	1.64	0	9240	9240	0	9240	9240
292F	AGR1	Agric Farm	$25,250	4225	0	0.00	1.28	2.14	0.00	0.81	1.64	0.00	1.28	2.14	0.00	0.81	1.64	0	3253	3253	0	3253	3253
293	RES1	Resi One s	$269,560	2010	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
294	COM3	Com Storag	$77,680	2100	3.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
295	RES2	Resi Class	$20,990	1152	1.5	0.00	0.08	0.47	0.00	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
296A	RES2	Resi Class	$40,360	1908	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
296B	AGR1	Agric Farm	$1,000	720	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
297	AGR1	Agric Farm	$6,080	936	0	0.00	0.02	0.12	0.00	0.01	0.07	0.00	0.02	0.12	0.00	0.01	0.07	0	721	721	0	721	721
298	AGR1	Agric Farm	$7,950	1920	0	0.17	0.35	0.41	0.24	0.33	0.50	0.17	0.35	0.41	0.24	0.33	0.50	1478	1478	1478	1478	1478	1478
299	RES2	Resi Class	$57,210	1404	2.5	0.23	0.34	0.34	0.33	0.33	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
2A	RES1	Resi One a	$122,200	1742	3.5	5.69	5.74	7.66	5.51	5.73	7.56	2.19	2.34	4.16	2.01	2.23	4.06	9753	9934	17086	9054	9800	16682
2B	RES1	Resi One s	$55,590	850	3.5	5.69	5.74	7.66	5.51	5.73	7.56	2.19	2.34	4.16	2.01	2.23	4.06	4750	4847	8327	4418	4831	8140
30	AGR1	Agric Beser	$290,870	2632	0			7.51			7.31	0.00	0.00	7.51	0.00	0.00	7.31	0	0	2027	0	0	2027
300A	AGR1	Agric Farm	$9,750	8844	0	0.13	0.28	0.27	0.20	0.20	0.38	0.13	0.28	0.27	0.20	0.20	0.38	6810	6810	6810	6810	6810	6810
300B	AGR1	Agric Farm	$1,000	448	0	0.13	0.28	0.27	0.20	0.20	0.38	0.13	0.28	0.27	0.20	0.20	0.38	345	345	345	345	345	345
300C	AGR1	Agric Farm	$1,920	686	0	0.13	0.28	0.27	0.20	0.20	0.38	0.13	0.28	0.27	0.20	0.20	0.38	528	528	528	528	528	528
300D	AGR1	Agric Farm	$6,260	4212	0	0.13	0.28	0.27	0.20	0.20	0.38	0.13	0.28	0.27	0.20	0.20	0.38	3243	3243	3243	3243	3243	3243
300E	AGR1	Agric Farm	$7,480	4422	0	0.13	0.28	0.27	0.20	0.20	0.38	0.13	0.28	0.27	0.20	0.20	0.38	3406	3405	3405	3403	3405	3405
301A	AGR1	Agric Farm	$4,770	2016	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
301B	AGR1	Agric Farm	$3,840	864	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
302B	RES2	Resi Class	$88,380	1620	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
303B	RES2	Resi Class	$102,420	1876	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
304	AGR1	Agric Farm	$82,030	6000	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
305	RES2	Resi Class	$23,950	5526	1.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
306	RES1	Resi One s	$299,860	2224	0.27	0.31	0.73	1.08	0.32	0.71	1.00	0.04	0.46	0.81	0.05	0.44	0.73	2285	4215	5912	2285	4140	5533
307	RES1	Resi One s	$166,040	2079	0.05	0.33	0.63	0.97	0.33	0.62	0.90	0.28	0.58	0.92	0.28	0.57	0.85	3142	4483	5985	3149	4425	5664
308	AGR1	Agric Farm	$21,430	1176	0.86	0.80	1.22	1.57	0.81	1.21	1.49	0.00	0.36	0.71	0.00	0.35	0.63	0	906	906	0	906	906
310	RES1	Resi One s	$102,170	1540	0	0.50	0.91	1.23	0.50	0.90	1.18	0.50	0.91	1.23	0.50	0.90	1.18	3067	4420	5468	3075	4386	5290
311	RES1	Resi Two s	$371,250	2848	0	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0	0	2721	0	0	2609
312	AGR1	Agric Farm	$9,390	1792	0	0.00	0.06	0.27	0.00	0.05	0.24	0.00	0.06	0.27	0.00	0.06	0.34	0	1380	1380	0	1380	1380
314A	RES2	Resi Class	$38,920	1656	1	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
314B	RES1	Resi M S C	$47,810	750	1	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
314C	AGR1	Agric Farm	$9,590	750	0	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0	0	578	0	0	578
317A	AGR1	Agric Farm	$44,800	9009	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
317B	AGR1	Agric Farm	$9,930	2860	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
317C	AGR1	Agric Farm	$18,100	5460	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
317D	AGR1	Agric Farm	$26,270	6500	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
317E	AGR1	Agric Farm	$9,760	1439	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
317F	AGR1	Agric Farm	$117,230	1216	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
318	RES1	Resi One s	$167,610	2640	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
319	AGR1	Agric Farm	$757,860	124	2			0.06				0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
31A	AGR1	Agric Farm	$329,340	2400	0			5.79			5.59	0.00	0.00	5.79	0.00	0.00	5.59	0	0	1848	0	0	1848
31B	AGR1	Agric Farm	$39,420	3942	0			5.79			5.59	0.00	0.00	5.79	0.00	0.00	5.59	0	0	3036	0	0	3036
31C	AGR1	Agric Farm	$131,560	13156	0			5.79			5.59	0.00	0.00	5.79	0.00	0.00	5.59	0	0	10130	0	0	10130
31D	AGR1	Agric Farm	$284,760	28476	0			5.79			5.59	0.00	0.00	5.79	0.00	0.00	5.59	0	0	21927	0	0	21927
31E	AGR1	Agric Farm	$11,200	1120	0			5.79			5.59	0.00	0.00	5.79	0.00	0.00	5.59	0	0	862	0	0	862
31F	AGR1	Agric Farm	$38,400	3840	0			5.79			5.59	0.00	0.00	5.79	0.00	0.00	5.59	0	0	2957	0	0	2957
31G	AGR1	Agric Farm	$41,100	4110	0			5.79			5.59	0.00	0.00	5.79	0.00	0.00	5.59	0	0	3165	0	0	3165
31H	AGR1	Agric Farm	$34,320	3432	0			5.79			5.59	0.00	0.00	5.79	0.00	0.00	5.59	0	0	2643	0	0	2643
31I	AGR1	Agric Farm	$11,680	1168	0			5.79			5.59	0.00	0.00	5.79	0.00	0.00	5.59	0	0	899	0	0	899
31J	AGR1	Agric Farm	$37,800	3780	0			5.79			5.59	0.00	0.00	5.79	0.00	0.00	5.59	0	0	2911	0	0	2911
31K	AGR1	Agric Farm	$43,470	7200	0			5.79			5.59	0.00	0.00	5.79	0.00	0.00	5.59	0	0	5544	0	0	5544
31L	AGR1	Agric Farm	$193,690	28120	0			5.79			5.59	0.00	0.00	5.79	0.00	0.00	5.59	0	0	21652	0	0	21652
31M	AGR1	Agric Farm	$268,130	2100	0			5.79			5.59	0.00	0.00	5.79	0.00	0.00	5.59	0	0	1617	0	0	1617
31N	AGR1	Agric Farm	$8,370	151	0			5.79			5.59	0.00	0.00	5.79	0.00	0.00	5.59	0	0	116	0	0	116
31O	AGR1	Agric Farm	$1,560	720	0			5.79			5.59	0.00	0.00	5.79	0.00	0.00	5.59	0	0	554	0	0	554
32	RES1	Resi One a	$50,220	1212	2.5			7.61			7.42	0.00	0.00	5.11	0.00	0.00	4.92	0	0	14330	0	0	13830
321	AGR1	Agric Farm	$3,410	1368	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
322A	AGR1	Agric Farm	$13,460	8526	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
322B	AGR1	Agric Farm	$40,570	11060	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
322C	AGR1	Agric Farm	$1,230	544	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
322D	AGR1	Agric Farm	$100,170	21600	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
322E	AGR1	Agric Farm	$101,950	1912	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
322F	AGR1	Agric Farm	$71,920	12170	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
322G	AGR1	Agric Farm	$71,180	13991	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
322H	AGR1	Agric Farm	$34,670	638	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
323	AGR1	Agric Farm	$15,240	2100	0	0.14	0.43	0.65	0.14	0.43	0.65	0.14	0.43	0.65	0.14	0.43	0.65	1617	1617	1617	1617	1617	1617
324A	AGR1	Agric Two s	$135,490	2687	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
324B	RES1	Resi One s	$40,160	864	0.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
327	AGR1	Agric Farm	$22,170	6000	0			0.01			0.01	0.00	0.00	0.01	0.00	0.00	0.01	0	0	4620	0	0	4620
328A	AGR1	Agric Farm	$34,950	2925	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
328B	AGR1	Agric Farm	$38,290	6675	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
328C	AGR1	Agric Farm	$108,400	14625	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
328D	AGR1	Agric Farm	$53,040	11600	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
328E	AGR1	Agric Farm	$35,850	4320	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
328F	AGR1	Agric Farm	$48,530	264	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
328G	AGR1	Agric Farm	$1,350	660	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
329	AGR1	Agric Farm	$54,950	9570	0	0.94	1.85	2.34	0.94	1.85	2.33	0.94	1.85	2.34	0.94	1.85	2.33	7369	7369	7369	7369	7369	7369
330	RES1	Resi One s	$153,890	1732	0.5			0.46			0.46	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
331	RES1	Resi One a	$58,040	1380	2							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
332A	AGR1	Agric Farm	$13,460	6000	0	0.47	2.50	3.25	0.03	0.97	1.71	0.47	2.50	3.25	0.03	0.97	1.71	4620	4620	4620	4620	4620	4620
332B	AGR1	Agric Farm	$10,570	4200	0	0.47	2.50	3.25	0.03	0.97	1.71	0.47	2.50	3.25	0.03	0.97	1.71	3234	3234	3234	3234	3234	3234
332C	AGR1	Agric Farm	$38,440	3080	0	0.47	2.50	3.25	0.03	0.97	1.71	0.47	2.50	3.25	0.03	0.97	1.71	2372	2372	2372	2372	2372	2372
332D	AGR1	Agric Farm	$5,480	1045	0	0.47	2.50	3.25	0.03	0.97	1.71	0.47	2.50	3.25	0.03	0.97	1.71	805	805	805	806	805	805
333	RES1	Resi One a	$95,070	1296	2							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
334	COM7	Com Medic	$298,640	3330	3		1.33	2.08		0.02	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
335	COM7	Com Medic	$548,970	9868	3							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
338A	COM6	Com Hospi	$8,273,890	1260	1							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
338B	RES1	Resi Resid	$10,000	2520	1							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
339	RES1	Resi One s	$20,230	1180	1							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
33A	RES1	Resi One a	$49,220	1130	2.5			5.98			5.78	0.00	0.00	3.48	0.00	0.00	3.28	0	0	9418	0	0	8862
33B	AGR1	Agric Farm	$1,000	212	0			5.98			5.78	0.00	0.00	5.98	0.00	0.00	5.78	0	0	163	0	0	163
34	COM1	Com Comm	$109,770	10100	0	1.39	1.38	7.74	1.39	1.39	7.55	1.39	1.38	7.74	1.39	1.39	7.55	38809	38694	164355	38839	38582	160456
340	RES1	Resi Duple	$131,880	1816	0.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
341	RES1	Resi One s	$56,570	864	1							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
342	RES1	Resi One s	$57,700	864	0.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
343	RES1	Resi One s	$87,940	864	0.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
344	RES1	Resi One s	$58,680	864	0.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
345	RES1	Resi One s	$93,230	864	0.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
346	RES1	Resi One s	$54,680	864	0.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
347	RES1	Resi One s	$59,770	864	0.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
348	RES1	Resi One s	$76,540	1313	0.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
349	GOV1	Govt Public	$225,600	1128	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
35	COM1	Com Office	$165,340	2434	0.5			6.82			6.63	0.00	0.00	6.32	0.00	0.00	6.13	0	0	32891	0	0	31973
350A	RES1	Resi One a	$75,130	1606	1	0.00	0.40			0.23	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
350B	AGR1	Agric Farm	$24,060	1440	0	0.00	0.40			0.23	0.90	0.00	0.40	0.00	0.00	0.23	0.00	0	1109	0	0	1109	1109
351	GOV1	Govt Public	$426,200	2141	4							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
352	GOV1	Govt Public	$428,200	2141	4							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
353	GOV1	Govt Public	$205,600	1028	1	0.11	0.46	1.08		0.41	0.89	0.00	0.00	0.06	0.00	0.00	0.00	0	0	1240	0	0	0
354	GOV1	Govt Public	$3,567,880	1305	1			0.40			0.23	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
355	GOV1	Govt Public	$270,400	1352	4							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
356	AGR1	Agric Farm	$1,000	264	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
357	GOV1	Govt Public	$310,200	1511	3			0.45			0.31	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
358	GOV1	Govt Public	$142,400	712	10			0.87			0.70	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
359	GOV1	Govt Public	$978,000	4890	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
360	COM1	Com Low R	$43,110	11721	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
362	GOV1	Govt Public	$1,732,000	8660	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
363	GOV1	Govt Public	$192,000	960	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
364	GOV1	Govt Public	$177,600	888	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
365	RES1	Resi One s	$104,660	1480	0.5		0.07	1.38		0.02	1.22	0.00	0.00	0.88	0.00	0.00	0.72	0	0	4141	0	0	3629
366	RES1	Resi One s	$87,520	1032	0.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
367	RES1	Resi One s	$91,080	1392	1							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
368	RES3	Resi Mul R	$288,200	3912	0.5		0.00	0.68		0.00	0.52	0.00	0.00	0.18	0.00	0.00	0.03	0	0	4330	0	0	3673
369	RES1	Resi One s	$152,320	1490	2	0.24	0.62	1.97	0.10	0.57	1.81	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
36A	RES1	Resi One a	$156,040	1926	1			7.60			7.41	0.00	0.00	6.60	0.00	0.00	6.41	0	0	28906	0	0	28122
36B	AGR1	Agric Farm	$1,290	240	0			7.60			7.41	0.00	0.00	7.60	0.00	0.00	7.41	0	0	185	0	0	185
37	AGR1	Agric Farm	$47,020	4702	0			8.17			7.98	0.00	0.00	8.17	0.00	0.00	7.98	0	0	3621	0	0	3621
370	RES1	Resi One s	$159,790	1607	1.5		0.00	0.57		0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0

371	RES1	Resi One s	$106,930	1474	1			0.30			0.16	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
372	RES1	Resi One s	$168,930	1292	1			0.48			0.19	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
373	RES1	Resi One s	$144,750	1640	0.5	1.20	1.57	0.25	1.05	1.38	0.23	0.70	1.07	0.00	0.58	0.88	0.00	4674	6213	0	4566	5438	0
374	RES1	Resi One s	$79,900	1056	2							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
375	RES1	Resi One s	$108,120	1832	0.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
377	RES3	Resi Mid R	$371,280	5304	0.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
378	RES3	Resi Mid R	$386,120	5516	1							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
379	RES1	Resi Duple	$236,600	2530	1.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
380	RES1	Resi One s	$385,450	3646	2.5	1.67	2.07	3.32	1.53	2.02	3.15	0.00	0.00	0.62	0.00	0.00	0.65	0	0	9742	0	0	8427
381	RES1	Resi One s	$135,250	1484	1.5		0.19	1.43		0.14	1.26	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
382	RES1	Resi One s	$131,850	1388	1	0.19	0.16	1.26	0.05	0.15	1.09	0.00	0.00	0.26	0.00	0.00	0.09	0	0	3952	0	0	1557
384	RES1	Resi One s	$112,740	1329	1	0.35	0.38	1.45	0.34	0.38	1.29	0.00	0.00	0.45	0.00	0.00	0.29	0	0	2506	0	0	2036
385	RES1	Resi One s	$118,100	1198	3	2.69	3.07	4.40	3.07	3.02	4.24	0.00	0.07	1.40	0.07	0.02	1.24	0	1266	4693	1266	1166	4272
386	RES1	Resi One s	$154,220	1598	2	0.05	0.07	1.02	0.04	0.07	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
387	RES1	Resi One s	$179,080	1751	1			0.24			0.11	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
388	RES1	Resi One s	$159,480	1752	2			0.44			0.28	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
389	RES1	Resi One s	$59,820	1494	1.25							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
38A	AGR1	Agric Farm	$57,570	19775	0			6.72			6.53	0.00	0.00	6.72	0.00	0.00	6.53	0	0	15227	0	0	15227
38B	AGR1	Agric Farm	$11,450	2120	0			6.72			6.53	0.00	0.00	6.72	0.00	0.00	6.53	0	0	1632	0	0	1632
38C	AGR1	Agric Farm	$15,370	5200	0			6.72			6.53	0.00	0.00	6.72	0.00	0.00	6.53	0	0	4004	0	0	4004
38D	AGR1	Agric Farm	$7,520	1200	0			6.72			6.53	0.00	0.00	6.72	0.00	0.00	6.53	0	0	924	0	0	924
38E	AGR1	Agric Farm	$5,240	2640	0			6.72			6.53	0.00	0.00	6.72	0.00	0.00	6.53	0	0	2033	0	0	2033
38F	AGR1	Agric Farm	$3,270	1760	0			6.72			6.53	0.00	0.00	6.72	0.00	0.00	6.53	0	0	1355	0	0	1355
38G	AGR1	Agric Farm	$14,060	4680	0			6.72			6.53	0.00	0.00	6.72	0.00	0.00	6.53	0	0	3604	0	0	3604
38H	AGR1	Agric Farm	$97,150	1200	0			6.72			6.53	0.00	0.00	6.72	0.00	0.00	6.53	0	0	924	0	0	924
38I	AGR1	Agric Farm	$12,440	4000	0			6.72			6.53	0.00	0.00	6.72	0.00	0.00	6.53	0	0	3080	0	0	3080
38J	AGR1	Agric Farm	$4,260	2340	0			6.72			6.53	0.00	0.00	6.72	0.00	0.00	6.53	0	0	1802	0	0	1802
38K	AGR1	Agric Farm	$13,790	3400	0			6.72			6.53	0.00	0.00	6.72	0.00	0.00	6.53	0	0	2618	0	0	2618
38L	AGR1	Agric Farm	$23,680	4216	0			6.72			6.53	0.00	0.00	6.72	0.00	0.00	6.53	0	0	3246	0	0	3246
38M	AGR1	Agric Farm	$11,430	1870	0			6.72			6.53	0.00	0.00	6.72	0.00	0.00	6.53	0	0	1440	0	0	1440
390	RES1	Resi One s	$78,910	1407	1.25							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
392	RES1	Resi One s	$133,690	1879	2.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
39A	AGR1	Agric Farm	$60,500	3156	0			5.90			5.71	0.00	0.00	5.90	0.00	0.00	5.71	0	0	2430	0	0	2430
39B	AGR1	Agric Farm	$3,600	660	0			5.90			5.71	0.00	0.00	5.90	0.00	0.00	5.71	0	0	508	0	0	508
4	AGR1	Agric Farm	$5,450	768	0	5.08	5.13	7.10	4.89	5.12	7.00	5.08	5.13	7.10	4.89	5.12	7.00	591	591	591	591	591	591
41	COM3	Com Storag	$1,329,320	7960	0	2.43	2.49	4.26	2.21	2.48	4.09	2.43	2.49	4.26	2.21	2.48	4.09	52369	53630	86494	48416	53342	82369
42	COM3	Com Storag	$248,993	1479	0	1.92	1.98	3.75	1.70	1.97	3.58	1.92	1.98	3.75	1.70	1.97	3.58	8013	8229	14172	7261	8194	13607
43	RES1	Resi One S	$75,710	1296	2.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
44	RES1	Resi One s	$91,010	1544	1							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
45	RES2	Resi Class	$39,200	1568	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
47	RES1	Resi One s	$86,570	568	1.5							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
48	AGR1	Agric Farm	$198,340	7858	0			2.34			1.16	0.00	0.00	2.34	0.00	0.00	1.16	0	0	6051	0	0	6051
49 & 50B	AGR1	Agric Farm	$159,770	2694	0			1.69			0.52	0.00	0.00	1.69	0.00	0.00	0.52	0	0	2074	0	0	2074
5	AGR1	Agric Farm	$7,100	2448	1	4.46	4.51	6.43	4.28	4.50	6.33	3.46	3.51	5.43	3.28	3.50	5.33	1885	1885	1885	1885	1885	1885
50A	AGR1	Agric Farm	$10,830	5608	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
50C	AGR1	Agric Farm	$5,630	1500	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
50D	AGR1	Agric Farm	$9,680	3969	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
50E	AGR1	Agric Farm	$19,840	2412	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
50F	AGR1	Agric Farm	$18,600	6000	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
50G	AGR1	Agric Farm	$13,820	2916	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
50H	AGR1	Agric Farm	$27,820	8981	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
50I	AGR1	Agric Farm	$1,960	720	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
50J	AGR1	Agric Farm	$6,680	2800	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
50K	AGR1	Agric Farm	$3,650	936	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
50L	AGR1	Agric Farm	$27,050	7400	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
50M	AGR1	Agric Farm	$232,080	20640	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
51	AGR1	Agric Farm	$15,210	2160	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
52	RES1	Resi Two s	$211,370	3344	2							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
53	AGR1	Agric Farm	$9,180	1200	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
54	RES1	Resi One s	$207,330	2681	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
55	RES2	Resi Class	$53,130	1485	1			6.45			6.26	0.00	0.00	6.45	0.00	0.00	6.26	0	0	7790	0	0	7560
56	AGR1	Agric Farm	$4,980	3025	0			6.50			6.31	0.00	0.00	6.50	0.00	0.00	6.31	0	0	2329	0	0	2329
57	RES1	Resi One s	$108,330	2116	1			6.51			6.32	0.00	0.00	5.31	0.00	0.00	5.32	0	0	26768	0	0	25830
58	AGR1	Agric Farm	$6,390	4000	0	2.77	4.40	5.14	2.12	2.78	3.58	2.77	4.40	5.14	2.12	2.78	3.58	3080	3080	3080	3080	3080	3080
59A	AGR1	Agric Farm	$14,830	6840	0	2.43	4.06	4.80	1.77	2.44	3.24	2.43	4.06	4.80	1.77	2.44	3.24	5267	5267	5267	5267	5267	5267
59B	AGR1	Agric Farm	$1,240	2000	0	2.43	4.06	4.80	1.77	2.44	3.24	2.43	4.06	4.80	1.77	2.44	3.24	1540	1540	1540	1540	1540	1540
59C	AGR1	Agric Farm	$1,970	420	0	2.43	4.06	4.80	1.77	2.44	3.24	2.43	4.06	4.80	1.77	2.44	3.24	323	323	323	323	323	323
60	AGR1	Agric Farm	$20,000	2000	0	2.45	4.13	4.92			3.00	2.45	4.13	4.92	0.00	0.00	3.00	1540	1540	1540	0	0	1540
61	AGR1	Agric Farm	$9,710	971	0	1.44	3.12	3.91			2.00	1.44	3.12	3.91	0.00	0.00	2.00	748	748	748	0	0	748
62	RES1	Resi One s	$98,800	1978	1.5	1.32	3.00	3.80			1.87	0.00	1.50	2.30	0.00	0.00	0.37	0	8164	11518	0	0	3400
63A	AGR1	Agric Farm	$15,280	4000	0	1.54	3.22	4.01	1.23	2.16	2.87	1.54	3.22	4.01	1.23	2.16	2.87	3080	3080	3080	3080	3080	3080
63B	AGR1	Agric Farm	$21,500	4000	0	1.54	3.22	4.01	1.23	2.16	2.87	1.54	3.22	4.01	1.23	2.16	2.87	3080	3080	3080	3080	3080	3080
63C	AGR1	Agric Farm	$9,890	4000	0	1.54	3.22	4.01	1.23	2.16	2.87	1.54	3.22	4.01	1.23	2.16	2.87	3080	3080	3080	3080	3080	3080
63D	AGR1	Agric Farm	$13,460	4000	0	1.54	3.22	4.01	1.23	2.16	2.87	1.54	3.22	4.01	1.23	2.16	2.87	3080	3080	3080	3080	3080	3080
63E	AGR1	Agric Farm	$4,590	4000	0	1.54	3.22	4.01	1.23	2.16	2.87	1.54	3.22	4.01	1.23	2.16	2.87	3080	3080	3080	3080	3080	3080
63F	AGR1	Agric Farm	$29,920	4000	0	1.54	3.22	4.01	1.23	2.16	2.87	1.54	3.22	4.01	1.23	2.16	2.87	3080	3080	3080	3080	3080	3080
64	RES1	Resi One s	$49,650	1068	2.5	2.85	4.49	5.25			3.56	0.35	1.98	2.75	0.00	0.00	1.06	1783	5627	7258	0	0	3386
65	AGR1	Agric Farm	$7,680	768	0	0.69	2.24	3.00			1.30	0.69	2.24	3.00	0.00	0.00	1.30	591	591	591	0	0	591
66	RES1	Resi One s	$43,700	1020	1.5	0.98	2.63	3.41			1.62	0.00	1.13	1.91	0.00	0.00	0.12	0	3408	5097	0	0	1202
67	AGR1	Agric Farm	$10,130	200	0	2.48	4.13	4.91			3.11	2.48	4.13	4.91	0.00	0.00	3.11	154	154	154	0	0	154
68	RES1	Resi One s	$172,550	2553	6	2.11	3.71	4.41	1.39	1.43	2.26	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
69	GOV1	Govt Unknc	$273,800	1369	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
72 78	AGR1	Agric Geog	$1,315,550	100	0							0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
79A	RES1	Resi One s	$53,420	1248	2.5	0.00	1.25	2.02	0.00	0.00	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
79B	RES1	Resi Basen	$238,890	2328	0	0.00	1.25	2.02	0.00	0.00	0.51	0.00	1.25	2.02	0.00	0.00	0.51	0	8363	12156	0	0	4677
7A	AGR1	Agric Farm	$12,090	2975	0	0.10	0.10	6.67	0.11	0.10	6.47	0.10	0.10	6.67	0.11	0.10	6.47	2291	2291	2291	2291	2291	2291
7B	AGR1	Agric Farm	$15,150	2880	0	0.10	0.10	6.67	0.11	0.10	6.47	0.10	0.10	6.67	0.11	0.10	6.47	2218	2218	2218	2218	2218	2218
7C	AGR1	Agric Farm	$8,030	340	0	0.10	0.10	6.67	0.11	0.10	6.47	0.10	0.10	6.67	0.11	0.10	6.47	262	262	262	262	262	262
7D	AGR1	Agric Farm	$1,000	560	0	0.10	0.10	6.67	0.11	0.10	6.47	0.10	0.10	6.67	0.11	0.10	6.47	431	431	431	431	431	431
7E	AGR1	Agric Farm	$16,580	3360	0	0.10	0.10	6.67	0.11	0.10	6.47	0.10	0.10	6.67	0.11	0.10	6.47	2587	2587	2587	2587	2587	2587
7F	AGR1	Agric Farm	$26,980	4284	0	0.10	0.10	6.67	0.11	0.10	6.47	0.10	0.10	6.67	0.11	0.10	6.47	3299	3299	3299	3299	3299	3299
7G	AGR1	Agric Farm	$4,190	2780	0	0.10	0.10	6.67	0.11	0.10	6.47	0.10	0.10	6.67	0.11	0.10	6.47	2141	2141	2141	2141	2141	2141
8	RES1	Resi One s	$187,990	1962	2.5	0.00	0.00	5.12	0.00	0.00	4.92	0.00	0.00	2.62	0.00	0.00	2.42	0	0	12786	0	0	11947
80	AGR1	Agric Farm	$11,000	2780	0	2.11	3.31	4.00	0.68	1.66	2.49	2.11	3.31	4.00	0.68	1.66	2.49	2141	2141	2141	2141	2141	2141
81A	RES1	Resi One s	$76,080	1282	1.5	1.92	3.12	3.82	0.56	1.48	2.31	0.42	1.62	2.32	0.00	0.00	0.81	2343	5618	7522	0	0	3386
81B	AGR1	Agric Farm	$1,350	448	0	1.92	3.12	3.82	0.56	1.48	2.31	1.92	3.12	3.82	0.56	1.48	2.31	345	345	345	345	345	345
82	AGR1	Agric Farm	$1,970	1680	0	1.83	3.03	3.73	0.69	1.45	2.22	1.83	3.03	3.73	0.69	1.45	2.22	1294	1294	1294	1294	1294	1294
83A	RES1	Resi M S C	$7,550	3064	0	0.78	2.24	3.00	0.00	0.53	1.50	0.78	2.24	3.00	0.00	0.53	1.50	7910	17436	22440	0	6315	12596
83B	RES2	Resi Class	$8,520	3064	2	0.78	2.24	3.00	0.00	0.53	1.50	0.00	0.24	1.00	0.00	0.00	0.00	0	3406	5200	0	0	0
84A	RES2	Resi Class	$1,720	256	1.5	0.72	2.18	2.94	0.00	0.47	1.44	0.00	0.68	1.44	0.00	0.00	0.00	0	374	529	0	0	0
84B	RES1	Residential	$82,600	1180	0	0.72	2.18	2.94	0.00	0.47	1.44	0.72	2.18	2.94	0.00	0.47	1.44	2884	6563	8490	0	2260	4700
85	AGR1	Agric Farm	$1,720	600	0	0.00	1.30	2.07	0.00	0.00	0.56	0.00	1.30	2.07	0.00	0.00	0.56	0	462	462	0	0	462
86	RES1	Resi One s	$88,440	1762	2	0.15	1.60	2.36	0.00	0.03	0.86	0.00	0.00	0.36	0.00	0.00	0.00	0	0	2993	0	0	0
87	RES1	Resi One s	$135,100	1812	1.5	0.48	1.94	2.70	0.00	0.23	1.20	0.00	0.44	1.20	0.00	0.00	0.00	0	3369	6318	0	0	0
88A	AGR1	Agric Farm	$35,200	3520	0	0.23	1.61	2.37	0.00	0.12	0.87	0.23	1.61	2.37	0.00	0.12	0.87	2710	2710	2710	0	2710	2710
88B	AGR1	Agric Farm	$19,800	1980	0	0.23	1.61	2.37	0.00	0.12	0.87	0.23	1.61	2.37	0.00	0.12	0.87	1525	1525	1525	0	1525	1525
89	AGR1	Agric Farm	$81,600	8160	0	0.00	0.03	0.80	0.00	0.00	0.00	0.00	0.03	0.80	0.00	0.00	0.00	0	6283	6283	0	0	0
90	AGR1	Agric Farm	$86,610	288	0	0.69	1.64	2.41	0.00	0.54	1.13	0.69	1.64	2.41	0.00	0.54	1.13	222	222	222	222	222	222
91	AGR1	Agric Farm	$8,880	1152	0	0.39	1.85	2.62	0.00	0.23	1.11	0.39	1.85	2.62	0.00	0.23	1.11	887	887	887	0	887	887
92A	AGR1	Agric Farm	$2,740	325	0	1.30	2.76	3.53	0.01	1.06	2.02	1.30	2.76	3.53	0.01	1.06	2.02	250	250	250	250	250	250
92B	AGR1	Agric Farm	$1,650	216	0	1.30	2.76	3.53	0.01	1.06	2.02	1.30	2.76	3.53	0.01	1.06	2.02	166	166	166	166	166	166
93A	RES1	Resi One s	$212,080	1804	1.5	0.00	0.49	0.95	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
93B	AGR1	Agric Farm	$3,970	744	0	0.00	0.49	0.95	0.00	0.00	0.03	0.00	0.49	0.95	0.00	0.00	0.03	0	573	573	0	0	573
94	RES1	Resi One s	$103,000	1566	1.5	0.00	0.92	1.69	0.00	0.00	0.19	0.00	0.00	0.19	0.00	0.00	0.00	0	0	2074	0	0	0
95	AGR1	Agric Farm	$3,020	576	0	0.30	1.76	2.52	0.00	0.05	1.02	0.30	1.76	2.52	0.00	0.06	1.02	444	444	444	0	444	444
96A	RES1	Resi One s	$103,700	1803	2.5	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
96B	AGR1	Agric Farm	$8,810	1142	0	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0	0	879	0	0	0
97	RES1	Resi One s	$157,420	2760	2	0.00	1.15	1.82	0.00	0.00	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0	0
99	AGR1	Agric Farm	$33,690	832	0	0.06	1.19	1.96	0.00	0.00	0.45	0.06	1.19	1.96	0.00	0.00	0.45	641	641	641	0	0	641

Comments are shown in brown type and our responses in blue.

COMMENT 1:

The Applicant has submitted with this appeal actual damage costs that FEMA earlier requested. They include three commercial properties that were damaged in two declared flood disasters, occurring in November, 2006 and December, 1998. The Applicant states that these three properties are within the project area. No other actual damage data was provided, including agricultural building damages which initially were attributed to 47 percent of the total flood costs in the first benefit-cost analysis.

Because no actual damage costs were available for agricultural losses, it was assumed by the analyst that agricultural losses equated to commercial losses. This was based upon a 'qualitative check' used but a validation or explanation as to how they can be used equally in a benefit-cost analysis was not provided.

Commercial businesses have inventory losses. Agricultural buildings do not have business inventory, yet there was no distinction of the two, and the benefit-cost analysis did include "Agricultural Inventory Loss." The details of the ratio for agricultural structures versus residential and commercial were included in the initial benefit-cost analysis submitted, which were 47 percent agricultural and 39 percent commercial structures. However, with a new project scope proposed, any changes in this ratio or its impacts was not included. The Applicant did reduce the agricultural inventory values of the lower frequency events in its analysis by 50 percent. However, agricultural buildings have no commercial inventory, and there is no documentation submitted to justify the inclusion of agricultural buildings as having commercial inventory.

Agricultural buildings are comprised of tractors, feed, cows, and milk parlors built of concrete block designed to accommodate high volumes of water for sanitation. A flood depth of 0 to 18 inches will have vastly different impacts between agricultural buildings and commercial buildings with inventory. Documentation of a thorough analysis of how these two different building types could be treated the same is needed to justify inclusion in the analysis.

Removing the avoided future costs due to 'Agricultural Inventory Loss' results in a reduction of $1,748,298 in benefits. The total project cost detailed in the Southern Flow Corridor Design Report is $8,056,943. The benefit-cost analysis lists the project cost as $8,336,015 and the benefits of this project at $9,509,639. Even using the lower project cost estimate, by removing the Agricultural Inventory Loss benefits of $1,748,298, the project is not cost-effective and does not meet a benefit-cost ratio of 1.0. If significant unclaimed benefits exist in the existing lower bound analysis, they should be included.

The review comments seem to assert that 1) agricultural structures do not have inventory and 2) we used commercial structure depth damage functions to model inventory losses for agricultural structures. Both assumptions are incorrect.

HAZUS treats inventory as a direct economic impact and calculates not only the direct replacement cost of the inventory but net economic losses. If you do not have inventory to sell, you cannot generate profit from that inventory. Inventory losses in the flood module are determined in a manner consistent with the other building losses, as well as the methodology currently utilized in the HAZUS earthquake module.

For occupancies with inventory considerations (COM1, COM2, IND1 - IND6 and AGR1, as defined in the HAZUS99 Earthquake Technical Manual), inventory losses are estimated using USACE-based depth-damage functions, in conjunction with HAZUS default inventory values determined as a percentage of annual sales per square foot. To estimate inventory losses, percent damage (determined from the depth-damage function) will be multiplied by the total inventory value (determined according to HAZUS Earthquake Methodology - floor area times the percent of gross sales or production per square foot).

We did not apply commercial business damage functions to the agricultural structures. HAZUS has an occupancy class for agricultural buildings (AGR1) and the associated inventory damage function for this class is based upon data from agricultural operations generated by the USACE. The Tillamook County structure database allowed clear classification of every structure into the correct occupancy class (i.e. residential, commercial, ag etc.). To summarize: HAZUS has a specific classification of agricultural buildings; every agricultural building in the project area was classified as such; and HAZUS automatically calculates agriculture specific inventory losses for these structures. We followed the standard FEMA model for agricultural structures as we did for all structures.

For agricultural structures, inventory is analogous to industrial facilities. There is input inventory – the raw materials needed for production – and output inventory, - the produced material, in this case milk. Dairy farm input inventory items include fuel, bedding, feed, fertilizer, and seed. For dairy farms feed is the single largest inventory expense, and is produced on the farm to the maximum extent possible. Hay and silage are produced over the summer months to provide winter feed for the cows. This means that feed inventories are largest during flood season. The volume of feed required and methods of storage used also mean feed is stored at ground level and is susceptible to flooding – hay is stored in 1400 lb round bales and silage in open sided bins-. Finally, large floods can cause extensive damage to pasture fields which are the source of feed. Due to field damage from the February 1996 flood, it was estimated farmers would need to buy an extra 45,000 tons of dairy hay though April 1997 (14 months) when the first crop on repaired field would be available.

In addition to the loss of input inventory during floods, milk production itself is affected. Cows can drown in flood events. Floods can interrupt milk production in many ways and those impacts can be long term. In fact, according to a post-disaster report of the 1996 flood event prepared by FEMA that impacted the project area:

- 700 dairy animals were lost due to the flood event. (655 drowned, 45 lost due to residual effects)
- Milk distribution was impacted because the trucks could not get to the facilities due to the flooding and the subsequent soft ground once the waters receded.
- Milk production was significantly reduced due to the stress the cows received during the event. Production can be reduced for weeks or months afterwards and in some cases never returns to pre-flood levels.

Inventory losses for dairy farms can therefore extend for than a year after a flood, between reduced milk production and waiting for the next seasons hay production for feed. Note that in Attachment B agricultural inventory losses are higher than content losses, whereas for commercial buildings inventory losses are lower. Most commercial structures have the ability to immediately replace inventory as it is manufactured off-site; as discussed above this is not the case for dairy farms so inventory losses are drawn out over an extended period.

The reviewers also comment about the differences between agricultural and commercial buildings. We agree, and point out that is presumably why the FEMA developers of HAZUS have agricultural buildings as a separate classification with independent depth damage functions.

We reduced both commercial and agricultural contents and inventory losses by 50% for the analysis. Our analysis of commercial buildings showed that HAZUS results for the 2006 flood were 37% higher than estimated replacement cash value for the affected structures. Since HAZUS models economic losses beyond those directly incurred, as we discussed regarding inventory above, this is expected. In other words, for commercial structures it is our opinion that the HAZUS results are in line with actual damages observed and the default depth damage functions are valid. Nevertheless, for the lower bound analysis we reduced content and inventory losses for commercial structures by 50%.

Less data was available for agricultural structures but we did have some numbers to compare using HAZUS outputs and reported damages from the 1996 flood. (Note that although we called it qualitative actual dollar values were generated and compared). Based on this it did appear that agricultural damages were being overstated to some degree. We therefore reduced content and inventory losses for this category by 50% as well.

The reasoning given for removing the agricultural inventory loss seems to be related to the incorrect assumption that there is no inventory for this class of buildings. We do not believe this to be a valid reason for removal. Throughout this analysis we used standard FEMA models and methods and remained conservative on assumptions:

- We did not increase HAZUS values for residential losses even though data showed it was 40% lower than observed losses

- We lowered commercial contents and inventory losses by 50% even though the data shows in our opinion that HAZUS outputs and observed losses are reasonably in line with each other.

- We lowered agriculture contents and inventory losses by 50% based on what data we had that seemed to show HAZUS values were high.

- We used a lower bound analysis and did not include other losses including displacement costs, transportation delays and cleanup etc.

In summary, we stand by our Benefit-Cost Analysis made using FEMA software and damage curves, and believe the lower bounds approach and conservative assumptions validate the project has a BCR above 1.0 as presented.

Nevertheless we did calculate additional benefits in the form of avoided displacement and disruption losses using the method detailed on page 5-19 in the *Supplement to the Benefit-Cost Analysis Reference*

Guide, June 2011 produced by FEMA. Single family residential structures (RES1) used the BCAR default value of $1.44/sf/month for displacement costs. All other costs were generated using Table 11 from the *Supplement*, updated to 2011 costs using the CPI calculator as recommended, with one exception. Updated displacement costs for agricultural structures were set to zero rather than the table value of $0.77/sf/month. The reason for this is that it is unlikely farmers would be able to find replacement dairy farms for rent during the displacement period, unlike commercial or residential structures where there is extensive non floodplain rental inventory likely to be available. This is also consistent with our attempts to remain conservative in our evaluation. One time disruption costs for all categories were applied using updated Table 11 values. All classes used the FEMA default displacement time rate of 1.48 months displacement /foot of flood depth (45 days/ft).

Avoided displacement and disruption costs (benefits) have a net present value of $873,781. While we do not agree with the complete exclusion of agricultural inventory benefits due to the reasons described above, we present the results here with and without this assumption to demonstrate that in both cases the project has a BCR above 1.0.

Case	Project Benefits	Add'l Displacement - Disruption Loss Avoided Benefits	Total Benefits	Project Costs	BCR
As Submitted	$9,509,636	$873,781	$10,383,417	$8,336,015	1.25
W/O Ag Inventory	$7,761,338	$873,781	$8,635,119	$8,336,015	1.04

A spreadsheet and BCAR output file with the Displacement/Disruption Loss calculations are included with these comments.

COMMENT 2: In addition, we'd like some more information about the assignment of 50 years as the project's useful life. Tide gates have no more than 30 years useful life per FEMA's own mitigation guidance, and are frequently assigned the useful life of concrete metal pipe culverts, which is 20 years.

The main high capacity flood gates will be a concrete structure with marine grade structural aluminum gates. The structure will sit within the levee and will only have flow through it every 2-3 years during floods. The design life for concrete pipe and box culverts easily meets the 70 year design life specified for culverts by most state transportation agencies. Similarly, aluminum CMP has a design life of 70+ years. The gates used in this structure are made of much thicker material than aluminum CMP.

There is a set of other minor culverts with tidegates needed for agricultural drainage. These will be constructed with corrugated HDPE plastic pipe that is immune to corrosion and chemical attack. These culverts will also have marine grade aluminum tide gates on the end.

The flood and tidegates will require replacement of seals and bushings during their service life but this is considered a maintenance cost and accounted for as such.

All culvert and gate components will be designed for a design life in excess of 50 years using design guidelines for culverts and bridges in saltwater environments. Salinity at the site does not approach full ocean values due to its location at the head of the estuary and freshwater inputs, during the winter salinities will be near zero much of the time, so this will provide an additional conservative design.

Some references on design life:

WSDOT Accepted Culvert Materials in Corrosion Zone III (Saltwater Environments): Concrete, HDPE, Aluminum. (WSDOT Hydraulics Manual, Ch 8, July 2008).

Estimated Service Life: Concrete, HDPE, Aluminum – 70 years (NYSDOT Highway Design Manual Ch 8 May 1996)

Estimated service life of concrete pipe: 100 years (concrete-pipe.org)

Estimated service life of 12 gage aluminum pipe: 70 years (Michigan DOT)

Estimated service life of HDPE Plastic pipe: > 100 years (plasticpipe.org)

The ongoing maintenance costs for 10,000 feet of levee and tide gates, which was assigned only $20,000 a year, still seems low.

Section 5.5 of the Preliminary Design Report gives details on the estimation of maintenance costs. The project has been designed to minimize maintenance costs. One of the major causes of levee failures and high maintenance costs is scour and erosion from construction directly adjacent to the river channel.

Between the period of January 1, 2002 through December 31, 2010 Tillamook County & the Tillamook Bay Habitat and Estuary Improvement District expended a total of $51,064 for repairs and maintenance on County owned lands in the project area (see Figure 5 of the preliminary design report). This includes everything from tide gate repairs to annual mowings and other miscellaneous levee maintenance. This averages $5,673/yr for maintaining a much longer length of poor quality levee, and more tide gates, than will be required under post-project conditions. As discussed above, all new gates, culverts and other structures will be constructed of corrosion resistant materials for long life, whereas current maintenance includes numerous older steel tidegates that are prone to corrosion and failure.

The estimated cost of $150,000 repair costs in a 10 year flood was based on conversations with Mr. Leo Kuntz of Nehalem Marine, who has maintained and repaired virtually every levee in the Tillamook area. In his opinion this is a typical repair cost to expected due to erosion or other levee failure in a large flood. Virtually all the existing levees in the area are constructed on the river bank, have a narrow top width and steep sides. The levees were originally constructed by early settlers as agricultural dikes, and subsequent repairs have not substantially improved them. In contrast, the new and upgraded levees for this project are set back far from the river channels in almost all cases, and will be engineered and constructed in accordance with Corps of Engineer levee design standards. The levees are also very low structures (typically 5 feet high or less) that will have 5:1 backslopes and wide tops in order to withstand overtopping floods without damage. In most cases during the flood peaks the levees will be fully submerged with little to no drop in flood level across them; therefore velocities will be relatively slow. The project designers have extensive experience with design of this type of levee and are confident in the ability of the levees to withstand numerous floods with minimal impact.

COMMENT 3:

For response to this comment we have highlighted and numbered (in brackets) what we see as the key issues in the comment and then address them.

The Applicant's appeal mentions potential confusion over the use of the term 'measure' versus 'alternative.' [1]FEMA's denial related to the inadequate demonstration that this mitigation project is a solution to the threat (flood hazards). While the project may include planning goals and objectives, and meet the desires of private property owners, to be eligible for FEMA funding it must demonstrate that it solves the threat. [2]The appeal documentation does not make clear either what the threat is to the built environment in the project area, [3] or how this project will mitigate that threat (or hazard). Hazard mitigation is the minimization or elimination of risk to the built environment and to lives from a natural hazard, such as a flood. While the proposed project has been revised for the Applicant's appeal, it remains unclear as to how the built environment will be protected from future damages due to this project which lowers the flood level 0 to 18 inches in the project area. The Applicant quotes FEMA in its own Appeal Brief on page 16, which is that a mitigation project must substantially reduce the risk of future damage, hardship, loss or suffering resulting from a major disaster. The Applicant's Project Description demonstrates an expansive alteration of the lower Wilson River floodplain that includes removing 36,000 feet of levee, constructing tidal dikes, replacing a floodgate structure, and restoring 520 acres of tidal marsh habitat. The Applicant writes that 10,100 feet of new and upgraded tidal dike "must be constructed to provide year-round protection to adjacent agricultural lands from twice daily tidal inundation…". There is also a brief mention that flood conditions along the Highway 101 business district will be improved. While the project includes thousands of feet of levees and dikes, and hundreds of acres, [4] there remains insufficient documentation to demonstrate this project directly reduces future costs and hazards to potential flood victims.

Sentence 2 states that the reviewers are unclear what the threat to the built environment is. Clearly the natural hazard being addressed is flooding, and the specific cause of damage is inundation of structures. There are 415 structures within the project effect area that are inundated in a 100-year flood with an average depth of 3.13 feet. This is reflected in the Benefit-Cost Analysis, which shows building structure (without inventory or contents) losses of $6.1 million in a 100-year flood. Flood insurance claims were paid in 1990, 1995, 1998, 2006 and 2007, (five times in less than 20 years) indicating the frequency at which damaging flooding occurs in the project area. The image demonstrates the threat along the north Highway 101 corridor in the 1999 flood.

Sentence 3 implies the reviewers are uncertain how the project will function. We quote from the Appeal Brief p. 7 "The Southern Flow Corridor function is to reduce flood levels to near natural levels by the removal to the maximum extent possible of man-made impediments to flow." The Southern Flow

Corridor is a "natural floodway" currently blocked by numerous levees and dikes. The project proposes to remove these blockages and set back remaining levees in order to provide an unobstructured flow corridor. The net result is that flood levels are reduced over a wide area in the lower Wilson and even to some degree the lower Trask and Tillamook River systems. Figures 2-4 of the SFC design report shows the reductions in flood levels due to the project. The same hydraulic model outputs shown in these figures were loaded into HAZUS for the BCA. Page 9 of the Appeal Brief summarizes project benefits.

Inundation flood losses are directly tied to the depth of flooding; this is reflected in the depth-damage curve approach used in HAZUS and BCAR to model these losses. Reducing depth of flooding in a structure can be accomplished by either elevating the structure or reducing the flood levels, the latter is the approach taken by the Southern Flow Corridor project. We note again that the flood level reduction is not accomplished by traditional flood control measures such as building taller levees or dams, rather the project removes levees and restores natural floodways.

Sentences 1, 3 and 4 basically address the same issue; that there is insufficent/inadequate documentation that the project solves/mitigates/reduces flood hazards and costs. We take this to reflect the criteria listed in 44 CFR 434 (4) and (5) and discuss the project in the context of these here.

(4) [A project must] Solve a problem independently or constitute a functional portion of a solution where there is assurance that the project as a whole will be completed. Projects that merely identify or analyze hazards or problems are not eligible;

Sentence 1 uses wording from this section. We note that the use of the word "solve" implies a more concrete resolution to most hazard mitigation projects than actually is possible. With the exception of acquisition projects, typical mitigation project reduce but do not eliminate risk, be it a flood elevation or seismic retrofit. This is reflected in the reviewers comment that "Hazard mitigation is the **minimization** or elimination of risk" [bold added].

We assert that this project minimizes risk to the built environment within the constraints of the situation. A structure elevation project of similar cost could likely have been formulated. Such a project would provide a high level of risk reduction to a small set of properties. The proposed Southern Flow Corridor project provides a modest level of risk reduction to a far greater number of properties, and provides large additional benefits to the community as a whole as listed in page 9 of the Appeal Brief.

The Southern Flow Corridor is a stand alone, independent project that does not rely anything else for function. Page 18 of the Appeal Brief discusses this, and the SFC Design Report describes the project in detail.

(5) Be cost-effective and substantially reduce the risk of future damage, hardship, loss, or suffering resulting from a major disaster. The grantee must demonstrate this by documenting that the project;

Cost effectiveness is addressed by the Benefit-Cost Analysis. The project substantially reduces the risk of future damage from a major disaster – it provides the greatest flood level reductions in the 100-yr event. We note that "substantially reduce" has not been a project scale dependent issue in past FEMA funded project – we are aware of FEMA funded home elevation projects that addressed less than five homes-.

(i) Addresses a problem that has been repetitive, or a problem that poses a significant risk to public health and safety if left unsolved,

Clearly the flood hazard in Tillamook is repetitive and severe as the frequency of flood insurance claims show. Other evidence can be found in the value of acquisition and elevation funds FEMA has directed to Tillamook County over the past decades. The hazard will continue to cause losses at the same rate in the future if left unsolved.

(ii) Will not cost more than the anticipated value of the reduction in both direct damages and subsequent negative impacts to the area if future disasters were to occur,

The project has been shown to have a positive BCR using a lower bounds approach. This is addressed by our BCA report and response to comment 1.

(iii) Has been determined to be the most practical, effective, and environmentally sound alternative after consideration of a range of options,

The Oregon Solutions stakeholder group considered a range of options for the project area and determined this project to be the preferred solution. Please refer to p.18 of the Appeal Brief and the Project Exodus report for a description of this process.

(iv) Contributes, to the extent practicable, to a long-term solution to the problem it is intended to address,

The project directly contributes to reduction of flood levels in the lower Wilson River floodplain. Removal and setback of existing levees allows a return to more natural flooding patterns which can continue over the long term with minimal future intervention or maintenance.

(v) Considers long-term changes to the areas and entities it protects, and has manageable future maintenance and modification requirements.

Section 4.2 and 4.3 of the SFC Design Report discuss expected long term changes and project sustainability. Maintenance costs are addressed in the response to comment 1.

It is clear from the overall review comments that the greatest concern lies with the Benefit-Cost Analysis. The BCA is the only quantitative element of 44 CFR 434(5) and FEMA relies heavily upon it in all in grant programs. Our BCA included the following keys data sources and steps:

- Hydraulic Data is from a calibrated, Corps of Engineers developed and reviewed model.
- Elevation data is from recent high accuracy Lidar survey of the area
- Structure information is from Tillamook County and contains all detailed information needed for analysis. The great majority of structures analyzed used either elevation certificates or photographs available to accurately estimate first floor elevations

- Loss estimates were developed using FEMA HAZUS and BCAR software packages, with individual structure classification of over 500 buildings. Methods followed those approved in *Supplement to the Benefit-Cost Analysis Reference Guide, June 2011* produced by FEMA.

- Loss estimates were validated and adjusted based on actual claims and damage data

- A lower bounds approach was taken with numerous conservative assumptions. The BCR was 1.14 using this approach.

In our opinion we followed a rigorous and defensible methodology for the analysis. The level of effort to perform this analysis for 570+ structures was extensive and we used all loss data we were able to gather. For agricultural structures where loss data was sparse we reduced contents and inventory values by 50%.

The Southern Flow Corridor project is unusual compared to standard flood mitigation project in that the level of risk reduction is modest. A qualitative comparison of the project against a more typical mitigation project such as a home elevation (which has a much higher level of risk reduction) understandably would make this project appear to be of small value. It is precisely for this reason that we believe the quantitative Benefit-Cost Analysis is critical. The translation to economic costs a BCA performs allows objective comparison and review of mitigation projects, even those that use non-traditional methods or have low net risk reduction. We are aware of many FEMA funded mitigation projects with Benefit-Cost ratios below that we have calculated, as well as many projects with much smaller areas of benefit and scale. We have also looked at projects such as home elevations that clearly provide excellent risk reduction but failed to meet the Benefit Cost criteria. The Southern Flow Corridor project meets the Benefit-Cost ratio because it provides modest loss reduction to a large number of structures.

Total Benefits: **$873,781** Total Costs: **$376,015** BCR: **2.32**

Project Number: Disaster #: Program: Agency: **Northwest Hydraulics Consultants**

State: **Washington** Point of Contact: Vaughn Collins Analyst: Rob Flaner

Project Summary:

Project Number:

Disaster #:

Program:

Agency: Northwest Hydraulics Consultants

Analyst: Rob Flaner

Point of Contact: Vaughn Collins

Phone Number: 206-241-6000

Address: 16300 Christensen Rd, Ste 350, Seattle, Washington, 98188

Email: vCollins@nhc-sea.com

Comments: PA Alternative Project

Structure Summary For:

Copy Of Tillamook county-Project Exodus, 2 Main Ave., Tillamook, Oregon, 97141, Tillamook

Structure Type: Building Historic Building: No Contact: Tillamook County

Benefits: $873,781 Costs: $376,015 BCR: 2.32

Mitigation	Hazard	BCR	Benefits	Costs
Drainage Improvement	Damage-Frequency Assessment	2.32	$873,781	$376,015

Total Benefits: **$873,781** Total Costs: **$376,015** BCR: **2.32**

Project Number: Disaster #: Program: Agency: **Northwest Hydraulics Consultants**

State: **Washington** Point of Contact: Vaughn Collins Analyst: Rob Flaner

Structure and Mitigation Details For: Copy Of Tillamook county-Project Exodus, 2 Main Ave., Tillamook, Oregon, 97141, Tillamook

Benefits: $873,781 Costs: $376,015 BCR: 2.32

Hazard: **Damage-Frequency Assessment - Flood**

Mitigation Option: Drainage Improvement

Latitude: Longitude: Project Useful Life: 50

Mitigation Information

Basis of Damages: Historical Damages

Number of Estimated Damage Events: 3

Number of Events with Know Recurrence Intervals: 3

Historic Damages Before and After Mitigation

Analysis Year: 2010 Analysis Duration: 1 Utilities ($/day):

Year Built: 2010 User Input Analysis Duration: Buildings ($/day):

Roads/Bridges ($/day):

Damages Before Mitigation

Damage Year: 2007
RI: 22.40
Are Damages In Current Dollars? Yes

Buildings (Days):
Utilities (Days):
Roads (Days):

Displacement ($)	$1,693,572
Total	$1,693,572
Total Inflated	$1,693,572

Damages After Mitigation

RI: 22.40
Are Damages In Current Dollars? Yes

Buildings (Days):
Utilities (Days):
Roads (Days):

Displacement ($)	$1,229,518
Total	$1,229,518

Total Benefits: **$873,781** Total Costs: **$376,015** BCR: **2.32**

Project Number: Disaster #: Program: Agency: **Northwest Hydraulics Consultants**

State: **Washington** Point of Contact: Vaughn Collins Analyst: Rob Flaner

Damage Year: 1999
RI: 5.80
Are Damages In Current Dollars? Yes

Buildings (Days):
Utilities (Days):
Roads (Days):

Displacement ($)	$931,609
Total	$931,609
Total Inflated	$931,609

RI: 5.80
Are Damages In Current Dollars? Yes

Buildings (Days):
Utilities (Days):
Roads (Days):

Displacement ($)	$720,123
Total	$720,123

Damage Year: 2010
RI: 100.00
Are Damages In Current Dollars? Yes

Buildings (Days):
Utilities (Days):
Roads (Days):

Displacement ($)	$2,665,464
Total	$2,665,464
Total Inflated	$2,665,464

RI: 100.00
Are Damages In Current Dollars? Yes

Buildings (Days):
Utilities (Days):
Roads (Days):

Displacement ($)	$2,123,356
Total	$2,123,356

Summary Of Benefits

Expected Annual Damages Before Mitigation	Expected Annual Damages After Mitigation	Expected Avoided Damages After Mitigation (Benefits)
Annual: $260,749	Annual: $197,435	Annual: $63,314
Present Value: $3,598,531	Present Value: $2,724,750	Present Value: $873,781

Mitigation Benefits: $873,781
Benefits Minus Costs: $497,766

Mitigation Costs: $376,015
Benefit-Cost Ratio: 2.32

Total Benefits: **$873,781** | Total Costs: **$376,015** | BCR: **2.32**

Project Number: | Disaster #: | Program: | Agency: **Northwest Hydraulics Consultants**

State: **Washington** | Point of Contact: Vaughn Collins | Analyst: Rob Flaner

Cost Estimate

Project Useful Life (years):	50	Construction Type:	
Mitigation Project Cost:	$100,000	Detailed Scope of Work:	Yes
Annual Project Maintenance Cost:	$20,000	Detailed Estimate for Entire Project:	Yes
Final Mitigation Project Cost:	$376,015	Years of Maintenance:	50
Cost Basis Year:		Present Worth of Annual Maintenance Costs:	$276,015
Construction Start Year:		Estimate Reflects Current Prices:	Yes
Construction End Year:		Project Escalation:	

Total Benefits: **$873,781** Total Costs: **$376,015** BCR: **2.32**

Project Number: Disaster #: Program: Agency: **Northwest Hydraulics Consultants**

State: **Washington** Point of Contact: Vaughn Collins Analyst: Rob Flaner

Justification/Attachments

Field	Description	Attachments
Mitigation Project Cost	See attached cost estimate	
Project useful life	Used FEMA recommended 50-year project life for major infrastructure projects.	
Year Built	This field is not applicable to this analysis since recurrence intervals have been determined for all events analyzed.	

GOETTEL & ASSOCIATES INC.
1732 Arena Drive
Davis, CA 95618
Telephone: (530) 750-0440
FAX: (530) 750-0441
E-mail: KenGoettel@aol.com
www.KenGoettel.com

MEMORANDUM

TO: Dennis Sigrist, OEM
FROM: Kenneth A. Goettel
RE: POTB FEMA Comments
DATE: August 23, 2011

****

FEMA raised three issues which bear on the BCA. Resolution of these issues is critical to the eligibility of the proposed project because with FEMA's stated current positions on these issues, the adjusted BCR will be below 1.0, the minimum threshold for project eligibility.

1. Ag losses constitute a large fraction of the total damages and losses and thus accurate estimates of Ag losses are critical for the credibility of the entire BCA. FEMA is questioning: 1) the value of Ag contents/inventory and 2) the credibility of Ag depth-damage relationships, noting that Ag buildings for dairy are designed to handle water used for cleaning/sanitation purposes and thus may have little or no damage at shallow water depths of 0 to 18 inches.

Subapplicant needs to provide much more robust documentation of the value of Ag losses and of the credibility of depth-damage relationships to address the issues raised by FEMA, including: Ag building losses and contents/inventory losses.

For example, if Ag contents/inventory losses are predominantly dairy cows, the total head of cows in the project area, along with the unit value per cow would provide a baseline value for the "inventory". A fuller explanation of the flood conditions that would result in widespread death of cows would help to support the Ag losses.

Questions that arise might include: 1) given flood warnings why can't all or most of the cows be moved to safe havens, 2) don't the high ground areas constructed after past floods provide a measure of protection to the cows?

2. This issue raised by FEMA has two separate components:

a) Project Useful Life. FEMA notes that tide gates have no more than 30 year useful lifetimes, and perhaps only 20 years. The BCR depends significantly on the project useful life as shown in the following table.

Useful Lifetime (years)	Present Value Coefficient with 7% Discount Rate	BCR Relative to BCR for 50-Year Useful Lifetime
50	13.80	100.00%
30	12.41	89.93%
20	10.59	76.74%

As shown in the table above, lowering the useful lifetime to 30 years or 20 years reduces the BCR to 89.93% and 76.74%, respectively, of the BCR for a project useful lifetime of 50 years.

The project useful lifetime can be addressed in two ways:

- Provide engineering documentation to convince FEMA that the proposed tide gates have a useful lifetime of at least 50 years, or
- Increase the project annual maintenance costs to include the necessary costs to replace the tide gates after 30 or 20 years. Doing this within the FEMA BCA software requires some side calculations, which must be shown to FEMA, to calculate the equivalent annual maintenance costs of replacing the tide gates in 20 or 30 years. The correct value is the annual maintenance cost amount (for the 50-year useful lifetime) that corresponds to increasing the net present value of annual maintenance costs by an amount equal to the net present value of replacing the tide gates in 20 or 30 years. As with all of the BCA inputs, the values used are 2011 values.

b) Annual Maintenance Costs. FEMA has questioned the validity of the $20,000 annual maintenance budget, given the length of levees and other infrastructure to be maintained. Provide engineering justification for the $20,000 estimate, with details, unit costs etc. or provide similar justification for a higher annual maintenance cost estimate.

The $20,000 annual maintenance cost has a net present value of $276,000 for a project with a 50-year useful lifetime. This value is included in the cost side of the BCA, but is not covered by the FEMA grant. Raising the annual maintenance cost by $10,000 or $20,000 would raise the total project cost proportionately and thus lower the BCR commensurately.

3. Effectiveness of the proposed mitigation project. FEMA's denial of eligibility is based on "inadequate demonstration that this mitigation project is a solution to the threat (flood hazards." This may be the most difficult FEMA objection to overcome. The subapplicant must convince FEMA that reducing future flood depths by only a few inches in most areas does constitute a solution to the flood problem. For example, it is difficult to understand how reducing a 2 foot flood in a given location to a 1.5 foot flood really provides a meaningful "solution" to the flood problem.

The language quoted in FEMA's memo comes from the FEMA definition of "cost-effective." All FEMA mitigation projects, both 406 and 404, must be cost-effective. This term is defined only under the 404 regulations, but FEMA applies the same criteria to 406 mitigation.

The definition of cost-effective is included in Part (5) of the following section of 44-CFR. For reference, the language in Part (4) is also included in the quotation below. To be eligible, a project must:

> ***§ 206.434 Eligibility.***
>
> (4) Solve a problem independently or constitute a functional portion of a solution where there is assurance that the project as a whole will be completed....
>
> (5) Be cost-effective and substantially reduce the risk of future damage, hardship, loss, or suffering resulting from a major disaster. The grantee must demonstrate this by documenting that the project;
>
> > (i) Addresses a problem that has been repetitive, or a problem that poses a significant risk to public health and safety if left unsolved,
> >
> > (ii) Will not cost more than the anticipated value of the reduction in both direct damages and subsequent negative impacts to the area if future disasters were to occur,
> >
> > (iii) Has been determined to be the most practical, effective, and environmentally sound alternative after consideration of a range of options,
> >
> > (iv) Contributes, to the extent practicable, to a long-term solution to the problem it is intended to address,
> >
> > (v) Considers long-term changes to the areas and entities it protects, and has manageable future maintenance and modification requirements.

Objectively, the project simply does not provide a "solution" to the flood problem because the proposed project reduces the expected annual damages by only about 23%, compared to acquisition projects which reduce damages by 100% or other types of projects such as elevations or flood control measures which typically reduce damages by 80% to 90% or more.

So, perhaps the only salvation vis-à-vis FEMA's objection is to emphasize that the project "contributes, to the extent practicable, to a long-term solution to the problem it is intended to address." This may be a weak argument, given the other language re: "substantially reduce the risk of future damage, hardship, loss or suffering" and "solve a problem independently."

Aaron Palter

From: Julie Slevin <Julie.SLEVIN@state.or.us>
Sent: Monday, August 22, 2011 2:56 PM
To: Aaron Palter
Cc: Julie Slevin; Daggett, Anna
Subject: FW: Request for additional information for POTB appeal

Hi Aaron – below are questions/comments from FEMA. Please submit(email is fine) the questions by September 2nd.

From: Daggett, Anna [mailto:Anna.Daggett@dhs.gov]
Sent: Friday, August 19, 2011 2:34 PM
To: 'Julie Slevin'
Subject: Request for additional information for POTB appeal

Hi Julie,
would it be possible for you and the Port to take a look and see if you can provide some further information/documentation on the items below? We definitely don't need a resubmission or anything super formal; just some supplemental information in whatever format suits you best. I am hopeful that this won't prove a major effort and am certainly not wishing to hold up a determination. Please let me know if you have any questions!

Thanks so much, Anna

Below are three comments/questions that came up in our review of the appeal documentation that we'd like to see addressed in order to complete our analysis:

1. The Applicant has submitted with this appeal actual damage costs that FEMA earlier requested. They include three commercial properties that were damaged in two declared flood disasters, occurring in November, 2006 and December, 1998. The Applicant states that these three properties are within the project area. No other actual damage data was provided, including agricultural building damages which initially were attributed to 47 percent of the total flood costs in the first benefit-cost analysis. Because no actual damage costs were available for agricultural losses, it was assumed by the analyst that agricultural losses equated to commercial losses. This was based upon a 'qualitative check' used but a validation or explanation as to how they can be used equally in a benefit-cost analysis was not provided. Commercial businesses have inventory losses. Agricultural buildings do not have business inventory, yet there was no distinction of the two, and the benefit-cost analysis did include "Agricultural Inventory Loss." The details of the ratio for agricultural structures versus residential and commercial were included in the initial benefit-cost analysis submitted, which were 47 percent agricultural and 39 percent commercial structures. However, with a new project scope proposed, any changes in this ratio or its impacts was not included. The Applicant did reduce the agricultural inventory values of the lower frequency events in its analysis by 50 percent. However, agricultural buildings have no commercial inventory, and there is no documentation submitted to justify the inclusion of agricultural buildings as having commerical inventory. Agricultural buildings are comprised of tractors, feed, cows, and milk parlors built of concrete block designed to accommodate high volumes of water for sanitation. A flood depth of 0 to 18 inches will have vastly different impacts

between agricultural buildings and commercial buildings with inventory. Documentation of a thorough analysis of how these two different building types could be treated the same is needed to justify inclusion in the analysis. Removing the avoided future costs due to 'Agricultural Inventory Loss' results in a reduction of $1,748,298 in benefits. The total project cost detailed in the Southern Flow Corridor Design Report is $8,056,943. The benefit-cost analyst lists the project cost as $8,336,015 and the benefits of this project at $9,509,639. Even using the lower project cost estimate, by removing the Agricultural Inventory Loss benefits of $1,748,298, the project is not cost-effective and does not meet a benefit-cost ratio of 1.0. If significant unclaimed benefits exist in the existing lower bound analysis, they should be included.

2. In addition, we'd like some more information about the assignment of 50 years as the project's useful life. Tide gates have no more than 30 years useful life per FEMA's own mitigation guidance, and are frequently assigned the useful life of concrete metal pipe culverts, which is 20 years. The ongoing maintenance costs for 10,000 feet of levee and tide gates, which was assigned only $20,000 a year, still seems low.

3. The Applicant's appeal mentions potential confusion over the use of the term 'measure' versus 'alternative.' FEMA's denial related to the inadequate demonstration that this mitigation project is a solution to the threat (flood hazards). While the project may include planning goals and objectives, and meet the desires of private property owners, to be eligible for FEMA funding it must demonstrate that it solves the threat. The appeal documentation does not make clear either what the threat is to the built environment in the project area, or how this project will mitigate that threat (or hazard). Hazard mitigation is the minimization or elimination of risk to the built environment and to lives from a natural hazard, such as a flood. While the proposed project has been revised for the Applicant's appeal, it remains unclear as to how the built environment will be protected from future damages due to this project which lowers the flood level 0 to 18 inches in the project area. The Applicant quotes FEMA in its own Appeal Brief on page 16, which is that a mitigation project must substantially reduce the risk of future damage, hardship, loss or suffering resulting from a major disaster. The Applicant's Project Description demonstrates an expansive alteration of the lower Wilson River floodplain that includes removing 36,000 feet of levee, constructing tidal dikes, replacing a floodgate structure, and restoring 520 acres of tidal marsh habitat. The Applicant writes that 10,100 feet of new and upgraded tidal dike "must be constructed to provide year-round protection to adjacent agricultural lands from twice daily tidal inundation…". There is also a brief mention that flood conditions along the Highway 101 business district will be improved. While the project includes thousands of feet of levees and dikes, and hundreds of acres, there remains insufficient documentation to demonstrate this project directly reduces future costs and hazards to potential flood victims.

425-482-3737 desk
425-408-2582 mobile
anna.daggett@dhs.gov

PORT
OF TILLAMOOK BAY

May 25, 2011

Mr. David Stuckey
Deputy Director
Financial and Recovery Services Section
Oregon Emergency Management
P.O. Box 14370
Salem, OR 97309-5062

RE: Disaster No.: 1733-DR-OR
FEMA No: 000-01ZZ1-00
Applicant: Port of Tillamook Bay A(POTB)
PW No: Alternate Project #13 to PW 936(1), Southern Flow Corridor Project

Dear Mr. Stuckey:

On March 28, 2011 POTB received by email your letter relating FEMA's denial of POTB's request for funding consideration for the above-referenced Southern Flow Corridor Project. This denial was based in part on the three (3) criteria stated in FEMA's March 16, 2011 letter to OEM and FEMA's clarification of Criterion 1 (Benefit Cost Analysis) in its March 24, 2011 letter to OEM.

Per 44 CFR 206.206, enclosed please find documents which represent POTB's appeal of FEMA's decision within the 60-day time period for the Appeal, and which contain the following justifications: 1) A Brief supporting POTB's position; 2) A specification of the monetary figure in dispute; and 3) The provisions in Federal law, regulation or policy which POTB believes the initial action was inconsistent.

It is our understanding that OEM will review the material submitted, and will be forwarding within sixty (60) days the Appeal to FEMA Region Ten Regional Administrator whom, within 90 days following receipt of the appeal or any requested information, will notify the State of the disposition of the Appeal.

Thank you for your assistance with this matter.

If you have any questions, please contact me.

Sincerely,

Michele Bradley
Michele Bradley
General Manager

enclosures

PORT OF TILLAMOOK BAY

May 25, 2011

Mr. David Stuckey
Deputy Director
Financial and Recovery Services Section
Oregon Emergency Management
P.O. Box 14370
Salem, OR 97309-5062

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Thank you for your assistance with this matter.

If you have any questions, please contact me.

Sincerely,

Michele Bradley

Michele Bradley
General Manager

enclosures

APPEAL BRIEF
FEMA: 1733-DR-OR
FEMA No.: 057-U1ZZV-00
Applicant: Port of Tillamook Bay (POTB)
PW No: 946 (Alternate Project #13 to PW936(1))
Southern Flow Corridor Project

STATEMENT OF THE CASE

This Project, entitled "Southern Flow Corridor Project" is one of several alternate projects to DR-1733-OR's Project Worksheet (PW) 936 for the repair of POTB's historic railroad. By letter on March 16, 2011 Charles Axton, FEMA Region X Recovery Division Director, determined that this project is ineligible for Public Assistance (PA) program grant funding for the following reasons:

1. The project does not appear to be cost-effective and has not sufficiently demonstrated to have a Benefit Cost Analysis (BCA) greater than 1.0. This issue was further clarified by Charles Axton in a letter dated March 24, 2011 that identified two key issues:
    a. The lack of use of actual historic damages to validate the FEMA HAZUS model depth damage functions
    b. Failure to adequately document project costs
2. The project does not appear to solve the threat independently or constitute a functional portion of a solution to the threat
3. The project does not appear to have the necessary assurances related to long-term and ongoing maintenance, repairs and operations

For those reasons, FEMA denied POTB's funding request for the Southern Flow Corridor Project. Subsequent discussions with FEMA staff established that FEMA would accept revised documents, including a BCA and Scope of Work, in addition to clarified statements of commitment relating to item 3 above during the appeal period.

POTB files this appeal of FEMA's denial pursuant to 44 CFR 206.440 and has submitted this appeal within the 60-day period required by 44 CFR 206.206.

SUMMARY OF ARGUMENTS

1. This project is demonstrated to be cost effective with a BCA of 1.14.

Per discussions with FEMA staff and the supplementary letter clarifying FEMA’s issues with the BCA from Charles Axton dated March 16, 2011 a validation of the modeled damages with actual observed damages was undertaken. The project costs were also reviewed and revised, including construction, real estate and maintenance costs. A revised BCA for the Southern Flow Corridor (Exhibit C) is attached with full details.

2. The Southern Flow Corridor is a standalone, independent project that constitutes the single most cost effective alternative for reducing flooding in the lower Wilson River floodplain. Some confusion may have been introduced on this issue in poorly communicating the difference between Project Exodus and the Southern Flow Corridor, especially as the Project Exodus design report was attached and the Alternate Project Request cover sheet included more than the Southern Flow Corridor.

The issue can best be clarified by using Corps of Engineers definitions from their flood planning guidelines. A "Measure" is a stand-alone, independent project that is economically justified on its own. An "Alternative" is a collection of measures that together seek to maximize meeting the planning goals and objectives.

Using these terms, Project Exodus is the preferred Alternative for meeting the Oregon Solutions goals and objectives for the lower Wilson River. The Southern Flow Corridor is one of three measures that comprise this Alternative.

This Alternate Project Request deals only with the Southern Flow Corridor. However, the Project Exodus Design Report is again submitted as Exhibit B here within this Appeal for the sole purpose of documenting the planning goals, objectives, background information and process used to arrive at the preferred Alternative. Since the Project Exodus Design Report was issued, the Southern Flow Corridor project has been revised to meet the desires and concerns of the private property owners affected by the Project, something that was not done at the initial stage.

Therefore, a new report is included with this brief as Exhibit A – the Southern Flow Corridor – Landowner Preferred Alternative Preliminary Design Report. This report (hereafter referred to as the Southern Flow Corridor Design Report) contains the most up to date information on the Southern Flow Corridor and supersedes any details given in the Project Exodus Design Report. This new report should be used for evaluating the Southern Flow Corridor in terms of scope of work, cost estimates, levee and dike alignments, etc.

3. POTB is committed to providing long-term and ongoing maintenance, repairs and operations of the completed project site. The administrative framework for accomplishing that commitment is described below in Section III General Work Eligibility.

Project maintenance costs previously submitted were also reviewed and compared with current estimated costs incurred by Tillamook County and various private parties in maintenance of nearby dikes and floodgates. The previous maintenance cost used of $20,000 per year remains unchanged based on this review. Details of how the cost was estimated are contained in the Southern Flow Corridor Design Report.

PROJECT SUMMARY AND ELIGIBILITY

A full description of the Project is contained in the Southern Flow Corridor Design Report attached hereto as Exhibit A. By way of summary, the Southern Flow Corridor Project is described below. These sections also address project eligibility as well as respond to the matters that are at issue in this appeal.

I. PROJECT REQUIREMENTS AND SCOPE OF WORK

DAP9525.13 (VII) (G) The proposal must include a description of the project, including the project location, an estimate of costs, a schedule of work, including a starting date for work and a targeted completion date and the necessary assurances to document compliance with special requirements, including, but not limited to floodplain management, environmental review, hazard mitigation, protection of wetlands and insurance.

44 CFR 206.203(d)(2)(v). Historic and any other legal considerations should also be identified. The applicant should identify the source of funding for projects when the cost estimate for the alternate project is greater than the eligible alternate project funding.

(1) Project Description

The Southern Flow Corridor Project proposes to remove manmade impediments to flood flows to the maximum extent possible in the lower Wilson River floodplain. By doing so, flood level reductions exceeding one point five feet in some locations can be obtained in the area.

The Southern Flow Corridor project would:

- Remove approximately 36,000 lineal feet of existing levee
- Lower an additional 11,100 feet of levee
- Construct 7,000 feet of new setback tidal dike and upgrade an additional 3,100 feet of pre-existing tidal dike
- Replace an existing floodgate structure with a new one
- Provide over 520 acres of restored tidal marsh habitat in a key location of the Tillamook Bay Estuary

The 10,100 feet of new and upgraded tidal dike must be constructed to provide year-round protection to adjacent agricultural lands from twice daily tidal inundation, particularly during the summertime higher tides. It should also be noted that the habitat restoration component of the project is a byproduct of the flood damage reduction benefits. Virtually all the costs related to habitat restoration are either anticipated to be required as permit conditions or benefit the flood damage reduction purpose of the Project. For instance, ditch filling is desired to allow the formation of natural tidal channels, but this allows on-site disposal of organic soils that would otherwise need to hauled off site and disposed of at much greater cost. Additionally, the excavated tidal channels shown, function as required flood conveyance or agricultural drainage channels, but are given sinuosity in order to provide habitat benefits.

Figure 1 below shows the Project elements. The Project is described in more detail in the attached Southern Flow Corridor Design Report.

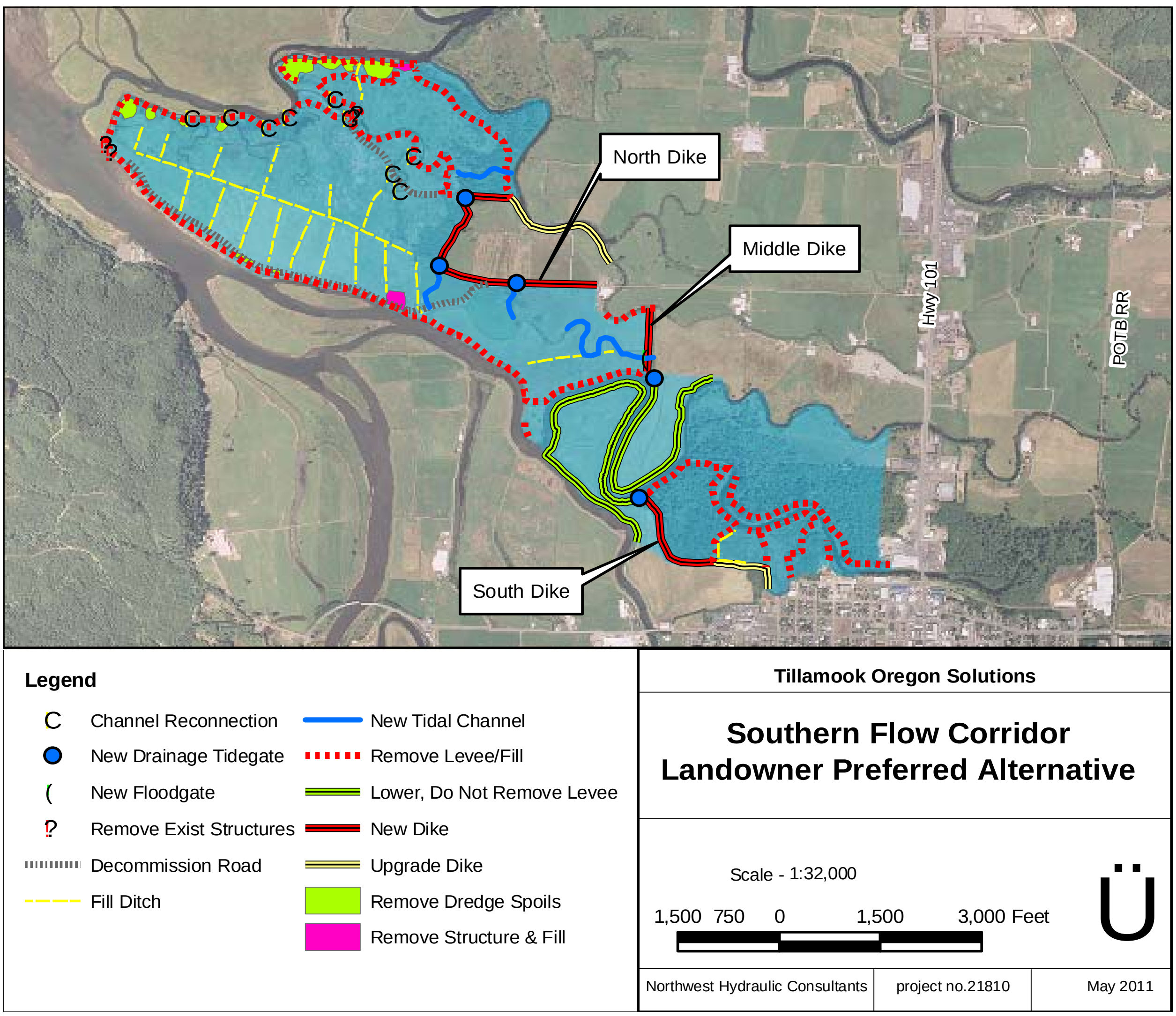

Figure 1: Southern Flow Corridor Project Elements

Also attached is the Project Exodus Design Report, dated February 2010 (Exhibit B). As discussed above, this report is provided here for the sole purpose of providing the background, objectives and methods that were used to investigate possible flood damage reduction measures within the flood plain that lies between Hoquarton Slough, Wilson River and Tillamook Bay. The report also describes various alternatives that were evaluated. Finally, the report presents a preliminary design for a recommended Project, consisting of three independent, standalone project elements, one of which is the Southern Flow Corridor. This report is provided for background and context of the Project, however, all design details, cost estimates and land needs have been refined since the publication of this report. The reader should refer to the Southern Flow Corridor Design Report (Exhibit A) for up-to-date project details.

(2) **Project Location**

The Southern Flow Corridor Project area is located at the confluence of the Wilson, Trask and Tillamook Rivers on the southern end of Tillamook Bay (see Figure 2 below). These three rivers and multiple sloughs connect in a complex delta system around the City of Tillamook. The area of influence of the Project (i.e. area of flood level reduction created by the Project) extends up the Wilson River east of the POTB railroad, west to Tillamook Bay and up the Tillamook and Trask Rivers to the south. Please refer to the Southern Flow Corridor Design Report (Exhibit A) for figures showing the extents of benefit from this project.

GPS Point #1: 45°27'32.76"N 123°50'45.74"W; then Northwesterly to GPS Point #2: 45°28'32.54"N 123°53'32.83"W; then Northeasterly to GPS Point #3: 45°28'26.69"N 123°52'09.36"W; then Southeasterly to GPS Point #4: 45°28'00.40"N 123°51 '23.24"W.

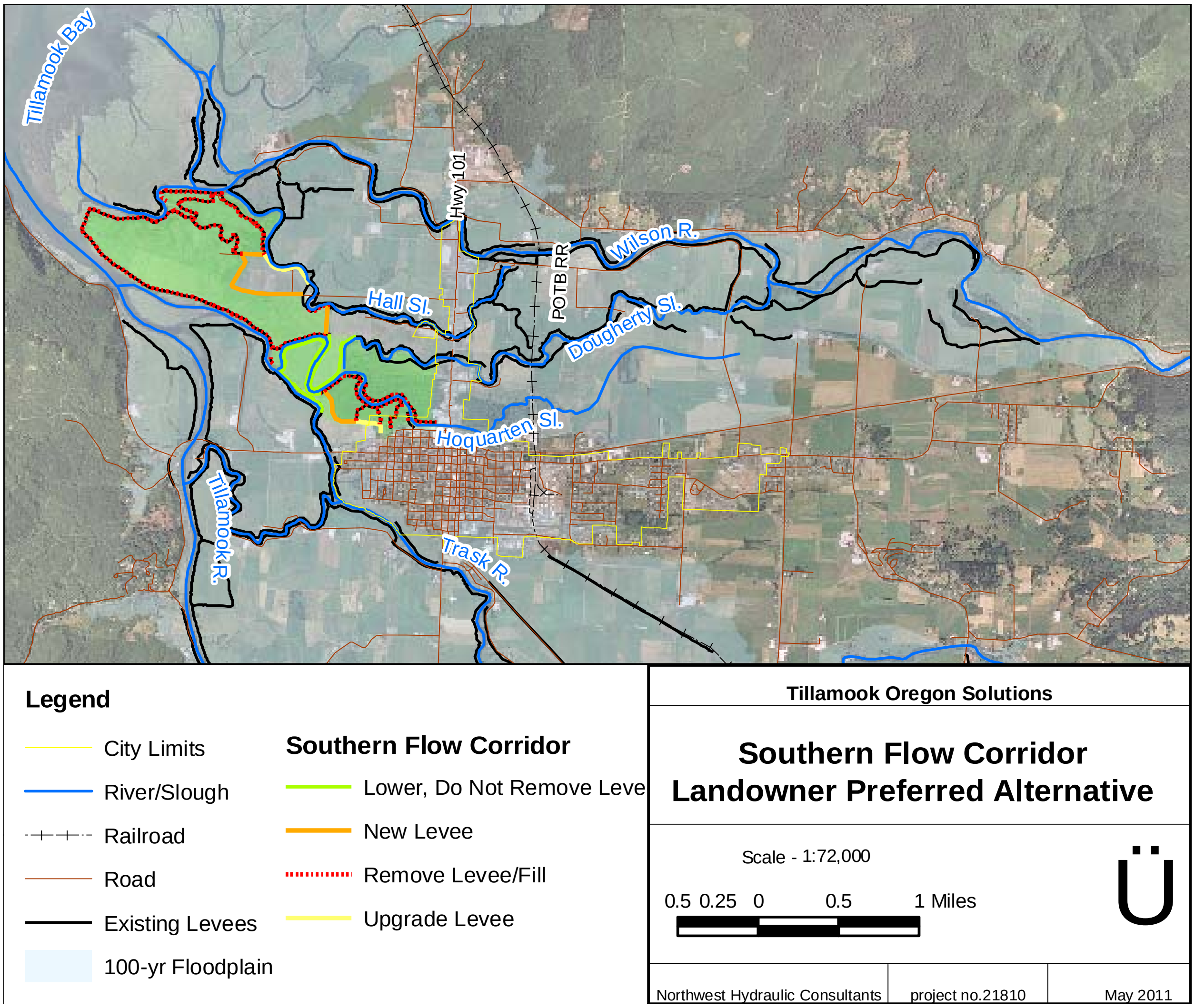

Figure 2: Southern Flow Corridor Project Location

(3) **Project Function**

The Southern Flow Corridor function is to reduce flood levels to near natural levels by the removal, to the maximum extent possible, of man-made impediments to flow.
The Wilson River flows through a steep canyon out of the mountains where it enters the lower valley about six miles above Tillamook Bay. The river channel meanders along the northern side of the floodplain and is perched - it runs in a channel with natural banks that are higher than the flood plains around it, while the southern side of the flood plain contains the lowest elevations. As a consequence, flood flows that spill over the south river banks never return to the channel, but instead flow south and west across the flood plain, across Highway 101 and mix with Trask and Tillamook River floodwaters at the head of the bay. As Figure 2 shows, below Highway 101 there are numerous levees bounding virtually the sloughs and channels in the area, a legacy of over a century of marsh reclamation, diking and draining. When the westerly flood flows hit

these levees, especially those that run north-south, a back water effect occurs, substantially contributing to the flood conditions along the Highway 101 business district and POTB's railroad. The Southern Flow Corridor project would remove these flow impediments to the maximum extent possible, removing or lowering over 47,000 lineal feet of levee in addition to remnant dredge spoils that were deposited between 1900 – 1973.

The 7,000 feet of new tidal dikes must be constructed to provide year-round protection to adjacent agricultural lands from twice daily tidal inundation, particularly during the summertime higher tides. Unless these dikes are constructed, the daily tidal cycle would convert the lands behind the dikes to salt marsh, making the lands no longer suitable for agricultural uses and necessitating the acquisition of entire farm parcels, together with the farm homes and agricultural buildings, thereby substantially increasing the total project costs. Privately held land in the amount of 119.8 acres will be purchased and flood easements will be acquired on three additional properties, thereby leaving the homes and agricultural operations behind the new setback dikes intact.

It is important to note the new dikes do not function as flood control levees or flood control works designed to exclude riverine floodwaters. Due to the floodwaters that arrive from upstream spillover as described above, the new setback dikes and lowered existing dikes are built as low as possible to pass river flood flows out without restriction while still preventing high tides from getting in. The dikes are designed to function as overtopping spillways during floods. The middle dike also includes a high capacity flood gate structure to pass flows and allow rapid post-flood drainage. Flood flows will pass through this structure every second or third year, a sufficient frequency which to keep the channels open and able to convey flood flows out to the main channels and bay along relic channels where the structures will be placed.

The habitat restoration function of the Project will be enabled primarily by the removal of the existing levees, culverts and other fill. Daily tides will then begin the process of rebuilding natural marsh surfaces, conversion of vegetation to salt-tolerant marsh species and formation of tidal channels. Filling of existing linear ditches provides a disposal location for organic soils and also serves to enhance the creation of natural channels.

A summary of the functions and benefits of the Project is as follows:

- Provides significant flood level reduction to near natural levels over a wide area of the lower Wilson River floodplain

- Provides faster post-flood drainage and consequent road re-openings

- Protects adjacent agricultural lands from tidal inundation and provides improved drainage to these lands

- Removes County obligations to maintain over 30,000 feet of sub-standard levee located on riverbanks and prone to erosion and failure. Replaces this with 7,000 feet of new tidal dike, setback from all main river channels and engineered for long term function with minimal maintenance

- Provides very significant habitat restoration value of critical habitat types in a key ecological location

(4) **Cost Estimates and Financial Assurances**

A summary of estimated costs of the Southern Flow Corridor is presented here. Cost details and methods of development are given in the Southern Flow Corridor Design Report (Exhibit A).

ITEM	COST
Permitting, Design & Construction	$6,517,000
Property Acquisition	$1,540,000
Maintenance	$ 20,000/year

The sources of funding for total project costs, including property acquisition, are described in the table below. These sources include acquisition and development funds from the Oregon Watershed Enhancement Board (OWEB) for which a commitment letter is attached as Exhibit J.

SOURCES OF FUNDING	AMOUNT
FEMA Alternate Project Funds	$3,225,000
OWEB Restoration Funds	$1,625,000
State Bond Matching Funds	$1,075,000
Other grant/loan funding	$2,132,000
	$8,057,000

Additionally, a loan commitment dated May 18, 2011 in the amount of up to $3,000,000 has been provided by TLC Federal Credit Union (Exhibit K). Tillamook County, to whom the commitment is made, has stated that it intends to replace the loan prior to the need for the funds.

More specifically, the Southern Flow Corridor is a flood damage reduction Project. Aside from FEMA, there are few, if any other funding sources available for flood reduction projects. However, the strategic location of the Southern Flow Corridor adjoining the estuary at the confluence of two major coastal salmon rivers, positions this Project to result in one of the largest habitat restoration projects on the Oregon Coast. Initially there was some skepticism that a hazard mitigation project could produce such results. However, the full range of natural resource agencies at the Oregon Solutions table for this Project have come to embrace this project, to the extent that the May 13, 2011 Oregon Solutions meeting produced a unanimous endorsement.

This project will restore natural hydrologic processes to the site. It will re-establish tidal exchange with the bay and hydrologic connectivity between the Wilson and Trask Rivers and their associated flood plains. This will result in a large number of key priority habitats for fish and wildlife, including intertidal mudflats, tidally influenced freshwater wetlands, flood plain lowland riparian and linear wetlands, lowland non-linear forested wetlands and Sitka spruce forest.

For these reasons the Southern Flow Corridor is eligible for a wide array of habitat restoration funding. As soon as property acquisitions are complete, grant applications will be submitted to the National Oceanic and Atmospheric Administration (NOAA), Office of Ocean and Resource Management and the US Fish and Wildlife Service. These agencies have already provided funds for the acquisition of the original 377 acres presently owned by the County and are committed to seeing this project being completed. Although these agencies are represented on this Oregon Solutions Project and Design Teams, program limitations prevented the representatives from making formal commitments outside the grant application process.

Additionally, other funding sources have expressed strong interests in this project and have invited applications. These include the Oregon Department of Fish and Wildlife, the Nature Conservancy, the Oregon Hunters Association and others.

Oregon Solutions has an uninterrupted string of successful projects across the state. Eleven million dollars was just secured last month to make the Vernonia project funding complete. FEMA is involved in that project as well. The POTB and its Tillamook Oregon Solutions partners are confident that this project will be another Oregon Solutions success.

(5) **Work Schedule**

Proposed Work Schedule

ITEM	TIMELINE
Property Acquisition	May 2011 - July 2012
Environmental Assessment & Permitting	August 2011 - February 2013
Preliminary Design	August 2011 - February 2012
Final Design	February 2012 - March 2013
Procurement/Bidding	March - April 2013
Construction	May - October 2013
Project Closeout	December 2013

Property Acquisition is ongoing. Two options have been obtained and appraisals on ongoing on other parcels. Options on all properties and easements are anticipated to have been acquired by August 2011. Funding for property acquisition will be submitted to OWEB when completed. OWEB is waiting to fund the Project once all property details have been fixed. Complete acquisition is anticipated for completion by July 2012.

Environmental Assessment and Permitting: Nineteen months are budgeted for environmental assessment and permitting. As mentioned in the design report, the project has been designed for the ability to obtain a Corps of Engineers nationwide permit. Whether or not a nationwide or individual permit is required, it is an indication of the relative ease of permitting the Project is expected to have given the very large ecological benefits that will accrue.

On April 26, 2011 Mark Eberlein, FEMA Region X's Regional Environmental Officer, discussed this project during his visit to the POTB. Mr. Eberlein indicated an Environmental Impact Study (EIS) would most likely be required for the Southern Flow Corridor Project. Given the additional requirements and time an EIS would require, the project schedule includes a 19-month period for this activity. Work will begin in August 2011 with environmental scoping and field data collection and conclude in February 2013 with the issuance of permits for construction.

Preliminary Design: Preliminary Design will begin concurrently with the environmental assessment as they are complementary. The exact Project feature alignments must be designed and laid out so they can be field marked for wetlands and cultural resource assessments to begin. The extensive involvement of resource agencies in the Oregon Solutions process will be utilized to ensure project design details will maximize habitat restoration benefits and not become issues during permit review. Preliminary design will conclude with the submittal of 30% plans for permit review.

Final Design: Final design will complete the preliminary design and incorporate any permit review and other environmental assessment requirements that may occur. The final construction ready plans, specifications and engineering (PSE) package will be prepared.

Procurement/Bidding: A bid package will be prepared with the PSE and other required bid documents and advertised in April 2013. Bid award will follow shortly thereafter.

Construction: A six-month construction window is allotted from May through October 2013. The majority of the work is anticipated to be completed in the middle of this period during the time of lowest high tides.

Project Closeout: After the end of construction, administrative tasks needed for project documentation, accounting and other items will be completed and necessary reports submitted to the requesting agencies.

(6) Special Requirements, Environmental Reviews and Permitting

The Southern Flow Corridor Project has benefited from a large amount of information generated by previous studies and other efforts in the area, including the US Army Corps of Engineers Tillamook Feasibility Study and various studies completed by the Tillamook Estuaries Partnership. The flood analysis is based on a detailed hydraulic model calibrated and validated against data from four floods of varying sizes. The process of selecting the Project was completed through the locally driven, stakeholder based Oregon Solutions process, with both key resource agencies and local community participation throughout. For these reasons the Project has been well-vetted, has strong community and resource agency support and a strong technical basis to justify each element.

(7) Floodplain Management

The Project is located entirely within the floodplain and floodway of the Wilson River. As such, floodplain management regulations will apply, including zero rise criteria. The Southern Flow Corridor Design Report shows that the Project results in water level reductions across the entire lower Wilson River floodplain in a 100 year flood. During the permitting phase this will be documented using the official FEMA hydraulic model as part of the flood hazard permit.

(8) Environmental Assessment

A fairly extensive discussion on permitting and the favorable environmental consequences of the proposed Project is contained in the Southern Flow Corridor Design Report (Exhibit A). As stated therein, "No major hurdles are anticipated". The Southern Flow Corridor has large ecosystem restoration benefits and would likely qualify for a streamlined restoration permit. The Project has been designed to qualify under the Federal Nationwide Permit (NWP-27) and the General Authorization under the State of Oregon Removal-Fill law. It has also been designed to comport with NOAA fisheries restoration programmatic biological opinion (SLOPES IV).

(9) Hazard Mitigation Plan

Please refer to Section 13(a) and 13(f) of this brief for documentation of compliance with state and local mitigation plans.

(10) Protection of Wetlands

The project will restore or enhance over 520 acres of wetlands through the removal of levees and reconnection of floodplain with the river system.

(11) **Insurance Requirement**

The project reduces 100 year flood levels throughout its area of influence. Therefore, even though the Project is located within the floodway, no flood hazard permit issues are known at this time. This result is determined with the NHC model, which is related to but different from the official FEMA flood model. The Project will be modeled using the FEMA model during permitting to verify the no-rise finding. No structures are proposed that would be subject to flood insurance requirements.

(12) **Property Acquisition**

The Southern Flow Corridor will require the acquisition of title to 119.8 acres and flood easements over another 85.3 acres. The County is presently undertaking the acquisitions. The specific parcels and rationale for these acquisitions is described in the Southern Flow Corridor Project Report (Exhibit A) and is summarized in the table below:

ID	Property	Acres	Cost ($)	Note
A	Fuhrman	1.5	$ 675,000	Signed Option
B	Allen	4.3	$ 31,300	Estimate
C	Jones	48.0	$ 192,000	Scaled Appraisal
D	Sadri	66.0	$ 485,000	Signed Option
E	Aufdermauer (Flood Easement)	50.5	$ 27,800	Estimate
F	Beeler (Flood Easement)	34.8	$ 19,100	Estimate
G	Temp. Construction Easements (2)	--	$ 20,000	Estimate
		Subtotal	$ 1,450,200	
	Appraisals/negotiations		$ 60,500	
	Title Reports		$ 2,500	
	Surveys for Legal Descriptions		$ 12,000	
	Environmental Assessment		$ 12,500	
	Closing costs/Title Insurance		$ 2,500	
	TOTAL		$ 1,540,200	

The status of each of these acquisitions is described as follows:

Sadri: A two year purchase option agreement was executed on February 23, 2011 for this 65.98 acre parcel in the amount of $485,000. The County will exercise its option upon receipt of the OWEB grant funds that have been committed to the Project. This is expected to occur by early 2012. Acquisition will be completed by July 2012.

Fuhrman: This property consists of an approximate 1.48 acre parcel and single family residential structure. A two year purchase option agreement was executed on March 9, 2011 in the amount of $675,000. The County will exercise its option upon receipt of the OWEB grant funds that have been committed to the Project. This is expected to occur by early 2012, with acquisition completed by July 2012.

Jones: This parcel consists of about 48 acres of marginal farmland. The yellow book appraisal is expected to be completed before the end of July 2011. The cost estimate presented here is based on a recently completed appraisal of the property that assumed the purchase of around 30 acres; the unit price from this appraisal was used for the new amount. The property will be under a purchase option agreement by September 2011. Funds for the purchase of this property are earmarked within the OWEB grant funds that have been committed to this Project. The is expected to occur by early 2012, with acquisition completed by July 2012.

Allen: This 4.25 acre parcel consists primarily of a disconnected slough that, once acquired, can be reconnected to further contribute to the flood discharge capacity of the Project. The yellow book appraisal is expected to be completed before the end of July 2011. The current estimate is based on unit acre costs from the Sadri purchase, as both parcels are primarily wetlands and open water. The property will be under a purchase option agreement by September 2011. Funds for the purchase of this property are included within the OWEB grant funds that have been committed to this Project. Acquisition will be completed by July 2012.

Aufdermauer/Beeler: Flood easements will be required over an 85.31 acre portion from the farmlands of these owners. This is due to the fact that these pastures are protected by levees that are slated to be lowered as part of this Project. The parcels will benefit from flood level reduction and drainage improvements due to the project. The flood easements will be negotiated and executed during final design of the Project, once the detailed requirements for drainage elevations and construction needs are determined.

Construction Easements: Three additional parcels owned by two parties will have work completed on their land as part of the Project. This work consists of either a) fill removal in an undiked area where the property will benefit from flood level reduction and will otherwise be unaffected and b) minor dike improvements necessary to tie into a new dike adjacent where the property will receive substantial flood level reduction benefits. In these cases $10,000 for each owner is budgeted for obtaining a temporary construction access easement only.

(13) Guidelines for Mitigation Projects

Under DAP9525.13 (VII) (J) the types of mitigation projects that may be approved for alternate project funds are very broad. Under that guideline, mitigation measures may be the same type as would be eligible for funding under section 404 of the Stafford Act, the Hazard Mitigation Grant Program (HMGP). As such, a project must meet five minimum project eligibility criteria, 44 CFR 206.434(b), as follows:

(a) The Project conforms with the State Hazard Mitigation Plan (HMP):

HMP Goal 1 - Protect life and reduce injuries resulting from natural hazards

Presently, Highway 101 is closed several times each year due to flooding. When Wilson River Loop Road also closes due to high water, access to Tillamook County General Hospital, the County's only hospital, is cut off to ambulances and other emergency vehicles transporting patients from the north end of Tillamook County, the most populous area of the County outside the City of Tillamook. In such cases, access to Seaside Hospital in Clatsop County is also usually blocked south of Seaside, leaving this population at great risk to injury or death without any hospital care. The proposed project will reduce depths and durations of this highway closure due to flooding.

HMP Goal 2 - Minimize public and private property damages and the disruption of essential services

The stretch of commercial property that will be benefited by this Project consists of a swath of businesses 1,000 feet wide along Highway 101 over one mile long. This area represents the business core of Tillamook City's highway commercial district, containing a number of the County's major employers. Even those properties in this area that are elevated sustain damages due to business disruption. A number of the remaining businesses have sustained repetitive loss from direct flood damage. Moreover, when the highway closes there are major disruptions to businesses outside the flood plain due to employees who cannot get to work. The proposed project will have a dramatic effect in reducing property damage and business disruptions. There are over 500 structures in the overall area that receive some benefit in flood level reduction to the project.

HMP Goal 3 - Increase the resilience of local, regional and statewide economies

When Highway 101 closes, some of the County's largest employers have to either shut down or reduce production. Businesses such as Tillamook Cheese, Fred Meyer, Rosenberg's Builders Supply, to name a few, are either forced to close or sustain major disruptions. Moreover, goods in transit over Highway 6 from the Willamette Valley to points in the flood area, in North Tillamook or in Southern Clatsop County are unable to reach their destinations. The flow of feed to farmers and milk to the Tillamook County Creamery Association or bottlers in the Willamette Valley are interrupted. Milk production often has to be dumped. Once again, this Project will have substantial benefits to the resilience of local, regional and state economies.

HMP Goal 4 - Minimize the impact of natural hazards while protecting and restoring the environment and

HMP Short Term Action #3 - Continue seeking effective hazard mitigation opportunities compatible with habitat and fisheries protection via multi-objective mitigation efforts

Out of the 59 project alternatives considered as part of the US Army Corps of Engineers Feasibility Project and the ten project alternatives analyzed under Project Exodus, the Southern Flow Corridor project was not only the most effective at flood mitigation but it is also the one project that provides the most environmental restoration, with approximately 450 acres of salt marsh creation and many miles of stream restoration. Perhaps more importantly, the Southern Flow Corridor Project has substantial benefits to the federally listed threatened and endangered Coho Salmon, benefits to Chinook and Chum Salmon, as well as to Steelhead Trout.

Long Term Action #6 - Assist local communities in securing funding to implement measures to mitigate damage to buildings exposed to or having experienced repetitive losses

Although Tillamook County has done much to relocate National Flood Insurance Program (NFIP) repetitive loss structures, there are still yet other NFIP repetitive loss structures remaining in the Project area. Moreover, there are other repetitive loss structures in the Project area that are not in the NFIP. All of these would be directly benefited by FEMA funding of the proposed mitigation project.

(b) Provides a beneficial impact upon the designated disaster area

Tillamook County was designated as a disaster area under DR-1733-OR that also included a number of Western Oregon Counties and the state. As noted above, there are substantial benefits from this Project locally, regionally and for the State of Oregon.

(c) Conforms to environmental laws and regulations

In addition to the substantial flood mitigation benefits from this Project, it has very large ecosystem restoration benefits and will likely qualify for a streamlined restoration permit. The project has been designated to qualify under the Federal Nationwide Permit (NWP-27) and the General Authorization under the State of Oregon Removal-Fill law. It has also been designed to comport with NOAA Fisheries restoration programmatic biological opinion (SLOPES IV).

(d) Solves a problem independently or constitutes a functional portion of a solution

The Southern Flow Corridor constitutes a standalone, independent solution to flooding in the lower Wilson River floodplain. It provides substantial flood level reduction over a wide area through the removal of man-made flow impediments to the maximum extent possible. No other projects are needed for these benefits to occur.

Oregon Solutions, the locally driven stakeholder group formed after the flood of 2006 to address flooding issues, identified a suite of flood damage reduction measures for implementation. Many measures were immediately implemented, such as removal of fill in the floodway; but in recognition of the complexity of flood issues on the lower Wilson River, an extensive technical alternatives analysis was undertaken with multiple public meetings and input. As a result of this process, Oregon Solutions voted to select Project Exodus as the preferred alternative for implementation. Project Exodus consists of three geographically separated projects, one of which is the Southern Flow Corridor. The Southern Flow Corridor was selected as the first project to implement, due to its standalone nature, availability of FEMA funding and having the widest and most significant flood damage reduction benefits of the three projects.

The Southern Flow Corridor Design Report (Exhibit A) and Benefit-Cost Analysis (Exhibit C) describe and analyze this project on its own, with benefits and costs compared to existing, present day conditions.

(e) Is cost effective

The Stafford Act and its implementing regulations require that HMGP projects be cost effective. 44 CFR 206.434(b). Among the minimum criteria for cost effectiveness is that a project must be "cost effective and substantially reduce the risk of future damage, hardship, loss or suffering resulting from a major disaster".

The cost effectiveness of the Project has been demonstrated by a BCA using FEMA developed software. The Project functions to provide risk reduction over all floods from a two year through 100 year event. The BCA Report (Exhibit C), addresses the concerns raised, including providing validation of the FEMA depth-damage curves with local observed historic damages.

In addition to the five minimum project eligibility criteria addressed above, an HMGP project must also meet three minimum project selection criteria, 44 CFR 206.435(b), as follows:

(f) The project must provide the best fit within the overall development plan and/or the Hazard Mitigation Plan for the area

For more than a decade, POTB, Tillamook County and the City of Tillamook have worked with other local, state and federal partners for flood mitigation and ecosystem restoration planning for this area. Initially, with the US Army Corps of Engineers Feasibility Study and later with the Project Exodus study, HEC-RAS computer modeling was used to identify a series of alternatives which were narrowed down to the preferred Alternative identified in the Project Exodus Design Report (Exhibit B), of which the

Southern Flow Corridor is the more important stand-alone component. This Project has the solid support of the local community and local governments as well as state and federal regulators.

Additionally, this Project fulfills the following goals and actions of the current City of Tillamook Hazard Mitigation Plan.

Goal A: Protect Life and Property

Engage in and promote long-term, cost-effective regional planning and property protection activities that will reduce or eliminate adverse impacts from flooding.

Goal B: Preserve Natural Areas Related to Flooding

Preserve and restore natural areas and water conveyance to enhance flood plain function. Protect or enlarge existing wetlands and open areas to maintain or create additional floodwater holding areas. Preserve and enhance public open space along floodways, rivers, sloughs, tributary streams and the bay to insure adequate floodplain function.

Goal D: Modify existing structures to improve hydrologic function

Develop solutions that ensure all non-emergency flood mitigation maintains or enhances natural resource protection. Implement structural flood mitigation solutions to protect critical structures and infrastructure when other alternatives do not exist.

Goal F: Improve and Promote Partnerships, Coordination and Implementation

Foster on-going community partnerships and forge new links with other agencies and organizations within and outside the city when implementing flood mitigation activities.

(g) Selected projects should be those that clearly reduce loss of life, loss of essential services, damage to critical facilities or severe economic hardship

This Project will substantially reduce the risk of future flood damages to the benefitted section of railroad. As noted elsewhere in this application, the POTB railroad will continue to be an important asset to the POTB. In past years when Highway 101 and Wilson River Loop road closed, the railroad was the only transportation link joining the North and South ends of Tillamook County. Additionally, Tillamook County General Hospital, the County's only hospital, is a critical facility. As indicated elsewhere within this brief, the limited hospital access issue for much of the County's population will be reduced by the project.

(h) Have the greatest potential to reduce losses after examining the alternatives available

As indicated in several locations elsewhere within this brief, this Project has the greatest potential to reduce future losses after examining the 59 alternatives identified in the US Army Corps of Engineers Feasibility Study and the ten alternatives explored in Project Exodus. The HEC-RAS modeling demonstrates between a one foot and one point five foot reduction in flood levels along Highway 101 and a six inch reduction along the POTB's railroad during a 100 year flood event. No other project examined or modeled over the last decade has shown as much potential to reduce future losses.

The HMGP manual (at Page 5-3) also lists a number of other considerations the state may add to its evaluation criteria when selecting an HMGP project. Each of the following criteria from that list is justified by elements of the proposed Project:

- Level of protection provided by the Project
- Measures designed to accomplish multi-objectives, including damage reduction, environmental enhancement and economic recovery
- The applicant community's participation in the National Flood Insurance Program, compliance record and Community Rating System level
- Local commitment and public buy-in

II. Project Eligibility

FEMA's Disaster Assistance Policy for Alternate Projects authorizes an eligible applicant to perform hazard mitigation measures unrelated to the original facility. DAP9525.13 (VI). In order to do so, an applicant must first demonstrate project eligibility under the guidelines of DAP9525.13 (VII). The following section lists each of those guidelines and applicant's documentation of eligibility.

(1) **The applicant may request approval of an alternate project from FEMA through the grantee which an applicant determines that the public welfare would not be best served by either restoring a damaged facility or by restoring the function of a damaged facility. Either one of the two conditions must be met. See 44 CFR 206.203(d)(2).**

The POTB has previously received authorization from FEMA to pursue a series of Alternate Projects in lieu of restoring its damaged railroad facilities. This Project application is one in that series of Alternate Projects.

(2) **The proposed alternate project must be a permanent project that benefits the general public. See 44 CFR 206.203(d)(2).**

The proposed project is permanent and the public benefits are substantial. As shown in the Southern Flow Corridor Design Report (Exhibit A), during the 100 year flood there will be up to a one foot reduction in flood levels at the south end of the Project area along Highway 101 and up to one point five foot flood reduction in flood levels at the north end of the Project area along Highway 101. This portion of the Project area, consisting of 500 feet on each side of Highway 101, contains a major piece of the City of Tillamook's commercial businesses representing millions of dollars in value. This Project will also reduce flooding on POTB's railroad up and downstream of the north-south rail line by about six inches in the 100 year flood. The environmental benefits will also be substantial. Between 500 and 600 acres of salt marsh wetland will be created as a direct consequence of this Project with direct benefit to the federally listed Coho Salmon. Also both Hoquarton and Dougherty Sloughs are currently listed by the Oregon Department of Environmental Quality (DEQ) as water quality impaired streams. According to the Director of DEQ, the beneficial effects on water quality in those streams as a direct result of this Project will be "immediate and dramatic".

(3) **A damaged facility whose repair costs were used for an approved alternate project may be eligible for future PA funding provided that the applicant funded and performed the repairs to the original damaged facility**

This policy guidance does not appear to be relevant to the issue of eligibility of the proposed Alternate Project.

(4) **Funds may be used to repair or expand other selected facilities to construct new facilities, purchase equipment or to fund hazard mitigation measures in accordance with other provisions of this policy**

This policy authorizes the proposed Alternate Project to be funded as a hazard mitigation measure.

(5) **FEMA expects the proposed alternate project to serve the same general area that was being served by the originally funded project**

The proposed Alternate Project is situated entirely within the exterior boundaries of the POTB. The POTB's railroad traverses through the project area.

(6) **The FEMA Regional Administrator must approve all alternate projects prior to the start of construction. See 44 CFR 206.203(d)(2)(v).**

The appeal is an important step in that process.

III. General Work Eligibility

Under 44 CFR 206.223 (a)(3), to be eligible for financial assistance, an item of work must be the legal responsibility of an eligible applicant

The POTB is a district and political subdivision of the State of Oregon organized under ORS 777.010 and 777.050. The State of Oregon has granted to each port, to the full extent possible "… full control of all bays, rivers and harbors within its limits and the sea." **ORS 777.120**. Under Oregon law, the POTB has legal authority and responsibility to:

(1) Regulate the placement or removal of obstructions to navigation from the bays, rivers and harbors; and

(2) Engage in the control and prevention of river and stream bank erosion and the prevention of damage from flood-water and sediment. Id.

The POTB is the owner of the railroad line and has been the owner prior to and since the date of the disaster. According to FEMA policy guidance, an eligible mitigation measure may be distinct from the integral parts of the damaged property. In this instance, the proposed hazard mitigation measure:

(1) Directly benefits the disaster-damaged railroad line owned by the POTB.

(2) Will be conducted within the jurisdictional boundaries of the POTB wherein the POTB has authority under Oregon law to take measures for the prevention of flood-related damage to life and property.

(3) Will be conducted on land to which the POTB has made arrangements to obtain ownership.

Based on a review of Oregon law relating to POTB's, federal law and regulations, hazard mitigation project documentation and FEMA recovery policy guidance documents, including appeal letters construing the requirements for legal responsibility under 44 CFR 206.223(a), both Senior Deputy Legislative Counsel Dexter Johnson and Tillamook County Counsel William Sargent have found that the POTB satisfies the requirement for legal responsibility. Legislative Counsel

Dexter Johnson's August 24, 2010 letter opinion is attached as Exhibit D; and Tillamook County Counsel William Sargent's August 20, 2010 letter opinion is attached as Exhibit E.

As noted above, the POTB has made arrangements to take ownership of the lands and easements upon which the hazard mitigation project will be constructed. More specifically, there are two Intergovernmental Agreements (IGAs) that not only address the process for the POTB's assumption of ownership for the project lands, but that also provide for the necessary assurances related to long-term and ongoing maintenance, repairs and operations for the project site.

Under an IGA effective April 14, 2010 (Exhibit F) between the POTB and Tillamook County, a process is set forth for the transfer of title and easements for the Project Lands upon completion of certain conditions precedent, including approval of the project by FEMA as an eligible FEMA Alternate Project. See Section 1.1, Exhibit F. No transfer of the lands will be made until these conditions precedent have been fully completed. There is also an additional IGA dated July 31, 2002 (Exhibit G) between the County, Soil and Water Conservation District (SWCD) and the Oregon Department of Fish and Wildlife (ODFW) that provides an existing administrative framework for financing on-going and long-term maintenance, repair and operations of the existing 377 acre County-owned wetland. The April 14, 2010 IGA (Exhibit F) provides at Section 2.3, that upon POTB's acquisition of the Project Lands, POTB will enter into an amended version of the July 31, 2002 IGA. This latter Section 2.3 is important because it provides the framework for ongoing and long term maintenance, repair and operations. For example, under the current version of the 2002 IGA, an annual work plan for maintenance is developed (Section 1.2), the County will coordinate and provide for ongoing maintenance and include within its annual budget such amounts as might be required to perform this work (Section 2.5). The County is responsible for making all Project maintenance expenditures (Section 2.3). A fund within the County budget is established for that purpose (Sections 5.1 and 5.2). The addition of the POTB to this financing structure further reinforces the ability of the POTB to carry out its financial assurance for ongoing and long term maintenance, repairs and operations.

Moreover, the Tillamook Bay Habitat and Estuary Improvement District (TBHEID) is an ORS Chapter 554 corporation for flood control that has been involved for more than a decade on project maintenance within the existing 377 acre tract despite the fact that the County tract is not part of its district by way of County membership in the corporation. Not only is TBHEID a member of the management committee that advises on project maintenance as described in Exhibit G, Section 5.3, but it is not subject to the same limitations of Oregon budget law as are the other parties. TBHEID collects approximately $30,000 annually in dues from its members. TBHEID has also provided a letter of financial assurance to assist with the expenses of on-going and long term maintenance, repairs and operations (Exhibit H).

Finally, the POTB has been an enrolled participant with the city, county, state and federal partners in the Oregon Solutions program that led to the proposed Project. This Oregon Solutions Project was established by Oregon Governor Ted Kulongoski, who appointed State Senator Betsy Johnson and County Commissioner Mark Labhart as Co-Conveners. The staff of all of Oregon's congressional delegation are also active participants. The POTB and all other members of the Project Team each signed the Declaration of Cooperation and a separate Statement of Assurances. (Exhibit I). The proposed Project is an important part of applicant's commitment to this Oregon Solutions Project.

EXHIBIT LIST

A. Southern Flow Corridor – Landowner Preferred Alternative Preliminary Design Report, May 2011

B. Project Exodus Design Report, February 2010

C. Benefit Cost Analysis Report for Southern Flow Corridor (Revised), May 2011

D. August 24, 2010 letter opinion by Legislative Counsel Dexter Johnson

E. August 20, 2010 letter opinion by Tillamook County Counsel William Sargent

F. April 14, 2010 Intergovernmental Agreement between Port of Tillamook Bay and Tillamook County

G. July 31, 2002 Intergovernmental Agreement between Tillamook County, Oregon Department of Fish and Wildlife and Tillamook County Soil and Water Conservation District

H. May 19, 2011 letter from the Tillamook Bay Habitat and Estuary Improvement District

I. Oregon Solutions Declaration of Cooperation (with the Port of Tillamook Bay's signature page) and Port of Tillamook Bay Statement of Assurances

J. Letter of Financial Commitment dated May 9, 2011 from the Oregon Watershed Enhancement Board

K. Loan Commitment dated May 18, 2011 from TLC Federal Credit Union

Southern Flow Corridor
Landowner Preferred Alternative
Preliminary Design Report

Prepared for:

Oregon Solutions Design Team
Under contract to Tillamook County
May 2011

Prepared by:

Northwest Hydraulic Consultants
16300 Christensen Rd., Ste 350
Seattle, WA 98188

In concert with

NEHALEM MARINE MFG.

Table of Contents

1 Introduction

This report describes the Southern Flow Corridor – Landowner Preferred Alternative project. Project design elements, flood level reduction benefits, and design, construction, real estate, and maintenance costs are presented. This report is designed to be a concise description of the Southern Flow Corridor (SFC) project. The project background, alternatives analysis, context within Project Exodus, and other additional information are contained in the Project Exodus Final Report dated February 2010.

2 Background

Northwest Hydraulic Consultants Inc. (NHC) in conjunction with HBH Engineering Consultants was selected by the Oregon Solutions Design Team to analyze flooding on the Wilson River in Tillamook County, Oregon and develop solutions to reduce flood levels. After an alternatives analysis and several rounds of revision and input from the OS Design Team, the preferred alternative was selected named Project Exodus. Project Exodus consists of three separate, independent elements that address flood level reduction in the lower Wilson River floodplain, the Southern Flow Corridor being one of them.

Subsequent to the selection of Project Exodus, the OS Design Team decided to pursue implementation of the SFC 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 SFC had potential significant funding available in the form of FEMA alternate project funds through the Port of Tillamook Bay.

At the same time, concerns were raised with the original SFC proposal in regards to the conversion of agricultural lands to restored marsh as a result of the proposed levee removals. NHC was then directed to evaluate the hydraulic impacts of the SFC on its own as a standalone project, and to investigate alternatives that minimized the amount of agricultural lands that might be lost. NHC presented its findings in June 2010, which demonstrated that the SFC 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.

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. NHC modeled this modification to ensure continued flood level reduction performance. At the May 13, 2011 OS Design Team meeting, this modification was approved.

3 Project Description

3.1 Overview

The primary intent of Southern Flow Corridor (Figure 1) is to remove manmade impediments to flood flows to the maximum extent possible in the lower Wilson River floodplain. The project accomplishes this by extensive removal of existing levees and fill. New setback tidal dikes are required to protect adjacent private lands. Areas outside the setback dikes will be restored to tidal marsh.

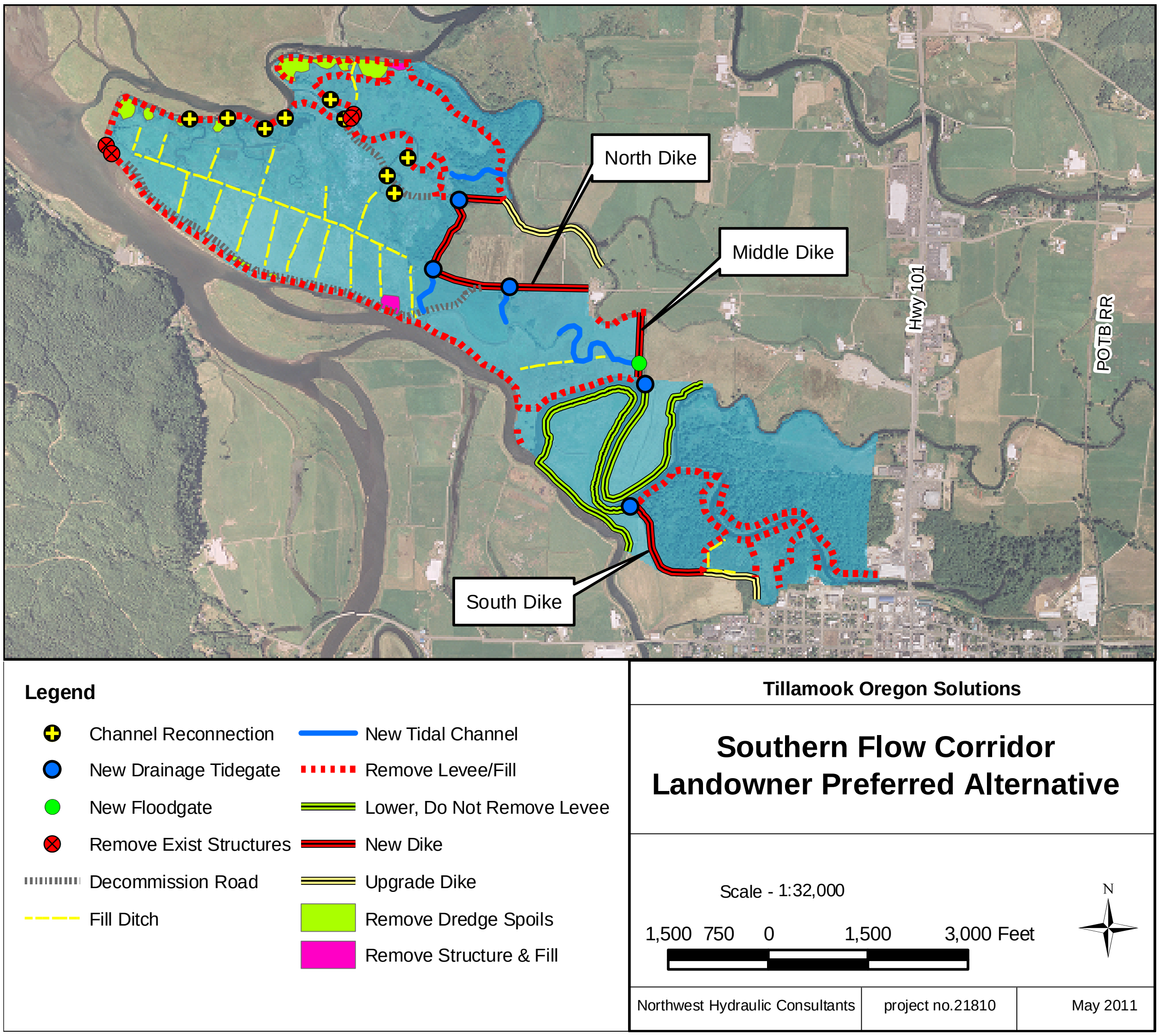

Figure 1: Southern Flow Corridor Project Elements

3.2 Project Elements

3.2.1 Levee and Fill Removal

Removal of the numerous levees and fills within the flow corridor provides the conveyance capacity increase that results in reduction of flood levels over a wide area of the lower Wilson River floodplain. In general, material will be removed to slightly below natural floodplain/marsh level. This elevation is around 9 feet at the mouth of the Wilson River, increasing to 10+ feet farther upstream. Lowering areas further than this could provide some additional flood level reduction, but the cost increase would be large and the benefits temporary as the tides and river will rebuild the lands back up to natural elevations. In a few locations, primarily in the area south of Hoquarton Slough, some short levee segments that are parallel to the flood flow path may be left as is. These segments will not affect flood level reduction as they are parallel to the flow, and they have established trees growing on them that provide habitat benefit.

Construction sequencing and methods are important in this task and are discussed further in the construction section. It is estimated there is 98,000 cubic yards of fill to be removed. The removed fill will be used for the new dikes, filling ditches, and any remainder spread on site to speed rebuilding to natural salt marsh elevations.

3.2.2 New and Upgraded Dikes

7000 feet of new tidal dike will be constructed in order to protect adjacent agricultural lands from tidal influence in the project area. 3100 feet of existing dike will be upgraded and tied into the new dike. There will be three dike segments constructed.

Most of the dikes will be built to the design elevation of 12 feet, with some adjustments where they tie into existing dikes or high ground. This elevation was selected based on modeling various dike elevations and historic tidal data – the goal is to build as low a structure as possible to pass river flood flows out while preventing high tides and coastal storm surges from getting in. The downstream side of each dike will have a 5:1 slope in order to pass overtopping floodwaters with minimal damage.

Construction will consist of stripping organic topsoils, excavating any soft or unsuitable soils in the subgrade, compacting the subgrade, and then constructing the dike proper. The dike will be constructed with materials from removal of the existing levees and fill. Organic topsoils stripped from the dike footprint and from spoils being removed elsewhere on the site will be placed on the side slopes and all exposed surfaces hydroseeded. The dike will be topped with an all-weather, crushed rock driving surface.

3.2.3 New Floodgates

A new high capacity floodgate structure will be incorporated in the middle dike in order to replace the existing gates, provide additional conveyance capacity, and allow rapid post flood drainage. The four 5x12 foot side hinge gates on the existing flood gate at the western end of the project area will be reused on the new floodgate, and an additional four gates added. The structure is anticipated to be a cast in place concrete structure with a sheet pile seepage cut off wall. The gates are designed to function only during floods and so will be set around floodplain elevation rather than in a channel. The upper end of the relic Nolan Slough channel will be excavated to the outlet of the new floodgates to serve as the exit channel from the gates. Flood flows will pass through the gates every second or third year, a sufficient frequency which will keep the channel open and able to convey flood flows out to the main river channels and bay.

3.2.4 Hall Slough Elements

Flood reduction requires improving the hydraulic connectivity between Hall and Blind Sloughs. This will be accomplished by removing the Fuhrman Road berm and construction of a Hall Slough – Blind Slough connector channel.

3.2.5 Drainage Network Improvements

Existing 5 and 6 ft diameter round tidegates currently installed on the site will be reused on replacement pipes in the new dikes to provide equal or better drainage from adjacent pasture lands. In the north dike, the outlet channels will use existing or constructed sinuous tidal channels to provide connections to the main river. Improvements to the existing drainage ditches inside the new dike will be made as necessary to connect them to the new tidegates and ensure that equal or better drainage is maintained once the project is implemented. This will be a relatively minor project component consisting of cleaning existing ditches and excavating some new connector segments near the new levee.

3.2.6 Habitat Restoration and Other Elements

Habitat restoration activities will generally be limited to removing constructed features that would impede the free exchange of tides within the project. The natural processes linked to the tides will bring in the water, salinity, sediment, and seeds that will initiate process based natural restoration.

Existing ditches will be filled with onsite organic materials in order to ensure natural tidal channels can develop without being short-circuited by the linear ditches. Existing relic tidal channels will have plugs and culverts removed to allow full tidal access. The few roads on site will have any crushed rock or large gravel surfaces removed and the roadbed de-compacted. There is one barn and one residence within the project area that will be demolished.

4 Flood Reduction Benefits

Flood level reduction and increases for the 2001 (~ 1.5-year), 1999 (~6-year), and 100-year floods are shown in the following figures. It can be seen that the project provides flood level reductions across most of the lower Wilson River floodplain at all sizes of floods. Some small flood reductions extend up the Tillamook and Trask systems.

4.1 Areas of Flood Level Increases

Flood level rises due to the project are predicted in one area in small floods, east of the new Middle Dike ("A" in Figure 2). This area is benefited under current conditions by the large flood storage volume available in the wetlands acquisition area. In smaller, more frequent floods, flows between Hall and Dougherty Sloughs will now fill the reduced storage volume more rapidly. Although the new dike will have substantially larger flood gate capacity, these will not begin to operate until water levels inside exceed those outside, so water levels will quickly rise to somewhat above the flood/tide level outside. At this point, the flood gates will begin to operate and discharge water out. It is important to note that these increases only occur in very small floods; in larger floods, the area benefits from similar flood level reductions as the rest of the floodplain.

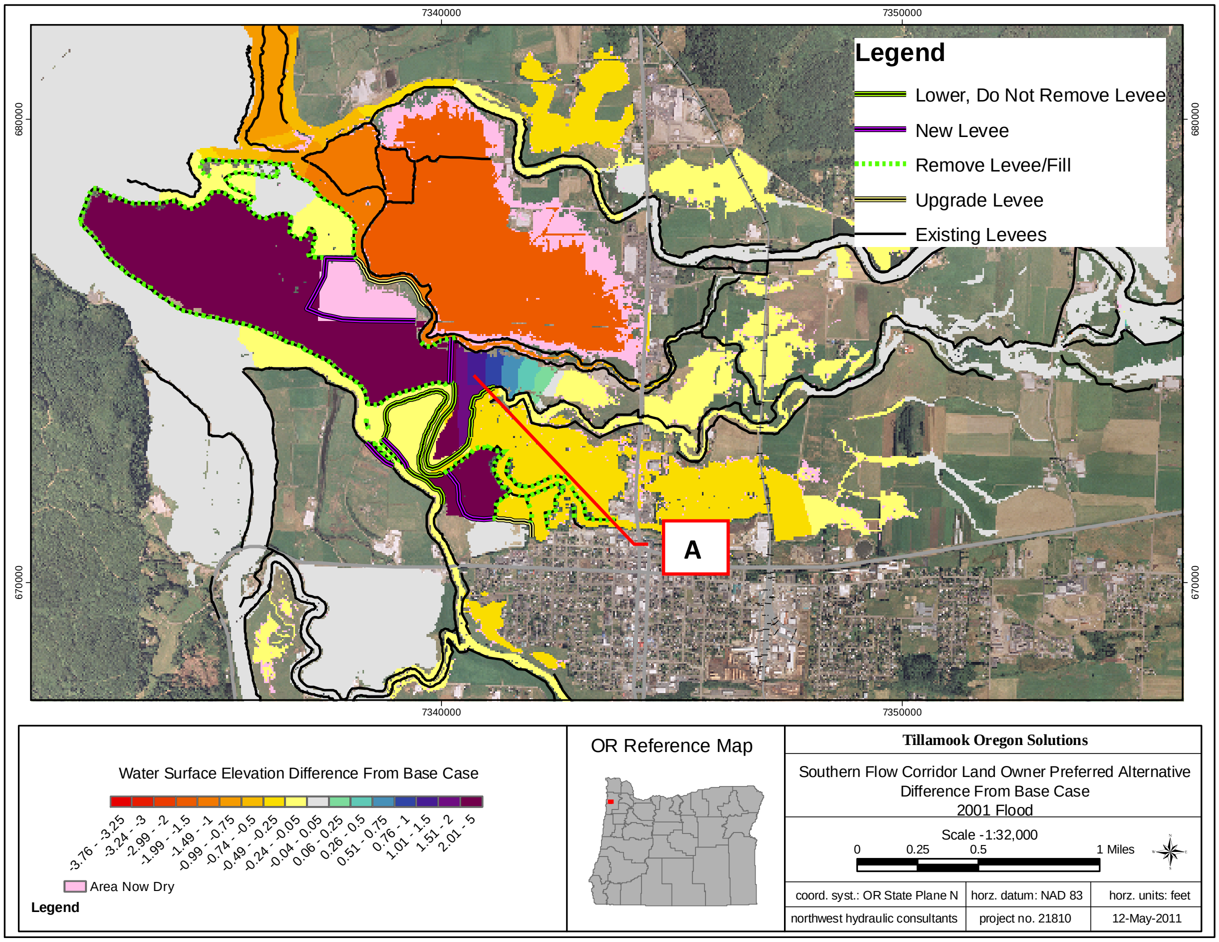

Figure 2: Changes in Flood Levels, 2001 Flood (1.5 yr Flood)

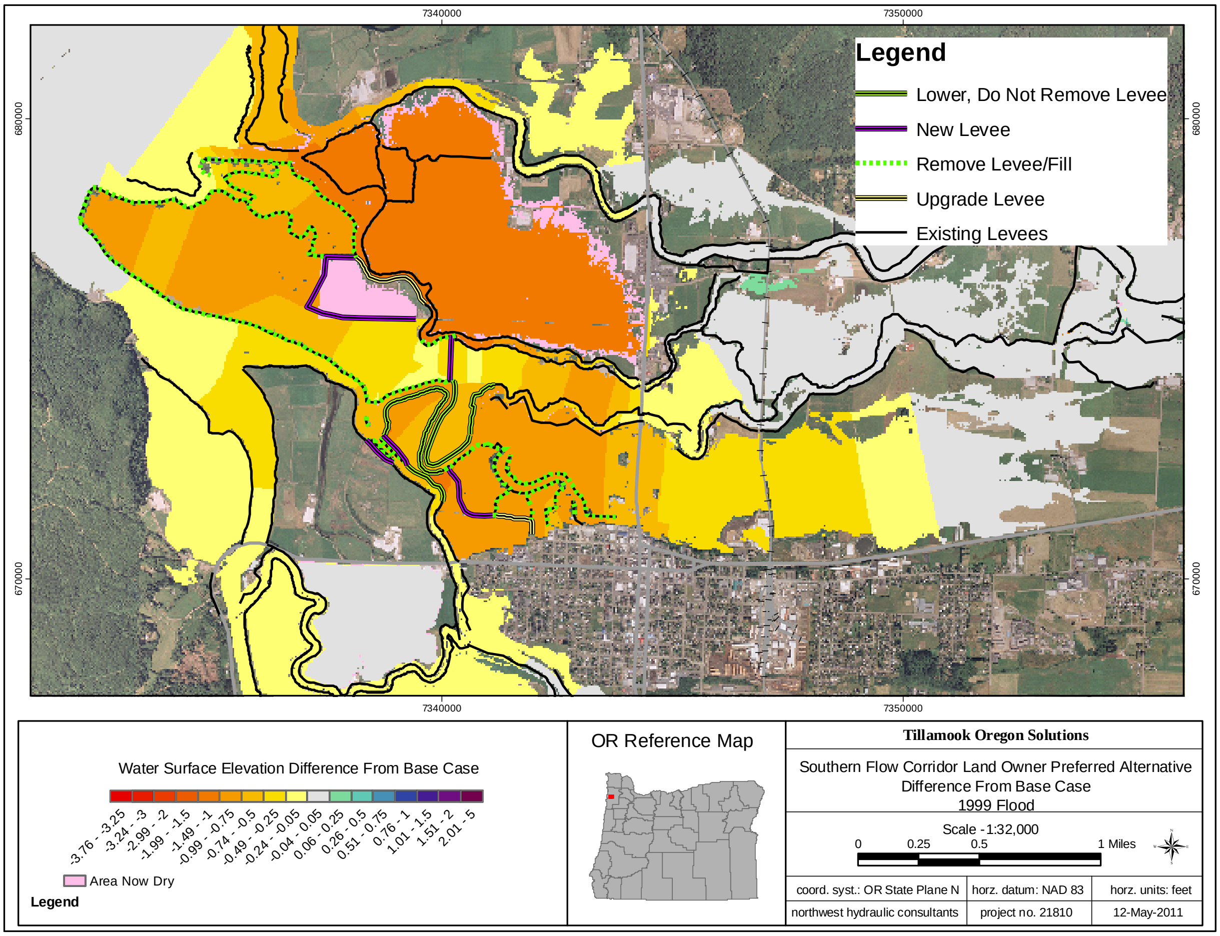

Figure 3: Changes in Flood Levels, 1999 Flood (6-yr Flood)

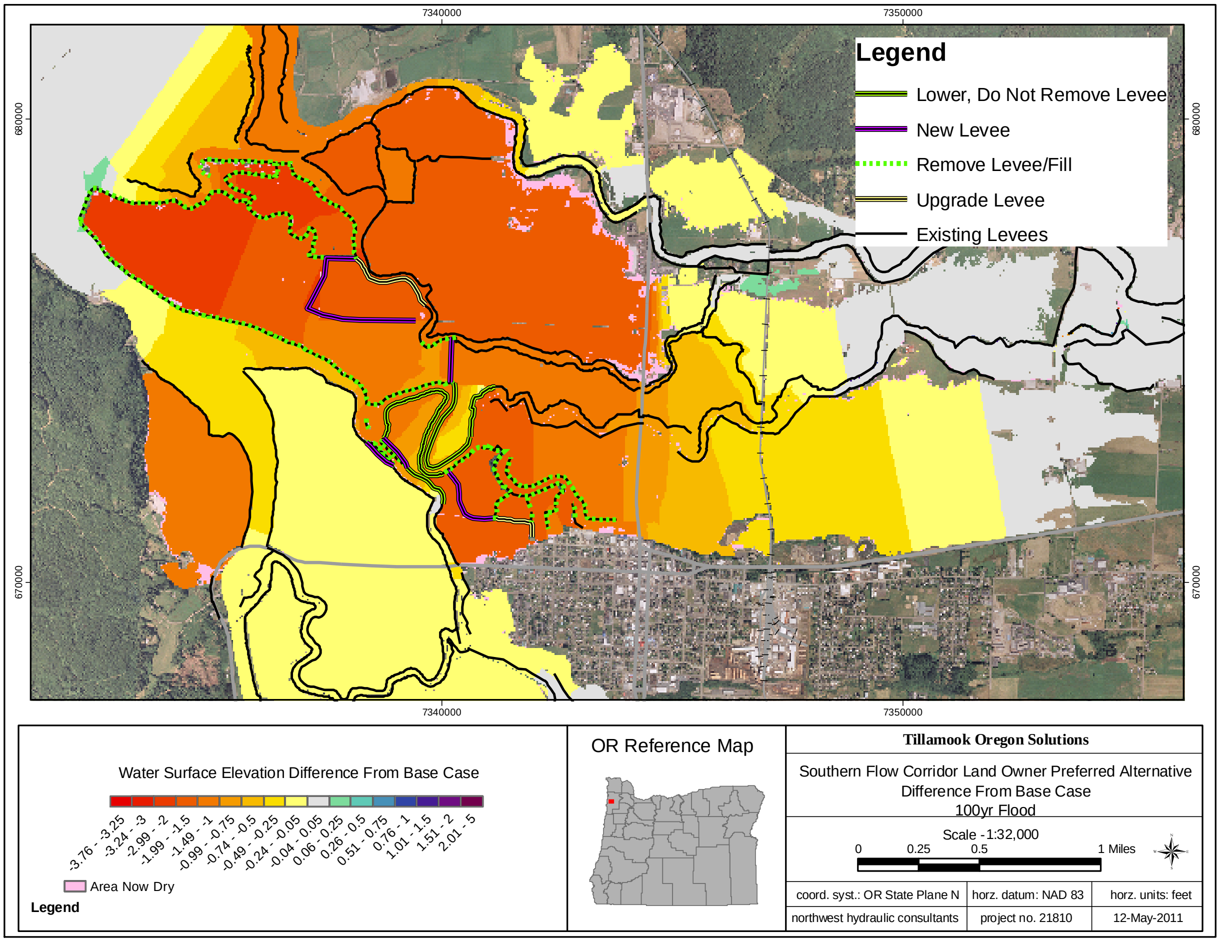

Figure 4: Changes in Flood Levels, 100-yr Flood

4.2 Long Term Changes in the Southern Flow Corridor

Restoration of tidal flows to the project site will initiate significant long term changes in the lands that have been protected by the diking system for decades. Most of the freshwater wetland and pasture vegetation within the Wetlands Acquisition Area will not be able to tolerate the saline waters that will enter the site and will quickly die off. Given that the site is subsided by several feet, the lands will initially convert to low marsh or even mud flat habitats. Lower portions of the spruce forest in the northwest corner will also likely die off, either through salinity or simply higher water levels. Forested wetlands along the southern project boundary near the City may also see die off due to higher water levels once they are not protected by dikes. Recent sampling of Hoquarton, Dougherty, and Hall Sloughs by TEP showed little to no salinity, indicating the project site is located in the transition zone between freshwater and saltwater tidal habitats. Vegetation within the project areas farther from the bay may not see saline or brackish waters.

Removal of the dikes combined with daily high tides and river flows will immediately begin bringing sediment onto the site. Ultimately it is expected the lands will rebuild from their current subsided condition up to high marsh, which around the project site typically sit 1-2 feet higher than MHHW. Rates of marsh building are difficult to predict, but are expected to occur on the timescale of decades. The abundant sediment supply and proximity to the rivers should help to accelerate the process. Areas close to the river and connected tidal channels will rebuild quicker, while more distant ends of the site will receive less sediment and accrete slower.

Channel changes due to the project are expected in several areas. Blind Slough will undergo enlargement as it becomes an important flood flow channel, conveying flows both from new floodgates in the dike and from the Hall Slough connector channel. Other relic tidal channels within the Wetlands Acquisition Area will also adjust as they begin to convey tidal flows in and out of the site again.

Some lateral movement and change of the main river channels can also be expected where rock armoring is removed. Channel migration is expected to be relatively small based on historic patterns.

4.3 Sustainability of Flood Level Reduction Benefits

The ability of Project Exodus to continue providing flood reduction benefits under changing conditions was tested for two scenarios using the 1999 (5-yr flood). Simulating lands in the upper conveyance corridor that had been rebuilt to natural floodplain levels resulted in minimal changes to project performance. Of greater concern is long term sea level rise. The current IPCC predictions for global sea level rise by 2100 are from 0.6 to 2 feet. Model runs of the 1999 (5-yr flood) with tidal sequences one and two feet higher than observed were performed. Flood level reductions due to Project Exodus persisted in most of the area with the one foot rise, but were not seen with a two foot rise due to the tidal backwater extending through the area.

5 Implementation Tasks and Costs

5.1 Real Estate

Real estate needed to implement this element is summarized in Table 1 and Figure 5 below. The entire 384 acres of County owned public lands in the project area (the Wetlands Acquisition Area) are used for flow conveyance and habitat restoration. Around 6 acres of land owned by the City of Tillamook will be needed to tie dikes into high ground and some fill removal. 120 acres of private lands are to be acquired. The two Jones parcels totaling 48 acres are currently in pasture. The Allen parcel is in agricultural use, but the 4.1 acres required are mostly open water and associated wetlands of Blind Slough, not pasture. The Fuhrman property is a residence on the banks of the Wilson River with a driveway access (not shown) from Goodspeed Road. The Sadri property is predominately spruce forest wetland.

There are six additional private properties held by four owners where temporary construction and flood easements will be required for either dike upgrades, levee lowering, or fill removal (yellow areas in Figure 5). The flood easements will set the elevations existing dikes on the properties may be maintained at in order to ensure continued function of the Southern Flow Corridor.

The Allen cost is estimated by applying the per acre option cost for the Sadri property, which is similar in type (wetlands and open water). The Jones cost uses unit costs from an appraisal recently completed on the same property for acquisition of 30 acres. The flood control easement costs are based on an estimate of $550/acre considering the benefits accrued and changes to the properties due to the construction and easements acquired. These properties will all benefit from reduced flood levels due to the project, and are all within the floodway and so already have an existing high level of restriction on allowable activities. The temporary construction easements are estimated at $10,000 each.

Table 1: Real Estate Costs

ID	Property	Acres	Cost ($)	Note
A	Fuhrman	1.5	$ 675,000	Signed Option
B	Allen	4.3	$ 31,300	Estimate
C	Jones	48.0	$ 192,000	Scaled Appraisal
D	Sadri	66.0	$ 485,000	Signed Option
E	Aufdermauer (Flood Easement)	50.5	$ 27,800	Estimate
F	Beeler (Flood Easement)	34.8	$ 19,100	Estimate
G	Temp. Construction Easements (2)	--	$ 20,000	Estimate
		Subtotal	$ 1,450,200	
	Appraisals/negotiations		$ 60,500	
	Title Reports		$ 2,500	
	Surveys for Legal Descriptions		$ 12,000	
	Environmental Assessment		$ 12,500	
	Closing costs/Title Insurance		$ 2,500	
	TOTAL		$ 1,540,200	

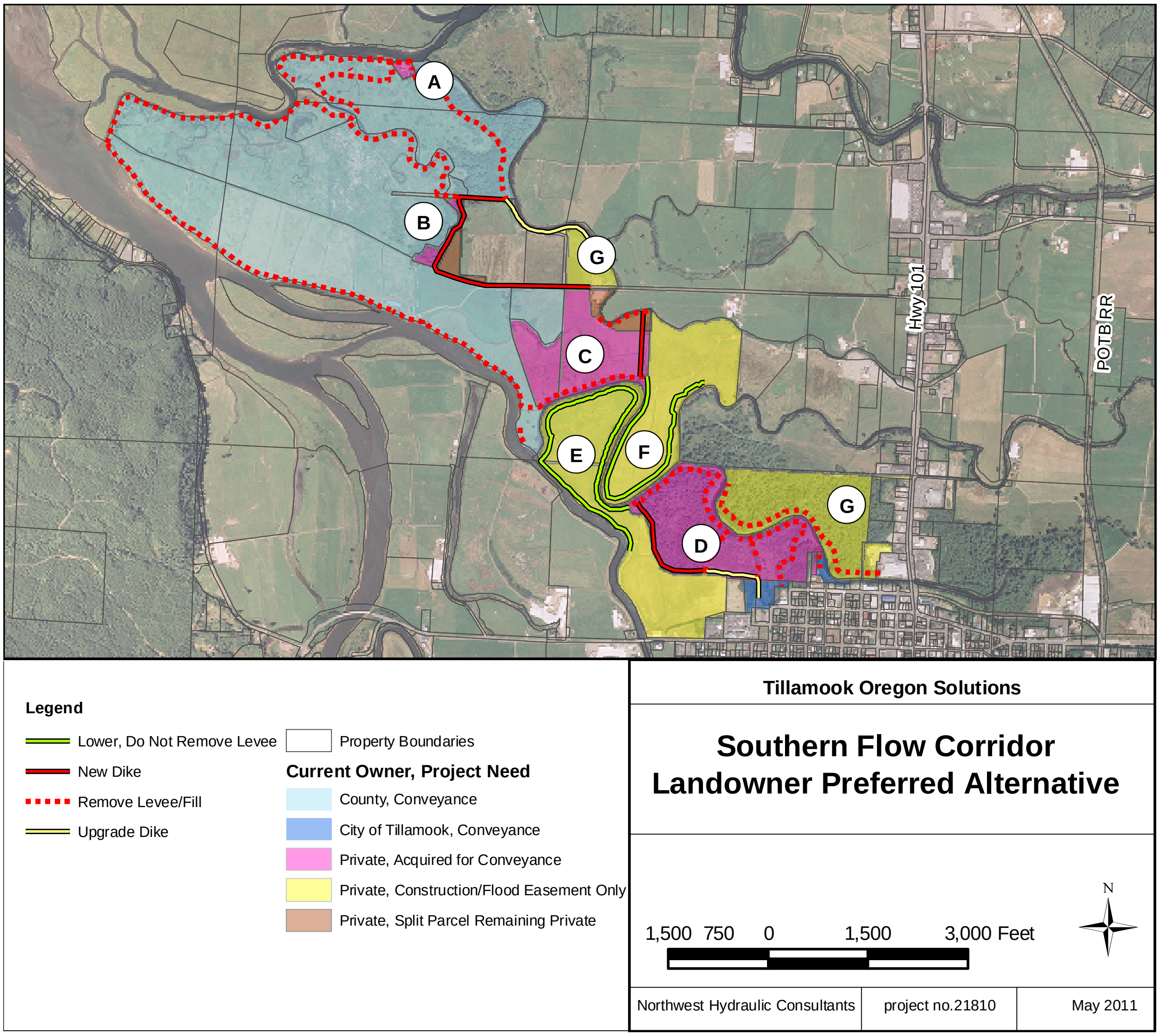

Figure 5: Southern Flow Corridor Real Estate Status and Needs

5.2 Design and Engineering

Key tasks will include ground survey and detailed field inspection of all sites. A geotechnical investigation of the new dike alignment will be required, including some borings and test pits. Completion of these tasks will give greater certainty to quantity and cost estimates. The 30% plan set will contain all information needed to support permit submittal. The hydraulic model will be updated to reflect the current design and the analysis rerun. The project will be analyzed using the new FEMA model for regulatory compliance. Final design will complete the preliminary design and incorporate any permit review and other environmental assessment requirements that may occur. The end deliverable will be a construction ready plans, specifications, and engineering (PSE) package. Costs for design and engineering are included in the construction cost estimate presented below.

5.3 Permitting

No major permitting hurdles are anticipated for Project Exodus. The Southern Flow Corridor has large ecosystem restoration benefits, and by itself would likely qualify for a streamlined restoration permit, based on work developing the April 2009 grant application for a smaller restoration of the Wetland Acquisition site. The full participation of regulatory agencies in the Oregon Solutions process and their familiarity with the Wetlands Acquisition Area and proposed project will also help to streamline the permitting process.

Environmental permitting was scoped and a cost estimate developed in 2010. Based on this scope the following elements would be completed:

1. Environmental Permit Scoping
2. Wetland Delineation
3. Wetland Functional Assessment
4. Cultural Resources Assessment
5. Assessment of State and Federal Listed Species (ESA)
6. Alternatives Analysis / Impact Assessment
7. Mitigation Plan
8. Joint Wetland Permit Package
9. Biological Assessment
10. Agency and Client Coordination
11. Project Management

5.3.1 Anticipated Permits

The agencies and anticipated permits that will be required for this project are as follows:

Corps of Engineers & Oregon Division of State Lands - Joint Fill and Removal Permit

Work below the ordinary high water line or in wetlands requires a Joint Fill and Removal permit from the U.S. Army Corps of Engineers and the State of Oregon. The Southern Flow Corridor has been designed to qualify under the Federal Nationwide Permit (NWP-27) and the General Authorization under the State of Oregon Removal-Fill Law. These programs are designed to streamline the permitting process for restoration activities. The NWP-27 authorizes the restoration of former tidal waters, the enhancement of degraded tidal wetlands, and the creation of tidal wetlands. The NWP-27 provides authorization for all wetland creation activities, provided those activities comply with the terms and conditions of the NWP-27.

Oregon´s Removal-Fill Law also allows the Oregon Division of State Lands to grant, by administrative rule, General Authorizations for removal and fill activities that would cause only minimal individual and cumulative environmental impacts, and would not result in long-term harm to water resources of the state. To be eligible for this General Authorization, the project must be for the specific purpose of wetland restoration. The Southern Flow Corridor element meets the type of projects allowed, criteria, and specific authorized activities.

National Marine Fisheries Service – Slopes IV Restoration

The Southern Flow Corridor has been designed to comport with NOAA Fisheries restoration programmatic biological opinion (SLOPES IV). The project meets the requirements of SLOPES IV as it applies to the Oregon Coast Coho salmon (*Oncorhynchus kisutch*). All of the proposed actions are within the range of anticipated effects considered in SLOPES IV. SLOPES IV Restoration identifies and authorizes nine categories of action related to stream restoration and fish passage. This project is limited to five of these categories - Fish Passage Restoration, Off- and Side-Channel Habitat Restoration, Set-back Existing Berms, Dikes, and Levees, Streambank Restoration, and Water Control Structure Removal.

The Joint Fill and Removal permit will trigger the following state agency actions during the public review process. Agency comments will condition the permit as per each agency's requirements.

Oregon Division of State Lands - Wetland Determinations and Delineations

For projects proposed in wetlands, the state removal-fill permit application requires that wetland delineation be completed and verified or "concurred with" by DSL before the permit can be issued.

Oregon Department of Fish and Wildlife

In-Water Timing Guidelines: The in-water work window for Tillamook Bay is November 1 – February 15 and July 1 – September 15 for the Wilson and Trask Rivers. In all likelihood, this project will incorporate work that falls into both timeframes.

Fish Passage Requirement: The owner or operator of an artificial obstruction located in waters in which native migratory fish are currently or were historically present must address fish passage requirements prior to certain trigger events. Artificial obstructions include dams, diversions, roads, culverts, tide gates, dikes, levees, berms, or any other human-made device placed in the waters of this state that precludes or prevents the migration of native migratory fish.

Habitat Mitigation Recommendation: ODFW recommends mitigation for projects where loss of fish and/or wildlife habitat is expected. The purpose of the Fish and Wildlife Habitat Mitigation Policy is to create consistent goals and standards to offset the impact to fish and wildlife habitat caused by land and water development projects. The policy provides goals and standards for general application to individual development projects.

Oregon Department of Land Conservation and Development

Coastal Zone Management Act Consistency Certification: Oregon has a federally approved coastal management program. This program generally applies within the state's coastal zone, extending from the boundary of the territorial sea to the crest of the coast range. Projects requiring a federal license or permit within this area must be consistent with the enforceable policies of the coastal management program.

Oregon Department of Environmental Quality

1200-C Stormwater Permit: A 1200-C Construction Stormwater National Pollutant Discharge Elimination System (NPDES) Permit regulates stormwater runoff from construction activities that disturb one or more acres of land. The permit requires permit holders prepare an Erosion and Sediment Control Plan and incorporate Best Management Practices into their construction work.

401 Water Quality Certification: A 401 Water Quality Certification (WQC) is required as a component of any federal action that has the potential to result in a discharge to waters of the state, including Joint Fill and Removal Permit (USACE/ODSL). The intent is to provide reasonable assurance that permitted activities will not violate state water quality standards, as approved by U.S. Environmental Protection Agency (EPA), and therefore will not impair water quality or beneficial uses of waters of the state (including wetlands).

Tillamook County Development Permit

This project will require coordination with the local government to ensure that land-use planning requirements are met. Most state agencies rely on a Land Use Compatibility Statement (LUCS) signed by a local planner indicating that the project is consistent with the applicable local planning requirements. A development permit will also be required for construction within a mapped floodplain.

5.3.2 Permitting Costs

The scoped permitting path described above was estimated to cost $203,000, and assumed the Corps of Engineers would serve as the lead agency for the NEPA process based on the submittal of the Joint Fill and Removal permit to them. Recent discussions with FEMA have indicated that should FEMA funds be used, they would possibly serve as the lead agency for NEPA, and that an Environmental Assessment (EA) and/or and Environmental Impact Statement (EIS) may be required. The data collection and analysis needed for the original permit scope will provide most of the information needed for an EA/EIS. The environmental assessment and permitting cost estimate has therefore been increased to $250,000 to cover the additional costs.

5.4 Construction

5.4.1 Construction Methods and Sequencing

Specific construction methods will be determined by the construction contractor, subject to permit conditions. Most of the site work required will be conducive to using standard heavy earthmoving equipment, including excavators, off-road dump trucks, and possibly scrapers. Some areas, particularly those on either side of Hoquarton Slough and in the center of the northern area, may require tracked dump trucks and lighter weight equipment due to wet soil conditions. There is not enough material from the levees to be removed on the south side of Hoquarton Slough to construct the new South Dike; therefore, material from the northern area will need to be transported over. The cost estimate assumes a temporary trestle or pontoon bridge across the Slough will be used. Another option is to haul the material required out of the site to Highway 101 and then through town to the southern site. This option avoids bridge costs but would incur additional roadway repair and other costs from use of public streets.

Construction sequencing is critical for implementation of the Southern Flow Corridor. While the existing levees and fill are desired for use in the new dike and ditch filling, the site must also remain protected from tides until this work is substantially completed, along with other interior work such as road decommissioning. If acceptable to permitting agencies, fish exclusion and repair and removal of tidegate mitigation devices will be done prior to beginning construction in order to temporarily maximize site drainage and make equipment access possible to the wetter areas, primarily for ditch filling. Fortunately the design fill removal elevations, which are tied to natural marsh elevations, are above summer high tide levels. This will allow virtually all the levee and fill removal and new dike construction work to occur in an efficient manner. Existing roads will be utilized and new temporary haul roads constructed as needed to facilitate efficient haul loops and use of equipment.

Once the new dike and flood gates are constructed and all other interior work completed, the remaining existing levee fill can be removed. Existing roads will be decommissioned and equipment access restricted to the perimeter of the site. Ultimately the levees must be breached, at which point removal of the remaining fill becomes much more difficult. Final excavation will require working within tide cycles, working back out of the project site without the benefit of loop haul roads, and more difficult sediment control measures. However, the quantities of excavation at this final stage are small.

5.4.2 Construction Costs

Construction costs were estimated using a variety of sources. Recent bid prices and experience with similar projects in the region were considered. Nehalem Marine Mfg has been providing construction services on the site for several decades and provided specific construction requirements and conditions for each element considered. Earthwork quantities were based on a Lidar topographic surface which has been checked with GPS based ground survey.

Uncertainties include the amount of additional fill that may be required for dike settlement in soft soils and the extent of work needed to upgrade the existing dikes to design standards. The majority of construction costs are related to earthmoving. Construction costs have fluctuated significantly in recent years, from very high costs due in part to high diesel prices several years ago to very favorable bids typically being received currently due to the poor economic climate. Costs presented here contain a 25% contingency in part to allow for this uncertainty.

Table 2: Construction Cost Estimate

No.	Item	Unit	Quantity	Unit Price	Total Amount
No.	North Dike (New) & Wetland Acquisition Area	Unit	Quantity	Unit Price	Total Amount
1	Clearing & Grubbing (Stockpile to Re-spread on Dike Face)	LS	1	$22,000	$22,000
2	Construction Staking	LS	1	$8,000	$8,000
3	Construction Compaction Testing	LS	1	$12,000	$12,000
4	Erosion Control Measures	LS	1	$26,000	$26,000
5	Filter Fabric at Dike Base and Haul Roads	SY	32,600	$2.60	$84,760
6	Spread Organics on Dike Face	CY	10,800	$8	$86,400
7	Temporary Access Road Aggregate Base Improvements	CY	1,800	$30	$54,000
8	Temporary Access Road Pavement Repair	TON	250	$100	$25,000
9	Remove Old Levee and use in New Dike Core	CY	40,000	$22	$880,000
10	Construction Fencing/Protection	LF	10,000	$3	$30,000
11	Dike Finish Slopes	LS	1	$40,000	$40,000
12	Dike Roadway Aggregate Base (12" depth) (4300 lf x 12' wide)	CY	2,000	$30	$60,000
13	Channel Reconnection Excavation & Haul	CY	2,000	$14	$28,000
14	6' Diameter Culverts with Reuse Tidegates	EA	4	$30,000	$120,000

No.	Item	Unit	Quantity	Unit Price	Total Amount
15	Demo Existing Structures and Culverts	LS	1	$24,000	$24,000
16	Removal of Plugs/Tidegates, Disposal of Rubbish, Tires	LS	1	$24,000	$24,000
17	Install Woody Debris	LS	1	$30,000	$30,000
18	Ditch Fill w/ Organics & Levee Spoils	CY	18000	$12	$216,000
19	Floating Sedimentation Fences	LS	1	$50,000	$50,000
20	Excavate Swale at Fuhrman Road and Spread on Dike Sides	CY	1,100	$14	$15,400
21	Temporary Dewatering	LS	1	$28,000	$28,000
22	Armor Protection	CY	400	$32	$12,800
23	Hydroseed Levee	AC	5	4000	20000
No.	GoodSpeed Road (Upgrade)	**Unit**	**Quantity**	**Unit Price**	**Total Amount**
1	Clearing & Grubbing (Stockpile to Re-spread on Dike Face)	CY	700	$8	$5,600
2	Construction Staking	LS	1	$3,000	$3,000
3	Construction Compaction Testing	LS	1	$5,000	$5,000
4	Erosion Control Measures	LS	1	$5,000	$5,000
5	Filter Fabric at Dike Base and Haul Road	SY	5,600	$2.60	$14,560
6	Spread Organics on Dike Face	CY	700	$4	$2,800
7	Temporary Access Road Aggregate Base Improvements	CY	1,000	$30	$30,000
8	Haul in Material for New Dike from Spoils Pile	CY	1,600	$22	$35,200
9	Dike Finish Slopes	LS	1	$5,000	$5,000
10	Hydroseed Levee	AC	0.5	4000	$2,000
11	Dike Roadway Aggregate Base (12" depth) (2100 lf x 12' wide)	CY	950	$30	$28,500
No.	Middle Dike	**Unit**	**Quantity**	**Unit Price**	**Total Amount**
1	Clearing & Grubbing	LS	1	$9,300	$9,300
2	Construction Staking	LS	1	$4,000	$4,000
3	Construction Compaction Testing	LS	1	$3,000	$3,000
4	Erosion Control Measures	LS	1	$500	$500
5	Filter Fabric at Dike Base and Haul Road	SY	6,800	$2.60	$17,680
6	Spread Organics on Dike Face	CY	730	$4	$2,920
7	Temporary Access Road Aggregate Base Improvements	CY	900	$30	$27,000
8	Temporary Access Road Pavement Repair	TON	50	$100	$5,000
9	Remove Old Levee and use in Ditches on Field (short haul)	CY	900	$22	$19,800
10	Haul in Material for New Dike from Spoils Pile	CY	5,400	$28	$151,200
11	Dike Finish Slopes	LS	1	$5,000	$5,000
12	Dike Roadway Aggregate Base (12" depth) (1100 lf x 12' wide)	CY	500	$30	$15,000
13	New Flood Structure (8) 5x12 S.H. Gates	EA	1	$500,000	$500,000
14	Hydroseed Levee	AC	1	4000	$4,000
15	Armor Protection	CY	200	$32	$6,400
16	Excavate Tidal Channel (Upper Nolan Slough)	CY	8000	$14	$112,000
No.	South Dike New	**Unit**	**Quantity**	**Unit Price**	**Total Amount**
1	Clearing & Grubbing (Stockpile to Re-spread on Dike Face)	LS	1	$28,320	$28,320
2	Construction Staking	LS	1	$4,000	$4,000
3	Construction Compaction Testing	LS	1	$4,000	$4,000
4	Erosion Control Measures	LS	1	$6,000	$6,000
5	Filter Fabric at Dike Base	SY	7,080	$2.60	$18,408
6	Temporary Trestle/Pontoon Bridge	LS	1	$50,000	$50,000
7	Spread Organics on Dike Face	CY	1100	$8	$8,800
8	Temporary Access Road Aggregate Base Improvements	CY	2,000	$30	$60,000
9	Remove Old Dike and use in New Dike Core (South Levee)	CY	2,000	$22	$44,000
10	Haul Excess Material from South Levees to Field	CY	10,000	$14	$140,000
11	Excavate & Haul N. Hoquarton Spoils	CY	2,000	$32	$64,000
12	Haul in Material for New Dike from Spoils Pile	CY	8,300	$22	$182,600
13	Construction Fencing/Protection	LF	2,000	$3	$6,000
14	Dike Finish Slopes	LS	1	$8,000	$8,000
15	Hydroseed Levee	AC	2	4000	$8,000

No.	Item	Unit	Quantity	Unit Price	Total Amount
16	Dike Roadway Aggregate Base (12" depth) (1800 lf x 12' wide)	CY	800	$22	$17,600
No.	South Dike Upgrade	**Unit**	**Quantity**	**Unit Price**	**Total Amount**
1	Clearing & Grubbing (Stockpile to Re-spread on Dike Face)	LS	1	$4,000	$4,000
2	Construction Staking	LS	1	$3,000	$3,000
3	Construction Compaction Testing	LS	1	$3,000	$3,000
4	Erosion Control Measures	LS	1	$2,000	$2,000
5	Spread Organics from Levee Removal on Dike Face	CY	1,100	$8	$8,800
6	Haul in Material for New Dike from Spoils Pile	CY	1,600	$22	$35,200
7	Dike Finish Slopes	LS	1	$10,000	$10,000
8	Dike Roadway Aggregate Base (12" depth) (1200 lf x 10' wide)	CY	450	$30	$13,500
9	6' Diameter Culverts with Reuse Tidegates	EA	1	$30,000	$30,000
No.	Beeler Levee Lower	**Unit**	**Quantity**	**Unit Price**	**Total Amount**
1	Clearing & Grubbing	LS	1	$9,000	$9,000
3	Construction Staking	LS	1	$3,000	$3,000
4	Construction Compaction Testing	LS	1	$3,000	$3,000
5	Erosion Control Measures	LS	1	$5,000	$5,000
6	Grade Levee/Place spoils on levee slope	CY	1900	$8	$15,200
7	Levee Finish Slopes	LS	1	$10,000	$10,000
8	Levee Roadway Aggregate Base (12" depth) (4600 lf x 12' wide)	CY	2,050	$30	$61,500
9	6' Diameter Culverts with Reuse Tidegates	EA	1	$30,000	$30,000
No.	Aufdemeyer Levee Lower	**Unit**	**Quantity**	**Unit Price**	**Total Amount**
1	Clearing & Grubbing	LS	1	$9,000	$9,000
2	Construction Staking	LS	1	$3,000	$3,000
3	Construction Compaction Testing	LS	1	$3,000	$3,000
4	Erosion Control Measures	LS	1	$8,000	$8,000
5	Grade Levee/Place spoils on levee slope	CY	1900	$8	$15,200
6	Levee Finish Slopes	LS	1	$20,000	$20,000
7	Levee Roadway Aggregate Base (12" depth) (6500 lf x 10' wide)	CY	2,400	$30	$72,000
8	6' Diameter Culverts with Reuse Tidegates	EA	1	$30,000	$30,000
9	Temporary Access Road Aggregate Base (2000 lf)	CY	900	$30	$27,000
10	Temporary Access Road Filter Fabric	SY	2700	$2.60	$7,020
	Mobilization @ 5%				$200,298
	Subtotal Construction Costs				**$4,206,266**
	Permitting				$250,000
	Engineering, Administration, Construction Mngt @ 18%				$757,128
	Subtotal Project Costs				**$5,213,394**
	25% Contingency				$1,303,349
	Total Project Costs				**$6,516,743**

5.5 Maintenance and Operation

Long term maintenance costs on public lands and dikes are expected to be lower with implementation of the project. Around 45,000 feet of levee, including 30,000 feet that run along river channels and are exposed to higher erosive stresses, will be replaced with 7000 feet of new, wider, better constructed dike, very little of which is near any channel. The new floodgates will all be constructed of corrosion resistant materials and have a longer life span than the numerous older steel culverts now in use.

Maintenance costs are estimated based on the experience of Nehalem Marine Mfg. in maintaining most of the levees and dikes in the area for over two decades and NHC's experience in the design and repair of overtopping dikes. Annual maintenance will consist of dike and floodgate inspection and mowing of the dike slopes.

Project infrastructure requiring maintenance will consist of 10,100 feet of setback dike and associated flood gates. Annual mowing and inspection of the dike system is assumed to cost $4,000/yr, around what is spent on the current system. Floodgate seals and bearings are estimated to have a life of 10 years, and require $4,000 to replace. The dikes are set back from the river channel, built at a low height (most of the system will be only 4-6 feet high) and designed to overtop and allow floodwaters to exit to Tillamook Bay without significant damage under frequent flood conditions. It is assumed that floods greater than 10-year events will cause some damage to the dikes due to greater overtopping depths and durations. Damages are expected to be surface erosion on the downstream dike face. An allowance of $150,000 every 10 years is made for damage repair. Using a conservative value of $30/cubic yard for dike materials delivered, graded, and compacted would provide up to 5,000 cubic yards of dike repair per incident, a volume that is unlikely to be needed based on past experience. Allowing for miscellaneous other costs, maintenance costs are estimated at $20,000/year.

Project Exodus
Final Report

Prepared for:

Oregon Solutions Design Team
Under contract to Tillamook County

Prepared by:

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and

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February 2010

Acknowledgements and Credits

NHC staff that contributed to this project include:

- Vaughn Collins: Project Management, Modeling, Report
- Sam Gould: Modeling, GIS
- Bonnie Cassarino: GIS
- Jeff Johnson: Principal Review

HBH Consulting Engineers staff included:

- Dave Boatman: Principal Review, Cost Estimating, Plan Review
- Jaime Jordan: Plan Development

We would like to thank: Paul Levesque (Tillamook County) for serving as contract manager and reviewing work products; Rick Klumph (ODFW) for ably chairing design team meetings and providing fisheries data; Leo Kuntz, for invaluable insights on flood behavior; Pete Dickerson (USACE), for providing data and technical review; and County Commissioner Mark Labhart and State Senator Betsy Johnson, for overall guidance and chairing project team meetings. Numerous others provided useful data, including the staff of the Tillamook Estuaries Partnership, Dale Buck, and Gus Meyers. We would also like to thank the TBHEID for giving the opportunity to present our work at their annual meeting.

Table of Contents

1 Introduction

Northwest Hydraulic Consultants, Inc. (NHC) in conjunction with HBH Engineering Consultants was selected by the Oregon Solutions Design Team to analyze flooding on the Wilson River in Tillamook County, Oregon and develop solutions to reduce flood levels. This report documents the process, methods and results of the project. The selected alternative - Project Exodus - is presented, including project elements, flood reduction benefits, preliminary plans, cost estimates and a scope of work for implementation.

2 Background

Five major rivers drain into Tillamook Bay. The lower valleys of the Wilson, Trask and Tillamook rivers merge to form a broad alluvial plain at the head of the bay on which the City of Tillamook is located. The Wilson River watershed is approximately 190 square miles, most of which is located in the Coast Range at elevations up to 3500 feet. The river flows through a steep canyon out of the mountains and does not have any significant floodplain until around 6 miles above the bay. The river channel is perched – it runs in a channel with natural banks that are higher than the floodplains around it-. As a consequence flood flows that leave the river, especially to the much larger southern floodplain, never return to the channel but flow south to the lowest part of the valley and west to meet the Trask and Tillamook Rivers. Highway 101 crosses the Wilson River floodplain at grade and so suffers frequent deep inundation across its lowest portions between Hoquarten and Dougherty Sloughs.

Recent decades have seen a number of damaging floods occur in Tillamook County. The 1996 flood in particular was noted for its long duration and extensive damages. Since then, large floods have occurred in 1998 and most recently in 2006 and 2007, causing further damages.

After the 2006 flood a letter was sent from State, County and City representatives to Governor Kulongoski requesting that Tillamook flood mitigation efforts be designated an Oregon Solutions project. The Oregon Solutions process provides a structure and process for public and private sectors to collaborate in addressing community needs. A project assessment was conducted in March, 2007, followed by Governor Ted Kulongoski's official designation in April, 2007.

The Governor assured participation of his staff and appropriate state agencies with other participating public and private partners through the designation of this effort as an Oregon Solutions Project. A Project Team was assembled in an effort to bring partners to the table. The team prioritized projects in September 2007 and began implementation shortly thereafter. The project list is a mix of capital projects and planning and analysis efforts funded by a legislative appropriation from the state.

Recognition of the complexity of flooding in the Wilson River and that prior work by the Corps of Engineers focused on ecosystem restoration rather than flood reduction led to the Project Team to combine two of the initially identified projects and broaden the overall scope into Project Exodus.

3 Objectives

Project Exodus is one part of the Tillamook Oregon Solutions process looking at reducing flood damages in Tillamook. The adopted Tillamook Oregon Solutions purpose statement is:

… to develop and implement a plan to reduce flooding and the adverse impacts of flooding while incorporating environmental, social and economic values in the development of short and long term solutions.

The purpose of Project Exodus is then to meet this goal in the Wilson River floodplain. The stated primary objective of Project Exodus is:

Reduce flood damages in the Wilson River floodplain through the reduction in flood levels and durations, focusing on 2-10 year floods.

First Flood Control Project

The First Flood Control Project was designed to provide information on what level of flood reduction was possible given as few constraints as possible. As such, the primary objective was the only objective specified. In discussions with stakeholders, a series of guiding principles were developed to help focus the exploratory design issues of the first project:

- Flood reduction should be considered over the entire project area equally
- Do not significantly increase overbank flood levels in the Tillamook/Trask floodplain.
- Increases in flood levels in some areas are acceptable if compliant with regulations and it is shown that the overall project provides flood reduction.
- The Wetlands Acquisition Area may be considered for flood control use only.
- Evaluate “full buildout” scenario along Hwy 101 corridor under existing zoning and flood mapping.
- A conceptual Dougherty Slough inlet structure will be evaluated to meet the primary objective; then the feasibility of modifying the existing structure for this purpose will be addressed.
- Evaluate incorporating previous Blind Slough, Hall Slough and Wetland Acquisition Area alternatives as part of project.
- Project costs should not exceed $10 million.

Initially it was anticipated that a series of detailed objectives would be developed during the second project phase. This proved unnecessary as the project elements proposed in the First Flood Control Project were adopted without change as the final preferred alternative.

4 Methods

The HEC-RAS hydraulic model developed for the Corps of Engineers Feasibility study was updated and used as the primary technical tool in hydraulic evaluation of alternatives for Project Exodus. Updating consisted of developing new floodplain cross sections using LiDAR data acquired in 2008. The berms and levees along the various channels were also updated from the LiDAR. In many areas these are covered in dense brush or under tree canopy, and the quality of both of the LiDAR and Corps photogrammetric data is 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 Garibaldi as a lower boundary condition. The sensitivity of the model to the tidal boundary condition was tested by running the 1999 (5-yr) flood with the observed tides increased by 1 foot and decreased by 2 feet. Changes to maximum water surface elevations only extended up to around the junction of Hoquarten Slough and the Trask River under either scenario. The ADCIRC two dimensional estuary modeling performed by the Corps during the feasibility study reached this same conclusion. Based on this insensitivity to tidal conditions, neither a coincident tidal-riverine frequency analysis nor further ADCIRC modeling was performed.

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.

Model calibration, field inspection and high water marks all point to the importance of berms in controlling flood patterns in the Wilson, especially in smaller floods. Unfortunately berms have one of higher levels of uncertainty within the model due to two factors.

First, the actual elevations of the berms are less certain than most other topographic features. Canopy cover, brush and the small size of the berms mean both photogrammetric and LiDAR based aerial mapping can have significant errors here. Second, discussions with Leo Kuntz and others made clear that berm failures were common in virtually all floods. These failures cannot be modeled, but they can change the flow distribution and flood levels. Especially in small floods, such berm failures may cause significant increases in flood levels not reflected in modeling.

Due to these uncertainties, 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 Wilson River in the vicinity of the Highway 101 bridge is one exception. The model was unable to be calibrated here using the range of expected roughness values for a channel of its form. The observed high water marks and witness accounts show the bridge creates a large backwater effect the model had difficulty in replicating.

Plan development and construction cost estimating were conducted by HBH Engineers. Unit costs estimates were developed using recent bid prices, professional judgment and knowledge of local conditions.

5 Alternatives Evaluation

A variety of previously proposed and new projects were evaluated for flood reduction benefits. Each alternative was evaluated against project objectives using modeling results and preliminary cost estimates. A brief description of each alternative evaluated and it’s flood control benefits is given below.

5.1 Habitat Restoration Projects

The Tillamook Bay and Estuary Feasibility Study completed by the Corps of Engineers in 2005 evaluated an initial list of 59 measures for habitat restoration and flood reduction benefits. After multiple rounds of screening and refinement, the final report evaluated three measures: The Hall Slough project and two alternatives for the Wetlands Acquisition Area. While these projects all had only small flood benefits in themselves, they provided useful information in the design process, and project elements were used directly or expanded upon in the First Flood Control Project

5.1.1 Hall Slough Project

The Hall Slough project consisted of a high flow inlet from the Wilson River and enlargement of Hall Slough through most of it length. The project had an estimated construction cost of $6.5 million and provided small flood reduction benefits, although it would have reduced nuisance flooding in the Highway 101 corridor up to a 2-yr flood. The project did not include any modifications to the Highway 101 Hall Slough crossing, which would add an estimated $2-3 million dollars to the cost.

5.1.2 Wetlands Acquisition Area Projects

The Wetlands Acquisition Area/Swale alternative consisted of a flood swale from upstream of Highway 101 leading down to a new levee and floodgate allowing tidal restoration of the Wetlands Acquisition Area. The Modified Wetlands Acquisition Area Project divided the public lands into a restored and non-restored portion in order to keep the existing flood conveyance corridor and not cause any increase in flood levels. A levee setback along Nolan Slough was also proposed.

A variant of the Modified Wetlands Acquisition Area Project was developed for a grant application submitted in the spring of 2009. This proposal had a slightly greater proportion of the area allocated to full tidal restoration, and greater flood gate capacity, but in major aspects was very similar to the Corps proposal. For all alternatives flood reduction benefits were small.

5.1.3 Blind Slough Project

The Blind Slough project was a scaled back project for restoration of a portion of the Wetlands Acquisition Area. Engineering work completed for this related to the Hall Slough- Blind Slough connection and Fuhrman Road were of particular importance in developing the proposed First Flood Control Project.

5.2 Upper Valley Projects

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. 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.

5.3 Highway 101 Crossings

Options to convey water under Highway 101 were also evaluated. It was apparent that any proposed structural modifications to the Highway would cost $2-3 million at a minimum, and flood level reductions were modest at best. There may be opportunities for future projects as ODOT repairs and replaces parts of Highway 101. ODOT is currently planning a new Hoquarten Slough bridge that offers the opportunity to increase conveyance through the slough.

5.4 Dougherty Slough

The Dougherty Slough Inlet was inspected and several alternatives considered for replacement of the existing structure. It was concluded that the existing structure appears to be functioning well. Evaluation of restricting flows in the slough inlet showed little benefit for floods greater than the 5-yr level. Restricting flows causes a rise in the Wilson River. This increases overtopping depths over thousands of feet of bank, especially upstream. The net result is overbank flows downstream, and hence water levels, do not differ significantly with any of the alternatives evaluated. No flood control project was recommended here for this reason. It is recommended that an engineering evaluation of the structure be performed to ensure the cable net and deadman anchoring system provide sufficient strength to hold the log jam in place.

5.5 First Flood Control Project

The alternatives analysis and modeling created an understanding of Wilson River flood behavior, including why different options did or did not reduce flood levels. Further refinement of those options that were most effective led to the First Flood Control Project, which contained three recommended elements. Two of the elements contained design options with flood reduction and cost differences.

5.5.1 Southern Flow Corridor Alternatives

The largest and most important project proposed was the Southern Flow Corridor. The southeastern portion proposed 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 northwestern half of the Wetlands Acquisition Area further levee removals were proposed. Two options were presented (at the time of presentation they were called Project Exodus Alternatives 3 and 4). They differed in how the southern half of the Wetlands Acquisition Area was treated. The two alternatives share 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, resulting in differences in flood level reduction, habitat restoration benefits and construction costs.

5.5.2 South Bank Wilson River Berm Alternatives

Two berm alternatives were presented to address nuisance flooding that originates from the Wilson River upstream of the Shilo structure and flows west through homes and commercial properties across Highway 101. The first alternative was to construct a new berm tying in from the railroad grade fill downstream to the Shilo structure. The 1600 foot long berm would be engineered to resist overtopping and prevent overbank flows up to around a 5-year frequency flood.

The second alternative was to use a “guide berm” to still allow overbank flows through the area, but direct all the flow into Hall Slough rather than flowing west towards the highway. This berm would run south from the upper end of the Shilo structure and redirect flows that would otherwise flow west into Hall Slough. The upper end of the Hall Slough channel down to just past SR101 would be excavated in order to prevent a rise in water surface in this reach due to the increased flows.

The first alternative provided flood protection to homes along the south bank of the Wilson River, but caused a small rise in the river and on the opposite north bank. The second alternative showed no flood level increases, but had the potential for some adverse impacts to south bank properties. Estimated construction costs were roughly equal.

5.5.3 North Bank Wilson Project

This proposed project involves lowering a section of high ground in a pasture that acts as a low dam and causes backwater under Highway 101 and upstream.

6 Recommended Project

The First Flood Control Project was presented in a report dated July 29, 2009. The project was presented in person to the Design Team and Project Team on August 4. At the September 2, 2009 Design Team meeting the First Flood Control Project was discussed and the alternatives within it voted upon. The recommendation of the Design Team consisted of Project Exodus Alternative 4, South Bank Wilson River Berm Alternative 1, and the North Bank Wilson River Field Regrading. This was subsequently approved by the Project Team, and forms the recommended project as shown below.

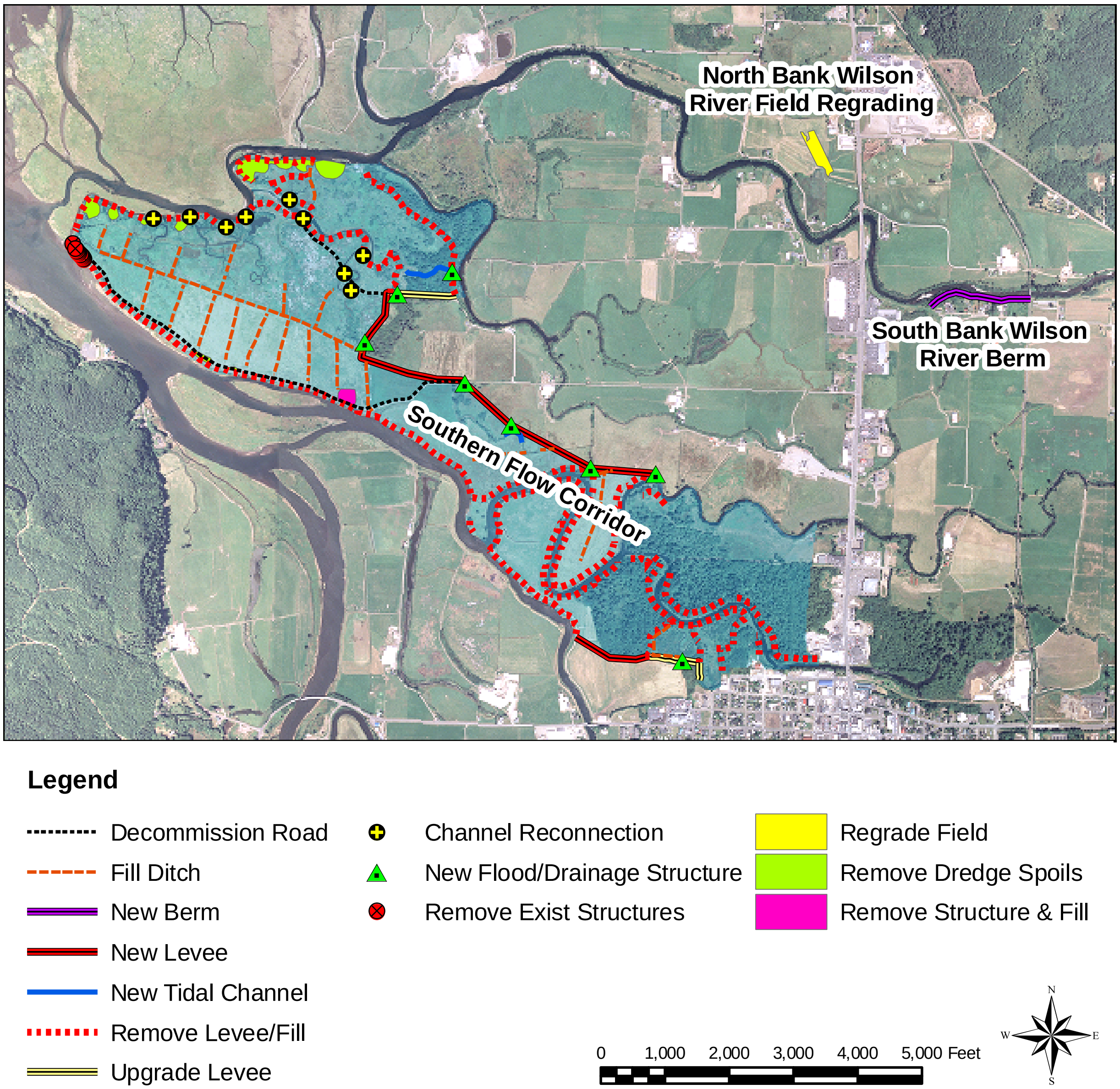

Figure 1: Project Exodus Overview

6.1 Project Elements

6.1.1 Southern Flow Corridor

The largest project element with the most extensive flood reduction benefits is the Southern Flow Corridor. This consists of removing the extensive levees and fill and constructing setback levees to create an unobstructed flood pathway out to Tillamook Bay.

Levee and Fill Removal

Removal of the numerous levees and fills within the flow corridor provides the conveyance capacity increase that results in reduction of flood levels over a wide area of the lower Wilson River floodplain. In general material will be removed to slightly below natural floodplain/marsh level. This elevation is around 8-9 feet at the mouth of the Wilson River, increasing to 10+ feet farther upstream. Lowering areas further than this could provide some additional flood level reduction, but the cost increase would be large and the benefits temporary as the tides and river will rebuild the lands back up to natural elevations.

Construction sequencing and methods are important in this task and are discussed further in the construction methods section. The removed fill will be used for the new levees if it meets geotechnical specifications, filling ditches, and any remainder spread on site to speed rebuilding to natural salt marsh elevations.

New and Upgraded Levees

9600 feet of new and upgraded levee will be constructed in order to protect adjacent agricultural lands from tidal influence in the project area. Most of the levees will be built to an elevation of 12 feet, with some adjustments where they tie into existing levees or high ground. This elevation was selected based on modeling various levee elevations – the goal is to build as low a levee as possible to pass river flood flows out while preventing high tides and coastal storm surges from getting in. The riverside of the northern levee will have a 5:1 slope in order to pass overtopping floodwaters with minimal damage. Construction will consist of stripping organic topsoils away, excavating any soft or unsuitable soils in the subgrade, compacting the subgrade and then constructing the levee proper. It is anticipated that the levee material specification will require a high fines content, which provides a more erosion resistant, less permeable levee. The levee will be topped with an all-weather crushed rock driving surface and have grass covered side slopes. On the bay side a bench consisting of organic strippings and debris will be placed to provide some protection from wave action that may occur.

New Floodgates

A series of floodgates will be incorporated in the new levee in order to replace the existing gates. The 10 existing 6 ft diameter round gates and four 6x12 foot side hinge gates on the spillway structure will be reused on replacement pipes and structures in the new levee. In addition, a new spillway structure will be constructed. Gate locations are distributed in existing relic tidal channels along the new levee alignment, primarily Blind and Nolan Sloughs. Additional gates will discharge directly into Dougherty Slough. Gate locations outside of channels are avoided to avoid burial as the site rebuilds to natural marsh levels. Flood flows will pass through the gates every second or third year, a sufficient frequency which should keep the channels open and able to convey flood flows out to the main river channels and bay.

Hall Slough Elements

Flood reduction requires improving the hydraulic connectivity between Hall and Blind Sloughs. This is will be accomplished by removing the Fuhrman Road berm and construction of a Hall Slough – Blind Slough connector channel. Additional work may be required depending on landowner negotiations regarding the road. Possible outcomes include road removal only, or constructing a bridge across the connector channel and armoring the road to withstand overtopping flows. For design purposes the latter option is assumed.

Some small improvements to the right bank levee along Hall Slough will also be made. The lands protected by this levee will generally receive the greatest flood level reductions of the entire project, however, it is possible that coastal storms could cause some small increases in high tide levels due to the more direct connection between the bay and Hall Slough created by the project. Filling several low spots in the existing levee where high tides currently overtop it are proposed to address this issue.

Drainage Network Improvements

Improvements to the existing drainage ditches inside the new levee will be made as necessary to connect them to the new floodgates and ensure that equal or better drainage is maintained once the project is implemented. This will be a relatively minor project component consisting of cleaning existing ditches and excavating some new connector segments near the new levee.

Habitat Restoration Elements

Habitat restoration activities will generally be limited to removing constructed features that would impede the free exchange of tides within the project. The natural processes linked to the tides will bring in the water, salinity, sediment, and seeds that will initiate restoration.

Existing ditches will be filled with onsite materials in order to ensure natural tidal channels can develop without being short-circuited by the linear ditches. Existing relic tidal channels will have plugs and culverts removed to allow full tidal access. The few roads on site will have any crushed rock or large gravel surfaces removed and the roadbed de-compacted. Self regulating tidegates for fish access to a few small areas with habitat behind the new levee will be included.

6.1.2 South Bank Wilson River Berm

The purpose of the proposed berm is to reduce the frequency at which flows overtop the south bank of the Wilson River and then flow westerly through the commercial strip along Highway 101 between Hall Slough and the Wilson River. Implementation of the Southern Flow Corridor will lower backwater flood elevations on the highway itself, this project will eliminate the nuisance flooding that occurs just east of the highway.

The berm will tie in from the railroad grade fill downstream to the Shilo structure. The 1600 foot long berm would be engineered to resist overtopping by constructing a 5:1 backslope and using compacted cohesive fill materials. It would be set at an elevation to prevent overbank flows up to around a 5-year frequency flood, although this threshold can be adjusted during the design phase. Wherever possible, it would be setback from the top of the river bank and vegetation on the riverbank preserved. Where there are structures close to the berm it would be elevated so overtopping flows are not directed at foundations. No riverbank armoring is proposed unless areas of instability are identified. The berm begins along a straight reach and most of the lower end is on the inside of a gentle bend, so erosive forces against the bank here are less than those seen by the Shilo structure downstream.

The proposed South Bank Wilson River berm and existing Shilo structure will function as a single flood control project between the railroad and Highway 101, benefiting the homes and businesses east of 101. While considered a training structure designed to help turn the river, repeated emergency work and repairs have resulted in it functioning as a levee, although it was not designed as such. Levees increase river levels and can consequently cause greater damages than would happen naturally if they fail. The existing Shilo structure has a number of deficiencies that should be addressed, including toe protection, oversteepened slopes and inappropriate fill materials. It is recommended that appropriate repair and reconstruction of the Shilo structure be undertaken in the near future, either as part of the new berm construction or independently. The structure is within the Corps flood control structure program so coordination with them on design will be required. Repair of this structure should be given priority over construction of the new berm if necessary.

6.1.3 North Bank Wilson River Field Grading

This project lowers an area of high ground within a pasture that causes backwater effects through Highway 101 and upstream. It provides flood level reductions and also mitigates the effects of the proposed South Bank Wilson River Berm in the area. This is a simple earthmoving project. Topsoil would be cleared to the side, the earth underneath removed to lower the field and the topsoil replaced to allow continued agricultural use. The soils could possibly be spread out onsite and tilled into the fields, used to fill low areas of nearby fields, or removed if necessary.

6.2 Flood Reduction Benefits

Flood level reduction and increases for the 2001 (~ 1.5 year), 1999 (~5-year) and 100-year floods are shown in the following figures. It can be seen that the project provides flood level reductions across most of the lower Wilson River floodplain at all sizes of floods. Some small flood reductions extend up the Tillamook and Trask systems.

6.2.1 Areas of Flood Level Increases

Flood level rises due to the project are predicted in several areas. Construction of the South Bank Wilson River Berm is predicted to cause up to 0.2 ft rise in the Wilson River channel in 100-yr flows. The increases in flood level drive more water overbank and cause increases in flood levels, primarily across the river to the north, but also in a small area south of the channel (“A” in Figures 2-4). The proposed Field Grading project lowers flood levels in the vicinity of and upstream of Highway 101, but areas farther upstream and downstream of this continue to see rises. The adverse impacts shown from the South Bank project are based on the assumption that there is essentially no berm currently in place. If in fact substantial portions of this area of the South Bank already have a berm, then some of the impacts due to a complete berm are already occurring. Therefore the portion of the flood level increase attributed to this project would be reduced.

The other area with predicted rises is just inside the new levee system north of the southern flow corridor ("B" in Figure 2). This area is benefited under current conditions by the large flood storage volume available in the wetlands acquisition area. In smaller, more frequent floods, flows between Hall and Dougherty Sloughs will now fill the reduced storage volume more rapidly. Although the new levee will have substantially larger flood gate capacity, these will not begin to operate until water levels inside exceed those outside, so water levels will quickly rise to somewhat above the flood/tide level outside. At this point the flood gates will begin to operate and discharge water out. This increase is only shown in the 2001 flood – by the 1999 flood (~5-yr event), the project is providing flood level reductions here.

6.2.2 Flood Level Mitigation Options

If some portion of the proposed project falls within the FEMA floodway then it cannot cause a rise in a 100-yr flood (zero-rise rule). The federal flood code does contain a clause allowing communities to implement projects that cause rises in the floodway with appropriate public notice and other requirements. This is rarely used and guidance from the regional FEMA office on the viability of this approach is needed.

However, under the current flood mapping the FEMA floodway is generally confined within the channel boundaries and it appears that the South Bank Wilson River berm can be built outside the floodway. Under standard FEMA regulations, rises of up to one foot may be created by projects outside the floodway. New flood maps will be released shortly for Tillamook County which may change this assessment if floodway boundaries are significantly changed.

If there are no regulatory requirements regarding the rise then it is the communities decision how to address it. Given that flood levels are generally lowered throughout most of the floodplain; flood level increases are relatively small; and increases occur in areas with few structures, the community may choose to accept the rise. The areas that show these rises, which are up to around 0.25 feet may be able to be addressed by some simple regrading similar to that proposed on the North Bank Wilson River. This has not been investigated further at this time and will require some ground survey work to do so.

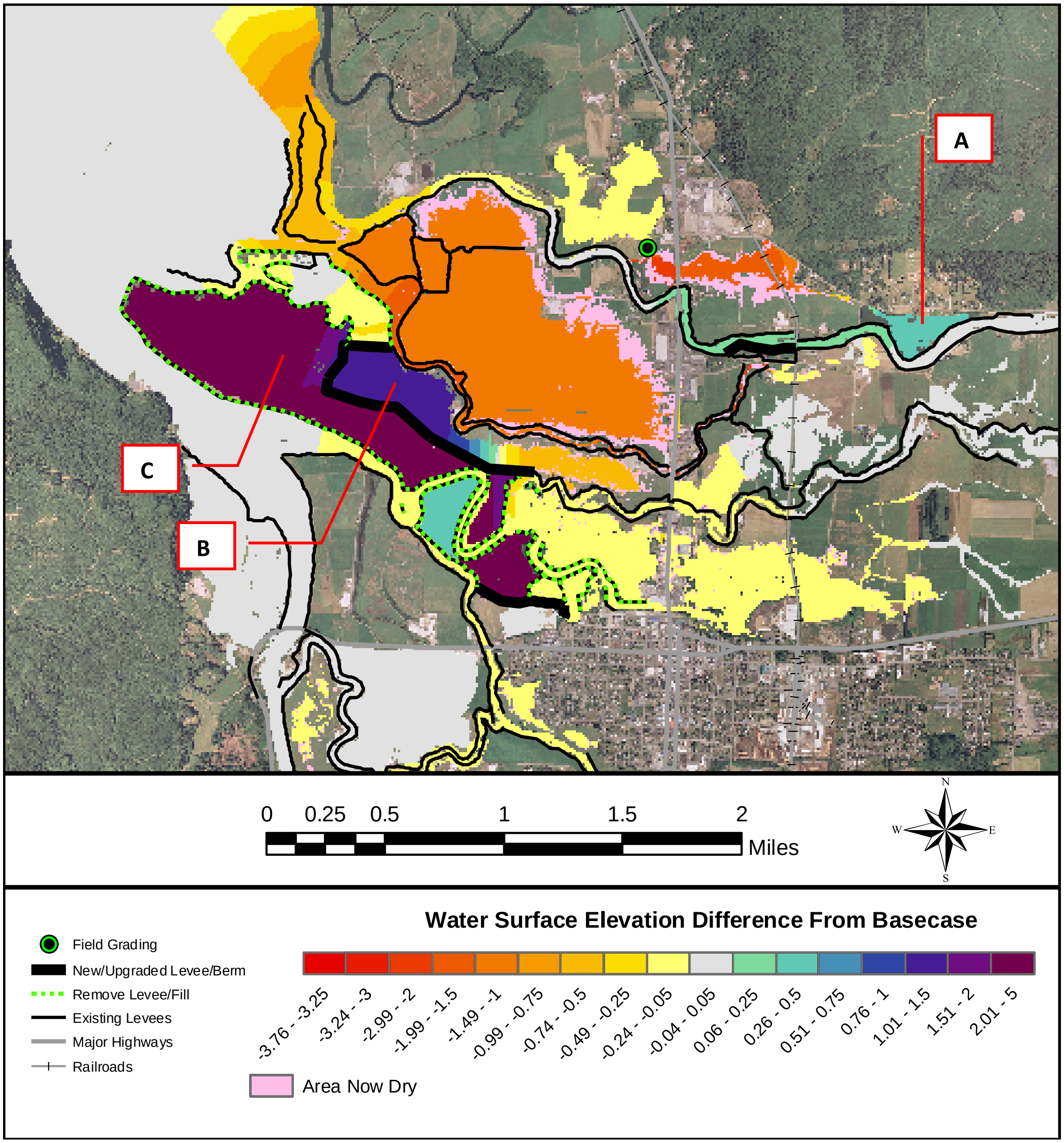

Figure 2: Changes in Flood Levels, 2001 Flood (1.5 yr Flood)

Note: “A” and “B” indicate areas of flood level rise due to project within protected areas. Area “C” shows a rise because as part of the southern conveyance corridor it is fully open to tidal influence.

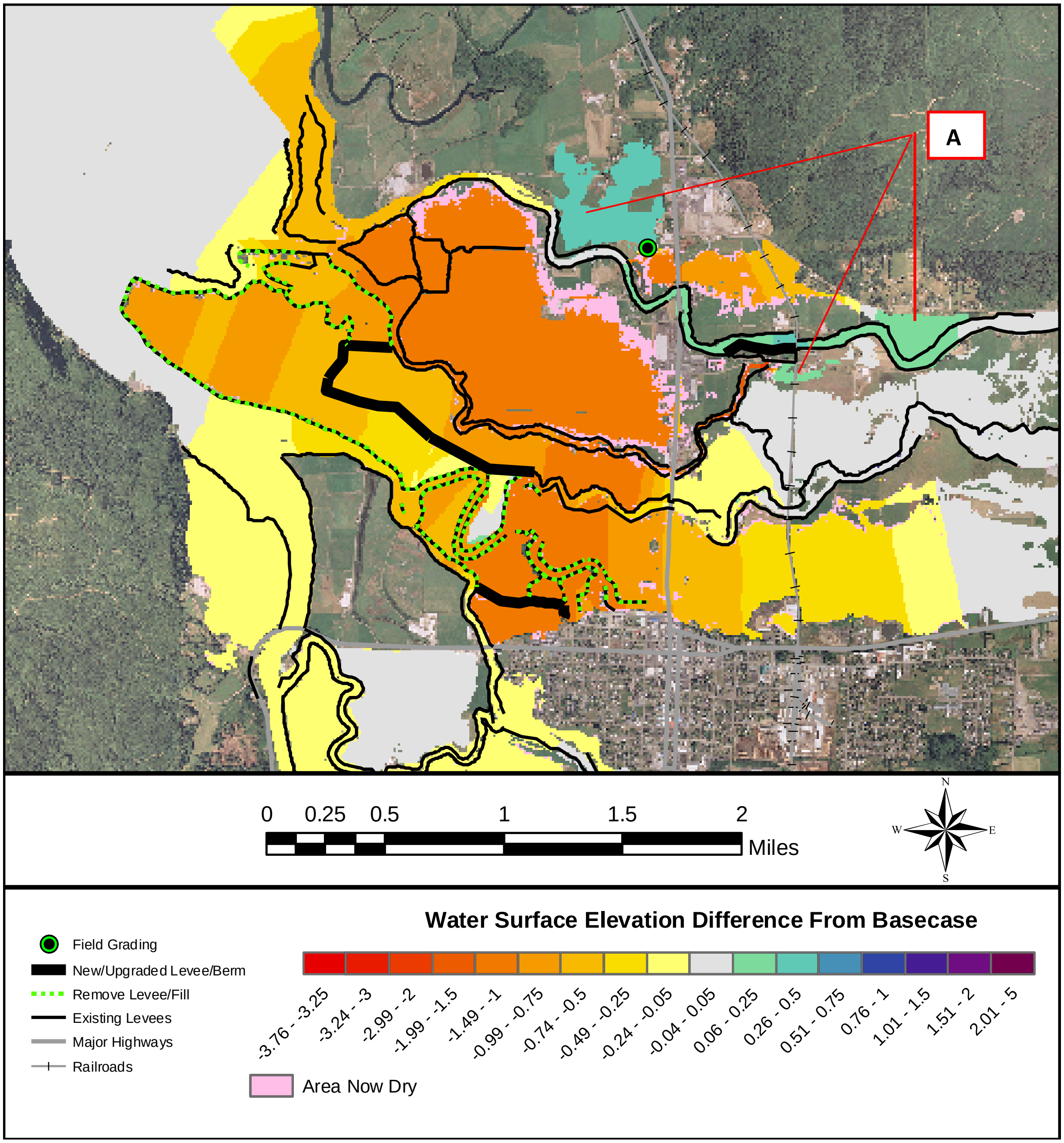

Figure 3:Changes in Flood Levels, 1999 Flood (5-yr Flood)

Note: "A" indicates areas of flood level rise due to project.

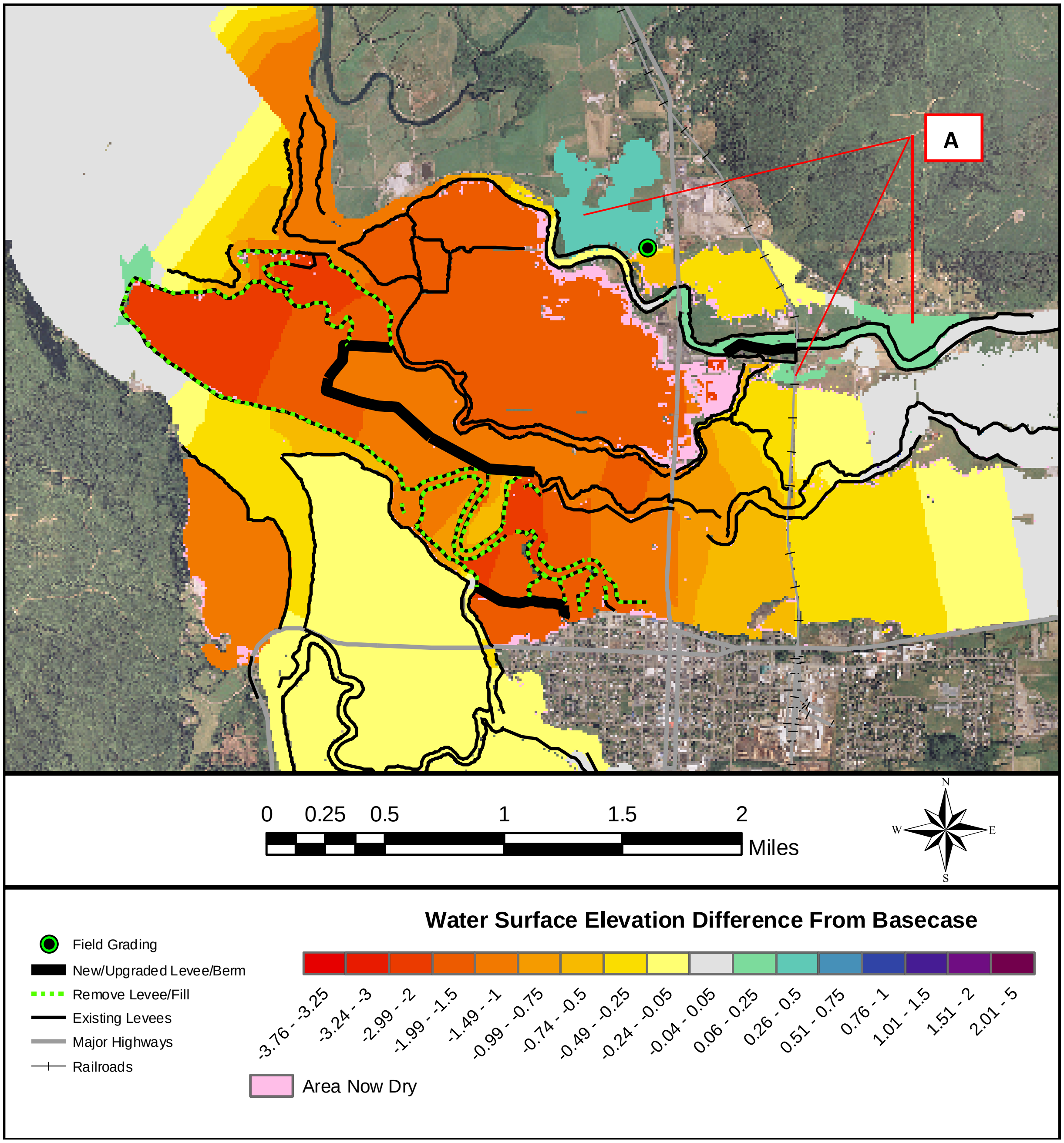

Figure 4:Changes in Flood Levels, 100-yr Flood

Note: "A" indicates areas of flood level rise due to project.

6.3 Construction Costs

Estimated construction costs are summarized in the following table; details are at the end of the report.

Item	Southern Flow Corridor	South Bank Wilson River Setback Berm	North Bank Wilson River Field Grading
Construction Costs	**$4,812,400**	**$580,360**	**$194,200**
Engineering, Admin, Permitting, Legal @ 18%	$926,232	$104,465	$34,956
Subtotal Project Costs	**$5,738,632**	**$684,825**	**$229,156**
25% Contingency	$1,434,658	$171,206	$57,289
Total	**$7,173,290**	**$856,031**	**$286,445**
Total Project Costs			**$8,316,000**

For the Southern Flow Corridor uncertainties include the amount of additional fill that may be required for levee settlement in soft soils; the suitability of the existing levees for the proposed upgrades; and the amount of existing onsite fill that can be used for new levees while still keeping perimeter tidal protection during construction. It is recommended that only contractors with prior experience in tidal marsh restoration be allowed to bid to minimize risk of cost overruns due to working with heavy machinery in a tidal wetlands environment.

The South Bank Wilson River Berm project cost uncertainties are also fairly large. If some properties already have berm segments that meet design standards costs could be reduced. Earthwork quantities are based on LiDAR survey, which is of poorer quality here due to the dense tree and brush cover. Ground survey, existing berm evaluations, and berm alignment decisions made in concert with individual landowners are needed in order tighten the cost estimate.

The North Bank Wilson River Field Grading project has the smallest overall project cost and the least uncertainty due to its simplicity and confidence in the LiDAR data in open fields.

The majority of construction costs are related to earthmoving. Construction costs have fluctuated significantly in recent years, from very high costs due in part to high diesel prices several years ago to very favorable bids typically being received currently due to the poor economic climate. Costs presented here contain a 25% contingency in part to allow for this uncertainty.

6.4 Real Estate Needs

Real estate needs for the project by element are discussed below, including the types of easements that might be appropriate for various parcels. The actual form of real estate rights acquired and acreages of private lands used will depend on negotiations with individual landowners. No cost estimates have been developed for real estate needs.

6.4.1 Southern Flow Corridor

Real estate needed to implement this element is summarized in the figure below. 377 of the 384 acres of public lands in the project area (the Wetland Acquisition Area) are used for flow conveyance and habitat restoration.

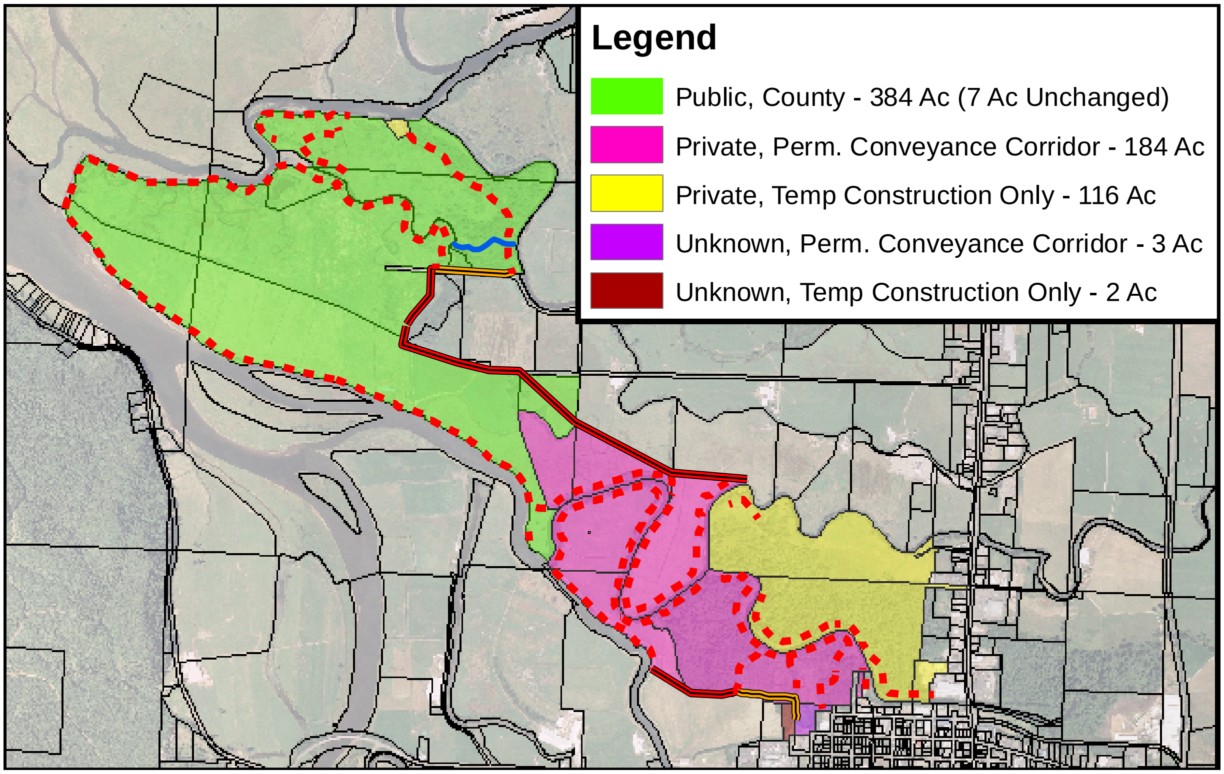

Figure 5: Southern Conveyance Corridor Real Estate Needs

Of the 184 acres of private lands needed for permanent conveyance, 116 acres are in agricultural production. Removal of the levees will expose these lands, much of which has subsided by 2-3 feet, to the tides. The lower portions of the lands will be inundated frequently, and the highest portions will see at least monthly high tide flooding. Whether or not the lower areas will be able to support any vegetation initially is unknown; these areas may convert to mudflats initially, then rebuild over time to elevations that will grow vegetation. 68 acres of private lands bordering Hoquarten Slough currently support forested wetlands; some have at least a partial hydrologic connection to the river system and are within the regulatory floodway.

There are several additional private properties totaling 116 acres between Dougherty and Hoquarten Sloughs that are mostly forested wetlands fully connected to the river system, but which contain remnant levee segments and fill that block conveyance. The fill is proposed to be removed from these properties, but there will be no change in normal flow hydrology on them due to the project. These parcels are also in the floodway, and so already contain inherent conveyance protection regulations on them. Subject to landowner approval, only temporary construction easements to remove the fill may be necessary on these lands.

The Fuhrman property of 2.5 acres includes a roadway access paralleling Hall Slough. For this project, the berm protecting the road is proposed for removal, the roadway upgraded to withstand overtopping, and a bridge constructed across the Hall Slough – Blind Slough connector channel. Inherent in this is the assumption that the existing house remains and the owners wish to retain access to it. If this property could be acquired then the project would only require the house and berm be removed. The decision whether or not to install the bridge and keep the road would likely depend on options for recreational access.

6.4.2 South Bank Wilson River Berm

The berm alignment will run across 7-8 private properties with 5-6 landowners. Alignments will vary by property depending on existing structures and negotiations with landowners. Permanent flood control easements will need to be obtained for operation and maintenance of the berm. It is assumed the easement will extend from the landward toe of the berm to the river channel in order to give the easement holding agency rights to repair the bank in the future should erosion threaten the berm. Landowners will benefit from reduced flooding and maintenance of the berm by a public agency.

6.4.3 North Bank Wilson Field Grading

A temporary construction easement from a single landowner will be needed to perform the work. It is recommended that a permanent flood conveyance easement also be obtained to ensure the flow path is not blocked in the future unless the pending flood maps add this area into the floodway.

6.5 Permitting

No major permitting hurdles are anticipated for Project Exodus. The Southern Flow Corridor has large ecosystem restoration benefits, and by itself would likely qualify for a streamlined restoration permit, based on work developing the April 2009 grant application for a smaller restoration of the Wetland Acquisition site. The North and South Bank Wilson River projects do not propose work below the ordinary high water line of the river, but may impact some small areas of wetlands and should have little if any long-term environmental consequences. If the Shilo structure repair is included with the South Bank berm project in-water work will be required.

The actual permit pathway selected will depend on whether the entire project is developed at once or broken into separable elements and implemented over time with individual permits. In any scenario, the environmental benefits of the project as a whole are believed to far outweigh the costs. The full participation of regulatory agencies in the Oregon Solutions process and their familiarity with the Wetlands Acquisition area and proposed project will also help to streamline the permitting process. The agencies and permits that will be required for this project are as follows:

Corp of Engineers & Oregon Division of State Lands - Joint Fill and Removal Permit – Work below the ordinary high water line or in wetlands requires a Joint Fill and Removal permit from the U.S. Army Corps of Engineers and the State of Oregon. The north and south bank Wilson River projects appear to be entirely above the OHWL and so will require a wetlands survey to determine if they require this permit or not. The Southern Flow Corridor element is almost entirely within the OHWL and will definitely require the permit.

The Southern Flow Corridor has been designed to qualify under the Federal Nationwide Permit (NWP-27) and the General Authorization under the State of Oregon Removal-Fill Law. These programs are designed to streamline the permitting process for restoration activities. The NWP-27 authorizes the restoration of former tidal waters, the enhancement of degraded tidal wetlands, and the creation of tidal wetlands. The NWP-27 provides authorization for all wetland creation activities, provided those activities comply with the terms and conditions of the NWP-27.

Oregon´s Removal-Fill Law also allows the Oregon Division of State Lands to grant, by administrative rule, General Authorizations for removal and fill activities that would cause only minimal individual and cumulative environmental impacts, and would not result in long-term harm to water resources of the state. To be eligible for this General Authorization, the project must be for the specific purpose of wetland restoration. The Southern Flow Corridor element meets the type of projects allowed, criteria and specific authorized activities.

National Marine Fisheries Service – Slopes IV Restoration

The Southern Flow Corridor has been designed to comport with NOAA Fisheries restoration programmatic biological opinion (SLOPES IV). The project meets the requirements of SLOPES IV as it applies to the Oregon Coast Coho salmon (*Oncorhynchus kisutch*). All of the proposed actions are within the range of anticipated effects considered in SLOPES IV. SLOPES IV Restoration identifies and authorizes nine categories of action related to stream restoration and fish passage. This project is limited to five of these categories - Fish Passage Restoration, Off- and Side-Channel Habitat Restoration, Set-back Existing Berms, Dikes, and Levees, Streambank Restoration, and Water Control Structure Removal

6.5.2 Other Permits

The Joint Fill and Removal permit will trigger the following state agency actions during the public review process. Agency comments will condition the permit as per each agency's requirements.

Oregon Division of State Lands - Wetland Determinations and Delineations

For projects proposed in wetlands, the state removal-fill permit application requires that wetland delineation be completed and verified or "concurred with" by DSL before the permit can be issued.

Oregon Department of Fish and Wildlife

In-Water Timing Guidelines: The in water work window for Tillamook Bay is November 1 – February 15 and July 1 – September 15 for the Wilson and Trask Rivers. In all likelihood, this project will incorporate work that falls into both timeframes.

Fish Passage Requirement: The owner or operator of an artificial obstruction located in waters in which native migratory fish are currently or were historically present must address fish passage requirements prior to certain trigger events. Artificial obstructions include dams, diversions, roads, culverts, tide gates, dikes, levees, berms, or any other human-made device placed in the waters of this state that precludes or prevents the migration of native migratory fish.

Habitat Mitigation Recommendation :ODFW recommends mitigation for projects where loss of fish and/or wildlife habitat is expected. The purpose of the Fish and Wildlife Habitat Mitigation Policy is to create consistent goals and standards to offset the impact to fish and wildlife habitat caused by land and water development projects. The policy provides goals and standards for general application to individual development projects.

Oregon Department of Land Conservation and Development

Coastal Zone Management Act Consistency Certification: Oregon has a federally approved coastal management program. This program generally applies within the state's coastal zone, extending from the boundary of the territorial sea to the crest of the coast range. Projects requiring a federal license or permit within this area must be consistent with the enforceable policies of the coastal management program.

Oregon Department of Environmental Quality

1200-C Storm Water Permit: A 1200-C Construction Stormwater National Pollutant Discharge Elimination System (NPDES) Permit regulates stormwater runoff from construction activities that disturb one or more acres of land. The permit requires permit holders prepare an Erosion and Sediment Control Plan and incorporate Best Management Practices into their construction work.

401 Water Quality Certification: A 401 Water Quality Certification (WQC) is required as a component of any federal action that has the potential to result in a discharge to waters of the state, including Joint Fill and Removal Permit (USACE/ODSL).The intent is to provide reasonable assurance that permitted activities will not violate state water quality standards, as approved by U.S. Environmental Protection Agency (EPA), and therefore will not impair water quality or beneficial uses of waters of the state (including wetlands).

Tillamook County Development Permit

This project will require coordination with the local government to ensure that land-use planning requirements are met. Most state agencies rely on a Land Use Compatibility Statement (LUCS) signed by a local planner indicating that the project is consistent with the applicable local planning requirements. A development permit will also be required for construction within a mapped floodplain. The South Bank Wilson River Berm project causes a rise in 100-yr flood levels in some areas which may have flood hazard regulation implications; this is discussed further in the section on flood reduction benefits.

6.6 Final Design and Construction

6.6.1 Plans and Specifications Development

The next step is to obtain the necessary information needed for full plan development. Key tasks will include ground survey and detailed field inspection of all sites. A geotechnical investigation of the new levee alignment will be required, including some borings and test pits. Completion of these tasks will give greater certainty to quantity and cost estimates. Real estate issues should also be resolved at this stage and all easements defined for plan layout. The 30% plan set will contain all information needed to support permit submittal. The hydraulic model will be updated to reflect the current design and the analysis rerun. The project may need to be analyzed using the new FEMA model for regulatory compliance. The model will also be used to evaluate multi-year construction approaches to ensure that there is no increased risk of flooding during construction created by phasing of project elements. Plans will be developed to the final stage based on several engineering and permit review cycles.

6.6.2 Construction

Construction sequencing is critical for implementation of the Southern Flow Corridor. While the existing levees and fill are desired for use in the new levee and ditch filling, the site must also remain protected from tides until this work is substantially completed, along with other interior work such as road decommissioning. If acceptable to permitting agencies, fish exclusion and repair and removal of tidegate mitigation devices will be done prior to beginning construction in order to temporarily dry the site out and make equipment access possible to the wetter areas, primarily for ditch filling. As much as possible the levees and fill will be removed while keeping the perimeter tidal protection in place. Strategies may include lowering levees to just above summer high tide levels entirely and removing the insides of levee while leaving a narrow berm on the outside.

Once the new levee and flood gates area constructed and all other interior work completed, the remaining existing levee fill can be removed. Ultimately the levees must be breached, at which point removal of the remaining fill becomes much more difficult. The plan calls for removal of virtually all of the existing levees and fill in the project area. Final excavation will require working within tide cycles, working back out of the project site without the benefit of loop haul roads and more difficult sediment control measures.

The North and South Bank Wilson River projects do not have the same tidal issues and construction should be relatively straightforward on these two projects.

6.7 Maintenance and Operation

Long term maintenance costs are expected to be lower with implementation of the project. Around 45,000 feet of levee, including 30,000 ft that run along river channels and are exposed to higher erosive stresses, will be replaced with 9600 feet of new wider, better constructed levee, very little of which is near any channel. The new floodgates will all be constructed of corrosion resistant materials and have a longer life span than the numerous older steel culverts now in use.

The jurisdiction maintaining the South Bank Wilson River berm should ensure that homeowners do not begin informally elevating the berm – this often occurs during floods when sandbags are added and not removed. Over time this results in greater risk of berm failure.

6.8 Separable Elements

Due to the size and complexity of the project implementation may be phased over a period of years. A separable element is the smallest project piece that may be constructed without causing adverse impacts. The Southern Flow Corridor and North Bank Wilson Field Grading project are separable elements. The South Bank Wilson River Berm is not considered a separable element. Due to the increases in flood levels in the Wilson River proper and on the north bank, it should not be implemented until the North Bank Project is completed.

Construction considerations permit some further division of separable elements. First, the Southern Flow Corridor can be divided into several logical areas for independent implementation as shown in the next figure. The two southeastern separable elements ("A and B" in Figure 6) are a smaller portion of the construction budget, but are all on currently private lands. The northwest area ("C" in Figure 6) comprises the bulk of work, and cannot readily be divided further without building temporary cross levees that would in themselves cost hundreds of thousands of dollars. Implementation in this area is more expensive, but also provides much greater environmental benefits, and the majority of land is already in public ownership.

Modeling results show that there is no one "chokepoint" that causes most backwatering effects, rather each cross levee and obstruction in the corridor incrementally adds to the backwater effects. This means there is no one area that needs be a priority due to flood reduction benefits; factors such as available funding or land rights can be used to decide sequencing of implementation.

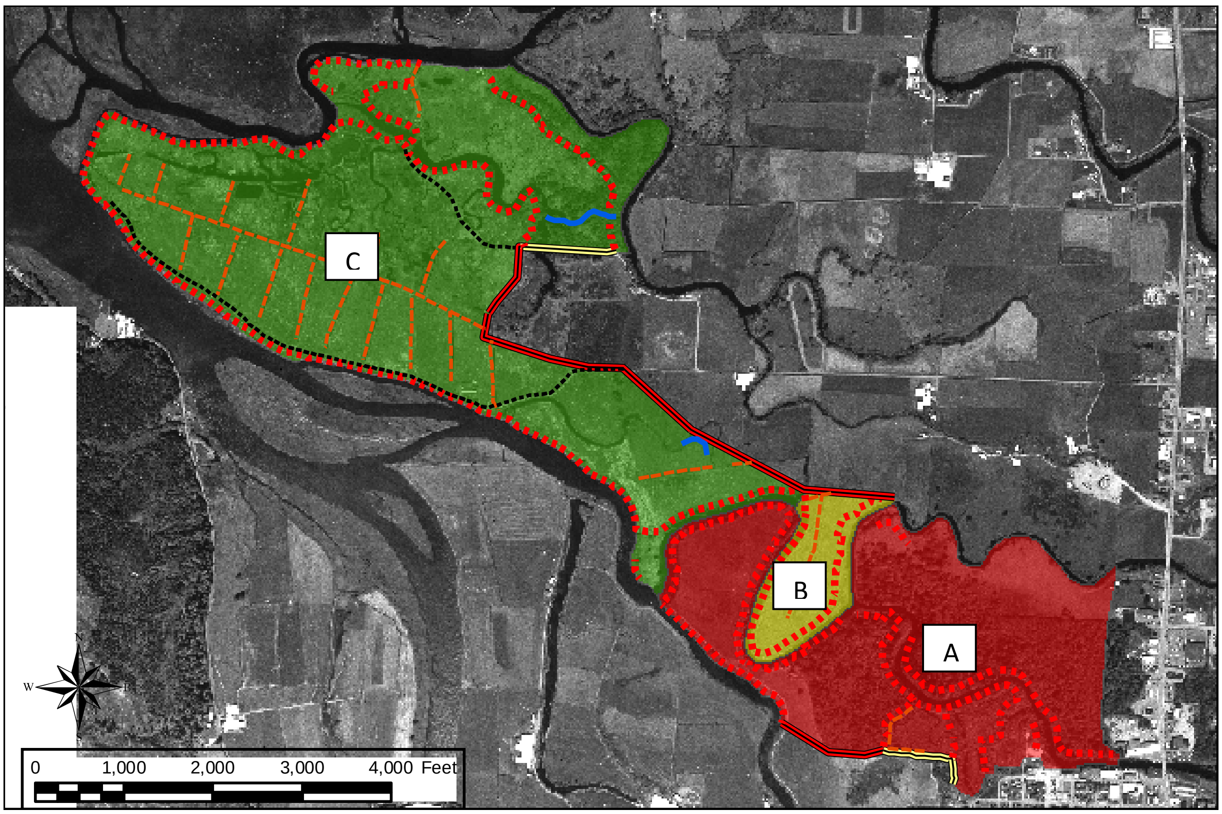

Figure 6: Southern Conveyance Corridor Separable Construction Elements

The South Bank Wilson River Berm could also be constructed in phases or a piecemeal fashion if funding or real estate issues prevent implementation in one phase. If this is the case it is recommended that the focus be put on the downstream end first; it is here that most or all of the water that flows west to 101 originates from.

6.9 Long Term Changes in the Southern Flow Corridor

Restoration of tidal flows to the project site will initiate significant long term changes in the lands that have been protected by the diking system for decades. Most of the freshwater wetland and pasture vegetation within the Wetlands Acquisition Area will not be able to tolerate the saline waters that will enter the site and will quickly die off. Given that the site is subsided by several feet, the lands will initially convert to low marsh or even mud flat habitats. Lower portions of the spruce forest in the northwest corner will also likely die off, either through salinity or simply higher water levels. Forested wetlands along the southern project boundary near the City may also see die off due to higher water levels once they are not protected by dikes. Recent sampling of Hoquarten, Dougherty and Hall Sloughs by TEP showed little to no salinity, indicating the project site is located in the transition zone between freshwater and saltwater tidal habitats. Vegetation within the project areas farther from the bay may not see saline or brackish waters.

Removal of the dikes combined with daily high tides and river flows will immediately begin bringing sediment onto the site. Ultimately it is expected the lands will rebuild from their current subsided condition up to high marsh, which around the project site typically sit 1-2 feet higher than MHHW. Rates of marsh building are difficult to predict, but are expected to occur on the timescale of decades. The abundant sediment supply and proximity to the rivers should help to accelerate the process. Areas close to the river and connected tidal channels will rebuild quicker, while more distant ends of the site will receive less sediment and accrete slower.

Channel changes due to the project are expected in several areas. Blind Slough will undergo enlargement as it becomes an important flood flow channel, conveying flows both from new floodgates in the levee and from the Hall Slough connector channel. Other relic tidal channels within the wetlands acquisition area will also adjust as they begin to convey tidal flows in and out of the site again.

Some lateral movement and change of the main river channels can also be expected where rock armoring is removed. Where this is acceptable will depend in part on the type of real estate rights obtained on private properties within the Southern Flow Corridor. Channel migration is expected to be relatively small based on historic patterns.

6.10 Sustainability of Flood Level Reduction Benefits

The ability of Project Exodus to continue providing flood reduction benefits under changing conditions was tested for two scenarios using the 1999 (5-yr flood). Simulating lands in the upper conveyance corridor had rebuilt to natural floodplain levels resulted in minimal changes to project performance. Of greater concern is long term sea level rise. The current IPCC predictions for global sea level rise by 2100 are from 0.6 to 2 feet. Model runs of the 1999 (5-yr flood) with tidal sequences one and two feet higher than observed were performed. Flood level reductions due to Project Exodus persisted in most of the area with the one foot rise, but were not seen with a two foot rise due to the tidal backwater extending through the area.

7 Additional Issues

In the course of developing Project Exodus, several flooding issues became apparent through review of past reports, conversations with various stakeholders and the technical analysis. These issues were not appropriate for or relevant to the project itself, but are suggested for consideration in the larger floodplain management context.

7.1 Sea Level Rise

The Highway 101 corridor between Hoquarten and Dougherty Sloughs is in the lowest area of the floodplain. Flood flows will continue to overtop the south bank upstream and flow down and over the highway here at significant depths. The proposed project will not change the frequency at which this happens, only the levels to which the floodwaters reach.

In addition, the land is now at elevations only 1-2 feet above wintertime high tides and is open to tidal influence via the sloughs that bound it. Projected sea level rises will result in wintertime high tides and storm surges inundating the highway corridor itself in the future. It is not cost feasible to reduce upstream flood flows – to do so would require a levee system along the entire Wilson River to the mouth of the canyon-, nor can levees or fill be used to protect against increasing sea levels as these would block the flood flows. Beyond implementing Project Exodus, either relocation or elevation with flow-though foundations appear to be the only viable alternatives for flood mitigation of structures in this area.

The farmlands west of Highway 101 depend on the levee system to protect them from tides. Much of the land has subsided and now lies below mean high tide elevations. Projected sea level rises will require these levees to be raised for tidal protection, but to do so will increase flood levels upstream. Of greatest concern here will be the levee along the north bank of Hall Slough. This is currently set as low as it can be while providing tidal protection. Elevation of this levee would cause increased backwater flooding on Highway 101 between Hall Slough and the Wilson River.

Some of the lands along Highway 101 north of Hall Slough are also at low elevations and at risk to sea level rise and levee raising along Hall Slough. However, the area rises quickly towards the Wilson River, and does not have the large, deep flows across it as the area to the south does. There are more options for adapting to sea level rise in this area without causing adverse effects elsewhere.

The National Flood Insurance Program regulations require minimum elevations structures may be built at based on current risk, even where it is likely future risk may be substantially higher during the life of the structure. It is recommended that the City and County consider setting a minimum building elevation standard based on projected sea level rise rather than current flood maps. For the Wilson River this would impact portions of the Highway 101 corridor and the lands west of it.

7.2 Sediment Monitoring

The effects of bedload sediment on flood levels have long been a concern on the Wilson River and in Tillamook Bay and will likely continue to be so. It is recommended that a program to regularly re-survey selected cross sections in the Wilson River be initiated. The purpose would be to provide quantitative data on channel changes in order to support future discussion on what actions, if any, might be needed to address sedimentation. The surveys should be performed every 2- 5 years. In addition, each bar immediately downstream of the bars permitted for gravel extraction under the recently approved Mediated Gravel Agreement should be completely surveyed. Growth or reduction of these bars over time, combined with extraction records, will provide valuable information on overall sediment budgets and the proportion of bedload being extracted versus passed down the system.

7.3 Berm System

As with most rivers, the levee and berm system along the Wilson River has a significant effect on flood levels and behavior. The current level of flood protection for the majority of land, buildings and infrastructure in the valley, including the Highway 101 corridor, depends on an assemblage of privately built and maintained berms of varying quality. Flood levels along the river do not differ greatly under different flows – the difference between a 5-yr and 100-yr flood is less than 1 foot for much of the reach-, so floodwaters that overtop the south bank flow at relatively shallow depths regardless of flood magnitude. As these overbank flows join and flow west in the lower southern edge of the floodplain the difference in depth become greater. On Highway 101 at Hoquarten Slough, the difference in flood level between a 5-yr and 100-yr flood is almost 3 feet. Having a significant breach in a berm increases floodplain flows and flood levels. For instance, this may cause flood levels expected for a 10-yr event to occur during a 5-yr flood.

The flood reduction benefits due to these berms extend beyond the properties they are built on. Conversely (see the discussion of the impacts of the proposed South Bank Wilson River Berm), these structures can cause increases in flood levels that extend well beyond their immediate location. Therefore it is recommended that the local community develop way to improve the quality of construction and maintenance of the entire berm system, and ensure that any new or raised berms or levees are properly analyzed as part of the permitting process.

8 Preliminary Cost Estimates

SOUTHERN FLOW CORRIDOR

Item No.	Item	Unit	Quantity	Unit Price	Total Amount
1	Mobilization, Bonding, Insurance, Demobilization @ 5%	LS	1	$62,000	$62,000
2	Clearing & Grubbing	LS	1	$36,000	$36,000
3	Construction Staking	LS	1	$24,000	$24,000
4	Construction Compaction Testing	LS	1	$24,000	$24,000
5	Erosion Control Measures	LS	1	$58,000	$58,000
6	Filter Fabric at Levee Base	SY	42,000	$2.60	$109,200
7	Strip and Haul Organics Offsite from Levee Base	CY	16,000	$14	$224,000
8	Strip and Spread Organics on Levee Face	CY	12000	$11	$132,000
9	Temporary Access Road Aggregate Base Improvements	CY	8,000	$22	$176,000
10	Temporary Access Road Pavement Repair	TON	250	$90	$22,500
11	Remove Old Levee and use in New Levee Core (short haul)	CY	40,000	$22	$880,000
12	Haul Excess Material from South Levees Offsite	CY	10,000	$14	$140,000
13	Haul in Material for New Levee from Spoils Pile	CY	34,000	$28	$952,000
14	Construction Fencing/Protection	LF	15,000	$3	$45,000
15	Levee Finish Slopes	LS	All	$40,000	$40,000
16	Levee Roadway Aggregate Base (12" depth) (7320 lf x 12' wide)	CY	3,300	$22	$72,600
17	6' Diameter Culverts with Top Hinge Tidegate (70' length)	EA	10	$40,000	$400,000
18	6' Diameter Culverts with Reuse Tidegates	EA	10	$30,000	$300,000
19	New Flood Structure	EA	1	$400,000	$400,000
20	New Flood Structure, Reuse Flood Gates and Tide Gates	EA	1	$300,000	$300,000
21	Demo Existing Structure, and Culverts	LS	1	$12,000	$12,000
22	Removal of Plugs/Tidegates, Disposal of Rubbish, Tires	LS	1	$24,000	$24,000
23	Install Woody Debris	LS	1	$70,000	$70,000
24	Install Organics/Fill Low areas	LS	1	$52,500	$52,500
25	Construction Fencing/Protection	LF	10,000	$3	$30,000
26	Floating Sedimentation Fences	LS	1	$50,000	$50,000
27	Excavate Swale at Fuhrman Road and Spread on Levee Sides	CY	1,100	$14	$15,400
28	Temporary Dewatering	LS	1	$28,000	$28,000
29	Armor Protection	CY	400	$20	$8,000
30	RR Flatcar Bridge on Fuhrman Road	EA	1	$120,000	$120,000
31	Fuhrman Road Upgrade for Bridge Delivery	CY	200	$26	$5,200
	Subtotal Construction Costs				**$4,812,400**
	Permitting				$60,000
	Engineering, Administration, Legal @ 18%				$866,232
	Subtotal Project Costs				**$5,738,632**
	25% Contingency				$1,434,658
	Total Project Costs				**$7,173,290**

SOUTH BANK WILSON RIVER SETBACK BERM

No.	Item	Unit	Quantity	Unit Price	Total Amount
1	Mobilization, Bonding, Insurance, Demobilization, Traffic Control	LS	1	$32,000	$32,000
2	Clearing and Grubbing (Haul Offsite)	CY	7600	$14	$106,400
3	Construction Staking	LS	1	$12,000	$12,000
4	Compaction Testing	LS	1	$12,000	$12,000
5	Erosion Control Measures	LS	1	$21,000	$21,000
6	Filter Fabric at Base of Levee	SY	11500	$2.50	$28,750
7	Strip and Spread Organics on Levee Face	CY	4030	$11	$44,330
8	Temporary Access Roadway	CY	760	$22	$16,720
9	Gravel Road on Top of Levee	CY	630	$22	$13,860
10	Haul in Material for New Levee and Earthwork	CY	9600	$28	$268,800
11	Construction Fencing/Protection	LF	3400	$2.50	$8,500
12	Levee Finish Slopes	LS	1	$16,000	$16,000
	Subtotal Construction Costs				**$580,360**
	Engineering, Administration, Legal @ 18%				$104,465
	Subtotal Project Costs				**$684,825**
	25% Contingency				$171,206
	Total Project Costs				**$856,031**

NORTH BANK WILSON RIVER FIELD GRADING PROJECT

No.	Item	Unit	Quantity	Unit Price	Total Amount
1	Mobilization, Bonding, Insurance, Demobilization	LS	1	$10,000	$10,000
2	Excavate underlying soil and Spread in Fields	CY	4900	$14	$68,600
3	Excavate and Replace Topsoil	CY	4400	$24	$105,600
4	Construction Staking	LS	1	$5,000	$5,000
5	Finish Grading and Seeding	LS	1	$5,000	$5,000
	Subtotal Construction Costs				**$194,200**
	Engineering, Administration, Legal @ 18%				$34,956
	Subtotal Project Costs				**$229,156**
	25% Contingency				$57,289
	Total Project Costs				**$286,445**

9 Preliminary Plans

Southern Flow Corridor Benefit-Cost Analysis

Prepared for:

Tillamook Oregon Solutions Design Team

Under contract to Tillamook County

Prepared by:

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REVISED MAY 2011

Acknowledgements

Project design and this report were prepared by Vaughn Collins, P.E., CFM. of NHC. Sam Gould of NHC performed hydraulic modeling and GIS analysis.

The Benefit-Cost analyses were performed by Rob Flaner, CFM, Hazard Mitigation Program Manager for Tetra Tech, Inc. The HAZUS-MH analysis was performed by Ed Whitford, Senior GIS Analyst for Tetra Tech, Inc.

We wish to thank the numerous staff from Tillamook County, especially the Assessor's Office, that collected needed data for the analysis on very short notice.

Contents

1 Executive Summary

The Port of Tillamook Bay has requested that the Southern Flow Corridor be eligible for FEMA funding under its Public Assistance Alternate Projects authority. A requirement under this program is that the proposed project meets benefit-cost criteria. The purpose of this report is to document the data sources, methods and results of the benefit-cost analysis.

To measure the cost-effectiveness of the proposed Southern Flow Corridor project, FEMA's Benefit Cost Analysis Re-engineering (BCAR) version 4.5.5 was utilized. The damage frequency assessment (DFA) module within BCAR was utilized. The damages entered into the DFA module were estimated using FEMA's HAZUS-MH (version MR-4) risk assessment tool. Due to the complexity and comprehensive nature of this project, this approach to measuring the cost-effectiveness was deemed appropriate and within FEMA guidelines by the analyst.

This report supersedes a prior version of the report dated November 2010. FEMA comments on the the prior benefit-cost analysis questioned the validity of the damage numbers generated. The method used was deemed appropriate, but it was requested that the analysis validate or otherwise justify the depth-damage curves used.

A limited amount of historic flood damage data was obtained and the HAZUS predicted damage results compared with the historic data. Only data for residential and commercial categories were able to be obtained. For these categories, the comparisons show that HAZUS estimated losses were 40% less than actual flood insurance claims for residential structures, and 37% greater than estimated Replacement Cash Value losses for commercial structures. HAZUS values are expected to always exceed RCV and claims values because the model estimates additional direct losses (such as displacement costs) beyond the building, content and inventory losses flood insurance will pay. The HAZUS values are judged to be close enough to RCV/claims value to be called validated.

Because no quantitative data for agricultural losses were available, a different approach was required. A qualitative check was conducted based on published aggregate damages for the February 1996 flood, and it was determined using commercial values was a reasonable replacement.

The entire analysis was run as a lower bound analysis; that is, using only the largest benefit categories and conservative assumptions the project was tested to see if the benefit-cost ratio was above 1.0. The lower bound approach leaves unquantified numerous known benefits, as the goal is to determine simply whether or not a project is cost-effective. If shown cost-effective, as this project is, the true benefit cost, while unknown, is guaranteed to be higher than the one calculated. The lower bounds analysis results show that the project is cost-effective, with a benefit-cost ratio of 1.14.

2 Project Description

The Southern Flow Corridor consists of removing existing levees and fill to create an unobstructed flood pathway out to Tillamook Bay. The Southern Flow Corridor – Landowner Preferred Alternative Preliminary Design Report ("SFC Design Report") describes in detail the project elements.

3 Flood Level Reduction Benefits

Implementation of the Southern Flow Corridor will result in reductions in flood levels across the lower Wilson River floodplain and to a smaller degree on the lower Trask and Tillamook Rivers as well. The project does not reduce the frequency of flooding, which is controlled by flows and bank elevations upstream, but reduces the flood levels to more natural levels over a wide range of flood magnitudes.

Three floods (two historic floods and a synthetic 100-year flood) were selected for use in the Benefit-Cost Analysis. An updated flood frequency analysis for the Wilson River USGS was completed and the published USGS peak flows applied to the curve to generate estimated recurrence intervals for each of the historic floods. The synthetic 100-yr event was taken directly from the Preliminary Flood Insurance Study. Figures showing the reduction in water level due to the project for the 1999 and 100-yr floods are shown in the SFC Design Report.

Table 1: Flood Recurrence Intervals

Flood Year	Recurrence Interval	Peak Flow (cfs)	Source
1999	6	25,400	USGS
2007	22	33,100	USGS
--	100	41,400	FEMA FIS

Modeled flood depths from the three floods, with and without the proposed project, were extracted and processed in GIS into depth grids for the analysis.

4 Project Costs

Project cost details and methods of estimation are described in the SFC Design Report. The summary project costs are shown here. Project costs are lower than the previous report. This is due primarily to two factors. 1) Two parcels that previously were assumed to be acquired will not be; the landowners have indicated they wish to keep the land and this has been reflected in the project layout, hydraulic modeling and costs, 2) As a result of some minor new dike realignment based on landowner negotiations the numbers of new floodgates required is substantially less and hence these costs.

As part of the reappraisal of the project in preparation for this appeal, the entire project cost estimate was revisited. Levee removal and dike construction quantities were recalculated and all unit and lump sum costs inspected and adjusted where necessary.

Project Design, Permitting and Construction costs are considered to be conservative. Project design and permitting alone have over $1,000,000 budgeted for a $4.2 million construction cost estimate. Given that the project, while large in scale, is a relatively simple earthmoving job without any of the complexities of buildings or urban environments, and that the major ecological benefits and support of resource agencies make permitting the project likely to be fairly easy allowing 25% of construction costs for design and permitting is conservative. In addition, a 25% contingency has been applied to the sum of construction and permitting/design costs.

5 HAZUS-MH Analysis

5.1 Building Inventory

A User Defined Facility (UDF) approach was used to model potential flood loss in the project area.

The project area was determined by using GIS to find all floodplain parcels that had at least a 0.1 foot reduction in flood level during the 100-yr flood as a result of the Southern Flow Corridor. All structures within the project area were digitized using 2009 aerial photographs and an ID number assigned. County Assessor staff then matched each structure with the appropriate structure from the County Assessor database using the parcel number. Assessor data extracted included Use Type, Building Square Feet, Building Construction Class, Year Built, and Assessed Improvement Value. GIS was used to determine the centroid of each digitized structure and coordinates extracted. A limited number of structures use the same coordinates. This occurred where large farm buildings covered by one roof are stored within the Assessor database as multiple individual structures; for instance, there may be a hay shed, equipment storage and milking parlor assessed separately under one roof. In these cases all structures under one roof were assigned the same centroid coordinates of the digitized roof polygon.

5.2 First Floor Height

Three methods were used to determine first floor height.

FEMA elevation certificates provided by the County were used to determine the first floor elevation for 16 buildings in the study area. The mean ground elevation for each of these buildings was determined using LIDAR and the first floor height above ground was calculated by subtracting the mean ground elevation from the first floor elevation.

The County provided 285 photos of buildings in the study area from Assessor files. For agricultural buildings, the County Assessor structure database separates different functional areas within a building. Therefore many of the large farm buildings contain up to 10 structures within the Assessors database. It was assumed that all structures covered by one roof contained the same floor elevation. As a result of multiple structures being cataloged within one building, the first floor heights above ground for 361 structures were estimated using these photos.

Based on these photographs, an estimated first floor height was calculated to the nearest 0.5 foot by using points of reference above adjacent grade. For example, standard step and masonry block heights are 8 inches, allowing estimation of flood height by multiplying the number of steps or blocks visible by 8 inches. This approach was utilized using any available visual gauges such as siding, concrete block, bricks, doors etc. For a small number of commercial buildings on or near Highway 101, Google Street View was used to estimate the first floor height above ground using the same techniques.

The first floor heights above ground for the remaining 190 (one-third of the total) buildings were determined using the following assumptions:

- the first floor of farm buildings was assumed to be at grade
- the first floor of single family residences was assumed to be 2.5 ft above grade.

These assumptions were based on typical values noted for structures with photographs.

5.3 Building and Content Value

For building replacement cost, the Tillamook County Assessor Real Market Value (RMV) was used when available. 96 of the 570 structures did not have RMV attributed. In these cases, an average value per square foot was applied, based on Occupancy Code/Use Type. For example, if an Agricultural structure was missing an improvement value, the average dollar amount per square foot was applied to that structure to create a building replacement cost.

The following percentages were used to create building content costs:

Table 2: Content Cost Multipliers by Occupancy Type

Content Cost Description	
Occupancy/Use Code	Content Cost
RES1 To RES6 & COM10	RMV * 1.0
COM1 To COM5, COM8, COM9, IND6, AGR1, REL1, GOV1 and EDU1	RMV* 1.0
COM6 To COM7, IND1 To IND5, GOV2 and EDU2	RMV * 1.5

After completion and validation of the building inventory, a total 570 buildings were loaded into the HAZUS-MH flood study region as user defined structures (UDF).

5.4 Flood Depth Grids

NHC produced six flood depth grids from hydraulic model outputs that were used in the HAZUS Flood analysis. Pre-project and post-project depth grids were provided for flood intervals of 6, 22, and 100 years. All six depth grids were loaded into the HAZUS study region as User Supplied Digital Elevation Models (DEMs).

5.5 Flood Analysis

HAZUS Flood Scenarios were created for each of the six events, and results included damage estimates for the 570 buildings in the study regions. For all Scenarios, USACE Generic Depth Damage Functions were used. For this reason, Residential Content Cost was set equal to Building Cost to be more in line with USACE standards. All results were summarized by General Occupancy Type, and included; Building Loss, Content Loss, and Inventory Loss. Inventory Loss was developed for all non-Residential and non-Agricultural structures. Flood loss types are defined below.

Building Loss: Building losses are dependent on depth-related percent damage (depth-damage functions). Building damage includes damages to the structure itself, as well as damages to components such as lighting, ceilings, mechanical and electrical equipment and other fixtures. The USACE generic damage functions for structures contained within HAZUS-MH (MR-4) were applied in this analysis.

Building Content Loss: Building contents are defined as furniture, equipment that is not integral with the structure, computers and other supplies. Contents damage functions are applied in the same manner as building damage functions. Once again, these damage functions are the USACE generic damage functions contained in HAZUS-MH.

Building Inventory Loss: Business inventories vary considerably with occupancy. For example, the value of inventory for a high tech manufacturing facility would be very different from that of a retail store. Thus, it is assumed for this model that business inventory for each occupancy class is based on annual sales. Business inventory losses then become the product of the total inventory value (floor area times the percent of gross sales or production per square foot) of buildings of a given occupancy in a given damage state, the percent loss to the inventory and the probability of given damage states.

Inventory losses in the flood module are determined in a manner consistent with the other building losses, as well as the methodology currently utilized in the HAZUS earthquake module. For occupancies with inventory considerations (COM1, COM2, IND1 - IND6 and AGR1, as defined in the HAZUS99 Earthquake Technical Manual), inventory losses are estimated using USACE-based depth-damage functions, in conjunction with HAZUS default inventory values determined as a percentage of annual sales per square foot.

The loss results generated by this analysis can be found in Attachment B of this memorandum.

6 Loss Validation

Loss validation was completed using what limited data could be collected in the time available. Available information included a spreadsheet of flood insurance claims in the Wilson River floodplain (including the project influence area and beyond) from 1977 through 2008, and detailed proof of loss forms received directly from 3 businesses.

The following analysis presents actual insurance data from two floods, occurring on December 12, 1998 and November 6, 2006. This is compared with HAZUS results from the December 3, 2007 flood. These three floods were all similar in flow magnitude, with flows of 35300, 38600 and 33100 cfs respectively. While the modeled 2007 flood has the lowest peak flow, the hydraulic model under simulates water surface elevation along the Highway 101 corridor to do some degree, such that the high water mark from the November 2006 flood is within 0.3 feet of the model results for the 2007 flood. For the purposes of this validation analysis, the floods can be treated as approximately equal in regards to the flood stages created in the lower Wilson River.

6.1 Residential Properties

Since 1977, sixty-two residential flood insurance claims have been paid within Tillamook County for a total of $1,978, 146 based on flood insurance claims data provided by FEMA Region X. This value is not inflated to current valuation. This averages out to be $31,905.58 per claim paid (including both structure and contents, and does not represent costs associated with displacement or loss of rental income from rental property).

Based on claims data filed for the 12/28/1998 flood event, there were seven claims filed for a total of $374,066. There was an anomaly in the data with 2 large claims showing for 1 property on consecutive days, the total of which exceed FEMA specified coverage limits. Therefore, these lesser value of the 2 claims was used to establish the average for the flood event. The average claim paid for the 12/28/1998 flood event, adjusted to 2011 dollar values was $45,215.

Based on claims data for the 11/6/2006 flood event, there were 18 residential flood insurance claims paid for a total of $708,846. This averages out to be $43,960 per claim, adjusted to 2011 dollars.

Table-1 illustrates the results generated by the level 2, user defined HAZUS model, in comparison to the insurance claims data available for Tillamook County. It should be noted that claims data was the only source of data for validation of the residential damage functions for this analysis.

Table 1

Claims versus HAZUS Comparison-Residential Properties

	Insurance Claims		HAZUS Analysis (December 3, 2007 Flood)		% differential
Event	Total Claims	Average Claim Paid(1)	Total Residential Loss	Average Loss	
12/28/1998	$182,405.00	$45,215.00	$1,055,738	$27,070	-40%
11/6/2006	$708,846.00	$43,960.00	$1,055,738	$27,070	-38%

1) Adjusted to 2011 dollars

Upon review of this data, the damage estimates generated by HAZUS for the 2007 event about 40% percent less than the actual claims paid for those historical events. The HAZUS average losses are also less than the average of all residential claims (unadjusted $) paid since 1977. As insurance claims pay only a portion of total losses incurred due to coverage limits and claims adjustment policies, the true difference between actual total damages and HAZUS estimates will be greater, i.e. HAZUS underestimates losses by more than 40% .This seems to substantiate that HAZUS does not over state damages to residential properties, and offers a conservative estimate of damage potential, which supports the concept of a lower bound analysis.

6.2 Commercial Properties

The commercial loss estimates generated by HAZUS were validated using flood loss data from 2 sources. Proof of loss documentation was provided for 3 commercial properties within the project reach. Additionally, historical flood insurance claims data provided by FEMA Region X was analyzed to establish average claims paid for commercial properties.

Since 1977, 155 commercial property flood insurance claims have been paid in the amount of $6,033,398 (not adjusted to reflect 2011 dollars). This is an average of $38, 925 per claim paid.

Based on claims data filed for the 12/28/1998 flood event, there were twenty-three claims filed for a total of $1,176,731. The average claim paid for the 12/28/1998 flood event, adjusted to 2011 dollar values was $74,535.

Based on claims data for the 11/6/2006 flood event, there were 21 commercial flood insurance claims paid for a total of $1,769,332. This averages out to be $92,125 per claim, adjusted to 2011 dollars.

Table 2 illustrates the comparison of the results generated by the level 2, user defined HAZUS model, in comparison to the insurance claims data available for Tillamook County.

Table 2

Claims versus HAZUS Comparison-Commercial Properties

	Insurance Claims		HAZUS Analysis 12/3/2007 Flood		% differential
Flood Event	Total Claims	Average Claim Paid(1)	Total Commercial Loss	Average Loss	
12/28/1998	$1,176,731	$74,535	$11,111,555	$144,305	+94%
11/6/2006	$1,769,332	$92,125	$11,111,555	$144,305	+57%

1) Adjusted to 2011 dollars

To further validate the commercial loss estimates, we looked at Replacement Cash Values (RCV) for building and contents damages from Proof of Loss statements filed for 3 properties within the project area and compared them these numbers to the HAZUS generated loss estimates for these specific properties. Table 3, summarizes this analysis.

Table 3

Proof of Loss versus HAZUS Comparison-Commercial Properties

Address	Event	RCV(1)	HAZUS Loss Estimate – 12/3/2007 Flood	% Differential
# 1 Main Ave., North	11/6/2006	$232,864	$389,850	+67
#2 Main Ave.	11/6/2006	$536,243	$1,092,045	+103%
#11 Main Ave.	11/6/2006	$290,122	$481,717	+66%

Adjusted to 2011 dollars

The data consistently show that HAZUS reports loss estimates from 57%-103% higher than either flood insurance payments or total replacement cash value. In our opinion the most reliable value to use is the data from the November 2006 flood shown in Table 2. There are 21 buildings in the sample, and the data is from a recent flood. The value is close to 2 of the 3 buildings with Proof of Loss statements listed in Table 3.

An estimate of the ratio between replacement cash value and flood insurance payment was made by averaging data from the 3 buildings shown in Table 3. The #11 building had data from both the 2006 and 2007 floods, giving a total of four data points to use. The average ratio of RCV to flood insurance payment was 114% (stated inversely, insurance payments were around 86% of RCV). Adding this 14% increase to the November 2006 flood average commercial flood insurance payment (Table 2) gives an estimated average Replacement Cash Value for commercial buildings of $105,022. Recalculating the HAZUS loss ratio to the estimated average RCV value rather than flood insurance payment results in HAZUS producing values 37% greater than RCV.

6.3 Agricultural Properties

There was not data available to directly validate the agricultural loss estimates within HAZUS. The insurance claims data did not include an agricultural value, and no individual property owners data were able to be collected.

Some data on agricultural losses is contained in the **Tillamook County, Oregon 1996 Flood Damage and Recovery Plan**, dated November 1996.

This report states there was $9,200,800 in agricultural damages within all of Tillamook County. Of the 155 dairy farms within the County, 90 were impacted with 20 to 30 significantly impacted. Of note in the report are the long lasting effects of flood damages on the dairy industry. The following paragraphs summarize the report findings.

655 cows were lost to drowning. Another 45 cows were lost to residual effects in the following weeks. An additional 600 cows were injured or became sick. Milk production was significantly reduced. Cows not milked for more than 12 hours typically suffer a loss of production that takes weeks to recover, and never does in some cases. As a result production losses were estimated at 10%, and were expected to remain at that level for at least a year.

The loss of pastures due to siltation was the major damage category. While the costs of renovating the pastures were extensive, the greatest damages occurred due to the loss of hay production, requiring farmers to buy rather than grow their own. With the next growing season lost, farmers were required to buy hay for over a year until their own field could once again produce it. Additional damages included damages to buildings, drainage systems and fencing.

The adjusted 2011 value of the estimated agricultural damages is $13,157,000. The 22 year (a flood very close in size to the 1996 event) pre-project damages from HAZUS are $8,513,000. Agriculture is concentrated in the area around the City of Tillamook, and some significant portion of the 23-30 farms reported with extensive problems are located in the project area. Thus the HAZUS outputs appear to be somewhat high but not extremely so when compared with stated damages. It is also noted that the damage values stated do not appear to account for long term milk production losses that were very significant – the Tillamook Creamery Co-op incurred estimated losses of $750,000/month.

6.4 Summary of Findings

- Residential:
  - HAZUS loss values are 40% less than average flood insurance claims
- Commercial:
  - HAZUS loss values are 37% greater than commercial replacement cost value losses
- Agriculture:

- No direct validation data was available
- Qualitative comparison of 1996 flood data with HAZUS indicates results are likely somewhat high compared to actual damages.
- Agricultural damages are incurred for some time after the event

7 Lower Bound Analysis

Lower-bound analysis is a powerful tool that can often demonstrate that projects are cost-effective — in many cases regardless of whether the available data are complete or not. This is an important point, because a project's cost-effectiveness can sometimes be determined by using only one or two key pieces of data. This is because the lower-bound analysis considers only *some* of a project's benefits — those that are the most important or those for which data exist — and ignores other benefits that may be difficult to estimate or for which data may not be available. In other words, this analysis purposely uses only a few data to determine the project's cost-effectiveness and undercounts, or ignores other benefits that will be gained by funding the project. A lower bound analysis indicates whether or not a project is cost-effective, but not the degree to which it may be so.

The analysis performed for the Southern Flow Corridor was a true lower bound analysis. Conservative approaches to estimating losses were utilized and elements of avoided losses were purposely left out of the analysis to measure the level of cost-effectiveness of this project.

7.1 Modified Damage Functions

It is our opinion that the HAZUS loss values for commercial building being 37% higher than estimated replacement cash value losses from insurance claims validates the HAZUS depth-damage curves. RCV values reflect only direct replacement costs for building, contents and inventory damages. The HAZUS model reflects additional costs beyond these that are incurred, including relocation expenses, capital related income losses, wage losses and rental income losses. These losses are time dependent functions incurred during the period required to restore the business to operation. The incorporation of these additional direct losses in HAZUS means HAZUS values should always be greater than replacement cash values losses for a business even where the model perfectly predicts building, content and inventory losses.

Given the lack of data for agricultural losses, we find the most logical approach is to assume that the same data apply to agriculture as to commercial business categories. The 1996 report states "*As an economic enterprise, dairy farms are capital and labor intensive in comparison to most other forms of farming. Extensive investments must be made in structures, machinery and equipment to support and maintain the enterprise",* which we believe supports this assumption. Our initial conclusion is then the same as for commercial: that HAZUS losses would be expected to be 37% higher than replacement cash values for insurance claims, and that this difference is expected and validates the HAZUS model.

Nevertheless, in our lower bounds approach it was determined to modify the estimated losses to demonstrate cost effectiveness even with lower damages. It was decided that, consistent with our findings above, the same approach should be taken with agriculture and commercial categories.

The approach taken was to reduce the agriculture and commercial inventory losses for the 6-yr and 22-yr events by 50% for entry into BCAR. The values for the 100-yr event were left at the HAZUS calculated values. This approach is based on the theory that being located in an area that frequently floods, floodplain farmers and business owners have taken actions to reduce damages during small events, but very large floods occur too infrequently to change normal human behavior regarding flood mitigation. In terms of overall damage loss estimates this is approximately a 20% reduction for the two floods modified.

7.2 Ignored Damages

The following benefits were not included in this analysis:

Displacement: FEMA allows for up to 45 days of displacement per foot of flood water, at $1.44/square foot in the full data module of BCAR. There were 60 structures with over 1-foot of flood water for the 100-year event. No displacement costs were included in the analysis.

Functional Downtime-Roads: No loss of function for Highway 101 was included in this analysis. Highway 101 within the project reach averages between 16, 000 to 18,000 cars per day. The project provides modest reductions in roadway time inundated.

Actual Cash Value versus Replacement Costs: Both HAZUS and BCAR are set up to use replacement costs to determining the value of the structures being protected by a mitigation project. These values can be extracted out of national costs estimation guides such as R.S. Means or the BNI Home Builders Construction Guides. For this analysis, taxed assessed valuations were used to establish these costs. Tax Assessor values tend to be 10% to 30% lower than values taken from cost guides. Use of this value once again supports to concept of the lower-bound analysis.

Emergency Response Costs: No values for emergency response costs were included in this analysis.

Debris Removal: No costs associated with debris removal and/or management were included in this analysis.

8 BCAR Crosswalk

The following discussions will crosswalk the BCAR data entries. The Damage Frequency Analysis (DFA) module of BCAR version 4.5.5 was utilized for this analysis. See attachment C for a copy of the final BCAR report for this project analysis.

8.1 Hazard and Mitigation Information

The hazard to be mitigated is Flood

The Mitigation type is a Drainage improvement.

The basis for the damages is historical damages generated by HAZUS-MH version MR-4

The number of events analyzed will be 3. Probabilities of recurrence will be assigned for all 3 events.

8.2 Cost Estimation information

The project life for this project has been assigned as 50 years based on the guidance provided in BCAR. The value assigned to “Major infrastructure projects” was selected.

The project cost utilized was $8,060,000, based on the detailed cost estimate provided by the study contractor. Documentation of the cost estimate was uploaded into BCAR. The cost estimate represents the total project cost for the Southern Flow Corridor. This includes all property acquisition, permitting, design and construction costs.

A value of $20,000 was assigned for annual maintenance costs based on opinion of project design contractor.

The cost reflects current prices and escalation was not calculated in the BCAR model.

8.3 Type of Services

The type of services category for this analysis was determined to be not applicable by the analysts. The focus of this analysis is on general building stock considering both residential and non-residential properties.

8.4 Historical Damages before Mitigation

Analysis year is 2010

Year Built - not applicable since the analysis will assign recurrence intervals for all events.

Damage year - the historic flood events of 2007 and 1999 were modeled in HAZUS. Depth grids for these 2 events as well as the 100-year flood event were generated.

Recurrence interval - Recurrence intervals were assigned for each event based on the hydrology generated for the flood study. (See Attachment C).

Damages were estimated for building loss, contents loss and inventory loss where applicable. All damages are based on current dollar values.

8.5 Historical Damages after Mitigation

As with the before-mitigation damages, HAZUS was utilized to model the expected damages after mitigation. The basis for this analysis was the hydraulic and hydrologic (H&H) modeling of the post-project impacts expected from this project. Depth grids were generated for the same hydrologic events modeled in the before-mitigation analysis. Once again, see Attachments A and B for more discussion on the project modeling.

9 Attachment A: Hydrology and Hydraulics Summary

9.1 Hydraulic Model

The HEC-RAS hydraulic model developed for the Corps of Engineers Feasibility study was updated and used as the primary technical tool in hydraulic evaluation of alternatives for Project Exodus. 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 LiDAR. In many areas these are covered in dense brush or under tree canopy, and the accuracy of both the LiDAR and Corps photogrammetric data is 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-yr) flood with the observed tides increased by 1 foot and decreased by 2 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.

9.2 Comparison with FIS model.

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.

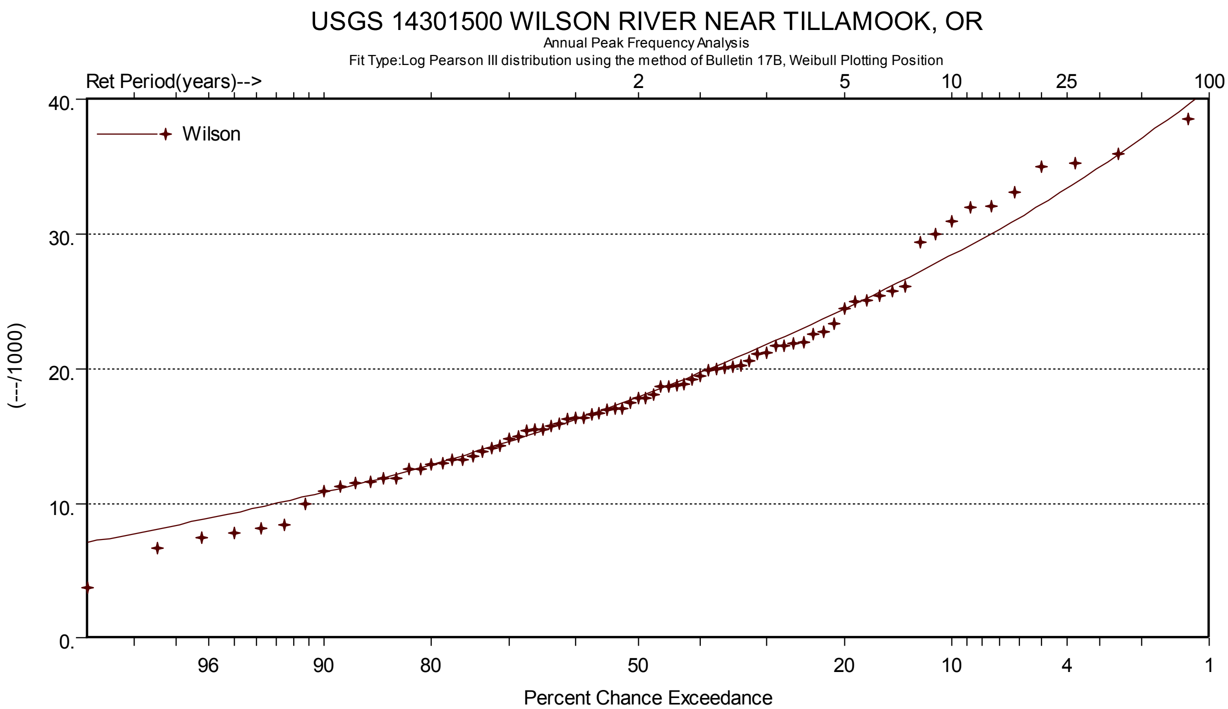
The NHC model included results for small floods, whereas the smallest flood in the FIS is the 10-yr event.

9.3 Processing of Modeling Results

Results from the hydraulic model were processed using a custom ArcGIS-based tool developed by NHC. Model outputs were processed through the tool into water surface elevation and depth grids for each flood. For HAZUS modeling, 20-foot cell size depth grids were generated.

9.4 Flood Frequencies

Three floods (two historic floods and a synthetic 100-year flood) were selected for use in the Benefit-Cost Analysis. An updated flood frequency analysis for the Wilson River USGS was completed and the published USGS peak flows applied to the curve to generate estimated recurrence intervals for the two historic floods. The synthetic 100-yr event was taken directly from the Preliminary Flood Insurance Study.



Flood Date	Recurrence Interval	Peak Flow (cfs)	Source
November 1999	6	25,400	USGS
December 2007	22	33,100	USGS
--	100	41,400	FEMA FIS

10 Attachment B: HAZUS-MH Loss Estimates

HAZUS OUTPUTS	AGR BUILDING LOSS	AGR CONTENT LOSS	AGR INVENTORY LOSS	COMM BUIDLING LOSS	COMM CONTENT LOSS	COMM INVENTORY LOSS	RES BUIDLING LOSS	RES CONTENT LOSS	RES INVENTORY LOSS	*OTHER BUIDLING LOSS	*OTHER CONTENT LOSS	*OTHER INVENTORY LOSS
100YR PRE PROJECT	$2,208,581	$6,058,512	$8,775,132	$2,039,940	$7,434,477	$6,896,835	$1,546,791	$1,628,429	$0	$306,835	$923,819	$803,716
100YR POST PROJECT	$1,817,151	$5,437,598	$7,792,295	$1,565,129	$5,728,424	$5,138,179	$1,166,609	$1,268,143	$0	$224,408	$631,220	$587,425
22YR PRE PROJECT	$851,293	$3,097,788	$4,176,251	$1,531,120	$5,406,149	$5,213,100	$700,007	$711,462	$0	$246,864	$761,897	$695,768
22YR POST PROJECT	$651,581	$2,584,761	$3,186,041	$1,257,394	$4,302,304	$4,068,218	$500,366	$436,070	$0	$174,983	$383,816	$373,064
6YR PRE PROJECT	$400,456	$1,513,665	$1,719,734	$945,695	$3,067,978	$2,700,866	$432,745	$392,414	$0	$101,043	$146,127	$151,539
6YR POST PROJECT	$270,491	$1,111,591	$1,179,023	$761,129	$2,440,985	$2,077,245	$367,961	$336,010	$0	$14,449	$0	$0

**Other Losses include; Industrial, Religion and Government*

HAZUS OUTPUTS	TOTALS		
	Bldg	**Contents**	**Inventory**
100YR PRE PROJECT	**$6,102,147**	**$16,045,237**	**$16,475,683**
100YR POST PROJECT	**$4,773,297**	**$13,065,385**	**$13,517,899**
22YR PRE PROJECT	**$3,329,284**	**$9,977,295**	**$10,085,120**
22YR POST PROJECT	**$2,584,323**	**$7,706,951**	**$7,627,323**
6YR PRE PROJECT	**$1,879,939**	**$5,120,184**	**$4,572,138**
6YR POST PROJECT	**$1,414,030**	**$3,888,585**	**$3,256,267**

ADJUSTED OUTPUTS	**Bldg**	**Contents**	Commercial Inventory Adjusted(1)	Ag Inventory Adjusted(1)	Total Adjusted Inventory
100YR PRE PROJECT	**$6,102,147**	**$16,045,237**	$6,896,835	$8,775,131.76	**$16,475,683**
100YR POST PROJECT	**$4,773,297**	**$13,065,385**	$5,138,179	$7,792,295.43	**$13,517,899**
22YR PRE PROJECT	**$3,329,284**	**$9,977,295**	$2,606,550	$2,088,125.71	**$5,390,444**
22YR POST PROJECT	**$2,584,323**	**$7,706,951**	$2,034,109	$1,593,020.47	**$4,000,194**
6YR PRE PROJECT	**$1,879,939**	**$5,120,184**	$1,350,433	$859,866.97	**$2,361,839**
6YR POST PROJECT	**$1,414,030**	**$3,888,585**	$1,038,622	$589,511.31	**$1,628,134**

(1) Inventory values were reduced by 50% for the 6-Year and 22-year events based on Historical data. The 100-Year was left at the HAZUS default value based on expected damages.

12 Attachment C: BCAR Report

Total Benefits:	**$9,509,639**	Total Costs:	**$8,336,015**	BCR:	**1.14**
Project Number:	Disaster #:	Program:		Agency:	**Northwest Hydraulics Consultants**
State:	**Washington**	Point of Contact:	Vaughn Collins	Analyst:	Rob Flaner

Project Summary:

Project Number:

Disaster #:

Program:

Agency: Northwest Hydraulics Consultants

Analyst: Rob Flaner

Point of Contact: Vaughn Collins

Phone Number: 206-241-6000

Address: 16300 Christensen Rd, Ste 350, Seattle, Washington, 98188

Email: vCollins@nhc-sea.com

Comments: PA Alternative Project

Structure Summary For:

Copy Of Copy Of Copy Of Tillamook county-Project Exodus, 2 Main Ave., Tillamook, Oregon, 97141, Tillamook

Structure Type: Building

Historic Building: No

Contact: Tillamook County

Benefits: $9,509,639

Costs: $8,336,015

BCR: 1.14

Mitigation	Hazard	BCR	Benefits	Costs
Drainage Improvement	Damage-Frequency Assessment	1.14	$9,509,639	$8,336,015

Total Benefits: **$9,509,639** Total Costs: **$8,336,015** BCR: **1.14**

Project Number: Disaster #: Program: Agency: **Northwest Hydraulics Consultants**

State: **Washington** Point of Contact: Vaughn Collins Analyst: Rob Flaner

Structure and Mitigation Details For: Copy Of Copy Of Copy Of Tillamook county-Project Exodus, 2 Main Ave., Tillamook, Oregon, 97141, Tillamook

Benefits: $9,509,639 Costs: $8,336,015 BCR: 1.14

Hazard: **Damage-Frequency Assessment - Flood**

Mitigation Option: Drainage Improvement

Latitude: Longitude: Project Useful Life: 50

Mitigation Information

Basis of Damages: Historical Damages

Number of Estimated Damage Events: 3

Number of Events with Know Recurrence Intervals: 3

Historic Damages Before and After Mitigation

Analysis Year: 2010 Analysis Duration: 21 Utilities ($/day):

Year Built: 1990 User Input Analysis Duration: Buildings ($/day):

Roads/Bridges ($/day):

Damages Before Mitigation

Damage Year: 2007
RI: 22.40
Are Damages In Current Dollars? Yes

Buildings (Days):
Utilities (Days):
Roads (Days):

Inventory Loss ($)	$5,390,444
Content loss ($)	$9,977,295

Damages After Mitigation

RI: 22.40
Are Damages In Current Dollars? Yes

Buildings (Days):
Utilities (Days):
Roads (Days):

Inventory Loss ($)	$4,000,194
Content loss ($)	$7,706,951

Total Benefits: **$9,509,639** Total Costs: **$8,336,015** BCR: **1.14**

Project Number: Disaster #: Program: Agency: **Northwest Hydraulics Consultants**

State: **Washington** Point of Contact: Vaughn Collins Analyst: Rob Flaner

Building Loss ($)	$3,329,284
Total	$18,697,023
Total Inflated	$18,697,023

Building Loss ($)	$2,584,323
Total	$14,291,468

Damage Year: 1999
RI: 5.80
Are Damages In Current Dollars? Yes

Buildings (Days):
Utilities (Days):
Roads (Days):

Inventory Loss ($)	$2,361,839
Content loss ($)	$5,120,184
Building Loss ($)	$1,879,939
Total	$9,361,962
Total Inflated	$9,361,962

RI: 5.80
Are Damages In Current Dollars? Yes

Buildings (Days):
Utilities (Days):
Roads (Days):

Inventory Loss ($)	$1,628,134
Content loss ($)	$3,888,585
Building Loss ($)	$1,414,030
Total	$6,930,749

Damage Year: 2010
RI: 100.00
Are Damages In Current Dollars? Yes

Buildings (Days):
Utilities (Days):
Roads (Days):

Inventory Loss ($)	$16,475,683
Content loss ($)	$16,045,237
Building Loss ($)	$6,102,147
Total	$38,623,067
Total Inflated	$38,623,067

RI: 100.00
Are Damages In Current Dollars? Yes

Buildings (Days):
Utilities (Days):
Roads (Days):

Inventory Loss ($)	$13,517,899
Content loss ($)	$13,065,385
Building Loss ($)	$4,773,297
Total	$31,356,581

Project: **Tillamook County-Project Exodus - Revised 5-21-2011-With Contingency**

Total Benefits:	**$9,509,639**	Total Costs:	**$8,336,015**	BCR:	**1.14**
Project Number:	Disaster #:	Program:		Agency:	**Northwest Hydraulics Consultants**
State:	**Washington**	Point of Contact:	Vaughn Collins	Analyst:	Rob Flaner

Summary Of Benefits

Expected Annual Damages Before Mitigation		Expected Annual Damages After Mitigation		Expected Avoided Damages After Mitigation (Benefits)	
Annual:	$3,007,618	Annual:	$2,318,551	Annual:	$689,067
Present Value:	$41,507,373	Present Value:	$31,997,734	Present Value:	$9,509,639

Mitigation Benefits:	$9,509,639	Mitigation Costs:	$8,336,015
Benefits Minus Costs:	$1,173,624	Benefit-Cost Ratio:	1.14

Cost Estimate

Project Useful Life (years):	50	Construction Type:	
Mitigation Project Cost:	$8,060,000	Detailed Scope of Work:	Yes
Annual Project Maintenance Cost:	$20,000	Detailed Estimate for Entire Project:	Yes
Final Mitigation Project Cost:	$8,336,015	Years of Maintenance:	50
Cost Basis Year:		Present Worth of Annual Maintenance Costs:	$276,015
Construction Start Year:		Estimate Reflects Current Prices:	Yes
Construction End Year:		Project Escalation:	

Total Benefits: **$9,509,639** Total Costs: **$8,336,015** BCR: **1.14**

Project Number: Disaster #: Program: Agency: **Northwest Hydraulics Consultants**

State: **Washington** Point of Contact: Vaughn Collins Analyst: Rob Flaner

Justification/Attachments

Field	Description	Attachments
Historic damages before mitigation	See attached BCA methodology memorandum.	
Mitigation Project Cost	See cost estimate contained in BCA Methodology memorandum.	
Project useful life	Used FEMA recommended 50-year project life for major infrastructure projects.	
Unknown Frequency - Damages after Mitigation	See attached BCA methodology memorandum.	
Year Built	This field is not applicable to this analysis since recurrence intervals have been determined for all events analyzed.	

STATE OF OREGON
LEGISLATIVE COUNSEL COMMITTEE

August 24, 2010

Senator Betsy Johnson
PO Box R
Scappoose OR 97056

Re: Legal Responsibility of Port of Tillamook Bay

Dear Senator Johnson:

QUESTION:

You asked whether the Port of Tillamook Bay (the Port) meets the legal responsibility requirements of the Federal Emergency Management Agency (FEMA) to use federal disaster assistance funds for a proposed hazard mitigation project identified by a problem-solving partnership known as Oregon Solutions.[1]

ANSWER:

We conclude that the Port satisfies the legal responsibility under the applicable federal law and regulations. FEMA can and will allow the Port to use federal disaster assistance funds for the proposed hazard mitigation project.

DISCUSSION:

Between December 1 and 17, 2007, severe storms and flooding led to a presidential declaration, on December 8, 2007, of a major disaster for several northwest Oregon counties including Tillamook.[2] Provisions of the Robert T. Stafford Disaster Relief and Emergency Assistance Act and federal regulations implementing the Act allow FEMA to approve the use of federal disaster assistance funds for hazard mitigation in conjunction with the repair, restoration or replacement of facilities damaged by the disaster.[3] In this instance, the Port is the applicant based on flood damage to a railroad line owned by the Port.

The Port's railroad line is subject to flooding several times per year. Through the collaborative process of Oregon Solutions,[4] stakeholders, including the Port, have identified a hazard mitigation project, formally known as the Port/Railroad Improvement Project or the Southern Flow Corridor Project, that is designed to mitigate the potential hazards of flooding to life and property along the several rivers flowing through the Tillamook Basin into Tillamook

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[1] *Oregon Solutions: Active Projects: Northwest Oregon* <http://www.orsolutions.org/northwest/northwest.htm>.
[2] *Disaster Summary For FEMA-1733-DR, Oregon* <http://www.fema.gov/news/eventcounties.fema?id=9125>.
[3] *Hazard Mitigation Funding Under Section 406 (Stafford Act), Disaster Assistance Policy 9526.1* <http://www.fema.gov/government/grant/pa/9526_1.shtm>.
[4] *Oregon Solutions, About Us* <http://www.orsolutions.org/about.htm> ("Oregon Solutions grew out of the State of Oregon's Sustainability Act of 2001" and promotes a "new style of community governance" based on the "principles of collaboration, integration and sustainability."

Bay. The Port proposes to use federal disaster assistance funds to perform flood hazard mitigation work that will reduce the instances of flooding throughout the project area, including the location of the Port's railroad line. In addition to its ownership (at all times during and after the disaster) of the railroad line to be benefited by the proposed hazard mitigation project, the Port has entered into an intergovernmental agreement under which it will obtain ownership to the proposed project lands, which are already within the jurisdictional boundaries of the Port.

Generally to qualify as eligible work for funding, the work must:

- Be required as the result of a major disaster event.
- Be located within a designated disaster area.
- Be the legal responsibility of an eligible applicant.[5]

Representatives of FEMA have requested that the applicant, the Port, demonstrate that it has legal responsibility to perform the hazard mitigation project under Oregon law. In turn, you asked us to opine as to whether we find that the Port has legal responsibility under 44 C.F.R. 206.223(a). Legal responsibility is a general work eligibility requirement prescribed by 44 C.F.R. 206.223(a) for approval of federal financial disaster assistance. Policy guidance issued by FEMA indicates that "work must be the **Legal Responsibility** of the applicant at the time of the disaster to be eligible. (Emphasis in original.)"[6]

The Port of Tillamook Bay is a district and a political subdivision of the State of Oregon organized under ORS 777.010 and 777.050.[7] The ports of the State of Oregon are engines of commercial, industrial and economic development in Oregon.[8] To achieve these purposes, the State of Oregon grants to each port, to the full extent possible, "full control of all bays, rivers and harbors within its limits, and between its limits and the sea."[9] Under Oregon law, the Port of Tillamook Bay has legal authority and responsibility to:

(1) Regulate the placement or removal of obstructions to navigation from the bays, rivers and harbors; and
(2) Engage in the control and prevention of river and stream bank erosion, and the prevention of damage from floodwater and sediment.[10]

As we have noted, the Port is the owner of the railroad line and has been the owner since a date prior to the disaster. Per FEMA policy guidance, an eligible mitigation measure may be distinct from the integral parts of the damaged property. In this instance, the proposed hazard mitigation measures:

- Directly benefit the disaster-damaged railroad line owned by the Port.
- Will be conducted on land to which the Port has made arrangements to obtain ownership.

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[5] 44 C.F.R. 206.223(a).
[6] *Public Assistance Policy Digest,* FEMA 321 / January 2008, p.82 <http://www.fema.gov/pdf/government/grant/pa/pdigest08.pdf>.
[7] Copies of Oregon Revised Statutes cited in this opinion are enclosed.
[8] *See, e.g.*, ORS 777.105 and 777.120. *See generally* ORS chapter 777.
[9] ORS 777.120.
[10] *Id.*

- Will be conducted within the jurisdictional boundaries of the Port wherein the Port has authority under Oregon law to take measures for the prevention of flood-related damage to life and property.

Based on our review of Oregon law relating to ports, federal law and regulations, hazard mitigation project documentation and FEMA recovery policy guidance documents, including appeal letters construing the requirement for legal responsibility under 44 C.F.R. 206.223(a), we find that the Port satisfies the requirement for legal responsibility.

As a district and subdivision of the State of Oregon, the Port is an *eligible applicant*. Based on the Port's ownership of the damaged railroad line and the project lands, the railroad line is an *eligible facility*. Based on the benefit to the eligible facility, the proposed hazard mitigation project is *eligible work* that will minimize the potential for future flood damage to the eligible facility. We conclude that, under the applicable federal law and regulations, FEMA can and will allow the Port to use federal disaster assistance funds for the proposed hazard mitigation project.

The opinions written by the Legislative Counsel and the staff of the Legislative Counsel's office are prepared solely for the purpose of assisting members of the Legislative Assembly in the development and consideration of legislative matters. In performing their duties, the Legislative Counsel and the members of the staff of the Legislative Counsel's office have no authority to provide legal advice to any other person, group or entity. For this reason, this opinion should not be considered or used as legal advice by any person other than legislators in the conduct of legislative business. Public bodies and their officers and employees should seek and rely upon the advice and opinion of the Attorney General, district attorney, county counsel, city attorney or other retained counsel. Constituents and other private persons and entities should seek and rely upon the advice and opinion of private counsel.

Very truly yours,

DEXTER A. JOHNSON
Legislative Counsel

By
B. Harrison Conley
Senior Deputy Legislative Counsel

Encl.

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William K. Sargent
Tillamook County Counsel
1134 Main Avenue
Tillamook, OR 97141
Telephone: (503) 842-4921 Fax: (503) 842-8862
Email: wsargent@oregoncoast.com

August 20, 2010

Tillamook County Board of Commissioners
Tillamook County Courthouse
201 Laurel Avenue
Tillamook, OR 97141

Re Legal Responsibility of Port of Tillamook Bay

Dear Mark, Tim, and Chuck:

The Port of Tillamook Bay ("POTB" or "Port") sustained substantial damages to its railroad as a result of severe flooding. FEMA has authorized the expenditure of funds by POTB for a series of alternate projects in lieu of restoring its damaged railroad facilities. One of the alternative projects is to construct the southern flow corridor ("Oregon Solutions Project" or "project"). The project would remove approximately 45,000 lineal feet of levy and would construct approximately 9,600 feet of tidal dike, including a gated spillway and various drainage devices within the tidal dike. Portions of POTB's rail line run through the project area and are subject to flooding several times each year.

FEMA's disaster assistance policy for alternative projects authorizes eligible applicants to perform hazard mitigation measures in lieu of repairing the damages to the original facility so long as the applicant can demonstrate project eligibility. Pursuant to 44 CFR 206.223(a)(3), in order to undertake the work necessary to perform the hazard mitigation measures, that work must be the "legal responsibility" of an eligible applicant (in this instance, the Port) POTB's agreements concerning the project lands and its statutory authorization to prevent storm water damage establish that POTB has a legal responsibility to perform work on the Oregon Solutions Project.

The following factors create POTB's legal responsibility:

1 If the project is not undertaken, POTB's line will continue to be subjected to flooding and resultant damage

2. A 1991 Oregon Economic Development Department grant agreement requires the Port to upgrade its railroad to certain standards. A subsequent intergovernmental agreement of April 6, 1993 between POTB and certain state agencies mandates that the Port comply with that grant agreement.

3. POTB is an active participant in the Oregon Solutions Project. POTB signed a declaration of cooperation and a statement of assurances with other project participants in which POTB committed to complete that project.

4. ORS 777.120 gives POTB statutory authority to prevent damage from floodwaters.

Very truly yours,

WILLIAM K. SARGENT

WKS:gds

BOOK 111 PAGE 702

COUNTY COURT JOURNAL

#4115

FILED
APR 1 5 2010
4:30pm
TASSI O'NEIL
COUNTY CLERK

INTERGOVERNMENTAL AGREEMENT
TILLAMOOK COUNTY AND PORT OF TILLAMOOK BAY
PORT/RAILROAD IMPROVEMENT PROJECT – SOUTHERN FLOW CORRIDOR

This Agreement is made and entered into, in duplicate originals, this 14th day of April, 2010 by and between Tillamook County, a political subdivision of the State of Oregon, hereinafter referred to as "COUNTY" and the PORT of Tillamook Bay, an Oregon Municipal Corporation, hereinafter referred to as "PORT".

RECITALS

1. COUNTY, PORT and others are engaged in an Oregon Solutions project for flood damage reduction on certain lands in Tillamook County within the boundaries of PORT.

2. As part of the Oregon Solutions project, the participants have identified a specific flood reduction project known variously as the Port/Railroad Improvement Project or the Southern Flow Corridor ("the Project"), as more particularly described in the February 2010 Project Exodus Final Report prepared by Northwest Hydraulic Consultants.

3. The Project will dramatically reduce flood elevations within the flood plain adjoining and west of PORT's railroad, between Hoquarten Slough and the Wilson River, including reductions in the one hundred (100) year flood levels from one to one and one-half (1 – 1 ½') feet along Highway 101.

4. Once completed the Project will have significant environmental restoration benefits with approximately six hundred (600) acres of salt marsh creation, many miles of stream restoration and substantial water quality and salmonid habitat benefits.

5. Under ORS 777.120(2), PORT has authority to engage in the control and prevention of river and streambank erosion and the prevention of damage from floodwaters and sediment.

6. With PORT, as an enrolled participant with COUNTY and the City of Tillamook, as well as with other local, state and federal Oregon Solution's partners, have each previously signed the Declaration of Cooperation and a separate Statement of Assurances. As such, Project is an important prior commitment to the Oregon Solutions' efforts.

7. The Project would remove approximately forty-five thousand (45,000) lineal feet of levee and would construct approximately nine thousand six hundred (9,600') feet of tidal dike, including a gated spillway and various drainage devices within the tidal dike.

8. COUNTY presently owns three hundred seventy-seven (377) acres of the four hundred eighty-three (483) acre Project area.

9. In order to construct the Project, it will be necessary to acquire approximately one hundred six (106) acres of largely marginal farmland from four (4) separate private landowners, together with such other lands as those landowners might require be included in the acquisition as a condition of sale.

10. The three hundred seventy-seven (377) acre COUNTY-owned portion of the Project area is currently subject to certain deed restrictions and conditions relative to the creation and protection of salt water wetland values and is presently managed under an Intergovernmental Agreement and Management Plan ("the Plan"), copies of which are attached hereto and by this reference incorporated herein.

11. The current parties to the Plan are COUNTY, Tillamook County Soil and Water Conservation District, the City of Tillamook, the Oregon Department of Fish and Wildlife, Tillamook Bay Habitat and Estuary Improvement District and the Tillamook Estuary Partnership, who collectively participate in the management of the three hundred seventy-seven (377) acres and each of whom have participated either financially or with in-kind contributions to the operation and maintenance of the said lands and drainage structures thereon.

12. PORT currently has available to it certain FEMA funds for a series of alternative projects under FEMA-1733 DR OR in lieu of restoring its damaged railroad facilities.

13. FEMA's Disaster Assistance Policy for Alternative Projects, DAP9525.13(VI) authorizes an eligible applicant to perform hazard mitigation measures unrelated to the original facility so long as the applicant can demonstrate project eligibility under the guidelines of DAP9525.13(VII).

14. Under 44 CFR 206.223(a)(3), to be eligible for financial assistance, an item of work must be the legal responsibility of an eligible applicant, in this case, PORT.

15. In order for PORT to demonstrate legal responsibility under the above circumstances, PORT must be the owner of the referenced three hundred seventy-seven (377) acre parcel and the additional lands acquired for the Project.

16. PORT is willing to assume ownership of said lands required for the Project as well as to undertake certain obligations in relation thereto, under the terms and conditions set forth in this Agreement.

17. COUNTY is willing to transfer its ownership of the three hundred seventy-seven (377) acres and such additional lands as might be acquired ("Project Lands") to PORT and to cooperate with implementation of the Project under the terms and conditions set forth in this Agreement.

WITNESSETH

NOW THEREFORE, IT IS HEREBY AGREED by and between the parties as follows: the mutual promises of each party are given in exchange and as consideration for the promises of the other party.

INTERGOVERNMENTAL AGREEMENT
TILLAMOOK COUNTY AND PORT OF TILLAMOOK BAY
PORT/RAILROAD IMPROVEMENT PROJECT – SOUTHERN FLOW CORRIDOR

SECTION 1. COUNTY'S RIGHTS, DUTIES AND AUTHORITIES

1.1. Conditions Precedent to PORT's Acquisition of Project Lands

1.1.1. COUNTY will work with the US Fish and Wildlife Service, NOAA Fisheries, the Oregon Watershed Enhancement Board and others as required to obtain approval for PORT's acquisition of the Project Lands.

1.1.2. COUNTY will work with FEMA and PORT to submit documentation and framework information, provide data collection for a Benefit/Cost Analysis, complete all other pre-requisites and obtain Project pre-approval from FEMA GHC as an eligible FEMA Alternative Project.

1.1.3. COUNTY will seek to acquire such additional lands as might be needed for the Project and will thereafter take the steps required to include such additional Project Lands within the Management Plan.

1.1.4. COUNTY, through Oregon Solutions, will be responsible for securing grants and all matching funds required for the Project.

1.2. Upon completion of the Conditions Precedent, COUNTY will transfer the Project Lands by deed to PORT, subject to the underlying restrictions, conditions and limitations on the use of the lands for wetlands and other resource values and subject also to easements and exceptions of record.

1.3. Oregon Solutions, through COUNTY, will prepare all contract procurement documents, provide Project management and administration and complete the closeout documentation for final design and construction of the Project.

1.4. COUNTY will continue to actively participate in the Management Plan for the Project Lands for so long as PORT is the owner of the Project Lands.

SECTION 2. PORT'S RIGHTS, DUTIES AND AUTHORITIES

2.1. PORT will cooperate with COUNTY to complete the Conditions Precedent described in Section 1.1 of this Agreement

2.2. Upon completion of the said Conditions Precedent, PORT will accept title to the Project Lands from COUNTY subject to the underlying restrictions, conditions and limitations on the use of the lands for wetlands and other resource values and subject also to easements and exceptions of record.

2.3. Upon PORT's acquisition of the Project Lands, PORT will enter into the IGA to become a party to the Management Plan and thereafter will manage the Project Lands in accordance with the provisions of the existing Management Plan or as such Plan might thereafter be amended by the parties to the Plan.

2.4. PORT will maintain the completed Project for the useful life of the improvements as required by FEMA.

SECTION 3. INSURANCE

3.1. Each party agrees to maintain insurance sufficient to meet sums specified by ORS 30.270.

SECTION 4. LIABILITY; INDEMNIFICATION

4.1. Each party shall indemnify and hold harmless the other party from all claims, costs, damages or expenses of any kind, including attorneys' fees and other costs and expenses of litigation, for personal or property damage arising out of that party's performance required by this Intergovernmental Agreement. It is the intent of this Section that each party assumes any and all liability for its respective torts, errors and omissions.

SECTION 5. EFFECTIVE DATE

5.1. This Agreement shall take affect on April 14, 2010.

SECTION 6. TERM

6.1. The term of this Agreement shall be from the date upon which it is fully executed by the parties and continue in force and effect until terminated pursuant to the provision of Section 7 of this Agreement.

SECTION 7. TERMINATION

7.1. Without Notice

7.1.1. The parties mutually consent to termination in writing.

7.2. With Notice

7.2.1. Any party breaches any duty, term or condition of this Agreement.

7.2.2. Either party commits a fraud or misrepresentation upon the other party.

SECTION 8. GENERAL PROVISIONS

8.1. Waiver; Modification

8.1.1. Failure by either party to enforce any provision of this Agreement does not constitute that party's continuing waiver of that provision, any other provision or of the entire Agreement. The rights and duties under this Agreement shall not be modified, delegated, transferred or assigned, except upon the written-signed consent of both parties.

8.2. Attorneys' Fees

8.2.1. Attorney fees, costs and disbursements necessary to enforce this Agreement through mediation, arbitration and/or litigation, including appeals, shall be awarded to the prevailing party, unless otherwise specified herein or agreed.

8.3. Legal Representation

8.3.1. In entering into this Agreement, each party has relied solely upon the advice of their own attorney. Each party has had the opportunity to consult with counsel or now waives that right. Each party represents and warrants to the other that they are fully satisfied with the representation received from their respective attorneys.

8.4. Notices

8.4.1. Any notice required or permitted under this Agreement shall be in writing and deemed given when:

8.4.1.1. actually delivered, or

8.4.1.2. Three (3) days after deposit in the United States Post, certified mail, postage prepaid, addressed to the other party at their last known address.

8.5. Language

8.5.1. The headings of the Agreement paragraphs are intended for information only and shall not be used to interpret paragraph contents. All masculine, feminine and neuter genders are interchangeable. All singular and plural nouns are interchangeable, unless the context requires otherwise.

8.6. Integration

8.6.1. This Agreement supersedes all prior oral or written Agreements between PORT and COUNTY regarding this site. It represents the entire Agreement between the parties. Time is of the essence in all terms, provisions, covenants and conditions in this Agreement.

8.7. Savings

8.7.1. Should any clause or section of this Agreement be declared by a Court to be void or voidable, the remainder of this Agreement shall remain in full force and effect.

INTERGOVERNMENTAL AGREEMENT
TILLAMOOK COUNTY AND PORT OF TILLAMOOK BAY
PORT/RAILROAD IMPROVEMENT PROJECT – SOUTHERN FLOW CORRIDOR

8.8. Jurisdiction; Law

8.8.1. This Agreement is executed in the State of Oregon and is subject to Tillamook County and Oregon law and jurisdiction. Venue shall be in Tillamook County, Oregon, unless otherwise agreed by the parties.

IN WITNESS WHEREOF, COUNTY and the PORT have executed this Agreement on the date first above written.

Dated this 12 day of April 2010.

PORT OF TILLAMOOK BAY

Michele Bradley
Michele Bradley
General Manager

THE BOARD OF COMMISSIONERS
FOR TILLAMOOK COUNTY, OREGON

Dated April 14, 2010

	Aye	Nay	Abstain/Absent
Mark Labhart, Chair	✓		/
Charles J. Hurliman, Vice-Chair	✓		/
Tim Josi, Commissioner	✓		/

ATTEST: Tassi O'Neil,
County Clerk

By: Susan L. Becraft
Special Deputy

APPROVED AS TO FORM:

William K. Sargent
County Counsel

COMMISSIONERS, TILLAMOOK COUNTY, STATE OF OREGON, BOARD OF COUNTY

FILED
JUL 31 2002
2:10pm
TASSI O'NEIL
COUNTY CLERK

BOOK 107 PAGE 772
COUNTY COURT JOURNAL
#3412

INTERGOVERNMENTAL AGREEMENT
REGARDING WETLAND ACQUISITION PROJECT

This agreement is made and entered into the 31st day of July 2002, by and between Tillamook County, by and through its Board of Commissioners, hereinafter COUNTY; the State of Oregon, by and through its Department of Fish and Wildlife, hereinafter ODFW; and the Tillamook County Soil and Water Conservation District, by and through its Board of Directors, hereinafter SWCD, referred to collectively as "the parties."

RECITALS

A. COUNTY, through its Performance Partnership secured a $1,025,000 grant for the acquisition of private lands at the confluence of Wilson and Trask Rivers and the development of such lands for wetland (hereinafter "the site").

B. Funds for county acquisition of said properties were provided as a grant from the Oregon Watershed Enhancement Board using funds from the Trust for Public Lands using funds from U.S. Fish and Wildlife services. Oregon Watershed Enhancement Board provided funds from the Coastal Wetlands Planning, Protection and Restoration Act dedicated for the purpose of protecting and restoring coastal wetlands.

C. A management plan has been developed for the site that provides the overarching framework for development and management of the wetlands, floodways, flood control structures, and other resource uses.

D. Prior to COUNTY's acquisition of title or floodway/conservation easements to the site, COUNTY through its consultants undertook engineering analysis and design alternatives for site development, including a determination of offsite flood impacts associated with the selected alternative.

E. ODFW desires to manage habitat values on existing wetlands and remnant upland forests at the site and such additional wetlands as might be created by the project alternative selected in the management plan.

F. SWCD desires to manage the agricultural lands remaining at the site after project implementation for purposes of generating revenues to be used for reimbursement of its costs and contribute to maintaining flood control structures and other project work at the site as set forth herein.

G. The parties intend to carry out the management activities set forth herein only to the extent that such actions do not increase off site flood elevations or reduce off site flood discharge characteristics.

H. COUNTY, ODFW and SWCD have authority to enter into intergovernmental agreements pursuant to ORS Chapter 190.

AGREEMENT

NOW THEREFORE, in consideration of the foregoing and of the mutual covenants, promises and undertakings hereinafter set forth, the parties agree as follows:

1. Statement of Project

1.1 The project work identified in the attached Exhibit "A" Management Plan, incorporated herein by reference will be undertaken at the site.

1.2 An annual work plan will be developed between the parties for any additional work and project maintenance at the site taking into consideration the recommendations of the committee described in paragraph 5.3.1 of this agreement.

1.3 This agreement is also subject to the reservations, covenants, conditions, limitations and restrictions contained in the following documents, incorporated herein by reference:

1.3.1 That certain deed from Wilson to COUNTY as recorded in Deed Book 432 at Page 660, deed records, Tillamook County, Oregon.

1.4 This agreement and the management of the subject parcels is limited to the purpose and conditions described in the conservation easement dedicated by the county as required by the terms of the federal grant.

1.5 Except as limited by paragraphs 1.1 and 1.3 above, reasonable public access to the site is allowed. No public access or use will be allowed that will result in adverse impacts to wildlife, the reduction of habitat or other values for which the site is managed. Nothing in this paragraph limits the authority or ability of any party to manage the site for wildlife viewing, lawful hunting, fishing, public safety, wildlife habitat conservation, or to preserve and protect agricultural uses.

1.6 Annually the parties will each give a status report on the project to the Board of County Commissioners.

2. Rights, Duties and Obligations of COUNTY

2.1 COUNTY will undertake all bid procurements and public contracts for the project work described in the attached management plan using grant funds available for the project.

2.2 COUNTY will provide construction management for the project to ensure the project achieves the desired wetland values and flood reduction benefits identified in Exhibit A.

2.3 COUNTY will make payments for all expenditures of grant funds for the acquisition and development of the site and for all fund expenditures as described in paragraph 5.4 of this agreement.

2.4 In consideration of One Dollar ($1.00) and other good and valuable consideration COUNTY hereby grants to SWCD a ground lease on those portions of the former Wilson property that are East of the new setback levy and suitable for agricultural using accepted farming practices.

2.5 COUNTY will coordinate and provide for routine maintenance of the levies, dikes and other flood control structures at the site. COUNTY will include within its annual budget proposal to the budget committee such amounts as might be required to perform this work.

buffers along all waterways in accordance with the Oregon Aquatic Habitat Restoration Guidelines to the extent such buffers are not contrary to flood control values sought to be developed and protected by this agreement.

5. Maintenance Fund; Advisory Committee

5.1 All proceeds from agricultural leases, other income derived from management of the site and all other funds collected for projects on the site shall be deposited into a fund maintained by COUNTY for use solely on the site: first in the reimbursement of SWCD administrative costs and thereafter for maintenance of flood control structures and other project work as set forth in an annual work plan.

5.2 All additional monies collected by COUNTY from private donations, grants, city or county agency budgeted funds designated for use on the site shall also be deposited into the fund described in paragraph 5.1 for the uses described therein.

5.3 COUNTY shall appoint a six person committee of staggered terms comprised of one representative recommended from each of the following: Tillamook County, Tillamook City, Oregon Dept. of Fish and Wildlife, Tillamook County SWCD, North Highway 101 Flood Mitigation Group (Tillamook Habitat & Estuary Improvement District), and Tillamook County Performance Partnership (Tillamook County Estuary Project) for the following purposes:

5.3.1 To recommend annual work plans, SWCD administrative costs, maintenance and other proposed budgeted items to the County Budget Committee for the fund described in paragraph 5.1.

5.3.2 To recommend annually to local cities, County agencies and other local governments amounts to be budgeted for contributions to the fund described in paragraph 5.1.

5.4 Annual expenditures from the fund described in paragraph 5.1 may be made as follows:

5.4.1 As budgeted expenditures for activities described in the annual work plan.

5.4.2 For unanticipated costs upon agreement by the parties from unexpended budgeted funds after consultation with the committee.

6. TERMINATION. This agreement and license shall terminate:

6.1 Upon the request of any party, after giving the other parties 90 days advance notice.

7. INDEMNITY. Each party agrees to be responsible for any damage or third party liability which may arise from its occupancy and use of the premises, including its officers, employees and agents, and to indemnify and hold harmless the other parties from all claims, suits, or actions of any nature resulting from the acts or omissions of its officers, contractors, employees or agents under this agreement subject to the limitations and conditions of the OREGON TORT CLAIMS ACT, ORS 30.260 through 30.300, and the OREGON CONSTITUTION, ARTICLE XI, SECTION 7.

8. GENERAL PROVISIONS.

2.6 COUNTY expressly retains the right to grant easements, rights of way, licenses or permits on, across and over the site consistent with the management plan and reserves unto itself all other incidents of property ownership.

2.7 COUNTY shall not approve any project described in paragraph 3.3 of this agreement without verification from FEMA that such project will not cause any increase in flood insurance premiums or jeopardize such premiums.

2.8 COUNTY hereby grants to ODFW, its contractors, licensees and invitees a right of entry on, over and across the premises for the purpose of carrying out its work at the site.

3. Rights, Duties and Obligations of ODFW

3.1 ODFW will assist COUNTY with construction management for the project to ensure the project achieves the desired wetland values identified in Exhibit A.

3.2 ODFW will manage habitat values on those portions of the site that consist of remnant freshwater wetlands, and isolated portions of upland forests as well as resulting low salt marsh, high salt marsh and salt water wetlands which were created or enhanced by the project identified in Exhibit A, or as hereafter might be created in accordance with paragraph 3.3 below.

3.3 ODFW shall not undertake any project that would expand the wetlands described in paragraph 3.2 without first:

3.3.1 Providing an engineering certificate that certifies that the proposed project will not increase off site flood elevations or reduce off-site flood discharge characteristics.

3.3.2 Receiving approval from COUNTY.

3.4 ODFW will assist COUNTY in complying with NEPA for the project and in preparing biological assessments required for any state or federal permits.

3.5 ODFW will regulate hunting and fishing activities at the site in consultation with COUNTY.

4. Rights, Duties and Obligations of SWCD.

4.1 SWCD may manage for agricultural uses those portions of the property described in paragraph 2.4 to the extent that such uses not interfere with or limit the habitat and flood values sought to be developed and protected by this agreement. Such agricultural uses may include, but are not limited to, pasture, feed or forage crops, grazing and aquaculture.

4.2 In undertaking its uses described in paragraph 4.1, SWCD may sublease, license or grant permits to other persons, firms or corporations, for such agricultural uses as it deems appropriate.

4.3 SWCD shall include within any sublease, license or permit granted pursuant to paragraph 4.2, provision for the person, firm or corporation to indemnify the parties to this agreement.

4.4 All proceeds derived by SWCD from the lands described in paragraph 4.1 shall be paid to COUNTY for deposit into the fund described in Section 5.0 for the uses set forth therein.

4.5 SWCD will manage the land described in paragraph 4.1 as a showcase of Best Management Practices (BMP) by protecting water quality and establishing riparian

8.1 MODIFICATION. The rights and duties under this AGREEMENT shall not be modified, delegated, transferred or assigned, except upon the written-signed consent of the parties. Prior to any modification of this agreement notice shall be provided at least 10 days in advance to the committee described in paragraph 5.3.

8.2 ATTORNEYS' FEES. Attorney fees, costs and disbursements necessary to enforce this agreement through mediation, arbitration and/or litigation, including appeals, shall be awarded to the prevailing party, unless otherwise specified herein or agreed.

8.3 LEGAL REPRESENTATION. In entering into this agreement, each party has relied solely upon the advice of their own attorney. Each party has had the opportunity to consult with counsel or now waives that right. Each party represents and warrants to the other that they are fully satisfied with the representation received from their respective attorneys.

8.4 NOTICES. Any notice required or permitted under this AGREEMENT shall be in writing and deemed given when:

8.4.1 actually delivered, or

8.4.2 three days after deposit in United States certified mail, postage prepaid, addressed to the other party at their last known address.

8.5 LANGUAGE. The headings of the contract paragraphs are intended for information only and shall not be used to interpret paragraph contents. All masculine, feminine and neuter genders are interchangeable. All singular and plural nouns are interchangeable, unless the context requires otherwise.

8.6 INTEGRATION. This AGREEMENT supersedes all prior oral or written agreements between the parties regarding this site. It represents the entire agreement between the parties. Time is of the essence in all terms, provisions, covenants, and conditions in this agreement.

8.7 SAVINGS. Should any clause or section of this AGREEMENT be declared by a court to be void or voidable, the remainder of this AGREEMENT shall remain in full force and effect.

8.8 JURISDICTION; LAW. This AGREEMENT is executed in the State of Oregon, and is subject to Tillamook County and Oregon law and jurisdiction. Venue shall be in Tillamook County, Oregon, unless otherwise agreed by the parties.

ACKNOWLEDGMENT: EACH PARTY REPRESENTS TO THE OTHER BY THEIR SIGNATURES BELOW THAT EACH HAS READ, UNDERSTANDS, AND AGREES TO ALL COVENANTS, TERMS AND CONDITIONS OF THIS AGREEMENT. EACH PARTY REPRESENTS TO THE OTHER TO HAVE THE ACTUAL AND/OR APPARENT AUTHORITY TO BIND THEIR RESPECTIVE LEGAL PERSONS, CORPORATE OR OTHERWISE, IN CONTRACT.

DATED THIS 29 **DAY OF** July **, 2002.**

DEPARTMENT OF FISH & WILDLIFE:

Tim Ryan
____

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DATED THIS 30 DAY OF July, 2002.

~~SOIL &~~ WATER ~~CON~~SERVATION DISTRICT:

Rudy Fenk

Rudy Fenk, Chair

DATED THIS 31st DAY OF July, 2002.

THE BOARD OF COMMISSIONERS
FOR TILLAMOOK COUNTY, OREGON

	Aye	Nay	Abstain/absent
Charles Hurliman, Chair	✓		
Tim Josi, Vice-Chair	✓		
Paul Hanneman, Commissioner	✓		

ATTEST: Tassi O'Neil,
County Clerk

By Dixie G. McKibben
Special Deputy

APPROVED AS TO FORM:

William K. Sargent,
County Counsel

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Tillamook Bay Wetlands:

DRAFT Management Plan for the Wilson, Fuhrman, and Farris Wetland Acquisition Properties

November 2001

Compiled and Partially Written by

Derek Sowers and Mark Trenholm
Staff of the Tillamook County Performance Partnership

for:

Wetlands Management Plan Development Team
Tillamook County Performance Partnership

Introduction

In December of 1999, the Tillamook Bay National Estuary Project published the Tillamook Bay Comprehensive and Conservation Management Plan. Among the 63 actions designed to enhance water quality, improve salmonid habitats, and mitigate the natural and human impacts of flooding are several actions aimed at reconnecting intertidal wetlands and enhancing tidal marsh. The purpose of these actions is 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.

In pursuit of these actions and objectives, the Tillamook Bay National Estuary Project, 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). By acquiring and restoring roughly 350 acres, this project represents a significant step toward the CCMP objective of 750 acres.

Purpose of this Plan:

The purpose of this management plan is to clearly articulate how the properties proposed for acquisition and restoration by the Tillamook County Performance Partnership (TCPP) will be managed to meet the goals and objectives stated in the grant agreements with the Oregon Watershed Enhancement Board (OWEB) and the United States Fish and Wildlife Service (USFWS) and as agreed upon by the relevant local stakeholders. The management plan is designed to provide assurance to the grant funding agencies, all potentially affected parties, as well as the general public, that the acquisition and management of the land parcels will be implemented in a carefully planned manner and in such a way as to address any existing or potential concerns. *This document has been prepared with the explicit intent to incorporate the interests of multiple stakeholder groups into a plan that assures strong community support for the project.*

Plan Development Process:

In order to accomplish broad-based community support, it was critical that the TCPP 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 TCPP hosted the first meeting of the Wetlands Management Plan Development Team. At this 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. TCPP staff members, land use/resource agency representatives, and invited guests were designated to provide technical expertise and staffing support throughout the plan development process.

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 enhancement. Each subcommittee was asked by the TCPP chair, who facilitated the process, to generate a plan, which addressed both flood mitigation and habitat enhancement. 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.

Subsequent meetings sought to resolve several issues including access to flood mitigation infrastructure, the location of dike breaches, long term maintenance of floodways and so on. *This plan represents the product of these discussions and is a consensus document, agreed to by all of the stakeholders serving on the Wetlands Management Plan Development Team.*

Organization of this Report:

The management plan contains discussions of all of the major elements in need of consideration prior to making the substantial commitment of resources necessary to implement and maintain the project. The plan is organized according to the following elements:

Element 1: Goals and Objectives

Element 2: Site Descriptions and Background Information

Element 3: Restoration and Enhancement Activities

Element 4: Ownership and Management: Identification of Responsible Participants

Element 5: Public Access Plan

Element 6: Monitoring and Evaluation

Element 7: Costs and Funding

Element 1: Goals and Objectives

Project Goals:

More than 85 percent of the Tillamook Bay area's historic floodplain and lowland wetlands have been lost as a result of human settlement and development (Tillamook Bay National Estuary Project 1999). Loss of these habitats has resulted in significant impacts on salmon, migratory birds, and other fish and wildlife. The purpose of this project is to restore more natural habitats and ecological processes in the upper estuary of Tillamook Bay and the river delta areas of the Wilson and Trask rivers in order to:

- improve habitat for native fish and wildlife,
- improve water quality,
- reduce flood hazards, and
- enhance the overall ecological health of Tillamook Bay.

Project Objective:

The objective of the original grant application to OWEB and USFWS was to acquire at least 300 acres for restoration and protection of estuarine and freshwater wetland habitats in the upper estuary of Tillamook Bay. In the process of narrowing the project scope down to particular land parcels, acquisition and restoration plans have become primarily focused on three lots under different land ownership: the Wilson, Farris, and Fuhrman properties. Thus, the current project objective is to specifically acquire and restore all three of these land parcels. In addition, there are several other very small land parcels that should logically be included in the project area because of their locations within or adjacent to the Wilson, Farris, and Fuhrman properties. These small parcels could be purchased or swapped as agreeable to the property owners.

Project Need:

The need for the project has been clearly identified in a number of plans developed by federal, state, and local conservation interests. These include the (Tillamook Bay National Estuary Project 1999); the *Oregon Plan for Salmon and Watersheds* (State of Oregon 1997); the *Pacific Coast Joint Venture Strategic Plan* (U.S. Fish and Wildlife Service 1993); and the *Concept plan for Waterfowl Wintering Habitat Preservation* (U.S. Fish and Wildlife Service 1979), and the Tillamook County Flood Mitigation Plan. Tillamook Bay's coastal wetlands have also been highlighted as a priority for conservation as part of a statewide biodiversity conservation strategy (Oregon Biodiversity Project 1998).

The success of this project is of primary importance to the Tillamook County Performance Partnership with regard to its implementation of the *Tillamook Bay Comprehensive Conservation and Management Plan (CCMP)*. This project specifically addresses the following elements of the CCMP:

- HAB-06 Protect and Enhance Lowland Riparian Areas (Priority Action)
- HAB-07 Protect and Enhance Instream Habitat
- HAB-08 Protect and Enhance Freshwater Wetland Habitat
- HAB-19 Protect and Enhance Tidal Marsh (Priority Action)
- HAB-21 Remove or Modify Ineffective Tide Gates and Floodplain/Lowland Culverts
- HAB-24 Reconnect Sloughs and Rivers to Improve Water Flow (Priority Action)
- HAB-30 Support the Oregon Plan for Salmon and Watersheds (Priority Action)
- WAQ-01 Define, Implement, and Enforce Pollution Prevention and Control Measures on Agricultural Lands (Priority Action)
- FLD-02 Implement Watershed Drainage Modification Projects

Expected Results:

The project is expected to result in protection and restoration of a natural functioning ecosystem on at least 300 acres within the diked former tidelands and forested wetlands in the river delta area at the southern end of Tillamook Bay. These areas will be primarily restored to intertidal habitats consisting of high salt marsh and brackish marsh, as well as forested wetlands. Existing remnant floodplain forests will be permanently protected and managed to maintain their natural values. Targeted breaching and alteration of existing dykes is expected to restore floodplain function and improve routing of flood waters, thus mitigating flood impacts in upstream areas. Construction of new levee structures will protect adjacent land uses from tidal inundation.

Geographic Scope of the Management Plan:

The management plan primarily addresses management issues on the Wilson, Fuhrman, and Farris parcels. Structural alterations and other direct management actions taken to restore habitat and floodplain function will be conducted within the property boundaries of these lots. In addition, there are several small additional parcels that have been included with the intent to consolidate ownership within the project area. However, the management plan also addresses off-site considerations such as ecological connectivity with the estuary and nearby rivers, potential flood mitigation benefits for the local community, and protection of the property rights interests of adjacent landowners. Refer to Figure 1 for a map of the project area (this will be added).

Element 2: Site Descriptions and Background Information

Historical Summary of Area's Attributes:

Using information gathered from the 1857 General Land Office Original Survey Notes, U.S. Geological Survey Topographic maps, soil survey maps, flood insurance rate maps, and U.S. Army Corps of Engineers 1939 aerial photographs, Phillip Williams and Associates has reconstructed a physical characterization map of the Tillamook Bay valley historical landscape circa 1857. The area currently identified as the Wilson, Farris, and Fuhrman parcels was described in survey notes as "grassy tidal marsh...tide land level, cut up by tide fissures, occasionally overflowed by the tide." Thus, historically, the project area was likely mostly composed of high and low salt marsh interspersed with intertidal sloughs, with dense floodplain forests in the higher elevations. These habitat types are widely recognized for their high biological productivity and critical importance to estuarine-dependent fish and wildlife species.

Following settlement of the Tillamook Bay area by non-indigenous people, much of the project area was diked with the intent to restrict tidal inundation and potentially put the land into agricultural production. The Wilson, Farris, and Fuhrman properties have been primarily converted into freshwater wetlands as a result of dike and levee construction. The Wilson property is the only one that has been used for productive agricultural use within the last several decades.

Land Parcel Descriptions of the Wilson, Farris, and Fuhrman Properties:

The following portion of this element discusses each of the three major land parcels included within the scope of this management plan. Summary information about each property's attributes is followed by a narrative discussion of the current physical and biological attributes pertaining to that parcel, as well as a brief explanation of how the property fits into the overall project.

(Note : Exact Acreage of acquisition parcels will not be known until properties are re-surveyed.)

Parcel Name:	Wilson
Tax Lot Map:	1S 10 23 lot 900
Ownership:	Donald and Nancy Wilson
Size:	147 acres
Estimated Value:	$443,000.00 *(option negotiated by the Trust for Public Lands)*

Property Description:
This parcel is at the southern extent of the project area and is bordered by the Trask River to the south and the Farris property to the north. The land consists primarily of farmed freshwater wetland (categorized as palustrine emergent by the National Wetlands Inventory) used as pasture. The system of linear manmade drainage ditches that terminate at the floodgates on the western end of the property is currently a predominant landscape feature. The main drainage ditch separates the Wilson and Farris properties. The lower portion of Nolan Slough, an estuarine channel with a great deal of additional restoration

potential, is located at the eastern extent of the property. The Wilson Levee system borders the southern and western edges of the parcel adjacent to the Trask River. Several piles of dredge spoils are located on the southern edge of the levee near the Trask River. Ten large floodgate structures were installed in 1999 at the west end of the levee to expedite the drainage of floodwaters. The only building on the property is a large barn. An adjacent landowner currently leases the pasture for grazing.

Parcel Name:	Farris
Tax Lot Map:	1S 10 22 lot 100, 1S 10 23 lot 800,801
Ownership:	David and Kendra Farris
Size:	147 acres
Estimated Value:	$280,000.00 *(excludes value of house and access road)*

Property Description:
The Farris property is located in the middle of the project area, with the Wilson property to the south, and the Wilson River and Blind Slough to the north. The bulk of the property is composed of freshwater wetlands (palustrine emergent) with several isolated patches of wooded upland, and has not been used for agricultural purposes for many years. Remnant natural tidal channels are readily apparent at the site, but are partially or wholly blocked from tidal exchange. The parcel shares a common dike with the adjacent Wilson property. The Farris property was at one time owned by The Nature Conservancy, which retains a conservation easement that prohibits agricultural use and a deed restriction that entitles them to one half of the interest in any mineral production activities. The former owners of the parcel, the Hamacheks, retain the right to hunt waterfowl within the Farris wetland area. The property includes a house, which Farris uses for recreation, as well as an access road. Farris wants to retain the house and access road, but is willing to sell most of the remaining land for conservation purposes. Some invasive plant species are present, most notably Scotch Broom associated with the piles of dredge spoils from the 1972-73 US Army Corps of Engineers dredging project. Manmade ponds are interspersed through parts of the property, and were originally created to enhance waterfowl habitat.

Parcel Name:	Fuhrman
Tax Lot Map:	1S 10 14 lot 400, 1S 10 23 lot 200
Ownership:	Diamond F. Inc., Rolph and Janet Fuhrman
Size:	127 acres (this figure still disputed)
Estimated Value:	$225,000.00 *(option negotiated by the Trust for Public Lands - excludes value of house and access road)*

Property Description:
The Fuhrman property is the northernmost parcel involved in the project area, and is bordered by Blind Slough to the south, the Wilson River to the west and north, and Hall Slough to the north and east. Blind slough (apparently a historic channel of the Wilson River) was diked off from the Wilson River for many years, but has recently been partially restored with the installation of new culverts and tidegates. The majority of the Fuhrman property consists of freshwater wetlands. The upland areas on the parcel consist of several dredge spoils piles adjacent to the Wilson River, and an impressive stand of spruce trees in the northwestern section. The dikes surrounding the parcel appear to be failing in some areas, but tidal exchange continues to be limited. A part-time residence is

located near the Wilson River, and is linked via a private drive to the Farris property and Goodspeed Road. The owners are willing to sell the bulk of the property, except for a one-acre homesite and one-acre road right-of-way.

Acquisition Priority:

The Wetlands Management Plan Development Team has decided that the acquisition of all three of the parcels is essential in order to implement a project that maximizes habitat and floodplain restoration benefits. Due to the nature of restoring estuarine wetlands with dike breaching, and the subsequent alteration of hydrologic regime, it is impractical to approach restoration of the project area without designing a comprehensive strategy that includes all three parcels. Therefore, it is the ultimate goal of the project participants to acquire all three parcels before implementing the full restoration plan. This management plan has been written to address the land area containing all three parcels with the assumption that once a strong plan has been adopted, funding for full implementation can be subsequently secured.

Other Parcels Involved in the Acquisition Process:

In addition to the three major parcels under consideration for acquisition, there are several small parcels that have been incorporated into the management plan strategy for restoration. Inclusion of these parcels allows for the acquisition and management of a contiguous area of wetland habitat, and maximizes the potential of this project to fulfill habitat enhancement and flood mitigation goals. The potential role of each parcel within the overall project strategy is discussed in the property description for that piece of land.

Parcel Name:	Allen
Tax Lot Map:	1S 10 23 lot 700
Ownership:	need full name of owner
Size:	8.4 acres
Estimated Value:	yet to be determined - fair market value

Property Description:
The Allen property is an area of partially wooded wetlands, and contains the upper remnants of the historic Blind Slough channel. The wetlands and channel habitat present should logically be included within the project area restored to tidal flushing, as they have high habitat value and poor agricultural value. Negotiations are occurring to determine if the landowners are willing to donate, sell, or swap this parcel as part of the restoration project.

Parcel Name:	Geinger
Tax Lot Map:	1S 10 14 lot 100
Ownership:	Lenhart and Helen Geinger
Size:	unknown (small)
Estimated Value:	yet to be determined - fair market value

Property Description:
This small lot is located wholly within, and contiguous to, the Fuhrman parcel and borders the Wilson River. Acquisition of this parcel may or may not be necessary in order implement the restoration measures.

Parcel Name: Tillamook County Parcel
Tax Lot Map: 1S 10 23 lot 300
Ownership: Tillamook County
Size: 1 acre
Estimated Value: yet to be determined
Property Description:
This small parcel is nestled at the southeast corner of the Fuhrman property and consists mainly of a riparian area for Blind Slough. This parcel falls within the management plan area.

Element 3: Restoration and Enhancement Activities

Overall Strategy for Restoration:

The key to restoring the project area to functioning estuarine habitat depends upon re-establishing tidal exchange with the bay as well as hydrologic conductivity between the Wilson and Trask rivers and their floodplains. With the main objective of this project being to restore salt marsh habitat, providing tidal inundation is essential in creating the physical and chemical conditions required to re-establish the desired vegetation community and habitat characteristics. Therefore, partially removing the existing levee system surrounding the property is the central aspect of the restoration plan. Levees will be rebuilt in the eastern portions of the Wilson and Farris properties to protect adjacent landowners from tidal flooding. The details of the how the levee system will be altered is discussed in greater detail in the Structural Modifications section of this element.

The project area encompassing the Wilson, Farris, and Fuhrman parcels is a complex and critical floodplain area during flooding events. 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.

The specific management measures proposed in this plan have been designed in a comprehensive manner that serves to address the needs to:

1. Restore properly functioning estuarine habitat for fish and wildlife, and

2. Ensure the security of the local community through the mitigation of flood hazards.

Fortunately, these dual goals can be complimentary. Restoration of floodplain function and hydrologic connectivity improves habitat quality *and* should allow for reduced flood severity. A detailed hydrological analysis will be completed prior to implementing proposed structural modifications. No modifications to the existing levee system will occur without strong evidence demonstrating that these alterations will not worsen, and hopefully will be beneficial in, reducing flood hazards. The specifics of how the project will be implemented are discussed below. Proposed structural modifications will be discussed first, followed by a description of proposed vegetation management strategies.

Structural Modifications:

The Wetlands Management Plan Development Team has resolved that the structural modifications proposed in this section of the plan will be modified slightly, as appropriate, when more detailed and site-specific information becomes available through:

- land surveys
- hydrologic modeling and analysis
- and further consultations with restoration, hydrology, and engineering professionals.

The following structural modifications will be implemented under this management plan:

1. **Build a new levee at the eastern edge of the wetland restoration area to ensure adjacent properties remain protected from tidal inundation.** Establishing this new levee is essential to the design of the restoration project, and will be completed before any breaching of existing levees occurs. Land uses and private property rights interests of landowners adjacent to the restoration project will not be affected. This new levee will be designed to the summer high tide elevation, which will keep tide water from inundating non-wetland areas while still allowing maximum conveyance of floodwaters to the bay during periods of riverine flooding. Floodgate culverts will be installed in this dike system in order to convey as much water as possible during flood events. These floodgate structures will be moved from their current location in the Wilson Levee (refer to Structural Modification #2).

   The exact location of this levee will be agreed upon subject to gathering of more detailed information on site elevations and hydrologic modeling. Areas with elevations, soils, and hydrology suitable for restoration as wetland habitat will be managed for this purpose. The new levee structure will be built to the east of the restored wetland areas. The major factors determining where this levee will be placed include the site-specific topography, the results of hydrologic modeling of the area (the levee location should maximize flood mitigation potential), engineering considerations, and cost.

2. **Breach several portions of the Wilson Levee along the southwest side of the Wilson property to restore tidal exchange.** This will involve the removal of the 10 large-volume floodgate culverts currently installed in the levee (these will be moved to the new levee discussed in #1), and the select removal of dike material down to an elevation that allows full tidal inundation.

3. **Breach select portions of the Wilson Levee along the northwest portion of the Farris property to restore tidal exchange.** Breach locations will correspond with existing channels within the Farris wetlands complex. This will provide hydrologic connectivity between the Wilson River channel and the Farris wetlands. These channels will provide excellent refuge and rearing areas for a variety of estuarine-dependent species as well as for juvenile salmonids. Dike protection to the Farris property will be provided only in the immediate vicinity of the residence and access road, regardless of the acreage ultimately retained by the landowner.

4. **Breach the Fuhrman Levee at select locations to allow connections between the Wilson River and existing or remnant channels on the Fuhrman parcel.**

5. **Abandon, and remove parts of, the current access road to the Fuhrman residence, as well as breach the Fuhrman levee adjacent to the road.** The existing access road is unpaved. The levee is located just to the northeast of the road and should be breached and abandoned. This road/levee should be breached to allow hydrologic connectivity between Hall Slough and Blind Slough.

6. **Build an elevated access road to the Farris and Furhman residences, and provide these residences with protection from tidal indundation.** This elevated road is necessary in order to maintain access to the existing residences which the owners wish to retain within the project area. The road needs to be built at an elevation high enough to stay above the Wilson River flood elevation at the Hall Slough junction. Large capacity tidegated culverts will be built into the road to allow as much connectivity as possible between channels bisected by the road. The tidegates would be kept open most of the time to allow fish passage and full water exchange, but can be closed during periods of flooding if this would facilitate improved conveyance of floodwaters to the bay. The Fuhrman residence will be connected to the Farris access road via a spur that crosses Blind Slough at the location of the current tidegate/fill area or along the existing access way. As needed, levee structures will be built adjacent to both residence structures to protect from tidal inundation. Given the locations of the houses, building levee structures to protect against severe riverine flooding is probably not practical.

7. **Fully restore hydrologic connectivity of Blind Slough.** This slough has been substantially improved by the recent fish-friendly tidegate installation project completed by the Performance Partnership and Nehalem Marine. However, a bridge crossing would enable a much greater degree of natural tidal exchange, improved fish passage ability, and a much greater capacity for floodwater conveyance.

8. **Utilize on-site materials from previous diking and dredging projects, as feasible, to build new planned levees and elevated roads.** The Wilson, Farris and Fuhrman parcels have existing dredge spoils sites. Utilizing this on-site material is the most economically feasible source for planned construction. Removing these materials from their current locations will also help to address the removal of the invasive scotch broom shrubs that have become established on the spoils piles, and will lower elevations to a level more amenable to the establishment of wetland vegetation.

9. **If recommended by restoration and hydrology experts, an intertidal channel could be established on the eastern portion of the Wilson property.** This channel will only be created if it is demonstrated to be important from a habitat standpoint, and if natural tidal channels are not likely to develop on their own in a desired manner.

10. **Enhance Nolan Slough.** This slough has been partially restored by the installation of a fish-friendly tidegate and the associated increase in tidal flushing. However, the

habitat value of the slough could be greatly enhanced through the establishment of a healthy riparian zone and an increase in habitat complexity components and cover for fish. Landowners adjacent to Nolan Slough should be asked about the degree of tidal inundation that is acceptable to them. The maximum level of tidal exchange should be provided to enhance the water quality and habitat value of the slough. Restoration and enhancement activities proposed for this slough must first be evaluated for their impact on the conveyance of floodwaters, as this area is a primary floodway during floods.

Vegetation Management:

As with the proposed structural modifications, management of vegetation on the site will be specific to certain portions of the project area. Different management measures should apply to different areas to meet the objectives and goals of the overall project. When implemented properly, the proposed structural modifications should provide the conditions necessary to naturally establish the desired vegetation communities. However, it is anticipated that active management will be required to control invasive exotic species and to properly manage the area of the Wilson property to be utilized for an agricultural purpose.

Primary Vegetation Management Principles:

1. **Remove invasive non-native vegetation, and replace with appropriate native species.** In order to maximize the habitat value of the restored wetland area it is important to limit the spread of undesirable invasive species. Invasives often reduce the overall diversity of plant species in an area and can reduce the complexity of habitat available to support a variety of wildlife species. Non-native grasses, sedges, brush, and berries located in the project area should be evaluated by habitat biologists in order to determine the best means of converting the area to a more desirable plant community. Personnel from the Oregon Department of Fish and Wildlife (ODFW), the Tillamook County Soil and Water Conservation District (TCSWCD), and the Natural Resource Conservation Service (NRCS) should collaborate on the invasive species remediation strategy. Refer to Appendix A. (to be added) for a list of noxious invasive species.

2. **Allow natural conversion of freshwater wetlands to intertidal wetlands as determined by tidal exchange regime and landscape elevation.** Once the structural alterations have been completed, daily exchange of tide waters and periodic inundation of the floodplain during high river flows will gradually alter the plant communities to species best adapted to the new hydrologic conditions. The breaching of portions of the Wilson and Fuhrman levee systems will cause a shift on the Fuhrman, Farris, and western portion of the Wilson properties from freshwater wetland habitat towards low and high salt marsh habitat. This change in plant community composition will not happen immediately, but will proceed through several phases. Details of the expected shift in plant community composition, as well as a list of desirable native species are described in Appendix B (to be added).

3. **Manage the upland portion of the Wilson property for appropriate agricultural uses and to maintain an unobstructed floodway.** Upland areas on the eastern portion of the Wilson property will be managed for their agricultural value. This land area will be managed to generate revenue to pay for costs associated with the ongoing management of the project area and maintenance of the flood control structures and levees. Most of this area will be managed to maintain an unobstructed pathway for floodwater conveyance during flood events. Management of the agricultural portion of the Wilson property will also take into consideration the utilization of the area by waterfowl and other wildlife species.

4. **Protect existing stands of Spruce forest, and allow for the re-establishment of floodplain forest habitat.** Most areas of native spruce forest in the Tillamook Bay lowlands have been cleared. Floodplain forests play a critical role in provide habitat diversity for native wildlife species, preventing erosion, alleviating sedimentation of the bay, and providing organic material essential to aquatic habitat structure and foodchain dynamics. The deficiency of large woody debris in Tillamook Basin rivers and within Tillamook Bay poses a substantial problem to the recovery of native salmonids, and has been clearly documented by ODFW, the Tillamook Bay National Estuary Project, and a number of watershed assessments completed for the Tillamook Bay Watershed Council. Large wood structure is critical for salmon in providing habitat complexity, food, and cover from predators. Existing trees and naturally recruited large wood occurring at the project site will be protected from removal and undue manipulation.

   Recognizing that under certain circumstances large woody debris jams can obstruct the drainage of floodwaters and pose a threat to public welfare, manipulation of large jams should be allowed if such a threat exists. Manipulation of debris jams needs to be decided on a case by case basis. The determination of a threat to public welfare will be coordinated through the existing mechanisms of Tillamook County Emergency Management.

Element 4: Ownership and Management - Identification of Responsible Participants

The following section discusses the role of stakeholders directly involved in, or impacted by, the management of properties addressed in this plan. This section also outlines a mechanism to resolve disputes among these parties as well as update elected county officials on implementation of this plan.

Management Responsibilities of Participating Stakeholders:

In addition to the numerous technical advisors and interested stakeholders, there are five primary participants involved in implementation of this management plan. Identified below are the participants responsible for ownership and management of acquired properties.

1. Tillamook County. Tillamook County is the sole owner of all land acquired under the CWPRA grant. Tillamook County manages this land under the terms of an Inter-Governmental Agreement (IGA) that has been prepared by Tillamook County Counsel and agreed upon by all of the parties listed in this section. Consistent with the terms of the acquisition grant, protection of the coastal wetland for fish and wildlife habitat is the primary purpose of the property, and is reflected in the title of the acquired properties. The IGA contains provisions to ensure maintenance of, and access to, flood control structures and levees throughout the project area.

2. Oregon Department of Fish and Wildlife. As defined in the IGA with Tillamook County, the Oregon Department of Fish and Wildlife is responsible for habitat management of the non-agricultural portions of the Wilson, Fuhrman, and Farris properties. In this capacity, ODFW is responsible for ensuring that restoration and enhancement activities discussed in Element 3 of this plan are implemented to maximize the goals of the acquisition grant, in accordance with the terms of this plan. These goals include:
   - improving habitat for native fish and wildlife,
   - improving water quality, and
   - enhancing the overall ecological health of Tillamook Bay.

3. North Highway 101 Flood Mitigation Group. The North 101 Flood Mitigation Group is committed to helping ensure that flood mitigation structures are properly maintained and that floodway easements are protected and enforced. Ongoing maintenance of flood protection/mitigation structures will be funded through a combination of: 1) proceeds derived from acquired lands managed as pasture, 2) support from the City of Tillamook, and 3) support from the Flood Mitigation Group. Flood easements protecting the interests of North 101 business district owners will be included as a provision of the Memorandum of Agreement. Local flood control groups will have access to flood control structures and levees and will work cooperatively with property managers to ensure proper maintenance of these structures.

4. Tillamook County Soil & Water Conservation District. SWCD manages that portion of the Wilson property designated for agricultural use as specified under the terms of the IGA. The SWCD remits a portion of any proceeds to the maintenance of flood mitigation infrastructure and other management options discussed in this plan. Proceeds are managed in accordance with the terms and conditions of the IGA.

5. Tillamook County Performance Partnership. The TCPP is responsible for project administration supporting the restoration activities occurring within the scope of the grant. Specific duties include: project tracking, progress reporting to funding agencies, coordinating contracted services and managing payment for properties acquired and restoration work completed, and other tasks required to close the grant upon project completion. In addition, TCPP will continue to seek appropriate funding to ensure full implementation of this management plan.

Assurance of Implementation:

As owner of the properties discussed in this plan, Tillamook County is ultimately responsible for ensuring plan implementation. Accordingly, one representative of each of the parties discussed above will appear before the County Board of Commissioners to provide a semi-annual oral progress report. Reporting as a group, these individuals will highlight successful implementation activities, barriers to implementation, and future courses of action. Written progress reports required by granting agencies and pertaining to the project will also be provided to the Board of Commissioners.

Dispute Resolution:

Successful implementation of this plan requires ongoing collaboration among all of the parties involved. Throughout the plan development process these parties have demonstrated that they can work effectively together, and consequently few disputes are anticipated. However, should events arise that create a management impasse, the five representatives chosen to report to the Commissioners will convene to resolve the dispute. The group may elect to use a unanimously chosen facilitator. Final resolution of any dispute will be by majority rule based on the course that best meets the goals and objectives established in Element 1.

Element 5: Public Access and Education Plan

Emphasis of Public Access Plan:

Public ownership of restored and transitioning wetland ecosystems provides a unique opportunity for citizens to learn about the value of wetlands to the natural and built environments. Under this concept, this plan endorses public access to the acquired properties through the development of several interpretive areas. These areas will manage flow through the property while providing unique educational and recreational experiences to the general public. Signage, kiosks, overlooks, and other educational infrastructure will highlight the following:

- Overview of estuarine function
- Overview of wetland function
- History of site from a land use perspective showing potential for restoration
- Wetland transition/species succession
- Habitat types present
- Plant and animal species present and habitat needs
- Riparian function
- Flood management infrastructure and relationship to wetland function

Access Provisions:

At this point in the project's development, it is premature to identify the specific design plans for these areas. However, to insure the goals of this plan are not compromised by (albeit minor) development, the wetlands management committee recommends that future planning should be governed by the following guidelines:

- The design of public access points and interpretive areas should be evaluated based upon the potential for community education with the least impact on this plan's broader goals of ecosystem restoration and flood hazard mitigation. Any development required will not impact flood mitigation or habitat enhancement efforts.
- Public access should be restricted to foot traffic only.
- Navigable waters within the properties are governed by the state. This plan recommends that the county address any problems due to powerboat/jetski access only when and if they arise. If needed, remedies should be sought through application to the Marine Board for special restrictions on waterways adjacent to the properties addressed in this plan.
- Parking and sanitation should be provided for by the county if deemed necessary and appropriate.
- Tillamook County will not be responsible for restricting access to the retained private properties within the project area.

- Hunting by the public will be permitted according to the prohibitions stated below. The hunting privileges legally conferred to the Hamachek and Farris families will be honored and accounted for in the hunting regulations applying to the area.

Prohibited Activities:

The Wetlands Advisory Committee views the following activities as incompatible with the goals of the plan and recommends that they be prohibited by the county.

- Use of motorized vehicles except on dedicated access roads and in designated parking areas. Recreational off-road vehicles are expressly prohibited.
- Camping.
- Horseback riding.
- No discharge of firearms except shotguns during waterfowl season.

Element 6: Monitoring and Evaluation

Monitoring the outcome of this project is essential in order to:

1. gauge the effectiveness of the restoration approach,
2. assess the adequacy and appropriateness of ongoing management efforts, and modify as needed,
3. gain meaningful insight into the ecological significance of the restoration effort, and
4. help advance the evolving science of estuarine wetland restoration.

The initial OWEB grant secured for this restoration project specifies minimum monitoring requirements for the first three years following project implementation, as described in Exhibit D of the grant award contract. Specifically, the contract states that in addition to conducting on-site photo-monitoring, the following information must be discussed in an annual monitoring report to OWEB:

1. A description of any restoration or maintenance performed.
2. An accounting of any costs associated with maintenance and monitoring.
3. An assessment of whether the project continues to meet the goals specified in the grant agreement.
4. A summary of any public awareness or educational activities related to the project, including identification of any tours or presentations and copies of newspaper or other media coverage about the project.

As administrator of the OWEB grant, the TCPP is responsible for ensuring that these requirements are responsibly fulfilled.

When implemented, this project will be one of the premier estuarine wetland restoration projects in the Pacific Northwest. The size and innovative nature of this collaborative undertaking warrant special attention from a monitoring standpoint. The results of the work conducted in Tillamook Bay will be of prime interest to other coastal communities interested in restoring and protecting their estuarine resources. Careful documentation of the lessons learned during the course of the project will facilitate the dissemination of information to others working in the field of estuarine habitat restoration. Thus, in addition to the monitoring activities required by the OWEB grant, additional efforts will be made to conduct a more scientifically rigorous investigation of the restoration site.

The development of a high quality monitoring strategy is an aspect of this restoration project that requires considerable scientific expertise in the realm of coastal wetland ecology and wildlife biology. Proposals for appropriate monitoring research will be developed upon extensive consultation and collaboration with experts in these fields. The

Tillamook County Performance Partnership will take the leadership role in facilitating this process and in working to secure funds to support the desired research plan.

An appropriate research plan should include some or all of the following elements:

- Documentation of the changes in the vegetation community over time with respect to species composition, distribution, and abundance.
- Documentation of major water quality parameters such as temperature, salinity, turbidity, dissolved oxygen, bacteria counts, etc.
- Documentation of changes in habitat type, quality, and function over time.
- Documentation of changes in fish and wildlife use of the restored area.

Element 7: Costs and Funding

Acquisition Costs:

Recognizing that the costs of property acquisition fluctuates depending on real estate negotiations, the approximate cost of acquiring all properties as currently proposed totals about 1 million dollars.

Restoration Costs:

Estimated costs for restoration and enhancement activities are difficult to predict and are highly variable depending on how much alteration of the site is required, how the site responds to restoration activities, and unforeseen expenses related to specific restoration techniques that may be necessary. It is anticipated that the initial OWEB grant of $250,000.00 may not be enough to complete all of the restoration actions required by this management plan. However, given the ecological significance of this restoration effort, additional funds for restoration should not be difficult to acquire through existing grant programs. These programs include the following:

- National Fish and Wildlife Foundation Five Star Challenge Grant Program
- USFW North American Wetlands Conservation Act Standard Grant Program
- USFW North American Wetlands Conservation Act Small Grant Program
- USFW Coastal Wetlands Conservation Grant Program
- USDA NRCS Wetlands Reserve Program (restoration cost share)
- EPA Wetland Program Development Grant Program
- NOAA/NMFS CRP Individual Habitat Restoration Project Grant Program
- Fish America Foundation Grant Program
- Oregon Watershed Enhancement Board Grant Program

Maintenance Costs:

Costs of maintaining the restored wetland area will primarily be associated with ensuring the proper functioning and integrity of flood protection structures (levees, culverts, and tidegates) and possibly for ongoing management of noxious invasive vegetation.

Maintenance of flood protection/mitigation structures will be funded through a combination of:

1) proceeds derived from acquired lands managed for agricultural use,
2) support from the City of Tillamook, and
3) support from the Flood Mitigation Group.

TILLAMOOK BAY HABITAT & ESTUARY
IMPROVEMENT DISTRICT
Post Office Box 700 • Tillamook, Oregon 97141
503-815-8164 • TBHEID@tillamookoffice.com • Fax 503-842-3587

May 19, 2011

Michele Bradley
General Manager
Port of Tillamook Bay
4000 Blimp Blvd
Tillamook OR 97141

RE: Letter of Financial Assurance

Dear Ms. Bradley:

Tillamook Bay Habitat & Estuary Improvement District (TBHEID) is writing this letter of financial assurance for the FEMA Southern Flow Corridor (SFC) grant appeal. TBHEID incorporated 9 years ago as an ORS Chapter 554 water control district and is the single largest private sector collaborator with vested interest in the SFC project. The District continues its partnership with other voters and financial investers constructing and maintaining the SFC project area now and in the future.

Although, TBHEID is not subject to the same limitations of Oregon budget law that the state, county, port and soil and water conservation districts are subject as to obligating future funds, the District uses private sector self-taxing funds and fees to partner with the public sector in maintaining SFC infrastructure.

Private and public members of TBHEID have a vested economic interest in maintenance of the SFC project area for protection and improvements in farm lands, residences, and businesses values. Continued commitment to flood protection measures and maintenance is a District priority.

Sincerely,

Chad Allen, President

Declaration of Cooperation

Tillamook Basin Flooding Reduction Project

November 2007

Sponsored by:

Tillamook County
Tillamook City
Tillamook Estuaries Partnership
Tillamook Bay Habitat & Estuary Improvement District
Tillamook County Hospital
Tillamook County Creamery Association
Oregon Solutions

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Purpose of Declaration of Cooperation: Oregon Solutions provides a structure and process for public and private sectors to collaborate in addressing community needs. That collaborative process, which results in agreements made amongst the parties, forms this Declaration of Cooperation. The purpose of Oregon Solutions is to have all interested and affected parties determine the best courses of action to diminish the magnitude and negative impacts of flooding in the Tillamook Basin. This document outlines the commitment of all parties to successfully carry out various projects which are outlined below. The commitment shall continue until all projects are completed or suspended by mutual agreement. By consent of all parties, this document may be amended from time to time to represent changing situations often found during project development.

Preface: In December, 2006 a letter was sent from State, County and City representatives to Governor Kulongoski requesting that Tillamook flood mitigation efforts be designated an Oregon Solutions project. A project assessment was concluded in March, 2007, followed by Governor Ted Kulongoski's official designation in April, 2007.

The Governor has assured participation of his staff and appropriate state agencies with participating public and private partners through the designation of this effort as an Oregon Solutions Project. A Project Team has been assembled in an effort to bring partners to the table. It is expected that the creation of this Team will help make efficient use of available resources, search for additional funding opportunities, accelerate the pace of the project, overcome potential impediments early on, and raise awareness of the project at local, regional, state and federal levels. In this fashion, the Project Team will commit resources and time to an integrated action plan focusing on successful, sustainable outcomes.

The Project Team (see Appendix A) has developed the following Goal statement: *The purpose of the Oregon Solutions Tillamook Flooding project is to develop and implement a plan to reduce flooding and the adverse impacts of flooding while incorporating environmental, social and economic values in the development of short and long term solutions.*

Background to Project: Regardless of the differences of opinion on how flooding can best be mitigated in the Tillamook Basin, most people agree that in recent years there have been more frequent floods and of larger magnitude than in the past. Adding to the complexity of this issue is the fact that nature configures each major flood differently than the previous one.

Over the years a number of flood mitigation improvements have been implemented in the Tillamook Basin. They include: installation of tide gates and other flood control systems; emergency repairs; and FEMA assistance to affected properties. In addition, mapping, studies, plans, rules and ordinances have been written, or updated, regarding flooding in the Tillamook Basin. One of the most helpful studies is the "Tillamook Bay and Estuary, Oregon General Investigative Study" [Army Corps Feasibility Study] authorized by Congress for funding in 1997. It examined 59 potential alternatives to help reduce flooding.

During the initial stages of this Oregon Solutions flooding project, three work groups were used to study, and offer to the Project Team numerous projects for consideration. These projects were examined and prioritized by the Project Team. This document addresses the top prioritized projects, including how funding and permits might be obtained. Several projects that maintain or improve the environment have been endorsed for further analysis. Because flooding affects the economy, some projects within this Declaration also outline efforts for how best to maintain and nurture growth of commercial businesses and how to support the dairy industry while mitigating the negative impacts of flooding.

Project Description: On September 12, 2007, the Oregon Solutions Tillamook Project Team prioritized projects for accomplishment. The projects listed below in order of prioritization, are those which can be worked on at this point through the Oregon Solutions process. Combined, they encompass both short term and long term objectives to alleviate flooding and maintain or enhance the environment. The following projects form the basis around which the Declaration of Cooperation is framed.

1. **Wilson/Trask Spillway:** Flood water drainage is blocked when high water behind berms is not allowed to escape. For added flood water drainage, this project would allow the expeditious exit of flood waters into Tillamook Bay through installation of a spillway and tide gate with mitigator next to the ten tide gates on the Tillamook Bay levee. The property is owned by Tillamook County. Following engineering design and any required modeling, permits are not expected to be an impediment to project completion. Expected cost of the project is $150,000 to $250,000.

2. **Tone Road Spillway:** This project shows a positive benefit for farm land where excessive loss of farm animals has occurred in two floods over the last decade. The project will install a second gated spillway to the north of Tone road, to convey flood water into the Tillamook River. The property owner and the Drainage District are endorsing this improvement. The project is not expected to exceed $350,000 and permits are not expected to pose an impediment for completion.

3. **Dougherty Slough Permanent Structure:** The Dougherty Slough permanent structure project is meant to replace the U.S. Army Corps of Engineers' temporary log jam at the headwaters of the slough in the Wilson River. Without a permanent structure, it is possible that the wooden structure could give way, causing significant flooding in the N. Hwy 101 business district. Permits will be needed and design of the structure must show fish friendly passage and structural integrity. Estimated cost for the structure is approximately $250,000.

4. **Comprehensive Community Vision and Strategic Plan:** This project is meant to reduce impacts of flooding by producing long term strategies for providing assistance and land-use alternatives for relocating potentially willing businesses

out of the flood area. Emphasis on maintaining business viability within the community is key in this project. Land use planning efforts, including inventories of available land for commercial purposes, and discussion of land use for vacant N. Hwy 101 properties will be part of this community wide planning process. The estimated cost for these efforts, combined with Tillamook City efforts to implement its Flood Mitigation Plan (see # 6 below), is about $100,000 per year.

5. **Trask Hook:** A box culvert would be installed to remove hydraulic pressure created by the Trask River Hook Channel. The problem was created when the SR 131 Bridge was constructed over the Tillamook River. The old Trask River channel currently directs flood waters against the flow of the Tillamook River, which creates a head wall of water, increasing flood water levels in the lower Trask Drainage cell. A box culvert would direct high water through a short cut into the Tillamook River. Consultation with ODOT is essential to ensure continued structural integrity of the SR 131 Bridge and to construct the improvements within the State right-of-way. The cost for this improvement is estimated to be approximately $100,000 based on a previous design. The Trask Drainage District is interested in assisting with this project. The need for several permits is anticipated.

6. **Implementation of City/County Flood Mitigation Plans:** This project endorses the continued need for carrying out the many goals listed in the Tillamook City Flood Mitigation Plan. Absent efforts to carry these recommendations forward, there will continue to be frustration over recurring damages from flooding and lack of coordination and inconsistencies among agency practices. A city staff person would accomplish activities under this proposal, with products including but not limited to: review of city/county flood hazard overlay zones for ordinance consistency; updating flood maps with local, state and federal partners; identifying uses for vacant land in floodways/floodplain; and coordinating peer review processes for engineering "no rise" reports and removal of fill in the floodway. Estimated cost for staffing this activity is $100,000 per year (resources to be combined with strategic planning activities listed in # 4 above)

7. **Mediated Gravel Agreement/Stream Corridor Management Plan:** Facilitation is needed to bring parties together with the goal of executing a final agreement and adoption of a Stream Corridor Management Plan. In 2000, a draft of an amended plan was completed, but an impasse was reached primarily due to concerns raised by DLCD. Since that time, the Plan has been rewritten and a new agreement prepared. Oregon Solutions has offered to provide and fund mediation/facilitation services to determine issues that must be addressed by all parties in order execute the plan.

8. **USACE Feasibility Study Hall Slough Project:** This project originally was designed to reconnect an historic slough disconnected in the 1950's, to the Wilson River. Set back levees with riparian plantings were suggested. Flood water would be channeled to avoid flooding in Hwy 101 areas and to open up the passage and disperse the water into Tillamook Bay. The project is meant to provide a relief valve when Wilson River water levels get too high. The initial cost for the project was estimated to be $ 4-7 million.

9. **Modified Wetland Restoration and Swale Project:** This project was also described in the USACE Feasibility Study. The dominant feature of this project is the construction of a new levee dividing the area roughly in half, east to west, separating a fully tidal area to the north with a flood storage area to the south. The full time saltwater marsh to the north would be reconnected to the Wilson River. To the east of the wetlands acquisition area, a swale to hold run off would be constructed to compensate for the removed capacity created by the salt water marsh area. The estimated cost of this project in 2004 was $4.5 million.

Project Exodus:

After reviewing the above two projects (Hall & Wetlands Restoration) it has been suggested by the U.S. Army Corps of Engineers and agreed upon by the Project Team that modifications to both projects be explored and possibly merged into a new and more complex project that will dramatically improve flooding conditions as well as improve eco-system restoration in the flood plain.

Process for Funding and Implementation of Prioritized Infrastructure Projects: A Design Committee (DC) will be used to review project alternatives, develop their design, and devise a process to obtain permits. Consideration will be given to combining elements of one project with another to maximize flood mitigation efforts. Conservation and improvement of the environment as well as the Tillamook Basin economy will be given priority as the DC works on flood projects. The Design Committee will forward various recommendations to the Project Team and will report regularly on their progress.

One representative from each of the following interests has been appointed by the Co-conveners to serve on the Design Committee: USACE, ODOT, NMFS, ODF&W, DSL, Farm Community, TBHEID, TEP, Tillamook County and Tillamook City. Rick Klumph, ODF&W North Coast Watershed District Manager will chair the Design Committee. The Committee will be assigned an Oregon Solutions project manager to assist in project implementation. As needed, technical expertise will be secured to assist the Design Committee. Emphasis by the DC will first be given to short term project accomplishment. These include: the Wilson/Trask Spillway, Tone Road Spillway, Dougherty Slough Permanent Structure and Trask Hook projects.

Implementation of flood mitigation projects will require funds from numerous sources over several years. The Tillamook flood mitigation project begins with $1 million allocated by the 2007 State legislature. It will be used as “seed money” to enhance other funding opportunities. Additional state funding sources will be explored and those members of the Project Team, for whom it is appropriate, will pursue federal funding through earmarks, congressional budget additions, and grants. A grant writer will be used to secure public and private funds. In order to be in the progression for 2008 federal funding (funds available in 2009), the appropriate Project Team members will aggressively pursue a work plan to present their needs to Congress through the Oregon Congressional delegation. A package for that purpose, including endorsement letters will be completed by the end of December 2007.

Note: As a Federal agency, the National Marine Fisheries Service cannot lobby for or pursue federal funding through earmarks, congressional budget additions and grants, or write letters of support or endorsement letters to Congress via the Project Team work plan.

Oregon Solutions Tillamook Flooding Agreements

All team members acknowledge that the best solutions depend upon cooperation by all entities at the table. Accordingly, they recognize that each party has a unique perspective and contribution to make, and legitimate interests that need to be taken into account for the success of various projects. The following sections provide each entities contributions to projects listed above.

State Legislative Representatives

Legislators representing the Tillamook Basin area provide a broad representation of interests and wide knowledge of the economic and social needs of the area. Senator Betsy Johnson was one of three parties who requested an Oregon Solutions designation from the Governor's office for this project. She serves as Co-convener for the Project Team with Commissioner Labhart. Representative Deborah Boone serves as a Project Team member. Both legislators have been active in working on the Project Team and offer their support and energies to Tillamook flood mitigation efforts. The Legislators have expressed interest in doing the following:

- Continue to provide leadership for the project and encourage all parties to work in a collaborative effort toward sustainable efforts to mitigate flooding.
- Speak in the region on the importance of the short and long term projects being undertaken.
- Sponsor or support legislation favorable to this project including sensible statutory changes that may be needed to facilitate projects, and funding opportunities for one or more projects.
- Endorse Congressional funding requests for the project and offer lobbying assistance for them.
- Senator Johnson will continue to offer her time as Co-convener of this project, and with Commissioner Labhart, will convene the Project Team at least quarterly.

Betsy Johnson 10/31/07

Oregon State Senator Betsy Johnson — Date

Deborah A Boone 10/31/07

Oregon State Representative Deborah Boone — Date

Tillamook County

The Tillamook County Commission was one of three parties to request the Governor's designation of this project. The County will act as the pass though agent for funding project management. It also has offered to keep records of all Project Team meetings. Commissioner Labhart serves as a Co-convener for the Tillamook flood mitigation Project Team. The County owns land that is affected by several projects and thus is in a key role to help facilitate land use management and permit processes to achieve desired projects. In addition to Commissioner Labhart, Tillamook County has offered the services of Paul Levesque and Tom Manning, who serve on the Project Team. Both have historical knowledge of flooding issues and provide leadership on project development and implementation. The County has contributed $7,500 toward project administrative expenses for the Oregon Solutions process.

As one of the lead public entities on the flood mitigation project, Tillamook County will:

- Have Commissioner Labhart continue to serve as Co-convener for this Oregon Solutions Project. Along with Senator Johnson, they will convene the Project Team at least quarterly.
- Serve as financial controller for all funds received and disbursed for projects under this Oregon Solutions effort.
- Provide leadership through its Board by encouraging fund raising efforts from the private, state and federal sectors. In this regard, the Commissioners and staff will offer their time and expertise to lobbying efforts as may be needed at the state and federal levels.
- Give priority, within county, state and federal laws and guidelines, to the issuance of permit applications.
- Work as a conduit with Drainage Districts and property owners to accomplish projects such as: Tone Road Spillway; Dougherty Permanent Structure; Trask Hook and other flood mitigation/environmental projects.
- As land owner of the Wetlands Restoration project area, work with all parties to assistant in installation of the Wilson-Trask Spillway.
- Give priority to efforts involving removal of the "Dean property fill" as it may apply under County jurisdiction.
- Will provide a leadership role in gathering all parties to the table to execute a final Stream Corridor Management Agreement.
- Will consider contributing further financial assistance to conduct future Project Team designated projects, as may be available within County budget constraints.
- Accept the responsibility of keeping the community, Project Team, news media, along with other key parties informed on progress of Oregon Solutions projects.
- Provide assistance to projects through the County Public Works Department as may be needed from time to time.
- Will work with the Oregon Solutions Project Team on balancing congressional funding requests between County needs and Oregon Solutions priorities.

Tillamook County Commission

Mark Labhart

Mark Labhart, Chair

10-17-07

Date

Charles J. Hurliman

Charles Hurliman, Vice-Chair

10-17-07

Date

Tim Josi

Tim Josi, Commissioner

10-22-07

Date

City of Tillamook

The City of Tillamook is represented on the Project Team by Mayor Bob McPheeters and City Manager Mark Gervasi. The City of Tillamook contributed $5,000 for project administrative expenses for the O/S process. During flooding events the City of Tillamook is surrounded by flood waters, with some encroachment into residential property and streets to the south, and high water into businesses along N. Hwy 101. Several properties have been acquired by the City through the FEMA buy-out program. The challenges these vacant properties present include planning efforts as well as removal of fill and other structures in the flood way. The City is desirous of having a community wide strategic planning effort that would move businesses out of harm's way and find suitable alternative locations for business development. The City has a Flood Mitigation Plan and has been recognized as a CRS rated community. Accordingly, goals stated in the Plan need to be implemented to reduce or hold flood insurance rates steady.

- Tillamook will take the lead in a community conversation and strategic visioning process to ascertain: how best to configure vacant parcels along north Hwy 101; where to encourage business development out of harm's way; and how to enhance economic opportunity for businesses in what ever locations they choose.
- Tillamook will work in partnership with DLCD and other state agencies in the above endeavors.
- Tillamook will explore the opportunity of hiring one additional employee who will assist in the community conversation efforts as well as implement the Tillamook Flood Mitigation Plan goals.
- As flood mitigation designs and proposals for sloughs and swales which pass through N. Hwy 101 are developed, the City will participate in the expeditious review of these projects toward implementation.
- Tillamook will consider the removal of the fill on the Dean property as a high and immediate priority and assist in that effort.
- Tillamook will provide leadership in the Oregon Solutions process and 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.
- The City will elicit the assistance of the Oregon Emergency Management office, and in particular their Hazard Mitigation Officer Dennis Sigrist, for advice and direction including the updating of flood maps, making training available, and securing improvements to the FEMA buy-out process.

Robert McPheeters ______________________ Oct 1, 2007 ______________
Mayor Bob McPheeters Date

Department of Land Conservation and Development (DLCD)

In general, to assure the highest possible level of livability, DLCD is charged with facilitating well prepared and coordinated comprehensive plans for cities and counties, regional areas and the state as a whole. As our mission statement indicates, we support all of our partners in creating and implementing comprehensive plans that reflect a balance of the statewide planning goals, the vision of citizens, and the interests of local, state, federal and tribal governments.

Specifically, in our role of assisting local governments, the Department will strive to help strengthen the economic vitality of Tillamook County communities while encouraging livability through sustainable development within urban areas. As the community of Tillamook engages in a strategic planning effort, the Department will offer guidance on planning and land management tools to promote development patterns that reduce flooding, and provide incentives to promote relocation of businesses outside of flood prone areas. In addition the City of Tillamook will be working on goals within the City's Flood Mitigation Plan and the Department may have other opportunities to assist in those endeavors. Following are key department concepts related to this OS effort:

- DLCD supports the efforts of the Oregon Solutions flooding project and will offer technical assistance early on to indicate the likelihood of project success.
- North Coast Regional Representative Laren Woolley will continue to serve on the Project Team with other DLCD staff assisting where appropriate.
- The Department will work with the city of Tillamook to help identify any potential resources and assistance in their planning efforts as described above, not only from limited department resources, but from other possible sources. Such work items as land inventories, zoning criteria for vacant properties occurring from FEMA buy-out programs, business relocation opportunities, and strengthening the local economy will potentially be explored.
- The Department will provide assistance wherever possible on issues related to enhanced community livability and strengthening economic vitality.
- DLCD will coordinate state review of projects requiring federal permits to assure that federal actions are consistent with Oregon Coastal Management Program requirements.
- DLCD will provide technical guidance and support to assure projects and local planning provisions are consistent with FEMA requirements. DLCD will provide advice on opportunities to (reduce flood vulnerability) and maximize opportunities for reduced flood insurance costs.
- The Department will provide input and assistance on other high priority projects on the Oregon Solutions project list dated 9/12/07, as appropriate.
- DLCD supports sustainable projects that have demonstrated flood reduction benefits and meet state and federal environmental, resource management and land use requirements.

Cora R Parker　　　　10·23·07

Cora Parker, Acting Director, DLCD　　　　Date

Department of State Lands (DSL)

The mission of the Department of State Lands (DSL) is to ensure a legacy for Oregonians and their public schools through sound stewardship of lands, wetlands, waterways, unclaimed property, estates and the Common School Fund. In accordance with this mission, DSL protects and conserves waterways and wetlands through administration of Oregon's Removal-Fill Law, enacted in 1967, as well as certain other statutes relating to activities involving removal-fill in waters of the state.

Under the Removal-Fill Law, the Department seeks to protect, conserve and ensure the best use of waters of the state, while protecting public navigation, fishery and recreational uses. Authorization is need from DSL for most activities involving removal or filling of greater than 50 cubic yards of material in waters of the state. Waters of the state include rivers, intermittent and perennial streams, lakes, ponds, wetlands, estuaries and tidal bays (to the elevation of the highest measured tide) and that portion of the Pacific Ocean which is in the boundaries of the state. The volume threshold of 50 cubic yards does not apply in designated Essential Indigenous Anadromous Salmonid Habitat Areas (ESH) or in State Scenic Waterways. ESH streams contain fish species that have been listed as sensitive, threatened or endangered by a state or federal agency.

As part of the Oregon Solutions process, certain projects have been identified that may help to reduce flooding within the Tillamook Bay Drainage Basin while incorporating environmental, social and economic values. DSL staff can contribute knowledge and expertise to assist in the design and permit decision-making process for those projects. Joy Vaughan serves on the Project Team and Assistant Director Kevin Moynahan is also involved in the process and has been present for several of the meetings.

- DSL will continue to provide representation on the Project Team and will participate on a "Design Committee" to provide guidance and assistance on the flood mitigation proposals.
- DSL will continue to provide guidance during the design and permitting phases of projects proposed as part of the Oregon Solutions process.
- DSL will contribute other appropriate resources for the Project Team to consider as the need arises.
- DSL will continue to cooperate and engage in discussions with other state, federal or local agencies concerning the permit process and any future implementation of projects identified through the Oregon Solutions process.
- DSL will be guided in its participation throughout the Oregon Solutions process and any permitting decisions by applicable statutory and regulatory process.

Louise Solliday

Louise Solliday, Director, DSL

10/17/07

Date

Governor's Economic Revitalization Team (ERT)

In designating Tillamook's flooding problems an Oregon Solutions Project, Governor Kulongoski has moved resolutely and decisively to bring to bear state resources and attention to foster a collaborative approach in helping to solve these long-standing problems. The Governor has further directed state agencies to treat projects arising from the Project Team as high priorities within each agency.

Under the direction of the Governor, the Economic Revitalization Team will focus the work of state agencies together with local interests to increase the level of success on numerous flooding projects. This effort will bring a special significance to the Tillamook Flooding mitigation efforts since seven (7) state agencies sit on the Project Team and are involved in one or more projects to help abate the impacts of flooding. ERT involvement will allow greater local access to state resources and assistance. It is anticipated that this public/private involvement will significantly enhance flooding mitigation opportunities. Specifically:

- Mark Ellsworth will continue to serve as the ERT representative on the Oregon Solutions Project Team.
- The ERT will identify early on impediments to, or the need for, special permits for projects under consideration by the Project Team.
- The ERT will provide coordination, as needed, with DLCD as they assist the Tillamook Community on land use issues, including land inventories and land use alternative ideas, planning efforts and implementation of other proposals.
- ERT coordination will provide assistance as required in working with ODOT on Hwy 101 bridge projects, Hwy 6/Hwy 101 improvements as they may tie into flood mitigation efforts, and the Trask Hook box culvert project.
- ERT will help coordinate, as needed, programs and processes that may be offered by OECDD.
- ERT will provide coordination assistance with the Governor's Natural Resources Office on projects as may be needed.
- ERT will coordinate efforts, as needed, with DSL in the review and approval of permits.
- ERT will act as a communication mechanism with federal agencies and the Congressional delegation on projects that offer flood mitigation potential.
- ERT will assist as necessary with the Office of Emergency Management in City/County discussions on FEMA processes.

Ray Naff   10-31-07

Ray Naff, Director   Date
Intergovernmental Relations &
Economic Revitalization Team for
Governor Ted Kulongoski

NOAA's National Marine Fisheries Service (NMFS)

The National Marine Fisheries Service (NMFS) is a Federal agency, within the Department of Commerce's National Oceanographic and Atmospheric Administration, responsible for the stewardship of living marine resources and their habitat. The agency works to promote sustainable fisheries and to prevent lost economic potential associated with over fishing, declining species, and degraded habitat. Cathy Tortorici, Chief, Oregon Coast/Lower Columbia River Branch, serves on the Project Team (Team). In addition, Robert Anderson, NMFS Fishery Biologist, has been an active participant in the evaluation of Team proposals. As a continuing partner in this Oregon Solutions process, NMFS will:

- Actively participate in the development of various proposals for flood control mitigation and ecosystem enhancement measures that benefit NMFS trust resources.
- Assign Robert Anderson to serve on the "Concept Design Committee" to offer NMFS technical perspectives on short- and long-range proposals under discussion.
- Continue to have Cathy Tortorici serve on the Project Team, where she will help the Team understand regulatory processes and consultation procedures to give Team proposals their best chance of success.

Michael Tehan 10/31/07

NMFS Oregon State Habitat Director Date

Congressional Delegation

GORDON H. SMITH
OREGON

COMMITTEES:
FINANCE
COMMERCE, SCIENCE, AND TRANSPORTATION
ENERGY AND NATURAL RESOURCES
INDIAN AFFAIRS

CHAIRMAN, SPECIAL COMMITTEE ON AGING

United States Senate
WASHINGTON, DC 20510–3704

October 31, 2007

The strong cooperative efforts that exist between various local, state and federal entities to improve the community through this Oregon Solutions flood mitigation project are truly commendable. Recognizing and creatively addressing the need to improve existing flooding conditions are key to the economic and environmental vitality of the Tillamook Basin. My office offers assistance to this effort as deemed appropriate and recognize and appreciate the community spirit embodied in this project.

Sincerely,

Gordon H. Smith
United States Senator

The strong cooperative efforts that exist between various local, state and federal entities to improve the community through this Oregon Solutions flood mitigation project are truly commendable. Recognizing and creatively addressing the need to improve existing flooding conditions are key to the economic and environmental vitality of the Tillamook Basin. Our offices offer assistance to this effort as deemed appropriate and recognize and appreciate the community spirit embodied in this project.

Signature

November 14, 2007
Date

Oregon Department of Fish and Wildlife (ODF&W)

The mission of the Oregon Department of Fish and Wildlife is to protect and enhance Oregon's fish and wildlife and their habitats for use and enjoyment by present and future generations. The Agency's responsibilities include advising on habitat protection for fish and wildlife populations and educating the public on natural resources. Projects to mitigate negative effects of flooding may effect fish and wildlife habitats. ODF&W Manager of the North Coast Watershed District, Rick Klumph serves on the Project Team and has provided leadership as chairperson of the In-Stream work group.

- ODF&W will continue to provide education and leadership for the Oregon Solutions process. Through participation in the Oregon Solutions process, the Department will attempt to find solutions that have multiple values and broad based support to help craft projects and move them forward.
- Rick Klumph will continue to serve on the Project Team and a "concept design committee" to help develop high priority flood mitigation projects.
- ODF&W will provide expertise in, and advice on, the permitting process and will share knowledge concerning fish and wildlife populations and habitats, as it relates to design considerations on the following projects: Dougherty Slough Permanent Structure; Trask Hook; Hall Slough and the Modified Wetland Restoration/Swale project.
- The Department will offer suggestions for funding opportunities for projects that nurture fish and wildlife protection.
- ODFW staff will also participate in additional Oregon Solutions projects such as the mediated gravel agreement/stream corridor management plan, providing leadership and seeking win-win solutions.

Director, ODF&W

10/10/07
Date

Oregon Department of Forestry

The Oregon Department of Forestry (Department) collects and shares information about the condition of Oregon's forests, protects forest lands, and works to conserve forest resources through sustainable forest management. The Department manages state forest lands in the Tillamook Bay watershed and is the single largest landowner within the watershed. One of the specific responsibilities of the Department is to implement the Oregon Plan for Salmon and Watersheds on these lands. Because it is in the forest lands where the rivers of Tillamook Bay originate, the Department's management activities influence the hydrologic system and may affect some rivers' behavior. The Department's Tillamook District Forester, currently Ross Holloway, serves on the Project Team.

- The Department will continue to be represented by Ross Holloway on the Project Team through 2007. Representation after that time will be provided by his successor in the District Forester position.
- The Department will contribute technical expertise, including that of their forest hydrologists, as may be appropriate, to analyze various proposals that relate to influences from forest lands.
- The Department will work with other Oregon Solutions partners to develop and provide appropriate public education about the flood mitigation projects through the Tillamook Forest Center.
- As may be identified, the Department will endorse funding requests for flood mitigation projects that are consistent with Department goals.
- The Department periodically collects data on resources in the forested portions of the Tillamook Bay Watershed, including aerial photography and LiDAR imagery. The Department will coordinate with Tillamook County, Tillamook Estuary Partnership, and other entities to form partnerships for the more efficient and cost effective collection and dissemination of this and other information.

Ross Holloway

Ross Holloway, Tillamook District Forester
Oregon Department of Forestry

10/31/07
Date

Oregon Department of Transportation (ODOT)

ODOT is currently negotiating a statement of work with CH2MHill to conduct an alternatives analysis at the intersection of OR6 and US101 on the north end of the Tillamook couplet. It is anticipated that the public process will begin in January 2008. Selected alternatives may positively affect other adjacent and related projects envisioned for flood mitigation. Highway related projects that are being considered under this Oregon Solutions process include: passage of flood waters under Hwy 101 bridges from Hoquarton Slough to the Wilson River Bridge; construction of the Trask River Hook box culvert project which will require evaluation by ODOT to ensure the continued structural integrity of the State Route 131 Bridge over the Tillamook River; and connecting Hall Slough to the Wilson River underneath Wilson River Road. The Department of Transportation's role in this Oregon Solutions project is to provide assistance in identifying opportunities to assist project efforts and potential funding sources for transportation system improvements for various Tillamook Flooding mitigation projects. ODOT encourages projects that are tailored to community needs and are an economic stimulus to the area. Northwest Area 1 Manager Larry McKinley serves on the Project Team. ODOT Area Planner Ingrid Weisenback has also participated in Tillamook project meetings.

- Larry McKinley will continue to serve on the Project Team
- Larry McKinley will serve on the "Concept Design Committee" and bring in subject matter experts when needed to help offer solutions and impact analysis on highway related projects.
- ODOT will provide assistance to this Oregon Solutions Tillamook Flooding project with the application process for applicable grants. Applicants are normally expected to provide a match of 20% or more.
- Application for other transportation related funding will be reviewed in accordance with established criteria.

Deputy Director, ODOT

30OCT07
Date

Oregon Economic and Community Development Department (OECDD)

The Oregon Economic and Community Development Department provides financial and technical resources to businesses and communities with a primary focus on the creation of jobs for Oregonians. Vicki Goodman, Regional Coordinator for OECDD serves on the Project Team.

- OECDD will assist the Tillamook Flooding Project by providing technical assistance to identify potential sources of funding for projects, some of which may meet the Department's criteria. Such assistance may include assuring that priority projects are listed on the community's infrastructure inventory with project descriptions and cost estimates; coordinating with other agencies to match sources of funding where appropriate; and assisting with applications where Department funding is appropriate.
- OECDD Regional Coordinator will continue to serve on the Project Team.
- The Department will assist the Tillamook Basin community's effort to assist willing businesses along Hwy 101 that are affected by flooding and work with DLCD to examine alternative locations and incentives to strengthen business development as relocations occur, including identifying infrastructure assistance that may be needed for relocation.
- The Department will help coordinate application for Immediate Opportunity Funds (IOF) with ODOT as may be appropriate for relocation of businesses out of harm's way.

Vicki Goodman

Vicki Goodman, Regional Coordinator
Oregon Economic & Community
Development Department

10-31-2007

Date

Oregon Watershed Enhancement Board (OWEB)

The Oregon Watershed Enhancement Board's long term mission is to achieve sustainable watershed health, thriving communities and a strong local economy throughout Oregon. The agency provides watershed improvement grants, technical guidance and training to groups working statewide to improve watershed health, and to support watershed protection and restoration efforts by citizens and groups. OWEB has a key role in the Tillamook Flooding project and has been involved through the years as various stream and wetland restoration projects have been developed and implemented. Ken Bierly serves on the Project Team. As a partner with the Oregon Solutions process, OWEB will:

- Continue to be active in the Tillamook Oregon Solutions process and be represented on the Project Team by OWEB Deputy Director Ken Bierly.
- Work with the Tillamook Flooding Project Team on restoration projects that may be proposed. Such assistance may include review of applications for OWEB funding for design/engineering and watershed restoration that may be part of the Wetlands Restoration project now under consideration.
- Assist the Project Team in identifying other sources of funding through State and Federal agencies that might supplement potential OWEB funds.

Thomas M. Byler, Executive Director, OWEB

10/29/07
Date

Port of Tillamook Bay

The Port of Tillamook Bay sits in a unique position to offer advice on the Tillamook flood mitigation project. The Port is comprised of over 1600 acres of land zoned for industrial use just two miles south of Tillamook. The Port's own railroad transits north /south through the Tillamook flood plain. On the drawing board are plans for a golf course, convention hotel and added spaces at the existing RV Park. As the Oregon Solutions flood mitigation project examines how to strengthen business currently located on N. Hwy 101 in the Tillamook Basin, discussions with the Port are a logical extension. Serving on the Project Team is Art Riedel who has extensive experience with coastal dredging and other water related projects.

- The Port of Tillamook Bay will support Oregon Solution efforts to mitigate impacts of flooding and Art Riedel will continue to serve on the Project Team.
- The Port will look for ways to partner with other entities to strengthen the local economy, including the potential for business relocation.
- The Port will actively participate in any "community conversation" that takes place, and which will develop a strategic plan for land use and zoning designations in the Tillamook Basin.

Chair, Port of Tillamook Bay 10/4/07 Date

Northwest Guides and Anglers Association

As a community leader in the commercial fishing industry, and as President of the Northwest Guides Association, Bob Rees represents the interests of anglers on the Project Team. Significant issues are faced by fish as the Tillamook Basin Rivers and Bay continue to fill in. Inadequate water temperatures, barriers to fish passage and lack of riparian areas confront the Tillamook Basin eco-system. To address these issues:

- Bob Rees will continue to serve on the Project Team.
- As projects are designed and implemented, he will provide advice and guidance to ensure that applicable projects maintain or enhance the eco-system.
- Bob Rees will lend support in the solicitation and lobbying of funding for various projects
- As time allows, he will provide to the news media and state and federal representatives opportunities to tour areas in the basin to show desirous habitat for fish species.

Robert Rees

Bob Rees, President
Northwest Guides and Anglers Association

11-12-07
Date

Tillamook Bay Community College (TBCC)

Tillamook Bay Community College strives to provide access to quality education in response to the needs of the community. In partnership with the Tillamook community, it provides a center for educational excellence that provides access to life long learning, and provides an environment for innovation in the economic, cultural and intellectual evolution of the Tillamook Community. The Community College has been represented on the Oregon Solutions Project Team by Jon Carnahan. Jon has also served as Chair of the Land Use work group.

- Jon Carnahan will continue to serve on the Project Team
- The College will look for ways to enhance a "community conversation" that will take place to form a strategic plan which will strengthen the local economy and deal with businesses located in the flood plain and now in harm's way.
- The College will serve in a leadership capacity to encourage partnerships within the community to enhance various flood mitigation efforts.

Jon Carnahan, President, TBCC — 10/31/07 Date

Tillamook Bay Habitat and Estuary Improvement District (TBHEID)

The Tillamook Bay Habitat and Estuary Improvement District (TBHEID) formed in 2002 as a voluntary self-taxing water control district in central Tillamook County. All members - business, farm, residential, public entities, groups, and citizens - pay annual dues. In addition, property owners pay an annual assessment. Total average annual revenues equal $38,500. The District's mission is to protect private and public sectors from preventable flood damages in Tillamook's most developed and populated area by controlling and maintaining waterways. The 2007-08 Master Projects Plan includes maintenance and flood structures for a Kilchis River Project, Wilson-Trask Rivers Wetlands Project, Dougherty Slough Project, Holden Creek Project, and North Main City of Tillamook Flood Drainage Project. The estimated cost for implementing the flood-ecosystem projects is $1.7 million. TBHEID Oregon Solutions Project Team representatives are Vice President Chad Allen, Board members Bub Boquist and Denny Pastega, and citizen, Don Hurd. TBHEID contributed $1,000 to the Oregon Solutions Flood Reduction Project.

- The TBHEID continues its support of Oregon Solutions flood reduction projects that benefit its members and the community economically, socially and environmentally.
- Currently designated TBHEID members will continue to serve on the Oregon Solutions Flood Reduction Project Team.
- TBHEID will financially contribute to prioritized projects like the Wilson-Trask Spillway Tidegate Project #1, the Dougherty Slough Permanent Structure Project #3, the Tillamook Bay Watershed Master Waterway Maintenance & Project Infrastructure Program Project #13, and Dredging of Wilson River Mouth & Bay Shoal Project #14, as agreed upon by District Board and members.
- TBHEID will assist in working with property owners, as needed, for project completion.
- TBHEID will lead efforts to unite the community and participants in moving forward collaboratively.
- TBHEID will work within timelines, prioritizations and procedures agreed upon by the Project Team.
- TBHEID will continue to share historical knowledge of flood issues in the Tillamook Bay Basin and provide the best collective information available to expedite project design and implementation.

Doug Rosenberg

Doug Rosenberg, TBHEID President

October 5, 2007

Date

Tillamook County Creamery Association (TCCA)

The Tillamook County Creamery Association is a nearly 100-year-old cooperative comprised of nearly 130 family dairy farmers. For the Oregon Solutions Tillamook flooding project, Shawn Reiersgaard, director of environmental and political affairs, has represented the interests of TCCA and its member dairy farmers. Representing dairy interests, TCCA is in a unique position to offer advice and guidance on the potential impacts of the various projects under consideration. In addition to participating in the effort to build a community supported solution to the flooding issue, TCCA supported the Oregon Solution effort through a $5,000 donation to help fund administration of this project.

To build upon the success of the Oregon Solutions process and to help move community flood mitigation efforts forward, TCCA will:

- Continue to participate on the Project Team through the services of Shawn Reiersgaard.
- Participate in, and encourage others to join, the community visioning and strategic planning process for the Tillamook Basin area.
- Offer encouragement and leadership on behalf of the farming community as it relates to flood project development.
- Keep the Project Team members aware of agricultural issues during project development.
- Converse with landowners and work to resolve conflicts, such as set back issues, as they arise in project design and development.
- Offer advice and assistance in the effort to secure funding for various flood mitigation projects.

Harold Strunk, CEO, TCCA

10/23/07
Date

Tillamook County Farm Bureau

The Tillamook County Farm Bureau is a subdivision of the Oregon Farm Bureau Federation. It is a voluntary grass roots non-profit organization and represents the interest of farmers in the public and policy making arenas. Primary goals for the Farm Bureau are to promote educational improvement, economic opportunity and social advancement for its members. Dale Buck represents the Farm Bureau on the Project Team. Dale was chair of the U.S. Army Corps of Engineers' Feasibility Study work group. He is also the Region 8 (Clatsop/Tillamook) Director for the Oregon Farm Bureau Federation.

- Dale Buck will continue to serve on the Project Team and on a "Design Committee" for project development.
- In the capacity of working on a Design Group, Dale will provide an educational role and explain the impacts of various designs and their implications for farming activities.
- The Bureau will offer advice and assistance in the effort to secure funding for various flood mitigation projects.
- The Bureau will converse with land owners and work to resolve conflicts over concepts such as setback levees as they arise in project design and development.
- Other items of interest may arise from time to time in which Tillamook County Farm Bureau may be able to assist.

Dale Buck
Dale Buck

10-31-07
Date

Tillamook Estuaries Partnership (TEP)

The Tillamook Estuaries Partnership (TEP) is a non-profit organization dedicated to enhancing the estuaries of Tillamook County and the watersheds that sustain them. It is organized as a 501(C)(3), and the Board consists of a wide array of stakeholders to implement the conservation plans established under the Tillamook Bay Comprehensive Conservation and Management Plan, or CCMP. TEP is one of twenty-eight designated National Estuary Projects. The National Estuary Program (NEP) was established by Congress in 1987 to improve the quality of estuaries of national significance.

In coordination with Tillamook County, TEP has taken the lead in grant and permit writing activities for one of the Oregon Solutions Project Team's main projects, the Wetlands Restoration/Swale project. TEP contributed $5,000 to the Oregon Solutions program, and Mark Trenholm serves on the Project Team. As Oregon Solutions projects are consistent with the goals of the CCMP, TEP looks forward to contributing the following:

- Mark Trenholm will continue to actively participate on the Project Team, and he will also serve on the "Design Committee."
- TEP will assist in the design and implementation of solutions to Tillamook Basin flood problems.
- In concert with Tillamook County, TEP will offer its skills in GIS mapping, research, grant writing, and development of studies as may be of assistance for various projects under consideration.
- TEP will pursue project funding, leverage resources, and seek permits.
- TEP will assist in the communication of projects to its members and the Tillamook Basin community at large.

Joe Sacks
Joel Sacks, Chair, TEP

10 - 31 - 07
Date

Tillamook County Soil and Water Conservation District

Tillamook County Soil and Water Conservation District
6415 Signal Street - Tillamook, Oregon 97141
Phone (503) 842-2848 / fax (503) 842-2760 / e-Mail: tcswcd@oregoncoast.com

October 18, 2007

Flood Reduction Project Team

RE: In-Stream Work Group

Dear In-Stream Work Group Members,

The Tillamook County Soil and Water Conservation District Board of Directors unanimously passed a motion in support of in stream projects for the purpose of flood control. They further added that the districts long term goals are Fishery Enhancement and Soil Erosion.

The motion as stated: **"The Tillamook County Soil and Water Conservation District supports in stream projects for the purpose of flood control. Our long term goals are Fishery Enhancement and Soil erosion."**

Sincerely,

Rudy Fenk

Rudy Fenk Tillamook County SWCD Chair

10-19-07
Date

CONSERVATION • DEVELOPMENT • SELF-GOVERNMENT

Trust for Public Land (TPL)

Trust for Public Land (TPL) is a national, nonprofit, land conservation organization that conserves land for people to enjoy as parks, community gardens, historic sites, rural lands, and other natural places to ensure livable communities for generations to come. Preserving land to protect natural water ways and working land, such as farms, are key common goals for TPL and the Tillamook flood mitigation project. Geoff Roach serves on the Project Team and has actively participated on the Land Use work group.

- Geoff Roach will continue to serve on the Project Team.
- TPL will offer knowledge of conservation issues, techniques and best practices to assist the Oregon Solution flood project. Such issues may include options for use of vacant parcels occurring through FEMA buy-outs, and ideas for land use options to encourage businesses to operate outside of harm's way.
- Trust for Public Land will offer fund raising ideas for projects that are in line with its mission.
- TPL will participate in strategic planning efforts within the Tillamook community to help define priorities, identify lands to be protected, and create a road map for long term investment.
- TPL will work with State and local government officials to explore ways FEMA can increase the incentive for property owners to use their assistance programs.

Geoff Roach, State Director
Trust for Public Land

11/12/07
Date

United States Army Corps of Engineers (USACE)

The mission of the U. S. Army Corps of Engineers is to serve the Armed Forces and the Nation by providing vital engineering services and capabilities, as a public service, across the full spectrum in support of national interests. Corps' missions include five broad areas: water resources, environment, infrastructure, homeland security, and war fighting.

Fulfillment of the Corps' water resources mission includes flood control related planning, design and implementation of civil works projects. The Corps is working in partnership with Oregon Solutions on various Tillamook flood damage reduction projects. The Assistant Chief of Planning, Programs and Project Management Division, Portland District serves on the Project Team and actively supports efforts to lessen the impacts of flooding in the Tillamook Bay Basin. The Portland District has supporting members with expertise in Corps' regulatory process, planning authorities, hydraulic and hydrologic modeling and emergency response. Subject to the availability of funding, the Corps will:

- Continue to be represented by the Assistant Chief of Planning, Programs and Project Management on the Oregon Solutions Project Team. In such representation, USACE will actively participate, lending its expertise in discussions and analysis of various flood damage reduction proposals.
- Serve on the "Design Committee" to narrow down and develop options to present to the Project Team. The Corps Regulatory Branch will actively participate and offer advice on project design and permitting requirements.
- Participate in modeling for proposed projects as may be requested and as funds are made available.
- Assist the Oregon Solutions process by providing input and knowledge on project and program opportunities, including other federal agencies in addition to USACE that would be most useful to help achieve the group's objectives.
- Provide emergency flood operations as authorized and based on eligibility criteria contained in PL 84-99 when requested, and emergency response preparation support within available funding.

Kevin J. Brice

Kevin J. Brice, P.E.
Deputy District Engineer
For Project Management

22 Oct 07
Date

United State Department of Interior, Fish & Wildlife Service

The Fish and Wildlife Service's (Service) mission is to work with others to conserve, protect and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people. In addition to our regulatory responsibilities, the Service supports a wide range of important conservation initiatives, including assisting landowners who volunteer to manage their property for the benefit of fish and wildlife. To accomplish our mission, we work cooperatively with individuals, conservation partners, Tribal governments, and all levels of state and local government.

- The Service will support efforts of the Tillamook Basin Flooding Reduction Project (Project) to develop and implement a plan to reduce the adverse impacts of flooding in a manner consistent with applicable conservation objectives and associated policies and regulations.
- The Service will participate in Project activities, provide technical assistance and review, assist in identifying and attaining funding for Project activities, and offer guidance on ecological principles, scientific knowledge, and regulatory process responsibilities.
- The Service will engage in the above actions as permissible and consistent with the Service's mission and policies and to the greatest extent practicable given available resources and priorities.

For Monty Knudsen

Kemper M. McMaster
State Supervisor

12/13/07
Date

Appendix A

Tillamook Oregon Solutions Project
Project Team

Co-Conveners: Oregon State Senator Betsy Johnson
Tillamook County Commissioner Mark Labhart

Oregon State Representative Deborah Boone
Chad Allen, Vice-Chair TBHEID
Ken Bierly, Deputy Director, OWEB
Bub Boquist, Farming Community
Dale Buck, Regional Director, Oregon Farm Bureau
Jon Carnahan, President, Tillamook Bay Community College
Doug Clarke, Chief, Programs & Project Management, U.S. Army Corps of Engineers
Mark Ellsworth, ERT Regional Coordinator
Rudy Fenk, Chair, Tillamook Soil Water & Conservation District (or designee)
Mark Gervasi, Tillamook City Manager
Vicki Goodman, Regional Coordinator, OECDD
Wendell Hesseltine, President, Tillamook County General Hospital
Ross Holloway, District Forester, Tillamook District
Don Hurd, Downtown Businessman
Rick Klumph, Manager, North Coast Watershed District, ODF&W
Tom Manning, Tillamook County Emergency Management Director
Larry McKinley, Northwest Area 1 Manager, ODOT
Tillamook Mayor Bob McPheeters (or City Council designee)
Paul Levesque, Tillamook County Management Analyst
Denny Pastega, Downtown and Hwy 101 Business Owner, TBHEID Board
Bob Rees, Local Fishing Guide
Art Reidel, Commissioner, Port of Tillamook Bay
Shawn Reiersgaard, Environmental Supervisor, Tillamook County Creamery Association
Geoff Roach, State Director, Trust for Public Land
Cathy Tortorici, Branch Chief, NOAA's National Marine Fisheries
Mark Trenholm, Executive Director, Tillamook Estuaries Partnership
Joy Vaughan, Tillamook County Resource Coordinator, DSL
Steve Wille, U.S. Fish and Wildlife Service
Laren Woolley, North Coast Regional Rep., DLCD

►Congressional Representation: Participating to provide resource and liaison with federal agencies:
Fritz Graham, Senator Wyden's Office
Richard Krikava, Senator Smith's Office
Jennifer Wagner, Congresswoman Hooley's Office

Project Manager: Dick Townsend, Salem, OR

Appendix B

6/27/07

Oregon Solutions Tillamook Flooding Project
Work Groups

Review Project List in USACE Feasibility Study

Dale Buck, Chair
Robert Anderson
Bruce Apple
Greg Beaman
Dale Blanton
Ken Bierly**
Doug Clarke
Miriam Hulst**
Don Hurd
Tracy Johnson
Rick Klumph
Paul Levesque
Rob Rees
Art Riedel
Shawn Reiersgaard
Mark Trenholm

In-Stream Projects (not limited to just gravel removal)

Rick Klumph, Chair
Chad Allen
Robert Anderson
Greg Beaman
Sandy Bell***
Bub Boquist
Orella Chadwick
Rudy Fenk***
Wendell Hesseltine
Don Hurd
Paul Levesque
Judy Mammano
Gus Meyer
Doug Rosenberg

Land Use (not limited to relocating businesses)

Jon Carnahan, Chair
Dale Blanton**
Bill Campbell
Joy Friebaum
Mark Gervasi
Vicki Goodman
Wendell Hesseltine
Bob McPheeters
Denny Pastega
Geoff Roach
Dennis Sigrist
Mark Trenholm
Laren Woolley**

* Indicates alternate or sharing Project Team responsibilities

Note: To insure balanced representation on all committees, additional Project Team members are welcome to participate. Other parties beyond those listed above may be designated by the project Conveners. If interested please contact Dick Townsend at consultown@comcast.net

Appendix C

Tillamook Flood Reduction
Design Committee
Contact List

Co-Conveners

Oregon State Senator Betsy Johnson
900 Court St NE S-314
Salem, Oregon 97301
Ph: 503-986-1716
E-mail: sen.betsyjohnson@state.or.us

County Commissioner Mark Labhart
County Court House
201 Laurel Ave
Tillamook, Oregon 97141
Ph: 503-842-3403
E-mail: mlabhart@co.tillamook.or.us

****

Design Committee:

Rick Klumph, Chair, Manager
ODFW North Coast Watershed District
4907 E Third St
Tillamook, Oregon 97141
Ph: 503-842-2741
E-mail: Rick.L.Klumph@state.or.us

Chad Allen, TBHEID
4450 Boquist Rd
Tillamook, Oregon 97141
Ph: 503-842-6240
E-mail: allen@oregoncoast.com

Robert Anderson, NOAA
1201 NE Lloyd Blvd
Suite 1100
Portland, OR 97232
Ph: 503-231-2226
E-mail: Robert.C.Anderson@noaa.gov

Larry McKinley, ODOT
NW Area 1 Manager
350 W Marine Drive
Astoria, Oregon 97103
Ph: 503-325-7222
E-mail: Larry.MCKINLEY@odot.state.or.us

Dale Buck
Tillamook County Farm Bureau
25590 Chinook St
Cloverdale, Oregon 97112
Ph: 503-398-5191
E-mail: dbuck@oregoncoast.com

Doug Clarke, Program & Project Management
US Army Corps of Engineers
P O Box 2946 (CENWP-PM-P)
Portland, Oregon 97208
Ph: 503-808-4701
E-mail: doug.a.clarke@usace.army.mil

Mark Gervasi
Tillamook City Manager
210 Laurel Ave
Tillamook, Oregon 97141
Ph: 503-842-2472
E-mail: mgervasi@tillamookor.gov

Paul Levesque
Tillamook County Management Analyst
County Court House, 201 Laurel Ave
Tillamook, Oregon 97141
Ph: 503-842-1809
E-mail: plevesqu@co.tillamook.or.us

Mark Trenholm, Executive Director
Tillamook Estuaries Partnership
613 Commercial Street
P O Box 493
Garibaldi, Oregon 97118
Ph: 503-322-2222
E-mail: mtren@tbnep.org

Joy Vaughan
775 Summer ST NE Suite 100
Salem, Oregon 97301
Ph: 503-986-5268
E-mail: Joy.Vaughan@state.or.us

Dick Townsend, Project Manager
815 Kingwood Dr. NW
Salem, Oregon 97304
Ph: 503-315-2194
E-mail: consultown@comcast.net

Appendix D

The purpose of the Oregon Solutions Tillamook Flooding project is to develop and implement a plan consistent with the Project Team's stated goal.

GOAL: Reduce flooding and the adverse impacts of flooding while incorporating environmental, social and economic values in the development of short and long term solutions

Notes
While the geographic area for the project is the Tillamook Bay Drainage Basin, this project will hopefully create a template and process to address flooding in other coastal basins (watersheds) .

Long term definition: Ten (10) years or more

Environmental considerations may include: freshwater wetlands, estuarine areas, associated side channels, streams and rivers, forest lands, and associated habitats and species.

Appendix E

Oregon Solutions Projects
(Prioritized by Project Team 9/12/07)

1. **Wilson/Trask Spillway**
2. **Tone Road Spillway**
3. **Dougherty Slough Permanent Structure**
4. **Comprehensive Community Vision and Strategic Plan**
5. **Trask Hook**
6. **Implement City/County Flood Mitigation Plans**
7. **Mediated Gravel Agreement/Stream Corridor Management Plan**
8. **Hall Slough Project**
9. **Modified Wetland Restoration and Swale (279)**

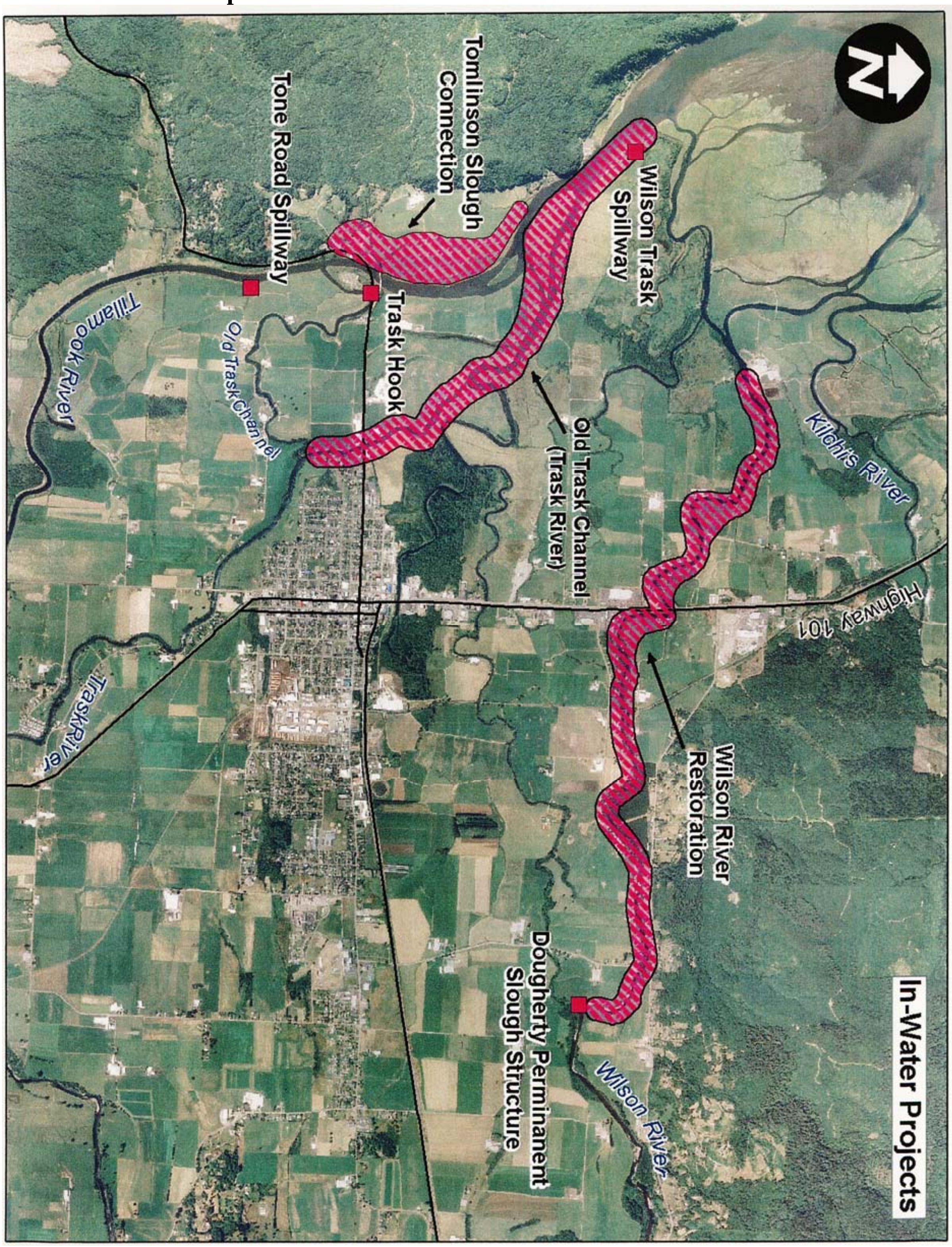
>>>

Other Projects for Possible Future Consideration

10. Tomlinson Slough Connection/Restoration (316)
11. Study of Drainage/Diking District Issues (321)
12. Old Trask Channel Restoration (340)
13. Drainage Maintenance and Flood Structure Improvements (349)
14. Wilson River Dredging – Mouth & Bay Shoal (354)
15. Wilson River Restoration (358)
16. Upper Basin Storage (374)
17. Implement Storm Water Maintenance Plan (417)
18. Bay Dredging - multiple sites (426)
19. Bay Dredging – East channel (440)

Appendix F

In-Stream Work Map



Appendix G

Oregon Solutions Project Evaluation Criteria

Purpose: The following criteria will assist the Project Team and work groups in evaluating the potential for accomplishing suggested projects.

1. Provide a brief description of the project, including the benefits derived from accomplishing the project.

2. Does it comply with the Project Team's stated goal?

   Reduce flooding and the adverse impacts of flooding while incorporating environmental, social and economic values in the development of short and long term solutions

3. What would happen if this project was not accomplished?

4. Does the project have strong community and agency support?
   Who are the responsible/lead parties?
   Who are partners that need to be involved?

5. List identified or potential funding sources to carry out the project.

   What is a rough cost estimate to complete the project?
   Will this project take additional funds to sustain the outcome? Are there operating or maintenance costs associated with the project?

6. Is this project characterized as a short or long term solution for the Team's stated goal?

7. List the approximate time frame for implementation.

8. Can the project be easily implemented? List the requirements for permits, logistics, EIS work, etc.

9. Outside of permits and funding requirements, list any impediments/obstacles to accomplishing the project. List possible solutions to those obstacles.

10. Is the project compatible with, or does it support recommended action items contained in the Tillamook County and Tillamook City flood mitigation plans?

11. Is the project economically and environmentally sustainable?

12. Discuss how success of the project can be measured or evaluated, i.e. how will we know it is reducing the adverse impacts of flooding?

Appendix H

Documents

Minutes are available for the following Project Team meetings:

- May 23, 2007
- June 27, 2007
- July 25, 2007
- September 12, 2007
- October 31, 2007

Numerous documents were used or referred to during Work Group and Project Team meetings. They include:

- Tillamook Bay and Estuary, Oregon – General Investigation Feasibility Report U.S. Army Corps of Engineers, Portland District, dated February 2005

- No Adverse Impact: A Toolkit for Common Sense Floodplain Management, 2003 Association of State Flood Plain Managers, Madison, WI.

- Federal Funding Source Table for NPS Activities, provided by NMFS

- City of Tillamook, Flood Mitigation Action Plan, November 2003

- Work Groups and the Project Team were presented with numerous pictures, diagrams, and maps to assist in their deliberations. State agency pamphlets and directives were made available during the project, as were City and County Land Use Ordinances and Plans. Many of these materials have become part of the record and are appended to meeting minutes.

OREGON SOLUTIONS

Appendix I

Note: This document was presented to the Project Team prior to voting on projects for prioritization. It was then signed at the meeting by all participants.

Oregon Solutions Tillamook Flooding Project

Affirmation of Cooperation for Oregon Solutions Process
September 12, 2007

The Tillamook Flooding Project has used three work groups to analyze and sort through dozens of potential proposals to address the Project Team's stated goal. These proposals will be presented to, and prioritized by the Project Team. This process is not meant to choose "winners" verses "losers." It simply provides a group decision about what projects have the highest likelihood of accomplishment.

The Oregon Solutions process will conclude its first stage in November when all stakeholders will sign a Declaration of Cooperation. That document will outline projects identified by the Project Team and will form a public statement of intent to participate in them. The Declaration will represent specific commitments by all parties to collaborate with other team members in promoting the success of projects.

As priority projects move forward, Project Team members today herein publicly state their intent to continue to participate in the Oregon Solutions Tillamook Flooding Project and strive to identify opportunities and solutions whenever possible. Through continued assistance and support on priority projects, Team members acknowledge that the best solutions depend upon cooperation by all entities at the table.

Betsy Johnson	Mark L. Labhart
Co-Convener **Senator Betsy Johnson**	**Co-Convener** **Commissioner Mark Labhart**
Deborah A Boone	Chad V. Allen
Representative Deborah Boone	**Chad Allen**
Kenneth F. Bierly	Bub Boquist
Ken Bierly	**Bub Boquist**

Dale Buck	**Jon Carnahan**
Doug Clarke	**Mark Ellsworth**
Rudy Fenk	DSL Kevin Moynahan Assistant Director **Joy Freibaum**
Mark Gervasi	**Vicki Goodman**
Ross Holloway	**Don Hurd**
Rick Klumph	**Paul Levesque**
Tom Manning	**Larry McKinley** (INGRID WEISENBACH)
Bob McPheeters	**Denny Pastega**
Bob Rees	**Art Reidel**

Oregon Solutions Tillamook Flooding Project
Affirmation of Cooperation, September 12, 2007
Page 3

Shawn Reiersgaard	Geoff Roach
Cathy Tortorici	Mark Trenholm
Stephen A. Wille Steve Wille	Dale Blanton for Laren Woolley

RESERVE the right to REVIEW Declaration of Cooperation BEFORE signing it AND make signing decision at that time.

Appendix J

How We Will Work Together

5/23/07

1. Recognize strength and diversity within the team: **Be respectful** of one another and allow others to talk without interruption

2. Help **develop trust** among the group: Be candid and honest, but do not blame, attack or put down other people. Strive to understand by asking questions for clarification or to get information. Don't challenge or intimidate others. Strive to provide advanced notice on issues or information that could come before the Team. Share with the Project Team all information that may affect a final agreement.

3. Work toward an agreement that is fair and constructive for everyone. Strive to reach **decisions by consensus in a collaborative manner.** When consensus is not possible, acknowledge and accept professional differences and disagreements.

4. Focus on the future you would like to create rather than past problems and past history of issues. **Agree on a *Statement of Purpose***

5. As project options are discussed, **be flexible** and don't establish irrevocable non-negotiable positions. Try not to create **"dueling data" situations**. When information has to be collected, agree up front on who is gathering it and how it will be gathered

6. Projects that are being worked on by the Project Team should not also be worked on separately by interest groups. **Pursuing two processes** can generate distrust and hostility among stakeholders. Agencies you are dealing with may throw up their hand in confusion or disgust.

7. Role of participants in the process: Attend all meetings or designate an alternate. Be responsible for keeping an alternate updated. (If you are not the right person to be participating on the Team, let us know by the end of the first project meeting.) You are responsible for keeping any group/entity that you are affiliated with "up to speed." Ultimately, project team members will be working on wording for a Declaration of Cooperation and getting it signed. Maintain focus on the agenda, use time wisely, and assure time for well reasoned decisions. Agendas will be prepared by the project manager for each meeting after consulting with the Co-Conveners. If a Team member has suggestions for an agenda, contact one of the Co-Conveners or project manager well in advance of the meeting.

8. Support the Co-Conveners and facilitators, and take responsibility for observing ground rules. The Team should enforce these guiding principles.

9. Public participation will be allowed with the consent of the Co-Conveners. Generally, the Project Team will be given priority in all discussion, and in some situations it will be limited to just the Project Team. <u>All meetings are open to the public</u>. Communications with the press and other media are most representative when they come on behalf of the whole Project Team.

Appendix K

Tillamook Headlight Herald

11/13/2007 1:42:00 PM

A flood of opportunities

The Oregon Solutions Tillamook Flood Reduction Project Team is off to a promising start.

Team members gathered two weeks ago to sign a declaration of cooperation to accomplish the nine priority projects agreed upon in a previous meeting. Oregon Solutions consultant Dick Townsend was amazed that the two dozen-plus participants came to this point in only five months, eight days from when they first met, despite their diversity of interests. In his time with the governor's Oregon Solutions program, he said, "I've never had a group come together this fast before."

It helped that participants had first determined that their goal would be to "develop and implement a plan to reduce flooding and the adverse impacts of flooding, while incorporating environmental, social and economic values in the develop of short- and long-term solutions."

In prioritizing projects - six will be tackled initially - work groups aimed to span the range of interests. As a result, several projects that maintain or improve the environment have been endorsed for further analysis. And because flooding affects the economy, some projects within this declaration of cooperation also consider how to best sustain and encourage growth of commercial businesses and support the dairy industry while mitigating the negative effects of flooding.

It also helps that the project, which began with no guarantee of funding at all, has a $1 million jump start with funding from the Legislature, thanks to the efforts of co-convener and State Sen. Betsy Johnson's efforts on the legislative Subcommittee on Transportation and Economic Development of the Joint Committee on Ways and Means.

Now comes the hammering out of details involving permitting, environmental requirements and, of course, money. The $1 million will come in handy as seed money to use as leverage for matching funds. As the saying goes, it takes money to make money - hiring a grant writer would be an excellent investment right now.

It also helps that the Governor's Office is committed to helping make Tillamook's projects work. Gov. Kulongoski has assured participation of his staff and appropriate state agencies with participating public and private partners by declaring this effort an Oregon Solutions project.

The important thing now will be to stay focused locally on the big picture - which nearly always involves lots of unwanted flood- waters several times a year. Co-convener and County Commissioner Mark Labhart has urged all participants to "stay at the table." The big floods may not be preventable, but the sustained, coordinated efforts involved in the Tillamook Oregon Solutions flood projects will go a long way toward nipping the nuisance floods.

Tackling Tillamook's flooding problems is the most difficult Oregon Solution Project efforts yet taken on, according to Labhart.

As Ray Naff of the Governor's Office said at the declaration of cooperation ceremony, "It's no simple task." Yes, it's only the beginning, he said, "but an extraordinary beginning."

Let's not lose this momentum.

Appendix L

Tillamook Poster and Logos

Oregon
John A. Kitzhaber, MD, Governor

Oregon Watershed Enhancement Board
775 Summer St NE Ste 360
Salem, OR 97301-1290
(503) 986-0178
FAX (503) 986-0199
www.oregon.gov/OWEB

May 9, 2011

Rick Klumph, Manager
North Coast Watershed District
Oregon Department of Fish and Wildlife
4907 East Third Street
Tillamook, Oregon 97141

RE: Oregon Solutions Project: Southern Flow Corridor

Dear Rick:

I am writing to confirm that the Oregon Watershed Enhancement Board has been awarded $1,000,000 to be used for land acquisition and restoration of property involved in the Southern Flow Corridor Project. In addition to the $1,000,000, the OWEB Board will provide matching funds for up to $625,000 when the project is fully developed and costs are determined. The Board has been briefed on the project and is excited about the possibility of participating in the conservation and flood reduction benefits that will accrue from the project.

If you need additional information, Please feel free to call.

Sincerely,

Kenneth F. Bierly

Kenneth F. Bierly
Deputy Director

TLC

FEDERAL CREDIT UNION

May 18, 2011

Port of Tillamook Bay
Attention: Michele Bradley
4000 Blimp Rd
Tillamook, OR 97141

Re: *Commitment for financing from TLC Federal Credit Union ("TLCFCU") to Tillamook County to fund Southern Flow Corridor Project*

Dear Ms. Michele Bradley:

We are pleased to advise the Port of Tillamook Bay that TLCFCU agrees to extend financing to Tillamook County on the terms and conditions summarized in this letter. If all of the conditions precedent listed in this letter are timely met, TLCFCU will provide a Line of Credit (the "Loan") subject to the following terms and conditions:

I. BASIC LOAN TERMS

1.1 BORROWER: Tillamook County

1.2 PURPOSE OF LOAN: To fund Southern Flow Corridor Project

1.3 LOAN TERMS: Up to $3,000,000 Loan at a fixed APR of 4.00% for 12 years

II. LOAN CLOSING REQUIREMENTS

Prior to or at the time of closing of the Loan, Tillamook County shall have provided to TLCFCU such documents and information as TLCFCU or its counsel may require in connection with the Loan, and/or Tillamook County (all such documents and information to be in form and substance satisfactory to TLCFCU), including, but not limited to, the following:

2.1 Loan Documents. Tillamook County shall execute a Note and any other loan documents that TLCFCU may require.

2.2 Evidence of Authority. TLCFCU shall be provided with evidence satisfactory to TLCFCU that Tillamook County is authorized to enter into the Loan transaction, execute the loan documents, and perform such other matters as may be required by TLCFCU's counsel.

The obligations of the Tillamook County to provide the items listed above in this Section II shall survive the closing of the Loan and any failure by TLCFCU to require compliance with the above Loan Closing Requirements shall not constitute a waiver by TLCFCU of its right to require that such be provided by Tillamook County.

Tillamook Branch
PO Box 160
Tillamook, OR 97141-0160
tlcfcu@tlcfcu.org
(503)842-7523
(503)842-6770 *fax*

Astoria Branch
85 W. Marine Dr
Astoria, OR 97103
tlcfcu@tlcfcu.org
(503)325-2538
(503)325-2540 *fax*

Seaside Branch
PO Box 800
Seaside, OR 97138-0800
tlcfcu@tlcfcu.org
(503)738-0957
(503)738-9317 *fax*

Lincoln City Branch
2004 NW 36th Street
Lincoln City, OR 97367
tlcfcu@tlcfcu.org
(541)994-9889
(541)994-9285 *fax*

Newport Branch
PO Box 1630
Newport, OR 97365
tlcfcu@tlcfcu.org
(541)265-8182
(541)265-8513 *fax*

FEDERAL CREDIT UNION

III. CERTAIN POST-CLOSING REQUIREMENTS

3.1 Financial Information. Tillamook County shall agree to provide to TLCFCU from time to time as requested by TLCFCU, certified copies of their respective financial statements, and such other financial information as required by TLCFCU, all in form and detail satisfactory to TLCFCU.

IV. MISCELLANEOUS

4.1 Survival. This Commitment shall survive the closing of the Loan. However, in the event of any inconsistency between the terms and conditions of this Commitment and the terms and conditions of any of the loan documents referred to in Section 2.1 of the Commitment, the terms and conditions of such loan documents shall control.

4.2 Out-of-Pocket Expenses. Tillamook County agrees to pay all of TLCFCU's out-of-pocket expenses (including, but not limited to, attorneys' fees) whether or not the Loan is closed.

4.3 Assignment. This Commitment shall not be assigned by Tillamook County without TLCFCU's prior written consent.

4.4 Amendment. This commitment shall not be amended in any way except by written instrument executed by Tillamook County and TLCFCU.

Very truly yours,

Mike Pierce, CEO/President
TLC Federal Credit Union

ATTACHMENT C

DISASTER NO.: 1733-DR-OR

PW NO.: ALTERNATE PROJECT #13 TO

PROJECT WORKSHEET (PW) 936

ALTERNATE PROJECT REQUEST

12/30/2009

DATES OF CORRESPONDENCE:

12/30/2009 – 03/28/2011 (NEWEST ON TOP)

Oregon
John A. Kitzhaber, MD, Governor

Military Department
Oregon Emergency Management
PO Box 14370
Salem, OR 97309-5062
Phone: (503) 378-2911
Fax: (503) 373-7833
TTY: (503) 373-7857

March 28, 2011

Ms. Michele Bradley
Port Manager
4000 Blimp Boulevard
Tillamook, OR 97141

RE: PW 946, Reference Number JH946D, Alternate Project #13

Dear Ms. Bradley:

Enclosed are two letters from FEMA, Region 10. The letters are in answer to my letter of January 13, 2011, asking for FEMA's consideration, further review and follow-up comments on project eligibility based on POTB's BCA analysis and the State's (consultant) review of those materials on the "Southern Flow Corridor Project".

FEMA is denying POTB's request for funding consideration on the Project. The three criteria that FEMA is using for the basis of their determination can be found in their letter dated March 16, 2011. Based on the March 16 letter, OEM asked for clarification of the statement *"The project does not appear to be cost-effective and has not sufficiently demonstrated to have a BCA greater than 1.0"* especially since the State provided FEMA with a BCA that had been deemed credible by the State's consultant, Ken Goettel. The letter of March 24, 2011, attempts to clarify FEMA's statement regarding the BCA.

The Port may appeal this determination pursuant to 44 CFR, § 206.206. An appeal may be made through the grantee to the Regional Administrator. If the Port chooses to appeal, the appeal must contain the following justifications: 1) supporting its position, 2) specifying the monetary figure in dispute, and 3) the provisions in Federal law, regulation, or policy with which the Port believes the initial action was inconsistent.

The Port has 60 days from the date of receipt of this letter to appeal the notice of this action that is being appealed. The Port shall make the appeal in writing through our office to the Regional Administrator, Kenneth Murphy, FEMA, Region 10.

Upon receipt of the appeal from the Port, the State will review the material submitted, and will forward the appeal to FEMA, Region Ten, Regional Administrator. Within 90 days following receipt of the appeal or the requested information, the Regional Administrator will notify the State of the disposition of the appeal.

Ms. Michele Bradley
RE: PW 946, Reference Number JH946D, Alternate Project #13
March 28, 2011: Page Two

If you have questions, please contact Julie Slevin of my staff.

Sincerely,

David A. Stuckey
Deputy Director

Enclosures

U.S. Department of Homeland Security
Region X
130 228th Street, SW
Bothell, WA 98021-9796

FEMA

March 16, 2011

Mr. David Stuckey
Deputy Director
Oregon Emergency Management
P.O. Box 14370
Salem, Oregon 97309-5062

Re: Disaster No: 1733-DR-OR
FEMA No: 000-U1ZZV-00
Applicant: Port of Tillamook Bay (POTB)
PW No: Alternate Project #13 to PW 936(1), Southern Flow Corridor Project

Dear Mr. Stuckey:

This is in response to your letter of January 13, 2011, related to an alternate project proposed by the Port of Tillamook Bay (POTB). This project, entitled the "Southern Flow Corridor Project," is requested as one of several alternate projects to DR-1733's Project Worksheet (PW) 936 for the repair of POTB's historic railroad.

Upon thorough review of the information received to date on this proposed alternate project, including the Benefit Cost Analysis (BCA), it is FEMA's determination that this project is ineligible for Public Assistance (PA) program grant funding, for the following reasons:

1. The project does not appear to be cost-effective and has not sufficiently demonstrated to have a BCA greater than 1.0.
2. The project does not appear to solve the threat independently or constitute a functional portion of a solution to the threat.
3. The project does not appear to have the necessary assurances related to long-term and ongoing maintenance, repairs and operations.

For these reasons, FEMA is denying POTB's request for funding consideration of the Southern Flow Corridor Project. Should POTB choose to appeal this decision, 44 CFR 206.206 states that an appeal must be received by FEMA Region X within 60 days of receipt of notice of this action.

If additional information is needed, please contact Denise Yandle, Public Assistance Branch Chief, at 425-482-3706.

Sincerely,

Charles R. Axton
Recovery Division Director

U.S. Department of Homeland Security
Region X
130 228th Street, SW
Bothell, WA 98021-9796

FEMA

March 24, 2011

Mr. David Stuckey
Deputy Director
Oregon Emergency Management
PO Box 14370
Salem, Oregon 97309-5062

RE: Disaster No: FEMA-1733-DR-OR
FEMA No: 057-U1ZZV-00
Applicant: Port of Tillamook Bay (POTB)
PW No: Alternate Project #13 to PW 936(1), Southern Flow Corridor

Dear Mr. Stuckey:

This letter is a clarification to my letter dated March 16, 2011, regarding the alternate project proposed by the Port of Tillamook Bay (POTB). The project, entitled the "Southern Flow Corridor Project," is requested as one of several alternate projects to DR-1733's Project Worksheet (PW) 936 for the repair of POTB's historic railroad.

I am providing clarification to my determination regarding the Benefit Cost Analysis (BCA) for the project. In my letter dated March 16, 2011, I stated that the project does not appear to be cost-effective and it has not been sufficiently demonstrated that the project has a BCA greater than 1.0. The BCA for the proposed project has been calculated by POTB's consultants to be 1.26. However, we find that the use of modeled rather than actual historical data results in unrealistic damages. The estimated damages for agricultural and commercial buildings and contents appear to be substantially inflated. We are unable to validate the avoided future damages used in the BCA because no actual past damage costs were included or referenced as a reasonable comparable to the assumed values utilized instead in the HAZUS modeling. We are also unable to fully review the BCA because the analysis provided by the applicant fails to adequately document the project costs used to calculate the benefit-cost ratio.

Please feel free to contact Denise Yandle, Public Assistance Branch Chief, at 425-482-3706, if you have any questions or concerns.

Sincerely,

Charles R. Axton
Recovery Division Director

Oregon

Theodore R. Kulongoski, Governor

Military Department
Oregon Emergency Management
PO Box 14370
Salem, OR 97309-5062
Phone: (503) 378-2911
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January 13, 2011

Kenneth Murphy
Regional Administrator
Federal Emergency Management Agency
Region X, Federal Regional Center
130-228th Street Southwest
Bothell, Washington 98021-9796

RE: Disaster No.: 1733-DR-OR
FEMA No.: 000-U1ZZV-00
Applicant: Port of Tillamook Bay (POTB)
PW NO.: 946, Reference number JH946D, Alternate Project#13

Dear Mr. Murphy:

As you are aware, the Port of Tillamook Bay (the Port or POTB) had determined that public welfare would not be best served by restoring the damaged facility, and therefore, had requested multiple alternate projects under Project Worksheet 936. The POTB timely filed its Alternate Project Requests with the State and were within Region's approved time extension of December 31, 2009 for Alternate Project Request submittal.

As a follow up request by FEMA and Oregon Emergency Management (the State) for supporting documentation for the Port's Alternate Project Request #13, a Benefit-Cost Analysis (BCA) was conducted by the Applicant's consultant, Northwest Hydraulic Consultants. The Port's consultant utilized FEMA's BCAR tool Version 4.5.5. The damage frequency assessment (DFA) module within BCAR was utilized where the damages entered into the DFA module were estimated using FEMA's HAZUS-MH risk assessment tool. The BCA was received by OEM through email on November 24, 2010. The BCA was forwarded to FEMA on the same day.

A BCA for this project is necessary to determine if this project fits within the guidance provided by FEMA Alternate Project Policy#9525.13, dated July 31, 2001, Section 7 (F). *Mitigation Projects:* (2). This section states that mitigation measures may be of the same type as would be eligible for funding under Section 404 of the Stafford Act.

As with any other potentially FEMA-funded mitigation project, the State has conducted a review and assessment of the BCA. The BCA review was conducted by the State's BCA consultant Dr. Ken Goettel and Associates (See Enclosed).

Based upon the State's consultant review and comments, the State has determined that the BCA result is credible and generally meets the minimum criteria of 44 CFR§ 206.434(c), therefore meeting the guidance for eligible projects provided in FEMA Alternate Project Policy #9525.13, dated July 31, 2001, Section 7(F).

We kindly ask for FEMA's consideration, further review and follow-up comments on project eligibility based on the applicant's BCA analysis and the State's (consultant) review of those materials.

Enclosed is the following for your review:

1. NHC BCA Methodology dated November 2010
2. BCA State reviewer Questions dated December 3, 2010
3. NHC BCA response to State reviewers questions, received from POTB December 22, 2010. This submittal includes:
   a) A revised Benefit-Cost Methodology Report, dated December 2010
   b) Response to State reviewers questions/comments, dated December 20, 2010
   c) NHC Spreadsheet reference
4. State reviewers' comments and assessment on BCA, dated January 11, 2011

If there are any questions, please contact Julie Slevin, at (503) 378–2911, extension 22235.

Sincerely,

Dave Stuckey
Deputy Director

DS/js/crc
Enclosures

cc: Michele Bradley

Tillamook County: Project Exodus
Southern Flow Corridor Benefit-Cost Analysis

Review Comments
January 10, 2011

The commentary below incorporates the additional information provided by Northwest Hydraulic Consultants in the December 20, 2010 memorandum. The detailed information in this memorandum was very helpful and provided clear answers to many of the questions posed in the December 3, 2010 review.

The comments below reflect my current understanding of the project, along with a synopsis of remaining issues.

1. Hydraulic modeling. The differences between the NHC hydraulic modeling and that in the 2010 FEMA FIS are significant, but not huge. For the 100-year flood event, the differences are less than 0.3 feet for many of the agricultural areas. However, there are larger differences of up to 1.3 feet along the 101 corridor and up to 3.2 feet in part of the agricultural area east of 101.

Qualitatively, the reasons for the differences as given by NHC in the December 10, 2010 Project Exodus Report and in the December 20, 2010 memo are logical and include more accurate LIDAR data and consideration of the flow impediments caused by Highway 101 and the buildings along 101. Semi-quantitatively, the magnitude of the differences between the two sets of hydraulic model results appears reasonable.

As noted in Phil Carpenter's memo re: the 2010 FIS, a full re-analysis of the hydraulic modeling would be a major undertaking requiring considerable time and a substantial budget. Such a review does <u>not</u> appear warranted. The NHC results appear credible. Furthermore, the benefit-cost analysis results, while somewhat sensitive to the absolute flood elevations, are more sensitive to the difference in flood elevations between the with project and without project conditions.

Given these considerations, I suggest accepting the NHC hydraulic results as being the best available results for benefit-cost analysis.

2. BCA Approach

The December 20, 2010 memo correctly notes that the FEMA BCAR – DFA module is fully credible. This is not an issue.

As noted correctly in the December 20, 2010 memo, the BCA is a lower-bound type BCA because displacement costs for buildings, loss of function costs for buildings (commercial, industrial, agricultural) and loss of function costs for infrastructure (roads and utilities) were not counted. Using FEMA BCAR functions, such categories of benefits typically range from roughly 10% to 25% of total benefits for buildings. However, as discussed below, using the HAZUS functions, the percentage of total benefits attributable to these categories will be much lower – probably roughly 5% to 10% - because the percentage of total buildings attributed to building damage is much lower, using the HAZUS functions than using the BCAR functions. Nevertheless, the loss of function impacts for road closures, especially for Highway101, may be significant.

The above notwithstanding, the approximate magnitude of increased benefits obtainable by considering the above categories of benefits is much smaller than the difference in benefits calculated using HAZUS functions vs. FEMA BCAR functions. Thus, this issue, while significant, is secondary.

3. FEMA BCAR vs. HAZUS Depth-Damage Functions

There are profound differences between the FEMA BCAR and HAZUS depth-damage functions. These differences greatly affect the benefits calculation and thus the BCR.

Agricultural Buildings

Damage to agricultural buildings is the largest damage category; for example, for the 10-year flood event, 47% of the total damages and losses are for ag, with 39% for commercial and only about 14% for other building types.

For the ag damages and losses, more than 85% are contents and inventory with less than 15% being building damages. These results are based on the HAZUS damage functions – there are no FEMA BCAR damage functions for ag buildings. Per HAZUS, for typical one story ag buildings, 1, 2 and 3 feet of water result in 6%, 11% and 15% damage, respectively (AGR1 – A1LN)

For ag buildings, the contents damages are about 3x the building damages. Per HAZUS, for typical one story ag buildings, 1, 2, and 3 feet of water result in 20%, 45% and 58% contents damage, respectively.

These results may be reasonable for situations with inexpensive buildings with low flood vulnerabilities and high contents values – such as a barn with milking equipment for a dairy farm. It is less clear that these results are reasonable for the full gamut of ag buildings, which seems to include "buildings" such as waste tanks, as well presumably rough storage buildings with low value contents.

For ag buildings, the inventory damages are about 4x the building damages. Thus, contents and inventory together are about 7x building damages which seems high at first look.

Per HAZUS, ag inventory is valued at 8% of gross annual sales, which have a "standard" value of $126 per SF. Per HAZUS, for typical one story ag buildings, 1, 2, and 3 feet of water result, in 25%, 50% and 75% damage, respectively. For dairy farms, with cows as inventory, these percentages seem very high, especially considering that at least some fraction of stock can be moved to high ground or transported out of the flood zone before floods occur.

Given the importance of ag damages to the total BCA, a more credible, more accurate BCA would require Tillamook specific damage estimates for the types of buildings, contents and inventory appropriate for Tillamook. The default HAZUS relationships may not be credible.

Commercial Buildings

Damage to commercial buildings is the second largest damage category; for example, for the 100-year flood event, 39% of the total damages and losses are for commercial buildings.

For commercial buildings, more than 80% of the total damages are from contents and inventory, with less than 20% for building damages. Thus, the total of contents and inventory damages are more than 4x the building damages. The FEMA BCAR ratios of contents damages to building damages range from less then 1.0 (furniture, clothing) to 1.5 (electronics) and about 3 (grocery). So, the HAZUS combination of contents and inventory damages appear to be much higher than the BCAR values.

These differences are large, using FEMA BCAR depth-damage functions for commercial buildings would drop the BCR by very roughly 20%, which would drop it from 1.26 to roughly 1.0 plus or minus.

Important caveat: the above comments re: contents/inventory damage functions in HAZUS vs. those in FEMA BCAR simply note the differences and not evaluate the credibility or accuracy of either set of functions. However, since most FEMA grant applications use the BCAR depth damage functions, using HAZUS functions does seem to "tilt the table" vis-à-vis other flood grant applications.

4. Project Approach and Benefit-Cost Ratio Issues

The issues listed below are up to OEM and FEMA to decide. These issues are noted here simply for completeness.

The stated benefit cost ratio is >1.0, the minimum threshold for eligibility but not a lot above 1.0. Including the additional categories of benefits (see #2 above) would raise the BCR a bit. However, the BCR would be much lower (probably about 1.0) if FEMA BCAR depth-damage functions were used for commercial building damages, rather than HAZUS depth-damage functions (see #3 above).

To the extent that the HAZUS ag damages may overestimate Tillamook specific damages, the overall BCR might be well below 1.0.

Furthermore, the percentage reduction in annualized damages obtainable by this project is atypically low – only about 25%. There may well be other alternative projects, such elevation of structures or other flood protection measures that might have significantly higher benefits for the same project cost.

Aaron Palter

From:	Julie Slevin <Julie.SLEVIN@state.or.us>
Sent:	Tuesday, December 07, 2010 10:57 AM
To:	Michele Bradley; Aaron Palter
Cc:	Dennis J.Sigrist; Abby Kershaw; Lopez, Lois
Subject:	BCA Review Questions - Southern Flow Corridor Alternate Project #13 (PW946) DR1733
Attachments:	BCA Questions 12-3-10 1.doc

Hi Michele, Aaron,

Oregon Emergency Management appreciates the opportunity to review the Tillamook Solutions – Project Exodus Southern Flow Corridor Benefit-Costs Analysis Report. As with any potential FEMA-funded mitigation project (disaster or non-disaster grant funded), we (OEM and FEMA) always critically review project feasibility, environmental considerations, alternative mitigation strategies, a detailed scope of work and costs, and the long-term, cost-effectiveness of the project using the FEMA-benefit-cost analysis tool to determine eligibility under HMGP (in accordance to FEMA Alternate Project Policy #9525.13, Dated July 31, 2001, Section 7 (F)(2)).

The following detailed questions will help us better understand the benefit-cost analysis presented for this project and to support the expenditure of Federal funds and the state-provided non-Federal matching share.

The benefit-cost ratio for this project is largely carried by the benefits (reduced flood damages) to agricultural and commercial buildings and their contents/inventory. In fact the building damage loss reduction is only about a fifth of the overall benefits where the contents/inventory contribution is by far the significant contribution. Traditionally, the depth-damage function in the 4.5.5 BCA toolkit is used to determine loses avoided to the structure and contents. In this report, the applicant has chosen to use the HAZUS loss estimation tool to derive those numbers. The following questions ask for clarification and/or explanation in the following categories:

- Flood Insurance Study and H & H Modeling
- General Comments / Details: Benefit Cost Analysis
- Differences Between HAZUS-MH/Flood and BCA Version 4.5.5 Software

Please return the answered questions by email.

Thanks so much,

Julie Slevin
State Public Assistance Officer
Oregon Emergency Management
Tel.503.378.2911, ext.22235

Tillamook County: Southern Flow Corridor Benefit-Cost Analysis

QUESTIONS/COMMENTS

FIS and H&H Modeling.

There is insufficient information in the Southern Flow Corridor Benefit-Cost Analysis report to understand the differences between the modeling assumptions in the 2010 FIS vis-à-vis the H&H modeling done by Northwest Hydraulic Consultants:

1. The 12/1 e-mail from Vaughn Collins notes that the FIS modeling assumed a 100-year flood <u>and</u> a 100-year tide. Where is this documented?
2. The e-mail comment that, <u>if</u> floods and tides are completely independent, the above combination has a 1 in 10,000 chance is incorrect. The 1 in 10,000 is the probability of both occurring in a given year, but what is relevant is the probability of occurring on the same day – another factor of 365 lower probability or perhaps the probability of occurring in the same hour as the peak flood elevation – still another factor of 12 given two tide cycles per day. Thus, if the daily or hourly probability governs, the annual probability drops to 1 in 3.65 million or 1 in 43.8 million, if the events were 100% independent, which they aren't.
3. Which reaches of the rivers are dominated by tides? Does this vary with the discharge in the river? That is, how far upstream do tidal effects control flood elevations?
    a) *After reviewing the February 2010 Project Exodus report. The tidal effects are limited to areas pretty near the Bay and downstream of the developed areas, so the effects of varying tidal assumptions vis-à-vis flood return periods is pretty minor.*
    b) *But, the above begs the question of what the differences are between the FEMA FIS and the revised H&H Calcs, since the email communication from Vaughn Collins seemed to state that differences how the tidal effects were included was the big difference. So, how and why are the NWC H & H results different from the FEMA FIS results?*
4. Are the assumptions re: tides and floods the only difference between the H&H modeling? If not, what are the other differences?
5. The FIS discussion on page 17 addresses issues of floodplain storage, unsteady flow vs. pseudo steady state flow. How were these issues addressed in the H&H study.
6. How big are the differences between the FIS and the H&H study?

a. Discharges for various return periods are the same? Or, if not – why not? Using a mix of USGS and FIS discharges seems odd – the data set should be internally consistent.

b. What are the flood elevation differences for the return periods used in the BCA between the FIS and the H&H results?

c. Do the elevation differences vary with reach of the rivers?

d. These differences will definitely affect the BCA, but perhaps not by a great amount since the benefits arise from the difference in damages with and without the project and the damages are proportional to the elevation drop and only to a somewhat lesser extent to the absolute elevations.

e. The 12/1 e-mail from Vaughn Collins states that changing the tidal boundary conditions up to 2 feet lower or 1 foot higher do not affect results in the project area. This is somewhat surprising – please explain why. If this is true for tidal boundary conditions wouldn't't' this also be true for the difference in flood elevations between the FEMA FIS elevations and your revised H&H elevations?

f. The geographic pattern of reductions in flood elevations is somewhat confusing. For example, there are reductions, even in the 6-year event, on both sides of levees that are being removed. Does this mean that these levees don't even provide 6-year protection? The pattern downstream from roughly where the hospital is located is very complicated. Can you explain briefly why the project results in this pattern of flood elevation reductions?

Benefit-Cost Analysis: Overview Comments

1. The BCA results show a reduction in annualized damages of only 26% which is very low percentage for a flood mitigation project:

Condition	Annualized Damages
w/o Project	$3,235,029
w/ Project	$2,379,792
Benefits	$855,237
Percent Reduction	26.44%

2. The Version 4.5.5 BCA states that the damages are "Historical Damages" which is incorrect – the damages are calculated "Expected Damages." This difference doesn't affect the numerical results but is important in evaluating the credibility of the BCA, since well documented historical damages are more credible than calculated damages.

3. The scenario damages, especially for the very short return period floods, are very high, with an extremely unusual pattern vs. return periods:

Return Period (Years)	Scenario Damages			
	Without Project	With Project	Reduction	Percent Reduction
1.6	$4,888,488	$4,589,460	$299,028	6.12%
5.8	$10,746,223	$7,912,033	$2,834,190	26.37%
22.4	$20,841,253	$14,984,908	$5,856,345	28.10%
100	$36,613,082	$27,953,280	$8,659,802	23.65%

a. Why does the project have such minimal effect on the 1.6 year damages? This suggests that something is missing in the project design – the most frequent flood problem is barely addressed by the proposed project! A smaller project addressing the very frequent floods only might have higher benefits in absolute terms and a much higher BCR.

b. Almost always, flood control projects are highly effective for small floods (often 100%) with the effectiveness decreasing smoothly or stepwise depending on the project design. The inverted, non-monotonic percent reduction pattern seems inexplicable and perhaps suggests errors in the calculations. Why does this pattern occur?

c. The without project damages, especially for the 1.6 year and 5.8 year return periods are extremely high. Especially for the 1.6 year event, but also for the 5.8 year event, a commensurate level of damages should be documented by historical events with historical damages. At first blush, it seems outside the bounds of credibility that there are nearly $5 million in damages in the limited area affected by the project in floods with a 1.6 year return period, unless there is historical documentation confirming at least approximately this level of damages. If not, then the credibility of the entire BCA is greatly diminished.

Benefit-Cost Analysis: Details

1. The BCA was completed in the Version 4.5.5 Damage-Frequency BCA software. The entries in the BCA software were copied directly from the HAZUS-MH results for the 5.6, 22.4 and 100-year floods. Thus, the validity of the BCA depends entirely on the validity of the HAZUS-MH inputs. That is, there are no errors or other irregularities in the BCA analysis, with the exception, noted above, of incorrectly listing the damages as "Historical."
2. The building inventory data and the approximate method of estimating first floor elevations both appear reasonable.
3. At first look, there appear to be some possible discrepancies between the HAZUS-MH results and the FEMA standard methods and data built into the Version 4.5.5 Flood BCA module. Damages by category are shown below for the without project (before mitigation) conditions:

Return Period (Years)	Inventory	Contents	Building	Total
5.8	$3,673,789	$4,768,862	$2,303,572	$10,746,223
22.4	$8,282,336	$8,751,653	$3,807,264	$20,841,253
100	$15,226,197	$14,529,740	$6,857,145	$36,613,082

Return Period (Years)	Inventory	Contents	Building	Total
5.8	34.19%	44.38%	21.44%	100.00%
22.4	39.74%	41.99%	18.27%	100.00%
100	41.59%	39.68%	18.73%	100.00%

As shown above, only about 20% of the damages are building damages, with the contents and inventory damages each being about 40% of the damages. This proportion of building damages seems very low – that is, the proportion of contents/inventory damages seems very high.

4. A high percentage of the total damages arises from agricultural buildings, which is somewhat surprising. Representative data for the 100-year flood without project (before mitigation) are shown below.

Building Category	Building Loss	Contents Loss	Inventory Loss	Total	Percentage
Agricultural	$2,177,889	$6,123,692	$8,772,266	$17,073,847	46.64%
Commercial	$2,500,975	$6,287,148	$5,653,503	$14,441,626	39.45%
Residential	$1,873,273	$1,040,820	$0	$2,914,093	7.96%
Other	$305,009	$1,069,079	$800,428	$2,174,516	5.94%
Total	$6,857,146	$14,520,739	$15,226,197	$36,604,082	100.00%

5. The differences between HAZUS-MH model parameters and FEMA Version 4.5.5 BCA parameters are addressed in the following section.

Differences Between HAZUS-MH and FEMA Version 4.5.5 Model Parameters

1. The Excel File with HAZUS results has several puzzling data characteristics.

   a. The summary table (cf. above) has large inventory losses for AGR1 buildings, but the data table has zero for all of the inventory losses.

   b. The contents damages for AGR1 (farm buildings) and COM1 (retail trade) categories are up to several times the building damages even though both categories are stated to have contents values of 100% of building values. The 100% number, which is the HAZUS default value, seems high, especially for and the default value may or may not be applicable to the Tillamook conditions. See examples on the following pages. See also the detailed data table – some of the AGR1 buildings would seem obviously to have zero or very close to zero contents or inventory value, such as waste tanks (which also would likely have minimal flood damages).

c. The inventory damages for AGR1 and COM1 categories are also up to several times the building damages which seems high, especially for AGR1. For AGR1 some of the types of buildings would obviously have no inventory or very little. The inventory would also be likely to be seasonally variable and perhaps low or zero during the winter flood season. Also, the specific crop or livestock characteristics should be considered. For example, if the "inventory" is cattle, then a few inches or a couple feet of water would likely result in zero losses.

d. Some buildings have contents/inventory damages when the building damages are zero. See examples on the following pages.

HAZUS OCCUPANCY	1.6YR BUILDING LOSS PRE-PROJECT	1.6YR CONTENT LOSS PRE-PROJECT	1.6YR INVENTORY LOSS PRE-PROJECT	5.8YR BUILDING LOSS PRE-PROJECT	5.8YR CONTENT LOSS PRE-PROJECT	5.8YR INVENTORY LOSS PRE-PROJECT	22.4YR BUILDING LOSS PRE-PROJECT	22.4YR CONTENT LOSS PRE-PROJECT	22.4YR INVENTORY LOSS PRE-PROJECT	100YR BUILDING LOSS PRE-PROJECT	100YR CONTENT LOSS PRE-PROJECT	100YR INVENTORY LOSS PRE-PROJECT
AGR1	$0	$4,480	$0	$17,457	$49,074	$0	$17,667	$49,109	$0	$25,189	$49,834	$0
AGR1	$0	$2,963	$0	$11,546	$32,458	$0	$11,685	$32,481	$0	$16,660	$32,960	$0
AGR1	$0	$1,877	$0	$7,314	$20,560	$0	$7,402	$20,575	$0	$10,553	$20,879	$0
AGR1	$0	$79	$0	$306	$861	$0	$310	$862	$0	$442	$874	$0
AGR1	$0	$588	$0	$2,291	$6,442	$0	$2,319	$6,446	$0	$3,306	$6,541	$0
AGR1	$0	$327	$0	$1,382	$3,597	$0	$1,394	$3,597	$0	$1,936	$3,666	$0
AGR1	$993	$4,055	$0	$795	$3,593	$0	$785	$3,570	$0	$10,188	$19,439	$0
AGR1	$567	$2,317	$0	$454	$2,053	$0	$448	$2,040	$0	$5,822	$11,108	$0
AGR1	$519	$2,120	$0	$415	$1,878	$0	$410	$1,866	$0	$5,326	$10,162	$0
AGR1	$414	$1,692	$0	$331	$1,499	$0	$327	$1,489	$0	$4,250	$8,110	$0
AGR1	$275	$1,124	$0	$220	$996	$0	$217	$989	$0	$2,823	$5,386	$0
AGR1	$144	$586	$0	$115	$519	$0	$113	$516	$0	$1,473	$2,811	$0
AGR1	$34	$140	$0	$27	$124	$0	$27	$123	$0	$352	$671	$0
AGR1	$0	$2,246	$0	$0	$2,246	$0	$0	$2,246	$0	$11,636	$24,785	$0
AGR1	$0	$2,177	$0	$0	$2,177	$0	$0	$2,177	$0	$11,278	$24,024	$0

HAZUS OCCUPANCY	1.6YR BUILDING LOSS PRE-PROJECT	1.6YR CONTENT LOSS PRE-PROJECT	1.6YR INVENTORY LOSS PRE-PROJECT	5.8YR BUILDING LOSS PRE-PROJECT	5.8YR CONTENT LOSS PRE-PROJECT	5.8YR INVENTORY LOSS PRE-PROJECT	22.4YR BUILDING LOSS PRE-PROJECT	22.4YR CONTENT LOSS PRE-PROJECT	22.4YR INVENTORY LOSS PRE-PROJECT	100YR BUILDING LOSS PRE-PROJECT	100YR CONTENT LOSS PRE-PROJECT	100YR INVENTORY LOSS PRE-PROJECT
COM1	$13,278	$39,416	$46,263	$12,655	$37,422	$44,021	$12,623	$37,321	$43,907	$33,221	$95,572	$102,159
COM1	$1,980	$3,960	$7,920	$1,980	$3,960	$7,920	$1,980	$3,960	$7,920	$1,980	$3,960	$7,920
COM1	$93	$187	$373	$1,463	$5,016	$5,826	$1,866	$7,276	$7,930	$2,096	$7,661	$8,314
COM1	$1,659	$3,317	$6,634	$20,533	$61,062	$71,598	$29,301	$109,462	$123,008	$32,033	$123,676	$135,856
COM1	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
COM1	$4,958	$9,916	$19,833	$4,958	$9,916	$19,833	$4,958	$9,916	$19,833	$7,732	$18,237	$29,194
COM1	$739	$1,865	$2,714	$2,279	$6,486	$7,913	$5,046	$15,612	$18,194	$5,596	$19,457	$22,588
COM1	$0	$0	$0	$0	$0	$0	$1,105	$2,210	$4,420	$7,374	$19,467	$26,546
COM1	$1,188	$2,376	$4,752	$1,188	$2,376	$4,752	$1,188	$2,376	$4,752	$7,054	$19,975	$24,550
COM1	$2,272	$4,544	$9,088	$2,272	$4,544	$9,088	$10,080	$27,969	$35,442	$19,336	$55,735	$66,678
COM1	$825	$1,650	$3,300	$825	$1,650	$3,300	$7,879	$22,902	$27,209	$11,203	$33,541	$39,177
COM1	$403	$805	$1,611	$403	$805	$1,611	$945	$2,434	$3,443	$2,764	$7,890	$9,581
COM1	$1,550	$3,100	$6,199	$1,550	$3,100	$6,199	$1,550	$3,100	$6,199	$1,550	$3,100	$6,199
COM1	$1,320	$2,640	$5,280	$5,502	$15,187	$19,395	$19,955	$65,768	$76,483	$22,114	$79,884	$91,267
COM1	$1,524	$3,048	$6,096	$2,439	$5,794	$9,185	$22,044	$68,961	$80,337	$24,535	$86,249	$99,889
COM1	$2,112	$4,224	$8,448	$27,100	$80,805	$94,602	$37,711	$141,783	$158,832	$41,164	$159,356	$174,678
COM1	$3,189	$6,378	$12,756	$11,165	$30,307	$39,676	$47,623	$154,776	$180,076	$52,873	$189,675	$217,452
COM1	$1,578	$3,157	$6,313	$1,578	$3,157	$6,313	$4,054	$10,583	$14,668	$14,043	$40,550	$48,381
COM1	$408	$817	$1,634	$408	$817	$1,634	$4,530	$13,352	$15,735	$5,887	$18,340	$21,368
COM1	$40	$80	$161	$40	$80	$161	$502	$1,494	$1,751	$602	$1,962	$2,283
COM1	$9,873	$19,746	$39,492	$9,873	$19,746	$39,492	$9,873	$19,746	$39,492	$9,873	$19,746	$39,492
COM1	$3,153	$11,640	$13,156	$3,891	$14,611	$15,884	$4,729	$15,462	$16,735	$5,280	$15,737	$16,872

2. To evaluate the credibility of the building, contents, and inventory losses entered into the BCA I need to see:
   a. The depth-damage functions used in HAZUS,
   b. The assumptions made re: inventory losses, with enough detail to recreate the calculations.
3. For reference, I checked the FEMA Version 4.5.5 DDFs for: Retail (Clothing, Furniture, Electronics) and Grocery. The contents damages relative to building damages are significantly lower for Clothing and Furniture, about 1.5 times higher for electronics and about 3 times higher (at low depths) for grocery. Overall, for the mix of retail, the contents damages appear likely to be similar to building damages – which is significantly different than the HAZUS results which for commercial (almost all COM1 – retail), the contents damages are about 2.5x the building damages and the sum of contents and inventory (which seems like double counting) are almost 5x the building damages which appears to be roughly a factor of 5x higher than FEMA Version 4.5.5. So, this is a huge discrepancy.

ALTERNATE PROJECT REQUEST

Applicant Port of Tillamook Bay **FEMA-** 1733 **DR** OR **Date:** 12/30/2009

If a subgrantee decides that a damaged public facility should not be restored, but desires to use funds for work on other facilities, the FEMA Regional Director may approve the project as an "Alternate Project". Approval, if granted, only covers the project identified on this form. Federal funding for such projects will be limited to 90% of the federal share of the approved estimate of eligible costs.

Location:

Five (5) major rivers drain into Tillamook Bay. At the southern end of the bay, the lower valleys of the Wilson, Trask and Tillamook Rivers merge to form a broad alluvial plain at the head of the bay on which the City of Tillamook is located. The project location is situated within this alluvial plain and consists of an area between Hoquarten Slough and the Wilson River, identified as the Southern Flow Corridor. This Corridor extends east-west from an area east of the Port of Tillamook Railroad, west to Tillamook Bay (see figure 1, page 7 and Figure 4, page 14 of the NHC Report).

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described in Figure 1, Page 7 of the NHC Report

Description of proposed Alternate Project:
See attached

Replaces Project Worksheet Number:

Schedule of work:

WORK ELEMENT	TIMELINE
Property acquisition	January - December 2010
Final Design	January - December 2010
Environmental review and permitting	July 2010 - March 2011
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Project closeout	July 2012 - December 2012

As required by DAP9525.13 (VII)(H), these are within the regulatory time frame of thirty (30) months established in 44 CRF 206.204.

Projected Cost

ITEM	SOUTHERN FLOW CORRIDOR	SOUTH BANK WILSON RIVER SETBACK BERM	MNORTH BANK WILSON RIVER FIELD GRADING
Construction Costs	$4,812,400	$580,360	$194,200
Engineering, Admin, Permitting, Legal @ 18%	$926,232	$104,465	$34,956
Subtotal Project Costs	$5,738,632	684,825	$229,156
25% Contingency	$1,434,658	171,206	$57,289
Total	$7,173,290	856,031	$286,445
Total Project Costs			$8,316,000

In addition to the above, OWEB staff will be presenting a recommenation to the OWEB Board on January 20, 2010 to confirm $2,000,000 for property acquisition.

Explanation of unique situation which makes alternate funding viable:

See attached

Attach information, as appropriate, to show compliance with: See attached
1. Floodplain management requirements
2. Environmental assessment requirements
3. Hazard Mitigation plan
4. Protection of wetlands requirement
5. Insurance requirement

SIGNATURE OF APPLICANT'S AUTHORIZED REPRESENTATIVE	**DATE:**
Michele Bradley	12/30/09
PRINT NAME AND POSITION:	**CONTACT NUMBER**
Michele Bradley, General Manager	503-842-2413 x 111
GOVERNOR'S AUTHORIZED REPRESENTATIVE:	**DATE:**

ALTERNATE PROJECT REQUEST

Oregon Emergency Management

Applicant Port of Tillamook Bay **FEMA-** 1733 **DR** OR **Date:** 12/30/2009

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Location:

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Explanation of unique situation which makes alternate funding viable:

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SIGNATURE OF APPLICANT'S AUTHORIZED REPRESENTATIVE:	DATE:
PRINT NAME AND POSITION:	**CONTACT NUMBER**
Michele Bradley, General Manager	503-842-2413 x 111
GOVERNOR'S AUTHORIZED REPRESENTATIVE:	**DATE:**

ALTERNATE PROJECT REQUEST
OREGON EMERGENCY MANAGEMENT

DESCRIPTION OF PROPOSED ALTERNATE PROJECT:

I. Project Description and Application Requirements

DAP9525.13 (VII) (G) The proposal must include a description of the project, including the project location, an estimate of costs, a schedule of work, including a starting date for work, and a targeted completion date, and the necessary assurances to document compliance with special requirements, including, but not limited to floodplain management, environmental review, hazard mitigation, protection of wetlands, and insurance. 44 CFR 206.203(d)(2)(v). Historic and any other legal considerations should also be identified. The applicant should identify the source of funding for projects when the cost estimate for the alternate project is greater than the eligible alternate project funding

(1) Project Description

This project, known variously as the Port/Railroad Improvement Project or the Southern Flow Corridor is more particularly described in the attached October 2009 report prepared by Northwest Hydraulic Consultants (NHC Report) under contract to Tillamook County. The report provides the background, objectives and methods that were used to investigate possible flood damage reduction measures within the flood plain that lies between Hoquarten Slough, Wilson River and Tillamook Bay. The report also describes various alternatives that were evaluated. Finally, the report presents a preliminary (30%) design for a recommended project, consisting of three (3) project elements: The Southern Flow Corridor, the North Bank Wilson River Field Regrading and the South Bank Wilson River Berm. This application seeks funding for only the Southern Flow Corridor.

(2) Project Location

Five (5) major rivers drain into Tillamook Bay. At the southern end of the bay, the lower valleys of the Wilson, Trask and Tillamook Rivers merge to form a broad alluvial plain at the head of the bay on which the City of Tillamook is located. The project location is situated within this alluvial plain and consists of an area between Hoquarten Slough and the Wilson River, identified as the Southern Flow Corridor. This Corridor extends east-west from an area east of the Port of Tillamook Bay Railroad, west to Tillamook Bay (see figure 1, page 7 and Figure 4, page 14 of the NHC Report).

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GPS Point #4: 45°28'00.40"N 123°51'23.24"W; and all points within as described in Figure 1, Page 7 of the NHC Report.

(3) Project Function

The Wilson River flows through a steep canyon out of the mountains where it enters the valley floor about six (6) miles above Tillamook Bay. At that point the river channel is perched – it runs in a channel with natural banks that are higher than the flood plains around it. As a consequence, flood flows that leave the river never return to the channel, but instead flow south and west across the flood plain to the proposed project area between Hoquarten and Dougherty Sloughs, which is the lowest area of the flood plain. Although Hoquarten Slough flows in a generally westerly direction to dump into the Trask and Tillamook Rivers at the bay, it meanders in sweeping ox bows back and forth in a north-south direction. Along its banks are "levees", recently discovered to be old disposals of dredged materials, that are two to three (2 – 3') feet higher than the adjoining land. When the westerly flood flows hit these north-south levees and similar levees down stream, a back water effect occurs, substantially contributing to the flood conditions along the US Highway 101 business district and the applicant's railroad.

The Southern Flow Corridor project would remove approximately forty-five thousand (45,000) lineal feet of levee and construct approximately nine thousand six hundred (9,600) lineal feet of tidal dike. Approximately thirty thousand (30,000) lineal feet of the levee removal will be along the banks of river channels that are presently exposed to higher erosive forces. The nine thousand six hundred (9,600') feet of new tidal dikes must be constructed to provide year-round protection to adjacent agricultural lands from twice daily tidal inundation, particularly during the summertime higher tides. Unless these dikes are constructed, the daily tidal cycle would convert the lands behind the dikes to salt marsh, making the lands no longer suitable for agricultural uses and necessitating the acquisition of entire farm parcels, together with the farm homes and agricultural buildings, thereby substantially increasing the total project costs. As currently proposed, it will only be necessary to either purchase flood easements or acquire outright one hundred three (103) acres of marginal farmland, thereby leaving the homes and agricultural operations behind the dikes intact if the sellers so desire.

Conversely, the nine thousand six hundred (9,600') feet of new dikes do not function as flood control levees or flood control works. On the contrary, during flooding events, flood waters will continue to inundate both sides of the new dikes (see figures 2, 3, and 4, NHC Report). As noted on page 8 of the NHC Report, the goal is to build the dikes as low as possible to pass river flood flows out while preventing high tides and coastal storm surges from getting in. While very little of the new dikes are near any channel, they will be wider and better constructed, in that the flow corridor side will have a five to one (5:1) slope in order to pass overtopping floodwaters from inside of the dikes with minimal, if any, damage. This entire Southern Flow Corridor will function as a large drainage area in that it will also include a series of flood gates and a new spillway structure to drain the interior area behind the dikes (See 30% Plans attached to the NHC Report). Flood flows will pass through these structures every second or third year, a sufficient frequency which should keep the channels open and able to convey flood flows out to the main channels and bay along relic channels where the structures will be placed.

(4) Cost Estimates

A summary of the preliminary construction cost estimate for the Southern Flow Corridor is contained on page 15 of the NHC Report, totaling Seven Million One Hundred Seventy-Three Thousand Two Hundred Ninety ($7,173,290) Dollars. A detailed breakdown of this estimate is provided on page 25 of the NHC Report. Property acquisition costs are not included in this estimate.

(5) Work Schedule

WORK ELEMENT	TIMELINE
Property acquisition	January – December 2010
Final design	January – December 2010
Environmental review and permitting	July 2010 – March 2011
Procurement/bidding	January 2011 – April 2011
Construction	May 2011 – July 2012
Project closeout	July 2012 – December 2012

As required by DAP9525.13 (VII) (H), these are within the regulatory time frame of thirty (30) months established in 44 CRF 206.204.

(6) Special Requirements, Environmental Reviews and Permitting

As noted in the NHC Report, the proposed alternative project was formulated and preliminarily designed using a sophisticated HEC-RAS model specifically developed for the project area. Consequently the hydrologic and design characteristics, as well as the environmental benefits have been reasonably ascertained. To the extent that additional hydrological or related permit information is needed, the model is available for that purpose. A fairly extensive discussion on permitting and the favorable environmental consequences of the proposed project is contained at pages 17 – 19 of the NHC Report. As stated therein, "No major hurdles are anticipated". The Southern Flow Corridor has large ecosystem restoration benefits and would likely qualify for a streamlined restoration permit. The project has been designed to qualify under the Federal Nationwide Permit (NWP-27) and the General Authorization under the State of Oregon Removal – Fill law. It has also been designed to comport with NOAA fisheries restoration programmatic biological opinion (SLOPES IV).

This project does produce some minor increases in flood elevations in areas outside the present floodway where there are few structures. However, until the FEMA flood mapping project is completed and the new maps made public, this issue cannot be conclusively resolved. The release of these maps is imminent and not expected to impact the tentative schedule. Moreover, even if portions of the project fall within the FEMA floodway, there are flood level mitigation options available (see NHC Report pages 10 – 11).

(7) Sources of Funding

SOURCES OF FUNDING	AMOUNT
FEMA Alternate Project Funds	$4,300,000
OWEB Restoration Funds	1,250,000
Local	150,000
Other grant funding	1,474,000
	$7,174,000

In addition to the above, OWEB staff will be presenting a recommendation to the OWEB Board on January 20, 2010 to confirm $2,000,000 for property acquisition.

(8) Guidelines for Mitigation Projects

Under DAP9525.13 (VII) (J) the types of mitigation projects that may be approved for alternate project funds are very broad. Under that guideline, mitigation measures may be the same type as would be eligible for funding under section 404 of the Stafford Act, the Hazard Mitigation Grant Program (HMGP). As such, a project must meet five (5) minimum project eligibility criteria, 44 CFR 206.434(b), as follows:

(a) **The Project conforms with the State Hazard Mitigation Plan (HMP):**

HMP Goal 1 Protect life and reduce injuries resulting from natural hazards

Presently US Highway 101 is closed several times each year due to flooding. When Wilson River Loop Road also closes due to high water, access to Tillamook County Hospital, the county's only hospital, is cut off to ambulances and other emergency vehicles transporting patients from the north end of Tillamook County, the most populous area of the county outside the City of Tillamook. In such cases, access to Seaside Hospital in Clatsop County is also usually blocked south of Seaside, leaving this population at great risk to injury or death without any hospital care. The proposed project will eliminate or minimize this highway closure due to flooding.

HMP Goal 2 – Minimize public and private property damages and the disruption of essential services

The stretch of commercial property that will be benefited by this project consists of a swath of businesses one thousand (1,000') feet wide along Highway 101 over one (1) mile long. This area represents the business core of Tillamook City's Highway Commercial District, containing a number of the County's major employers. Even those properties in this area that are elevated sustain damages due to business disruption. A number of the remaining businesses have sustained repetitive loss from direct flood damage. Moreover, when the highway closes there are major disruptions to businesses outside the flood plain due to employees who cannot get to work. The proposed project will have a dramatic effect in reducing property damage and business disruptions.

HMP Goal 3 – Increase the resilience of local, regional and statewide economies

When Highway 101 closes, some of the county's largest employers have to either shut down or reduce production. Businesses such as Tillamook Cheese, Fred Meyer, Rosenberg's Builders Supply, to name a few, are either forced to close or sustain major disruptions. Moreover, goods in transit over State Highway 6 from the Willamette Valley to points in the flood area, in North Tillamook or in Southern Clatsop County are unable to reach their destinations. The flow of feed to farmers and milk to the Tillamook County Creamery Association or bottlers in the Willamette Valley are interrupted. Milk production often has to be dumped. Once again, this project will have substantial benefits to the resilience of local, regional and state economies.

HMP Goal 4 – Minimize the impact of natural hazards while protecting and restoring the environment

and

HMP Short Term Action #3 - Continue seeking effective hazard mitigation opportunities compatible with habitat and fisheries protection via multi-objective mitigation efforts

Out of the fifty-nine (59) project alternatives considered as part of the Corps Feasibility Project and the ten (10) project alternatives analyzed under Project Exodus, the proposed project was not only the most effective at flood mitigation but it was also the one (1) project that provided the most environmental restoration, with approximately six hundred (600) acres of salt marsh creation and many miles of stream restoration. Perhaps more importantly, this project has substantial benefits to the federally listed threatened and endangered Coho Salmon.

Long Term Action #6 – Assist local communities in securing funding to implement measures to mitigate damage to buildings exposed to or having experienced repetitive losses

Although Tillamook County has done much to relocate repetitive loss NFIP structures, there are still yet other NFIP repetitive loss structures remaining in the project area. Moreover, there are other repetitive loss structures in the project area that are not in the NFIP. All of these would be directly benefited by FEMA funding of the proposed mitigation project.

(b) Provides a beneficial impact upon the designated disaster area

Tillamook County was designated as a disaster area under DR - 1733-OR that also included a number of Western Oregon Counties and the state. As noted above, there are substantial benefits from this project locally, regionally and for the State of Oregon.

(c) Conforms to environmental laws and regulations

Despite the substantial flood mitigation benefits from this project, it has large ecosystem restoration benefits and will likely qualify for a streamlined restoration permit. The project has been designated to qualify under the Federal Nationwide Permit (NWP-27) and the General Authorization under the State of Oregon Removal-Fill Law. It has also been designed to comport with NOAA Fisheries restoration programmatic biological opinion (SLOPES IV).

(d) Solves a problem independently or constitutes a functional portion of a solution

In addition to resolving the applicant's obligations, the Southern Flow Corridor constitutes the largest functional portion of a solution for the North Tillamook City flood plain. Together with the South Bank of the Wilson River and the North Bank of the Wilson River projects, which are not part of this application, the Southern Flow Corridor presents the largest functional portion of a comprehensive flood mitigation solution for this area.

(e) Is cost effective

The Stafford Act and its implementing regulations require that HMGP projects be cost effective. 44 CFR 206.434(b). A benefit-cost analysis will be performed by the state or FEMA to determine how the anticipated value of the project compares to the cost. Among the minimum criteria for cost effectiveness is that a project must be "cost effective <u>and</u> substantially reduce the risk of future damage, hardship, loss or suffering resulting from a major disaster".

Clearly, if ever there was a project that would meet the latter criteria, the proposed project meets that requirement.

In addition to the five (5) minimum project eligibility criteria addressed above, an HMGP project must also meet three (3) minimum project selection criteria, 44 CFR 206.435(b), as follows:

(f) The project must provide the best fit within the overall development plan and/or the Hazard Mitigation Plan for the area

For more than a decade the Port of Tillamook Bay, the county and the City of Tillamook have worked with other local, state and federal partners for flood mitigation and ecosystem restoration planning for this area. Initially with the US Army Corps of Engineers Feasibility Study and later with the Project Exodus study contained in the attached NHC Report, HEC-RAS computer modeling was used to identify a series of alternatives which have now been narrowed to the three (3) projects identified in the attached NHC Report, of which the Southern Flow Corridor is the project identified in this application. This project has the solid support of the local community and local governments as well as state and federal regulators.

Additionally, this project fulfills the following goals and actions of the current City of Tillamook Hazard Mitigation Plan

Goal A	Protect Life and Property Engage in and promote long-term, cost-effective regional planning and property protection activities that will reduce or eliminate adverse impacts from flooding
Goal B	Preserve Natural Areas Related to Flooding Preserve and restore natural areas and water conveyance to enhance flood plain function Protect or enlarge existing wetlands and open areas to maintain or create additional floodwater holding areas Preserve and enhance public open space along floodways, rivers, sloughs, tributary streams and the bay to insure adequate flood plain function
Goal D	Modify existing structures to improve hydrologic function Develop solutions that ensure all non-emergency flood mitigation maintains or enhances natural resource protection Implement structural flood mitigation solutions to protect critical structures and infrastructure when other alternatives do not exist
Goal F	Improve and Promote Partnerships, Coordination and Implementation Foster on-going community partnerships and forge new links with other agencies and organizations within and outside the city when implementing flood mitigation activities

	Develop and coordinate new projects with existing plans and efforts Pursue and implement permanent and/or low maintenance, cost-effective solutions to flood problems Emphasize on-the-ground projects that best meet mutual goals of environmental considerations and flood mitigation
Short Term Mitigation Action #3	Develop a commercial district flood plain management strategy
Long Term Mitigation Action #2	Restore riparian areas, flood plains and wetlands and protect water quality.

(g) Selected projects should be those that clearly reduce loss of life, loss of essential services, damage to critical facilities or severe economic hardship

This project will eliminate or substantially reduce the risk of future flood damages to the benefitted section of railroad. As noted elsewhere in this application, the Port of Tillamook Bay Railroad will continue to be an important asset to the Port. The ability to construct ocean wave energy devices at the Port's industrial park and then transport those oversize devices by rail to the Port of Garibaldi for ocean transport will be critical to the economic viability of this alternative energy project and the region. This project is important in maintaining the rail line as a critical facility for Tillamook County as a whole. In past years when Highway 101 and Wilson River Loop road closed, the railroad was the only transportation link joining the North and South ends of the County. Additionally, Tillamook County General Hospital, as the county's only hospital, is a critical facility. As indicated elsewhere within this application, the limited hospital access issue for much of the county's population will be greatly reduced or eliminated by the project.

(h) Have the greatest potential to reduce losses after examining the alternatives available

As indicated in several locations elsewhere within this application, this project has the greatest potential to reduce future losses after examining the fifty-nine (59) alternatives identified in the Corps Feasibility Study and the ten (10) alternatives explored in Project Exodus. The HEC-RAS modeling demonstrates between a one (1') foot and one point five (1.5') foot reduction in flood levels along US Highway 101 and a six (6") inch reduction along the railroad during a one hundred (100) year flood. No other project examined or modeled over the last decade has shown as much potential to reduce future losses.

The HMGP manual at page 5-3 also lists a number of other considerations the state may add to its evaluation criteria when selecting an HMGP project. Each of the following criteria from that list is justified by elements of the proposed project:

- Level of protection provided by the project
- Measures designed to accomplish multi-objectives, including damage reduction, environmental enhancement and economic recovery
- The applicant community's participation in the National Flood Insurance Program, compliance record and Community Rating System level
- Local commitment and public buy-in

II. Project Eligibility

FEMA's Disaster Assistance Policy for Alternative Projects authorizes an eligible applicant to perform hazard mitigation measures unrelated to the original facility. DAP9525.13 (VI). In order to do so, an applicant must first demonstrate project eligibility under the guidelines of DAP9525.13 (VII). The following section lists each of those guidelines and applicant's documentation of eligibility.

(1) The applicant may request approval of an alternate project from FEMA through the grantee when an applicant determines that the public welfare would not be best served by either restoring a damaged facility or by restoring the function of a damaged facility. Either one of the two (2) conditions must be met. See 44 CFR 206.203(d)(2).

The Port of Tillamook Bay has previously received authorization from FEMA to pursue a series of alternative projects in lieu of restoring its damaged railroad facilities. This project application is one (1) in that series of alternative projects.

(2) **The proposed alternate project must be a permanent project that benefits the general public. See 44 CFR 206.203(d)(2),**

The proposed project is permanent and the public benefits are substantial. As shown on pages 10 – 14 of the NHC Report, during the one hundred (100) year flood there will be up to a one (1') foot reduction in flood levels at the south end of the project area along US Highway 101 and up to one point five (1.5') feet flood reduction in flood levels at the north end of the project area along US Highway 101. This portion of the project area, consisting of five hundred (500') feet on each side of US Highway 101 contains a major piece of the City of Tillamook's commercial businesses representing millions of dollars in value. This project will also reduce flooding on the port's railroad up and downstream of the north-south rail line by about six (6") inches in the one hundred (100) year flood. The environmental benefits will also be substantial. Between five hundred and six hundred (500 – 600) acres of salt marsh wetland will be created as a direct consequence of this project with direct benefit to the federally listed Coho Salmon. Also both Hoquarten and Dougherty Sloughs are currently listed by the Oregon Department of Environmental Quality (DEQ) as water quality impaired streams. According to the Director of DEQ, the beneficial effects on water quality in those streams as a direct result of this project will be "immediate and dramatic".

(3) **A damaged facility whose repair costs were used for an approved alternate project may be eligible for future Public Assistance funding provided that the applicant funded and performed the repairs to the original damaged facility**

This policy guidance does not appear to be relevant to the issue of eligibility of the proposed alternative project.

(4) **Funds may be used to repair or expand other selected facilities to construct new facilities, purchase equipment or to fund hazard mitigation measures in accordance with other provisions of this policy**

This policy authorizes the proposed alternative project to be funded as a hazard mitigation measure.

(5) **FEMA expects the proposed alternate project to serve the same general area that was being served by the originally funded project**

The proposed alternative project is situated entirely within the exterior boundaries of the Port of Tillamook Bay (POTB). The POTB railroad traverses through the project area.

(6) The FEMA Regional Administrator must approve all alternate projects prior to the start of construction. See 44 CFR 206.203(d)(2)(v)

This application is the first step in that approval process.

III. General Work Eligibility

Under 44 CFR 206.223 (a)(3), to be eligible for financial assistance, an item of work must be the legal responsibility of an eligible applicant

In the case of the present application, there are several levels of legal responsibility.

In the first instance, applicant's rail line runs through the project area and is subject to flooding several times each year. The proposed project would reduce flooding on the north-south portion of the line by up to six (6") inches during a one hundred (100) year flood event. Additionally, applicant also has an approximate three quarter (3/4) mile railroad right-of-way that runs east-west along the southern edge of the project area. The proposed project would eliminate flooding on that east-west right-of-way that is located adjacent to the US Highway 101 and Oregon Highway 6 intersection. Although neither the north-south line nor the east-west right-of-way are presently in use, the applicant has an obligation to its tax payers and the state agency that oversees this rail line to protect and maintain this important asset.

More specifically, under an April 6, 1993 Intergovernmental Agreement (IGA) between the Port and various state agencies, the Port is required to comply with the Plan of Rehabilitation and Operation established pursuant to Section 4.03 of a 1991 OEDD Grant Agreement, including a schedule for upgrading the railroad to FRA Class II standards. The proposed Alternative Project is consistent with the Port's obligation under the 1993 IGA and 1991 Grant Agreement.

This is particularly important as preliminary discussions are now underway with a developer of ocean energy to assemble components of the energy devices at POTB, with rail shipment to Garibaldi, where the devices would be off loaded to ocean vessels and then be towed off shore. If those preliminary plans come to fruition, the rail facilities within the project area would be critical to the success of the project.

Secondly, the applicant has been an enrolled participant with the city, county, state and federal partners in the Oregon Solutions program that led to the proposed project. This Oregon Solutions project was established by Oregon Governor Ted Kulongoski, who appointed State Senator Betsy Johnson and County Commissioner Mark Labhart as Co-Conveners. The staff of all of Oregon's congressional delegation are also active participants. The applicant, and all other members of the Project Team, each signed the Declaration of Cooperation and a separate Statement of Assurances. (See attached). The proposed project is an important part of applicant's commitment to this Oregon Solutions project.

Perhaps most importantly, allegations have recently been raised that the applicant has a legal obligation arising from the fact that the Port of Tillamook, applicant's predecessor port district, created the "levees" along Hoquarten Slough that must now be removed. More specifically, the Port of Tillamook was created by a special act of the Oregon Legislature in 1899 for the express purpose of maintaining Hoquarten Slough as part of the federally authorized navigation channel. There is substantial evidence that the Port of Tillamook was actively engaged in depositing its dredged materials along those banks from 1899 to 1919 when Hoquarten Slough's designation as a federally authorized channel was removed by congress. Those dredged materials are the "levees" that must now be removed to reduce flood damages. The applicant continues to assemble the documentation that demonstrates the applicant's present legal responsibility for removing these materials and undertaking this project as part of that legal responsibility. Prior discussions between the applicant, Oregon Emergency Management and FEMA personnel stressed the importance of submitting the present application prior to December 31, 2009 but allowing additional time after the application was submitted within which to supply additional documentation in support of its application. Pursuant to those discussions, applicant desires an additional 60 days to complete its documentation on work eligibility.

Project Exodus
Draft Final Report

Prepared for:

Oregon Solutions Design Team
Under contract to Tillamook County

Prepared by:

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and

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October 2009

Acknowledgements and Credits

NHC staff that contributed to this project include:

- Vaughn Collins: Project Management, Modeling, Report
- Sam Gould: Modeling, GIS
- Bonnie Cassarino: GIS
- Jeff Johnson: Principal Review

HBH Consulting Engineers staff included:

- Dave Boatman: Principal Review, Cost Estimating, Plan Review
- Jaime Jordan: Plan Development

We would like to thank: Paul Levesque (Tillamook County) for serving as contract manager and reviewing work products; Rick Klumph (ODFW) for ably chairing design team meetings and providing fisheries data; Leo Kuntz, for invaluable insights on flood behavior; Pete Dickerson (USACE), for providing data and technical review; and County Commissioner Mark Labhart and State Senator Betsy Johnson, for overall guidance and chairing project team meetings. Numerous others provided useful data, including the staff of the Tillamook Estuaries Partnership, Dale Buck, and Gus Meyers. We would also like to thank the TBHEID for giving the opportunity to present our work at their annual meeting.

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Introduction

Northwest Hydraulic Consultants, Inc. (NHC) in conjunction with HBH Engineering Consultants was selected by the Oregon Solutions Design Team to analyze flooding on the Wilson River in Tillamook County, Oregon and develop solutions to reduce flood levels. This report documents the process, methods and results of the project. The selected alternative - Project Exodus - is presented, including project elements, flood reduction benefits, preliminary plans, cost estimates and a scope of work for implementation.

Background

Five major rivers drain into Tillamook Bay. The lower valleys of the Wilson, Trask and Tillamook rivers merge to form a broad alluvial plain at the head of the bay on which the City of Tillamook is located. The Wilson River watershed is approximately 190 square miles, most of which is located in the Coast Range at elevations up to 3500 feet. The river flows through a steep canyon out of the mountains and does not have any significant floodplain until around 6 miles above the bay. The river channel is perched – it runs in a channel with natural banks that are higher than the floodplains around it-. As a consequence flood flows that leave the river, especially to the much larger southern floodplain, never return to the channel but flow south to the lowest part of the valley and west to meet the Trask and Tillamook Rivers. Highway 101 crosses the Wilson River floodplain at grade and so suffers frequent deep inundation across its lowest portions between Hoquarten and Dougherty Sloughs.

Recent decades have seen a number of damaging floods occur in Tillamook County. The 1996 flood in particular was noted for its long duration and extensive damages. Since then, large floods have occurred in 1998 and most recently in 2006 and 2007, causing further damages.

After the 2006 flood a letter was sent from State, County and City representatives to Governor Kulongoski requesting that Tillamook flood mitigation efforts be designated an Oregon Solutions project. The Oregon Solutions process provides a structure and process for public and private sectors to collaborate in addressing community needs. A project assessment was conducted in March, 2007, followed by Governor Ted Kulongoski's official designation in April, 2007.

The Governor assured participation of his staff and appropriate state agencies with other participating public and private partners through the designation of this effort as an Oregon Solutions Project. A Project Team was assembled in an effort to bring partners to the table. The team prioritized projects in September 2007 and began implementation shortly thereafter. The project list is a mix of capital projects and planning and analysis efforts funded by a legislative appropriation from the state.

Recognition of the complexity of flooding in the Wilson River and that prior work by the Corps of Engineers focused on ecosystem restoration rather than flood reduction led to the Project Team to combine two of the initially identified projects and broaden the overall scope into Project Exodus.

Objectives

Project Exodus is one part of the Tillamook Oregon Solutions process looking at reducing flood damages in Tillamook. The adopted Tillamook Oregon Solutions purpose statement is:

... to develop and implement a plan to reduce flooding and the adverse impacts of flooding while incorporating environmental, social and economic values in the development of short and long term solutions.

The purpose of Project Exodus is then to meet this goal in the Wilson River floodplain. The stated primary objective of Project Exodus is:

Reduce flood damages in the Wilson River floodplain through the reduction in flood levels and durations, focusing on 2-10 year floods.

First Flood Control Project

The First Flood Control Project was designed to provide information on what level of flood reduction was possible given as few constraints as possible. As such, the primary objective was the only objective specified. In discussions with stakeholders, a series of guiding principles were developed to help focus the exploratory design issues of the first project:

- Flood reduction should be considered over the entire project area equally
- Do not significantly increase overbank flood levels in the Tillamook/Trask floodplain.
- Increases in flood levels in some areas are acceptable if compliant with regulations and it is shown that the overall project provides flood reduction.
- The Wetlands Acquisition Area may be considered for flood control use only.
- Evaluate "full buildout" scenario along Hwy 101 corridor under existing zoning and flood mapping.
- A conceptual Dougherty Slough inlet structure will be evaluated to meet the primary objective; then the feasibility of modifying the existing structure for this purpose will be addressed.
- Evaluate incorporating previous Blind Slough, Hall Slough and Wetland Acquisition Area alternatives as part of project.
- Project costs should not exceed $10 million.

Initially it was anticipated that a series of detailed objectives would be developed during the second project phase. This proved unnecessary as the project elements proposed in the First Flood Control Project were adopted without change as the final preferred alternative.

Methods

The HEC-RAS hydraulic model developed for the Corps of Engineers Feasibility study was updated and used as the primary technical tool in hydraulic evaluation of alternatives for Project Exodus. Updating consisted of developing new floodplain cross sections using lidar data acquired in 2008. The berms and levees along the various channels were also updated from the lidar. In many areas these are covered in dense brush or under tree canopy, and the quality of both of the lidar and Corps photogrammetric data is 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 Garibaldi as a lower boundary condition. The sensitivity of the model to the tidal boundary condition was tested by running the 1999 (5-yr) flood with the observed tides increased by 1 foot and decreased by 2 feet. Changes to maximum water surface elevations only extended up to around the junction of Hoquarten Slough and the Trask River under either scenario. The ADCIRC two dimensional estuary modeling performed by the Corps during the feasibility study reached this same conclusion. Based on this insensitivity to tidal conditions, neither a coincident tidal-riverine frequency analysis nor further ADCIRC modeling was performed.

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.

Model calibration, field inspection and high water marks all point to the importance of berms in controlling flood patterns in the Wilson, especially in smaller floods. Unfortunately berms have one of higher levels of uncertainty within the model due to two factors.

First, the actual elevations of the berms are less certain than most other topographic features. Canopy cover, brush and the small size of the berms mean both photogrammetric and lidar based aerial mapping can have significant errors here. Second, discussions with Leo Kuntz and others made clear that berm failures were common in virtually all floods. These failures cannot be modeled, but they can change the flow distribution and flood levels. Especially in small floods, such berm failures may cause significant increases in flood levels not reflected in modeling.

Due to these uncertainties, 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 Wilson River in the vicinity of the Highway 101 bridge is one exception. The model was unable to be calibrated here using the range of expected roughness values for a channel of its form. The observed high water marks and witness accounts show the bridge creates a large backwater effect the model had difficulty in replicating.

Plan development and construction cost estimating were conducted by HBH Engineers. Unit costs estimates were developed using recent bid prices, professional judgment and knowledge of local conditions.

Alternatives Evaluation

A variety of previously proposed and new projects were evaluated for flood reduction benefits. Each alternative was evaluated against project objectives using modeling results and preliminary cost estimates. A brief description of each alternative evaluated and it's flood control benefits is given below.

Habitat Restoration Projects

The Tillamook Bay and Estuary Feasibility Study completed by the Corps of Engineers in 2005 evaluated an initial list of 59 measures for habitat restoration and flood reduction benefits. After multiple rounds of screening and refinement, the final report evaluated three measures: The Hall Slough project and two alternatives for the Wetlands Acquisition Area. While these projects all had only small flood benefits in themselves, they provided useful information in the design process, and project elements were used directly or expanded upon in the First Flood Control Project

Hall Slough Project

The Hall Slough project consisted of a high flow inlet from the Wilson River and enlargement of Hall Slough through most of it length. The project had an estimated construction cost of $6.5 million and provided small flood reduction benefits, although it would have reduced nuisance flooding in the Highway 101 corridor up to a 2-yr flood. The project did not include any modifications to the Highway 101 Hall Slough crossing, which would add an estimated $2-3 million dollars to the cost.

Wetlands Acquisition Area Projects

The Wetlands Acquisition Area/Swale alternative consisted of a flood swale from upstream of Highway 101 leading down to a new levee and floodgate allowing tidal restoration of the Wetlands Acquisition Area. The Modified Wetlands Acquisition Area Project divided the public lands into a restored and non-restored portion in order to keep the existing flood conveyance corridor and not cause any increase in flood levels. A levee setback along Nolan Slough was also proposed.

A variant of the Modified Wetlands Acquisition Area Project was developed for a grant application submitted in the spring of 2009. This proposal had a slightly greater proportion of the area allocated to full tidal restoration, and greater flood gate capacity, but in major aspects was very similar to the Corps proposal. For all alternatives flood reduction benefits were small.

Blind Slough Project

The Blind Slough project was a scaled back project for restoration of a portion of the Wetlands Acquisition Area. Engineering work completed for this related to the Hall Slough- Blind Slough connection and Fuhrman Road were of particular importance in developing the proposed First Flood Control Project.

Upper Valley Projects

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. 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.

Highway 101 Crossings

Options to convey water under Highway 101 were also evaluated. It was apparent that any proposed structural modifications to the Highway would cost $2-3 million at a minimum, and flood level reductions were modest at best.

Dougherty Slough

The Dougherty Slough Inlet was inspected and several alternatives considered for replacement of the existing structure. It was concluded that the existing structure appears to be functioning well. Evaluation of restricting flows in the slough inlet showed little benefit for flows greater than the 5-yr level and beyond. Restricting flows causes a rise in the Wilson River. This increases overtopping depths over thousands of feet of bank, especially upstream. The net result is overbank flows downstream, and hence water levels, do not differ significantly with any of the alternatives evaluated. No flood control project was recommended here for this reason. It is recommended that an engineering evaluation of the structure be performed to ensure the cable net and deadman anchoring system provide sufficient strength to hold the log jam in place.

First Flood Control Project

The alternatives analysis and modeling created an understanding of Wilson River flood behavior, including why different options did or did not reduce flood levels. Further refinement of those options that were most effective led to the First Flood Control Project, which contained three recommended elements. Two of the elements contained design options with flood reduction and cost differences.

Southern Flow Corridor Alternatives

The largest and most important project proposed was the Southern Flow Corridor. The southeastern portion proposed 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 northwestern half of the Wetlands Acquisition Area further levee removals were proposed. Two options were presented (at the time of presentation they were called Project Exodus Alternatives 3 and 4). They differed in how the southern half of the Wetlands Acquisition Area was treated. The two alternatives share 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, resulting in differences in flood level reduction, habitat restoration benefits and construction costs.

South Bank Wilson River Berm Alternatives

Two berm alternatives were presented to address nuisance flooding that originates from the Wilson River upstream of the Shilo structure and flows west through homes and commercial properties across Highway 101. The first alternative was to construct a new berm tying in from the railroad grade fill downstream to the Shilo structure. The 1600 foot long berm would be engineered to resist overtopping and prevent overbank flows up to around a 5-year frequency flood.

The second alternative was to use a "guide berm" to still allow overbank flows through the area, but direct all the flow into Hall Slough rather than flowing west towards the highway. This berm would run south from the upper end of the Shilo structure and redirect flows that would otherwise flow west into Hall Slough. The upper end of the Hall Slough channel down to just past SR101 would be excavated in order to prevent a rise in water surface in this reach due to the increased flows.

The first alternative provided flood protection to homes along the south bank of the Wilson River, but caused a small rise in the river and on the opposite north bank. The second alternative showed no flood level increases, but had the potential for some adverse impacts to south bank properties. Estimated construction costs were roughly equal.

North Bank Wilson Project

This proposed project involves lowering a section of high ground in a pasture that acts as a low dam and causes backwater under Highway 101 and upstream.

Recommended Project

The First Flood Control Project was presented in a report dated July 29, 2009. The project was presented in person to the Design Team and Project Team on August 4. At the September 2, 2009 Design Team meeting the First Flood Control Project was discussed and the alternatives within it voted upon. The recommendation of the Design Team consisted of Project Exodus Alternative 4, South Bank Wilson River Berm Alternative 1, and the North Bank Wilson River Field Regrading. This was subsequently approved by the Project Team, and forms the recommended project as shown below.

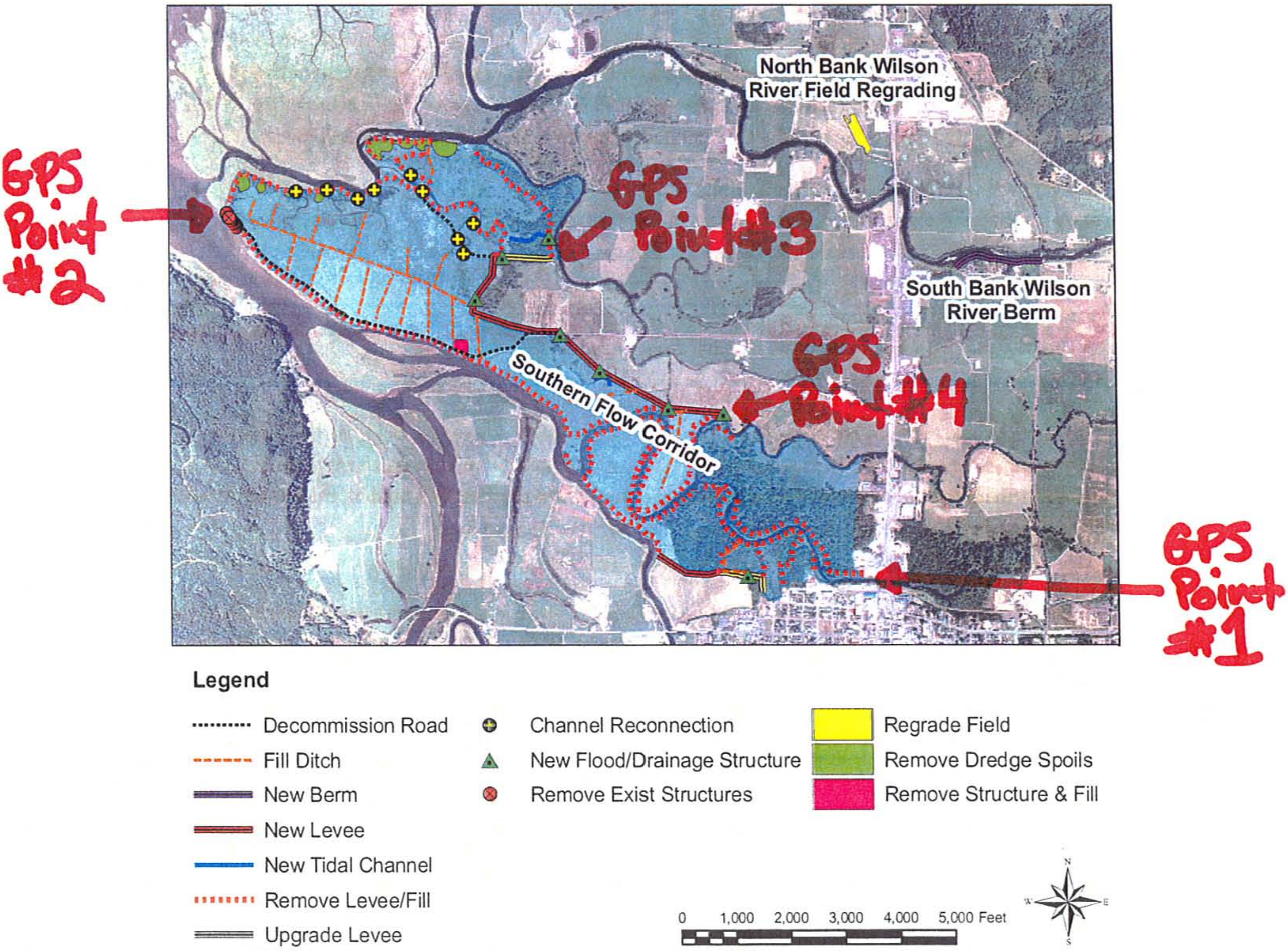

Figure 1: Project Exodus Overview

Project Elements

Southern Flow Corridor

The largest project element with the most extensive flood reduction benefits is the Southern Flow Corridor. This consists of removing the extensive levees and fill and constructing setback levees to create an unobstructed flood pathway out to Tillamook Bay.

Levee and Fill Removal

Removal of the numerous levees and fills within the flow corridor provides the conveyance capacity increase that results in reduction of flood levels over a wide area of the lower Wilson River floodplain. In general material will be removed to slightly below natural floodplain/marsh level. This elevation is around 8-9 feet at the mouth of the Wilson River, increasing to 10+ feet farther upstream. Lowering areas further than this could provide some additional flood level reduction, but the cost increase would be large and the benefits temporary as the tides and river will rebuild the lands back up to natural elevations.

Construction sequencing and methods are important in this task and are discussed further in the construction methods section. The removed fill will be used for the new levees if it meets geotechnical specifications, filling ditches, and any remainder spread on site to speed rebuilding to natural salt marsh elevations.

New and Upgraded Levees

9600 feet of new and upgraded levee will be constructed in order to protect adjacent agricultural lands from tidal influence in the project area. Most of the levees will be built to an elevation of 12 feet, with some adjustments where they tie into existing levees or high ground. This elevation was selected based on modeling various levee elevations – the goal is to build as low a levee as possible to pass river flood flows out while preventing high tides and coastal storm surges from getting in. The riverside of the northern levee will have a 5:1 slope in order to pass overtopping floodwaters with minimal damage. Construction will consist of stripping organic topsoils away, excavating any soft or unsuitable soils in the subgrade, compacting the subgrade and then constructing the levee proper. It is anticipated that the levee material specification will require a high fines content, which provides a more erosion resistant, less permeable levee. The levee will be topped with an all-weather crushed rock driving surface and have grass covered side slopes. On the bay side a bench consisting of organic strippings and debris will be placed to provide some protection from wave action that may occur.

New Floodgates

A series of floodgates will be incorporated in the new levee in order to replace the existing gates. The 10 existing 6 ft diameter round gates and four 6x12 foot side hinge gates on the spillway structure will be reused on replacement pipes and structures in the new levee. In addition, a new spillway structure will be constructed. Gate locations are distributed in existing relic tidal channels along the new levee alignment, primarily Blind and Nolan Sloughs. Additional gates will discharge directly into Dougherty Slough. Gate locations outside of channels are avoided to avoid burial as the site rebuilds to natural marsh levels. Flood flows will pass through the gates every second or third year, a sufficient frequency which should keep the channels open and able to convey flood flows out to the main river channels and bay.

Hall Slough Elements

Flood reduction requires improving the hydraulic connectivity between Hall and Blind Sloughs. This is will be accomplished by removing the Fuhrman Road berm and construction of a Hall Slough – Blind Slough connector channel. Additional work may be required depending on landowner negotiations regarding the road. Possible outcomes include road removal only, or constructing a bridge across the connector channel and armoring the road to withstand overtopping flows. For design purposes the latter option is assumed.

Some small improvements to the right bank levee along Hall Slough will also be made. The lands protected by this levee will generally receive the greatest flood level reductions of the entire project, however, it is possible that coastal storms could cause some small increases in high tide levels due to the more direct connection between the bay and Hall Slough created by the project. Filling several low spots in the existing levee where high tides currently overtop it are proposed to address this issue.

Drainage Network Improvements

Improvements to the existing drainage ditches inside the new levee will be made as necessary to connect them to the new floodgates and ensure that equal or better drainage is maintained once the project is implemented. This will be a relatively minor project component consisting of cleaning existing ditches and excavating some new connector segments near the new levee.

Habitat Restoration Elements

Habitat restoration activities will generally be limited to removing constructed features that would impede the free exchange of tides within the project. The natural processes linked to the tides will bring in the water, salinity, sediment, and seeds that will initiate restoration.

Existing ditches will be filled with onsite materials in order to ensure natural tidal channels can develop without being short-circuited by the linear ditches. Existing relic tidal channels will have plugs and culverts removed to allow full tidal access. The few roads on site will have any crushed rock or large gravel surfaces removed and the roadbed de-compacted. Self regulating tidegates for fish access to a few small areas with habitat behind the new levee will be included.

South Bank Wilson River Berm

The purpose of the proposed berm is to reduce the frequency at which flows overtop the south bank of the Wilson River and then flow westerly through the commercial strip along Highway 101 between Hall Slough and the Wilson River. Implementation of the Southern Flow Corridor will lower backwater flood elevations on the highway itself, this project will eliminate the nuisance flooding that occurs just east of the highway.

The berm will tie in from the railroad grade fill downstream to the Shilo structure. The 1600 foot long berm would be engineered to resist overtopping by constructing a 5:1 backslope and using compacted cohesive fill materials. It would be set at an elevation to prevent overbank flows up to around a 5-year frequency flood, although this threshold can be adjusted during the design phase. Wherever possible, it would be setback from the top of the river bank and vegetation on the riverbank preserved. Where there are structures close to the berm it would be elevated so overtopping flows are not directed at foundations. No riverbank armoring is proposed unless areas of instability are identified. The berm begins along a straight reach and most of the lower end is on the inside of a gentle bend, so erosive forces against the bank here are less than those seen by the Shilo structure downstream.

The proposed South Bank Wilson River berm and existing Shilo structure will function as a single flood control project between the railroad and Highway 101, benefiting the homes and businesses east of 101. While considered a training structure designed to help turn the river, repeated emergency work and repairs have resulted in it functioning as a levee, although it was not designed as such. Levees increase river levels and can consequently cause greater damages than would happen naturally if they fail. The existing Shilo structure has a number of deficiencies that should be addressed, including toe protection, oversteepened slopes and inappropriate fill materials. It is recommended that appropriate repair and reconstruction of the Shilo structure be undertaken in the near future, either as part of the new berm construction or independently. This should be given priority over construction of the new berm if necessary.

North Bank Wilson River Field Grading

This project lowers an area of high ground within a pasture that causes backwater effects through Highway 101 and upstream. It provides flood level reductions and also mitigates the effects of the proposed South Bank Wilson River Berm in the area. This is a simple earthmoving project. Topsoil would be cleared to the side, the earth underneath removed to lower the field and the topsoil replaced to allow continued agricultural use. The soils could possibly be spread out onsite and tilled into the fields, used to fill low areas of nearby fields, or removed if necessary.

Flood Reduction Benefits

Flood level reduction and increases for the 2001 (~ 1.5 year), 1999 (~5-year) and 100-year floods are shown in the following figures. It can be seen that the project provides flood level reductions across most of the lower Wilson River floodplain at all sizes of floods. Some small flood reductions extend up the Tillamook and Trask systems.

Areas of Flood Level Increases

Flood level rises due to the project are predicted in several areas. Construction of the South Bank Wilson River Berm is predicted to cause up to 0.2 ft rise in the Wilson River channel in 100-yr flows. The increases in flood level drive more water overbank and cause increases in flood levels, primarily across the river to the north, but also in a small area south of the channel ("A" in Figures 2-4). The proposed Field Grading project lowers flood levels in the vicinity of and upstream of Highway 101, but areas farther upstream and downstream of this continue to see rises. The adverse impacts shown from the South Bank project are based on the assumption that there is essentially no berm currently in place. If in fact substantial portions of this area of the South Bank already have a berm, then some of the impacts due to a complete berm are already occurring. Therefore the portion of the flood level increase attributed to this project would be reduced.

The other area with predicted rises is just inside the new levee system north of the southern flow corridor ("B" in Figure 2). This area is benefited under current conditions by the large flood storage volume available in the wetlands acquisition area. In smaller, more frequent floods, flows between Hall and Dougherty Sloughs will now fill the reduced storage volume more rapidly. Although the new levee will have substantially larger flood gate capacity, these will not begin to operate until water levels inside exceed those outside, so water levels will quickly rise to somewhat above the flood/tide level outside. At this point the flood gates will begin to operate and discharge water out. This increase is only shown in the 2001 flood – by the 1999 flood (~5-yr event), the project is providing flood level reductions here.

Flood Level Mitigation Options

If some portion of the proposed project falls within the FEMA floodway then it cannot cause a rise in a 100-yr flood (zero-rise rule). The federal flood code does contain a clause allowing communities to implement projects that cause rises in the floodway with appropriate public notice and other requirements. This is rarely used and guidance from the regional FEMA office on the viability of this approach is needed.

However, under the current flood mapping the FEMA floodway is generally confined within the channel boundaries and it appears that the South Bank Wilson River berm can be built outside the floodway. Under standard FEMA regulations, rises of up to one foot may be created by projects outside the floodway. New flood maps will be released shortly for Tillamook County which may change this assessment if floodway boundaries are significantly changed.

If there are no regulatory requirements regarding the rise then it is the communities decision how to address it. Given that flood levels are generally lowered throughout most of the floodplain; flood level increases are relatively small; and increases occur in areas with few structures, the community may choose to accept the rise. The areas that show these rises, which are up to around 0.25 feet may be able to be addressed by some simple regrading similar to that proposed on the North Bank Wilson River. This has not been investigated further at this time and will require some ground survey work to do so.

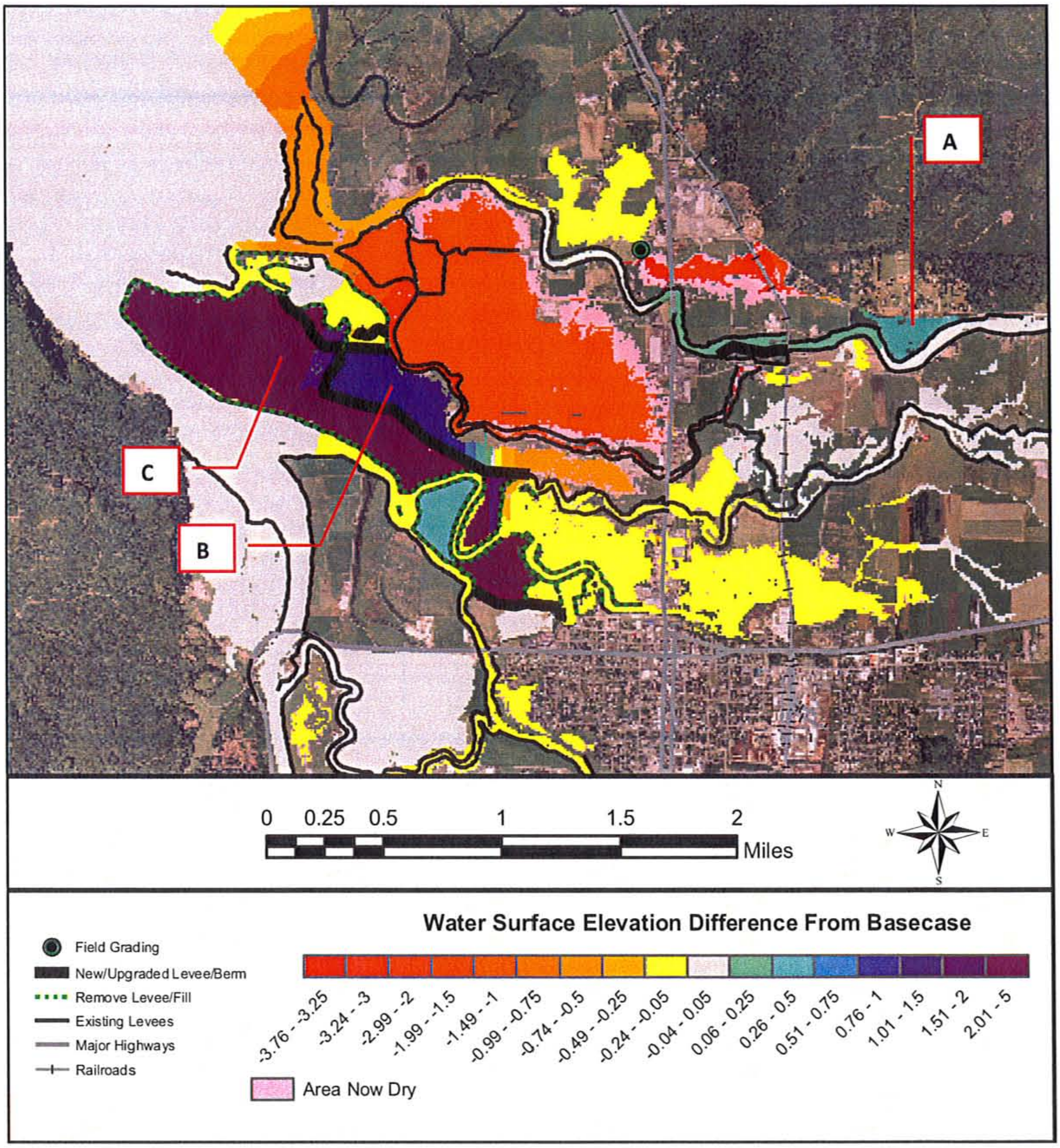

Figure 2: Changes in Flood Levels, 2001 Flood (1.5 yr Flood)

Note: "A" and "B" indicate areas of flood level rise due to project within protected areas. Area "C" shows a rise because as part of the southern conveyance corridor it is fully open to tidal influence.

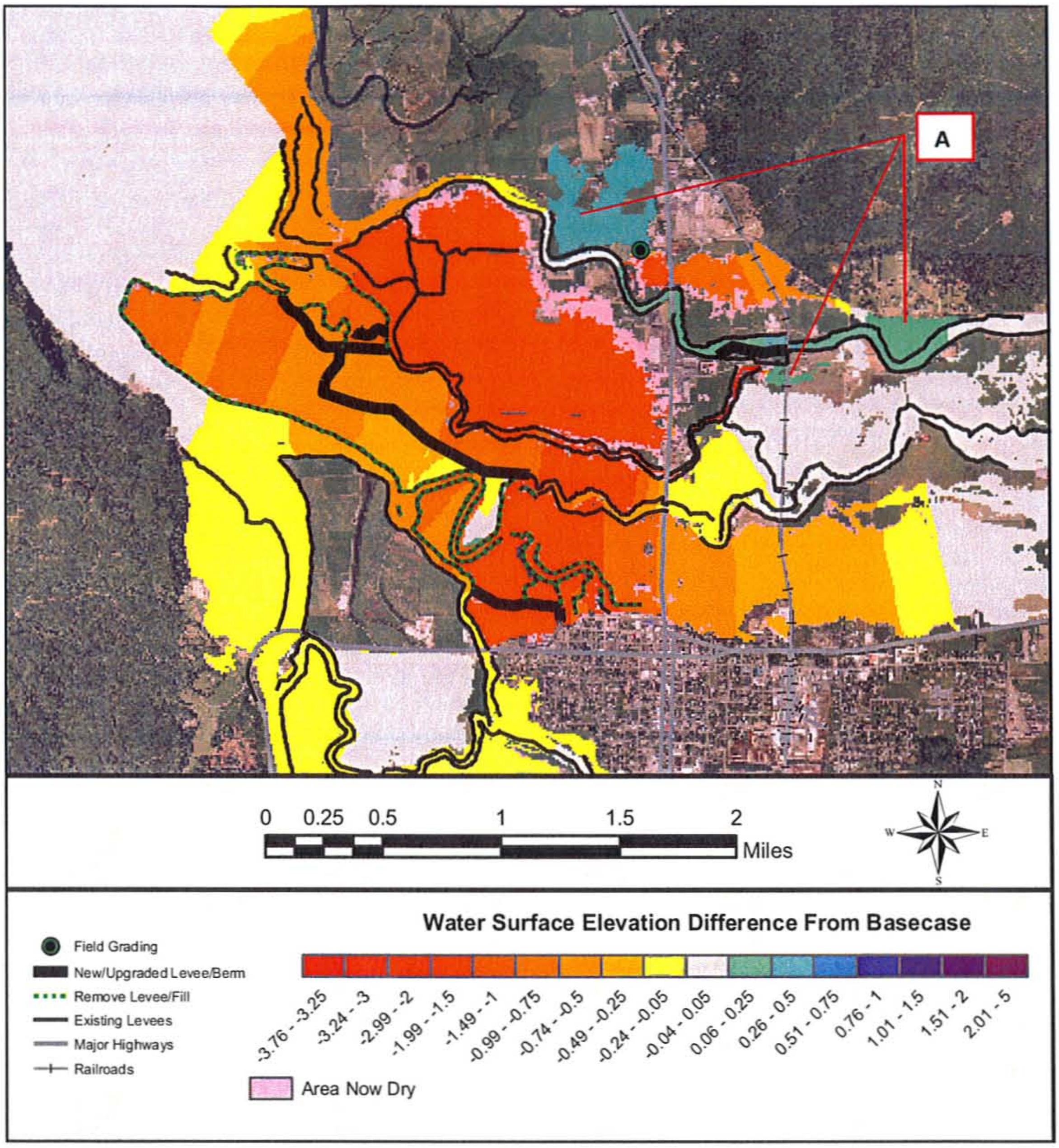

Figure 3:Changes in Flood Levels, 1999 Flood (5-yr Flood)

Note: "A" indicates areas of flood level rise due to project.

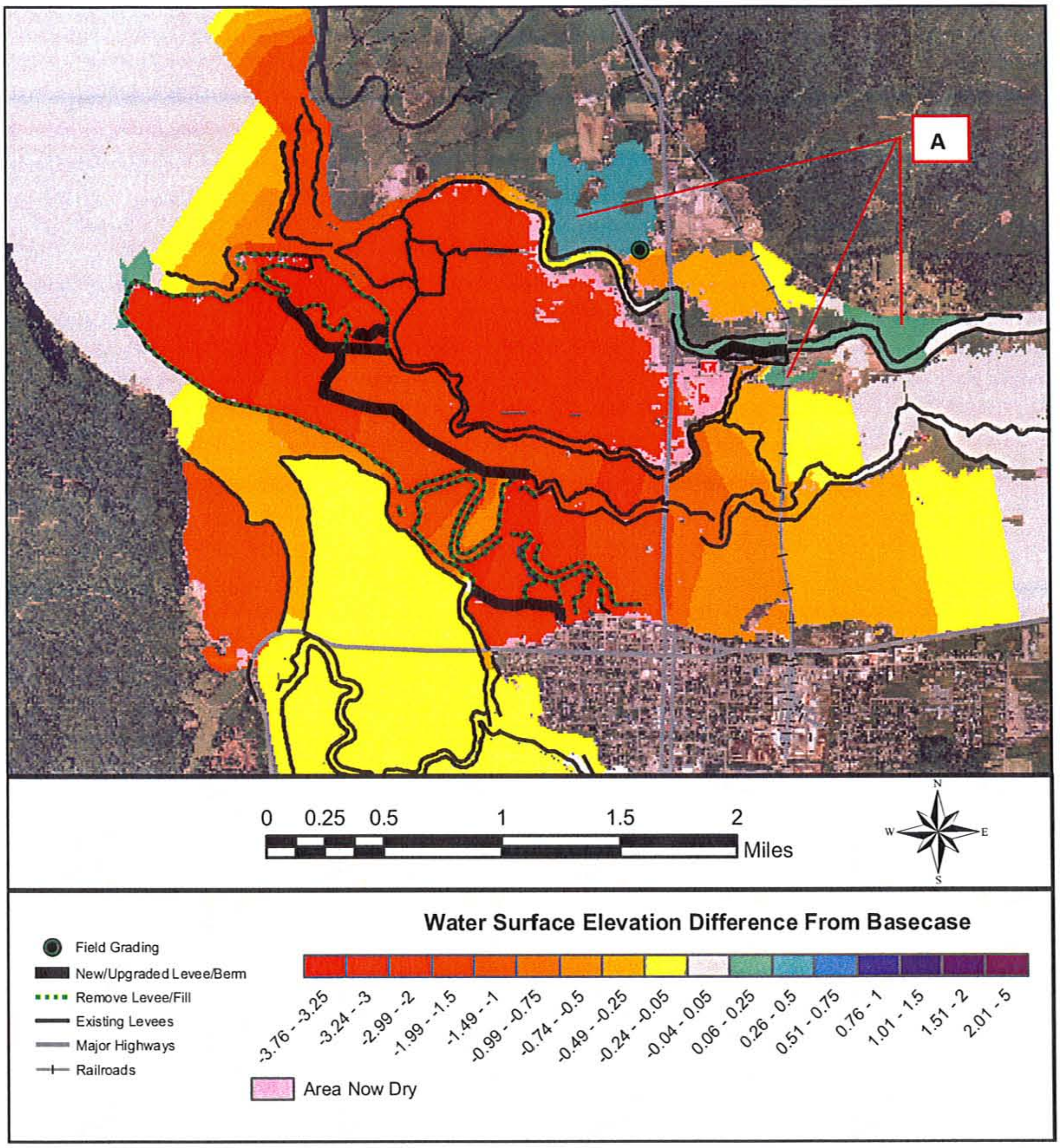

Figure 4:Changes in Flood Levels, 100-yr Flood

Note: "A" indicates areas of flood level rise due to project.

Construction Costs

Estimated construction costs are summarized in the following table; details are at the end of the report.

Item	Southern Flow Corridor	South Bank Wilson River Setback Berm	North Bank Wilson River Field Grading
Construction Costs	**$4,812,400**	**$580,360**	**$194,200**
Engineering, Admin, Permitting, Legal @ 18%	$926,232	$104,465	$34,956
Subtotal Project Costs	**$5,738,632**	**$684,825**	**$229,156**
25% Contingency	$1,434,658	$171,206	$57,289
Total	**$7,173,290**	**$856,031**	**$286,445**
Total Project Costs			**$8,316,000**

For the Southern Flow Corridor uncertainties include the amount of additional fill that may be required for levee settlement in soft soils; the suitability of the existing levees for the proposed upgrades; and the amount of existing onsite fill that can be used for new levees while still keeping perimeter tidal protection during construction. It is recommended that only contractors with prior experience in tidal marsh restoration be allowed to bid to minimize risk of cost overruns due to working with heavy machinery in a tidal wetlands environment.

The South Bank Wilson River Berm project cost uncertainties are also fairly large. If some properties already have berm segments that meet design standards costs could be reduced. Earthwork quantities are based on lidar survey, which is of poorer quality here due to the dense tree and brush cover. Ground survey, existing berm evaluations, and berm alignment decisions made in concert with individual landowners are needed in order tighten the cost estimate.

The North Bank Wilson River Field Grading project has the smallest overall project cost and the least uncertainty due to its simplicity and confidence in the lidar data in open fields.

The majority of construction costs are related to earthmoving. Construction costs have fluctuated significantly in recent years, from very high costs due in part to high diesel prices several years ago to very favorable bids typically being received currently due to the poor economic climate. Costs presented here contain a 25% contingency in part to allow for this uncertainty.

Real Estate Needs

Real estate needs for the project by element are discussed below, including the types of easements that might be appropriate for various parcels. The actual form of real estate rights acquired and acreages of private lands used will depend on negotiations with individual landowners. No cost estimates have been developed for real estate needs.

Southern Flow Corridor

Real estate needed to implement this element is summarized in the figure below. 377 of the 384 acres of public lands in the project area (the Wetland Acquisition Area) are used for flow conveyance and habitat restoration.

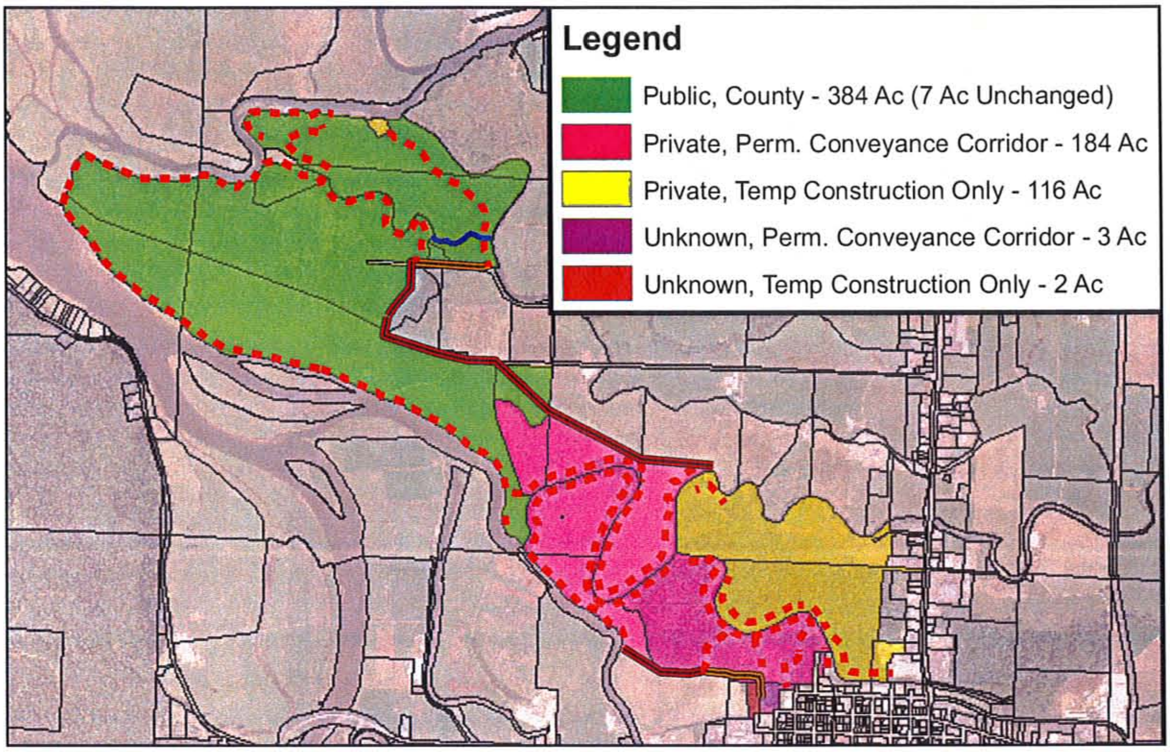

Figure 5: Southern Conveyance Corridor Real Estate Needs

Of the 184 acres of private lands needed for permanent conveyance, 116 acres are in agricultural production. Removal of the levees will expose these lands, much of which has subsided by 2-3 feet, to the tides. The lower portions of the lands will be inundated frequently, and the highest portions will see at least monthly high tide flooding. Whether or not the lower areas will be able to support any vegetation initially is unknown; these areas may convert to mudflats initially, then rebuild over time to elevations that will grow vegetation. 68 acres of private lands bordering Hoquarten Slough currently support forested wetlands; some have at least a partial hydrologic connection to the river system and are within the regulatory floodway.

There are several additional private properties totaling 116 acres between Dougherty and Hoquarten Sloughs that are mostly forested wetlands fully connected to the river system, but which contain remnant levee segments and fill that block conveyance. The fill is proposed to be removed from these properties, but there will be no change in normal flow hydrology on them due to the project. These parcels are also in the floodway, and so already contain inherent conveyance protection regulations on them. Subject to landowner approval, only temporary construction easements to remove the fill may be necessary on these lands.

The Fuhrman property of 2.5 acres includes a roadway access paralleling Hall Slough. For this project, the berm protecting the road is proposed for removal, the roadway upgraded to withstand overtopping, and a bridge constructed across the Hall Slough – Blind Slough connector channel. Inherent in this is the assumption that the existing house remains and the owners wish to retain access to it. If this property could be acquired then the project would only require the house and berm be removed. The decision whether or not to install the bridge and keep the road would likely depend on options for recreational access.

South Bank Wilson River Berm

The berm alignment will run across 7-8 private properties with 5-6 landowners. Alignments will vary by property depending on existing structures and negotiations with landowners. Permanent flood control easements will need to be obtained for operation and maintenance of the berm. It is assumed the easement will extend from the landward toe of the berm to the river channel in order to give the easement holding agency rights to repair the bank in the future should erosion threaten the berm. Landowners will benefit from reduced flooding and maintenance of the berm by a public agency.

North Bank Wilson Field Grading

A temporary construction easement from a single landowner will be needed to perform the work. It is recommended that a permanent flood conveyance easement also be obtained to ensure the flow path is not blocked in the future unless the pending flood maps add this area into the floodway.

Permitting

No major permitting hurdles are anticipated for Project Exodus. The Southern Flow Corridor has large ecosystem restoration benefits, and by itself would likely qualify for a streamlined restoration permit, based on work developing the April 2009 grant application for a smaller restoration of the Wetland Acquisition site. The North and South Bank Wilson River projects do not propose work below the ordinary high water line of the river, but may impact some small areas of wetlands and should have little if any long-term environmental consequences. If the Shilo structure repair is with the South Bank berm project in-water work will be required.

The actual permit pathway selected will depend on whether the entire project is developed at once or broken into separable elements and implemented over time with individual permits. In any scenario, the environmental benefits of the project as a whole are believed to far outweigh the costs. The full participation of regulatory agencies in the Oregon Solutions process and their familiarity with the Wetlands Acquisition area and proposed project will also help to streamline the permitting process. The agencies and permits that will be required for this project are as follows:

Corp of Engineers & Oregon Division of State Lands - Joint Fill and Removal Permit – Work below the ordinary high water line or in wetlands requires a Joint Fill and Removal permit from the U.S. Army Corps of Engineers and the State of Oregon. The north and south bank Wilson River projects appear to be entirely above the OHWL and so will require a wetlands survey to determine if they require this permit or not. The Southern Flow Corridor element is almost entirely within the OHWL and will definitely require the permit.

The Southern Flow Corridor has been designed to qualify under the Federal Nationwide Permit (NWP-27) and the General Authorization under the State of Oregon Removal-Fill Law. These programs are designed to streamline the permitting process for restoration activities. The NWP-27 authorizes the restoration of former tidal waters, the enhancement of degraded tidal wetlands, and the creation of tidal wetlands. The NWP-27 provides authorization for all wetland creation activities, provided those activities comply with the terms and conditions of the NWP-27.

Oregon´s Removal-Fill Law also allows the Oregon Division of State Lands to grant, by administrative rule, General Authorizations for removal and fill activities that would cause only minimal individual and cumulative environmental impacts, and would not result in long-term harm to water resources of the state. To be eligible for this General Authorization, the project must be for the specific purpose of wetland restoration. The Southern Flow Corridor element meets the type of projects allowed, criteria and specific authorized activities.

National Marine Fisheries Service – Slopes IV Restoration

The Southern Flow Corridor has been designed to comport with NOAA Fisheries restoration programmatic biological opinion (SLOPES IV). The project meets the requirements of SLOPES IV as it applies to the Oregon Coast Coho salmon (*Oncorhynchus kisutch*). All of the proposed actions are within the range of anticipated effects considered in SLOPES IV. SLOPES IV Restoration identifies and authorizes nine categories of action related to stream restoration and fish passage. This project is limited to five of these categories - Fish Passage Restoration, Off- and Side-Channel Habitat Restoration, Set-back Existing Berms, Dikes, and Levees, Streambank Restoration, and Water Control Structure Removal

Other Permits

The Joint Fill and Removal permit will trigger the following state agency actions during the public review process. Agency comments will condition the permit as per each agency's requirements.

Oregon Division of State Lands - Wetland Determinations and Delineations

For projects proposed in wetlands, the state removal-fill permit application requires that wetland delineation be completed and verified or "concurred with" by DSL before the permit can be issued.

Oregon Department of Fish and Wildlife

In-Water Timing Guidelines: The in water work window for Tillamook Bay is November 1 – February 15 and July 1 – September 15 for the Wilson and Trask Rivers. In all likelihood, this project will incorporate work that falls into both timeframes.

Fish Passage Requirement: The owner or operator of an artificial obstruction located in waters in which native migratory fish are currently or were historically present must address fish passage requirements prior to certain trigger events. Artificial obstructions include dams, diversions, roads, culverts, tide gates, dikes, levees, berms, or any other human-made device placed in the waters of this state that precludes or prevents the migration of native migratory fish.

Habitat Mitigation Recommendation :ODFW recommends mitigation for projects where loss of fish and/or wildlife habitat is expected. The purpose of the Fish and Wildlife Habitat Mitigation Policy is to create consistent goals and standards to offset the impact to fish and wildlife habitat caused by land and water development projects. The policy provides goals and standards for general application to individual development projects.

Oregon Department of Land Conservation and Development

Coastal Zone Management Act Consistency Certification: Oregon has a federally approved coastal management program. This program generally applies within the state's coastal zone, extending from the boundary of the territorial sea to the crest of the coast range. Projects requiring a federal license or permit within this area must be consistent with the enforceable policies of the coastal management program.

Oregon Department of Environmental Quality

1200-C Storm Water Permit: A 1200-C Construction Stormwater National Pollutant Discharge Elimination System (NPDES) Permit regulates stormwater runoff from construction activities that disturb one or more acres of land. The permit requires permit holders prepare an Erosion and Sediment Control Plan and incorporate Best Management Practices into their construction work.

401 Water Quality Certification: A 401 Water Quality Certification (WQC) is required as a component of any federal action that has the potential to result in a discharge to waters of the state, including Joint Fill and Removal Permit (USACE/ODSL).The intent is to provide reasonable assurance that permitted activities will not violate state water quality standards, as approved by U.S. Environmental Protection Agency (EPA), and therefore will not impair water quality or beneficial uses of waters of the state (including wetlands).

Tillamook County Development Permit

This project will require coordination with the local government to ensure that land-use planning requirements are met. Most state agencies rely on a Land Use Compatibility Statement (LUCS) signed by a local planner indicating that the project is consistent with the applicable local planning requirements. A development permit will also be required for construction within a mapped floodplain. The South Bank Wilson River Berm project causes a rise in 100-yr flood levels in some areas which may have flood hazard regulation implications; this is discussed further in the section on flood reduction benefits.

Final Design and Construction

Plans and Specifications Development

The next step is to obtain the necessary information needed for full plan development. Key tasks will include ground survey and detailed field inspection of all sites. A geotechnical investigation of the new levee alignment will be required, including some borings and test pits. Completion of these tasks will give greater certainty to quantity and cost estimates. Real estate issues should also be resolved at this stage and all easements defined for plan layout. The 30% plan set will contain all information needed to support permit submittal. Plans will be developed to the final stage based on several engineering and permit review cycles.

Construction

Construction sequencing is critical for implementation of the Southern Flow Corridor. While the existing levees and fill are desired for use in the new levee and ditch filling, the site must also remain protected from tides until this work is substantially completed, along with other interior work such as road decommissioning. If acceptable to permitting agencies, fish exclusion and repair and removal of tidegate mitigation devices will be done prior to beginning construction in order to temporarily dry the site out and make equipment access possible to the wetter areas, primarily for ditch filling. As much as possible the levees and fill will be removed while keeping the perimeter tidal protection in place. Strategies may include lowering levees to just above summer high tide levels entirely and removing the insides of levee while leaving a narrow berm on the outside.

Once the new levee and flood gates area constructed and all other interior work completed, the remaining existing levee fill can be removed. Ultimately the levees must be breached, at which point removal of the remaining fill becomes much more difficult. The plan calls for removal of virtually all of the existing levees and fill in the project area. Final excavation will require working within tide cycles, working back out of the project site without the benefit of loop haul roads and more difficult sediment control measures.

The North and South Bank Wilson River projects do not have the same tidal issues and construction should be relatively straightforward on these two projects.

Maintenance and Operation

Long term maintenance costs are expected to be lower with implementation of the project. Around 45,000 feet of levee, including 30,000 ft that run along river channels and are exposed to higher erosive stresses, will be replaced with 9600 feet of new wider, better constructed levee, very little of which is near any channel. The new floodgates will all be constructed of corrosion resistant materials and have a longer life span than the numerous older steel culverts now in use.

The jurisdiction maintaining the South Bank Wilson River berm should ensure that homeowners do not begin informally elevating the berm – this often occurs during floods when sandbags are added and not removed. Over time this results in greater risk of berm failure.

Separable Elements

Due to the size and complexity of the project implementation may be phased over a period of years. A separable element is the smallest project piece that may be constructed without causing adverse impacts. The Southern Flow Corridor and North Bank Wilson Field Grading project are separable elements. The South Bank Wilson River Berm is not considered a separable element. Due to the increases in flood levels in the Wilson River proper and on the north bank, it should not be implemented until the North Bank Project is completed.

Construction considerations permit some further division of separable elements. First, the Southern Flow Corridor can be divided into several logical areas for independent implementation as shown in the next figure. The two southeastern separable elements ("A and B" in Figure 6) are a smaller portion of the construction budget, but are all on private lands. The northwest area ("C" in Figure 6) comprises the bulk of work, and cannot readily be divided further without building temporary cross levees that would in themselves cost hundreds of thousands of dollars. Implementation in this area is more expensive, but also provides much greater environmental benefits, and the majority of land is already in public ownership.

Modeling results show that there is no one "chokepoint" that causes most backwatering effects, rather each cross levee and obstruction in the corridor incrementally adds to the backwater effects. This means there is no one area that needs be a priority due to flood reduction benefits; factors such as available funding or land rights can be used to decide sequencing of implementation.

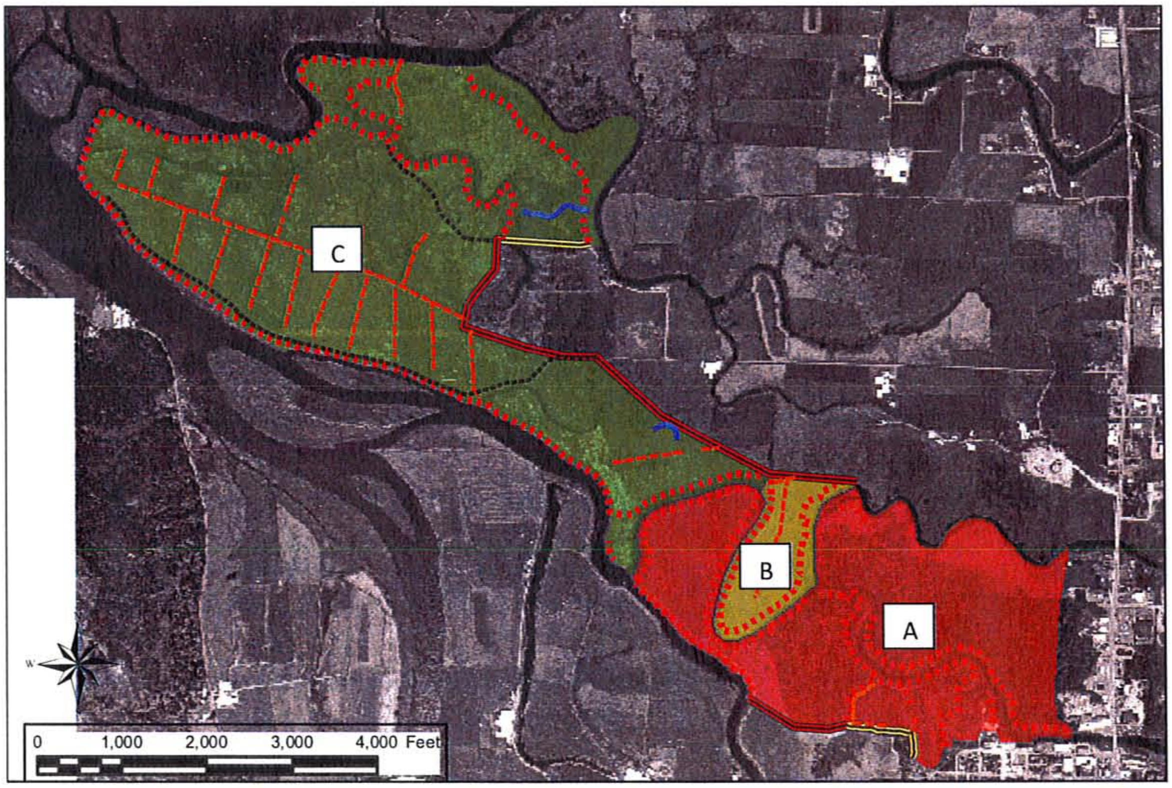

Figure 6: Southern Conveyance Corridor Separable Construction Elements

The South Bank Wilson River Berm could also be constructed in phases or a piecemeal fashion if funding or real estate issues prevent implementation in one phase. If this is the case it is recommended that the focus be put on the downstream end first; it is here that most or all of the water that flows west to 101 originates from.

Long Term Changes in the Southern Flow Corridor

Restoration of tidal flows to the project site will initiate significant long term changes in the lands that have been protected by the diking system for decades. Most of the freshwater wetland and pasture vegetation within the Wetlands Acquisition Area will not be able to tolerate the saline waters that will enter the site and will quickly die off. Given that the site is subsided by several feet, the lands will initially convert to low marsh or even mud flat habitats. Lower portions of the spruce forest in the northwest corner will also likely die off, either through salinity or simply higher water levels. Forested wetlands along the southern project boundary near the City may also see die off due to higher water levels once they are not protected by dikes. Recent sampling of Hoquarten, Dougherty and Hall Sloughs by TEP showed little to no salinity, indicating the project site is located in the transition zone between freshwater and saltwater tidal habitats. Vegetation within the project areas farther from the bay may not see saline or brackish waters.

Removal of the dikes combined with daily high tides and river flows will immediately begin bringing sediment onto the site. Ultimately it is expected the lands will rebuild from their current subsided condition up to high marsh, which around the project site typically sit 1-2 feet higher than MHHW. Rates of marsh building are difficult to predict, but are expected to occur on the timescale of decades. The abundant sediment supply and proximity to the rivers should help to accelerate the process. Areas close to the river and connected tidal channels will rebuild quicker, while more distant ends of the site will receive less sediment and accrete slower.

Channel changes due to the project are expected in several areas. Blind Slough will undergo enlargement as it becomes an important flood flow channel, conveying flows both from new floodgates in the levee and from the Hall Slough connector channel. Other relic tidal channels within the wetlands acquisition area will also adjust as they begin to convey tidal flows in and out of the site again.

Some lateral movement and change of the main river channels can also be expected where rock armoring is removed. Where this is acceptable will depend in part on the type of real estate rights obtained on private properties within the Southern Flow Corridor. Channel migration is expected to be relatively small based on historic patterns.

Sustainability of Flood Level Reduction Benefits

The ability of Project Exodus to continue providing flood reduction benefits under changing conditions was tested for two scenarios using the 1999 (5-yr flood). Simulating lands in the upper conveyance corridor had rebuilt to natural floodplain levels resulted in minimal changes to project performance. Of greater concern is long term sea level rise. The current IPCC predictions for global sea level rise by 2100 are from 0.6 to 2 feet. Model runs of the 1999 (5-yr flood) with tidal sequences one and two feet higher than observed were performed. Flood level reductions due to Project Exodus persisted in most of the area with the one foot rise, but were not seen with a two foot rise due to the tidal backwater extending through the area.

Additional Issues

In the course of developing Project Exodus, several flooding issues became apparent through review of past reports, conversations with various stakeholders and the technical analysis. These issues were not appropriate for or relevant to the project itself, but are suggested for consideration in the larger floodplain management context.

Sea Level Rise

The Highway 101 corridor between Hoquarten and Dougherty Sloughs is in the lowest area of the floodplain. Flood flows will continue to overtop the south bank upstream and flow down and over the highway here at significant depths. The proposed project will not change the frequency at which this happens, only the levels to which the floodwaters reach.

In addition, the land is now at elevations only 1-2 feet above wintertime high tides and is open to tidal influence via the sloughs that bound it. Projected sea level rises will result in wintertime high tides and storm surges inundating the highway corridor itself in the future. It is not cost feasible to reduce upstream flood flows – to do so would require a levee system along the entire Wilson River to the mouth of the canyon-, nor can levees or fill be used to protect against increasing sea levels as these would block the flood flows. Beyond implementing Project Exodus, either relocation or elevation with flow-though foundations appear to be the only viable alternatives for flood mitigation of structures in this area.

The farmlands west of Highway 101 depend on the levee system to protect them from tides. Much of the land has subsided and now lies below mean high tide elevations. Projected sea level rises will require these levees to be raised for tidal protection, but to do so will increase flood levels upstream. Of greatest concern here will be the levee along the north bank of Hall Slough. This is currently set as low as it can be while providing tidal protection. Elevation of this levee would cause increased backwater flooding on Highway 101 between Hall Slough and the Wilson River.

Some of the lands along Highway 101 north of Hall Slough are also at low elevations and at risk to sea level rise and levee raising along Hall Slough. However, the area rises quickly towards the Wilson River, and does not have the large, deep flows across it as the area to the south does. There are more options for adapting to sea level rise in this area without causing adverse effects elsewhere.

The National Flood Insurance Program regulations require minimum elevations structures may be built at based on current risk, even where it is likely future risk may be substantially higher during the life of the structure. It is recommended that the City and County consider setting a minimum building elevation standard based on projected sea level rise rather than current flood maps. For the Wilson River this would impact portions of the Highway 101 corridor and the lands west of it.

Sediment Monitoring

The effects of bedload sediment on flood levels have long been a concern on the Wilson River and in Tillamook Bay and will likely continue to be so. It is recommended that a program to regularly re-survey selected cross sections in the Wilson River be initiated. The purpose would be to provide quantitative data on channel changes in order to support future discussion on what actions, if any, might be needed to address sedimentation. The surveys should be performed every 2- 5 years. In addition, each bar immediately downstream of the bars permitted for gravel extraction under the recently approved Mediated Gravel Agreement should be completely surveyed. Growth or reduction of these bars over time, combined with extraction records, will provide valuable information on overall sediment budgets and the proportion of bedload being extracted versus passed down the system.

Berm System

As with most rivers, the levee and berm system along the Wilson River has a significant effect on flood levels and behavior. The current level of flood protection for the majority of land, buildings and infrastructure in the valley, including the Highway 101 corridor, depends on an assemblage of privately built and maintained berms of varying quality. Flood levels along the river do not differ greatly under different flows – the difference between a 5-yr and 100-yr flood is less than 1 foot for much of the reach-, so floodwaters that overtop the south bank flow at relatively shallow depths regardless of flood magnitude. As these overbank flows join and flow west in the lower southern edge of the floodplain the difference in depth become greater. On Highway 101 at Hoquarten Slough, the difference in flood level between a 5-yr and 100-yr flood is almost 3 feet. Having a significant breach in a berm increases floodplain flows and flood levels. For instance, this may cause flood levels expected for a 10-yr event to occur during a 5-yr flood.

The flood reduction benefits due to these berms extend beyond the properties they are built on. Conversely (see the discussion of the impacts of the proposed South Bank Wilson River Berm), these structures can cause increases in flood levels that extend well beyond their immediate location. Therefore it is recommended that the local community develop way to improve the quality of construction and maintenance of the entire berm system, and ensure that any new or raised berms or levees are properly analyzed as part of the permitting process.

Preliminary Cost Estimates

SOUTHERN FLOW CORRIDOR

Item No.	Item	Unit	Quantity	Unit Price	Total Amount
1	Mobilization, Bonding, Insurance, Demobilization @ 5%	LS	1	$62,000	$62,000
2	Clearing & Grubbing	LS	1	$36,000	$36,000
3	Construction Staking	LS	1	$24,000	$24,000
4	Construction Compaction Testing	LS	1	$24,000	$24,000
5	Erosion Control Measures	LS	1	$58,000	$58,000
6	Filter Fabric at Levee Base	SY	42,000	$2.60	$109,200
7	Strip and Haul Organics Offsite from Levee Base	CY	16,000	$14	$224,000
8	Strip and Spread Organics on Levee Face	CY	12000	$11	$132,000
9	Temporary Access Road Aggregate Base Improvements	CY	8,000	$22	$176,000
10	Temporary Access Road Pavement Repair	TON	250	$90	$22,500
11	Remove Old Levee and use in New Levee Core (short haul)	CY	40,000	$22	$880,000
12	Haul Excess Material from South Levees Offsite	CY	10,000	$14	$140,000
13	Haul in Material for New Levee from Spoils Pile	CY	34,000	$28	$952,000
14	Construction Fencing/Protection	LF	15,000	$3	$45,000
15	Levee Finish Slopes	LS	All	$40,000	$40,000
16	Levee Roadway Aggregate Base (12" depth) (7320 lf x 12' wide)	CY	3,300	$22	$72,600
17	6' Diameter Culverts with Top Hinge Tidegate (70' length)	EA	10	$40,000	$400,000
18	6' Diameter Culverts with Reuse Tidegates	EA	10	$30,000	$300,000
19	New Flood Structure	EA	1	$400,000	$400,000
20	New Flood Structure, Reuse Flood Gates and Tide Gates	EA	1	$300,000	$300,000
21	Demo Existing Structure, and Culverts	LS	1	$12,000	$12,000
22	Removal of Plugs/Tidegates, Disposal of Rubbish, Tires	LS	1	$24,000	$24,000
23	Install Woody Debris	LS	1	$70,000	$70,000
24	Install Organics/Fill Low areas	LS	1	$52,500	$52,500
25	Construction Fencing/Protection	LF	10,000	$3	$30,000
26	Floating Sedimentation Fences	LS	1	$50,000	$50,000
27	Excavate Swale at Fuhrman Road and Spread on Levee Sides	CY	1,100	$14	$15,400
28	Temporary Dewatering	LS	1	$28,000	$28,000
29	Armor Protection	CY	400	$20	$8,000
30	RR Flatcar Bridge on Fuhrman Road	EA	1	$120,000	$120,000
31	Fuhrman Road Upgrade for Bridge Delivery	CY	200	$26	$5,200
	Subtotal Construction Costs				**$4,812,400**
	Permitting				$60,000
	Engineering, Administration, Legal @ 18%				$866,232
	Subtotal Project Costs				**$5,738,632**
	25% Contingency				$1,434,658
	Total Project Costs				**$7,173,290**

SOUTH BANK WILSON RIVER SETBACK BERM

No.	Item	Unit	Quantity	Unit Price	Total Amount
1	Mobilization, Bonding, Insurance, Demobilization, Traffic Control	LS	1	$32,000	$32,000
2	Clearing and Grubbing (Haul Offsite)	CY	7600	$14	$106,400
3	Construction Staking	LS	1	$12,000	$12,000
4	Compaction Testing	LS	1	$12,000	$12,000
5	Erosion Control Measures	LS	1	$21,000	$21,000
6	Filter Fabric at Base of Levee	SY	11500	$2.50	$28,750
7	Strip and Spread Organics on Levee Face	CY	4030	$11	$44,330
8	Temporary Access Roadway	CY	760	$22	$16,720
9	Gravel Road on Top of Levee	CY	630	$22	$13,860
10	Haul in Material for New Levee and Earthwork	CY	9600	$28	$268,800
11	Construction Fencing/Protection	LF	3400	$2.50	$8,500
12	Levee Finish Slopes	LS	1	$16,000	$16,000
	Subtotal Construction Costs				**$580,360**
	Engineering, Administration, Legal @ 18%				$104,465
	Subtotal Project Costs				**$684,825**
	25% Contingency				$171,206
	Total Project Costs				**$856,031**

NORTH BANK WILSON RIVER FIELD GRADING PROJECT

No.	Item	Unit	Quantity	Unit Price	Total Amount
1	Mobilization, Bonding, Insurance, Demobilization	LS	1	$10,000	$10,000
2	Excavate underlying soil and Spread in Fields	CY	4900	$14	$68,600
3	Excavate and Replace Topsoil	CY	4400	$24	$105,600
4	Construction Staking	LS	1	$5,000	$5,000
5	Finish Grading and Seeding	LS	1	$5,000	$5,000
	Subtotal Construction Costs				**$194,200**
	Engineering, Administration, Legal @ 18%				$34,956
	Subtotal Project Costs				**$229,156**
	25% Contingency				$57,289
	Total Project Costs				**$286,445**

Preliminary Plans

PROJECT EXODUS PRELIMINARY DESIGN

OCTOBER 2009

VICINITY MAP

APPLICANT:

TILLAMOOK COUNTY
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PH: (503) 842-1809
CONTACT: PAUL LEVESQUE

ON BEHALF OF:

OREGON SOLUTIONS
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CONTACT: RICK KLUMPH
DESIGN COMMITTEE CHAIR

CIVIL ENGINEER:

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EMAIL: dboatman@hbh-consulting.com
PROJECT MANAGER: DAVID K. BOATMAN, P.E.

PROJECT DESIGN:

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SEATTLE, WA 98188
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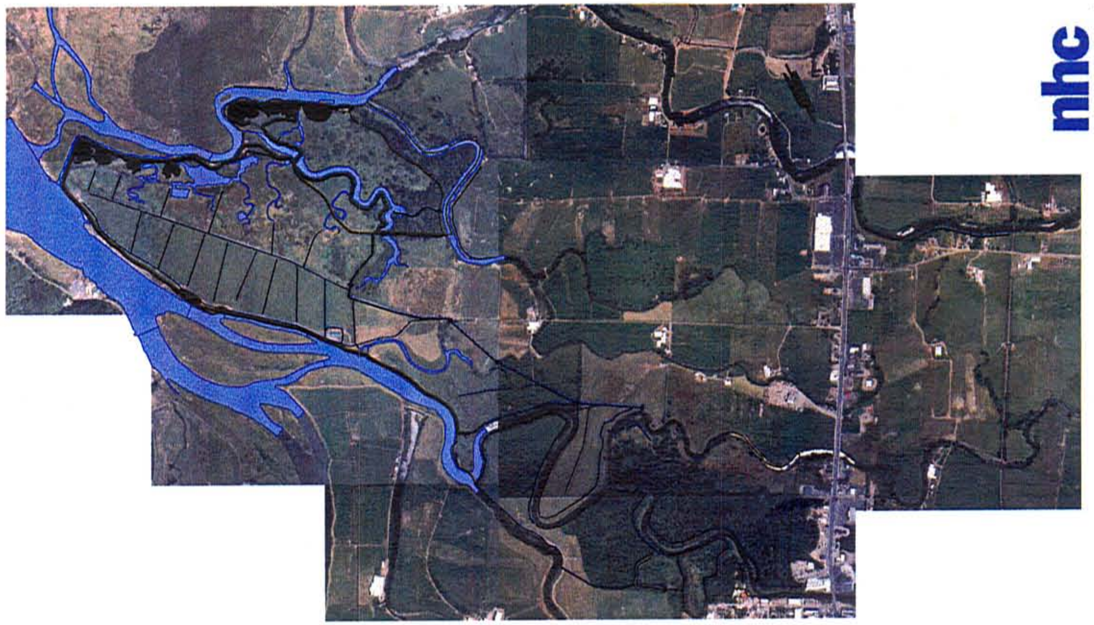
EMAIL: vcollins@nhc-sea.com
CONTACT: VAUGHN COLLINS, P.E., CFM



LOCATION MAP

nhc northwest hydraulic consultants

HBH Consulting Engineers
20015 SW Pacific Hwy, Suite 101
Sherwood, Oregon 97140
503/625-8065 fax 503/625-1531
email: mail@hbh-consulting.com

REGISTERED PROFESSIONAL ENGINEER
OREGON
DAVID K. BOATMAN
EXPIRES 12/31/2009

PRELIMINARY

COVER

OREGON SOLUTIONS

PROJECT EXODUS
TILLAMOOK, OREGON
COVER SHEET

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ABBREVIATIONS

@	AT
AC	ASPHALT
BV	BUTTERFLY VALVE
CB	CATCH BASIN
C/L	CENTERLINE
CMP	CORRUGATED METAL PIPE
CO	CLEAN OUT
COTG	CLEAN OUT TO GRADE
CY	CUBIC YARDS
DR	DRIVE
DIP	DUCTILE IRON PIPE
E	EAST
ELEV	ELEVATION
EP	EDGE OF PAVEMENT
EX	EXISTING
FLG	FLANGE
GUT	GUTTER
GV	GATE VALVE
HDPE	HIGH DENSITY POLYETHYLENE
HOR	HORIZONTAL
HP	HIGH POINT
HYD	HYDRANT
IE	INVERT ELEVATION
LF	LINEAR FEET
LN	LINE
LP	LOW POINT
LT	LEFT
MH	MANHOLE
MJ	MECHANICAL JOINT
N	NORTH
NE	NORTH EAST
NTS	NOT TO SCALE
NW	NORTH WEST
OHP	OVER HEAD POWER
PC	POINT OF CURVATURE
PRC	POINT OF REVERSE CURVE
PT	POINT OF TANGENCY
P/L	PROPERTY LINE
PVC	POLYVINYL CHLORIDE
PVI	POINT OF VERTICAL INTERSECTION
ROW	RIGHT OF WAY
RT	RIGHT
S	SOUTH
SE	SOUTH EAST
SW	SOUTH WEST
STM	STORM DRAIN
SF	SQUARE FEET
SAN	SANITARY SEWER
ST	STREET
STA	STATION
S=	SLOPE EQUALS
S/W	SIDEWALK
TB	THRUST BLOCK
TYP	TYPICAL
VER	VERTICAL
W	WEST
W/	WITH
WTR	WATER

TAX LOT INFORMATION

THIS PROJECT IS LOCATED IN A PORTION OF SECTION 22 AND 23 OF TOWNSHIP 1 SOUTH, RANGE 10 WEST OF THE WILLAMETTE MERIDIAN. COUNTY OF TILLAMOOK, STATE OF OREGON.

VERTICAL DATUM

THE ELEVATIONS SHOWN HEREON ARE BASED UPON NAVD 88 DATUM.

LOCATE

(48 HOUR NOTICE PRIOR TO EXCAVATION)

OREGON LAW REQUIRES YOU TO FOLLOW THE RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER. THOSE RULES ARE SET FORTH IN OAR 952-001-0010 THROUGH 952-001-0090 & ORS 757.542 THROUGH 757.562 & ORS 757.993. YOU MAY OBTAIN COPIES OF THE RULES FROM THE CENTER BY CALLING (503) 246-1987.
ONE CALL SYSTEM NUMBER 1-800-332-2344.

GENERAL NOTES

1. ALL WORK SHALL CONFORM TO ALL STATE, FEDERAL AND LOCAL AGENCY REGULATIONS. THE CONTRACTOR SHALL REVIEW REGULATORY PERMIT REQUIREMENTS TO ENSURE CONFORMANCE TO THE RULES OF EACH AGENCIES.

2. THE CONTRACTOR SHALL PROVIDE A PLAN FOR WORK IN WATERWAYS THAT ARE ACCESSIBLE BY FISHERIES. THE CONSTRUCTION ACTIVITY SHALL BE LIMITED TO IN-WATER WORK PERIODS. A FISHERIES BIOLOGIST SHALL BE CONSULTED TO REVIEW THE WORK PLAN TO ENSURE THAT ALL REGULATIONS ARE STRICTLY ADHERED TO. THIS WORK MAY INCLUDE COFFERDAMS, REMOVAL OF FISH AND RELATED WORK. THE PLAN SHALL BE REVIEWED BY THE AFFECTED AGENCIES.

3. A PORTION OF THIS WORK IS TIDAL RELATED. THE CONTRACTOR SHALL COORDINATE THEIR ACTIVITIES WITH THE INSPECTOR AND LOCAL AGENCIES WHEN WORKING IN THIS ZONE. WORK HOURS MAY NEED TO BE ADJUSTED ACCORDINGLY.

4. ALL CONCRETE POURS SHALL NOT BE IN CONTACT WITH WATER. PUMPING WILL BE REQUIRED. A PUMPING PLAN SHALL BE SUBMITTED AND APPROVED PRIOR TO STARTING THIS PORTION OF WORK.

5. THE CONTRACTOR SHALL SUBMIT AN OVERALL WORKPLAN FOR THE SCHEDULED ACTIVITIES. THIS PLAN SHALL BE DETAILED INTO MONTHLY ACTIVITIES AND REVIEWED BIWEEKLY. THE PLAN SHALL BE FORWARDED TO PERMITTING AGENCIES FOR COMMENT.

6. THE CONTRACTOR SHALL PROTECT WATERWAYS FROM SILTATION DUE TO CONSTRUCTION ACTIVITIES. AN EROSION CONTROL PLAN SHALL BE SUBMITTED FOR REVIEW BY THE ENGINEER. NO MUD OR SILTATION SHALL LEAVE THE JOB SITE VIA ACCESS ROADWAYS. TIRES MUST BE CLEANED AT PROJECT LIMITS.

SHEET INDEX

REGISTERED PROFESSIONAL ENGINEER
OREGON
DAVID K BOATMAN
EXPIRES 12/31/2009

H B H
Consulting Engineers
20015 SW Pacific Hwy, Suite 101
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REV. | DATE | DESCRIPTION | BY

IF THIS LINE IS NOT 1 INCH SCALE IS NOT AS SHOWN

OREGON SOLUTIONS

PROJECT EXODUS
TILLAMOOK, OREGON
INDEX SHEET

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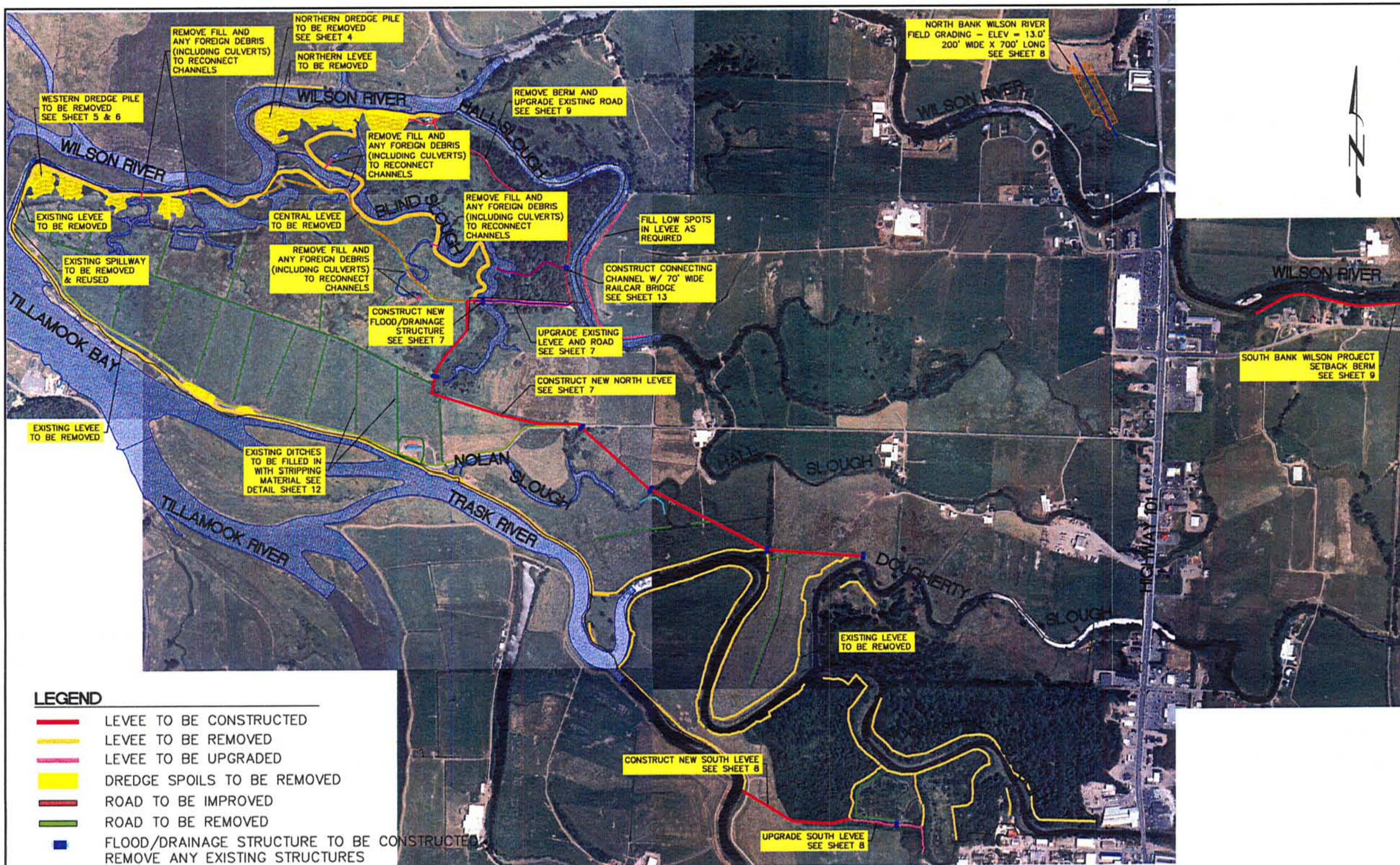

LEGEND

- LEVEE TO BE CONSTRUCTED
- LEVEE TO BE REMOVED
- LEVEE TO BE UPGRADED
- DREDGE SPOILS TO BE REMOVED
- ROAD TO BE IMPROVED
- ROAD TO BE REMOVED
- FLOOD/DRAINAGE STRUCTURE TO BE CONSTRUCTED, REMOVE ANY EXISTING STRUCTURES
- RECONNECT CHANNELS
- WATER
- EXISTING DITCH TO BE FILLED IN
- REGRADE FIELD

PROJECT OVERVIEW

GRAPHIC SCALE

(IN FEET)
1 inch = 500 ft.

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JULY 23, 1991
DAVID K. BONTRAIN
EXPIRES 12/31/2009

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REV. | DATE | DESCRIPTION | BY

3

IF THIS LINE IS NOT 1 INCH SCALE IS NOT AS SHOWN

OREGON SOLUTIONS

PROJECT EXODUS
TILLAMOOK, OREGON
PROJECT OVERVIEW

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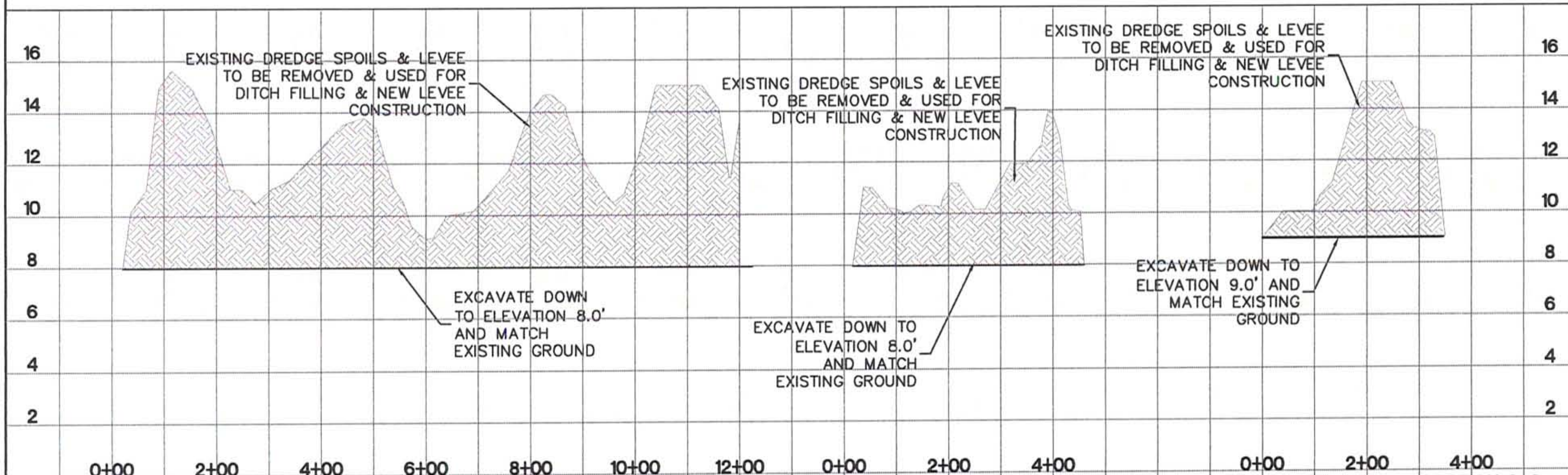
2009-003

GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.

NORTHERN DREDGE PILE PLAN
SCALE: 1" = 100'



NORTHERN DREDGE PILE SECTION A-A
SCALE: HOR: 1" = 100'
VER: 1" = 2'

NORTHERN DREDGE PILE SECTION B-B
SCALE: HOR: 1" = 100'
VER: 1" = 2'

NORTHERN DREDGE PILE SECTION C-C
SCALE: HOR: 1" = 100'
VER: 1" = 2'

REGISTERED PROFESSIONAL ENGINEER 15408 OREGON JULY 23, 1991 DAVID K. BOATMAN
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File:	L:/2009-003/DWG/SPOILS					Layout:	NORTHERN

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OREGON SOLUTIONS

PROJECT EXODUS
TILLAMOOK, OREGON

NORTHERN DREDGE PILE PLAN AND SECTIONS

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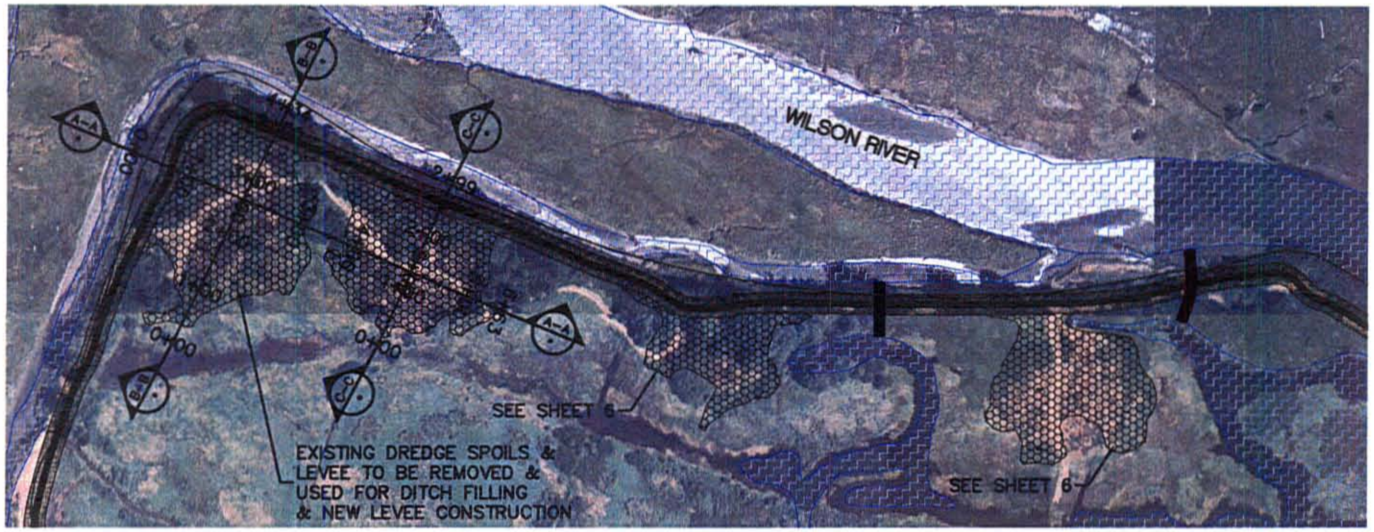
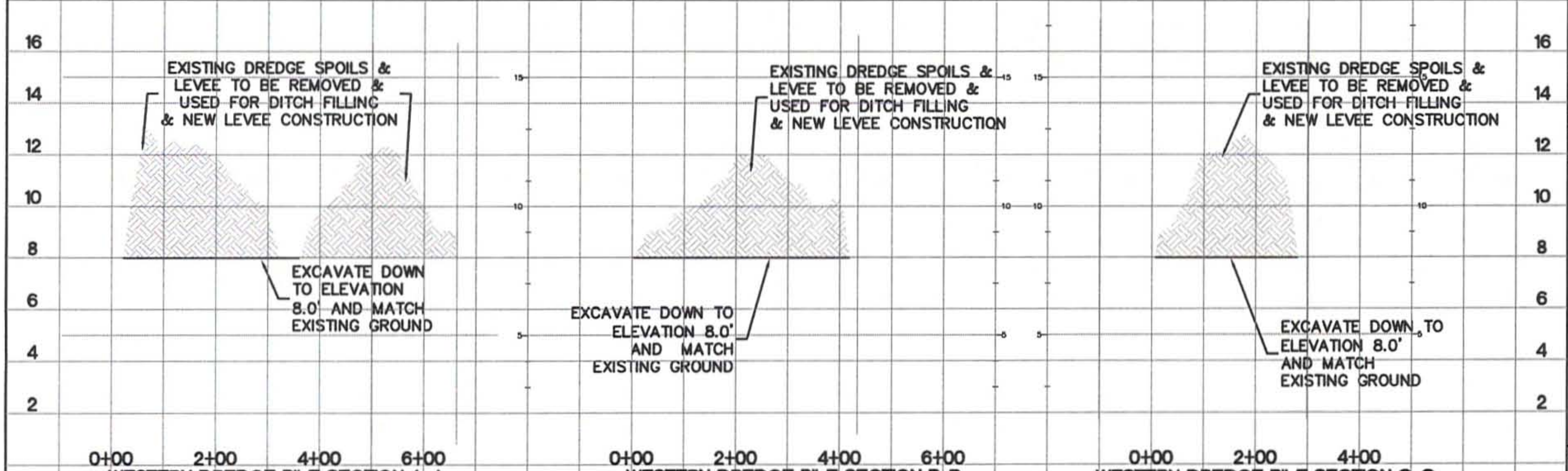
Date 10-12-09
2009-003



GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.

WESTERN DREDGE PILE PLAN
SCALE: 1" = 100'



WESTERN DREDGE PILE SECTION A-A
SCALE: HOR: 1" = 100'
VER: 1" = 2'

WESTERN DREDGE PILE SECTION B-B
SCALE: HOR: 1" = 100'
VER: 1" = 2'

WESTERN DREDGE PILE SECTION C-C
SCALE: HOR: 1" = 100'
VER: 1" = 2'

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PROJECT EXODUS
TILLAMOOK, OREGON

WESTERN DREDGE PILE PLAN AND SECTIONS

Sheet No. 5
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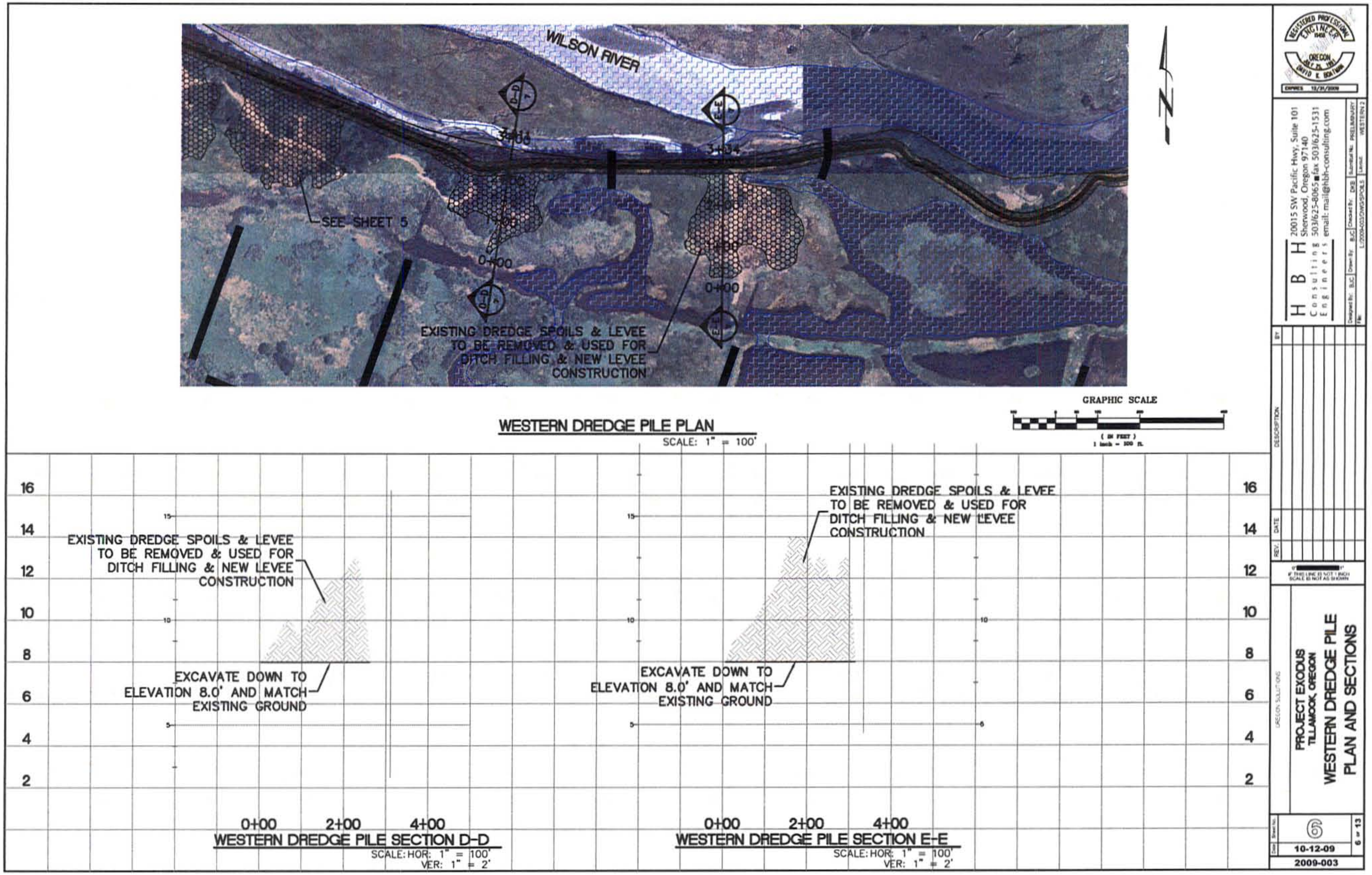
Date 10-12-09
2009-003


WILSON RIVER
SEE SHEET 5
EXISTING DREDGE SPOILS & LEVEE TO BE REMOVED & USED FOR DITCH FILLING & NEW LEVEE CONSTRUCTION
GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.
WESTERN DREDGE PILE PLAN
SCALE: 1" = 100'
16
14
12
10
8
6
4
2
EXISTING DREDGE SPOILS & LEVEE TO BE REMOVED & USED FOR DITCH FILLING & NEW LEVEE CONSTRUCTION
EXCAVATE DOWN TO ELEVATION 8.0' AND MATCH EXISTING GROUND
0+00
2+00
4+00
WESTERN DREDGE PILE SECTION D-D
SCALE: HOR: 1" = 100'
VER: 1" = 2'
EXISTING DREDGE SPOILS & LEVEE TO BE REMOVED & USED FOR DITCH FILLING & NEW LEVEE CONSTRUCTION
EXCAVATE DOWN TO ELEVATION 8.0' AND MATCH EXISTING GROUND
0+00
2+00
4+00
WESTERN DREDGE PILE SECTION E-E
SCALE: HOR: 1" = 100'
VER: 1" = 2'
REGISTERED PROFESSIONAL ENGINEER
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REV.
DATE
DESCRIPTION
BY
IF THIS LINE IS NOT 1 INCH SCALE IS NOT AS SHOWN
PROJECT EXODUS
TILLAMOOK, OREGON
WESTERN DREDGE PILE
PLAN AND SECTIONS
6
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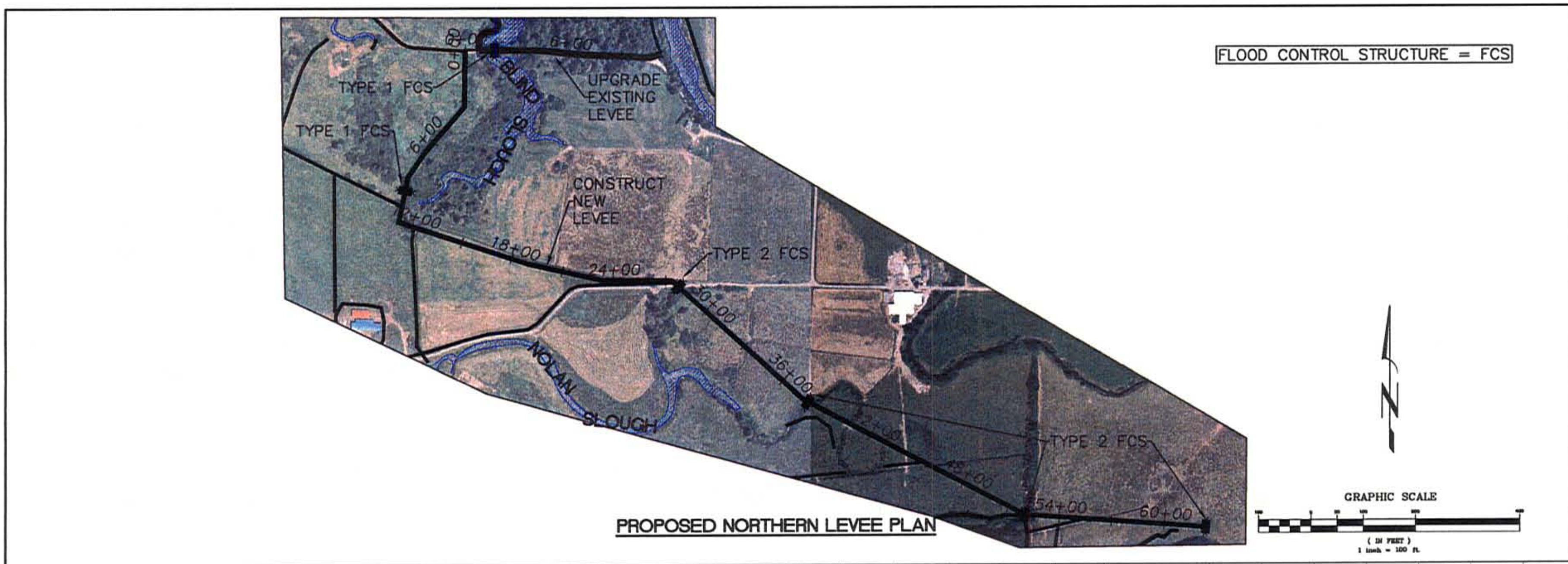
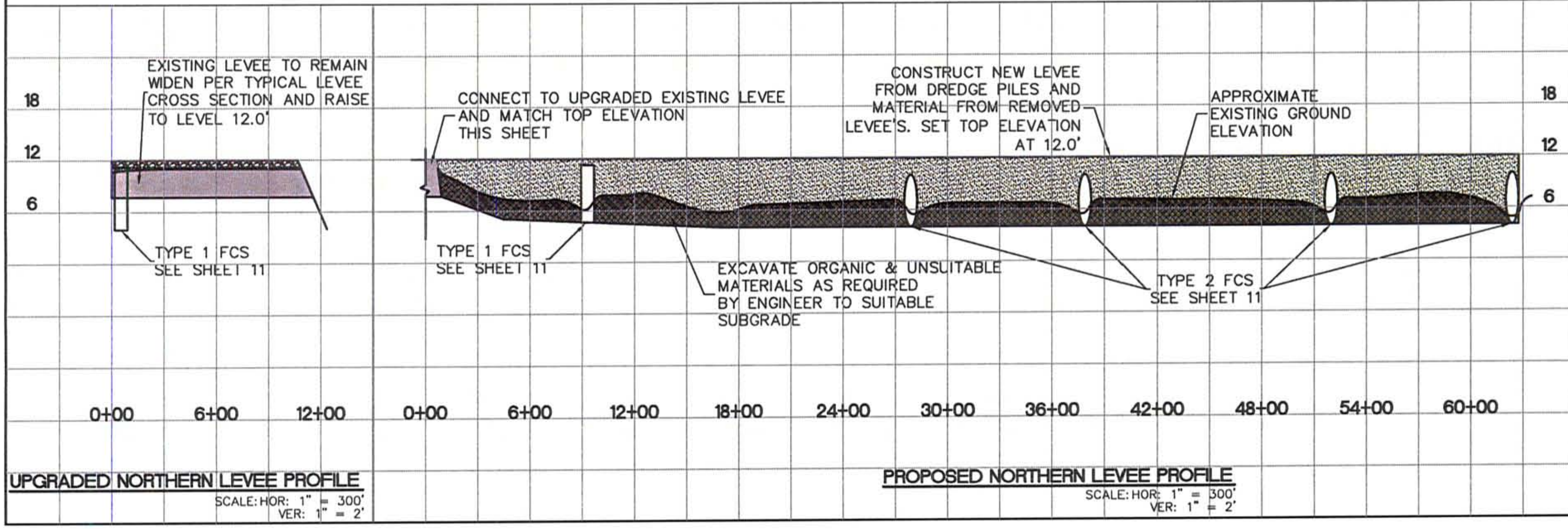
10-12-09
2009-003





REGISTERED PROFESSIONAL ENGINEER 15458 OREGON JULY 25, 1991 DAVID K. BOKTMAN
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File: L/2009-003/DWG/PROPOSED LEVEE | Layout: 45+00 TO 57+00

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0" 1"
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LAEGON SOLUTIONS

PROJECT EXODUS
TILLAMOOK, OREGON

PROPOSED NORTH LEVEE PLAN AND PROFILE

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Date 10-12-09
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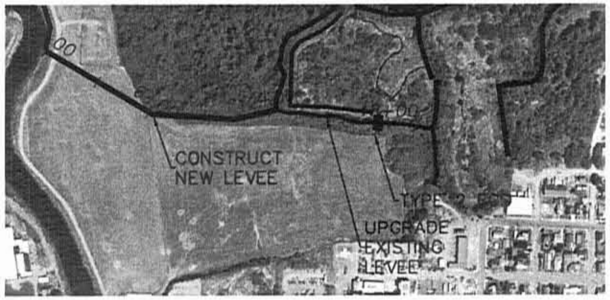
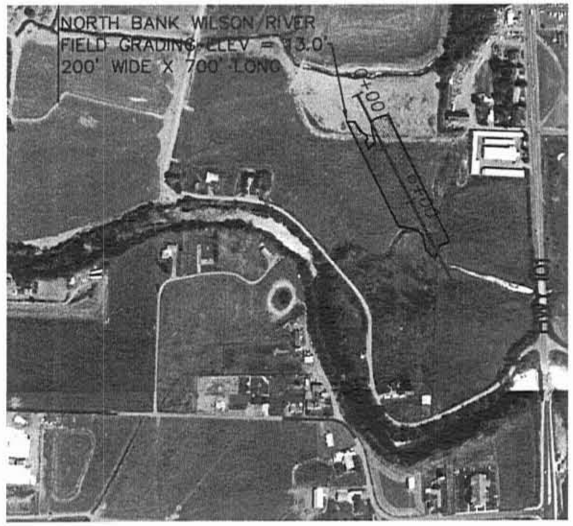
FLOOD CONTROL STRUCTURE = FCS



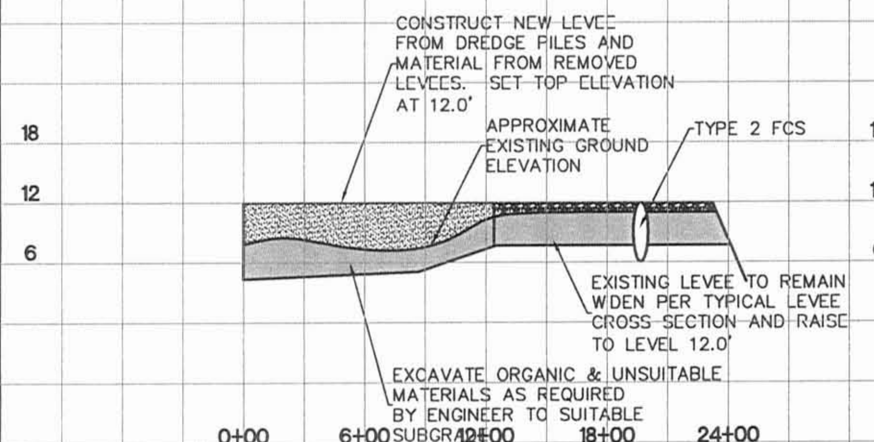
PROPOSED SOUTHERN LEVEE PLAN

GRAPHIC SCALE

(IN FEET)
1 inch = 100 ft.

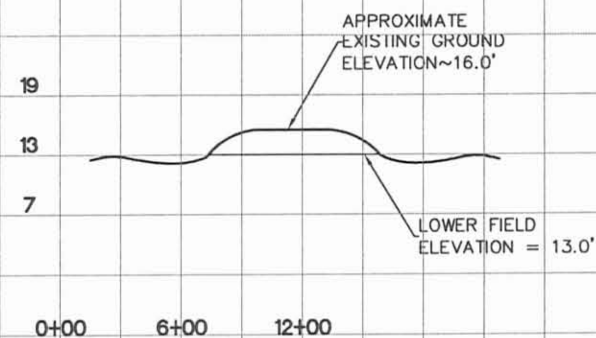


PROPOSED FIELD GRADING PLAN



PROPOSED SOUTHERN LEVEE PROFILE

SCALE: HOR: 1" = 300'
VER: 1" = 2'



PROPOSED FIELD GRADING PROFILE

SCALE: HOR: 1" = 300'
VER: 1" = 2'

REGISTERED PROFESSIONAL ENGINEER 15454 OREGON JULY 25, 1991 DAVID E. BOATMAN
EXPIRES 12/31/2009

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Designed By: DKB | Drawn By: DKB | Checked By: JLJ | DKB | Submittal No: PRELIMINARY
File: L:/2009-003/DWG/PROPOSED LEVEE | Layout: 45+00 TO 57+00

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PROJECT EXODUS
TILLAMOOK, OREGON
PROPOSED SOUTH LEVEE + FIELD GRADING
PLAN AND PROFILE

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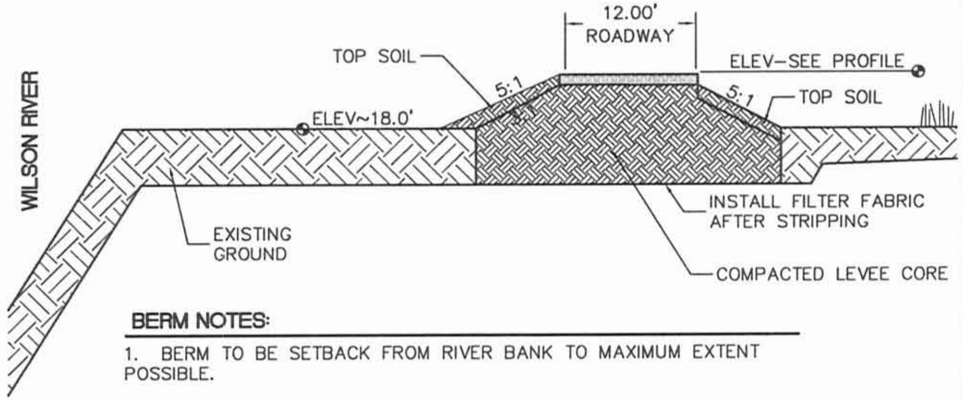
GRAPHIC SCALE
(IN FEET)
1 inch = 300 ft.

SOUTH BANK WILSON BERM PLAN

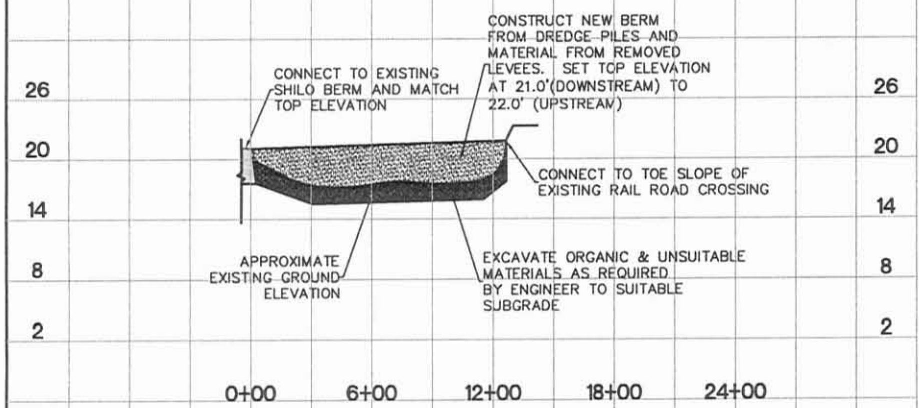


BERM NOTES:

1. BERM TO BE SETBACK FROM RIVER BANK TO MAXIMUM EXTENT POSSIBLE.
2. RAISE BERM 1 FOOT WHERE STRUCTURES ARE WITHIN 30 FEET.

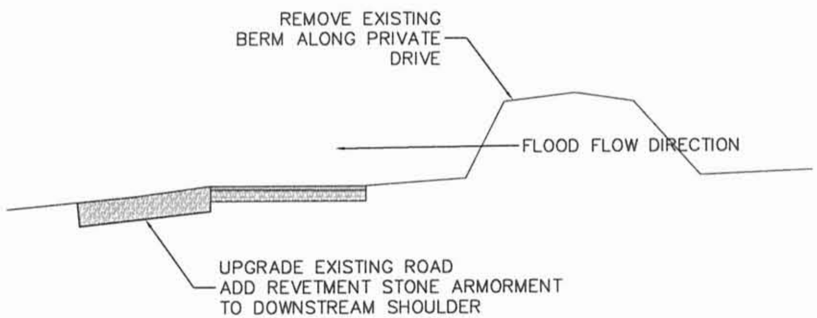
TYPICAL SETBACK BERM SECTION

N.T.S.



SOUTH BANK WILSON BERM PROFILE

SCALE: HOR: 1" = 300'



TYPICAL BERM REMOVAL SECTION

N.T.S.

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PROJECT EXODUS
TILLAMOOK, OREGON
SOUTH BANK WILSON RIVER BERM
PLAN AND PROFILE

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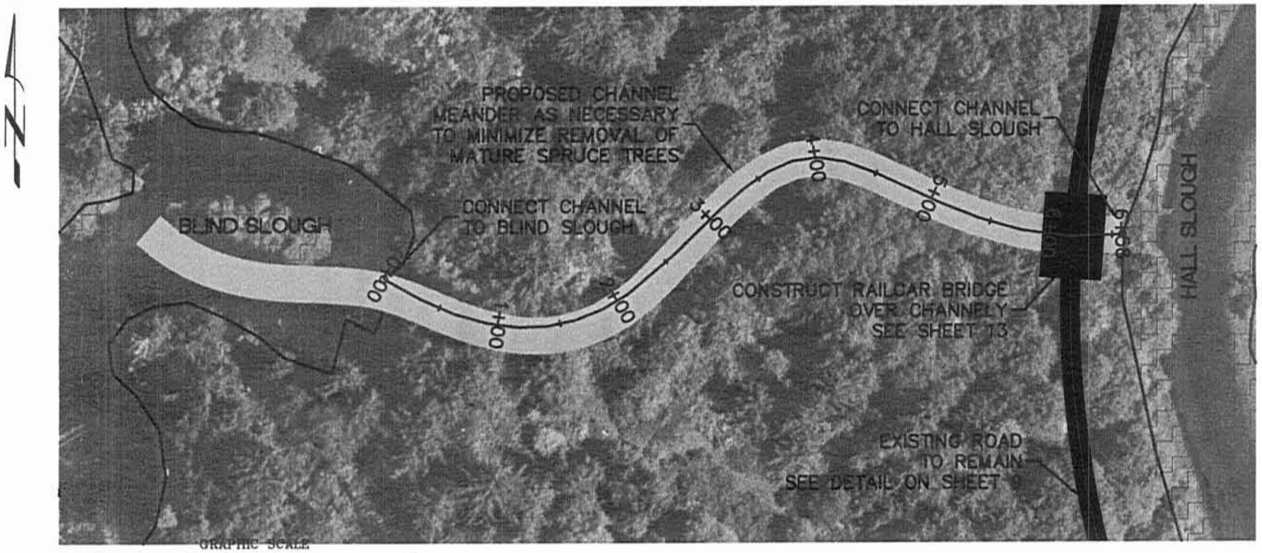
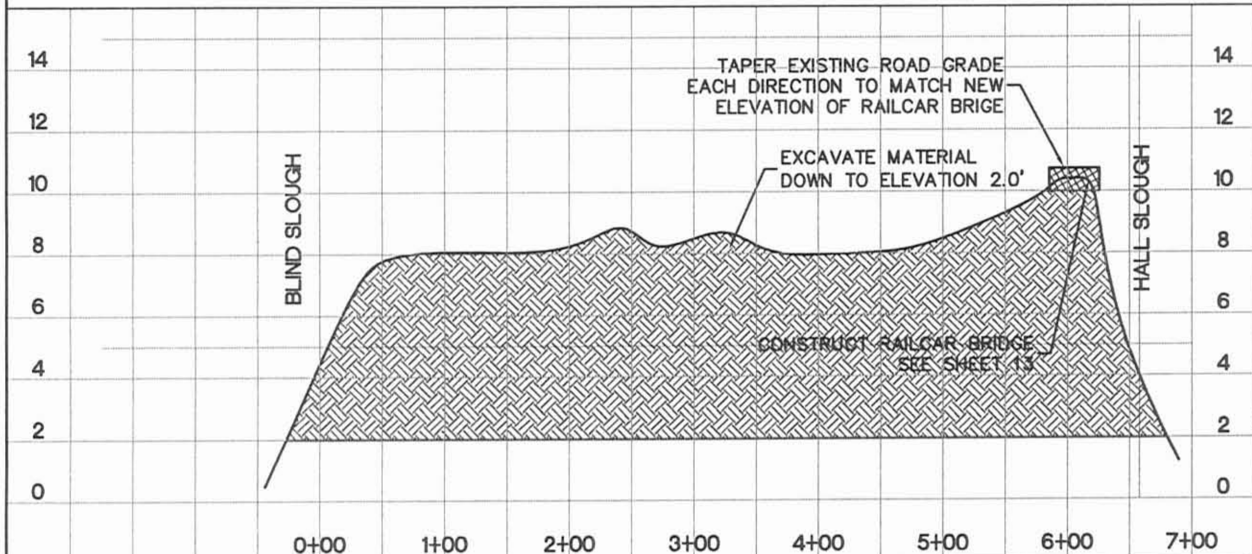


GRAPHIC SCALE

(IN FEET)
1 inch = 50 ft.

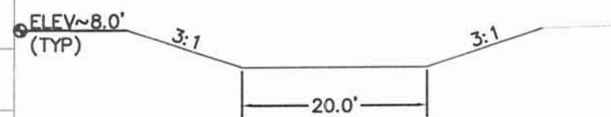
CHANNEL PLAN

SCALE: 1" = 50'



CHANNEL PROFILE

SCALE: HOR: 1" = 50'
VER: 1" = 2'



TYPICAL CHANNEL SECTION

N.T.S.

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DAVID K. BOKTMAN
EXPIRES 12/31/2008

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File: L:\2009-003\DWG\CHANNEL | Layout: CHANNEL

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PROJECT EXODUS
TILLAMOOK, OREGON

HALL TO BLIND SLOUGH CONNECTION

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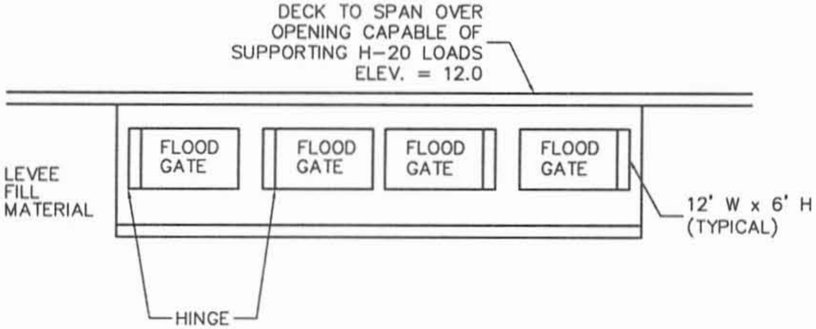
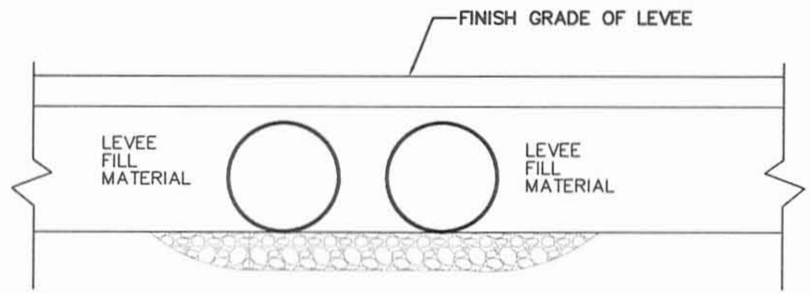
10 of 13
Date: 10-12-09
2009-003



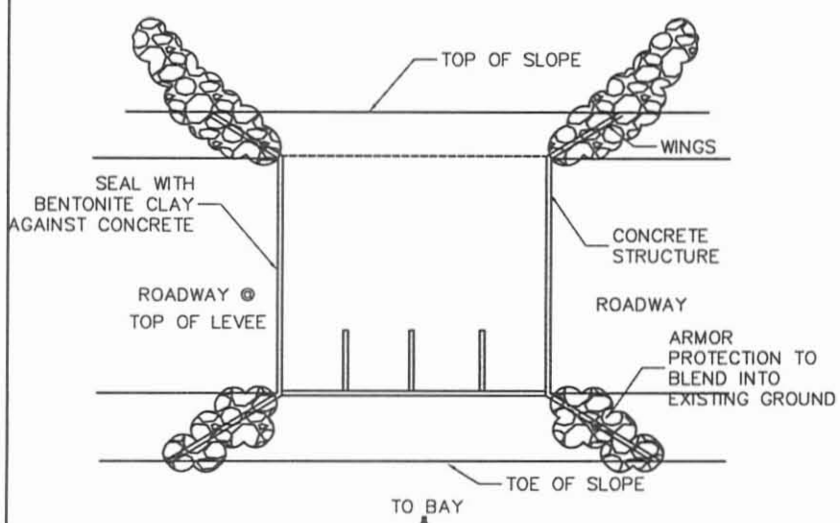
ELEVATION VIEW

N.T.S.



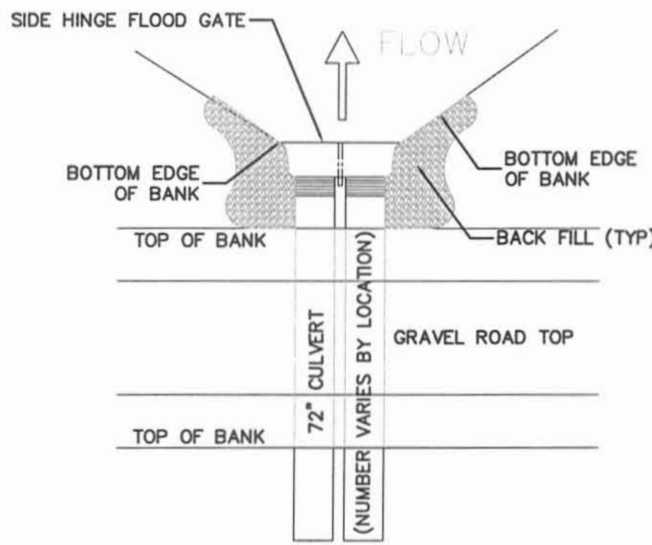
ELEVATION VIEW

N.T.S.



PROPOSED TYPICAL FLOOD CONTROL STRUCTURE TYPE 1

N.T.S.



PROPOSED TYPICAL FLOOD CONTROL STRUCTURE TYPE 2

N.T.S.

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EXPIRES 12/31/2009

PROJECT EXODUS
TILLAMOOK, OREGON
TYPICAL DETAILS

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10-12-09

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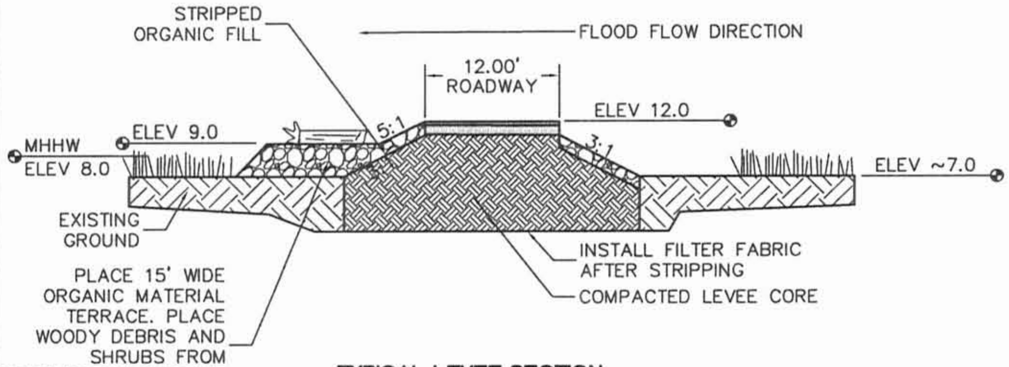
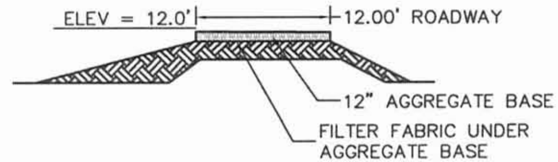


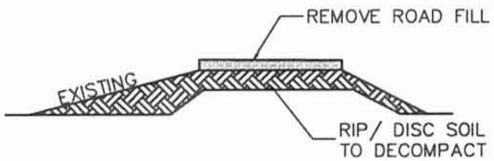
TYPICAL LEVEE SECTION

N.T.S.



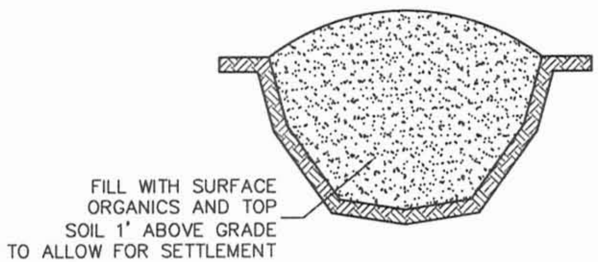
TYPICAL ROAD SECTION TOP OF LEVEE

N.T.S.



EXISTING ROAD REMOVAL

N.T.S.



DRAINAGE DITCH DETAILS

N.T.S.

LEVEE NOTES:

1. INSTALL WOODY DEBRIS OVER ORGANIC FILL ON THE WINDWARD SIDE OF THE LEVEE. CONCENTRATE DEBRIS NEAR THE TOP OF THE LEVEE TO DISPERSE WAVE ACTION.
2. INSTALL 12" OF PIT-RUN AGGREGATE BASE FOR THE ROADWAY TO A WIDTH OF 12 FEET.
3. COMPACTION OF THE FILL FOR THE LEVEE SHALL BE A COMBINATION OF MEANS AND METHODS PLUS A TEST SECTION OF FILL. THE FILL WILL BE TESTED WITH A GOAL OF 88% MDD FOR THE MODIFIED PROCTOR DENSITY. IF THE SUBGRADE BEGINS TO PUMP, THE CONTRACTOR SHALL WORK WITH THE OWNER'S REPRESENTATIVE TO DETERMINE THE OPTIMAL METHOD OF COMPACTION. NO FURTHER TESTING WILL BE NECESSARY AS LONG AS THE CONTRACTOR FOLLOWS THE APPROVED PROCEDURE.
4. THE CONTRACTOR SHALL USE ALL AVAILABLE MATERIAL IDENTIFIED THAT IS SUITABLE FOR BUILDING STRUCTURAL FILLS. UPON EXHAUSTING THIS RESOURCE, THE CONTRACTOR SHALL HAUL IN APPROVED FILL MATERIAL FROM AN OFFSITE SOURCE. THE MATERIAL SHALL BE TESTED FOR COMPACTION SUITABILITY.
5. THE CONTRACTOR SHALL PLACE A LAYER OF BENTONITE CLAY BETWEEN THE CONCRETE FLOOD CONTROL STRUCTURAL AND THE LEVEE CORE MATERIAL TO SEAL THE SEAM.
6. TURNOUT LEVEE EXTENSIONS WILL BE CONSTRUCTED AT 500' O.C. EXTENDING TOWARD THE STORAGE SIDE. THEY SHALL BE 20' IN TOP WIDTH FOR A LENGTH OF 30 FEET WITH 20' RADIUS CORNERS.
7. JUTE MAT SHALL BE PLACED ON THE SIDE SLOPES BETWEEN THE TOP OF FILL AND THE EXISTING GROUND ELEVATION FOR BOTH SIDES OF THE LEVEE.

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DAVID K. BOATMAN
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PROJECT EXODUS
TILLAMOOK, OREGON
TYPICAL DETAILS

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10-12-09
2009-003
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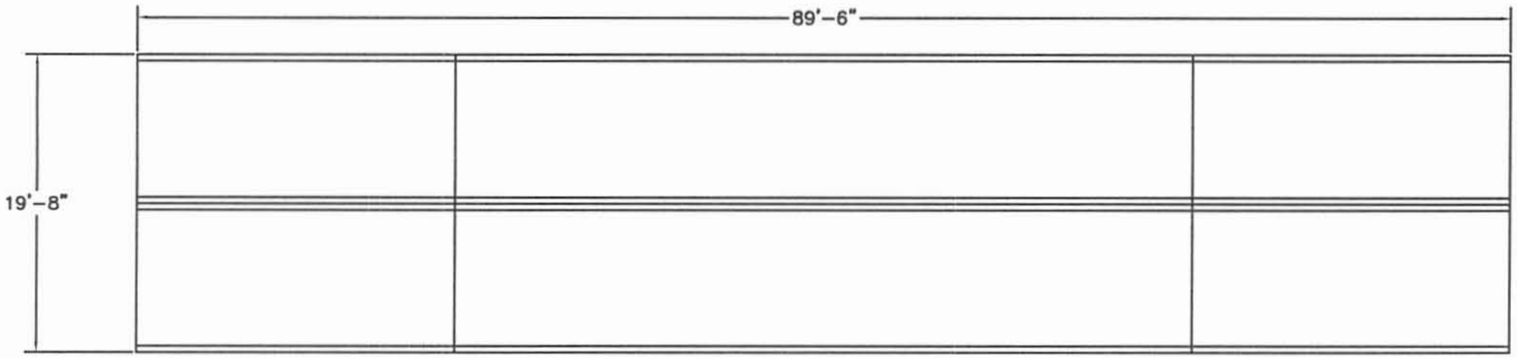
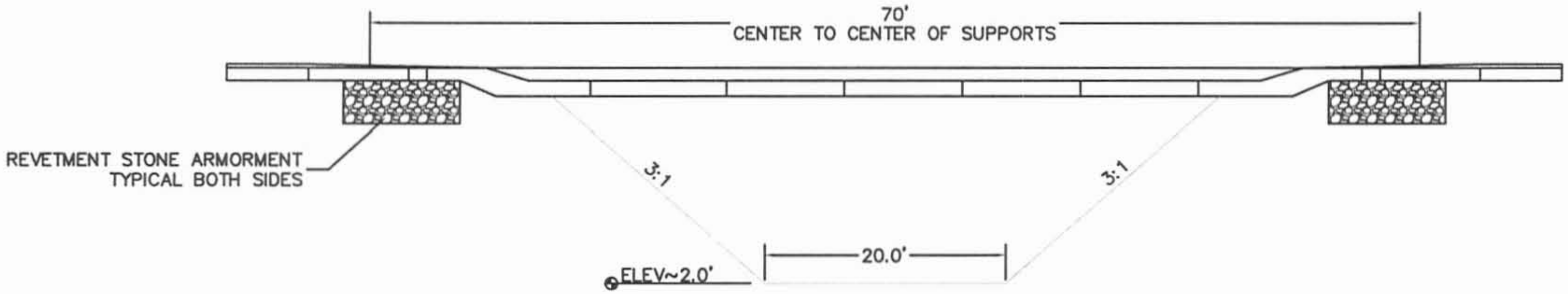
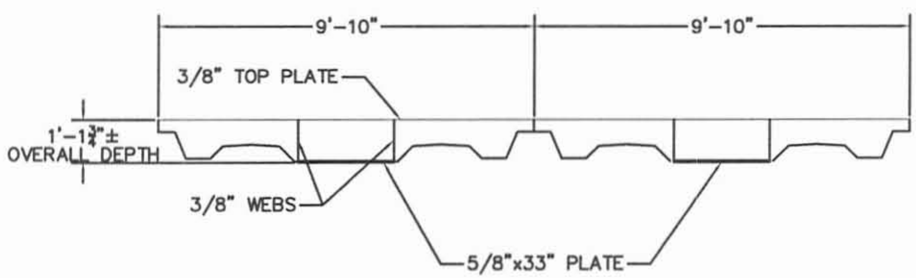


DOUBLE RAILCAR BRIDGE PLAN VIEW
N.T.S.



ELEVATION VIEW
N.T.S.



SECTION VIEW
N.T.S.

REGISTERED PROFESSIONAL ENGINEER
13458
OREGON
JULY 25, 1991
DAVID K. BOATMAN
EXPIRES 12/31/2009

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File: L:\2009-003\DWG\DETAILS | Layout: DETAIL 3

REV. | DATE | DESCRIPTION | BY

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PROJECT EXODUS
TILLAMOOK, OREGON
TYPICAL DETAILS

Sheet No. 13
Date 10-12-09
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2009-003

OREGON
SOLUTIONS

Declaration of Cooperation

Tillamook Basin Flooding Reduction Project

November 2007

Sponsored by:

Tillamook County
Tillamook City
Tillamook Estuaries Partnership
Tillamook Bay Habitat & Estuary Improvement District
Tillamook County Hospital
Tillamook County Creamery Association
Oregon Solutions

Table of Contents

Purpose of Declaration of Cooperation: Oregon Solutions provides a structure and process for public and private sectors to collaborate in addressing community needs. That collaborative process, which results in agreements made amongst the parties, forms this Declaration of Cooperation. The purpose of Oregon Solutions is to have all interested and affected parties determine the best courses of action to diminish the magnitude and negative impacts of flooding in the Tillamook Basin. This document outlines the commitment of all parties to successfully carry out various projects which are outlined below. The commitment shall continue until all projects are completed or suspended by mutual agreement. By consent of all parties, this document may be amended from time to time to represent changing situations often found during project development.

Preface: In December, 2006 a letter was sent from State, County and City representatives to Governor Kulongoski requesting that Tillamook flood mitigation efforts be designated an Oregon Solutions project. A project assessment was concluded in March, 2007, followed by Governor Ted Kulongoski's official designation in April, 2007.

The Governor has assured participation of his staff and appropriate state agencies with participating public and private partners through the designation of this effort as an Oregon Solutions Project. A Project Team has been assembled in an effort to bring partners to the table. It is expected that the creation of this Team will help make efficient use of available resources, search for additional funding opportunities, accelerate the pace of the project, overcome potential impediments early on, and raise awareness of the project at local, regional, state and federal levels. In this fashion, the Project Team will commit resources and time to an integrated action plan focusing on successful, sustainable outcomes.

The Project Team (see Appendix A) has developed the following Goal statement: *The purpose of the Oregon Solutions Tillamook Flooding project is to develop and implement a plan to reduce flooding and the adverse impacts of flooding while incorporating environmental, social and economic values in the development of short and long term solutions.*

Background to Project: Regardless of the differences of opinion on how flooding can best be mitigated in the Tillamook Basin, most people agree that in recent years there have been more frequent floods and of larger magnitude than in the past. Adding to the complexity of this issue is the fact that nature configures each major flood differently than the previous one.

Over the years a number of flood mitigation improvements have been implemented in the Tillamook Basin. They include: installation of tide gates and other flood control systems; emergency repairs; and FEMA assistance to affected properties. In addition, mapping, studies, plans, rules and ordinances have been written, or updated, regarding flooding in the Tillamook Basin. One of the most helpful studies is the "Tillamook Bay and Estuary, Oregon General Investigative Study" [Army Corps Feasibility Study] authorized by Congress for funding in 1997. It examined 59 potential alternatives to help reduce flooding.

During the initial stages of this Oregon Solutions flooding project, three work groups were used to study, and offer to the Project Team numerous projects for consideration. These projects were examined and prioritized by the Project Team. This document addresses the top prioritized projects, including how funding and permits might be obtained. Several projects that maintain or improve the environment have been endorsed for further analysis. Because flooding affects the economy, some projects within this Declaration also outline efforts for how best to maintain and nurture growth of commercial businesses and how to support the dairy industry while mitigating the negative impacts of flooding.

Project Description: On September 12, 2007, the Oregon Solutions Tillamook Project Team prioritized projects for accomplishment. The projects listed below in order of prioritization, are those which can be worked on at this point through the Oregon Solutions process. Combined, they encompass both short term and long term objectives to alleviate flooding and maintain or enhance the environment. The following projects form the basis around which the Declaration of Cooperation is framed.

1. **Wilson/Trask Spillway:** Flood water drainage is blocked when high water behind berms is not allowed to escape. For added flood water drainage, this project would allow the expeditious exit of flood waters into Tillamook Bay through installation of a spillway and tide gate with mitigator next to the ten tide gates on the Tillamook Bay levee. The property is owned by Tillamook County. Following engineering design and any required modeling, permits are not expected to be an impediment to project completion. Expected cost of the project is $150,000 to $250,000.

2. **Tone Road Spillway:** This project shows a positive benefit for farm land where excessive loss of farm animals has occurred in two floods over the last decade. The project will install a second gated spillway to the north of Tone road, to convey flood water into the Tillamook River. The property owner and the Drainage District are endorsing this improvement. The project is not expected to exceed $350,000 and permits are not expected to pose an impediment for completion.

3. **Dougherty Slough Permanent Structure:** The Dougherty Slough permanent structure project is meant to replace the U.S. Army Corps of Engineers' temporary log jam at the headwaters of the slough in the Wilson River. Without a permanent structure, it is possible that the wooden structure could give way, causing significant flooding in the N. Hwy 101 business district. Permits will be needed and design of the structure must show fish friendly passage and structural integrity. Estimated cost for the structure is approximately $250,000.

4. **Comprehensive Community Vision and Strategic Plan:** This project is meant to reduce impacts of flooding by producing long term strategies for providing assistance and land-use alternatives for relocating potentially willing businesses

out of the flood area. Emphasis on maintaining business viability within the community is key in this project. Land use planning efforts, including inventories of available land for commercial purposes, and discussion of land use for vacant N. Hwy 101 properties will be part of this community wide planning process. The estimated cost for these efforts, combined with Tillamook City efforts to implement its Flood Mitigation Plan (see # 6 below), is about $100,000 per year.

5. **Trask Hook:** A box culvert would be installed to remove hydraulic pressure created by the Trask River Hook Channel. The problem was created when the SR 131 Bridge was constructed over the Tillamook River. The old Trask River channel currently directs flood waters against the flow of the Tillamook River, which creates a head wall of water, increasing flood water levels in the lower Trask Drainage cell. A box culvert would direct high water through a short cut into the Tillamook River. Consultation with ODOT is essential to ensure continued structural integrity of the SR 131 Bridge and to construct the improvements within the State right-of-way. The cost for this improvement is estimated to be approximately $100,000 based on a previous design. The Trask Drainage District is interested in assisting with this project. The need for several permits is anticipated.

6. **Implementation of City/County Flood Mitigation Plans:** This project endorses the continued need for carrying out the many goals listed in the Tillamook City Flood Mitigation Plan. Absent efforts to carry these recommendations forward, there will continue to be frustration over recurring damages from flooding and lack of coordination and inconsistencies among agency practices. A city staff person would accomplish activities under this proposal, with products including but not limited to: review of city/county flood hazard overlay zones for ordinance consistency; updating flood maps with local, state and federal partners; identifying uses for vacant land in floodways/floodplain; and coordinating peer review processes for engineering "no rise" reports and removal of fill in the floodway. Estimated cost for staffing this activity is $100,000 per year (resources to be combined with strategic planning activities listed in # 4 above)

7. **Mediated Gravel Agreement/Stream Corridor Management Plan:** Facilitation is needed to bring parties together with the goal of executing a final agreement and adoption of a Stream Corridor Management Plan. In 2000, a draft of an amended plan was completed, but an impasse was reached primarily due to concerns raised by DLCD. Since that time, the Plan has been rewritten and a new agreement prepared. Oregon Solutions has offered to provide and fund mediation/facilitation services to determine issues that must be addressed by all parties in order execute the plan.

8. **USACE Feasibility Study Hall Slough Project:** This project originally was designed to reconnect an historic slough disconnected in the 1950's, to the Wilson River. Set back levees with riparian plantings were suggested. Flood water would be channeled to avoid flooding in Hwy 101 areas and to open up the passage and disperse the water into Tillamook Bay. The project is meant to provide a relief valve when Wilson River water levels get too high. The initial cost for the project was estimated to be $ 4-7 million.

9. **Modified Wetland Restoration and Swale Project:** This project was also described in the USACE Feasibility Study. The dominant feature of this project is the construction of a new levee dividing the area roughly in half, east to west, separating a fully tidal area to the north with a flood storage area to the south. The full time saltwater marsh to the north would be reconnected to the Wilson River. To the east of the wetlands acquisition area, a swale to hold run off would be constructed to compensate for the removed capacity created by the salt water marsh area. The estimated cost of this project in 2004 was $4.5 million.

Project Exodus:

After reviewing the above two projects (Hall & Wetlands Restoration) it has been suggested by the U.S. Army Corps of Engineers and agreed upon by the Project Team that modifications to both projects be explored and possibly merged into a new and more complex project that will dramatically improve flooding conditions as well as improve eco-system restoration in the flood plain.

Process for Funding and Implementation of Prioritized Infrastructure Projects: A Design Committee (DC) will be used to review project alternatives, develop their design, and devise a process to obtain permits. Consideration will be given to combining elements of one project with another to maximize flood mitigation efforts. Conservation and improvement of the environment as well as the Tillamook Basin economy will be given priority as the DC works on flood projects. The Design Committee will forward various recommendations to the Project Team and will report regularly on their progress.

One representative from each of the following interests has been appointed by the Co-conveners to serve on the Design Committee: USACE, ODOT, NMFS, ODF&W, DSL, Farm Community, TBHEID, TEP, Tillamook County and Tillamook City. Rick Klumph, ODF&W North Coast Watershed District Manager will chair the Design Committee. The Committee will be assigned an Oregon Solutions project manager to assist in project implementation. As needed, technical expertise will be secured to assist the Design Committee. Emphasis by the DC will first be given to short term project accomplishment. These include: the Wilson/Trask Spillway, Tone Road Spillway, Dougherty Slough Permanent Structure and Trask Hook projects.

Implementation of flood mitigation projects will require funds from numerous sources over several years. The Tillamook flood mitigation project begins with $1 million allocated by the 2007 State legislature. It will be used as "seed money" to enhance other funding opportunities. Additional state funding sources will be explored and those members of the Project Team, for whom it is appropriate, will pursue federal funding through earmarks, congressional budget additions, and grants. A grant writer will be used to secure public and private funds. In order to be in the progression for 2008 federal funding (funds available in 2009), the appropriate Project Team members will aggressively pursue a work plan to present their needs to Congress through the Oregon Congressional delegation. A package for that purpose, including endorsement letters will be completed by the end of December 2007.

Note: As a Federal agency, the National Marine Fisheries Service cannot lobby for or pursue federal funding through earmarks, congressional budget additions and grants, or write letters of support or endorsement letters to Congress via the Project Team work plan.

Oregon Solutions Tillamook Flooding Agreements

All team members acknowledge that the best solutions depend upon cooperation by all entities at the table. Accordingly, they recognize that each party has a unique perspective and contribution to make, and legitimate interests that need to be taken into account for the success of various projects. The following sections provide each entities contributions to projects listed above.

State Legislative Representatives

Legislators representing the Tillamook Basin area provide a broad representation of interests and wide knowledge of the economic and social needs of the area. Senator Betsy Johnson was one of three parties who requested an Oregon Solutions designation from the Governor's office for this project. She serves as Co-convener for the Project Team with Commissioner Labhart. Representative Deborah Boone serves as a Project Team member. Both legislators have been active in working on the Project Team and offer their support and energies to Tillamook flood mitigation efforts. The Legislators have expressed interest in doing the following:

- Continue to provide leadership for the project and encourage all parties to work in a collaborative effort toward sustainable efforts to mitigate flooding.
- Speak in the region on the importance of the short and long term projects being undertaken.
- Sponsor or support legislation favorable to this project including sensible statutory changes that may be needed to facilitate projects, and funding opportunities for one or more projects.
- Endorse Congressional funding requests for the project and offer lobbying assistance for them.
- Senator Johnson will continue to offer her time as Co-convener of this project, and with Commissioner Labhart, will convene the Project Team at least quarterly.

Betsy Johnson — 10/31/07

Oregon State Senator Betsy Johnson — Date

Deborah A Boone — 10/31/07

Oregon State Representative Deborah Boone — Date

Tillamook County

The Tillamook County Commission was one of three parties to request the Governor's designation of this project. The County will act as the pass though agent for funding project management. It also has offered to keep records of all Project Team meetings. Commissioner Labhart serves as a Co-convener for the Tillamook flood mitigation Project Team. The County owns land that is affected by several projects and thus is in a key role to help facilitate land use management and permit processes to achieve desired projects. In addition to Commissioner Labhart, Tillamook County has offered the services of Paul Levesque and Tom Manning, who serve on the Project Team. Both have historical knowledge of flooding issues and provide leadership on project development and implementation. The County has contributed $7,500 toward project administrative expenses for the Oregon Solutions process.

As one of the lead public entities on the flood mitigation project, Tillamook County will:

- Have Commissioner Labhart continue to serve as Co-convener for this Oregon Solutions Project. Along with Senator Johnson, they will convene the Project Team at least quarterly.
- Serve as financial controller for all funds received and disbursed for projects under this Oregon Solutions effort.
- Provide leadership through its Board by encouraging fund raising efforts from the private, state and federal sectors. In this regard, the Commissioners and staff will offer their time and expertise to lobbying efforts as may be needed at the state and federal levels.
- Give priority, within county, state and federal laws and guidelines, to the issuance of permit applications.
- Work as a conduit with Drainage Districts and property owners to accomplish projects such as: Tone Road Spillway; Dougherty Permanent Structure; Trask Hook and other flood mitigation/environmental projects.
- As land owner of the Wetlands Restoration project area, work with all parties to assistant in installation of the Wilson-Trask Spillway.
- Give priority to efforts involving removal of the "Dean property fill" as it may apply under County jurisdiction.
- Will provide a leadership role in gathering all parties to the table to execute a final Stream Corridor Management Agreement.
- Will consider contributing further financial assistance to conduct future Project Team designated projects, as may be available within County budget constraints.
- Accept the responsibility of keeping the community, Project Team, news media, along with other key parties informed on progress of Oregon Solutions projects.
- Provide assistance to projects through the County Public Works Department as may be needed from time to time.
- Will work with the Oregon Solutions Project Team on balancing congressional funding requests between County needs and Oregon Solutions priorities.

Tillamook County Commission

Mark Labhart, Chair	10-17-07 Date
Charles Hurliman, Vice-Chair	10-17-07 Date
Tim Josi, Commissioner	10-22-07 Date

City of Tillamook

The City of Tillamook is represented on the Project Team by Mayor Bob McPheeters and City Manager Mark Gervasi. The City of Tillamook contributed $5,000 for project administrative expenses for the O/S process. During flooding events the City of Tillamook is surrounded by flood waters, with some encroachment into residential property and streets to the south, and high water into businesses along N. Hwy 101. Several properties have been acquired by the City through the FEMA buy-out program. The challenges these vacant properties present include planning efforts as well as removal of fill and other structures in the flood way. The City is desirous of having a community wide strategic planning effort that would move businesses out of harm's way and find suitable alternative locations for business development. The City has a Flood Mitigation Plan and has been recognized as a CRS rated community. Accordingly, goals stated in the Plan need to be implemented to reduce or hold flood insurance rates steady.

- Tillamook will take the lead in a community conversation and strategic visioning process to ascertain: how best to configure vacant parcels along north Hwy 101; where to encourage business development out of harm's way; and how to enhance economic opportunity for businesses in what ever locations they choose.
- Tillamook will work in partnership with DLCD and other state agencies in the above endeavors.
- Tillamook will explore the opportunity of hiring one additional employee who will assist in the community conversation efforts as well as implement the Tillamook Flood Mitigation Plan goals.
- As flood mitigation designs and proposals for sloughs and swales which pass through N. Hwy 101 are developed, the City will participate in the expeditious review of these projects toward implementation.
- Tillamook will consider the removal of the fill on the Dean property as a high and immediate priority and assist in that effort.
- Tillamook will provide leadership in the Oregon Solutions process and 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.
- The City will elicit the assistance of the Oregon Emergency Management office, and in particular their Hazard Mitigation Officer Dennis Sigrist, for advice and direction including the updating of flood maps, making training available, and securing improvements to the FEMA buy-out process.

Robert McPheeters — Oct 1, 2007

Mayor Bob McPheeters — Date

Department of Land Conservation and Development (DLCD)

In general, to assure the highest possible level of livability, DLCD is charged with facilitating well prepared and coordinated comprehensive plans for cities and counties, regional areas and the state as a whole. As our mission statement indicates, we support all of our partners in creating and implementing comprehensive plans that reflect a balance of the statewide planning goals, the vision of citizens, and the interests of local, state, federal and tribal governments.

Specifically, in our role of assisting local governments, the Department will strive to help strengthen the economic vitality of Tillamook County communities while encouraging livability through sustainable development within urban areas. As the community of Tillamook engages in a strategic planning effort, the Department will offer guidance on planning and land management tools to promote development patterns that reduce flooding, and provide incentives to promote relocation of businesses outside of flood prone areas. In addition the City of Tillamook will be working on goals within the City's Flood Mitigation Plan and the Department may have other opportunities to assist in those endeavors. Following are key department concepts related to this OS effort:

- DLCD supports the efforts of the Oregon Solutions flooding project and will offer technical assistance early on to indicate the likelihood of project success.
- North Coast Regional Representative Laren Woolley will continue to serve on the Project Team with other DLCD staff assisting where appropriate.
- The Department will work with the city of Tillamook to help identify any potential resources and assistance in their planning efforts as described above, not only from limited department resources, but from other possible sources. Such work items as land inventories, zoning criteria for vacant properties occurring from FEMA buy-out programs, business relocation opportunities, and strengthening the local economy will potentially be explored.
- The Department will provide assistance wherever possible on issues related to enhanced community livability and strengthening economic vitality.
- DLCD will coordinate state review of projects requiring federal permits to assure that federal actions are consistent with Oregon Coastal Management Program requirements.
- DLCD will provide technical guidance and support to assure projects and local planning provisions are consistent with FEMA requirements. DLCD will provide advice on opportunities to (reduce flood vulnerability) and maximize opportunities for reduced flood insurance costs.
- The Department will provide input and assistance on other high priority projects on the Oregon Solutions project list dated 9/12/07, as appropriate.
- DLCD supports sustainable projects that have demonstrated flood reduction benefits and meet state and federal environmental, resource management and land use requirements.

Cora R Parker — 10·23·07

Cora Parker, Acting Director, DLCD — Date

Department of State Lands (DSL)

The mission of the Department of State Lands (DSL) is to ensure a legacy for Oregonians and their public schools through sound stewardship of lands, wetlands, waterways, unclaimed property, estates and the Common School Fund. In accordance with this mission, DSL protects and conserves waterways and wetlands through administration of Oregon's Removal-Fill Law, enacted in 1967, as well as certain other statutes relating to activities involving removal-fill in waters of the state.

Under the Removal-Fill Law, the Department seeks to protect, conserve and ensure the best use of waters of the state, while protecting public navigation, fishery and recreational uses. Authorization is need from DSL for most activities involving removal or filling of greater than 50 cubic yards of material in waters of the state. Waters of the state include rivers, intermittent and perennial streams, lakes, ponds, wetlands, estuaries and tidal bays (to the elevation of the highest measured tide) and that portion of the Pacific Ocean which is in the boundaries of the state. The volume threshold of 50 cubic yards does not apply in designated Essential Indigenous Anadromous Salmonid Habitat Areas (ESH) or in State Scenic Waterways. ESH streams contain fish species that have been listed as sensitive, threatened or endangered by a state or federal agency.

As part of the Oregon Solutions process, certain projects have been identified that may help to reduce flooding within the Tillamook Bay Drainage Basin while incorporating environmental, social and economic values. DSL staff can contribute knowledge and expertise to assist in the design and permit decision-making process for those projects. Joy Vaughan serves on the Project Team and Assistant Director Kevin Moynahan is also involved in the process and has been present for several of the meetings.

- DSL will continue to provide representation on the Project Team and will participate on a "Design Committee" to provide guidance and assistance on the flood mitigation proposals.
- DSL will continue to provide guidance during the design and permitting phases of projects proposed as part of the Oregon Solutions process.
- DSL will contribute other appropriate resources for the Project Team to consider as the need arises.
- DSL will continue to cooperate and engage in discussions with other state, federal or local agencies concerning the permit process and any future implementation of projects identified through the Oregon Solutions process.
- DSL will be guided in its participation throughout the Oregon Solutions process and any permitting decisions by applicable statutory and regulatory process.

Louise Solliday

Louise Solliday, Director, DSL

10/17/07

Date

Governor's Economic Revitalization Team (ERT)

In designating Tillamook's flooding problems an Oregon Solutions Project, Governor Kulongoski has moved resolutely and decisively to bring to bear state resources and attention to foster a collaborative approach in helping to solve these long-standing problems. The Governor has further directed state agencies to treat projects arising from the Project Team as high priorities within each agency.

Under the direction of the Governor, the Economic Revitalization Team will focus the work of state agencies together with local interests to increase the level of success on numerous flooding projects. This effort will bring a special significance to the Tillamook Flooding mitigation efforts since seven (7) state agencies sit on the Project Team and are involved in one or more projects to help abate the impacts of flooding. ERT involvement will allow greater local access to state resources and assistance. It is anticipated that this public/private involvement will significantly enhance flooding mitigation opportunities. Specifically:

- Mark Ellsworth will continue to serve as the ERT representative on the Oregon Solutions Project Team.
- The ERT will identify early on impediments to, or the need for, special permits for projects under consideration by the Project Team.
- The ERT will provide coordination, as needed, with DLCD as they assist the Tillamook Community on land use issues, including land inventories and land use alternative ideas, planning efforts and implementation of other proposals.
- ERT coordination will provide assistance as required in working with ODOT on Hwy 101 bridge projects, Hwy 6/Hwy 101 improvements as they may tie into flood mitigation efforts, and the Trask Hook box culvert project.
- ERT will help coordinate, as needed, programs and processes that may be offered by OECDD.
- ERT will provide coordination assistance with the Governor's Natural Resources Office on projects as may be needed.
- ERT will coordinate efforts, as needed, with DSL in the review and approval of permits.
- ERT will act as a communication mechanism with federal agencies and the Congressional delegation on projects that offer flood mitigation potential.
- ERT will assist as necessary with the Office of Emergency Management in City/County discussions on FEMA processes.

Ray Naff [signature]

Ray Naff, Director
Intergovernmental Relations &
Economic Revitalization Team for
Governor Ted Kulongoski

10-31-07
Date

NOAA's National Marine Fisheries Service (NMFS)

The National Marine Fisheries Service (NMFS) is a Federal agency, within the Department of Commerce's National Oceanographic and Atmospheric Administration, responsible for the stewardship of living marine resources and their habitat. The agency works to promote sustainable fisheries and to prevent lost economic potential associated with over fishing, declining species, and degraded habitat. Cathy Tortorici, Chief, Oregon Coast/Lower Columbia River Branch, serves on the Project Team (Team). In addition, Robert Anderson, NMFS Fishery Biologist, has been an active participant in the evaluation of Team proposals. As a continuing partner in this Oregon Solutions process, NMFS will:

- Actively participate in the development of various proposals for flood control mitigation and ecosystem enhancement measures that benefit NMFS trust resources.

- Assign Robert Anderson to serve on the "Concept Design Committee" to offer NMFS technical perspectives on short- and long-range proposals under discussion.

- Continue to have Cathy Tortorici serve on the Project Team, where she will help the Team understand regulatory processes and consultation procedures to give Team proposals their best chance of success.

Michael Tehan 10/31/07

NMFS Oregon State Habitat Director   Date

Congressional Delegation

GORDON H. SMITH
OREGON

United States Senate
WASHINGTON, DC 20510-3704

COMMITTEES:
FINANCE
COMMERCE, SCIENCE, AND TRANSPORTATION
ENERGY AND NATURAL RESOURCES
INDIAN AFFAIRS

CHAIRMAN, SPECIAL COMMITTEE ON AGING

October 31, 2007

The strong cooperative efforts that exist between various local, state and federal entities to improve the community through this Oregon Solutions flood mitigation project are truly commendable. Recognizing and creatively addressing the need to improve existing flooding conditions are key to the economic and environmental vitality of the Tillamook Basin. My office offers assistance to this effort as deemed appropriate and recognize and appreciate the community spirit embodied in this project.

Sincerely,

Gordon H. Smith
United States Senator

The strong cooperative efforts that exist between various local, state and federal entities to improve the community through this Oregon Solutions flood mitigation project are truly commendable. Recognizing and creatively addressing the need to improve existing flooding conditions are key to the economic and environmental vitality of the Tillamook Basin. Our offices offer assistance to this effort as deemed appropriate and recognize and appreciate the community spirit embodied in this project.

Darlene Hooley

Signature

November 14, 2007
Date

Oregon Department of Fish and Wildlife (ODF&W)

The mission of the Oregon Department of Fish and Wildlife is to protect and enhance Oregon's fish and wildlife and their habitats for use and enjoyment by present and future generations. The Agency's responsibilities include advising on habitat protection for fish and wildlife populations and educating the public on natural resources. Projects to mitigate negative effects of flooding may effect fish and wildlife habitats. ODF&W Manager of the North Coast Watershed District, Rick Klumph serves on the Project Team and has provided leadership as chairperson of the In-Stream work group.

- ODF&W will continue to provide education and leadership for the Oregon Solutions process. Through participation in the Oregon Solutions process, the Department will attempt to find solutions that have multiple values and broad based support to help craft projects and move them forward.
- Rick Klumph will continue to serve on the Project Team and a "concept design committee" to help develop high priority flood mitigation projects.
- ODF&W will provide expertise in, and advice on, the permitting process and will share knowledge concerning fish and wildlife populations and habitats, as it relates to design considerations on the following projects: Dougherty Slough Permanent Structure; Trask Hook; Hall Slough and the Modified Wetland Restoration/Swale project.
- The Department will offer suggestions for funding opportunities for projects that nurture fish and wildlife protection.
- ODFW staff will also participate in additional Oregon Solutions projects such as the mediated gravel agreement/stream corridor management plan, providing leadership and seeking win-win solutions.

Director, ODF&W 10/10/07
Date

Oregon Department of Forestry

The Oregon Department of Forestry (Department) collects and shares information about the condition of Oregon's forests, protects forest lands, and works to conserve forest resources through sustainable forest management. The Department manages state forest lands in the Tillamook Bay watershed and is the single largest landowner within the watershed. One of the specific responsibilities of the Department is to implement the Oregon Plan for Salmon and Watersheds on these lands. Because it is in the forest lands where the rivers of Tillamook Bay originate, the Department's management activities influence the hydrologic system and may affect some rivers' behavior. The Department's Tillamook District Forester, currently Ross Holloway, serves on the Project Team.

- The Department will continue to be represented by Ross Holloway on the Project Team through 2007. Representation after that time will be provided by his successor in the District Forester position.
- The Department will contribute technical expertise, including that of their forest hydrologists, as may be appropriate, to analyze various proposals that relate to influences from forest lands.
- The Department will work with other Oregon Solutions partners to develop and provide appropriate public education about the flood mitigation projects through the Tillamook Forest Center.
- As may be identified, the Department will endorse funding requests for flood mitigation projects that are consistent with Department goals.
- The Department periodically collects data on resources in the forested portions of the Tillamook Bay Watershed, including aerial photography and LiDAR imagery. The Department will coordinate with Tillamook County, Tillamook Estuary Partnership, and other entities to form partnerships for the more efficient and cost effective collection and dissemination of this and other information.

Ross Holloway
Ross Holloway, Tillamook District Forester
Oregon Department of Forestry

10/31/07
Date

Oregon Department of Transportation (ODOT)

ODOT is currently negotiating a statement of work with CH2MHill to conduct an alternatives analysis at the intersection of OR6 and US101 on the north end of the Tillamook couplet. It is anticipated that the public process will begin in January 2008. Selected alternatives may positively affect other adjacent and related projects envisioned for flood mitigation. Highway related projects that are being considered under this Oregon Solutions process include: passage of flood waters under Hwy 101 bridges from Hoquarton Slough to the Wilson River Bridge; construction of the Trask River Hook box culvert project which will require evaluation by ODOT to ensure the continued structural integrity of the State Route 131 Bridge over the Tillamook River; and connecting Hall Slough to the Wilson River underneath Wilson River Road. The Department of Transportation's role in this Oregon Solutions project is to provide assistance in identifying opportunities to assist project efforts and potential funding sources for transportation system improvements for various Tillamook Flooding mitigation projects. ODOT encourages projects that are tailored to community needs and are an economic stimulus to the area. Northwest Area 1 Manager Larry McKinley serves on the Project Team. ODOT Area Planner Ingrid Weisenback has also participated in Tillamook project meetings.

- Larry McKinley will continue to serve on the Project Team
- Larry McKinley will serve on the "Concept Design Committee" and bring in subject matter experts when needed to help offer solutions and impact analysis on highway related projects.
- ODOT will provide assistance to this Oregon Solutions Tillamook Flooding project with the application process for applicable grants. Applicants are normally expected to provide a match of 20% or more.
- Application for other transportation related funding will be reviewed in accordance with established criteria.

Deputy Director, ODOT

30OCT07
Date

Oregon Economic and Community Development Department (OECDD)

The Oregon Economic and Community Development Department provides financial and technical resources to businesses and communities with a primary focus on the creation of jobs for Oregonians. Vicki Goodman, Regional Coordinator for OECDD serves on the Project Team.

- OECDD will assist the Tillamook Flooding Project by providing technical assistance to identify potential sources of funding for projects, some of which may meet the Department's criteria. Such assistance may include assuring that priority projects are listed on the community's infrastructure inventory with project descriptions and cost estimates; coordinating with other agencies to match sources of funding where appropriate; and assisting with applications where Department funding is appropriate.
- OECDD Regional Coordinator will continue to serve on the Project Team.
- The Department will assist the Tillamook Basin community's effort to assist willing businesses along Hwy 101 that are affected by flooding and work with DLCD to examine alternative locations and incentives to strengthen business development as relocations occur, including identifying infrastructure assistance that may be needed for relocation.
- The Department will help coordinate application for Immediate Opportunity Funds (IOF) with ODOT as may be appropriate for relocation of businesses out of harm's way.

Vicki Goodman

Vicki Goodman, Regional Coordinator
Oregon Economic & Community
Development Department

10-31-2007
Date

Oregon Watershed Enhancement Board (OWEB)

The Oregon Watershed Enhancement Board's long term mission is to achieve sustainable watershed health, thriving communities and a strong local economy throughout Oregon. The agency provides watershed improvement grants, technical guidance and training to groups working statewide to improve watershed health, and to support watershed protection and restoration efforts by citizens and groups. OWEB has a key role in the Tillamook Flooding project and has been involved through the years as various stream and wetland restoration projects have been developed and implemented. Ken Bierly serves on the Project Team. As a partner with the Oregon Solutions process, OWEB will:

- Continue to be active in the Tillamook Oregon Solutions process and be represented on the Project Team by OWEB Deputy Director Ken Bierly.
- Work with the Tillamook Flooding Project Team on restoration projects that may be proposed. Such assistance may include review of applications for OWEB funding for design/engineering and watershed restoration that may be part of the Wetlands Restoration project now under consideration.
- Assist the Project Team in identifying other sources of funding through State and Federal agencies that might supplement potential OWEB funds.

Thomas M. Byler, Executive Director, OWEB

10/29/07
Date

Port of Tillamook Bay

The Port of Tillamook Bay sits in a unique position to offer advice on the Tillamook flood mitigation project. The Port is comprised of over 1600 acres of land zoned for industrial use just two miles south of Tillamook. The Port's own railroad transits north /south through the Tillamook flood plain. On the drawing board are plans for a golf course, convention hotel and added spaces at the existing RV Park. As the Oregon Solutions flood mitigation project examines how to strengthen business currently located on N. Hwy 101 in the Tillamook Basin, discussions with the Port are a logical extension. Serving on the Project Team is Art Riedel who has extensive experience with coastal dredging and other water related projects.

- The Port of Tillamook Bay will support Oregon Solution efforts to mitigate impacts of flooding and Art Riedel will continue to serve on the Project Team.
- The Port will look for ways to partner with other entities to strengthen the local economy, including the potential for business relocation.
- The Port will actively participate in any "community conversation" that takes place, and which will develop a strategic plan for land use and zoning designations in the Tillamook Basin.

Chair, Port of Tillamook Bay 10/6/07
Date

Northwest Guides and Anglers Association

As a community leader in the commercial fishing industry, and as President of the Northwest Guides Association, Bob Rees represents the interests of anglers on the Project Team. Significant issues are faced by fish as the Tillamook Basin Rivers and Bay continue to fill in. Inadequate water temperatures, barriers to fish passage and lack of riparian areas confront the Tillamook Basin eco-system. To address these issues:

- Bob Rees will continue to serve on the Project Team.
- As projects are designed and implemented, he will provide advice and guidance to ensure that applicable projects maintain or enhance the eco-system.
- Bob Rees will lend support in the solicitation and lobbying of funding for various projects
- As time allows, he will provide to the news media and state and federal representatives opportunities to tour areas in the basin to show desirous habitat for fish species.

Robert Rees

Bob Rees, President
Northwest Guides and Anglers Association

11-12-07
Date

Tillamook Bay Community College (TBCC)

Tillamook Bay Community College strives to provide access to quality education in response to the needs of the community. In partnership with the Tillamook community, it provides a center for educational excellence that provides access to life long learning, and provides an environment for innovation in the economic, cultural and intellectual evolution of the Tillamook Community. The Community College has been represented on the Oregon Solutions Project Team by Jon Carnahan. Jon has also served as Chair of the Land Use work group.

- Jon Carnahan will continue to serve on the Project Team
- The College will look for ways to enhance a "community conversation" that will take place to form a strategic plan which will strengthen the local economy and deal with businesses located in the flood plain and now in harm's way.
- The College will serve in a leadership capacity to encourage partnerships within the community to enhance various flood mitigation efforts.

Jon Carnahan, President, TBCC — 10/31/07

Date

Tillamook Bay Habitat and Estuary Improvement District (TBHEID)

The Tillamook Bay Habitat and Estuary Improvement District (TBHEID) formed in 2002 as a voluntary self-taxing water control district in central Tillamook County. All members - business, farm, residential, public entities, groups, and citizens - pay annual dues. In addition, property owners pay an annual assessment. Total average annual revenues equal $38,500. The District's mission is to protect private and public sectors from preventable flood damages in Tillamook's most developed and populated area by controlling and maintaining waterways. The 2007-08 Master Projects Plan includes maintenance and flood structures for a Kilchis River Project, Wilson-Trask Rivers Wetlands Project, Dougherty Slough Project, Holden Creek Project, and North Main City of Tillamook Flood Drainage Project. The estimated cost for implementing the flood-ecosystem projects is $1.7 million. TBHEID Oregon Solutions Project Team representatives are Vice President Chad Allen, Board members Bub Boquist and Denny Pastega, and citizen, Don Hurd. TBHEID contributed $1,000 to the Oregon Solutions Flood Reduction Project.

- The TBHEID continues its support of Oregon Solutions flood reduction projects that benefit its members and the community economically, socially and environmentally.
- Currently designated TBHEID members will continue to serve on the Oregon Solutions Flood Reduction Project Team.
- TBHEID will financially contribute to prioritized projects like the Wilson-Trask Spillway Tidegate Project #1, the Dougherty Slough Permanent Structure Project #3, the Tillamook Bay Watershed Master Waterway Maintenance & Project Infrastructure Program Project #13, and Dredging of Wilson River Mouth & Bay Shoal Project #14, as agreed upon by District Board and members.
- TBHEID will assist in working with property owners, as needed, for project completion.
- TBHEID will lead efforts to unite the community and participants in moving forward collaboratively.
- TBHEID will work within timelines, prioritizations and procedures agreed upon by the Project Team.
- TBHEID will continue to share historical knowledge of flood issues in the Tillamook Bay Basin and provide the best collective information available to expedite project design and implementation.

Doug Rosenberg, TBHEID President — October 5, 2007
Date

Tillamook County Creamery Association (TCCA)

The Tillamook County Creamery Association is a nearly 100-year-old cooperative comprised of nearly 130 family dairy farmers. For the Oregon Solutions Tillamook flooding project, Shawn Reiersgaard, director of environmental and political affairs, has represented the interests of TCCA and its member dairy farmers. Representing dairy interests, TCCA is in a unique position to offer advice and guidance on the potential impacts of the various projects under consideration. In addition to participating in the effort to build a community supported solution to the flooding issue, TCCA supported the Oregon Solution effort through a $5,000 donation to help fund administration of this project.

To build upon the success of the Oregon Solutions process and to help move community flood mitigation efforts forward, TCCA will:

- Continue to participate on the Project Team through the services of Shawn Reiersgaard.
- Participate in, and encourage others to join, the community visioning and strategic planning process for the Tillamook Basin area.
- Offer encouragement and leadership on behalf of the farming community as it relates to flood project development.
- Keep the Project Team members aware of agricultural issues during project development.
- Converse with landowners and work to resolve conflicts, such as set back issues, as they arise in project design and development.
- Offer advice and assistance in the effort to secure funding for various flood mitigation projects.

Harold Strunk, CEO, TCCA

10/23/07
Date

Tillamook County Farm Bureau

The Tillamook County Farm Bureau is a subdivision of the Oregon Farm Bureau Federation. It is a voluntary grass roots non-profit organization and represents the interest of farmers in the public and policy making arenas. Primary goals for the Farm Bureau are to promote educational improvement, economic opportunity and social advancement for its members. Dale Buck represents the Farm Bureau on the Project Team. Dale was chair of the U.S. Army Corps of Engineers' Feasibility Study work group. He is also the Region 8 (Clatsop/Tillamook) Director for the Oregon Farm Bureau Federation.

- Dale Buck will continue to serve on the Project Team and on a "Design Committee" for project development.
- In the capacity of working on a Design Group, Dale will provide an educational role and explain the impacts of various designs and their implications for farming activities.
- The Bureau will offer advice and assistance in the effort to secure funding for various flood mitigation projects.
- The Bureau will converse with land owners and work to resolve conflicts over concepts such as setback levees as they arise in project design and development.
- Other items of interest may arise from time to time in which Tillamook County Farm Bureau may be able to assist.

Dale Buck　　　　10-31-07

Dale Buck　　　　Date

Tillamook Estuaries Partnership (TEP)

The Tillamook Estuaries Partnership (TEP) is a non-profit organization dedicated to enhancing the estuaries of Tillamook County and the watersheds that sustain them. It is organized as a 501(C)(3), and the Board consists of a wide array of stakeholders to implement the conservation plans established under the Tillamook Bay Comprehensive Conservation and Management Plan, or CCMP. TEP is one of twenty-eight designated National Estuary Projects. The National Estuary Program (NEP) was established by Congress in 1987 to improve the quality of estuaries of national significance.

In coordination with Tillamook County, TEP has taken the lead in grant and permit writing activities for one of the Oregon Solutions Project Team's main projects, the Wetlands Restoration/Swale project. TEP contributed $5,000 to the Oregon Solutions program, and Mark Trenholm serves on the Project Team. As Oregon Solutions projects are consistent with the goals of the CCMP, TEP looks forward to contributing the following:

- Mark Trenholm will continue to actively participate on the Project Team, and he will also serve on the "Design Committee."
- TEP will assist in the design and implementation of solutions to Tillamook Basin flood problems.
- In concert with Tillamook County, TEP will offer its skills in GIS mapping, research, grant writing, and development of studies as may be of assistance for various projects under consideration.
- TEP will pursue project funding, leverage resources, and seek permits.
- TEP will assist in the communication of projects to its members and the Tillamook Basin community at large.

Joel Sacks

Joel Sacks, Chair, TEP

10 . 31 . 07

Date

Tillamook County Soil and Water Conservation District

Tillamook County Soil and Water Conservation District
6415 Signal Street - Tillamook, Oregon 97141
Phone (503) 842-2848 / fax (503) 842-2760 / e-Mail: tcswcd@oregoncoast.com

October 18, 2007

Flood Reduction Project Team

RE: In-Stream Work Group

Dear In-Stream Work Group Members,

The Tillamook County Soil and Water Conservation District Board of Directors unanimously passed a motion in support of in stream projects for the purpose of flood control. They further added that the districts long term goals are Fishery Enhancement and Soil Erosion.

The motion as stated: **"The Tillamook County Soil and Water Conservation District supports in stream projects for the purpose of flood control. Our long term goals are Fishery Enhancement and Soil erosion."**

Sincerely,

Rudy Fenk

Rudy Fenk Tillamook County SWCD Chair

10-19-07
Date

CONSERVATION • DEVELOPMENT • SELF-GOVERNMENT

Trust for Public Land (TPL)

Trust for Public Land (TPL) is a national, nonprofit, land conservation organization that conserves land for people to enjoy as parks, community gardens, historic sites, rural lands, and other natural places to ensure livable communities for generations to come. Preserving land to protect natural water ways and working land, such as farms, are key common goals for TPL and the Tillamook flood mitigation project. Geoff Roach serves on the Project Team and has actively participated on the Land Use work group.

- Geoff Roach will continue to serve on the Project Team.
- TPL will offer knowledge of conservation issues, techniques and best practices to assist the Oregon Solution flood project. Such issues may include options for use of vacant parcels occurring through FEMA buy-outs, and ideas for land use options to encourage businesses to operate outside of harm's way.
- Trust for Public Land will offer fund raising ideas for projects that are in line with its mission.
- TPL will participate in strategic planning efforts within the Tillamook community to help define priorities, identify lands to be protected, and create a road map for long term investment.
- TPL will work with State and local government officials to explore ways FEMA can increase the incentive for property owners to use their assistance programs.

Geoff Roach, State Director
Trust for Public Land

11/12/07
Date

United States Army Corps of Engineers (USACE)

The mission of the U. S. Army Corps of Engineers is to serve the Armed Forces and the Nation by providing vital engineering services and capabilities, as a public service, across the full spectrum in support of national interests. Corps' missions include five broad areas: water resources, environment, infrastructure, homeland security, and war fighting.

Fulfillment of the Corps' water resources mission includes flood control related planning, design and implementation of civil works projects. The Corps is working in partnership with Oregon Solutions on various Tillamook flood damage reduction projects. The Assistant Chief of Planning, Programs and Project Management Division, Portland District serves on the Project Team and actively supports efforts to lessen the impacts of flooding in the Tillamook Bay Basin. The Portland District has supporting members with expertise in Corps' regulatory process, planning authorities, hydraulic and hydrologic modeling and emergency response. Subject to the availability of funding, the Corps will:

- Continue to be represented by the Assistant Chief of Planning, Programs and Project Management on the Oregon Solutions Project Team. In such representation, USACE will actively participate, lending its expertise in discussions and analysis of various flood damage reduction proposals.
- Serve on the "Design Committee" to narrow down and develop options to present to the Project Team. The Corps Regulatory Branch will actively participate and offer advice on project design and permitting requirements.
- Participate in modeling for proposed projects as may be requested and as funds are made available.
- Assist the Oregon Solutions process by providing input and knowledge on project and program opportunities, including other federal agencies in addition to USACE that would be most useful to help achieve the group's objectives.
- Provide emergency flood operations as authorized and based on eligibility criteria contained in PL 84-99 when requested, and emergency response preparation support within available funding.

Kevin J. Brice

Kevin J. Brice, P.E.
Deputy District Engineer
For Project Management

22 Oct 07
Date

United State Department of Interior, Fish & Wildlife Service

The Fish and Wildlife Service's (Service) mission is to work with others to conserve, protect and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people. In addition to our regulatory responsibilities, the Service supports a wide range of important conservation initiatives, including assisting landowners who volunteer to manage their property for the benefit of fish and wildlife. To accomplish our mission, we work cooperatively with individuals, conservation partners, Tribal governments, and all levels of state and local government.

- The Service will support efforts of the Tillamook Basin Flooding Reduction Project (Project) to develop and implement a plan to reduce the adverse impacts of flooding in a manner consistent with applicable conservation objectives and associated policies and regulations.
- The Service will participate in Project activities, provide technical assistance and review, assist in identifying and attaining funding for Project activities, and offer guidance on ecological principles, scientific knowledge, and regulatory process responsibilities.
- The Service will engage in the above actions as permissible and consistent with the Service's mission and policies and to the greatest extent practicable given available resources and priorities.

for Monty Knudsen
Kemper M. McMaster
State Supervisor

12/13/07
Date

OREGON SOLUTIONS

Appendix A

Tillamook Oregon Solutions Project
Project Team

Co-Conveners: Oregon State Senator Betsy Johnson
Tillamook County Commissioner Mark Labhart

Oregon State Representative Deborah Boone
Chad Allen, Vice-Chair TBHEID
Ken Bierly, Deputy Director, OWEB
Bub Boquist, Farming Community
Dale Buck, Regional Director, Oregon Farm Bureau
Jon Carnahan, President, Tillamook Bay Community College
Doug Clarke, Chief, Programs & Project Management, U.S. Army Corps of Engineers
Mark Ellsworth, ERT Regional Coordinator
Rudy Fenk, Chair, Tillamook Soil Water & Conservation District (or designee)
Mark Gervasi, Tillamook City Manager
Vicki Goodman, Regional Coordinator, OECDD
Wendell Hesseltine, President, Tillamook County General Hospital
Ross Holloway, District Forester, Tillamook District
Don Hurd, Downtown Businessman
Rick Klumph, Manager, North Coast Watershed District, ODF&W
Tom Manning, Tillamook County Emergency Management Director
Larry McKinley, Northwest Area 1 Manager, ODOT
Tillamook Mayor Bob McPheeters (or City Council designee)
Paul Levesque, Tillamook County Management Analyst
Denny Pastega, Downtown and Hwy 101 Business Owner, TBHEID Board
Bob Rees, Local Fishing Guide
Art Reidel, Commissioner, Port of Tillamook Bay
Shawn Reiersgaard, Environmental Supervisor, Tillamook County Creamery Association
Geoff Roach, State Director, Trust for Public Land
Cathy Tortorici, Branch Chief, NOAA's National Marine Fisheries
Mark Trenholm, Executive Director, Tillamook Estuaries Partnership
Joy Vaughan, Tillamook County Resource Coordinator, DSL
Steve Wille, U.S. Fish and Wildlife Service
Laren Woolley, North Coast Regional Rep., DLCD

► Congressional Representation: Participating to provide resource and liaison with federal agencies:

Fritz Graham, Senator Wyden's Office
Richard Krikava, Senator Smith's Office
Jennifer Wagner, Congresswoman Hooley's Office

Project Manager: Dick Townsend, Salem, OR

Appendix B

6/27/07

Oregon Solutions Tillamook Flooding Project
Work Groups

Review Project List in USACE Feasibility Study

Dale Buck, Chair	Don Hurd
Robert Anderson	Tracy Johnson
Bruce Apple	Rick Klumph
Greg Beaman	Paul Levesque
Dale Blanton	Rob Rees
Ken Bierly**	Art Riedel
Doug Clarke	Shawn Reiersgaard
Miriam Hulst**	Mark Trenholm

In-Stream Projects (not limited to just gravel removal)

Rick Klumph, Chair	Rudy Fenk***
Chad Allen	Wendell Hesseltine
Robert Anderson	Don Hurd
Greg Beaman	Paul Levesque
Sandy Bell***	Judy Mammano
Bub Boquist	Gus Meyer
Orella Chadwick	Doug Rosenberg

Land Use (not limited to relocating businesses)

Jon Carnahan, Chair	Bob McPheeters
Dale Blanton**	Denny Pastega
Bill Campbell	Geoff Roach
Joy Friebaum	Dennis Sigrist
Mark Gervasi	Mark Trenholm
Vicki Goodman	Laren Woolley**
Wendell Hesseltine	

* Indicates alternate or sharing Project Team responsibilities

Note: To insure balanced representation on all committees, additional Project Team members are welcome to participate. Other parties beyond those listed above may be designated by the project Conveners. If interested please contact Dick Townsend at consultown@comcast.net

Appendix C

Tillamook Flood Reduction
Design Committee
Contact List

Co-Conveners

Oregon State Senator Betsy Johnson
900 Court St NE S-314
Salem, Oregon 97301
Ph: 503-986-1716
E-mail: sen.betsyjohnson@state.or.us

County Commissioner Mark Labhart
County Court House
201 Laurel Ave
Tillamook, Oregon 97141
Ph: 503-842-3403
E-mail: mlabhart@co.tillamook.or.us

****

Design Committee:

Rick Klumph, Chair, Manager
ODFW North Coast Watershed District
4907 E Third St
Tillamook, Oregon 97141
Ph: 503-842-2741
E-mail: Rick.L.Klumph@state.or.us

Chad Allen, TBHEID
4450 Boquist Rd
Tillamook, Oregon 97141
Ph: 503-842-6240
E-mail: allen@oregoncoast.com

Robert Anderson, NOAA
1201 NE Lloyd Blvd
Suite 1100
Portland, OR 97232
Ph: 503-231-2226
E-mail: Robert.C.Anderson@noaa.gov

Larry McKinley, ODOT
NW Area 1 Manager
350 W Marine Drive
Astoria, Oregon 97103
Ph: 503-325-7222
E-mail: Larry.MCKINLEY@odot.state.or.us

Dale Buck
Tillamook County Farm Bureau
25590 Chinook St
Cloverdale, Oregon 97112
Ph: 503-398-5191
E-mail: dbuck@oregoncoast.com

Doug Clarke, Program & Project Management
US Army Corps of Engineers
P O Box 2946 (CENWP-PM-P)
Portland, Oregon 97208
Ph: 503-808-4701
E-mail: doug.a.clarke@usace.army.mil

Mark Gervasi
Tillamook City Manager
210 Laurel Ave
Tillamook, Oregon 97141
Ph: 503-842-2472
E-mail: mgervasi@tillamookor.gov

Paul Levesque
Tillamook County Management Analyst
County Court House, 201 Laurel Ave
Tillamook, Oregon 97141
Ph: 503-842-1809
E-mail: plevesqu@co.tillamook.or.us

Mark Trenholm, Executive Director
Tillamook Estuaries Partnership
613 Commercial Street
P O Box 493
Garibaldi, Oregon 97118
Ph: 503-322-2222
E-mail: mtren@tbnep.org

Joy Vaughan
775 Summer ST NE Suite 100
Salem, Oregon 97301
Ph: 503-986-5268
E-mail: Joy.Vaughan@state.or.us

Dick Townsend, Project Manager
815 Kingwood Dr. NW
Salem, Oregon 97304
Ph: 503-315-2194
E-mail: consultown@comcast.net

Appendix D

The purpose of the Oregon Solutions Tillamook Flooding project is to develop and implement a plan consistent with the Project Team's stated goal.

GOAL: Reduce flooding and the adverse impacts of flooding while incorporating environmental, social and economic values in the development of short and long term solutions

Notes
While the geographic area for the project is the Tillamook Bay Drainage Basin, this project will hopefully create a template and process to address flooding in other coastal basins (watersheds) .

Long term definition: Ten (10) years or more

Environmental considerations may include: freshwater wetlands, estuarine areas, associated side channels, streams and rivers, forest lands, and associated habitats and species.

Appendix E

Oregon Solutions Projects
(Prioritized by Project Team 9/12/07)

1. **Wilson/Trask Spillway**
2. **Tone Road Spillway**
3. **Dougherty Slough Permanent Structure**
4. **Comprehensive Community Vision and Strategic Plan**
5. **Trask Hook**
6. **Implement City/County Flood Mitigation Plans**
7. **Mediated Gravel Agreement/Stream Corridor Management Plan**
8. **Hall Slough Project**
9. **Modified Wetland Restoration and Swale (279)**

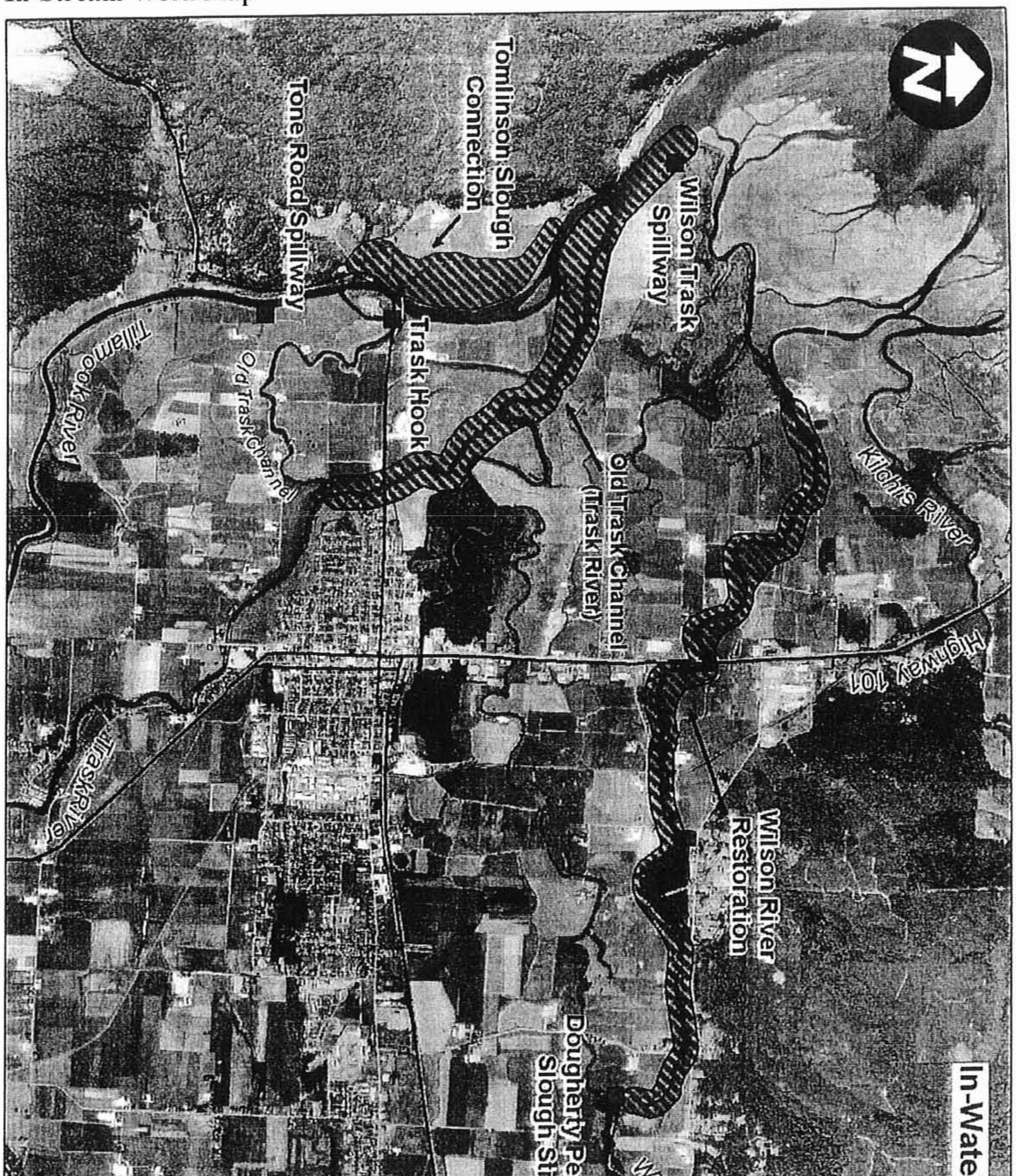
>>

Other Projects for Possible Future Consideration

10. Tomlinson Slough Connection/Restoration (316)
11. Study of Drainage/Diking District Issues (321)
12. Old Trask Channel Restoration (340)
13. Drainage Maintenance and Flood Structure Improvements (349)
14. Wilson River Dredging – Mouth & Bay Shoal (354)
15. Wilson River Restoration (358)
16. Upper Basin Storage (374)
17. Implement Storm Water Maintenance Plan (417)
18. Bay Dredging - multiple sites (426)
19. Bay Dredging – East channel (440)

Appendix F

In-Stream Work Map



Appendix G

Oregon Solutions Project Evaluation Criteria

Purpose: The following criteria will assist the Project Team and work groups in evaluating the potential for accomplishing suggested projects.

1. Provide a brief description of the project, including the benefits derived from accomplishing the project.

2. Does it comply with the Project Team's stated goal?

   Reduce flooding and the adverse impacts of flooding while incorporating environmental, social and economic values in the development of short and long term solutions

3. What would happen if this project was not accomplished?

4. Does the project have strong community and agency support?
   Who are the responsible/lead parties?
   Who are partners that need to be involved?

5. List identified or potential funding sources to carry out the project.

   What is a rough cost estimate to complete the project?
   Will this project take additional funds to sustain the outcome? Are there operating or maintenance costs associated with the project?

6. Is this project characterized as a short or long term solution for the Team's stated goal?

7. List the approximate time frame for implementation.

8. Can the project be easily implemented? List the requirements for permits, logistics, EIS work, etc.

9. Outside of permits and funding requirements, list any impediments/obstacles to accomplishing the project. List possible solutions to those obstacles.

10. Is the project compatible with, or does it support recommended action items contained in the Tillamook County and Tillamook City flood mitigation plans?

11. Is the project economically and environmentally sustainable?

12. Discuss how success of the project can be measured or evaluated, i.e. how will we know it is reducing the adverse impacts of flooding?

Appendix H

Documents

Minutes are available for the following Project Team meetings:

- May 23, 2007
- June 27, 2007
- July 25, 2007
- September 12, 2007
- October 31, 2007

Numerous documents were used or referred to during Work Group and Project Team meetings. They include:

- Tillamook Bay and Estuary, Oregon – General Investigation Feasibility Report U.S. Army Corps of Engineers, Portland District, dated February 2005

- No Adverse Impact: A Toolkit for Common Sense Floodplain Management, 2003 Association of State Flood Plain Managers, Madison, WI.

- Federal Funding Source Table for NPS Activities, provided by NMFS

- City of Tillamook, Flood Mitigation Action Plan, November 2003

- Work Groups and the Project Team were presented with numerous pictures, diagrams, and maps to assist in their deliberations. State agency pamphlets and directives were made available during the project, as were City and County Land Use Ordinances and Plans. Many of these materials have become part of the record and are appended to meeting minutes.

OREGON SOLUTIONS

Appendix I

Note: This document was presented to the Project Team prior to voting on projects for prioritization. It was then signed at the meeting by all participants.

Oregon Solutions Tillamook Flooding Project

Affirmation of Cooperation for Oregon Solutions Process
September 12, 2007

The Tillamook Flooding Project has used three work groups to analyze and sort through dozens of potential proposals to address the Project Team's stated goal. These proposals will be presented to, and prioritized by the Project Team. This process is not meant to choose "winners" verses "losers." It simply provides a group decision about what projects have the highest likelihood of accomplishment.

The Oregon Solutions process will conclude its first stage in November when all stakeholders will sign a Declaration of Cooperation. That document will outline projects identified by the Project Team and will form a public statement of intent to participate in them. The Declaration will represent specific commitments by all parties to collaborate with other team members in promoting the success of projects.

As priority projects move forward, Project Team members today herein publicly state their intent to continue to participate in the Oregon Solutions Tillamook Flooding Project and strive to identify opportunities and solutions whenever possible. Through continued assistance and support on priority projects, Team members acknowledge that the best solutions depend upon cooperation by all entities at the table.

Co-Convener **Senator Betsy Johnson**	**Co-Convener** **Commissioner Mark Labhart**
Representative Deborah Boone	**Chad Allen**
Ken Bierly	**Bub Boquist**

Oregon Solutions Tillamook Flooding Project
Affrimation of Cooperation, 9/12/07
Page 2

Dale Buck

Doug Clarke

Rudy Fenk

Mark Gervasi

Ross Holloway

Rick Klumph

Tom Manning

Bob McPheeters

Bob Rees

Jon Carnahan

Mark Ellsworth

DSL Assistant Director
Joy Freibaum

Vicki Goodman

Don Hurd

Paul Levesque

Larry McKinley

Denny Pastega

Art Reidel

Oregon Solutions Tillamook Flooding Project
Affirmation of Cooperation, September 12, 2007
Page 3

Shawn Reiersgaard	Geoff Roach
Cathy Tortorici	Mark Trenholm

-> RESERVE the right to REVIEW Declaration of Cooperation BEFORE signing it AND make signing decision at that time.

Stephen A. Wille	Dale Blanton for
Steve Wille	Laren Woolley

Appendix J

How We Will Work Together

5/23/07

1. Recognize strength and diversity within the team: **Be respectful** of one another and allow others to talk without interruption

2. Help **develop trust** among the group: Be candid and honest, but do not blame, attack or put down other people. Strive to understand by asking questions for clarification or to get information. Don't challenge or intimidate others. Strive to provide advanced notice on issues or information that could come before the Team. Share with the Project Team all information that may affect a final agreement.

3. Work toward an agreement that is fair and constructive for everyone. Strive to reach **decisions by consensus in a collaborative manner.** When consensus is not possible, acknowledge and accept professional differences and disagreements.

4. Focus on the future you would like to create rather than past problems and past history of issues. **Agree on a *Statement of Purpose***

5. As project options are discussed, **be flexible** and don't establish irrevocable non-negotiable positions. Try not to create **"dueling data" situations**. When information has to be collected, agree up front on who is gathering it and how it will be gathered

6. Projects that are being worked on by the Project Team should not also be worked on separately by interest groups. **Pursuing two processes** can generate distrust and hostility among stakeholders. Agencies you are dealing with may throw up their hand in confusion or disgust.

7. Role of participants in the process: Attend all meetings or designate an alternate. Be responsible for keeping an alternate updated. (If you are not the right person to be participating on the Team, let us know by the end of the first project meeting.) You are responsible for keeping any group/entity that you are affiliated with "up to speed." Ultimately, project team members will be working on wording for a Declaration of Cooperation and getting it signed. Maintain focus on the agenda, use time wisely, and assure time for well reasoned decisions. Agendas will be prepared by the project manager for each meeting after consulting with the Co-Conveners. If a Team member has suggestions for an agenda, contact one of the Co-Conveners or project manager well in advance of the meeting.

8. Support the Co-Conveners and facilitators, and take responsibility for observing ground rules. The Team should enforce these guiding principles.

9. Public participation will be allowed with the consent of the Co-Conveners. Generally, the Project Team will be given priority in all discussion, and in some situations it will be limited to just the Project Team. <u>All meetings are open to the public</u>. Communications with the press and other media are most representative when they come on behalf of the whole Project Team.

Appendix K

Tillamook Headlight Herald
11/13/2007 1:42:00 PM

A flood of opportunities

The Oregon Solutions Tillamook Flood Reduction Project Team is off to a promising start.

Team members gathered two weeks ago to sign a declaration of cooperation to accomplish the nine priority projects agreed upon in a previous meeting. Oregon Solutions consultant Dick Townsend was amazed that the two dozen-plus participants came to this point in only five months, eight days from when they first met, despite their diversity of interests. In his time with the governor's Oregon Solutions program, he said, "I've never had a group come together this fast before."

It helped that participants had first determined that their goal would be to "develop and implement a plan to reduce flooding and the adverse impacts of flooding, while incorporating environmental, social and economic values in the develop of short- and long-term solutions."

In prioritizing projects - six will be tackled initially - work groups aimed to span the range of interests. As a result, several projects that maintain or improve the environment have been endorsed for further analysis. And because flooding affects the economy, some projects within this declaration of cooperation also consider how to best sustain and encourage growth of commercial businesses and support the dairy industry while mitigating the negative effects of flooding.

It also helps that the project, which began with no guarantee of funding at all, has a $1 million jump start with funding from the Legislature, thanks to the efforts of co-convener and State Sen. Betsy Johnson's efforts on the legislative Subcommittee on Transportation and Economic Development of the Joint Committee on Ways and Means.

Now comes the hammering out of details involving permitting, environmental requirements and, of course, money. The $1 million will come in handy as seed money to use as leverage for matching funds. As the saying goes, it takes money to make money - hiring a grant writer would be an excellent investment right now.

It also helps that the Governor's Office is committed to helping make Tillamook's projects work. Gov. Kulongoski has assured participation of his staff and appropriate state agencies with participating public and private partners by declaring this effort an Oregon Solutions project.

The important thing now will be to stay focused locally on the big picture - which nearly always involves lots of unwanted flood- waters several times a year. Co-convener and County Commissioner Mark Labhart has urged all participants to "stay at the table." The big floods may not be preventable, but the sustained, coordinated efforts involved in the Tillamook Oregon Solutions flood projects will go a long way toward nipping the nuisance floods.

Tackling Tillamook's flooding problems is the most difficult Oregon Solution Project efforts yet taken on, according to Labhart.

As Ray Naff of the Governor's Office said at the declaration of cooperation ceremony, "It's no simple task." Yes, it's only the beginning, he said, "but an extraordinary beginning."

Let's not lose this momentum.

Appendix L

Tillamook Poster and Logos

Tillamook Basin Flooding Reduction Project
Oregon Solutions Team

US Army Corps of Engineers.

farm bureau

OREGON DEPARTMENT OF STATE LANDS

OREGON Fish & Wildlife

OREGON SOLUTIONS

THE TRUST for PUBLIC LAND

NOAA

OWEB

Oregon Department of Transportation

Tillamook SWCD

Tillamook Estuaries Partnership

A National Estuary Project

OREGON
SOLUTIONS

Declaration of Cooperation

Tillamook Basin Flooding Reduction Project

August 2009

The purpose of the Oregon Solutions Tillamook Flooding Project is to develop and implement a plan to reduce flooding and the adverse impacts of flooding while incorporating environmental, social and economic values in the development of short and long range solutions.

This document is preceded by:
Declaration of Cooperation dated November 2007
Addendum to the Declaration dated January 2009

Purpose of Declaration of Cooperation: The Oregon Solutions process provides a structure and process for public and private sectors to collaborate in addressing community needs. That collaborative process, which results in agreements made amongst the parties, form a Declaration of Cooperation. The purpose of this document, and those that have preceded it, is to have all interested and affected parties determine the best courses of action to diminish the magnitude and negative impacts of flooding in the Tillamook Basin. The Declaration of Cooperation outlines the commitment of all parties to successfully carry out various projects which are identified by the Project Team. The Oregon Solutions Tillamook Basin Flooding Reduction Project is entering its third year. This document provides background to this project and outlines accomplishments of priority sub-projects which were selected by the Project Team. The closing sections of this Declaration provide a frame work for project facilitation over the next year and declare a commitment by all parties to continue to work productively on uncompleted priority work elements.

Preface: In December, 2006 a letter was sent from State, County and City representatives to Governor Kulongoski requesting that Tillamook flood mitigation efforts be designated an Oregon Solutions project. A project assessment was conducted in March, 2007, followed by Governor Ted Kulongoski's official designation in April, 2007.

The Governor assured participation of his staff and appropriate state agencies with other participating public and private partners through the designation of this effort as an Oregon Solutions Project. A Project Team was assembled in an effort to bring partners to the table. It was expected that the creation of this Team would help make efficient use of available resources, accelerate the pace of the project, overcome potential impediments early on, and raise awareness of the project at local, regional, state and federal levels. In this fashion, the Project Team would commit resources and time to an integrated action plan focusing on successful, sustainable outcomes.

Project Description: On September 12, 2007 the Oregon Solutions Tillamook Project Team prioritized projects for accomplishment. The projects are listed in order of prioritization and were those that can be worked on through the Oregon Solutions Process. Combined, they encompass both short and long term objectives to alleviate flooding and maintain or enhance the environment. The following projects form the basis around which this Declaration of Cooperation is framed.

1. **Wilson/Trask Spillway:** Flood water drainage is blocked when high water behind berms is not allowed to escape. For added flood drainage, this project allows the expeditious exit of flood waters into Tillamook Bay through a gated spillway next to the ten tide gates on the Tillamook Bay levee. The U.S. Corps of Engineers provided valuable information for optimal design criteria and the Oregon Department of State Lands waived permit fees and provided expedited permit application review. Funding for this project came from a legislative allocation in 2007 (see pg 6). The Tillamook Bay Habitat and Estuary Improvement District provided some matching funds for this structure and for the Tone Road Spillway. ***Project construction was completed in September 2008.***

2. **Tone Road Spillway:** This project shows a positive benefit for farm land where excessive loss of farm animals occurred in two floods over the last decade. The project has installed a second gated spillway north of Tone Road, to convey flood water into Tillamook River. The property owner and Drainage District endorsed this improvement. ***Project construction was completed in April 2009***, using funds from the legislative allocation.

3. **Dougherty Slough Permanent Structure:** The Dougherty Slough permanent structure is meant to replace the U.S. Army Corps of Engineers' temporary log jam at the head waters of the slough in the Wilson River. Concern has been that without a permanent structure, it is possible that the wooden structure would give-way, causing significant flooding in the North Hwy 101 business district. (This project has been subsequently ***added as a component of Project Exodus*** for further analysis by the engineering firm)

4. **Comprehensive Community Vision and Strategic Plan:** This project is meant to reduce the impacts of flooding by producing long term strategies for providing assistance and land use alternatives for relocating willing businesses out of harm's way. Key to this project is the emphasis on maintaining business vitality within the community. Land use planning efforts, including inventories of available land for commercial purposes, and discussion of open space designs for vacant North Hwy 101 properties, will be part of this community wide planning process. A grant from the Oregon Department of Land Conservation and Development was provided to Tillamook City for this project. ***The consulting firm of Johnson-Gardner has been retained and a project report is expected in the fall of 2009. Project Team members will receive a copy of this report and have an opportunity to discuss land use issues at one of their meetings.***

5. **Trask Hook:** This project envisioned installing a culvert, or other type of by-pass, to remove the hydraulic pressure created by the Trask River Hook channel. The Old Trask channel currently directs flood waters against the flow of the Tillamook River, which creates a headwall of water, increasing flood water levels in the lower Trask Drainage Cell. Conflicting hydraulic analysis was presented to the Design Committee. Because of this and the relatively high cost of the project, ***in December 2008 the Committee tabled this project.***

6. **Implementation of City/County Flood Mitigation Plans:** This project endorses the continued need for carrying out the many goals as listed in the Tillamook City Flood Mitigation Plan. Absent efforts to carry these recommendations forward, there will continue to be frustration over reoccurring damages from flooding and lack of coordination and inconsistencies among agency practices. Removal of dirt piles in the flood way was one type of project listed in the Mitigation Plan. These tend to negatively disperse waters during flood events. In September 2008 the 12,000 cubic yard Dean Dirt Pile was removed through this Oregon Solutions effort. VLG Consulting has been obtained by Tillamook City with the assistance of Oregon Solutions funding to update the Plan with the help of a Steering Committee. ***Expected completion of the Plan update is fall 2009. An informational report will be provided to the Project Team at one of their meetings.***

7. **Mediated Gravel Agreement/Stream Corridor Management:** Facilitation was needed to bring parties together with the goal of executing a final agreement and adoption of a Stream Channel Management Plan. The Plan addresses where and under what conditions gravel may be extracted in certain Tillamook County rivers. In 2000, a draft of an amended plan was completed, but an impasse was reached primarily due to concerns raised by DLCD. The Plan has now been rewritten and the new agreement signed. Oregon Solutions provided, through the PSU Oregon Consensus Program, mediation and facilitation services to work through Agreement issues. ***In February 2009 the document was finalized with the signature of all parties and the celebratory signing took place in the County Courthouse.***

8. **USACE Feasibility Study Hall Slough Project:** This project originally was designed to reconnect an historic slough disconnected in the 1950's, to the Wilson River. Set back levees were suggested. Flood water would be channeled into the slough to reduce flooding in Hwy 101 areas and to open up the passage of flood waters and disperse the water into Tillamook Bay. The project was meant to provide a relief valve when Wilson River water levels get too high. ***This project has become a component of Project Exodus*** (see description below)

9. **Modified Wetland Restoration and Swale Project:** This project was also described in the USACE Feasibility Study. The dominant feature of this project is the construction of a new levee dividing an area located between the mouths of the Wilson and Trask Rivers and Tillamook Bay roughly in half, east to west, separating a fully tidal area to the north from a flood storage area to the south. The full time salt water marsh to the north would be connected to the Wilson River. In the spring of 2009, an application was submitted to NOAA-Fisheries for funding of this project, but this grant was not awarded. ***This project has also become a component of Project Exodus.*** (see description below)

Project Exodus: After reviewing the above two projects (Hall and Wetlands Restoration) it has been suggested by the U.S. Army Corps of Engineers and agreed upon by the Project Team that modifications to both projects be explored and merged into a new and more complex project that will dramatically improve flooding conditions in the flood plain. In December 2008, engineering contracts were approved by the Project Team to work on Project Exodus. The contracting entity was Tillamook County and engaged were Northwest Hydraulic Consultants and HBH Consulting Engineers, Inc. Also under separate contract with Tillamook County was the U.S. Army Corps of Engineers for oversight and consultation on this project. Current work by the consultants includes modeling of the Tillamook Basin to ascertain the most advantageous flood work projects. The consultants are meeting with the Project Design Committee (PDC) as they work on various elements. ***The Project Team will stay apprised of, discuss and determine the best sub-projects to pursue when adequate engineering and design information is forwarded to them by the Design Committee.***

Process for Implementation of Prioritized Project Exodus and other Projects Identified by the Project Team: The PDC is being used to review project alternatives and their design and seek implementation approval from the

Project Team. Consideration is being given to combining elements of one project with another to maximize flood mitigation efforts. Conservation and improvement of the environment as well as the Tillamook Basin economy was to be given priority as the PDC works on flood projects. The Chair of this Committee is Rick Klumph. At each Project Team meeting a report is given by this committee and direction is requested as needed.

Implementation funding: Flood mitigation projects require funds from numerous sources. The Tillamook project began with $1 million allocated by the 2007 state legislature. It was used as "seed money" to enhance other funding opportunities. Additional state funding sources were to be explored and the Project Team would pursue federal funding through earmarks, congressional budget additions, and grants. The success of completing Project Exodus sub-projects will be dependent upon securing additional funding. Over the term of this project, funding applications to OWEB, NOAA and congressional requests through U.S. Fish & Wildlife have not been successful. Through the efforts of State Senator Betsy Johnson, $4,300,000 in FEMA funds were secured for Oregon Solutions projects. Tillamook County will take the lead in securing further Oregon Solutions funding. Approximately $190,000 in unobligated funds remain out of the $1 Million available through the 2007 legislative allocation.

Oregon Solutions and Project Management: For the coming year the Tillamook Flooding Reduction project will continue to be guided by the Oregon Solutions process and its' objectives. Tillamook County will provide project management as needed. In so doing and as the lead implementing agency, Tillamook County will work to provide a fair and transparent forum where all parties are heard and collaboration is supported toward mutual goals. Oregon Solutions staff at Portland State University will assist with consultation as needed to maintain project continuity.

Project Team

This document, signed by members signifies that all parties agree with and encourage the continuing, collaborative partnership that has been developed as well as to abide by their respective Statement of Assurances under the original Declaration. This commitment is in addition to agreements previously signed in the original Declaration of

Cooperation dated November 2007. The Team will plan to meet quarterly to review progress, provide assistance and direction on the uncompleted projects listed above. By consent of all parties, the document may be amended from time to time to represent changing situations often found during project development.

DATED this ____ day of August, 2009.

Betsy Johnson
Co-Convener
Senator Betsy Johnson

Mark Labhart
Co-Convener
Commissioner Mark Labhart

Deborah Boone
Oregon State Representative

Chad Allen
Vice-Chair, TBHEID

Ken F. Bierly
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Bub Boquist
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Dale Buck
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Mark Ellsworth
ERT, Regional Coordinator

Rudy Fenk
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Commissioner, Port of Tillamook Bay

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Geoff Roach
State Director, Trust for Public Land

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