

Appendix D: Channel Migration Zone Maps

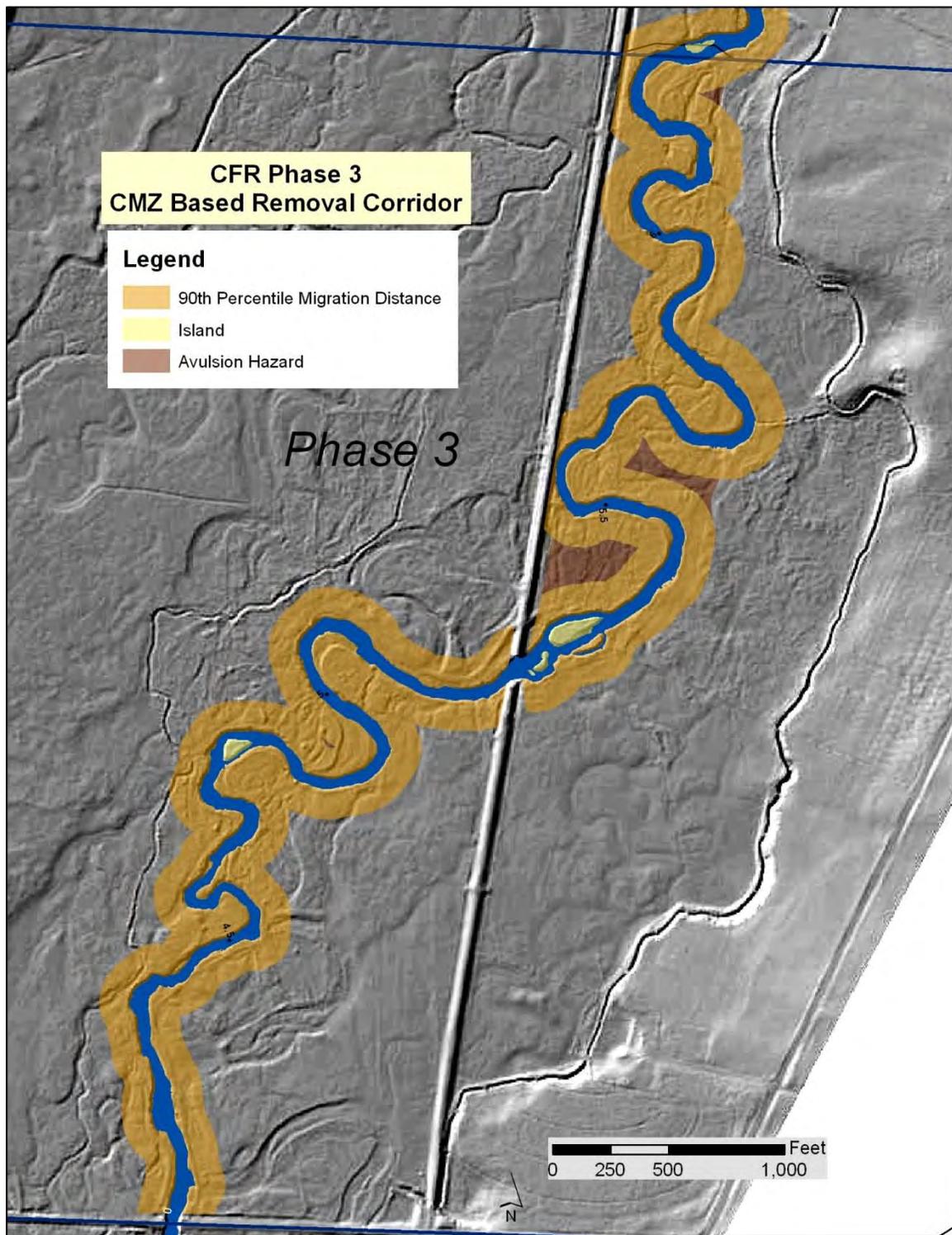


Figure D- 1. 100-year Channel Migration Zone (CMZ) map, Phase 3.

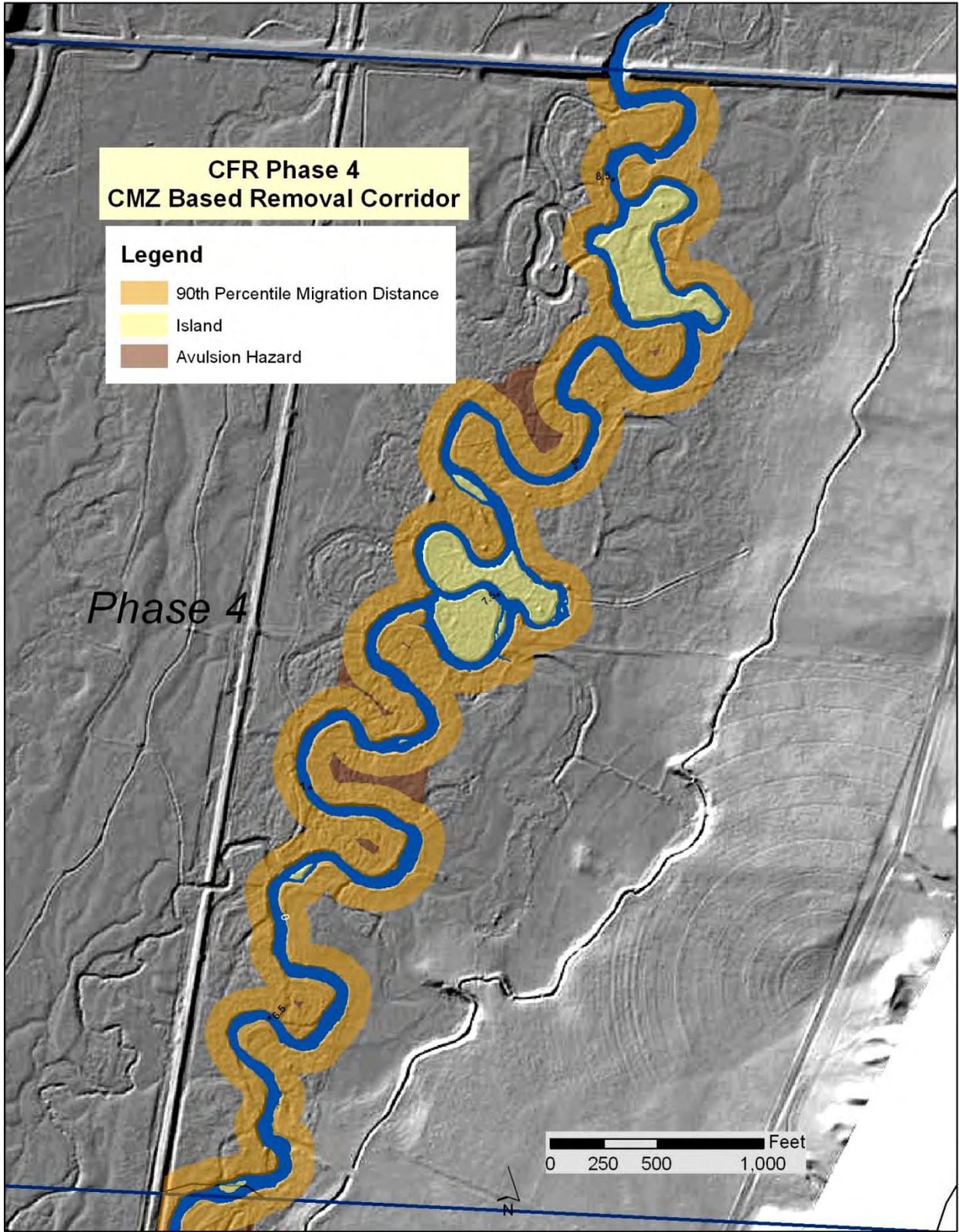


Figure D- 2. 100-year Channel Migration Zone (CMZ) map, Phase 4.

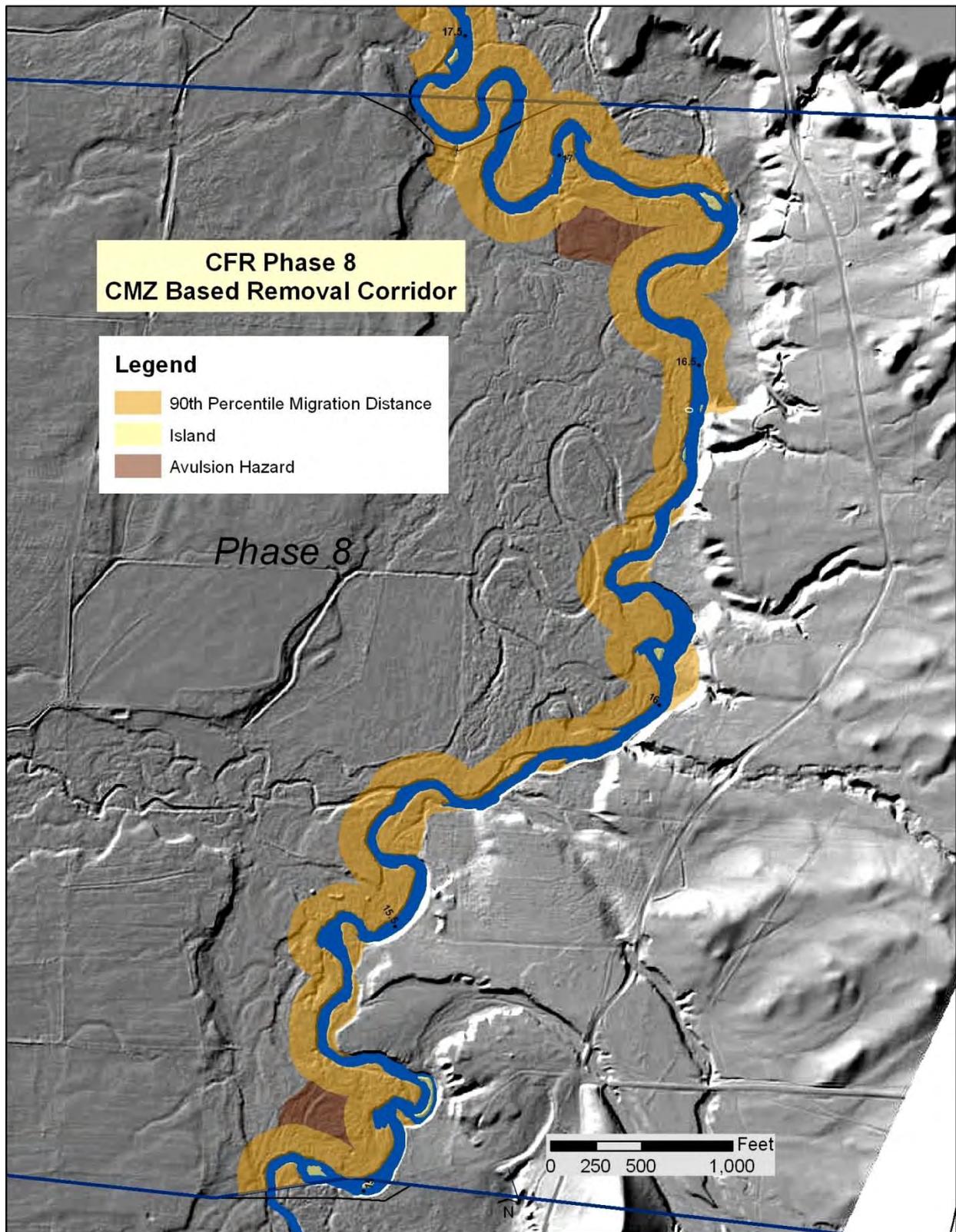


Figure D- 3. 100-year Channel Migration Zone (CMZ) map, Phase 8.

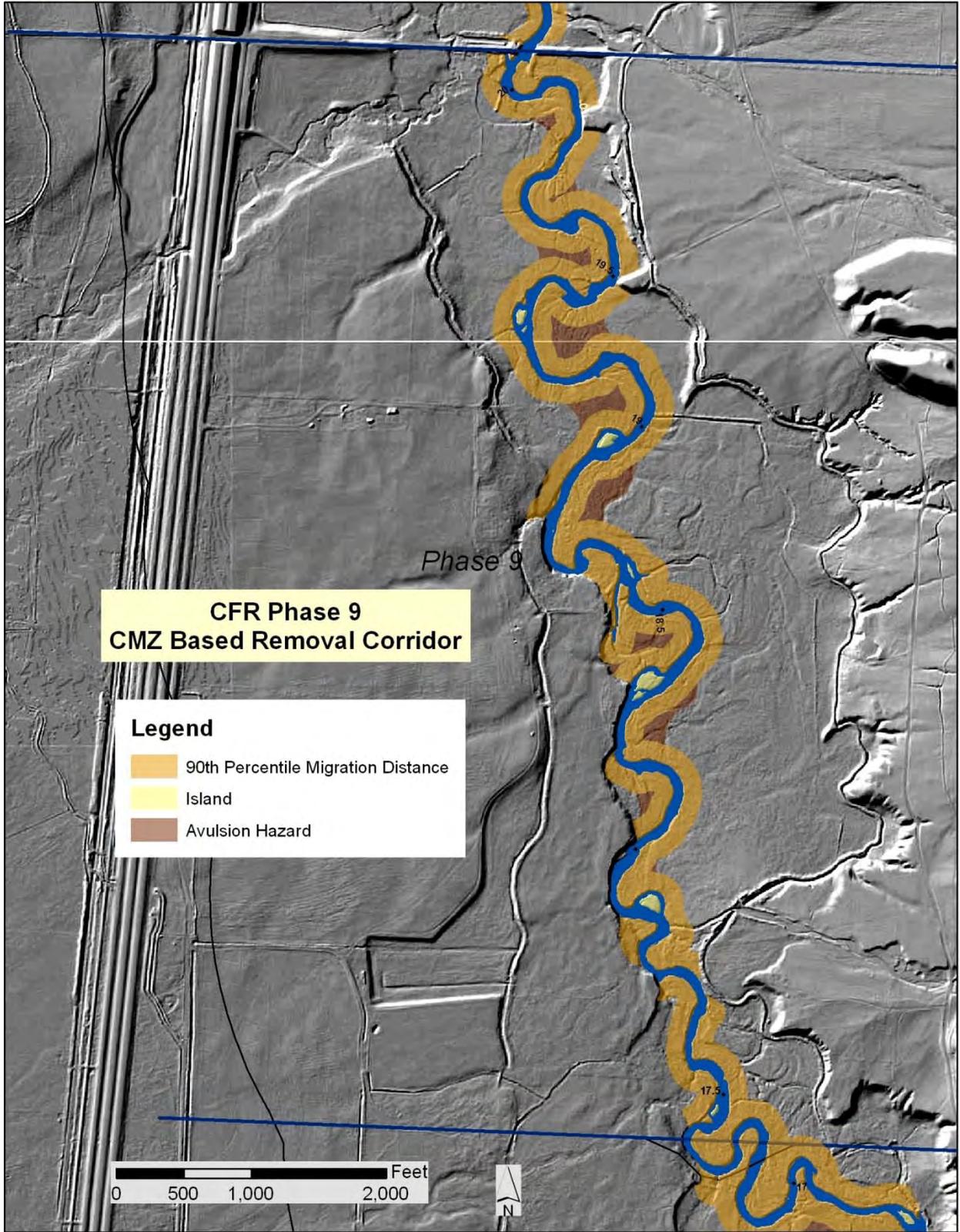


Figure D- 4. 100-year Channel Migration Zone (CMZ) map, Phase 9.

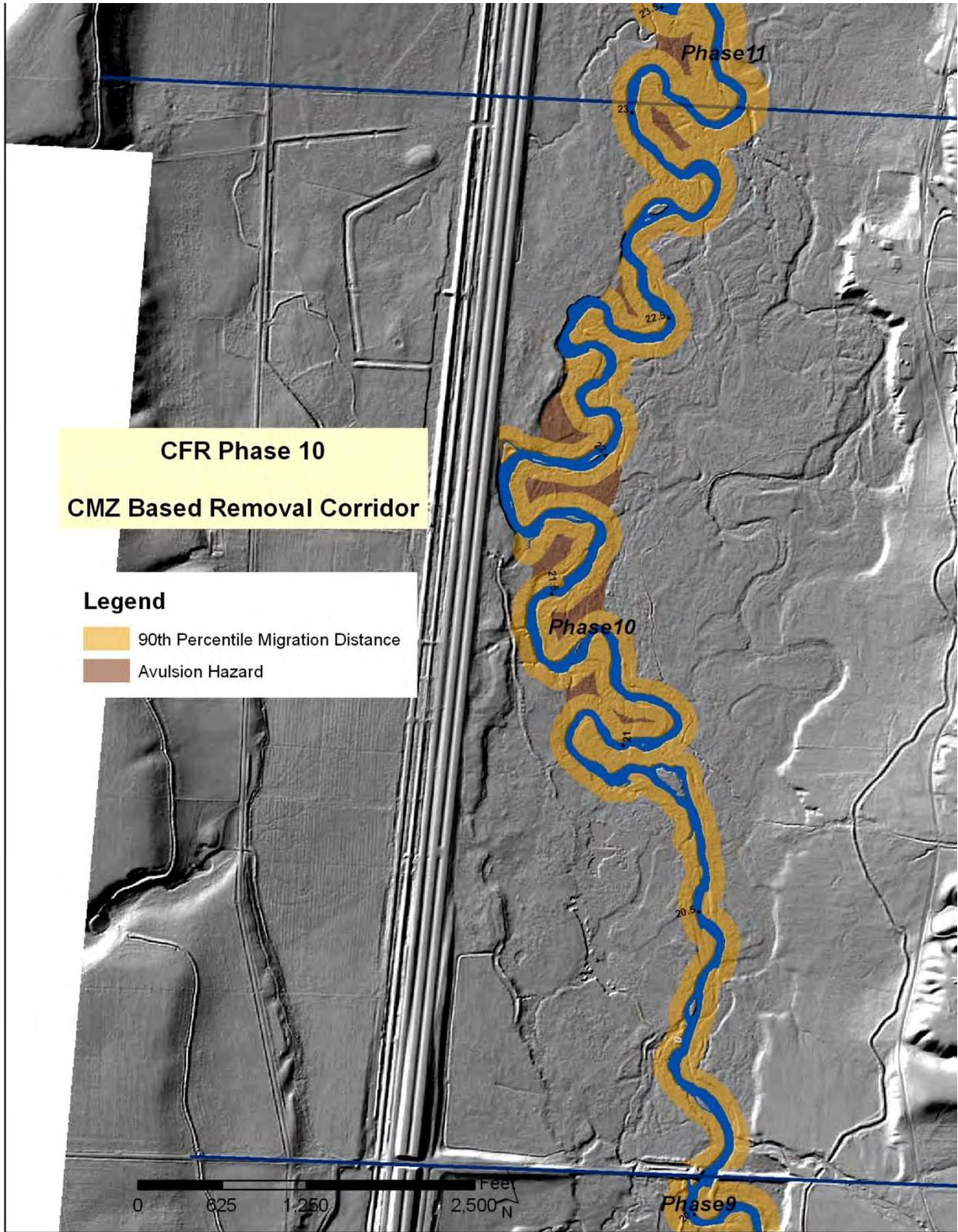


Figure D- 5. 100-year Channel Migration Zone (CMZ) map, Phase 10.

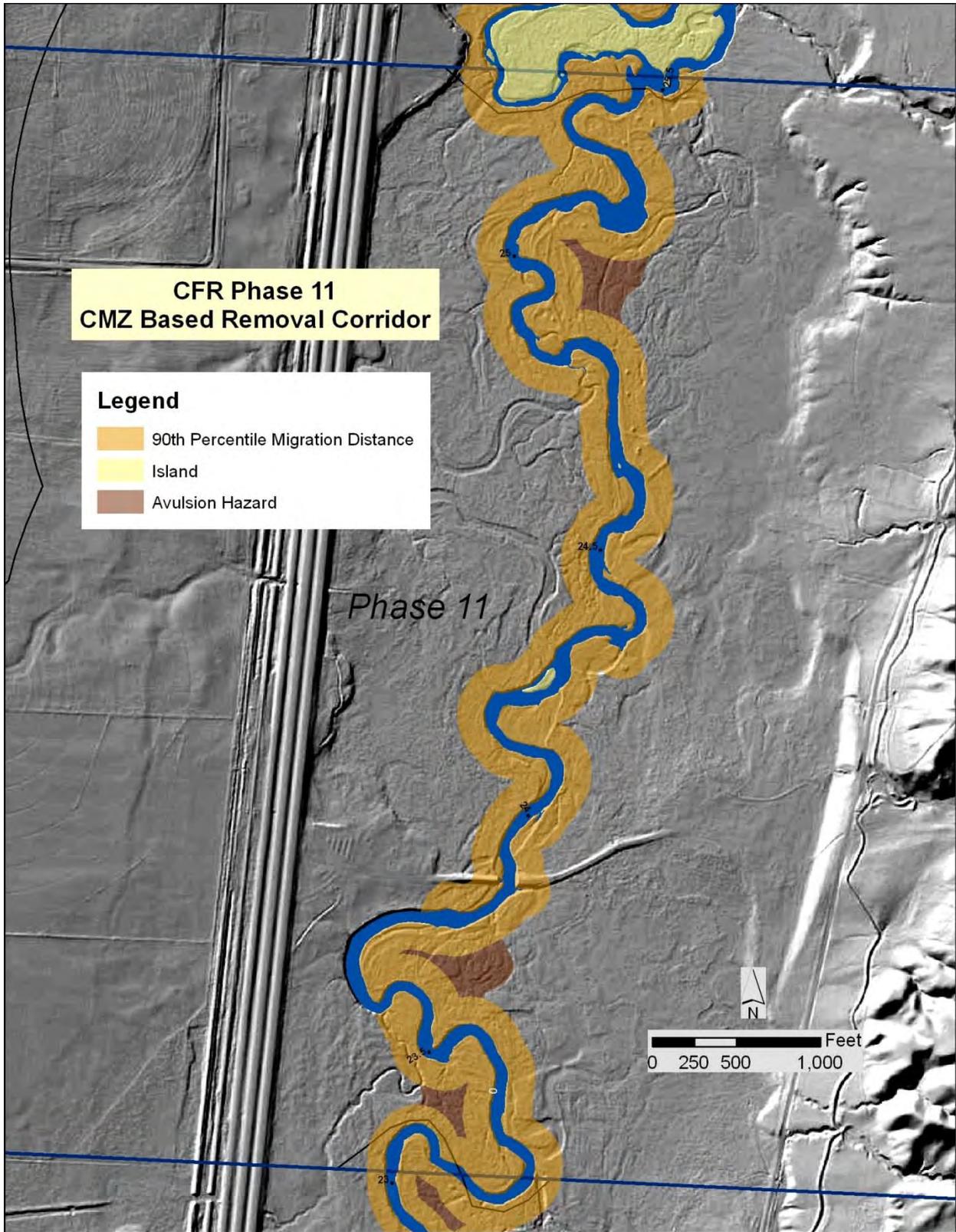


Figure D- 6. 100-year Channel Migration Zone (CMZ) map, Phase 11.

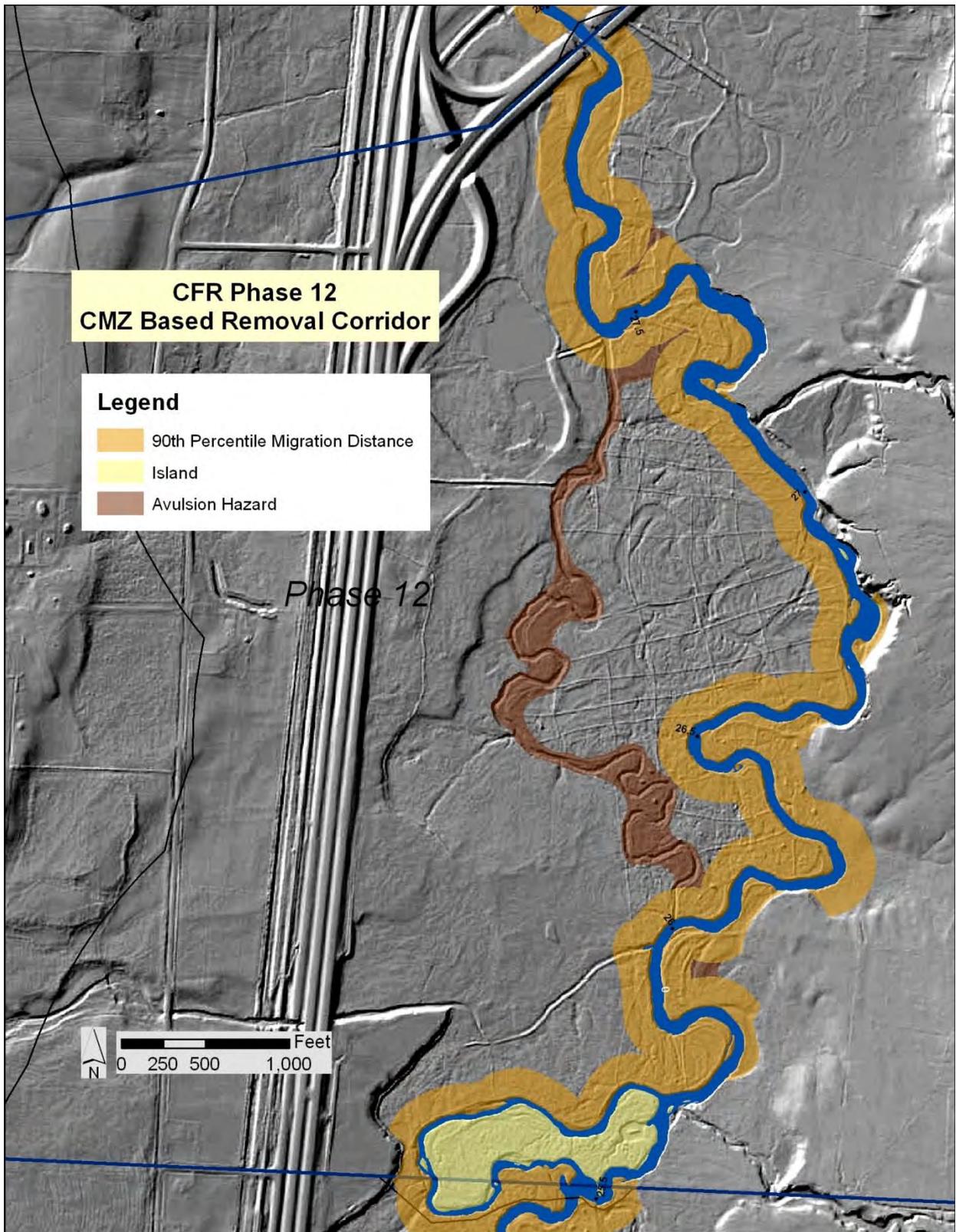


Figure D- 7. 100-year Channel Migration Zone (CMZ) map, Phase 12.

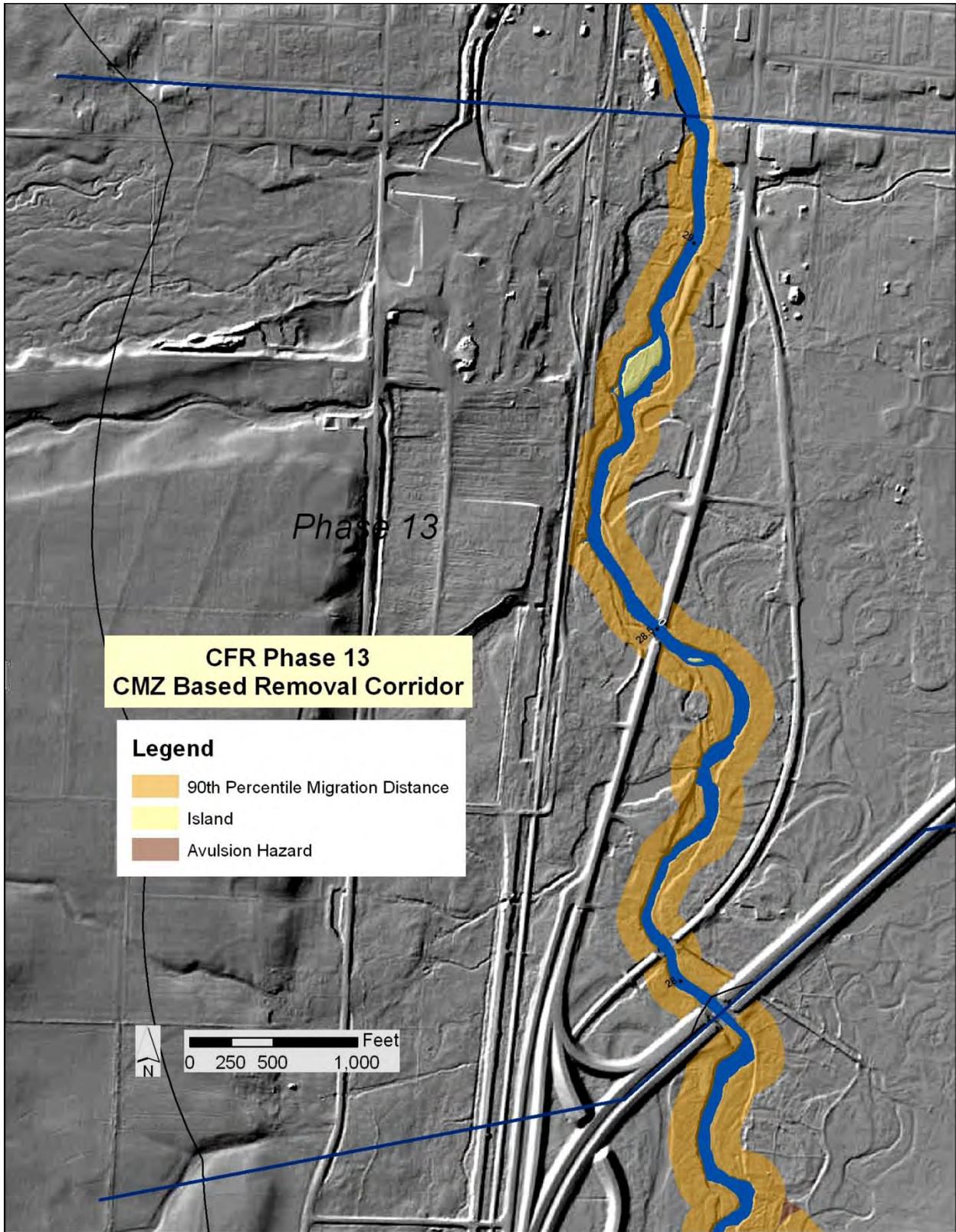


Figure D- 8. 100-year Channel Migration Zone (CMZ) map, Phase 13.

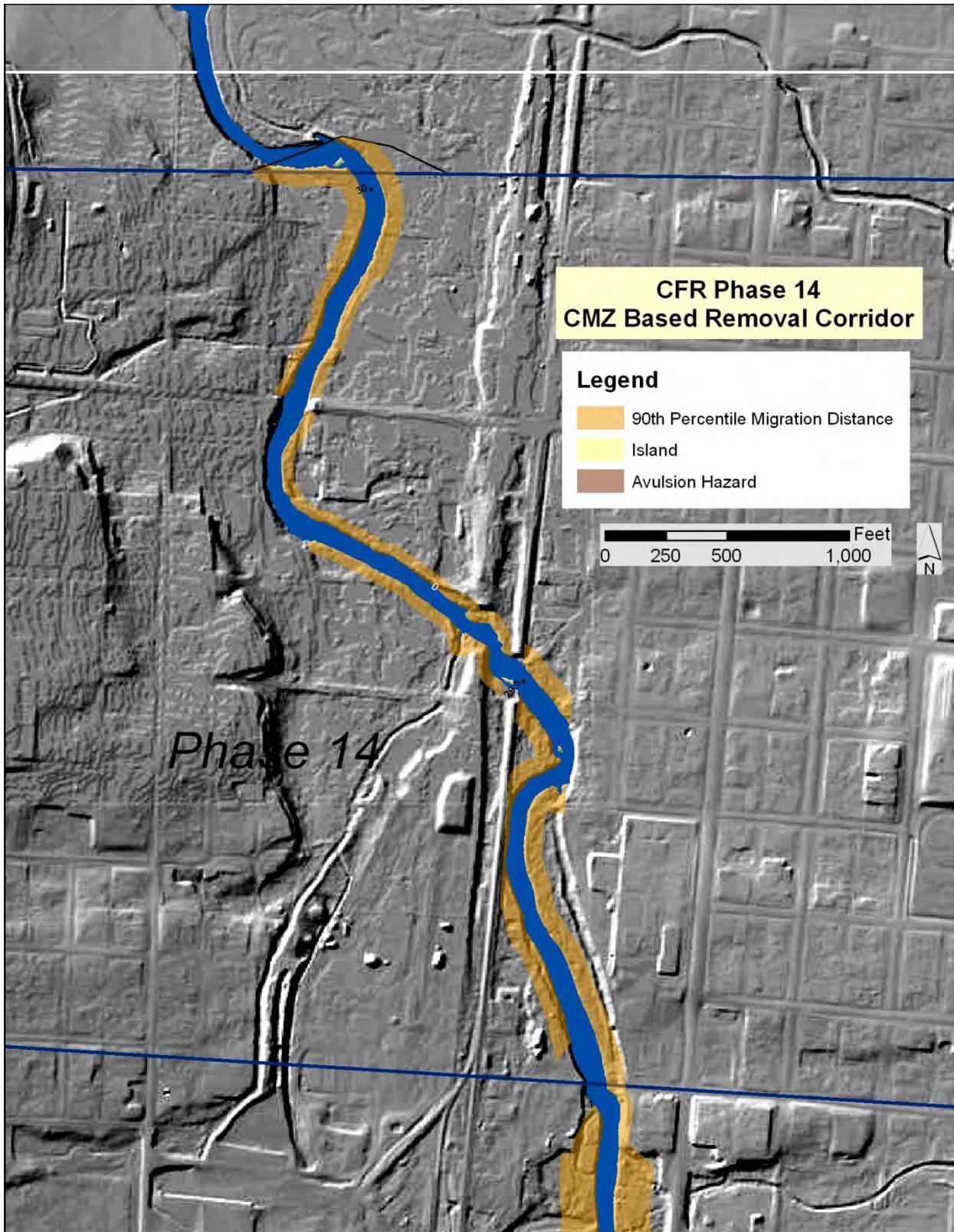


Figure D- 9. 100-year Channel Migration Zone (CMZ) map, Phase 14.

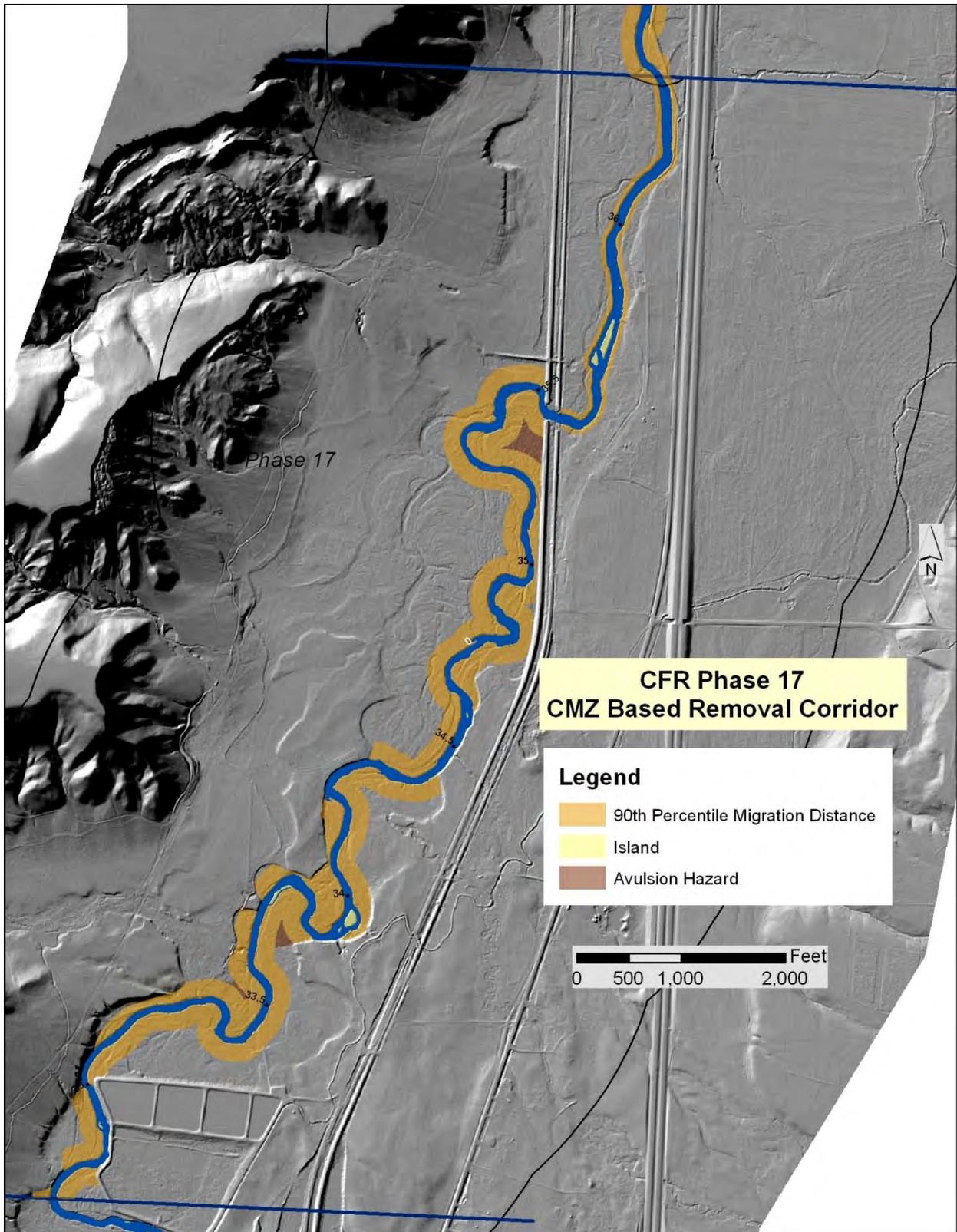


Figure D- 10. 100-year Channel Migration Zone (CMZ) map, Phase 17.

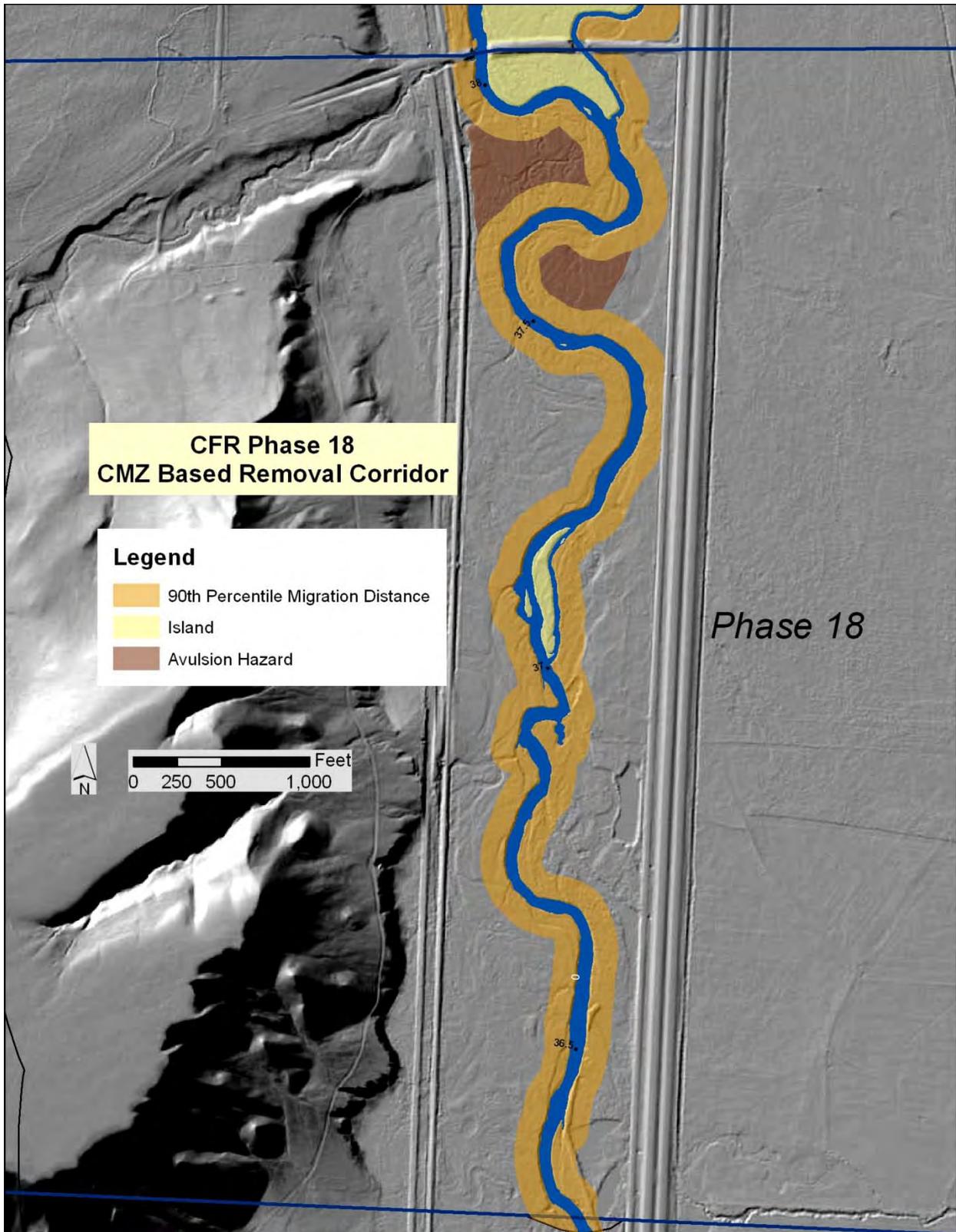


Figure D- 11. 100-year Channel Migration Zone (CMZ) map, Phase 18.

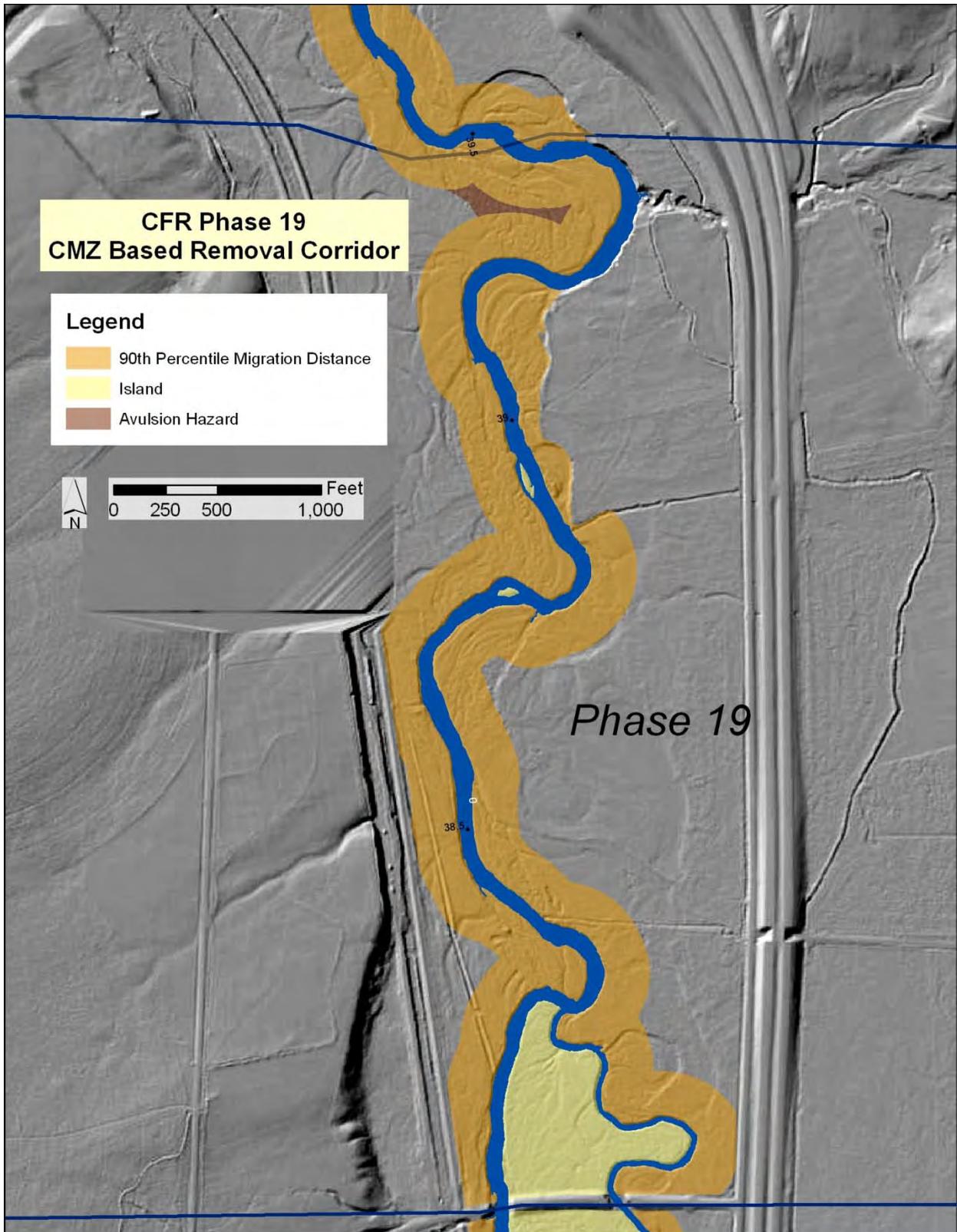


Figure D- 12. 100-year Channel Migration Zone (CMZ) map, Phase 19.

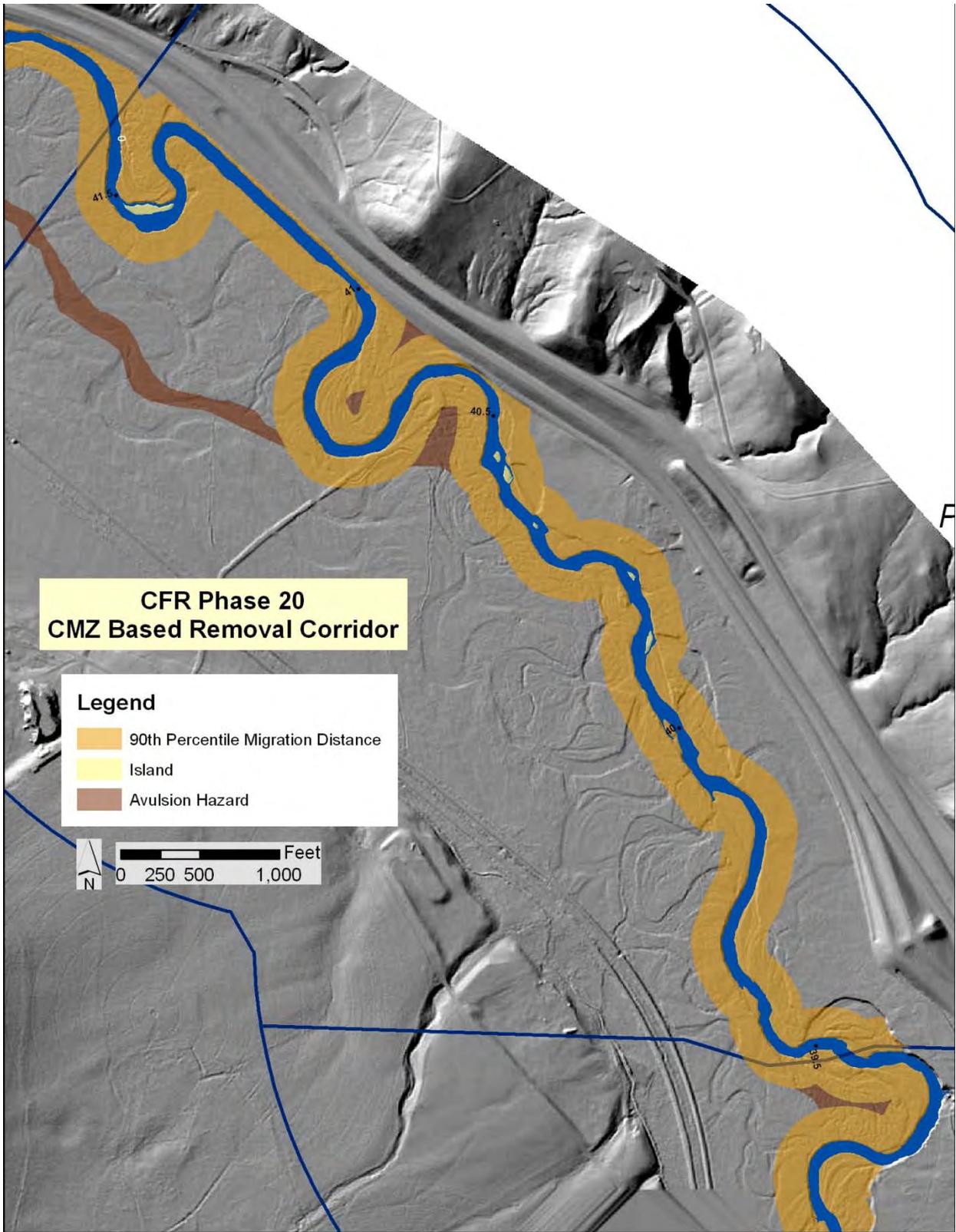


Figure D- 13. 100-year Channel Migration Zone (CMZ) map, Phase 20.

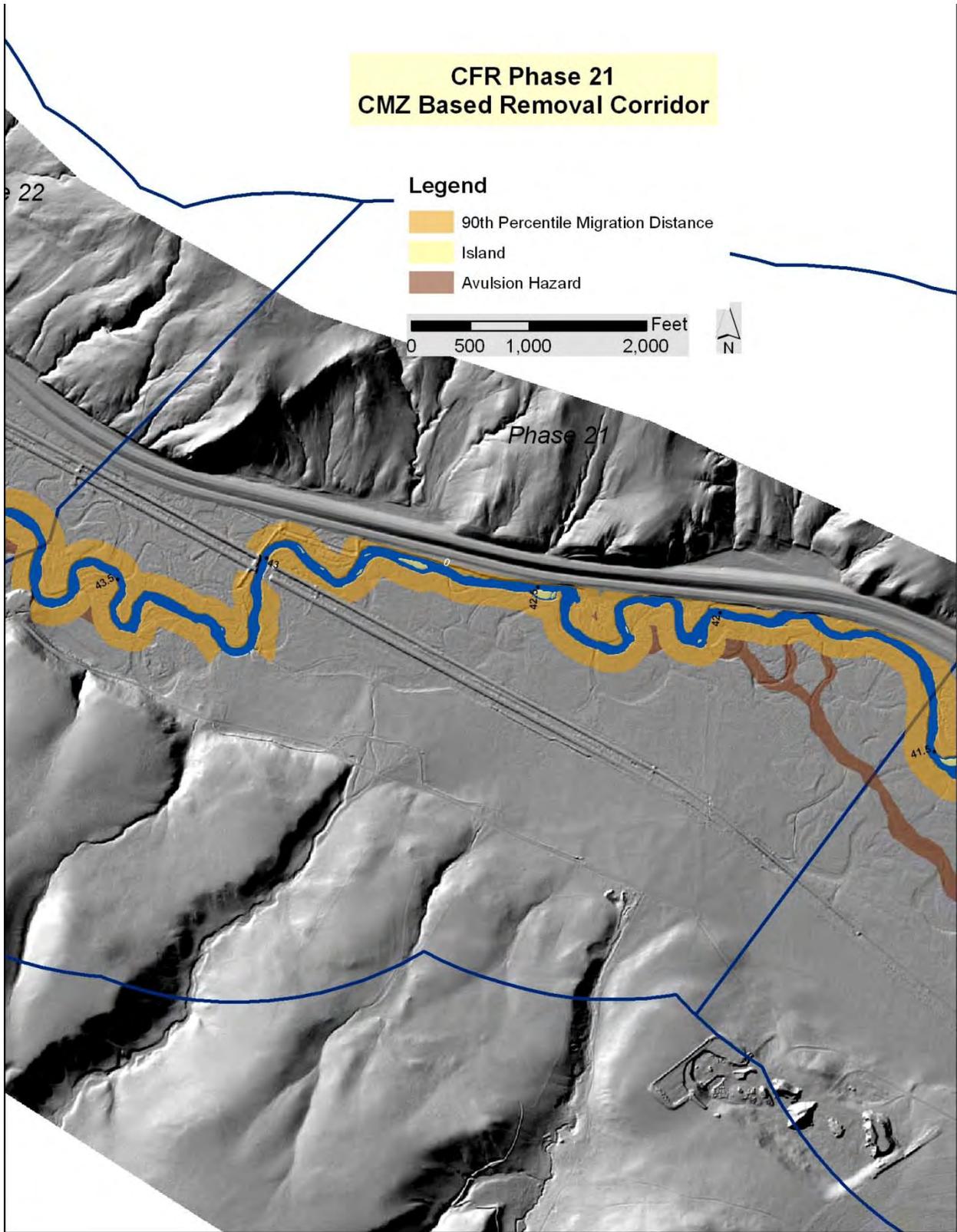


Figure D- 14. 100-year Channel Migration Zone (CMZ) map, Phase 21.

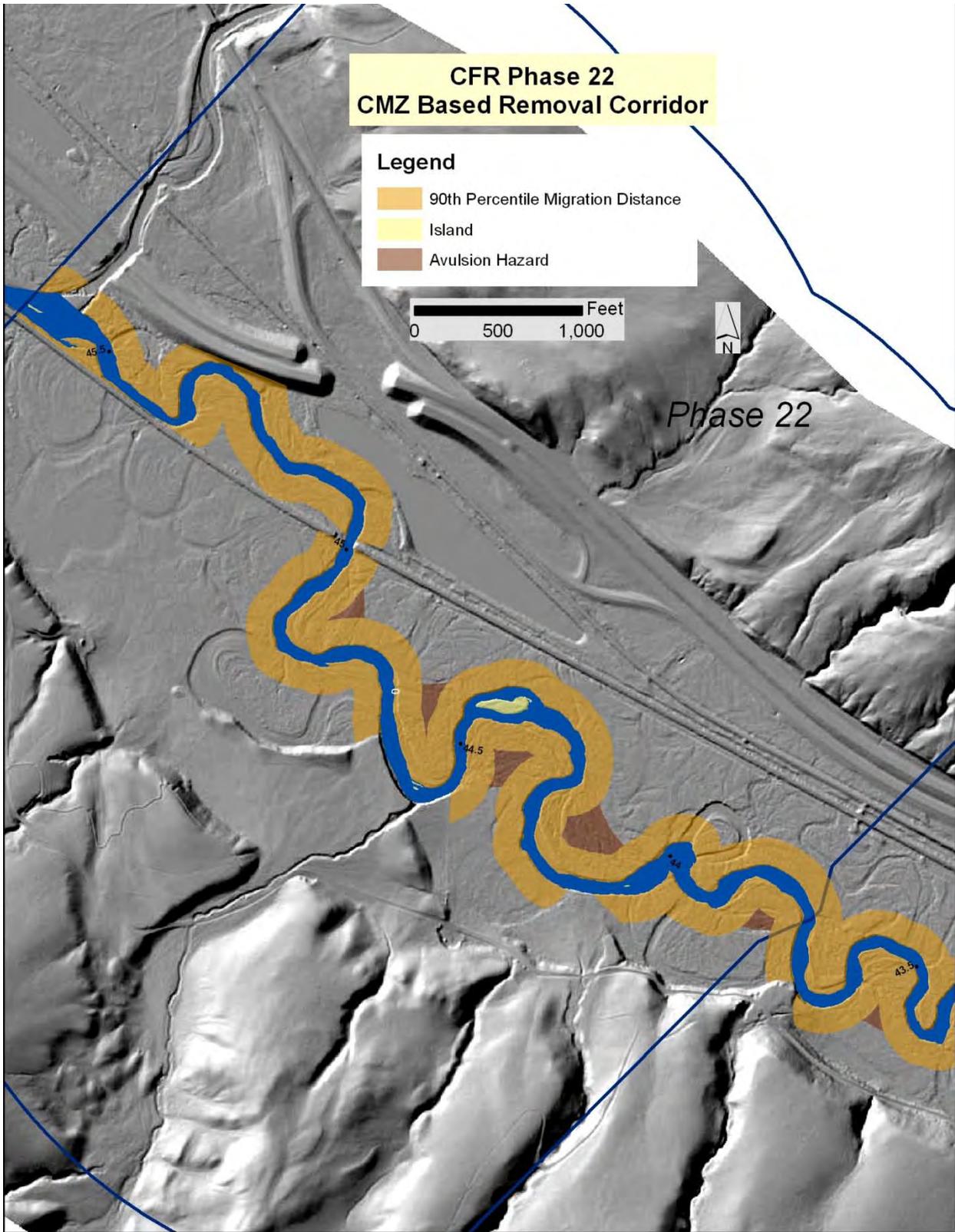


Figure D- 15. 100-year Channel Migration Zone (CMZ) map, Phase 22.

Appendix E: Floodplain Connectivity Maps

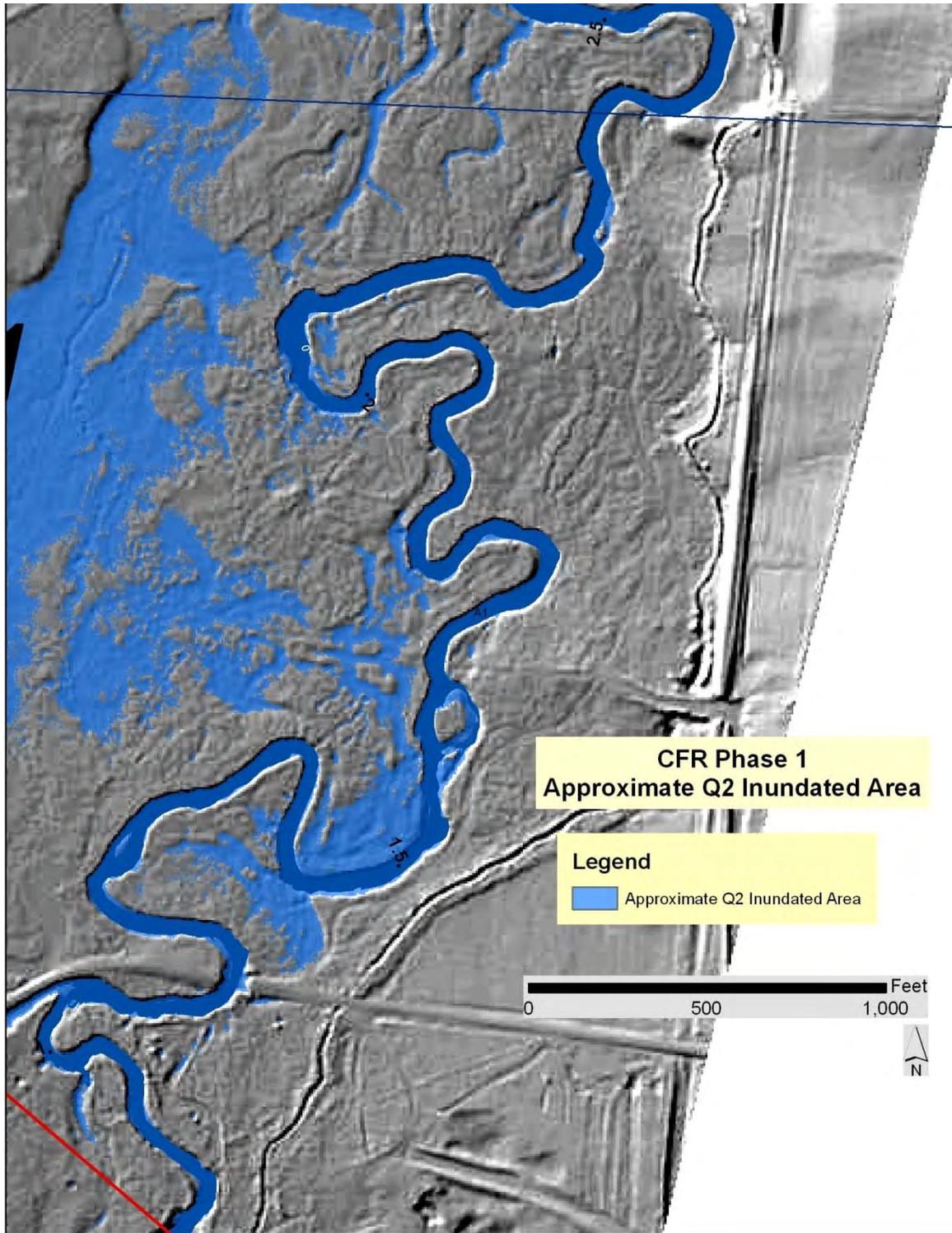


Figure E 1. Phase 1 Estimated floodplain connectivity map.

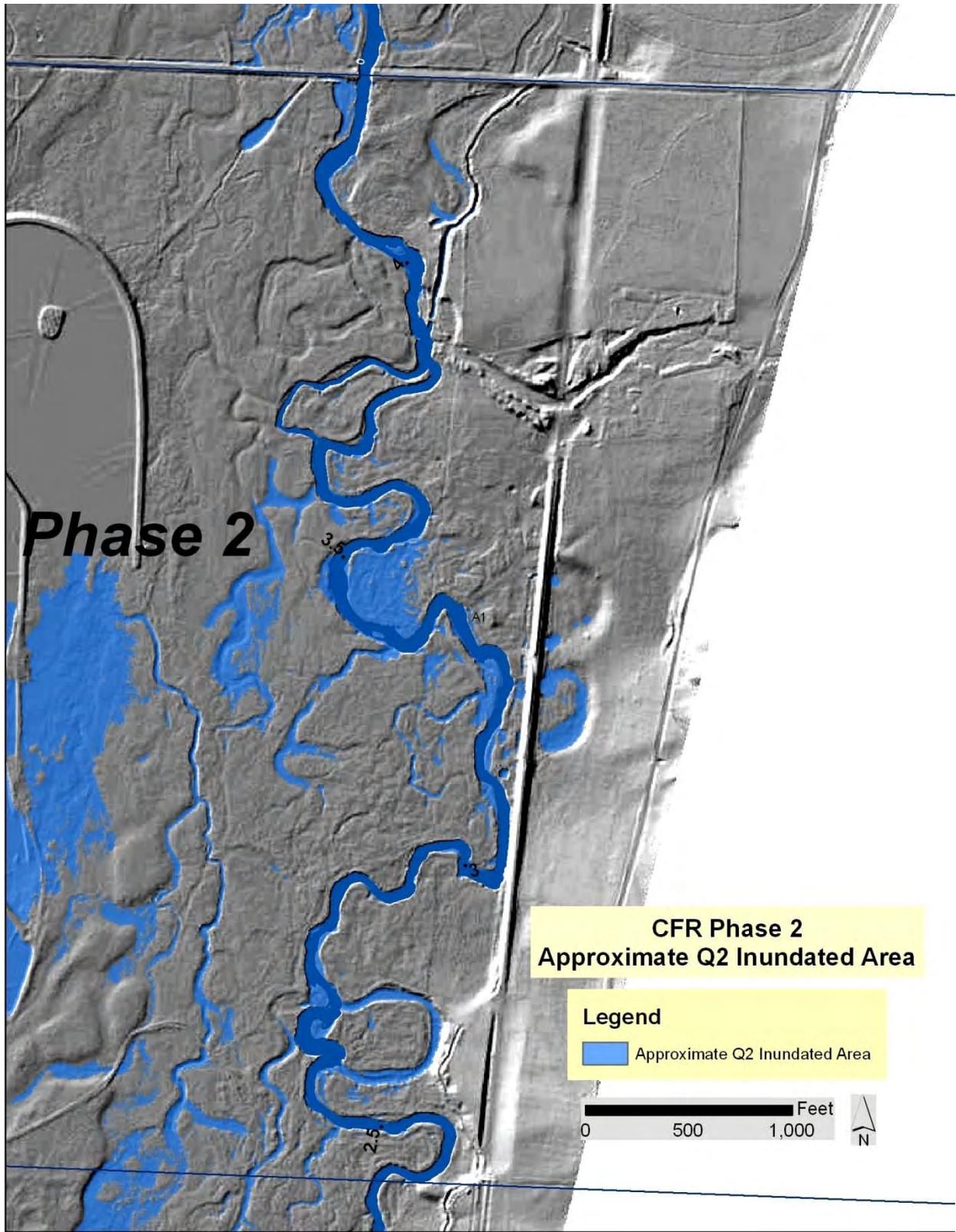


Figure E 2. Phase 2 Estimated floodplain connectivity map.

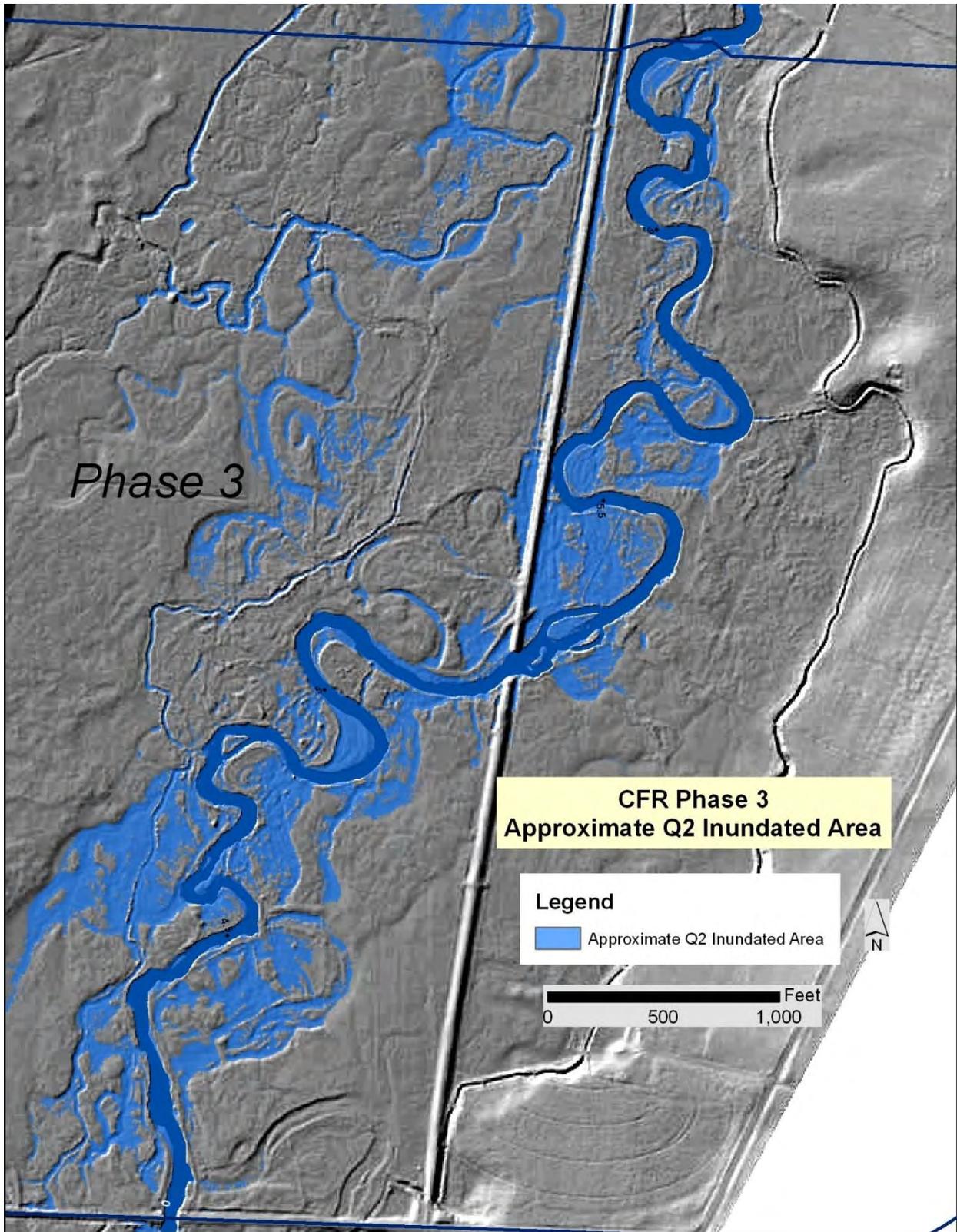


Figure E 3. Phase 3 Estimated floodplain connectivity map.

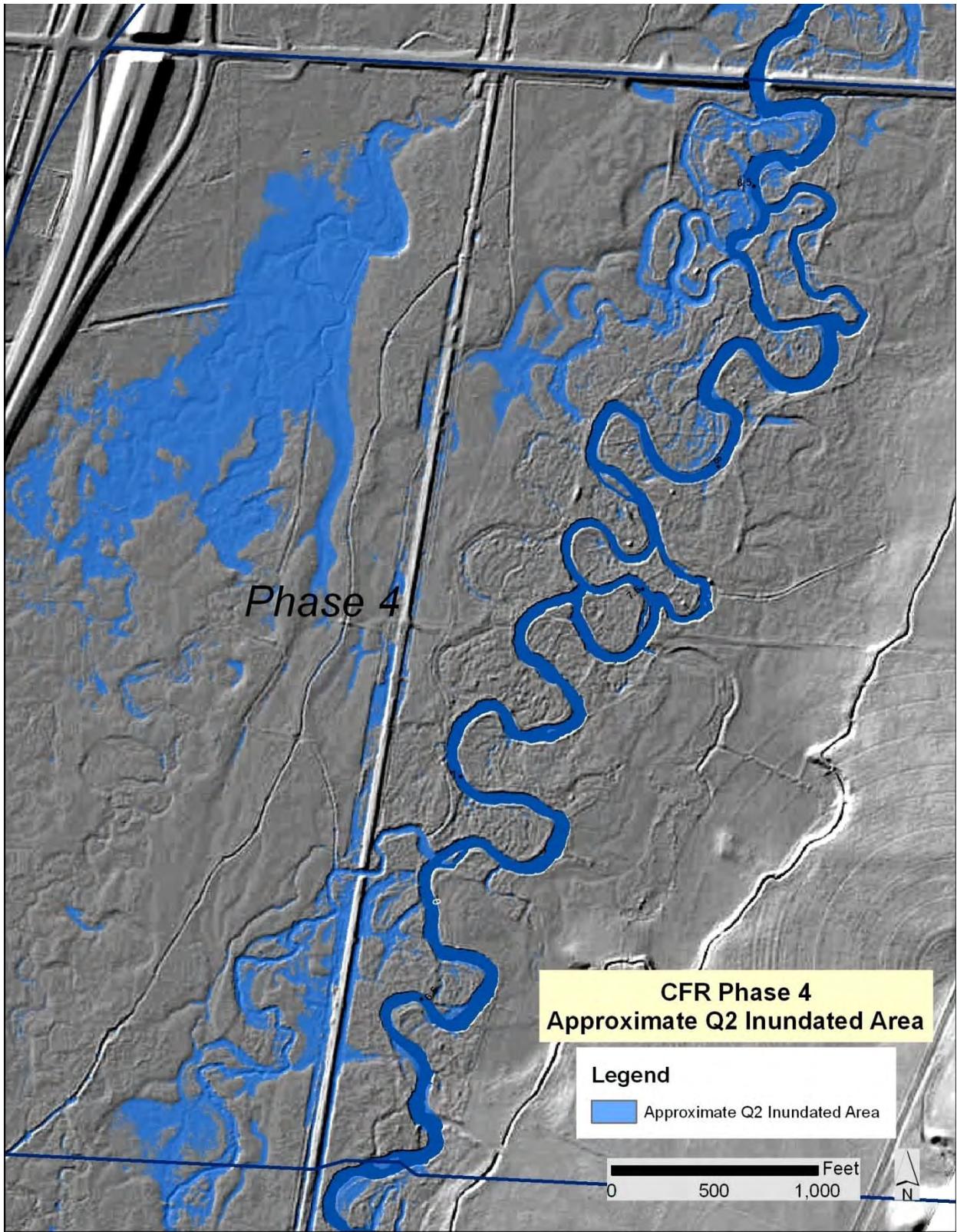


Figure E 4. Phase 4 Estimated floodplain connectivity map.

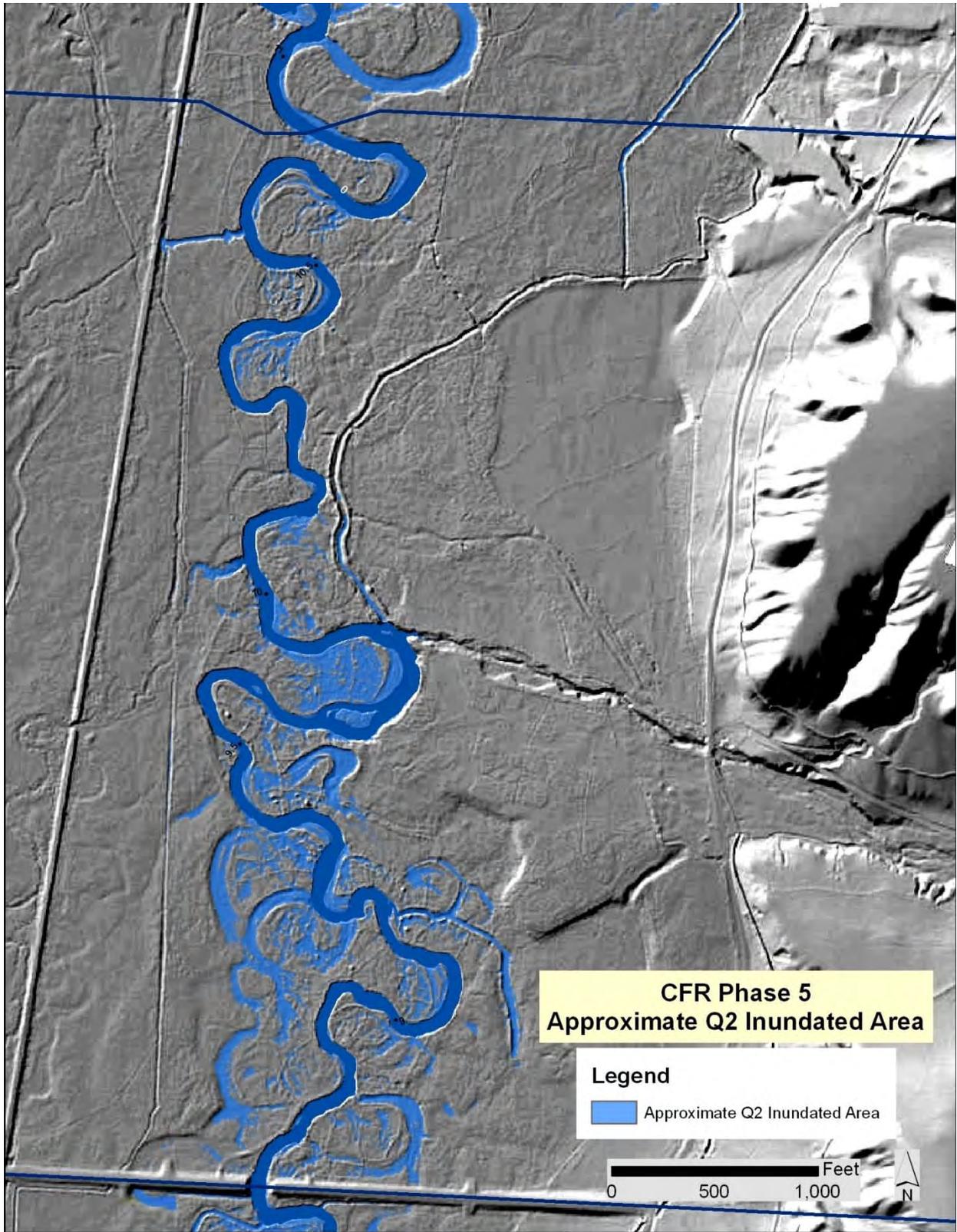


Figure E 5. Phase 5 Estimated floodplain connectivity map.

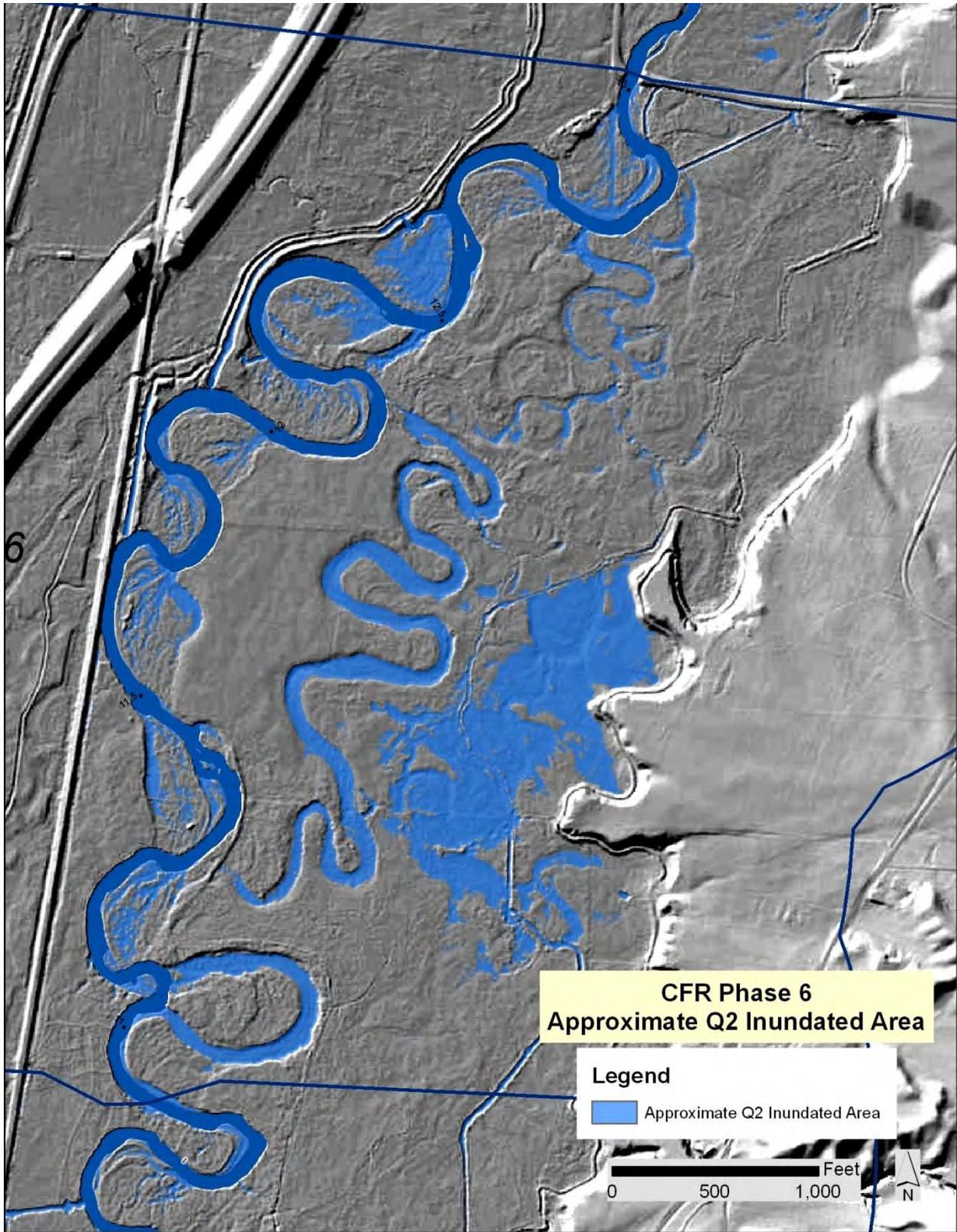


Figure E 6. Phase 6 Estimated floodplain connectivity map.

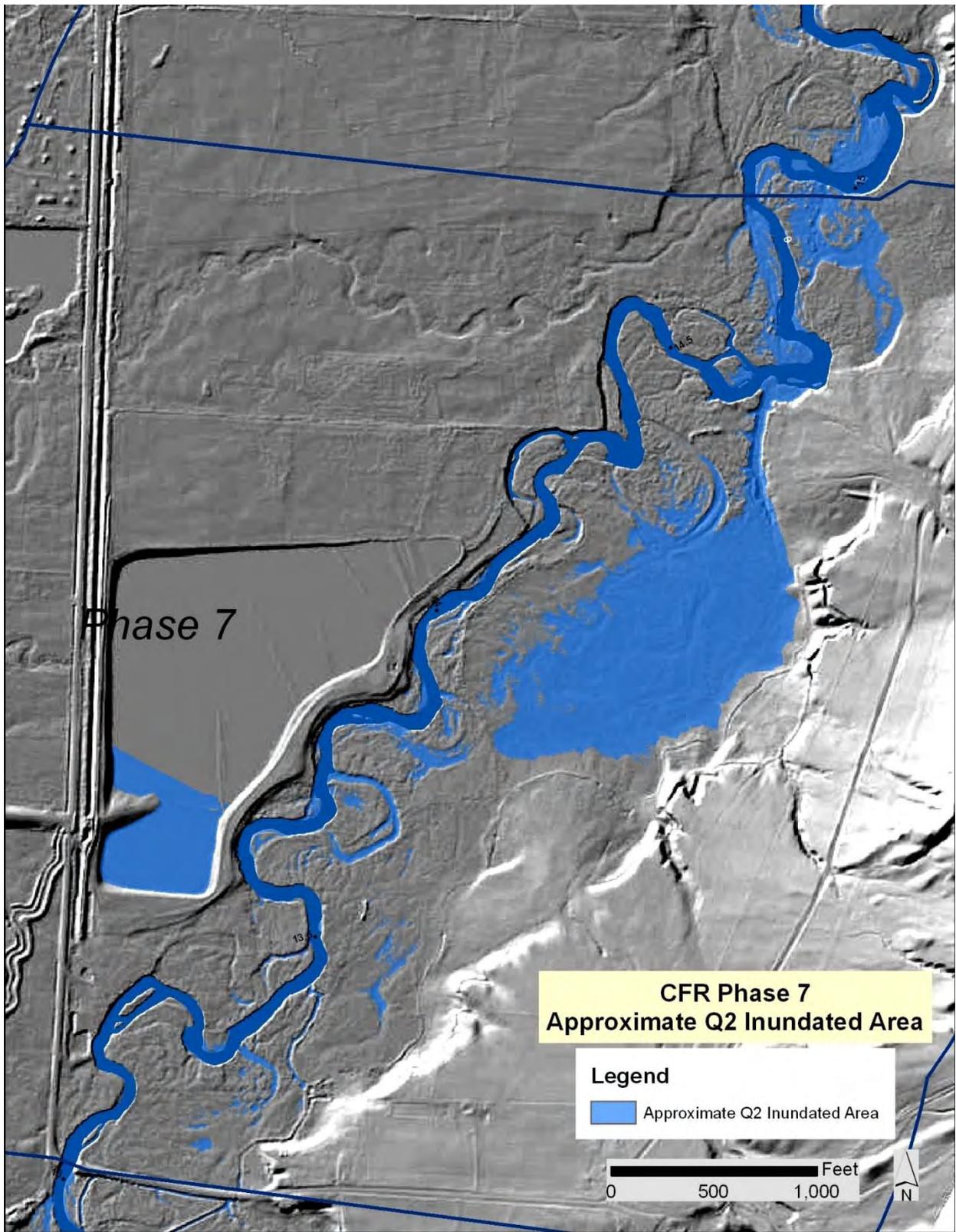


Figure E 7. Phase 7 Estimated floodplain connectivity map.

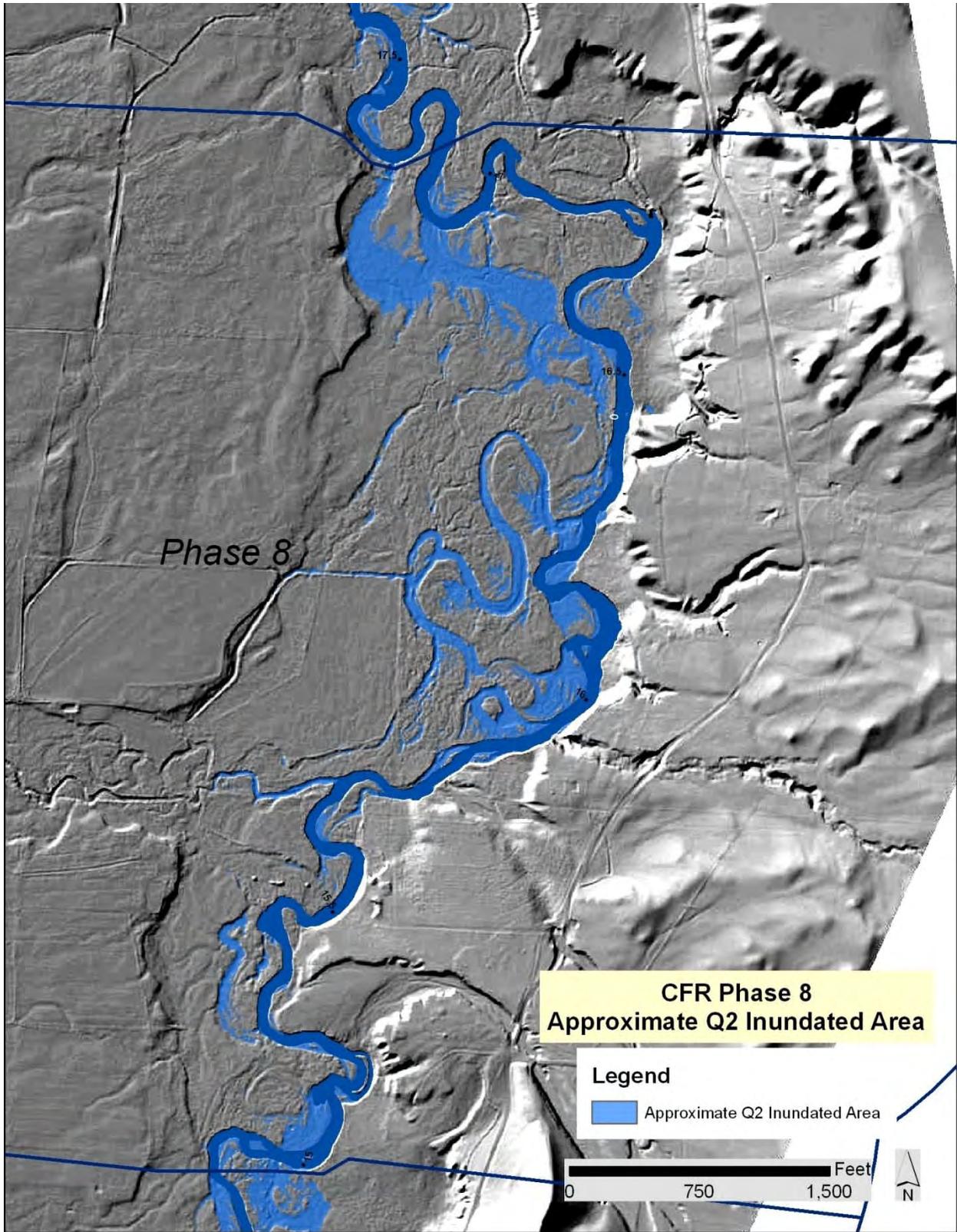


Figure E 8. Phase 8 Estimated floodplain connectivity map.

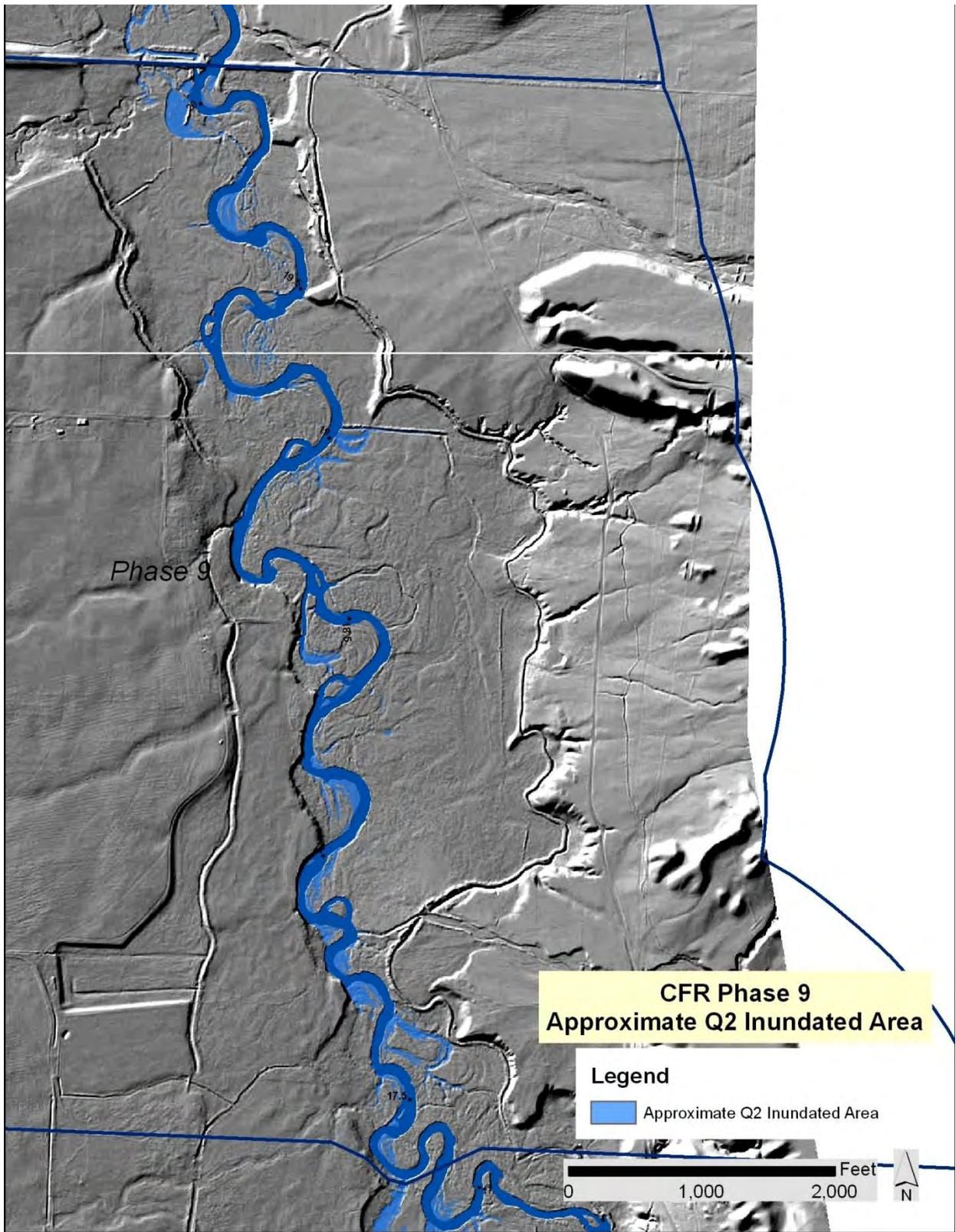


Figure E 9. Phase 9 Estimated floodplain connectivity map.

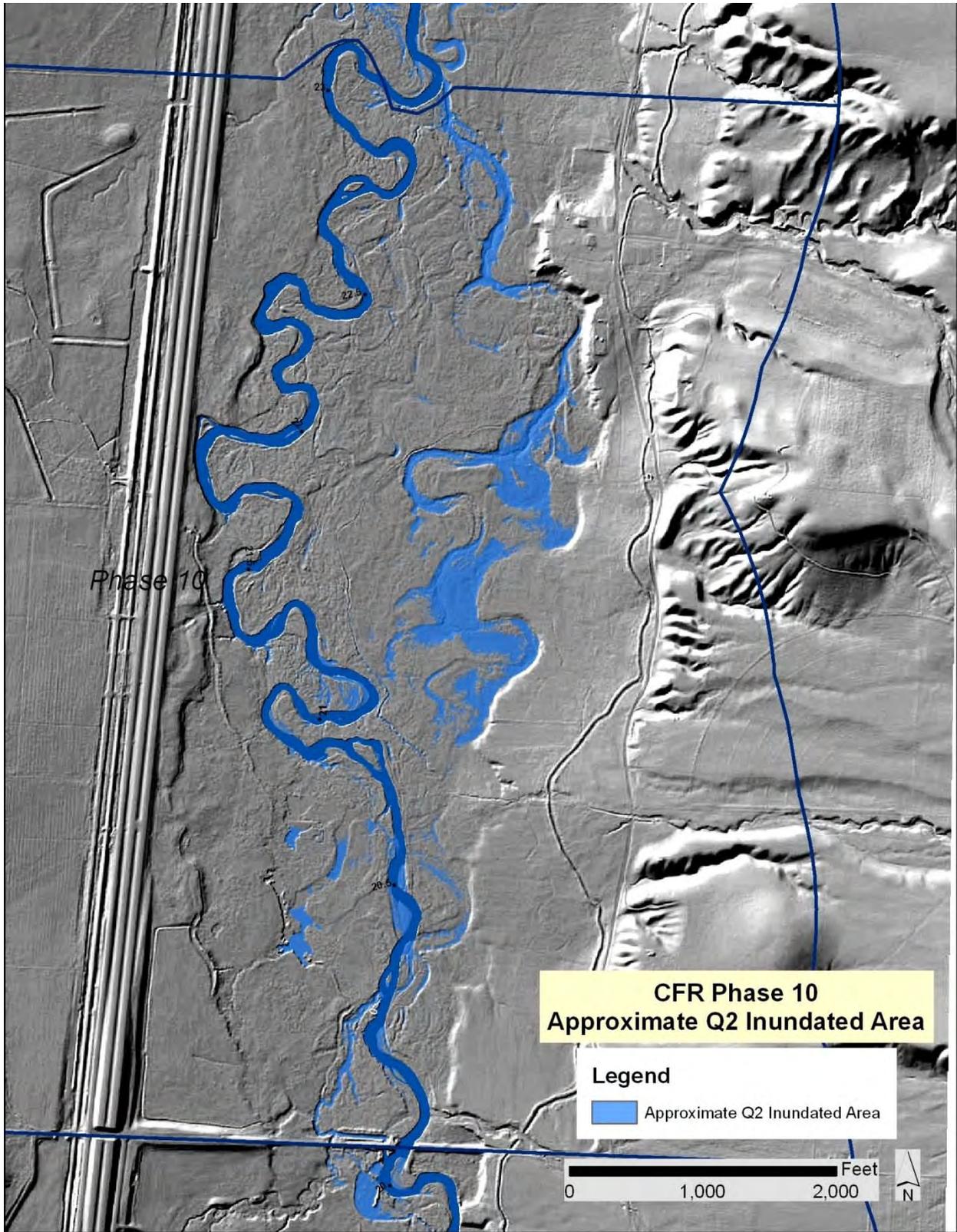


Figure E 10. Phase 10 Estimated floodplain connectivity map.

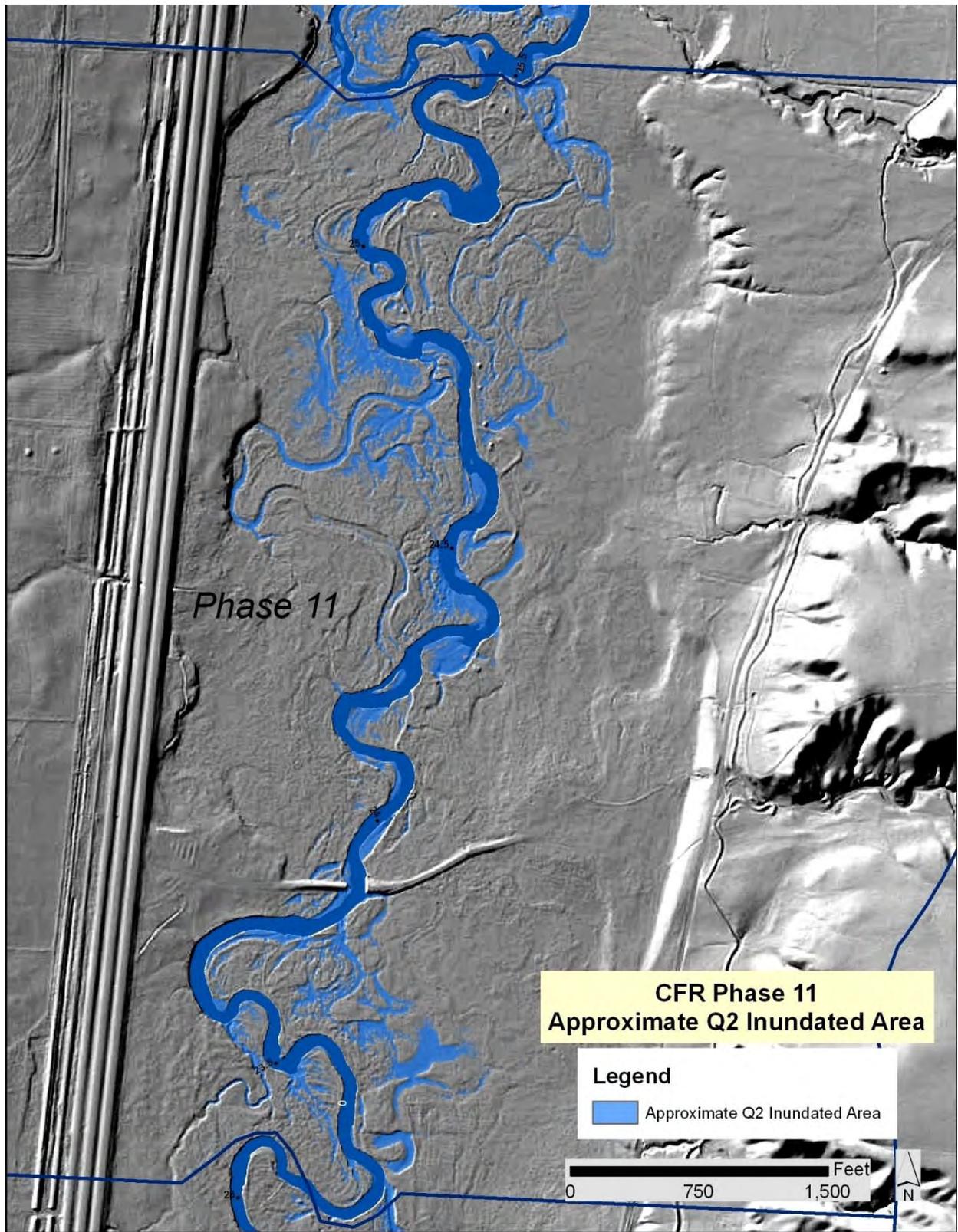


Figure E 11. Phase 11 Estimated floodplain connectivity map.

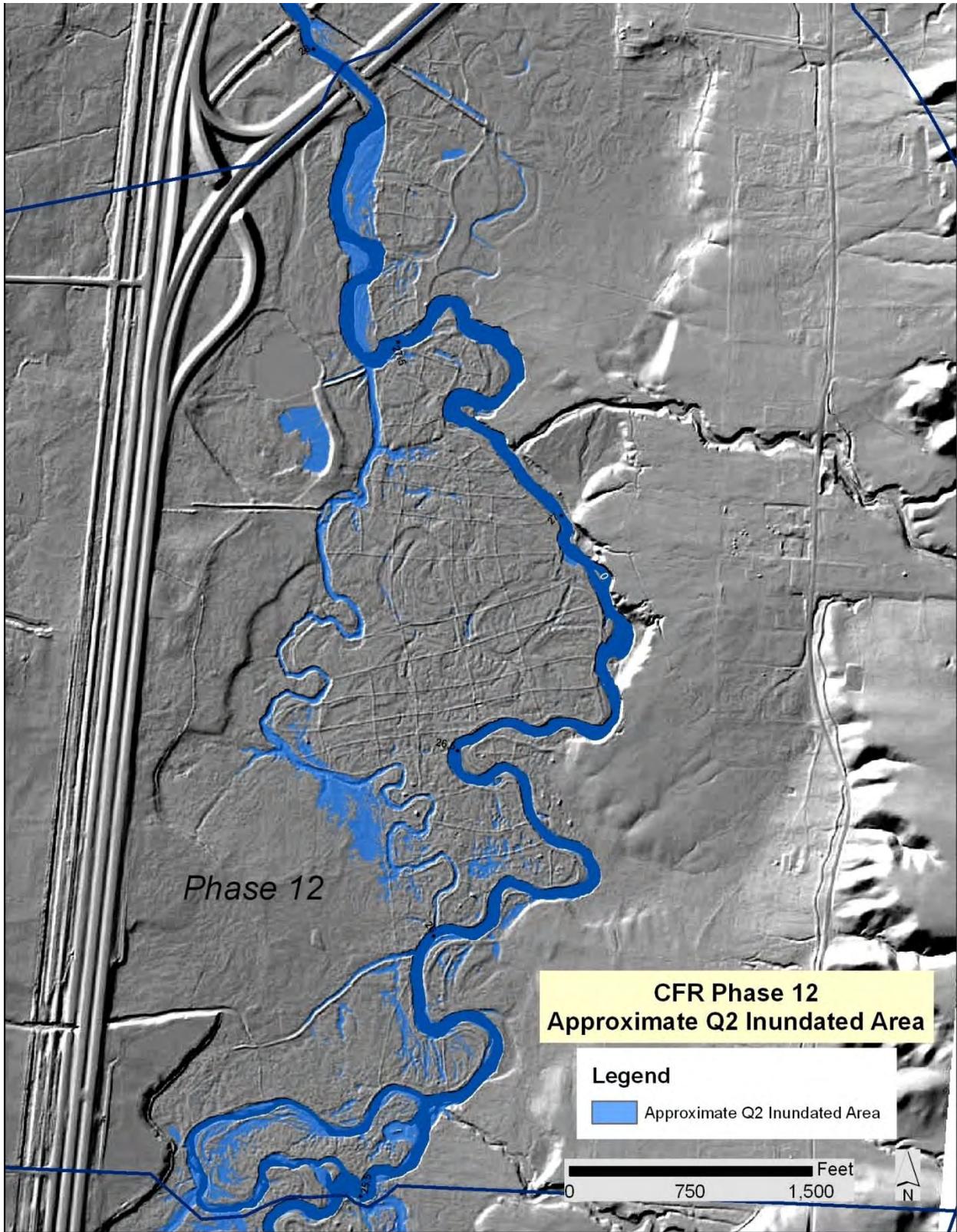


Figure E 12. Phase 12 Estimated floodplain connectivity map.

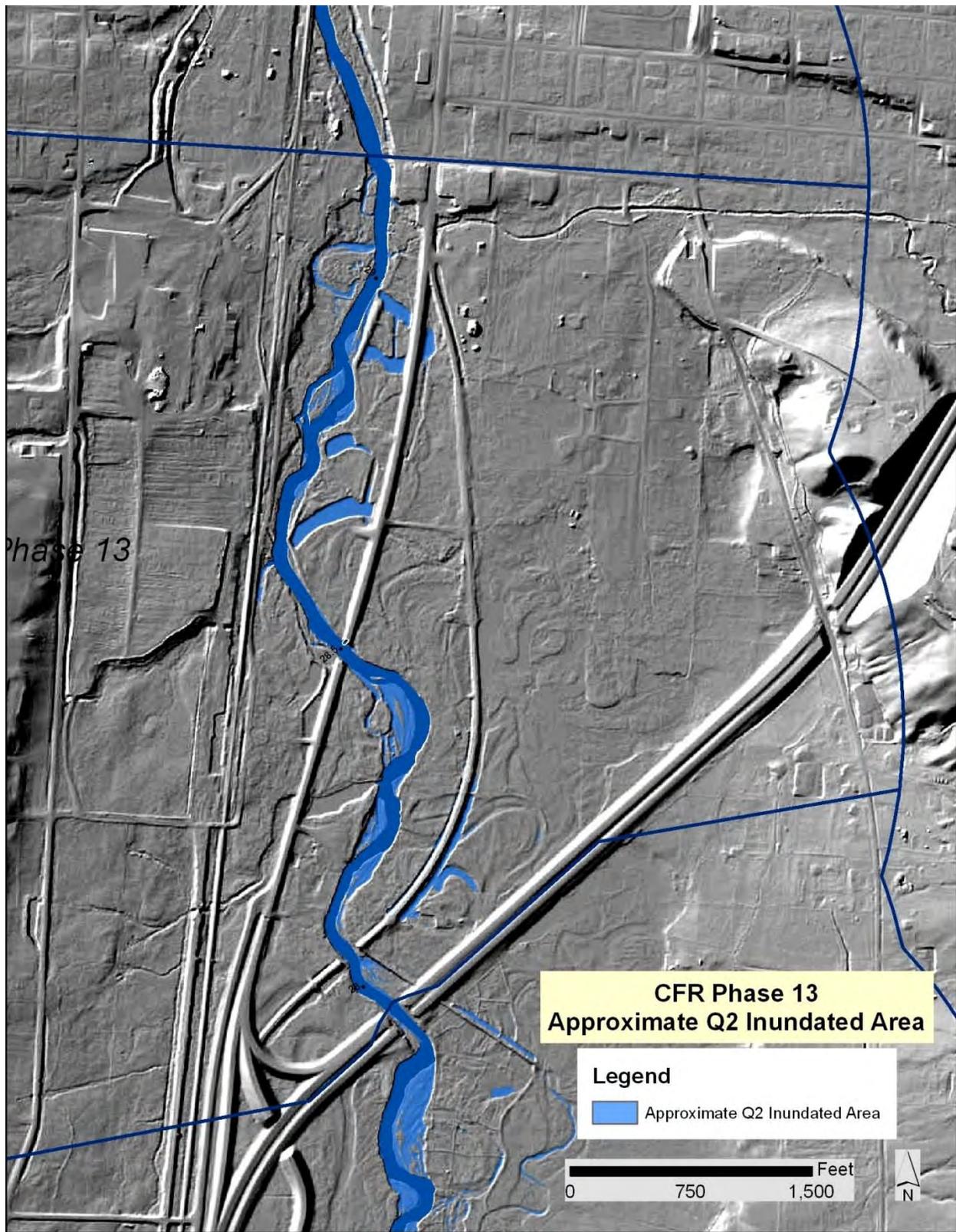


Figure E 13. Phase 13 Estimated floodplain connectivity map.

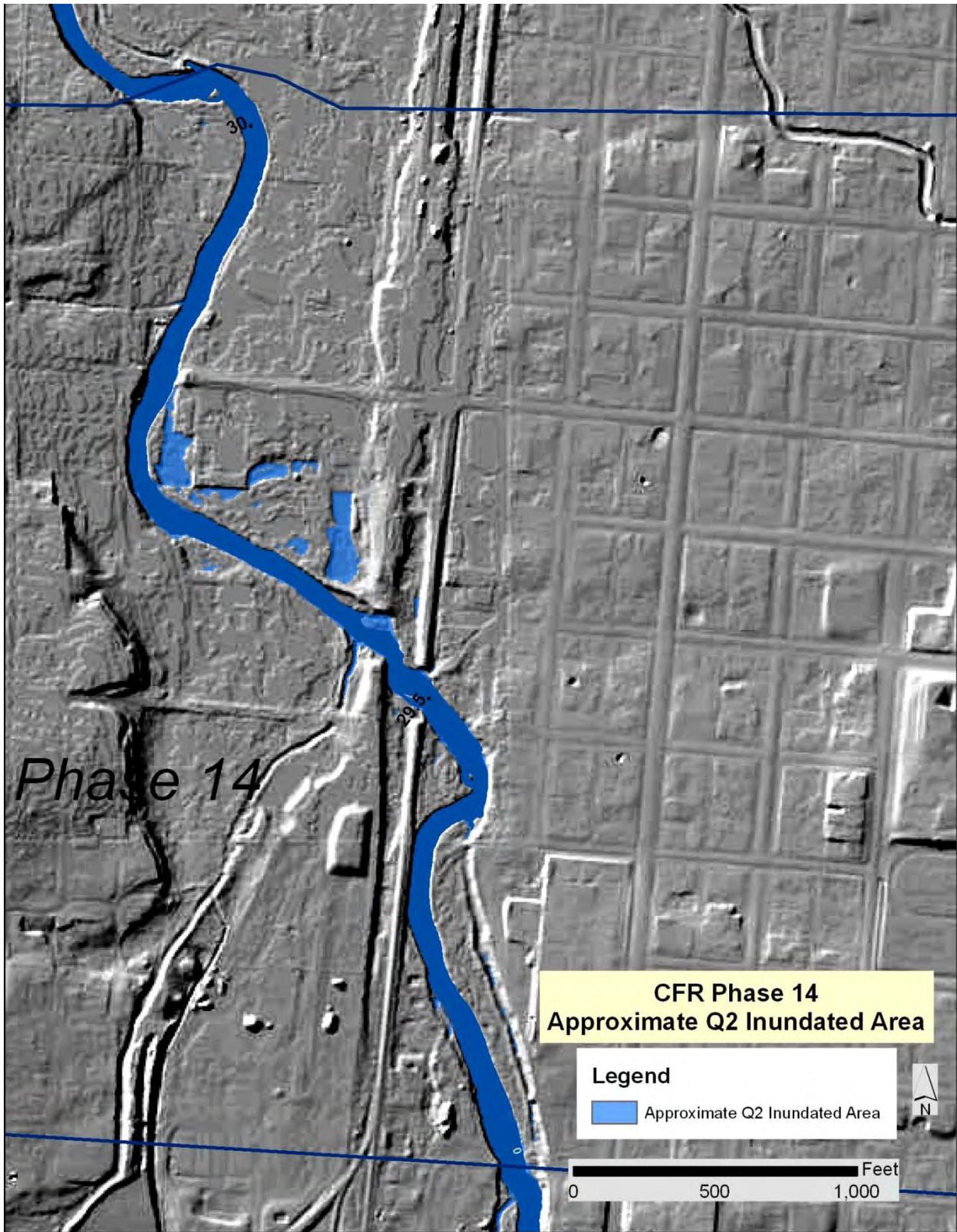


Figure E 14. Phase 14 Estimated floodplain connectivity map.

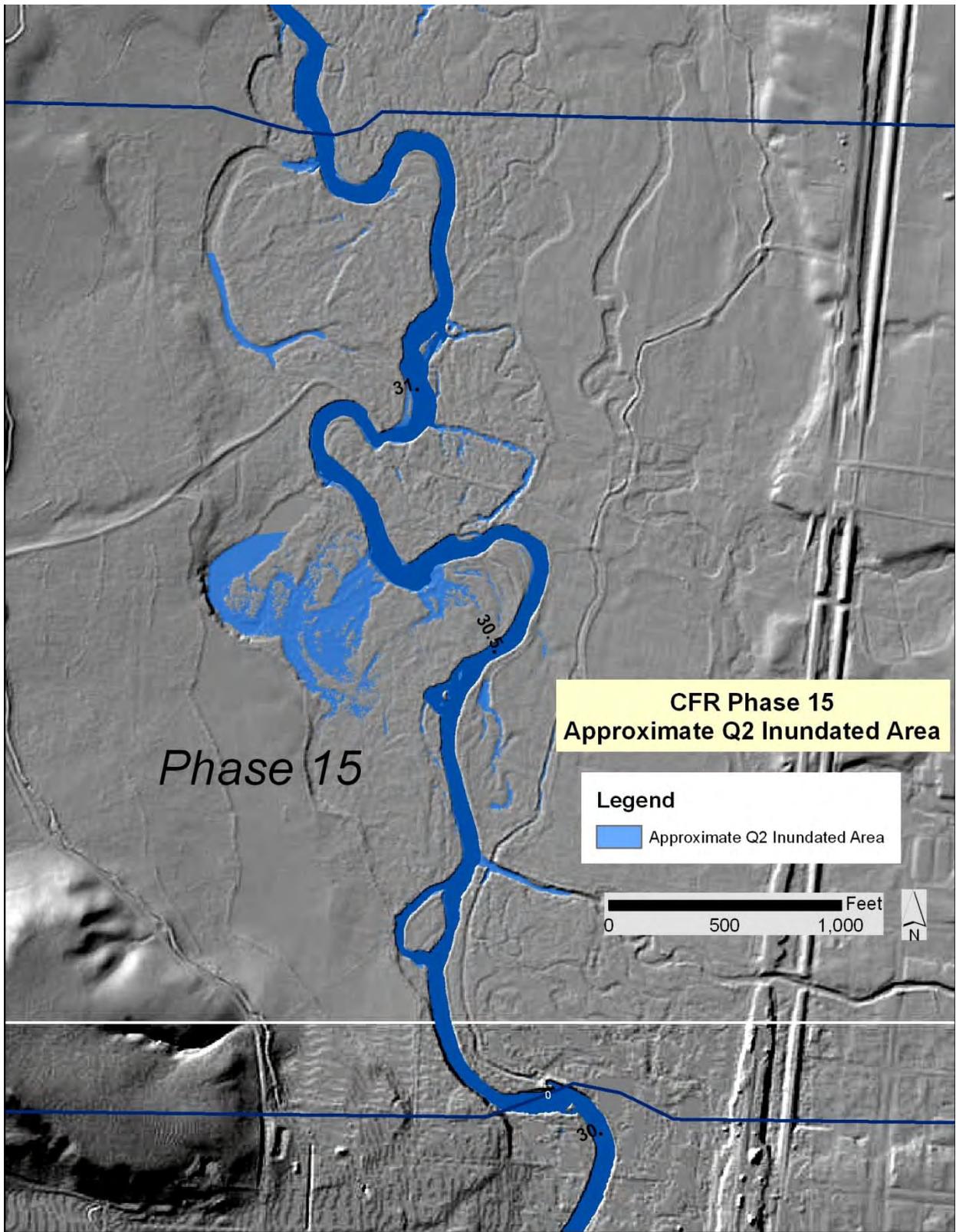


Figure E 15. Phase 15 Estimated floodplain connectivity map.

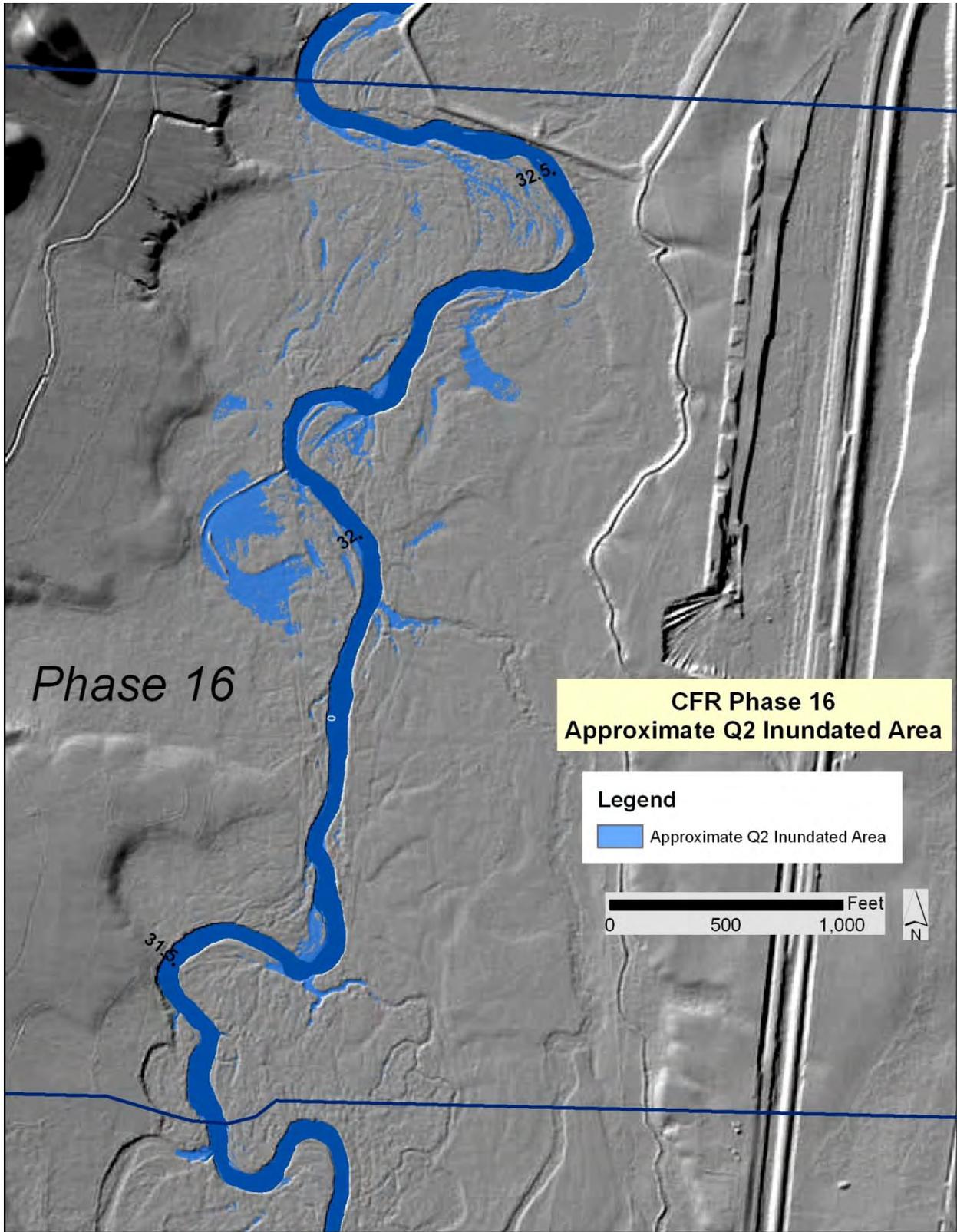


Figure E 16. Phase 16 Estimated floodplain connectivity map.

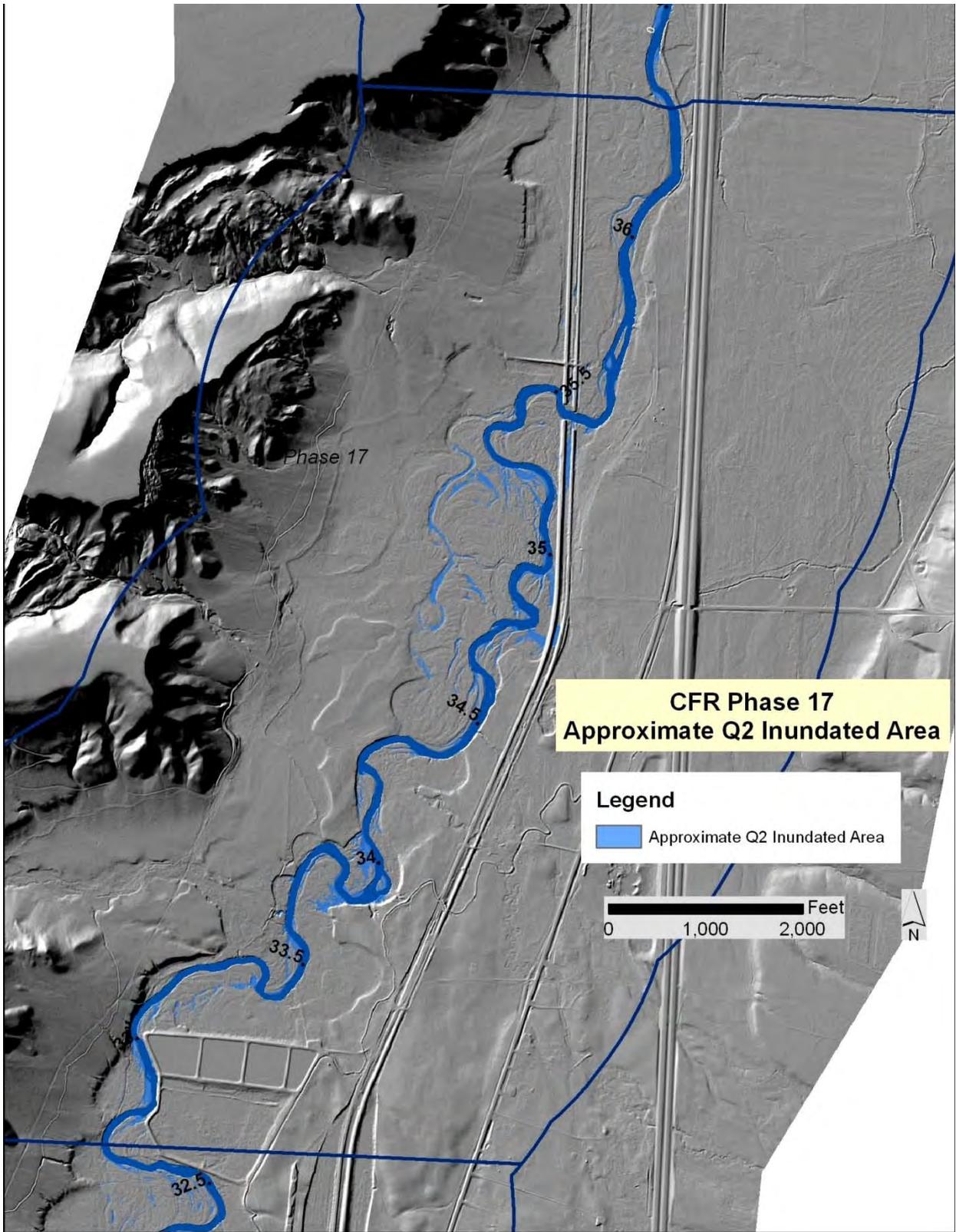


Figure E 17. Phase 17 Estimated floodplain connectivity map.

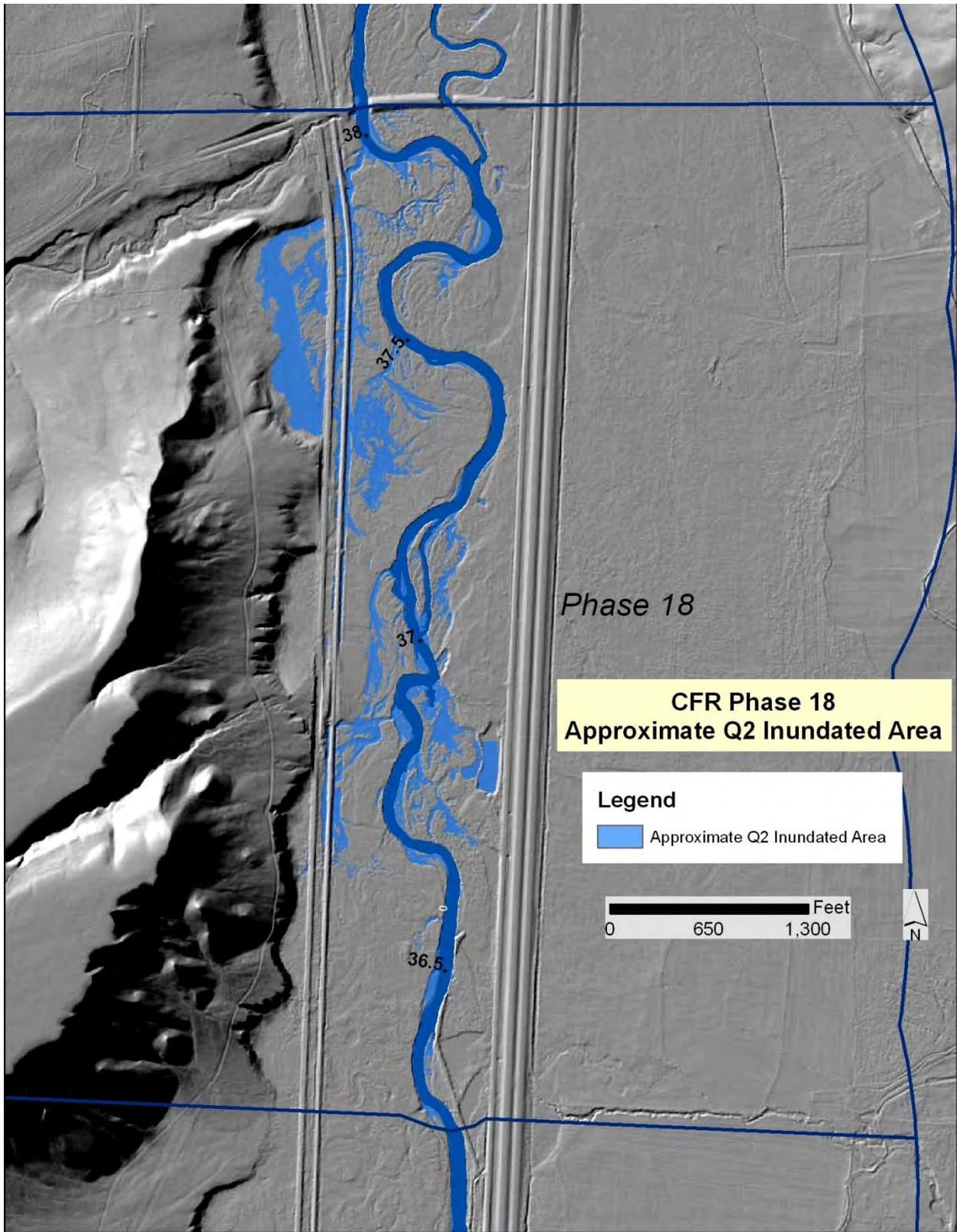


Figure E 18. Phase 18 Estimated floodplain connectivity map.

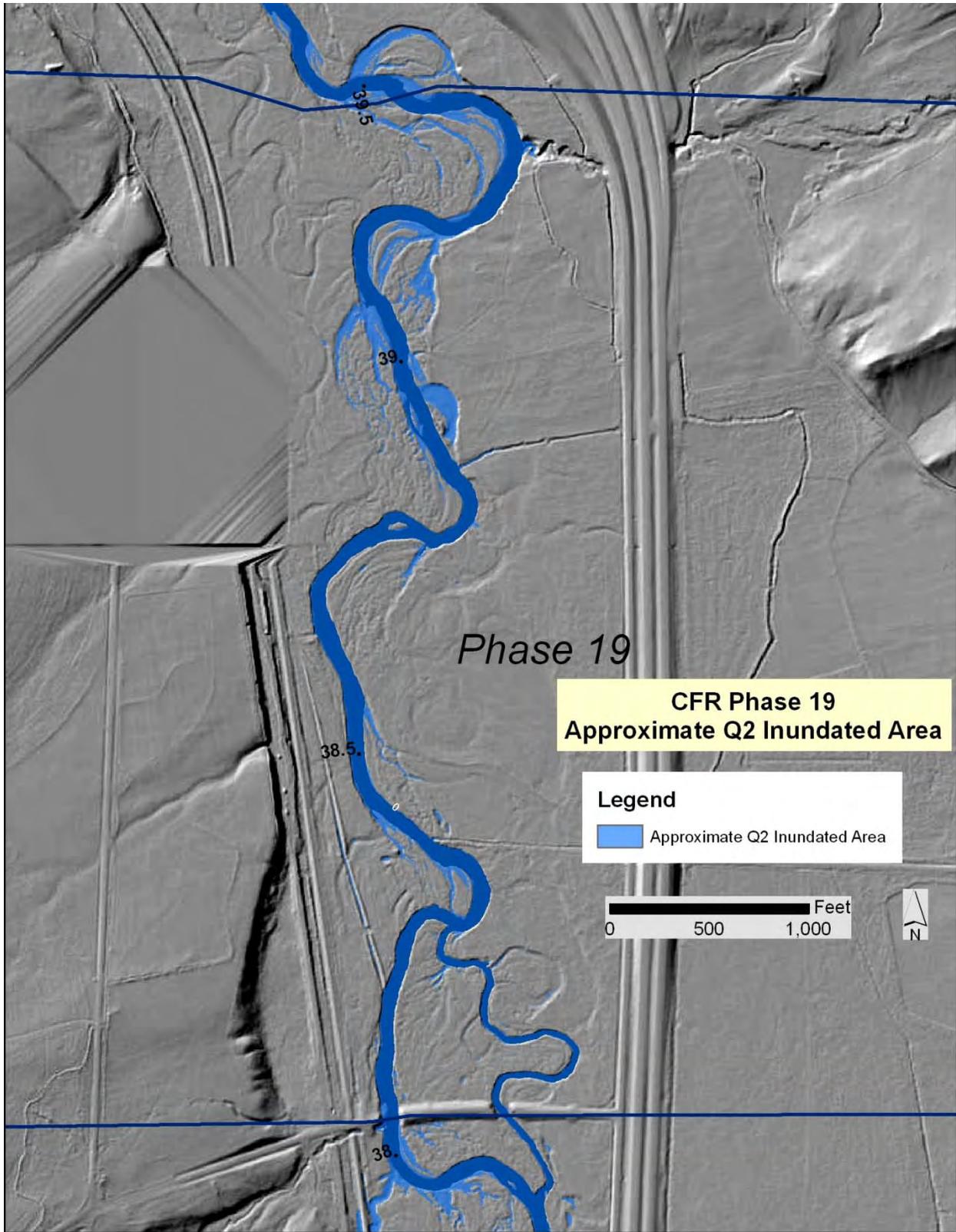


Figure E 19. Phase 19 Estimated floodplain connectivity map.

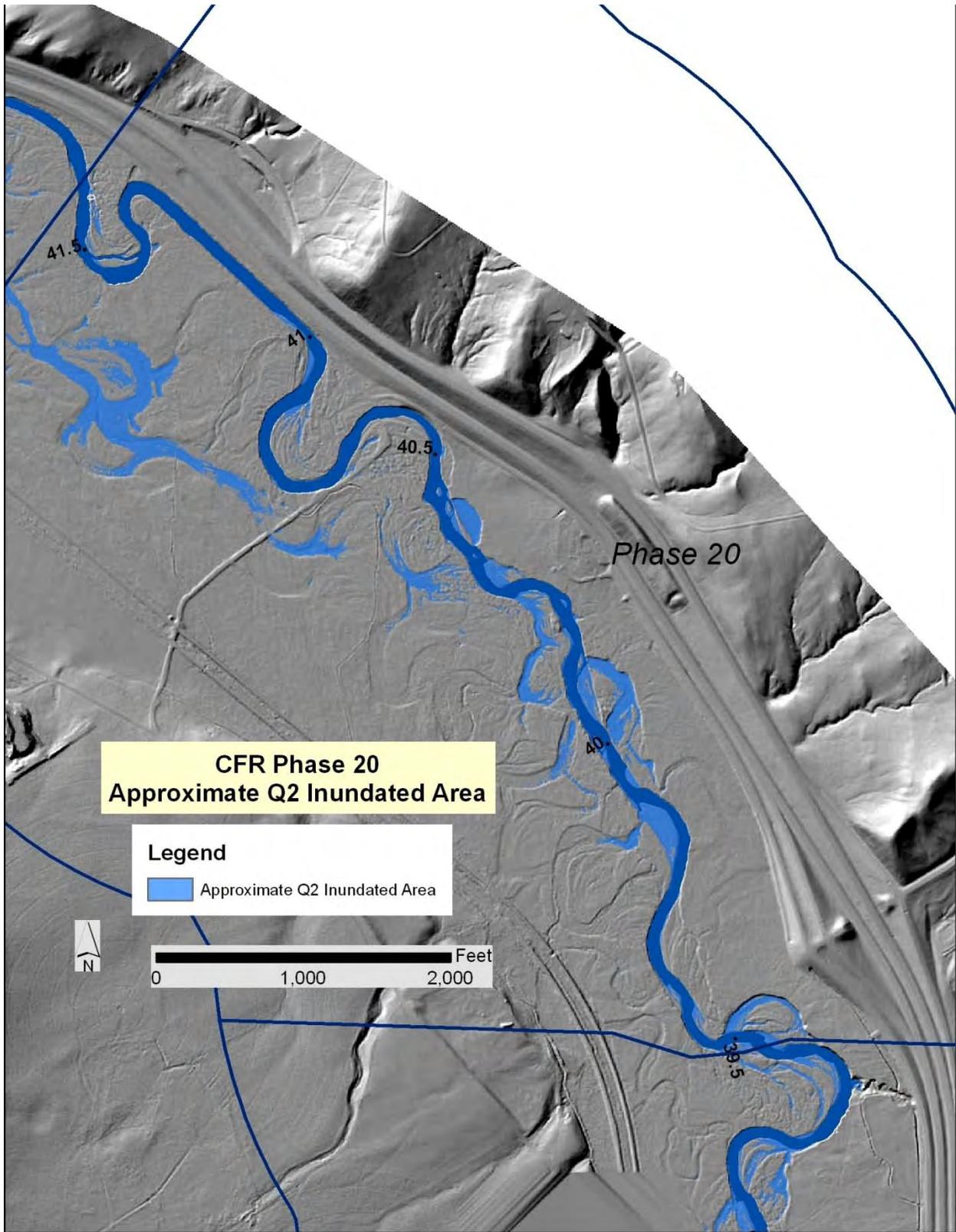


Figure E 20. Phase 20 Estimated floodplain connectivity map.

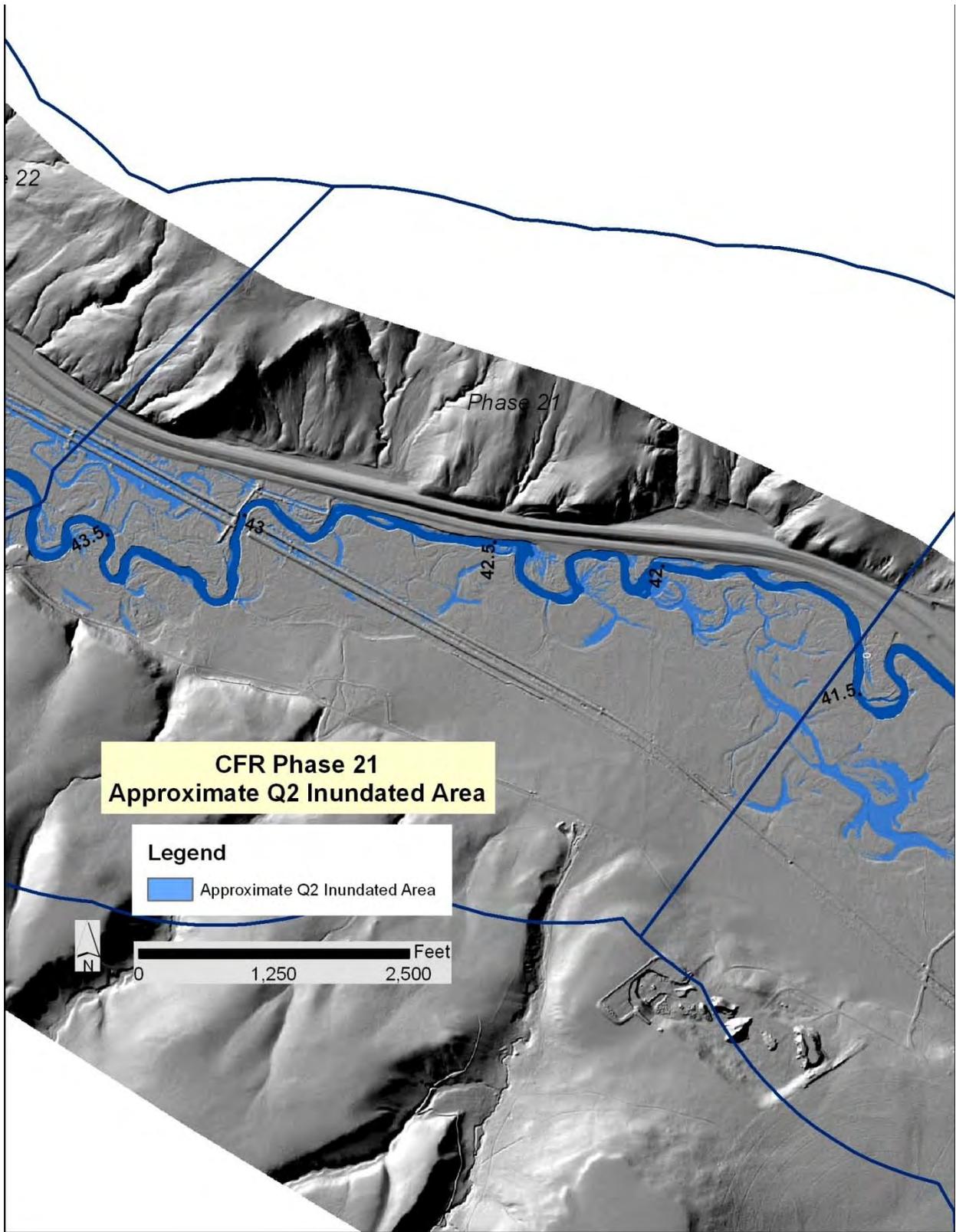


Figure E 21. Phase 21 Estimated floodplain connectivity map.

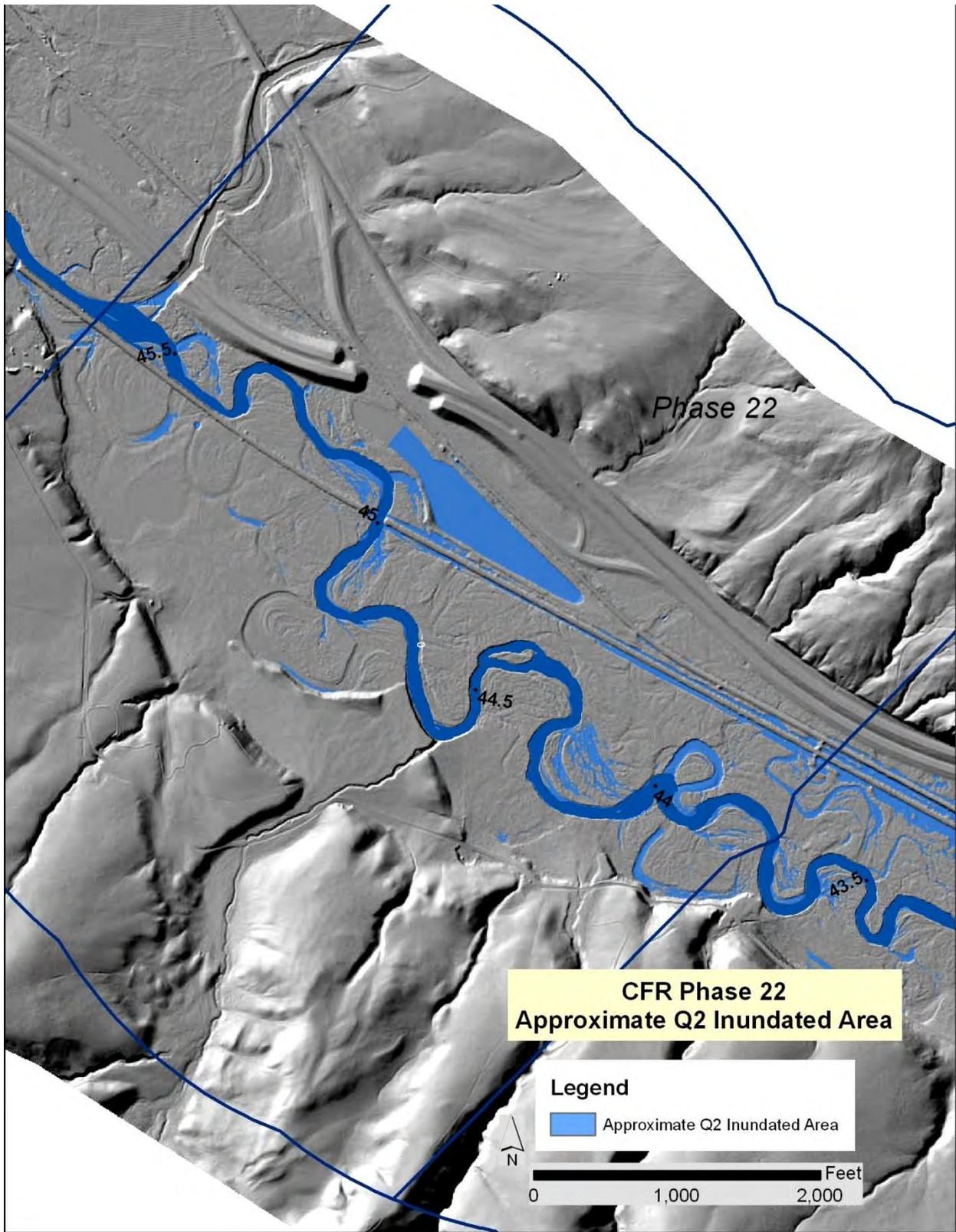


Figure E 22. Phase 22 Estimated floodplain connectivity map.

Phase	Date Floated	Personnel	Tailings Distributions	Bank Erosion Rates/Patterns	Channel Stability	Substrate	Habitat	Other
3	11/1/2012	Boyd, Bucher, Mainzhausen	Extensive in upper bank	Extensive severe erosion; mostly fine grained banks with increasing frequency of coarse toe material in downstream direction. Point bars increasingly common.	Locally entrenched	Gravel riffle crests	Woody bank vegetation similar to Phase 2-- water birch common in mid-bank; moderate density	No terraces. Cattle trampling is extensive, and commonly on slickens . Old railroad berm follows channel. High riffle frequency.
4	11/1/2012	Boyd, Bucher, Mainzhausen	Extensive, massive; local slickens	Extensive meander dynamics with scars to west. Cutoffs from 1950-2009 and 2009-2011. Tight bendways	Largely stable with local cutoffs. Entrenched with old willows/birches at bank toe, locally dense. Dense willows concentrated on downstream limbs of bends.	Visible bank toe mostly fines with local gravel. Upper bank primarily fines.	High riffle frequency; gravels un-embedded; local sand accumulations/ sorting	Lost Creek contributed approximately 30cfs to reach.
5	11/1/2012	Boyd, Bucher, Mainzhausen	Sporadic concentrations	High coarse point bars, gravel bank toe common	Planform-controlled erosion sites	Intermittent cobble toe	Steep riffles, numerous spawning brown trout	Good vegetative reinforcement of banks on fine grained toe
6	11/1/2012	Boyd, Bucher, Mainzhausen	Less exposed tailings than Phase 5	Good stable banks with lower entrenchment	Relatively stable bankline			Good vegetation reinforcement. Wide shallow riffle crests. Two diversions, upper uses fence posts and sandbags, and a the lower diversion, no dam was in place, but boards were stacked on the bank.
7	10/17/2012	Boyd, Bucher, Mainzhausen	Sporadic in location and thickness. Locally up to 2 ft thick; commonly overlain by a few inches of soil.	Bendway migration and localized adjustments from cutoffs. Fairly extensive bank armor that may affect lateral stability.	Locally, good low inset floodplain. Channel is very dynamic and in adjustment. Now flows against east valley wall.	Sand, gravel and cobbles	High abundance of woody debris, islands, complex bars. Some undercut banks in upper portion of reach.	Very high terrace (~30ft) on right bank through much of reach: fine grained, thinly stratified with high sand concentrations, bank swallows.
9	10/17/2012	Boyd, Bucher, Mainzhausen	On low surfaces, 0.4ft to 2 ft thick. Laminated, sometimes exposed as pockets.	Highly dynamic reach; mostly low ~3ft or ~4ft bank heights. Excellent sorting on point bars.	Dynamically stable with good Qbf indicators	Sand on point bars to cobble. Local cobble lenses in bank toe/bed.	Good: deep pools against west terrace edge.	Terraces on east-- fine grained, collapsing off of Tertiary pediments. To west-- glacial outwash-- coarse grained on resistant toe; seeping against irrigated fields (large center pivot west of Phase 9).
10	10/18/2012	Boyd, Bucher, Mainzhausen	Common, laminated, variable thickness locally	Long eroding banks on high amplitude meanders; variable	Good bankfull indicators on point bars; moderately entrenched with high outside	fines/sand and gravel;	Deep pools, some associated with wood.	More flow; Dempsey Creek contributing ~15cfs. Island common, good pool/riffle

Phase	Date Floated	Personnel	Tailings Distributions	Bank Erosion Rates/Patterns	Channel Stability	Substrate	Habitat	Other
			>24".	toe materials, good complexity. Grazing pressure and trampling common. Topple failure common.	banks.			sequences, islands common. Well-sorted bedload.
11	10/19/2012	Boyd, Bucher, Mainzhausen	More slickens and thicker tailings in bank relative to Phase 8. Massive deposits, and more decadent willows/birch in banks and on floodplain	Long eroding cutbanks; lost fences in channel. Broad sloping gravel/cobble pt bars indicate rapid rates of migration.	Lots of bank trampling and high lateral migration rates. Cutbanks commonly ~5 ft tall, locally minimally entrenched.	Fines to gravel/cobble. More sand relative to upstream--sand waves in bed.	Good pool/riffle sequences, moderate undercutting, islands common.	Clay lenses in toe. May be seeing Mozama ash (~1" white ashy horizon ~2ft below top of bank).
12	10/19/2012	Boyd, Bucher, Mainzhausen	Slickens with floodplain berms mostly west of channel. Thick tailings exposed where channel has eroded into berms and super-elevated banks.	Most eroding banks fine grained. Long, with high severity. High terrace banks (2 terraces) both clean.	Uppermost avulsion has created excellent slackwater habitat holding numerous 4 inch trout. Moderately entrenched with high tailings entrapment; minimal reinforcing vegetation	Sand waves common in bed. Point bars commonly vegetated to water's edge. Sometimes small gravel bar attached.	Fewer riffles in upstream portion; w:d ratio highly variable	Qt on east side. Qt1 : 6 ft high, Qt2 30 ft. Fine grained with local gravel toe. Lots of bank treatments will be required in this reach. Riprap at and below I-90 Br.
13/14	10/20/2012	Boyd, Bucher, Mainzhausen	Urban; difficult to see	Extensive armor: most migration in Phase 13	Concrete wall/eco-block failure on left bank at construction yard/mill.	Some coarse material at bridges	Few pools/riffles	Several bridges. Log cribwalls with cobble infilling. Phase 13-failed toe (coir lift). Residential encroachment common. Grade breaks at several bridges. Steep through bridge sill just d/s of second railroad bridge.
17	10/19/2012	Boyd, Bucher, Mainzhausen	Tailings typically relatively thin, with some material on top (tenths of inches). Tailings thicker upstream of railroad crossing, minimal below.	Gravel toes common. Stable channel d/s of railroad bridge.	Good point bars with sloping gravel surfaces	Gravel to coarse cobbles from west side causing steep riffle crests/drops. Cobble bed below bridge; long runs with high w:d ratios.	Moderate. Mostly lateral scour pools with some undercutting	Dogwood common for first time; healthy young willows, cottonwoods.
18	10/19/2012	Boyd, Bucher, Mainzhausen	Typically very thin.	Mostly fine grained banks; topple failure of upper bank common. Long stretches with minimal erosion.	Variably entrenched; moderate entrenchment through most of reach. Confined between highway and railroad.	Locally very coarse bed material, with long embedded runs.	Poor. Mostly runs; some undercut banks.	

Phase	Date Floated	Personnel	Tailings Distributions	Bank Erosion Rates/Patterns	Channel Stability	Substrate	Habitat	Other
19/20	10/19/2012	Boyd, Bucher, Mainzhausen	Tailings Mostly on left bank; variable thickness	Minimal bank vegetation; mostly fine grained toes with undercutting and topple failure. Planform-based erosion patterns.	Locally moderate entrenchment; banks 1' to 5' tall.	Sand to cobble; some steep-faced point bars.	Long runs, some lateral scour pools. Long symmetrical riffles	Mostly grassed banks; bank treatments will be scattered-- long segments with no erosion; stable islands.
20 (Lower)	10/31/2013	Boyd, Mainzhausen, Knopp	Mostly thin, locally below 18" or more of recent deposition. Locally thick tailings, not necessarily associated with infrastructure.	Local meanders show rapid migration since 1954. Topple failure of fine grained banks common. Locally coarse cobble toe.	Woody vegetation reinforcement minimal. High w/d ratios, low riffle frequency.	Fine banks. Gravel bars with some sand caps.	Some undercutting; secondary channels increase bank habitat length. Eg. RM 41.4	Meander scars to west traverse irrigated fields but could provide good secondary channel paths. I-90 confinement is locally significant; armored with rock riprap. Grazing influences evident: trampling and access pts.
21	10/31/2012	Boyd, Mainzhausen, Knopp	Similar to Phase 20. Commonly no visible tailings on banks over 5 ft high; tailings infilling on lower surfaces about low terrace.	Higher density of eroding banks than Phase 20. Erosion common at riffles as well as cutbanks. Topple failure common.	Locally channelized against railroad; gaining length elsewhere with significant erosion/migration.	Gravel with abundant sand; sand sorting on point bars. Point bars climb and fine in d/s direction.	Deep pools in entrenched bends. Riffles more common, and locally hold steep grade. Split flow common	W/d ratios drop in d/s direction. Pt bars show steep scarp between floodplain bench and gravel bar.
22	10/31/2012	Boyd, Mainzhausen, Knopp	Two banks with no tailings. Massive slickens at confluence with Little Blackfoot River. Also slickens at upper end Reach B.	High Banks-- entrenched with steep point bar margins. Bank toes all upper bank fines, with cobble toes common. Long eroding banks on bendways.	Almost no upper bank woody vegetation.	High riffle frequency	Numerous islands	Lots of riprap, transportation infrastructure.