

Appendix A
Classification of Benefits to Secondary Roads, Highways, and Railroads
Rand Peterson Levee District
Harrison and Pottawattamie County, Iowa
December, 2018

The Rand-Peterson Levee District appointed commissioners to perform a reclassification study for existing parcels within the district and new parcels proposed to be annexed. The annexation proposal is described in the report “Engineer’s Report – Annexation, Rand-Peterson Levee District, Harrison and Pottawattamie Counties, Iowa, November, 2018”. There are no reports available describing in detail the method used for development of the existing assessment schedule for the Rand-Peterson Levee District. Review of the existing assessment schedule indicates that assessment amounts are based upon the acreage for each parcel, with consideration for depth or frequency of flooding because some parcels have a higher assessment than other parcels that have the same acreage. Additionally the assessment for the railroads, state highways, and county secondary roads has a higher assessment rate per acre than private parcels, but there is no information available for how that assessment rate was determined. The following Table 2 is summary of the existing assessment schedule:

Table 1 – Summary of Existing Assessment Schedule

Iowa DOT	\$8,847
Union Pacific Railroad	\$10,532
Harrison County Secondary Roads	\$7,769
Private Parcels	\$42,319
Total	\$69,467

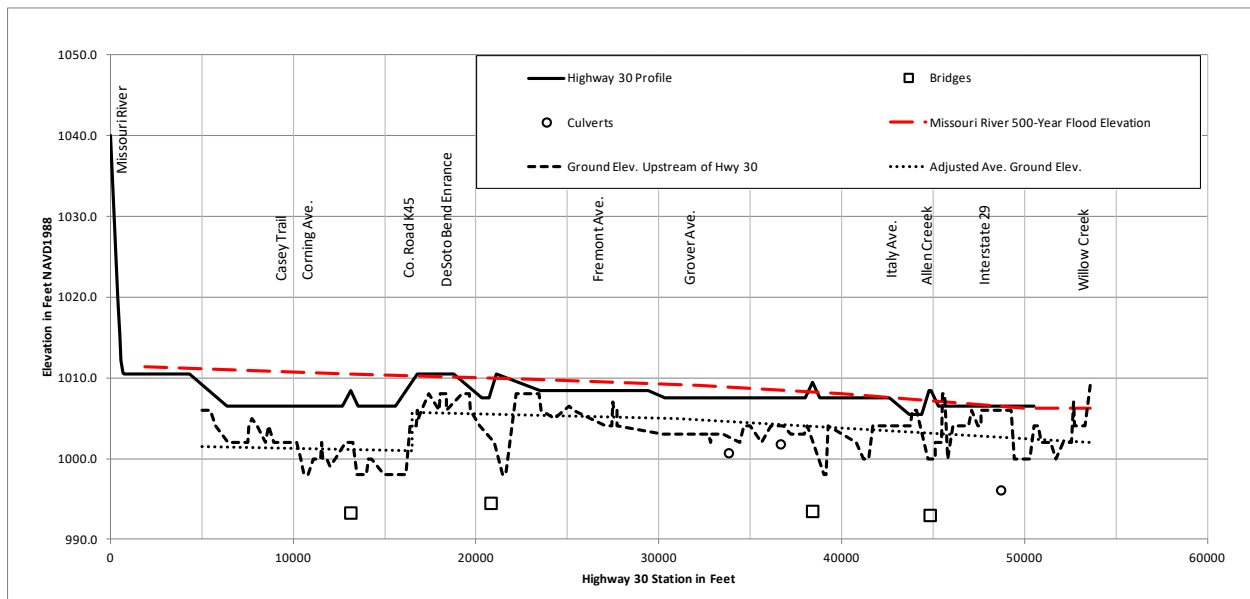
As part of the reclassification study it was decided to make assessments based upon depth of flooding for the 500-year flood and the dollar valuation of parcels of land. This report describes the analysis for assessment of county secondary roads, city streets, state highways, railroads and electric utilities. The attached Plate 1 shows a map of the area that is part of the reclassification along with identification of state roads and railroads. The area that is part of the reclassification study was subdivided into zones to provide capability to evaluate alternative assessment rates within each zone. Plate 2 shows the locations of the zones. Following is a description of the analysis for each category.

Valuation – There is no valuation for state highways that is performed by the Harrison County Assessor’s Office because state highways are not taxed by Harrison County. As part of Flood Protection Benefits Assessment, M&P Levee District, May 2017, Amended November 2, 2017, a valuation for state highways was developed in the amount of \$400 per lineal foot or \$2,112,000 per mile. Similarly valuations for Interstate highways were developed in the amount of \$660 per lineal foot or \$3,168,000 per mile and valuations for county roads were developed in the amount of \$35 per lineal foot or \$184,800 per mile. These valuations were used as part of this reclassification study. There is no valuation for railroad performed by the Harrison County Assessor’s Office because property tax for railroads is collected by the Iowa Department of Revenue as part of the Centralized Assessment Program. As part of this

program, the Union Pacific Railroad has a valuation of \$909,674 per mile. Similarly, there is no valuation for electric power utilities performed by the Harrison County Assessor’s Office because property tax for electric power utilities is also collected by the Iowa Department of Revenue as part of the Centralized Assessment Program. As part of this program, the Harrison County REC has a county wide valuation of \$11,565,286 with an estimated \$1,727,963 of that amount being with the area being assessed as part of this reclassification study. Mid American Energy has a county wide valuation of \$18,186,670 with an estimated 2,850,782 of that amount being with the area being assessed as part of this reclassification study. All other utilities that were part of the Centralized Assessment Program were not included because it was assumed that the potential flood damages and associated benefits from the Rand-Peterson levee were negligible and/or difficult to quantify.

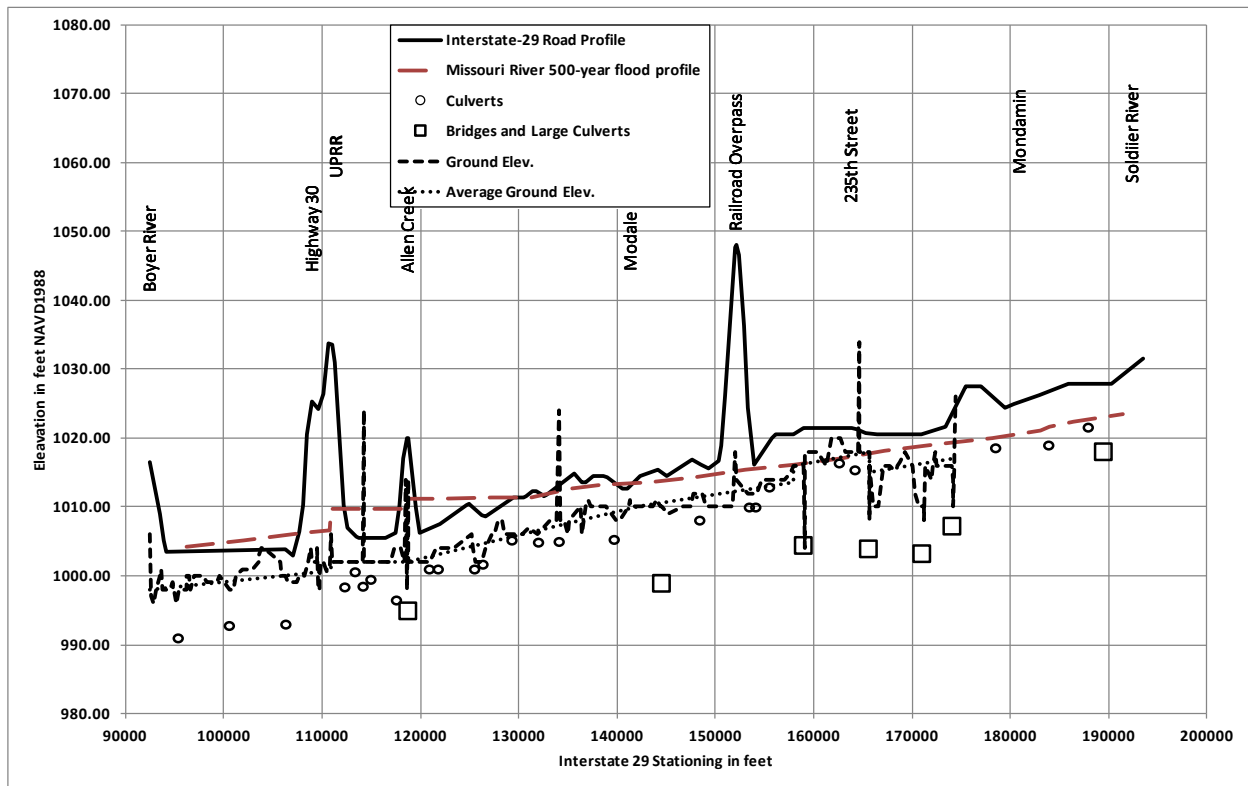
Depth of Flooding – Highway 30 - The depth of flooding analysis for Highway 30 was based upon design top of road profiles provided by the Iowa DOT, 500-year flood profiles from the U.S. Army Corps of Engineers, and 2 foot contour interval LIDAR topographic mapping obtained by the state of Iowa. The 500-year flood depth was determined by subtracting the average elevation of natural ground next to the upstream side of the roadway from the 500-year flood elevation. Using the road ditch elevation was considered in lieu of the natural ground elevation but not used because elevations of creeks, drainageways, and low lying wetlands were excluded for ground elevations for other parts of the reclassification study. The following Figure 1 shows a profile of the top of road, 500-year flood elevation, natural ground profile from the topographic mapping, and an average natural ground profile. The average natural ground profile was subdivided into reaches and 500-year flood depth was developed for each reach. A weighted average 500-year flood depth was then calculated. The weighted average 500- year flood depth for Highway 30 from the Rand-Peterson levee to Allen Creek is 5.3 feet with a length of 7.55 miles. The weighted average 500- year flood depth for Highway 30 from the Allen Creek to Willow Creek is 4.2 feet with a length of 1.66 miles.

Figure 1



Depth of Flooding – Interstate 29 - The depth of flooding analysis for Interstate 29 was based upon design top of road profiles provided by the Iowa DOT, 500-year flood profiles from the U.S. Army Corps of Engineers, and 2 foot contour interval LIDAR topographic mapping obtained by the state of Iowa. The 500-year flood depth was determined by subtracting the average elevation of natural ground next to the upstream side of the roadway from the 500-year flood elevation. Using the road ditch elevation was considered in lieu of the natural ground elevation but not used because elevations of creeks, drainageways, and low lying wetlands were excluded for ground elevations for other parts of the reclassification study. The following Figure 2 shows a profile of the top of road, 500-year flood elevation, natural ground profile from the topographic mapping, and an average natural ground profile. The average natural ground profile was subdivided into reaches and 500-year flood depth was developed for each reach. A weighted average 500-year flood depth was then calculated. The weighted average 500- year flood depth for Interstate 29 from the Boyer River to Union Pacific Railroad is 5.7 feet with a length of 3.48 miles. The weighted average 500- year flood depth from the Union Pacific Railroad to near Allen Creek is 7.7 feet with a length of 1.45 miles. The weighted average 500- year flood depth from Allen Creek to near Modale is 5.9 feet with a length of 4.49 miles. The weighted average 500- year flood depth from near Modale near 1.5 miles south of Mondamin is 2.2 feet with a length of 6.08 miles.

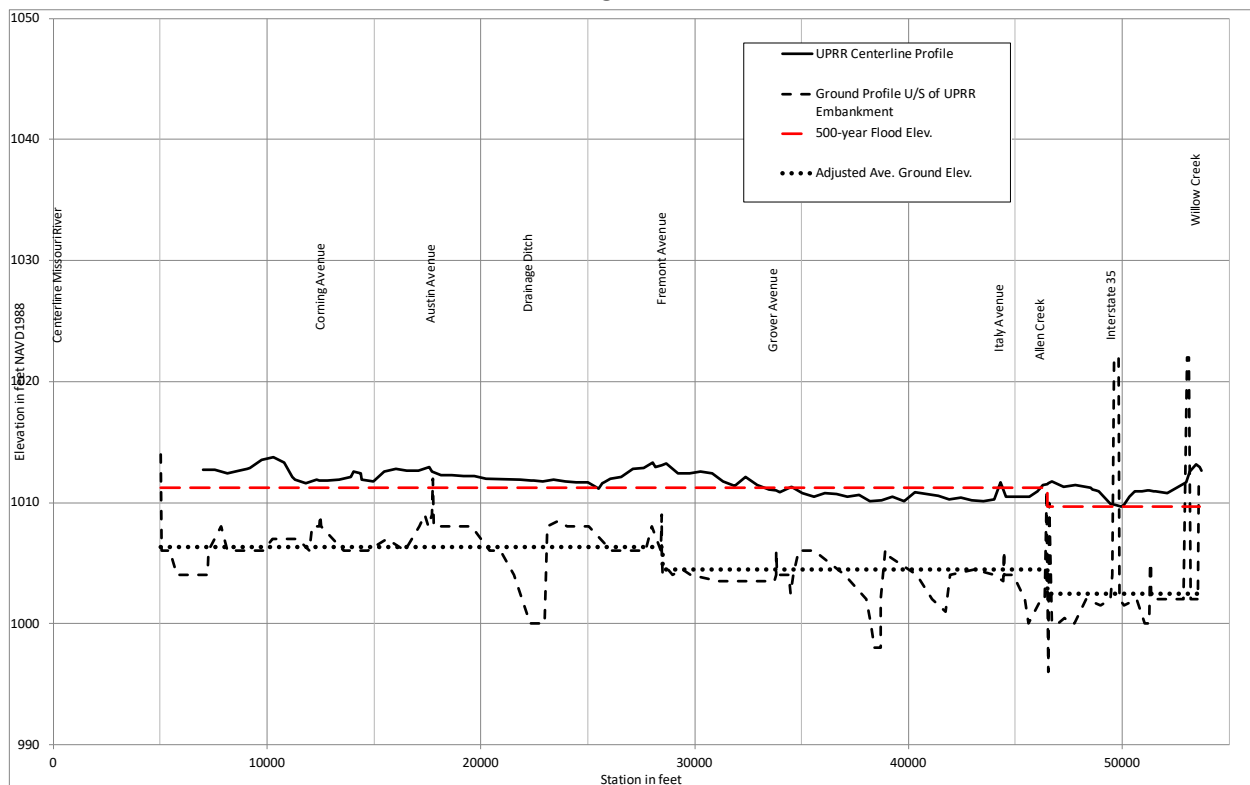
Figure 2



Depth of Flooding – Union Pacific Railroad (Blair to Missouri Valley) - The depth of flooding analysis for Union Pacific Railroad from Blair to Missouri Valley was based upon top of rail profiles provided by the Union Pacific Railroad, 500-year flood profiles from the U.S. Army Corps of Engineers, and 2 foot contour interval LIDAR topographic mapping obtained by the state of Iowa. The 500-year flood depth was

determined by subtracting the average elevation of natural ground next to the upstream side of the roadway from the 500-year flood elevation. Using the road ditch elevation was considered in lieu of the natural ground elevation but not used because elevations of creeks, drainageways, and low lying wetlands were excluded for ground elevations for other parts of the reclassification study. The following Figure 3 shows a profile of the top of road, 500-year flood elevation, natural ground profile from the topographic mapping, and an average natural ground profile. The average natural ground profile was subdivided into reaches and 500-year flood depth was developed for each reach. A weighted average 500-year flood depth was then calculated. The weighted average 500-year flood depth for the Union Pacific Railroad from the Rand-Peterson levee to Allen Creek is 5.7 feet with a length of 7.86 miles. The weighted average 500-year flood depth from Allen Creek to Willow Creek is 7.2 feet with a length of 1.35 miles.

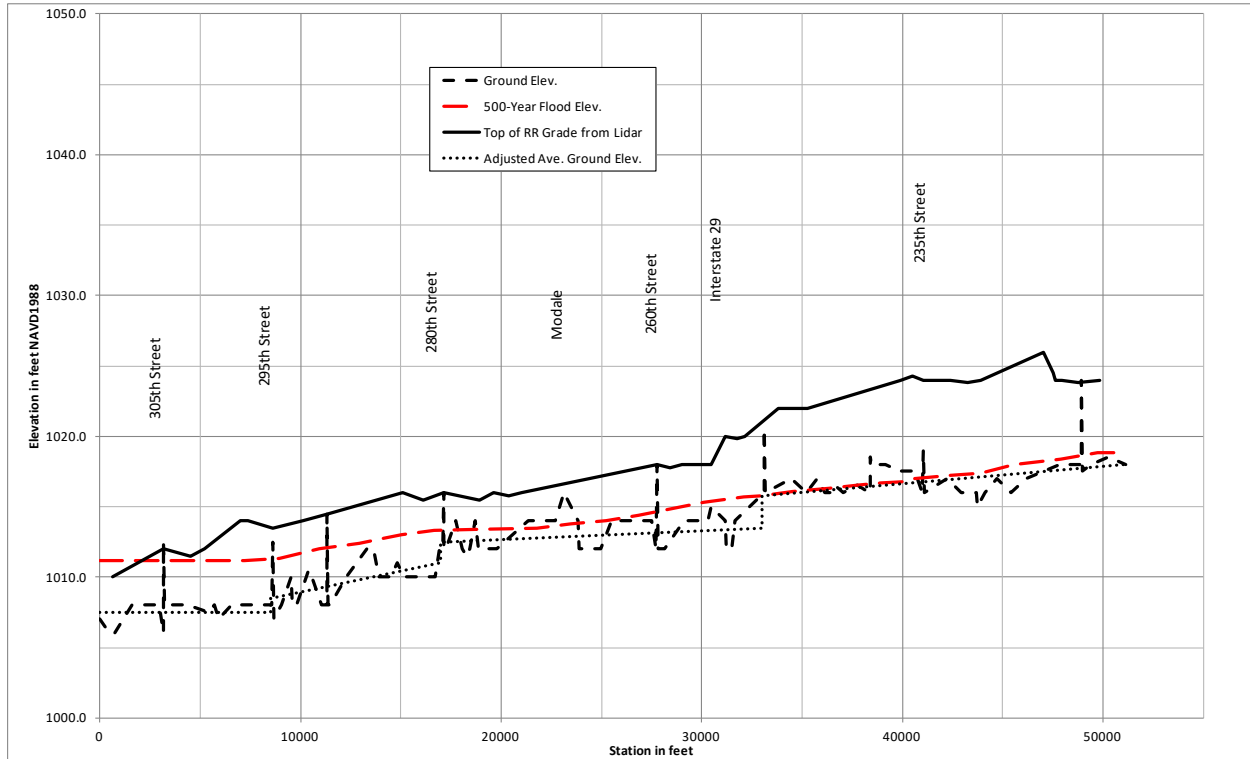
Figure 3



Depth of Flooding – Union Pacific Railroad (California Junction to Mondamin) - The depth of flooding analysis for Union Pacific Railroad from California Junction to Mondamin was based upon top of railway and natural ground profiles developed from 2 foot contour interval LIDAR topographic mapping obtained by the state of Iowa and 500-year flood profiles from the U.S. Army Corps of Engineers. The 500-year flood depth was determined by subtracting the average elevation of natural ground next to the west side of the railroad from the 500-year flood elevation. Using the road ditch elevation was considered in lieu of the natural ground elevation but not used because elevations of creeks, drainageways, and low lying wetlands were excluded for ground elevations for other parts of the reclassification study. The following Figure 4 shows a profile of the top of railway, 500-year flood elevation, natural ground profile from the topographic mapping, and an average natural ground profile.

The average natural ground profile was subdivided into reaches and 500-year flood depth was developed for each reach. A weighted average 500-year flood depth was then calculated. The weighted average 500-year flood depth for the Union Pacific Railroad from California Junction to near Mondamin is 1.6 feet with a length of 9.66 miles.

Figure 4



Secondary Roads - The only available top of road and ground elevation data for secondary roads was the 2 foot LIDAR topographic mapping. Flood depths for secondary roads was determined first by estimating the length of overtopping area for each road segment, and the maximum flood depth on the roadway for this segment. The weighted maximum depth for each zone was then determined. The following Table 1 is a summary of results and below that in Table 2 are detailed results on each road.

Table 1 –Summary of Secondary Roads Calculations

Zone No.	Total Length (ft.)	Weighted Max. Depth (ft)	Area (acres)	Length (mi)
Zone 1	157,522	5.5	238.7	29.8
Zone 2	702	2.6	1.1	0.1
Zone 3	121,429	3.8	184.0	23.0
Zone 4	61,023	4.7	92.5	11.6
Zone 5	51,668	5.1	78.3	9.8
Zone 6	23,417	4.1	35.5	4.4
Zone 7	56,492	6.0	85.6	10.7
Zone 8	19,560	6.0	29.6	3.7

Table 2 –Detailed Secondary Roads Calculations

Street Name	Zone	Length (ft.)	500-yr. Elev.	Low Elev.	High Elev.	Max. Depth. (ft.)	Mult. Factor	Weighted Max. Depth (ft)	Area (acres)	Length (mi)
Zone 1										
Cody Ave.	1	414	1020	1019	1020	1	414			
212th Street	1	1800	1020.3	1019.5	1020.3	0.8	1440			
Boone Trail	1	4049	1019.9	1018.2	1019.9	1.7	6883			
Carroll Trail	1	5632	1019.2	1013.9	1019.2	5.3	29850			
Cody Ave.	1	1477	1019.7	1017.5	1019.7	2.2	3249			
220th Street	1	2464	1019.6	1015.5	1019.6	4.1	10102			
222nd Street	1	5639	1020	1014	1020	6	33834			
Boone Trail	1	5345	1019.2	1015.5	1019.2	3.7	19777			
Carroll Trail	1	2300	1018.8	1017.8	1018.8	1	2300			
Carroll Trail	1	2891	1018.1	1015	1018.1	3.1	8962			
232nd Street	1	2572	1019.1	1017.5	1019.1	1.6	4115			
Ames Place	1	458	1018.4	1018.1	1018.4	0.3	137			
Carroll Trail	1	3254	1017.4	1009.5	1017.4	7.9	25707			
248th Trail	1	804	1017.1	1015.8	1017.1	1.3	1045			
249th Trail	1	3556	1016.9	1011.8	1016.9	5.1	18136			
Cook Avenue	1	2107	1015.8	1014	1015.8	1.8	3793			
Delta Avenue	1	804	1015.5	1015	1015.5	0.5	402			
260th Street	1	3542	1016.3	1009.5	1016.3	6.8	24086			
260st Street	1	5983	1016.1	1013.9	1016.1	2.2	13163			
260st Street	1	4766	1014.9	1011.5	1014.9	3.4	16204			
Britt Avenue	1	5133	1015.7	1006	1015.7	9.7	49790			
North Main Street	1	1448	1013.9	1012	1013.9	1.9	2751			
270th Trail	1	9310	1014.6	1008	1014.6	6.6	61446			
270th Trail	1	3074	1013.9	1009.5	1013.9	4.4	13526			
Britt Avenue	1	3200	1015.1	1010	1015.1	5.1	16320			
Edna Avenue	1	3990	1013.4	1005.5	1013.4	7.9	31521			
South Main Street	1	3290	1013.4	1009.8	1013.4	3.6	11844			
Britt Avenue	1	1440	1014.9	1012	1014.9	2.9	4176			
280th Street	1	11084	1013.9	1006	1011	7.9	87564			
280th Street	1	6775	1013.4	1004	1013.4	9.4	63685			
Austin Avenue	1	2439	1013.4	1009.8	1013.4	3.6	8780			
280th Street	1	1245	1013.3	1011	1013.3	2.3	2863			
Austin Avenue	1	8820	1012.3	1009.5	1012	2.8	24696			
291st Street	1	5348	1012.2	1003.5	1012	8.7	46528			
295th Street	1	4005	1013	1004	1016.5	9	36045			
295th Street	1	3870	1012.4	1008	1011	4.4	17028			
Austin Avenue	1	6643	1011.4	1003.5	1011	7.9	52480			
305th Street	1	1658	1011.2	1003.5	1007	7.7	12767			
305th Street	1	8065	1011.2	1005.8	1010.5	5.4	43551			
307th Place	1	5720	1011.2	1002	1010	9.2	52624			
Corning Avenue	1	1108	1011.2	1009.5	1010	1.7	1884			
Total		157522					865466	5.5	238.7	29.8
Zone 2										
Cody Ave.	2	702	1023.6	1021	1023.6	2.6	1825			
Total		702					1825	2.6	1.1	0.1

Street Name	Zone	Length (ft.)	500-yr. Elev.	Low Elev.	High Elev.	Max. Depth. (ft.)	Mult. Factor	Weighted Max. Depth (ft)	Area (acres)	Length (mi)
Zone 3										
250th Street	3	514	1014	1013.8	1014	0.2	103			
Essex Place	3	1384	1015.5	1013.8	1015.5	1.7	2353			
Essex Place	3	2462	1014.6	1013.5	1014.6	1.1	2708			
260th Street	3	4752	1014	1011	1014	3	14256			
260th Street	3	3978	1013.7	1011.9	1013.7	1.8	7160			
260th Street	3	6412	1013.4	1011.9	1013.4	1.5	9618			
Garland Avenue	3	3673	1013.4	1011.5	1013.4	1.9	6979			
Hamlin Avenue	3	4375	1013.3	1011.5	1013.3	1.8	7875			
271st Street	3	4332	1013.4	1011.5	1012	1.9	8231			
270th Street	3	4500	1013.3	1011.8	1013.3	1.5	6750			
Fowler Avenue	3	5233	1013.4	1010.5	1013	2.9	15176			
Houston Avenue	3	5210	1012	1010	1012	2	10420			
280th Street	3	3861	1013.3	1009	1013.3	4.3	16602			
280th Street	3	6278	1012.5	1010	1012.5	2.5	15695			
280th Street	3	2760	1011.7	1007.8	1011.7	3.9	10764			
280th Street	3	4977	1011.3	1008	1009.5	3.3	16424			
Houston Avenue	3	1211	1011.6	1007.8	1008.5	3.8	4602			
Exira Avenue	3	773	1012.8	1011.9	1012.8	0.9	696			
Green Avenue	3	6026	1011.2	1005.8	1010	5.4	32540			
291st Street	3	5300	1011.2	1005.5	1010	5.7	30210			
Fremont Avenue	3	1930	1011.2	1009.8	1011.2	1.4	2702			
295th Street	3	5350	1011.2	1005.5	1011	5.7	30495			
Fremont Avenue	3	5370	1011.2	1008	1010.5	3.2	17184			
Grover Avenue	3	5300	1011.2	1005.5	1009	5.7	30210			
305th Street	3	1730	1011.2	1008	1011.2	3.2	5536			
305th Street	3	5370	1011.2	1005.5	1010	5.7	30609			
305th Street	3	5290	1011.2	1004	1006	7.2	38088			
305th Street	3	7313	1011.2	1004	1006	7.2	52654			
Fremont Avenue	3	2812	1011.2	1007.5	1010	3.7	10404			
Italy Avenue	3	2953	1011.2	1003.5	1006	7.7	22738			
Total		121429					459782	3.8	184.0	23.0
Zone 4										
280th Street	4	7195	1009.7	1007.8	1009.7	1.9	13671			
Jewell Avenue	4	6025	1009.7	1005.8	1008.5	3.9	23498			
291st Street	4	3476	1009.7	1004	1006	5.7	19813			
Jewell Avenue	4	8059	1011.2	1003.8	1006.5	7.4	59637			
305th Street	4	750	1011.2	1003.8	1005	7.4	5550			
Willow Road	4	2770	1011.2	1001.8	1004.2	9.4	26038			
Joliet Avenue	4	5032	1005.9	1003.5	1003.5	2.4	12077			
Joliet Avenue	4	5211	1004.9	1002.5	1003.5	2.4	12506			
West Canal Street	4	1924	1006.1	1001.5	1003	4.6	8850			
Jopine Place	4	2930	1006	999.5	1002	6.5	19045			
Jopine Place	4	4164	1005.4	1002	1003	3.4	14158			
Jopine Place	4	3915	1004.7	999	1002.5	5.7	22316			
334th Street	4	2157	1004.4	999.8	1001	4.6	9922			
335th Street	4	2005	1004	997.8	1001.5	6.2	12431			
Joliet Avenue	4	2129	1004	999.5	1001.5	4.5	9581			
Joliet Avenue	4	3281	1003	997.5	999.5	5.5	18046			
Total		61023					287137	4.7	92.5	11.6

Street Name	Zone	Length (ft.)	500-yr. Elev.	Low Elev.	High Elev.	Max. Depth. (ft.)	Mult. Factor	Weighted Max. Depth (ft)	Area (acres)	Length (mi)
Zone 5										
Corning Avenue	5	2680	1010.9	1001.5	1009	9.4	25192			
Austin Avenue	5	1490	1010.4	1008	1010.4	2.4	3576			
Fremont Avenue	5	2301	1009.6	1005.8	1008	3.8	8744			
Italy Avenue	5	2105	1007.7	1005.8	1006	1.9	4000			
Casey Trail	5	5245	1010.5	1001.5	1004.5	9	47205			
317th Street	5	2490	1010.6	1001.8	1004.5	8.8	21912			
Casey Trail	5	1190	1010.1	1003.5	1004.5	6.6	7854			
Italy Avenue	5	5170	1006.6	1003.5	1004.5	3.1	16027			
325th Street	5	4055	1006.6	1003	1003.5	3.6	14598			
325th Street	5	3934	1006	1001.5	1003.5	4.5	17703			
Italy Avenue	5	5235	1005.3	1001.5	1003.5	3.8	19893			
335th Street	5	4516	1005.4	1001.5	1004	3.9	17612			
335th Street	5	6046	1004.9	1000	1002	4.9	29625			
Italy Avenue	5	5211	1004.4	999	1001.5	5.4	28139			
Total		51668					262081	5.1	78.3	9.8
Zone 6										
Grover Avenue	6	5235	1007.8	1003.5	1005	4.3	22510			
325th Street	6	2650	1007.3	1003.5	1004.5	3.8	10070			
Grover Avenue	6	5272	1006.3	1003.5	1004.5	2.8	14762			
335th Street	6	3200	1006	1003.9	1006	2.1	6720			
335th Street	6	1825	1005.8	1003.9	1005.8	1.9	3467			
Grover Avenue	6	5235	1005.1	997.8	1004	7.3	38216			
Total		23417					95745	4.1	35.5	4.4
Zone 7										
York Road	7	5270	1004.7	997.5	1000.5	7.2	37944			
York Road	7	5305	1004	996	999	8	42440			
Wilson Lane	7	2433	1004.5	997.5	998.5	7	17031			
110th Street/Grover Avenue	7	5230	1004.5	998	1002.3	6.5	33995			
130th Street/Italy Avenue	7	5300	1002.7	999.5	1001	3.2	16960			
DeSoto Avenue	7	5300	1004.2	995.8	998.5	8.4	44520			
DeSoto Avenue	7	6600	1003.2	998	1002.5	5.2	34320			
DeSoto Avenue	7	3924	1002.1	997.5	1001	4.6	18050			
DeSoto Avenue	7	1900	1001.8	997.5	1001.8	4.3	8170			
122nd Street	7	2600	1002.1	998	999.5	4.1	10660			
122nd Street (east-west)	7	3990	1001.8	995.5	1000	6.3	25137			
130th Street	7	2680	1001.8	996	1000.2	5.8	15544			
130st Street	7	2630	1001.5	995.8	997	5.7	14991			
Westgate Road	7	3330	1001.2	995.8	997	5.4	17982			
Total		56492					337744	6.0	85.6	10.7

Zone 8										
140th Street/Joliet Avenue	8	2630	1002.1	995.8	997.5	6.3	16569			
DeSoto Avenue	8	2200	1001.8	995.9	999.5	5.9	12980			
140th Street	8	2680	1001.7	997.5	999	4.2	11256			
DeSoto Avenue	8	2330	1001.7	997.9	998.5	3.8	8854			
140th Street	8	5320	1001	993.8	998.5	7.2	38304			
140th Street	8	4400	1000.7	994	997.5	6.7	29480			
Total		19560					117443	6.0	29.6	3.7

Modale and Missouri Valley Streets - The only available top of road and ground elevation data for Modale and Missouri Valley Streets was the 2 foot LIDAR topographic mapping. Flood depths for these streets were determined first by estimating the length of overtopping area for each road segment, and the maximum flood depth on the roadway for this segment. The weighted maximum depth for each zone was then determined. Following is a summary of results.

Street Name	Zone	Length (ft.)	500-yr. Elev.	Low Elev.	High Elev.	Max. Depth. (ft.)	Average Depth (ft.)	Mult. Factor	Weighted Max. Depth (ft)	Area (acres)	Length (mi)
Modale Roads											
South Main Street	3	2669	1013.5	1009.8	1012.0	3.7	2.6	9875			
North Main Street	3	1556	1013.9	1011.9	1013.9	2.0	1.0	3112			
North Beebe Street	3	1068	1013.8	1011.0	1012.0	2.8	2.3	2990			
South Archer Street	3	412	1013.6	1012.0	1014.0	1.6	0.6	659			
West Anderson Street	3	3124	1013.9	1009.8	1014.0	4.1	2.0	12808			
East Palmer Street	3	729	1013.6	1012.0	1013.0	1.6	1.1	1166			
East Martin Street	3	121	1013.6	1013.5	1013.6	0.1	0.1	12			
Total		9679						30624	3.2	14.67	1.83
Missouri Valley Roads											
West St. Clair Street	4	1690	1009.7	1002.0	1003.5	7.7	7.0	13013			
West Michigan Street	4	1354	1009.7	1001.8	1003.0	7.9	7.3	10697			
West Superior Street	4	1354	1009.7	1001.8	1002.5	7.9	7.6	10697			
West Huron Street	4	2212	1009.7	1003.0	1004.0	6.7	6.2	14820			
North Willow Road	4	2794	1009.7	1001.8	1004.2	7.9	6.7	22073			
Beacon Avenue	4	1080	1009.7	1002.5	1003.0	7.2	7.0	7776			
Park Avenue	4	1080	1009.7	1002.0	1003.0	7.7	7.2	8316			
North Boston Avenue	4	1080	1009.7	1001.8	1003.0	7.9	7.3	8532			
North Portland Avenue	4	1080	1009.7	1001.8	1003.0	7.9	7.3	8532			
North Shawmut Avenue	4	1080	1009.7	1001.8	1003.0	7.9	7.3	8532			
South Willow Road	4	600	1009.7	1003.0	1005.5	6.7	5.5	4020			
South Willow Road	4	1732	1006.6	1002.0	1006.0	4.6	2.6	7967			
Jopine Place	4	1475	1006.3	1001.5	1006.5	4.8	2.3	7080			
Canal Street	4	1032	1006.1	1003.5	1006.5	2.6	1.1	2683			
Total		19643						134738	6.9	29.76	3.72

Mid American Energy and Harrison County REC - The only available top of road and ground elevation data for Mid American Energy and Harrison County REC was the 2 foot LIDAR topographic mapping. It was assumed their facilities were primarily power poles or substations that were at the same elevation as surrounding natural ground. The average 500-year flood depth in each zone was determined by selecting several representative locations with each zone and subtracting the ground elevation at each location from the 500-year flood elevation at that location. Following is a summary of results.

Mid American Energy	Area (sq mi)	Ave Depth (ft)	Valuation in this zone (\$)
Zone 1	1.82	1.76	\$190,261
Zone 2	0	0.00	\$0
Zone 3	11.02	3.32	\$1,152,021
Zone 4	5.6	4.40	\$585,419
Zone 5	8	5.67	\$836,313
Zone 6	0.83	5.56	\$86,767
Zone 7			\$0
Zone 8			\$0
	27.27		\$2,850,782
Harrison County REC	Area (sq mi)	Ave Depth (ft)	Valuation in this zone (\$)
Zone 1	38.2	5.07	\$882,580
Zone 2	2.21	4.50	\$51,060
Zone 3	19.9	2.97	\$459,774
Zone 4	4.46	5.71	\$103,045
Zone 5	6.67	6.23	\$154,105
Zone 6	3.35	5.30	\$77,399
Zone 7			\$0
Zone 8			\$0
	74.79		\$1,727,963

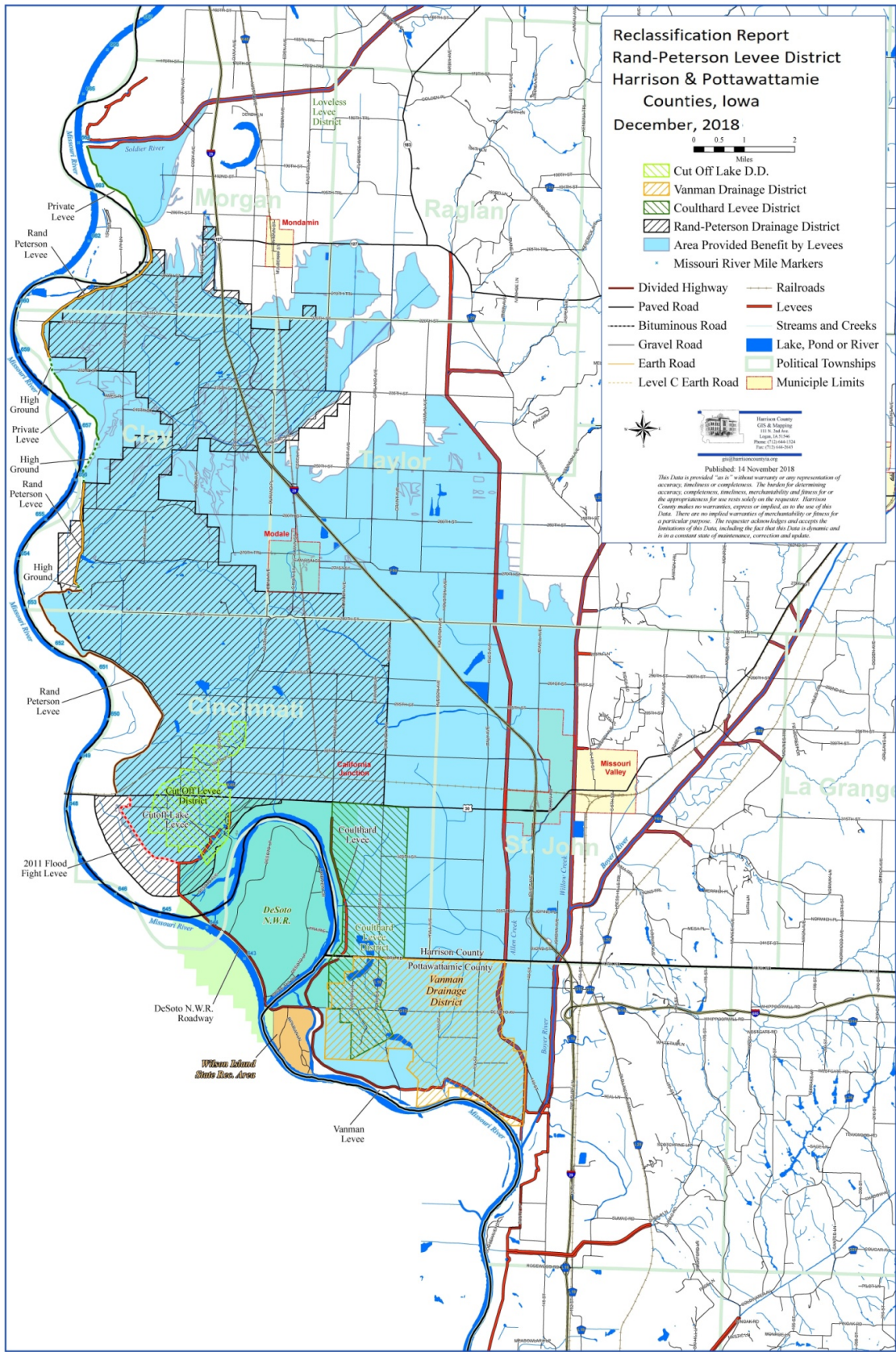


Plate 1

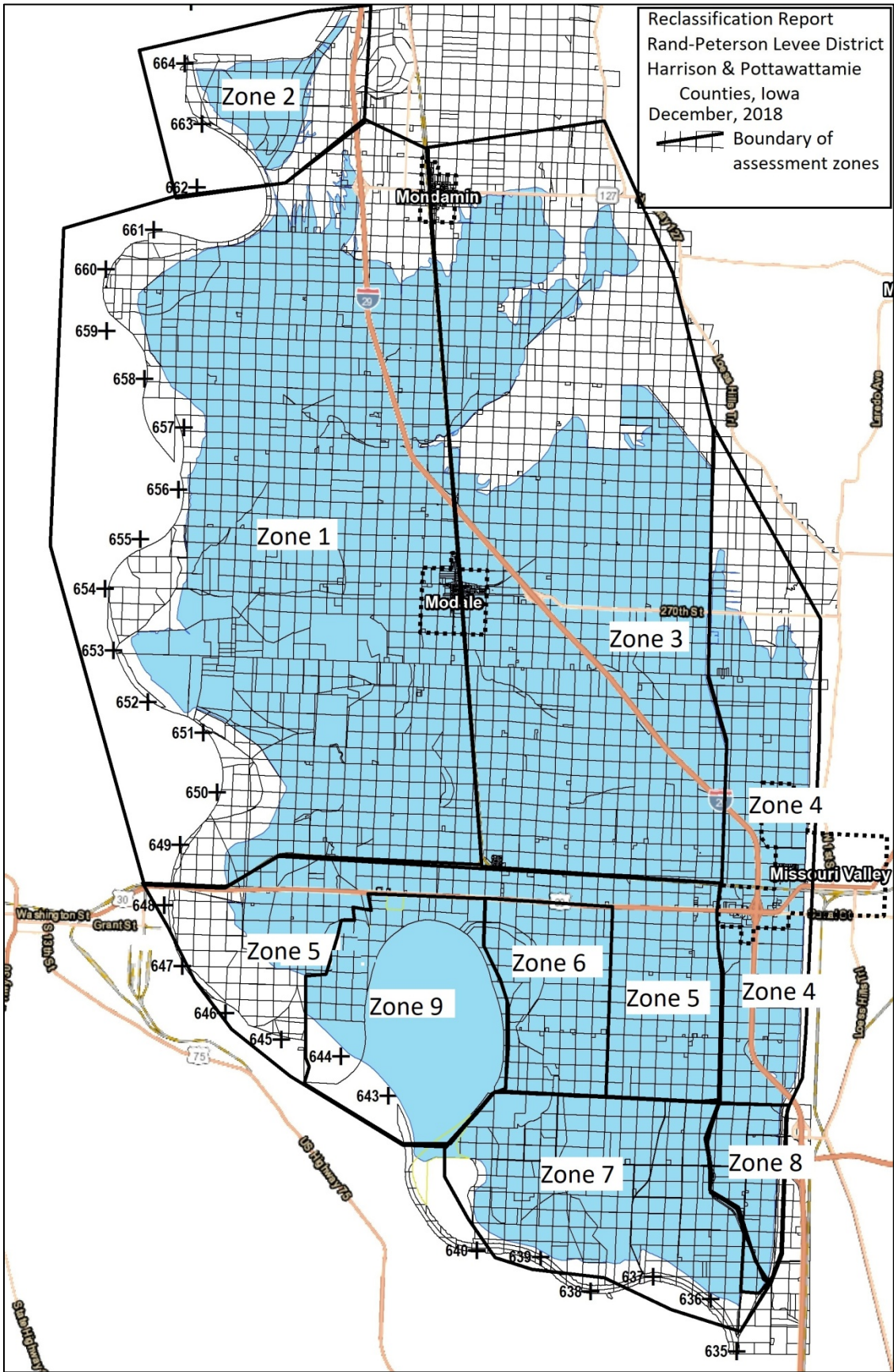


Plate 2