HAZUS Results for the City of Mount Vernon

Due to the Removal of the Mount Vernon Levee

100 Year Flood Analysis

HAZUS Disclaimer

The estimates of social and economic impacts contained in this report were produced using HAZUS loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific flood. These results can be improved by using enhanced inventory data and flood hazard information.

Figure 1. Close up of the City of Mount Vernon. Flood Depth is shown in square pixels due to size of the raster image. The areas near the horseshoe bend levee have very high flood depths which impacts portions of Mount Vernon.

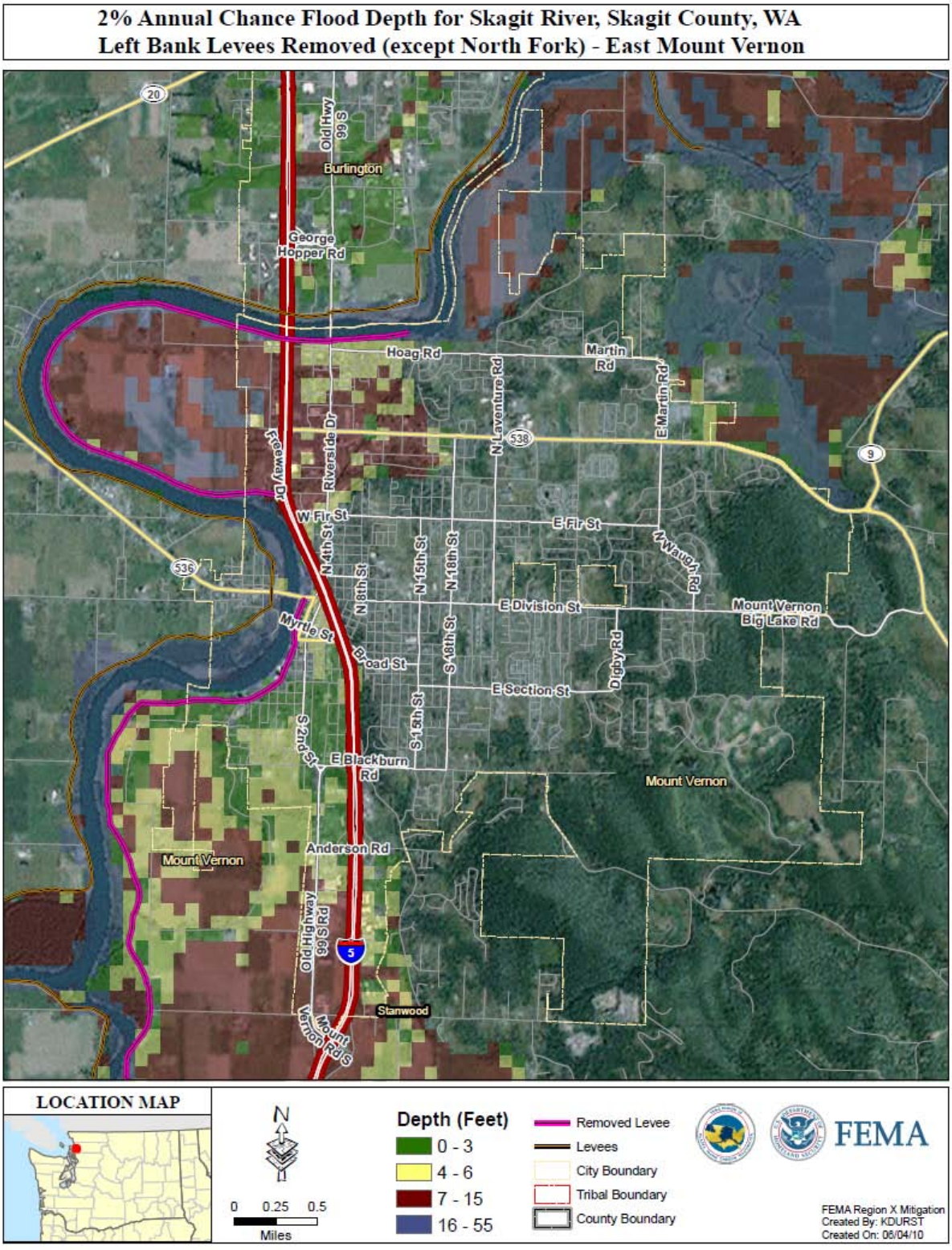


Figure 2. Close up for the City of Mount Vernon and total economic loss. Total economic loss is shown by census block. Census blocks shown in red have $10-30 million dollars of economic loss, which comprise mostly commercial and residential areas. The total amount of economic loss for the City of Mount Vernon is $289 million.

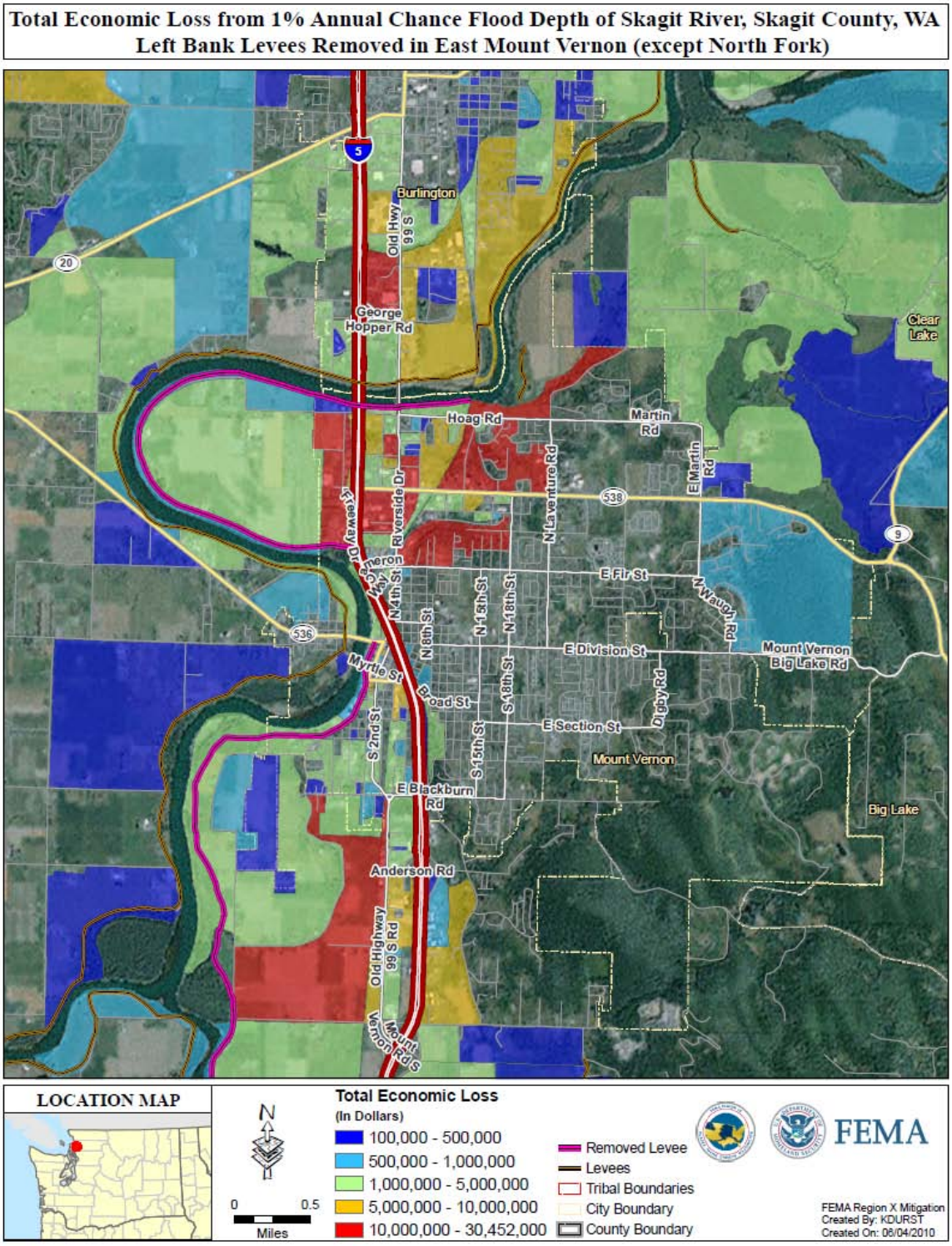


Table 1. Total Economic Loss for Each Building Category, for a 100 Year Flood with the Mount Vernon Levee Removed. Results are for the City of Mount Vernon Only.

Loss Category	Residential	Commercial	Industrial	Others	TOTAL
Building Loss					
Building	$6.2M	$50.2M	$6.8M	$37.6M	$100.8M
Content	$24.7M	$111M	$9.4M	$29.0M	$174.1M
Inventory	$0	$3.0M	$2.7M	$800K	$6.5M
Subtotal	**$30.9M**	**$164.9M**	**$18.9M**	**$67.4M**	**$281M**
Business Interruption					
Income	$35K	$685K	$3K	$22K	$778K
Relocation	$87K	$225K	$4K	$0	$316K
Rental Income	$102K	$155K	$1K	$0	$258K
Wage	$85K	$706M	$5K	$2.1M	$2.9M
Subtotal	**$309K**	**$1.8M**	**$13K**	**$2.1M**	**$4.3M**
TOTAL	**$31.2M**	**$166.7M**	**$18.9M**	**$69.5M**	**$286M**

*The above totals are estimates generated from HAZUS. A real event may produce different results than presented here.

Figure 3. Close up of the City of Mount Vernon and damaged residential substantial buildings. For the City of Mount Vernon HAZUS estimates approximately 57 substantially damaged residential buildings and approximately 530 residential buildings with at least minor damage.

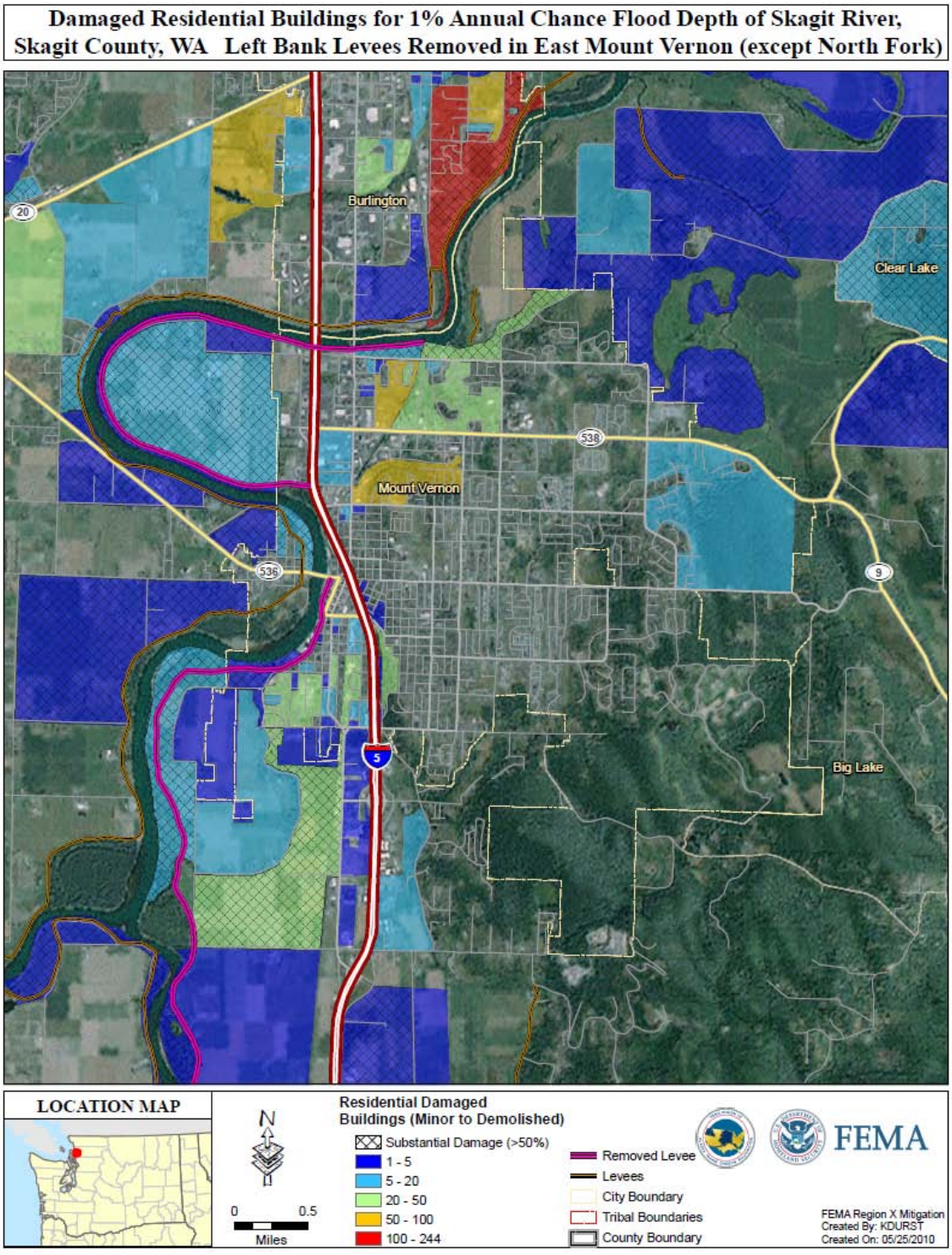


Table 2. Number of Buildings Damaged by Percent of Damage to that Building Results fare for the City of Mount Vernon Only.

	Percent of Damage to Building							
Building Type	**None**	**1-10%**	**11-20%**	**21-30%**	**31-40%**	**41-50%**	**Substantial**	**Total**
Education	0	0	1	0	0	0	0	1
Government	0	0	2	0	0	0	0	2
Religion	0	0	0	0	0	0	0	0
Agriculture	0	0	0	1	0	0	0	1
Industrial	0	0	0	0	2	0	3	5
Commercial	0	0	5	16	2	2	12	37
Residential	202	0	31	192	110	139	55	729
Total	**202**	**0**	**39**	**209**	**114**	**141**	**70**	**775**

*The above totals are estimates generated from HAZUS. A real event may produce different results than presented here.

Figure 4. Close up of the City of Mount Vernon. Census blocks are mapped based on the number of displaced individuals. For the City of Mount Vernon, HAZUS estimates 3,700 people will be displaced and of those, 3,200 would need short term shelter.

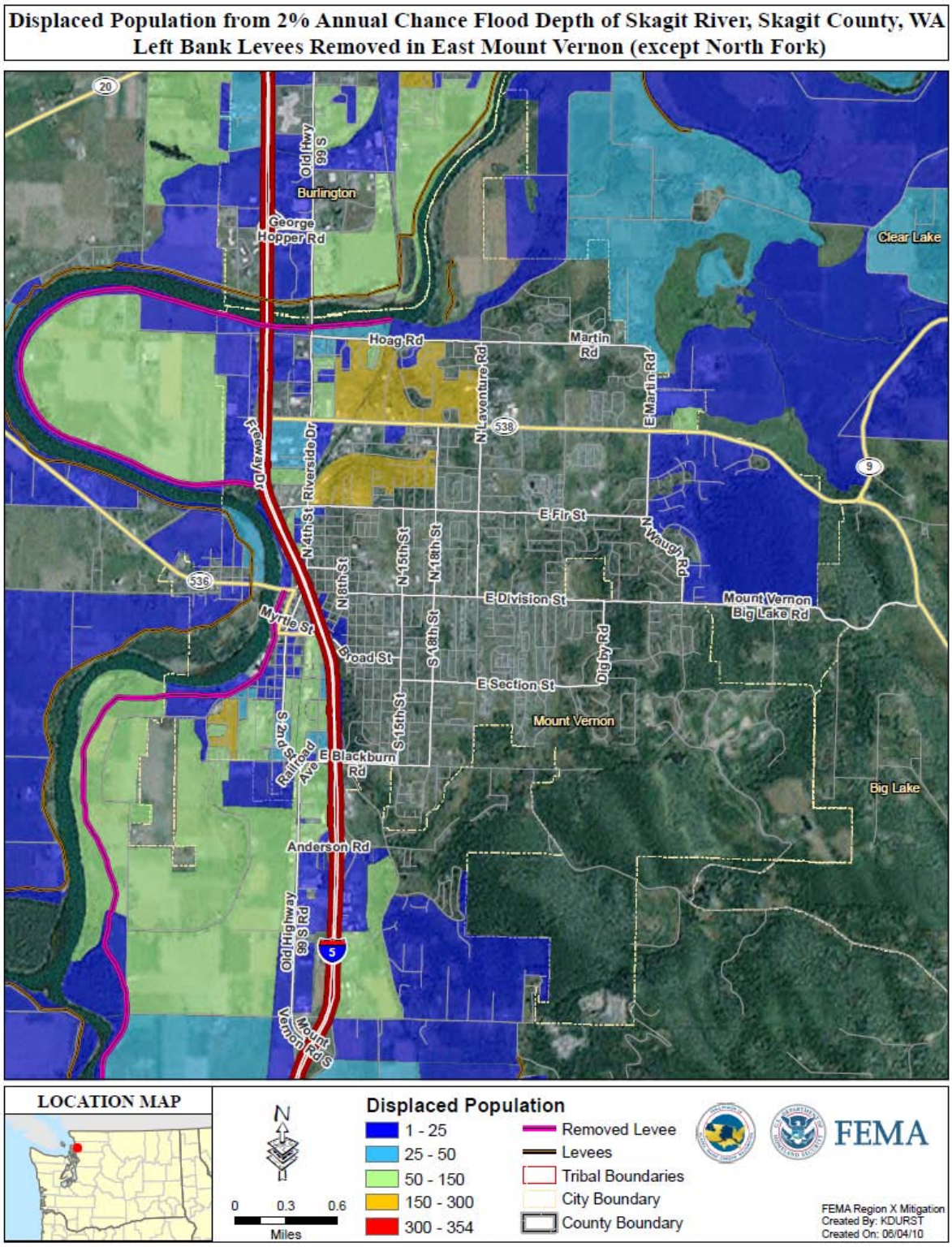
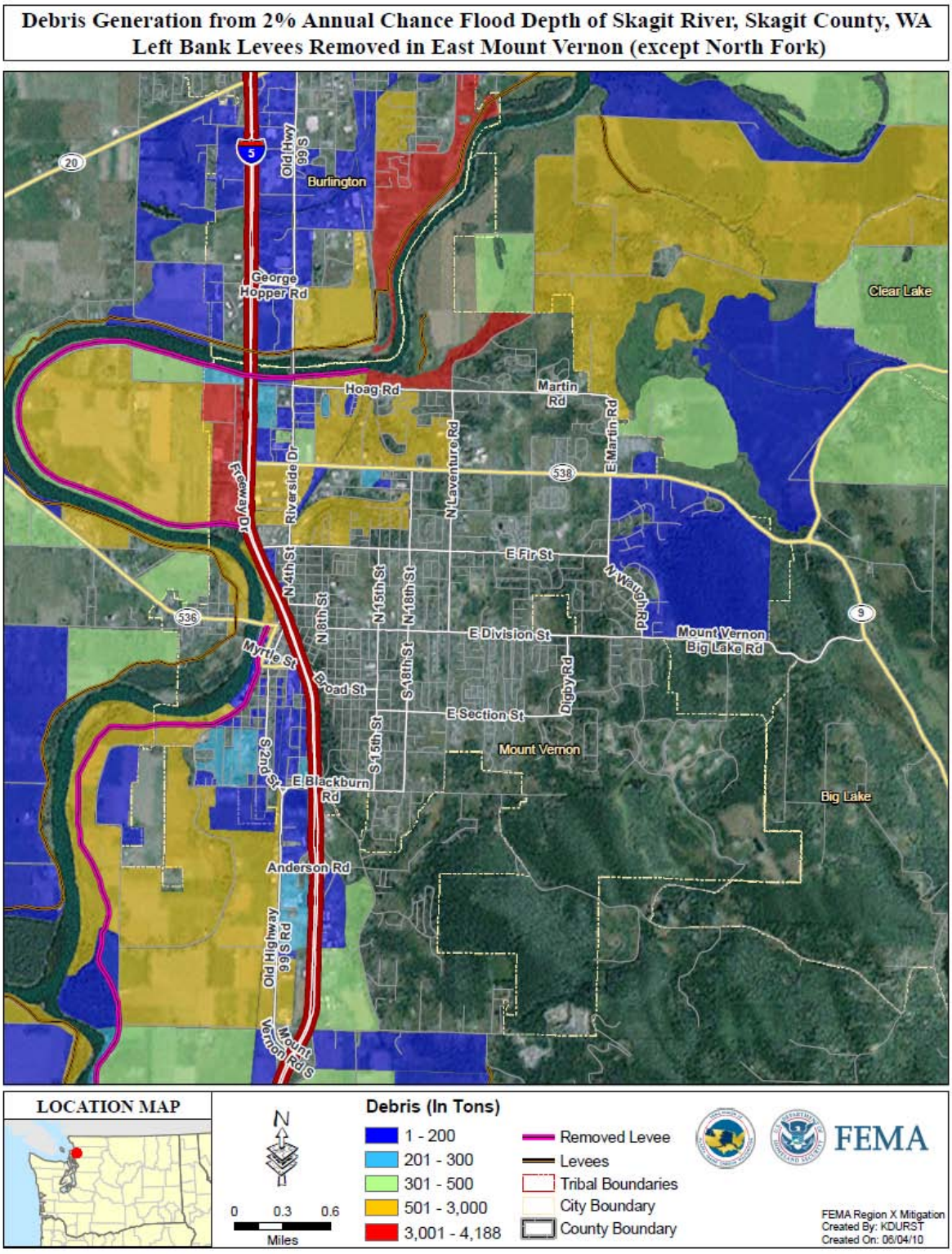


Figure 5. Close up of the City of Mount Vernon and debris shown in tons per census block. HAZUS calculates the estimated total debris generated for the City of Mount Vernon is 41,500 tons.



HAZUS Results for the Skagit Valley
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Figure 6. Flood Depth generated from a 100 year flood and the removal of the Mount Vernon levee (shown in pink). All left bank levees were removed with right bank levees intact. Much of the area has depths from 0-15 feet. Portions of Mount Vernon near the large river bend could have depths of 7-20 feet.

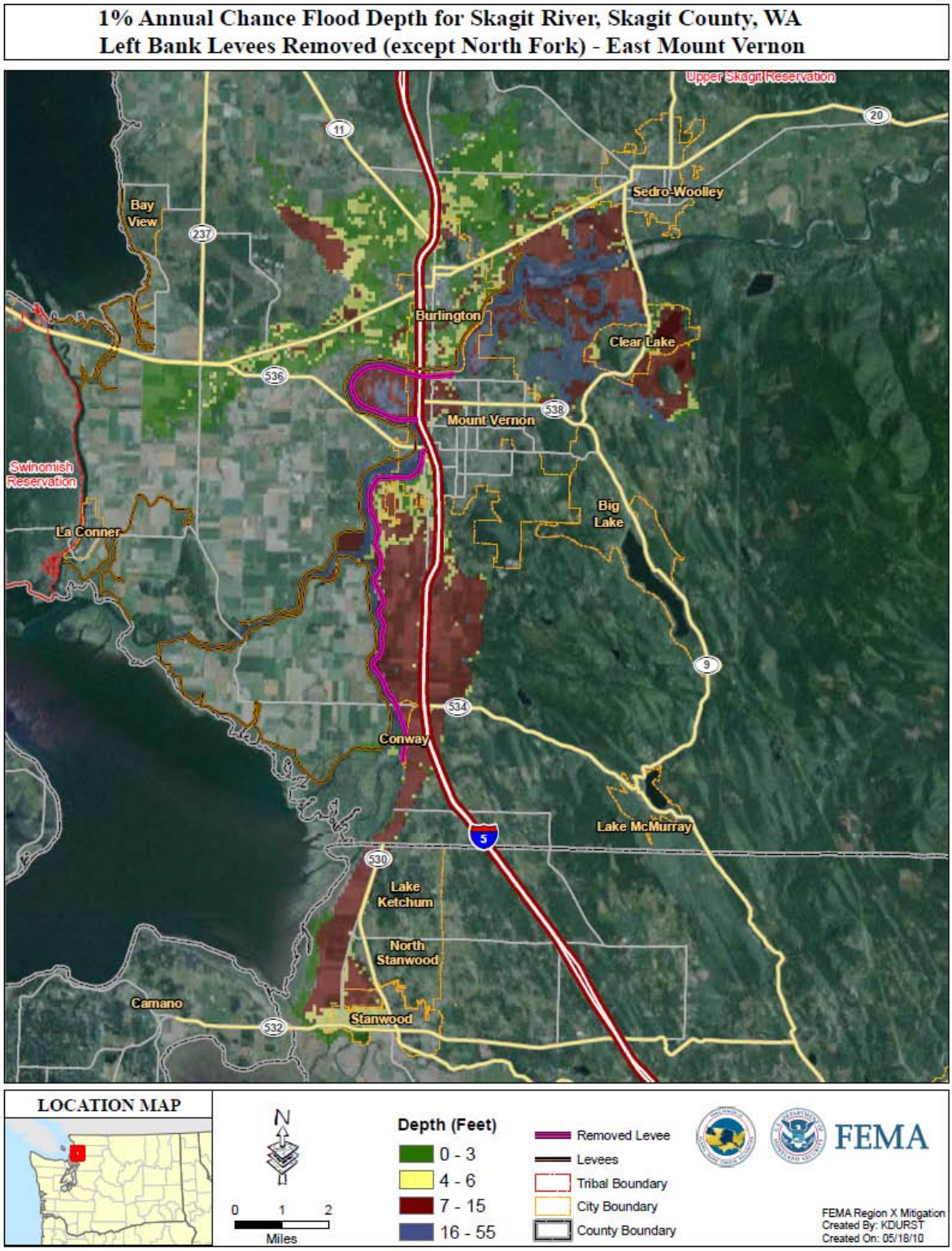

Figure 7. Using the Flood Depths and the local data, HAZUS calculates a total economic loss which includes structural damage including building cost, contents cost, and inventory cost. Additional non-structural costs are calculated including business interruption, relocation etc. Total economic loss for the entire area shown is $644 million. Red areas indicate $10-33 million of economic loss for each census block.

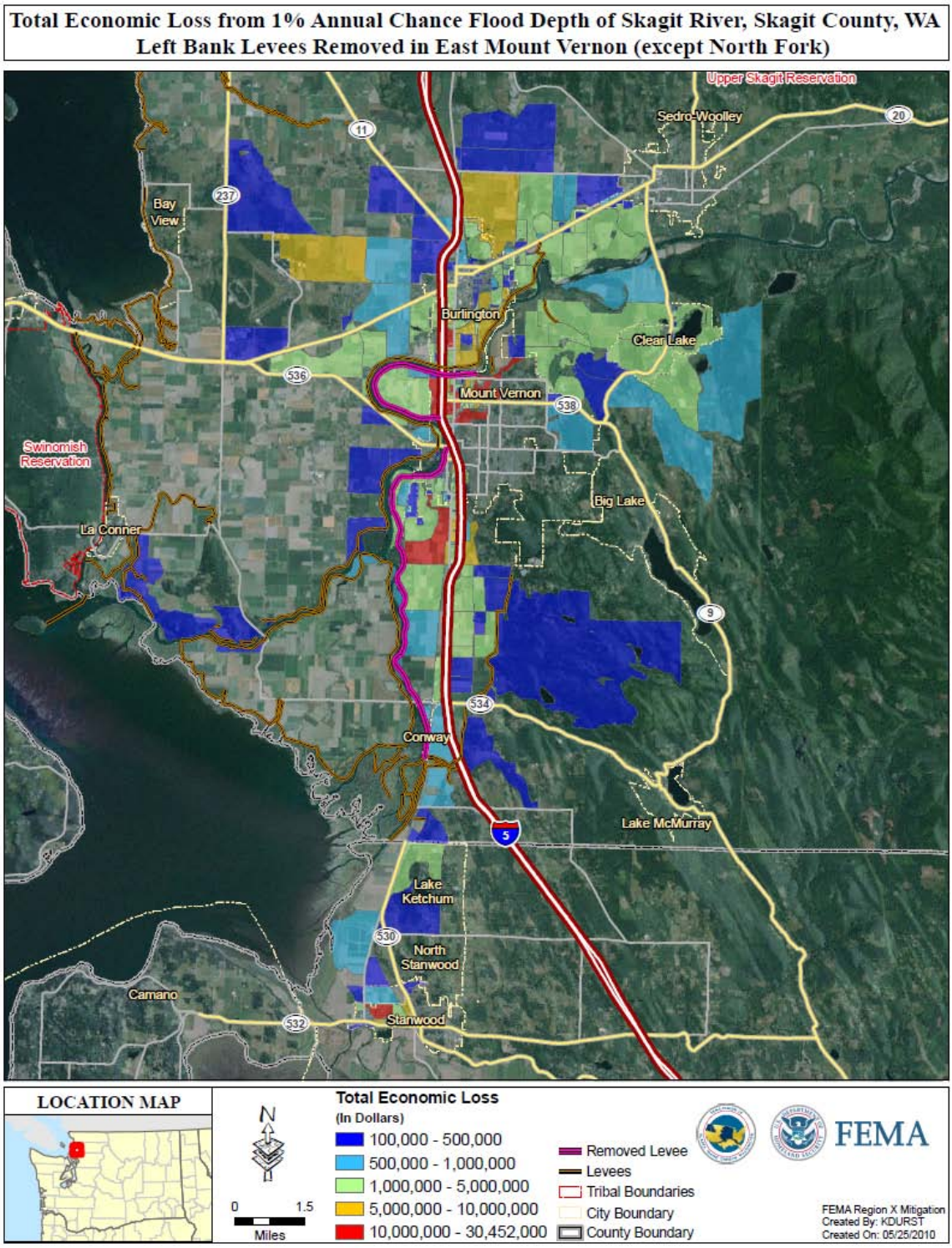

Table 3. Total Economic Loss for Each Building Category, for a 100 Year Flood with the Mount Vernon Levee Removed. Results are for the entire area shown in Figure 7.

Loss Category	Residential	Commercial	Industrial	Others	TOTAL
Building Loss					
Building	$128.4M	$80.3M	$19.4M	$13.5M	$241.67M
Content	$93.5M	$194.8M	$44.3M	$45.0M	$377.6M
Inventory	$0	$6.2M	$8.2M	$1.9M	$16.3M
Subtotal	**$221.9M**	**$281.3M**	**$71.9M**	**$60.4M**	**$635.6M**
Business Interruption					
Income	$10K	$1.2M	$10K	$22K	$1.5M
Relocation	$36K	$46K	$10K	$0	$82K
Rental Income	$23K	$30K	$0	$0	$53K
Wage	$24K	$1.4M	$10K	$4.0M	$5.7M
Subtotal	**$93K**	**$3.4M**	**$30K**	**$4.3M**	**$8.6M**
TOTAL	**$222.8M**	**$284.6M**	**$72.0M**	**$64.7M**	**$644.1M**

*The above totals are estimates generated from HAZUS. A real event may produce different results than presented here.

Figure 8. Number of residential buildings damaged for the Mount Vernon Scenario. The results estimate approximately 150 substantially damaged (cross-hatched pattern) residential buildings and approximately 1600 residential buildings with at least minor damage.

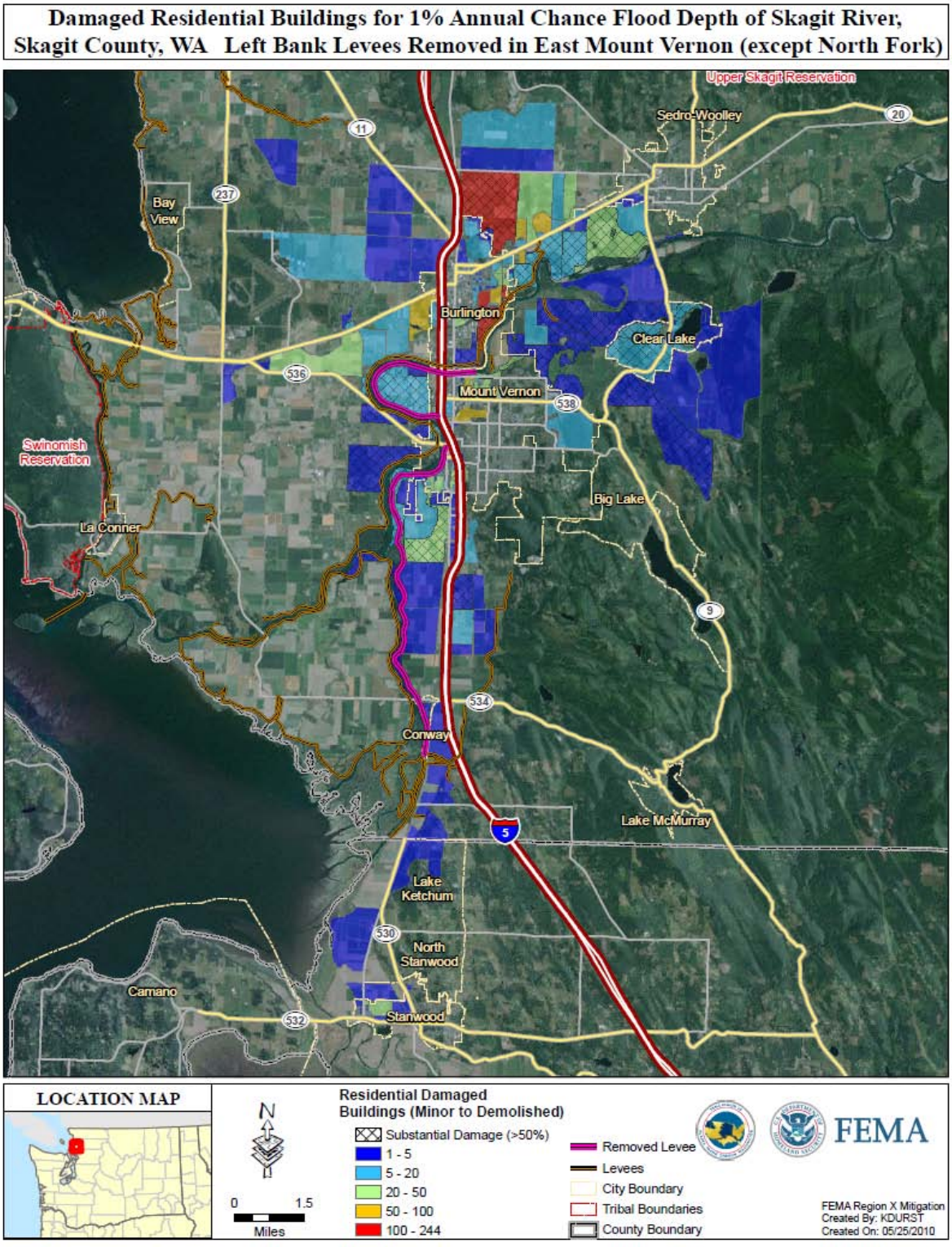

Table 4. Number of Buildings Damaged by Percent of Damage to that Building. Results are for the entire area shown in Figure 8.

	Percent of Damage to Building							
Building Type	**None**	**1-10%**	**11-20%**	**21-30%**	**31-40%**	**41-50%**	**Substantial**	**Total**
Education	0	0	1	0	0	0	0	1
Government	0	0	2	0	0	0	0	2
Religion	0	0	1	0	0	0	1	2
Agriculture	0	0	0	1	0	0	0	1
Industrial	0	0	0	0	2	0	4	6
Commercial	2	0	11	19	4	2	12	50
Residential	1168	1	111	627	279	432	155	2773
Total	**1168**	**1**	**126**	**647**	**285**	**434**	**172**	**2833**

*The above totals are estimates generated from HAZUS. A real event may produce different results than presented here.

Figure 9. Displaced individuals and short term shelter needs for the Mount Vernon Scenario. Census blocks are mapped based on the number of displaced individuals. HAZUS estimated 14,000 people will be displaced and of those, 11,500 would need short term shelter.

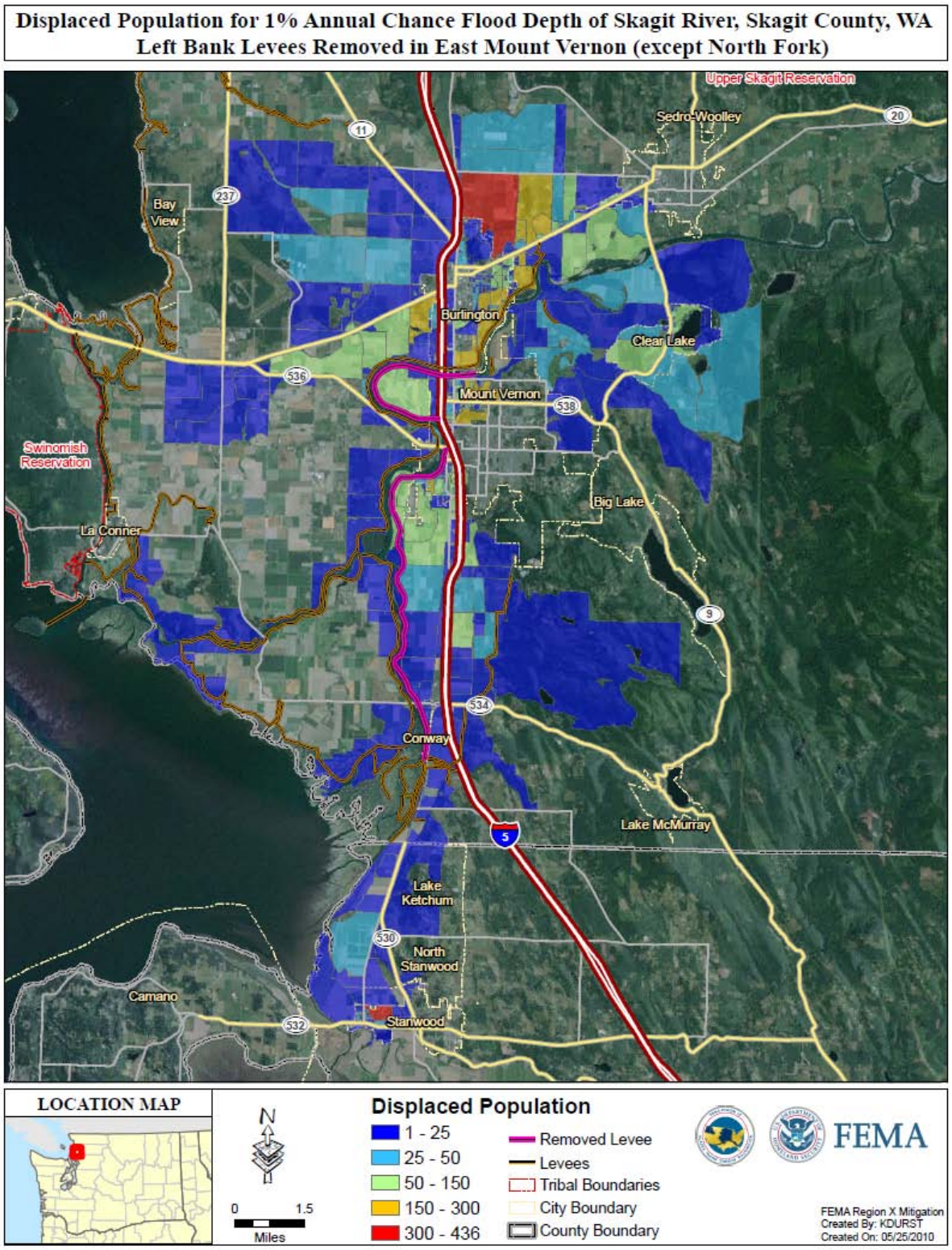

Figure 10. Debris Estimation for the Mount Vernon Scenario. Debris in tons is shown per census block. HAZUS calculates the estimated total debris generated to be 78,000 tons. Debris is generated from building and content debris, not from damage due to roads or utilities.