

Appendix 4E

Evaluation Summary Table of Potentially Feasible Flood Management Strategies

Table 4E. Potentially Feasible Flood Management Strategies Identified by RFPG

FMS ID	FMS Name	Description	Associated Goals (ID)	Associated FME, FMS, or FMP	Associated FME, FMS, or FMP Description	Counties	HUC8s	Strategy Type	Strategy Project Area (sqmi)	Flood Risk Type (Riverine, Coastal, Urban, Playa, Other)	Sponsor
142000001	FEMA Levee Accreditation for All Rio Grande Levees at El Paso	Coordination needed between USIBWC, FEMA, El Paso Water, El Paso County, Doña Ana County, and Hudspeth County to certify and accredit all remaining levee segments through El Paso County. Interior drainage studies are needed in Hudspeth and Doña Ana.	14004001	N/A	N/A	El Paso	13030102, 13040100	Regulatory and Guidance	91.19	Riverine	USIBWC, El Paso Water, El Paso County, Doña Ana County, Hudspeth County
142000002	Irrigation and Recharge Application of Captured Rainwater Runoff at Alpine	Construct rainwater basins at 3 locations around Kokernot Park to drain neighboring streets, impound runoff volume, promote infiltration and aquifer recharge, reduce landscaping water costs, and remediate pollutants.	14012001, 14013001	N/A	N/A	Brewster	13070006	Infrastructure Projects	0.06	Urban/Local	City of Alpine, Brewster County
142000003	Implement Colonia-wide Drainage System and Maintenance and Outreach Program for Roadside Swales and Driveway Culverts at Fort Hancock	Construct drainage improvements as detailed in FME ID: 141000014; maintain existing roadside ditches/swales to ensure positive drainage; and develop an outreach program to encourage residents to maintain and repair driveway culverts.	14007001, 14007002, 14014001, 14009002, 14009004, 14010001, 14010002	FME ID: 141000014	FME ID: 141000014 will be done prior to identify flood mitigation improvements in Fort Hancock and Acala.	Hudspeth	13040100	Education and Outreach, Other	1.12	Urban/Local	Fort Hancock CDP, Hudspeth County
142000004	Coordination with Ft. Bliss for FMP Permitting and Maintenance Access	El Paso Water designed NE7 on Ft. Bliss near unexploded ordinances (UXOs), and has an easement to maintain Fusselman and Northgate Dams, but can't access them due to UXOs. El Paso County designed MON1 on Ft. Bliss near a training ground and potential UXOs.	14007003, 14011001, 14009001, 14009003, 14010001, 14010002	N/A	N/A	El Paso	13040100	Infrastructure Projects	0.67	Urban/Local	El Paso Water, El Paso County, U.S. Army
142000005	Maintenance Program to control Salt Cedar vegetation along Rio Grande upstream of Presidio	Study to develop alternatives to clear vegetation along the Rio Grande between Candelaria and City of Presidio to allow for proper drainage for communities located along FM 170. Coordination needed between RGCOG, Presidio County, TXDOT, USACE and USIBWC.	14007003, 14012001	FMS ID: 142000007	FMS ID: 142000007 will follow as it utilizes this FME's saltcedar research.	Presidio	13040201	Education and Outreach, Other	28.86	Urban/Local	RGCOG, Presidio County, TXDOT, USIBWC, USACE
142000006	Study Binational Streamflow Recommendations for Big Bend Reach of Rio Grande/Rio Bravo	Conduct study with recommendations for binationally beneficial stream flows for Big Bend reach of the Rio Grande/Rio Bravo. Study will identify stream flows to support the river's ecological environment in state and federal parks in the U.S. and Mexico.	14007003, 14012001	FME ID: 141000008; FME ID: 141000015; FMS ID: 142000016	FME 141000008 precedes to assess how proposed sediment control on Alamito & Ternereros Creeks affect recommended pulse flows. FME 141000015 & FMS 142000016 precede as they provide method for estimating sediment loads & develop erosion solutions for region.	Presidio, Brewster	13040203, 13040204, 13040205, 13040202, 13040201	Other	212.79	Riverine	Presidio County, USIBWC, RG/B Basin Flows Collaboration, Rio Grande Joint Venture
142000007	Study to plan the management of saltcedar growth and debris in channels in/adjacent to City of Pecos	Study to identify and characterize alternatives to manage vegetation in natural drainages in and adjacent to the City of Pecos to increase conveyance and reduce flooding within the City of Pecos.	14012001	FME ID: 141000010; FMS ID: 142000005	FME ID: 141000010 will be done prior as it studies flooding in City of Pecos; FMS ID: 142000005 will be done prior as it involves saltcedar research that will be utilized.	Reeves	13060007, 13060011, 13040212, 13070002, 13070003, 13070006, 13070008, 13070009, 13070010, 13070011, 13070012, 13070001, 13070007	Other	124.33	Riverine	City of Pecos, Reeves County
142000008	Develop Certification Package for Cibolo Creek Channel and Levee	Perform planning and design required by FEMA for levee accreditation, then complete certification package for Cibolo Creek levee in vicinity of City of Presidio. Package includes O&M Plan.	14015001, 14007000, 14004002	FME ID: 141000002	FME ID: 141000002 will be done prior as the interior drainage study is needed for levee certification	Presidio	13040201	Regulatory and Guidance	2.75	Riverine	USACE, Presidio County, City of Presidio
142000009	Regulatory Review of Off-Road Traffic on State Lands	Coordination should take place between EPCWID1, El Paso County, and State land owners to discuss enforcement of restrictions associated with off-road motor vehicles on undeveloped land.	14002001, 14007003	N/A	N/A	El Paso	13040100, 13050003	Regulatory and Guidance	620.49	Other	EPCWID1, El Paso County, Texas GLO
142000010	Regulatory Review of Impervious Cover on New Development in El Paso County	Coordination should take place between EPCWID1, El Paso County, and Texas GLO land owners to discuss revisions to development regulations associated with detention and impervious cover.	14001001, 14007003	N/A	N/A	El Paso	13040100, 13050003	Regulatory and Guidance	619.88	Urban/Local	EPCWID1, El Paso County, Texas GLO

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142000013	Staff augmentation support or funding for at risk communities to join and/or enforce the NFIP	Prioritize and provide staff augmentation support or funding for at risk communities not currently participating in the NFIP or communities with limited resources to enforce the NFIP. Aid communities in implementing recommended minimum standards.	14001001, 14001002	N/A	N/A	Presidio, Hudspeth, Reeves, Andrews, Edwards, Pecos, Winkler		Regulatory and Guidance	16144.52	Urban/Local, Riverine	RGCOG
142000014	Develop new flood gages throughout the region	Prioritize, fund, and develop new flood gages (rainfall and/or stream gages) throughout the region to support flood warning system improvements and improve ability to validate or calibrate existing and new flood models	14005001, 14006001, 1400602	N/A	N/A	All of Region 14		Flood Measurement and Warning	43031.15	Riverine	RGCOG
142000015	Develop and design standard options for addressing identified development-related flooding in El Paso	Evaluate COEP and El Paso County drainage design standards for inlets, curb cuts, requirements for on-site storage in new developments, addressing as-built elevations, protecting remaining on-site storage and recovering original storage for existing developments.	14002001, 14003001	N/A	N/A	El Paso	13030102, 13040100, 13050003	Regulatory and Guidance	1011.05	Urban/Local	El Paso Water, El Paso County
142000016	Develop regional solutions to address erosion issues in natural channels affecting stormwater conveyance	Develop consensus region-specific erosion-resistant designs to prevent removal of material from drainage conveyances, with functional comparisons to aid selection of best practices.	14007003, 14002001, 14003001, 14007001, 14007002	FME ID: 141000008; FME ID: 141000015	FME ID: 141000008 will follow as it utilizes the erosion control solutions developed in this FME. FME ID: 141000015 will be done prior as it estimates sediment in arroyos and develops method to estimate sediment in arroyos throughout region.	All of Region 14	13030102, 13040100, 13050003	Other	1011.05	Urban/Local, Riverine	RGCOG
142000017	Develop solutions to address city/county stormwater conveyance into the Rio Grande (El Paso County)	Refine agency action coordination in conveyance of interior flooding to the Rio Grande. Develop FMP designs and costs for improvements of conveyance from river terrace storm water infrastructure, considering high ground water.	14006001, 14004001, 14004002, 14007003	FME ID: 14000018	FME ID: 14000018 will be done prior as it identifies new outfalls and prioritizes existing outfalls improvements	El Paso	13030102, 13040100, 13040201, 13040202, 13040203, 13040204, 13040205, 13040206, 13040207, 13040208, 13040209, 13040210, 13040211, 13040212, 13070006, 13070008, 13070010, 13070012, 13050003, 13050004, 13070007	Infrastructure Projects, Other	17923.72	Urban/Local, Riverine	El Paso Water, El Paso County
142000019	Initiate program to develop integrated solutions to improve irrigation system/ stormwater conveyance system interaction in El Paso area	Initiate program to develop integrated solutions to improve irrigation system/ stormwater conveyance system interaction in El Paso area	14014001, 14007000	N/A	N/A	El Paso	13030102, 13040100, 13050003	Other	1011.05	Urban/Local, Riverine	El Paso Water, El Paso County, EPCWID1
142000020	Develop and Improve Early Warning System for El Paso City/ County interior drainage	Conduct study to evaluate and proposed improvements to Early Warning Systems (EWSs) for interior drainage in El Paso City and El Paso County. Includes assessment of existing flood EWS.	14006001, 1400602	N/A	N/A	El Paso	13030102, 13040100, 13050003	Flood Measurement and Warning	1010.83	Urban/Local, Riverine	El Paso Water, COEP, El Paso County, EPCWID1
142000021	Develop and Improve Early Warning System for City of Pecos	Conduct study to evaluate and propose improvements to Early Warning Systems (EWSs) for City of Pecos and adjacent Lindsay Census Designated Place. Includes assessment of existing flood EWS.	14006001, 1400602	N/A	N/A	Reeves	13070003, 13070001	Flood Measurement and Warning	23.03	Urban/Local, Riverine	City of Pecos, Reeves County
142000022	Develop and Improve Early Warning System for City of Alpine	Conduct study to evaluate and propose improvements to Early Warning Systems (EWSs) for City of Alpine. Includes assessment of existing flood EWS.	14006001, 1400602	N/A	N/A	Brewster	13070006	Flood Measurement and Warning	4.79	Urban/Local, Riverine	City of Alpine, Brewster County
142000023	Develop and Improve Early Warning System for City of Presidio, Presidio County	Identify and design access routes and bridges/culverts to provide emergency access during extreme flood events in the City of Presidio.	14006001, 1400602	N/A	N/A	Presidio	13040201	Flood Measurement and Warning	2.57	Urban/Local, Riverine	City of Presidio, Presidio County
141000024	Develop and Improve Early Warning System for City of Fort Stockton	Conduct study to evaluate and propose improvements to Early Warning Systems (EWSs) for City of Fort Stockton. Includes assessment of existing flood EWS.	14006001, 1400602	N/A	N/A	Pecos	13070007	Flood Measurement and Warning	5.53	Urban/Local, Riverine	City of Fort Stockton, Pecos County
142000025	Develop and Improve Early Warning System for City of Marfa, Presidio County	Identify and design access routes and bridges/culverts to provide emergency access during extreme flood events in Marfa. Southeast Marfa and dirt portion of FM2810 were identified as problem areas by Presidio County Office of Emergency Management.	14006001, 1400602	FMP ID: 143000007	FMP ID: 143000007 also improves early warning in Marfa, but is not required before or after this FMS.	Presidio	13040202	Flood Measurement and Warning	1.62	Urban/Local, Riverine	City of Marfa, Presidio County

Table 4E. Potentially Feasible Flood Management Strategies Identified by RFPG

FMS ID	FMS Name	Entities with Oversight	Emergency Need (Y/N)	Estimated Project Cost (\$)	Potential Funding Sources and Amount	Flood Risk									
						Area in 100yr (1% annual chance) Floodplain	Area in 500yr (0.2% annual chance) Floodplain	Estimated number of structures at 100yr flood risk	Residential structures at flood risk	Estimated population at flood risk	Critical facilities at flood risk (#)	Number of low water crossings at flood risk (#)	Estimated number of road closures (#)	Estimated length of roads at flood risk (miles)	Estimated active farm & ranch land at flood risk (acres)
142000001	FEMA Levee Accreditation for All Rio Grande Levees at El Paso	USIBWC, El Paso Water, El Paso County, Doña Ana County, Hudspeth County	No	\$ 482,000	Federal, State, Local	54.3	65.7	11251	9905	30450	35	34	334	196	23451
142000002	Irrigation and Recharge Application of Captured Rainwater Runoff at Alpine	City of Alpine, Brewster County	No	\$ 1,282,000	State, Local	0.06	0.1	13	5	42	0	0	5	0.45	0.0
142000003	Implement Colonia-wide Drainage System and Maintenance and Outreach Program for Roadside Swales and Driveway Culverts at Fort Hancock	Fort Hancock CDP, Acala CDP, Hudspeth County	No	\$ 404,000	State, Local	0.3	0.4	12	0	16	0	6	0	2	61
142000004	Coordination with Ft. Bliss for FMP Permitting and Maintenance Access	El Paso Water, El Paso County, U.S. Army	No	\$ 49,000	Federal, State, Local	1.0	1.1	119	104	443	3	5	87	30.1	0
142000005	Maintenance Program to control Salt Cedar vegetation along Rio Grande upstream of Presidio	Presidio County, TXDOT, USIBWC, USACE	No	\$ 97,000	Federal, State, Local	21.6	22.5	18	0	49	0	2	2	1	109
142000006	Study Binational Streamflow Recommendations for Big Bend Reach of Rio Grande/Rio Bravo	City of Presidio, Presidio County, Brewster County, Big Bend National Park, Rio Grande Wild and Scenic River, Big Bend Ranch State Park, Black Gap Wildlife Management Area, Santa Elena Canyon Wildlife and Plant Protection Area, Maderas del Carmen Wildlife and Plant Protection Area, Ocampo Wildlife and Plant Protection Area, and the Rio Bravo Monument	No	\$ 63,000	Federal, State	64.9	70.9	136	46	361	0	107	113	182.1	282
142000007	Study to plan the management of saltcedar growth and debris in channels in/adjacent to City of Pecos	City of Pecos, Reeves County	No	\$ 73,000	Federal, State, Local	12.8	12.9	2120	1240	7359	3	18	295	89.9	532
142000008	Develop Certification Package for Cibolo Creek Channel and Levee	USACE, Presidio County	No	\$ 79,000	Federal, State, Local	1.6	1.7	712	479	1472	0	0	22	14.1	34
142000009	Regulatory Review of Off-Road Traffic on State Lands	EPCWID1, El Paso County, Texas GLO	No	\$ 99,000	State, Local	118.0	168.7	2603	2056	7134	1	51	104	97	35063
142000010	Regulatory Review of Impervious Cover on New Development in El Paso County	EPCWID1, El Paso County, Texas GLO	No	\$ 64,000	State, Local	117.9	168.5	2603	2056	7134	1	51	103	97	35026

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						Area in 100yr (1% annual chance) Floodplain	Area in 500yr (0.2% annual chance) Floodplain	Estimated number of structures at 100yr flood risk	Residential structures at flood risk	Estimated population at flood risk	Critical facilities at flood risk (#)	Number of low water crossings at flood risk (#)	Estimated number of road closures (#)	Estimated length of roads at flood risk (miles)	Estimated active farm & ranch land at flood risk (acres)
142000013	Staff augmentation support or funding for at risk communities to join and/or enforce the NFIP	Presidio County, Hudspeth County, Reeves County, Andrews County, Edwards County, Pecos County, Winkler County, City of Alpine, City of Sonora, City of Barstow, City of Kermit, City of Rankin, City of Thorntonville, Town of Valentine, City of Wickett, City of Wink	No	\$ 44,000	Federal, State, Local	3900.0	4843.0	8498	3843	22565	22	523	1188	1243.2	28217
142000014	Develop new flood gages throughout the region		Yes	\$ 240,000	Federal, State, Local	9286.0	11041.0	40121	24931	115519	94	1778	5871	3792	479713
142000015	Develop and design standard options for addressing identified development-related flooding in El Paso	El Paso Water, El Paso County	No	\$ 35,000	State, Local	179	245	21373	16856	70212	37	132	841	607	48551
142000016	Develop regional solutions to address erosion issues in natural channels affecting stormwater conveyance		No	\$ 57,000	State, Local	9286.0	11041.0	40121	24931	115519	94	1778	5871	3792	479713
142000017	Develop solutions to address city/county stormwater conveyance into the Rio Grande (El Paso County)	El Paso Water, El Paso County	No	\$ 99,000	Federal, State, Local	179	245	21373	16856	70212	37	132	841	607	48551
142000019	Initiate program to develop integrated solutions to improve irrigation system/stormwater conveyance system interaction in El Paso area	El Paso Water, El Paso County, EPCWID1	No	\$ 21,000	State, Local	179	245	21373	16856	70212	37	132	841	607	48551
142000020	Develop and Improve Early Warning System for El Paso City/ County interior drainage	El Paso Water, COEP, El Paso County, EPCWID1	Yes	\$ 140,000	State, Local	179	245	21373	16856	70212	37	132	841	607.00	48551
142000021	Develop and Improve Early Warning System for City of Pecos	City of Pecos, Reeves County	Yes	\$ 50,000	State, Local	12.8	12.9	2120	1240	7359	3	18	295	89.92	532
142000022	Develop and Improve Early Warning System for City of Alpine	City of Alpine, Brewster County	Yes	\$ 50,000	State, Local	2.0	2.3	1640	1181	4364	6	18	199	38.03	50
142000023	Develop and Improve Early Warning System for City of Presidio, Presidio County	City of Presidio, Presidio County	Yes	\$ 50,000	State, Local	0.8	0.9	655	513	1292	0	0	56	15.71	14
141000024	Develop and Improve Early Warning System for City of Fort Stockton	City of Fort Stockton, Pecos County	Yes	\$ 50,000	State, Local	0.8	1.1	166	108	899	2	4	26	21.61	14
142000025	Develop and Improve Early Warning System for City of Marfa, Presidio County	City of Marfa, Presidio County	Yes	\$ 50,000	State, Local	0.3	0.4	212	140	334	1	12	55	6.46	0

Table 4E. Potentially Feasible Flood Management Strategies Identified by RFPG

FMS ID	FMS Name	Reduction in Flood Risk												Cost/ Structure removed	Consideration of nature- based solution (Y/N)	Negative Impact (Y/N)	Negative Impact Mitigation (Y/N)	Water Supply Benefit (Y/N)
		Number of structures with reduced 100yr (1% annual chance) flood risk	Number of structures removed from 100yr (1% annual chance) flood risk	Number of structures removed from 500yr (0.2% annual chance) flood risk	Residential structures removed from 100yr (1% annual chance) flood risk	Estimated Population removed from 100yr (1% annual chance) flood risk	Critical facilities removed from 100yr (1% annual chance) flood risk (#)	Number of low water crossings removed from 100yr (1% annual chance) flood risk (#)	Estimated reduction in road closure occurrences	Estimated length of roads removed from 100yr flood risk (miles)	Estimated active farm & ranch land removed from 100yr flood risk (acres)	Estimated reduction in fatalities (if available)	Estimated reduction in injuries (if available)					
142000001	FEMA Levee Accreditation for All Rio Grande Levees at El Paso	11036	10275	0	9160	28148	30	32	188	168	17834	0	0	\$ 44	No	No	No	No
142000002	Irrigation and Recharge Application of Captured Rainwater Runoff at Alpine	0	0	0	0	0	0	0	0	0	0	0	0	N/A	Yes	No	No	Yes
142000003	Implement Colonia-wide Drainage System and Maintenance and Outreach Program for Roadside Swales and Driveway Culverts at Fort Hancock	0	0	0	0	0	0	0	0	0	0	0	0	N/A	No	No	No	No
142000004	Coordination with Ft. Bliss for FMP Permitting and Maintenance Access	118	5	0	4	15	0	0	0	0.8	0	0	0	\$ 415	No	No	No	No
142000005	Maintenance Program to control Salt Cedar vegetation along Rio Grande upstream of Presidio	0	0	0	0	0	0	0	0	0	0	0	0	N/A	Yes	No	No	No
142000006	Study Binational Streamflow Recommendations for Big Bend Reach of Rio Grande/Rio Bravo	0	0	0	0	0	0	0	0	0	0	0	0	N/A	Yes	No	No	No
142000007	Study to plan the management of saltcedar growth and debris in channels in/adjacent to City of Pecos	0	0	0	0	0	0	0	0	0	0	0	0	N/A	Yes	No	No	No
142000008	Develop Certification Package for Cibolo Creek Channel and Levee	681	681	0	462	1401	0	0	11	13.4	30	0	0	\$ 116	No	No	No	No
142000009	Regulatory Review of Off-Road Traffic on State Lands	0	0	0	0	0	0	0	0	0	0	0	0	N/A	No	No	No	No
142000010	Regulatory Review of Impervious Cover on New Development in El Paso County	0	0	0	0	0	0	0	0	0	0	0	0	N/A	No	No	No	No

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FMS ID	FMS Name	Reduction in Flood Risk												Cost/ Structure removed	Consideration of nature-based solution (Y/N)	Negative Impact (Y/N)	Negative Impact Mitigation (Y/N)	Water Supply Benefit (Y/N)
		Number of structures with reduced 100yr (1% annual chance) flood risk	Number of structures removed from 100yr (1% annual chance) flood risk	Number of structures removed from 500yr (0.2% annual chance) flood risk	Residential structures removed from 100yr (1% annual chance) flood risk	Estimated Population removed from 100yr (1% annual chance) flood risk	Critical facilities removed from 100yr (1% annual chance) flood risk (#)	Number of low water crossings removed from 100yr (1% annual chance) flood risk (#)	Estimated reduction in road closure occurrences	Estimated length of roads removed from 100yr flood risk (miles)	Estimated active farm & ranch land removed from 100yr flood risk (acres)	Estimated reduction in fatalities (if available)	Estimated reduction in injuries (if available)					
142000013	Staff augmentation support or funding for at risk communities to join and/or enforce the NFIP	0	0	0	0	0	0	0	0	0	0	0	0	N/A	No	No	No	No
142000014	Develop new flood gages throughout the region	0	0	0	0	0	0	0	0	0	0	0	0	N/A	No	No	No	No
142000015	Develop and design standard options for addressing identified development-related flooding in El Paso	0	0	0	0	0	0	0	0	0	0	0	0	N/A	No	No	No	No
142000016	Develop regional solutions to address erosion issues in natural channels affecting stormwater conveyance	0	0	0	0	0	0	0	0	0	0	0	0	N/A	No	No	No	No
142000017	Develop solutions to address city/county stormwater conveyance into the Rio Grande (El Paso County)	0	0	0	0	0	0	0	0	0	0	0	0	N/A	No	No	No	No
142000019	Initiate program to develop integrated solutions to improve irrigation system/ stormwater conveyance system interaction in El Paso area	0	0	0	0	0	0	0	0	0	0	0	0	N/A	No	No	No	No
142000020	Develop and Improve Early Warning System for El Paso City/ County interior drainage	0	0	0	0	0	0	0	0	0	0	0	0	N/A	No	No	No	No
142000021	Develop and Improve Early Warning System for City of Pecos	0	0	0	0	0	0	0	0	0	0	0	0	N/A	No	No	No	No
142000022	Develop and Improve Early Warning System for City of Alpine	0	0	0	0	0	0	0	0	0	0	0	0	N/A	No	No	No	No
142000023	Develop and Improve Early Warning System for City of Presidio, Presidio County	0	0	0	0	0	0	0	0	0	0	0	0	N/A	No	No	No	No
141000024	Develop and Improve Early Warning System for City of Fort Stockton	0	0	0	0	0	0	0	0	0	0	0	0	N/A	No	No	No	No
142000025	Develop and Improve Early Warning System for City of Marfa, Presidio County	0	0	0	0	0	0	0	0	0	0	1	0	N/A	No	No	No	No