

Knightsen Community Services District



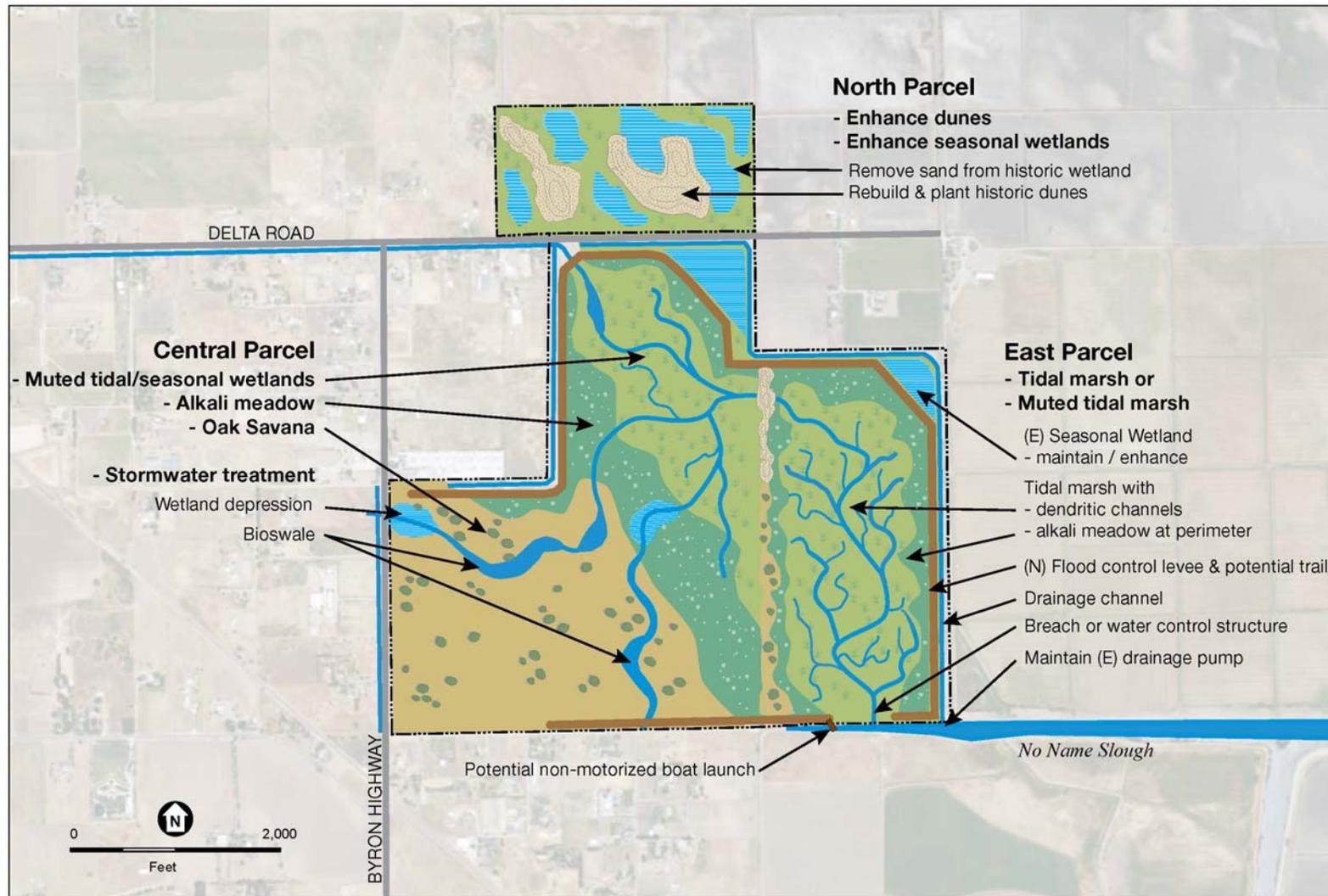
Knightsen Hydrology Updates and Culvert Capacity Calculations



23 October 2017

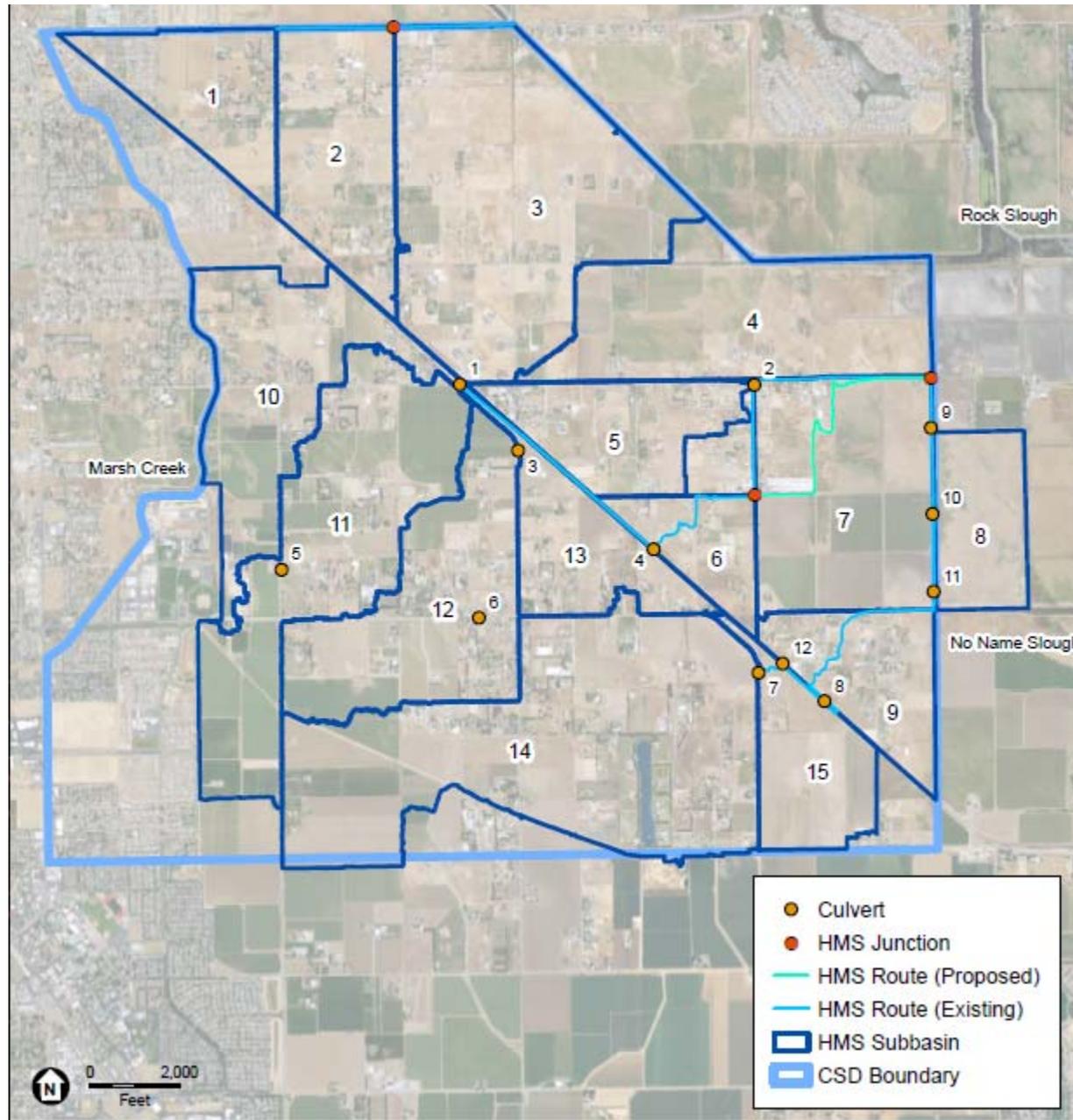
Knightsen SWRP - History

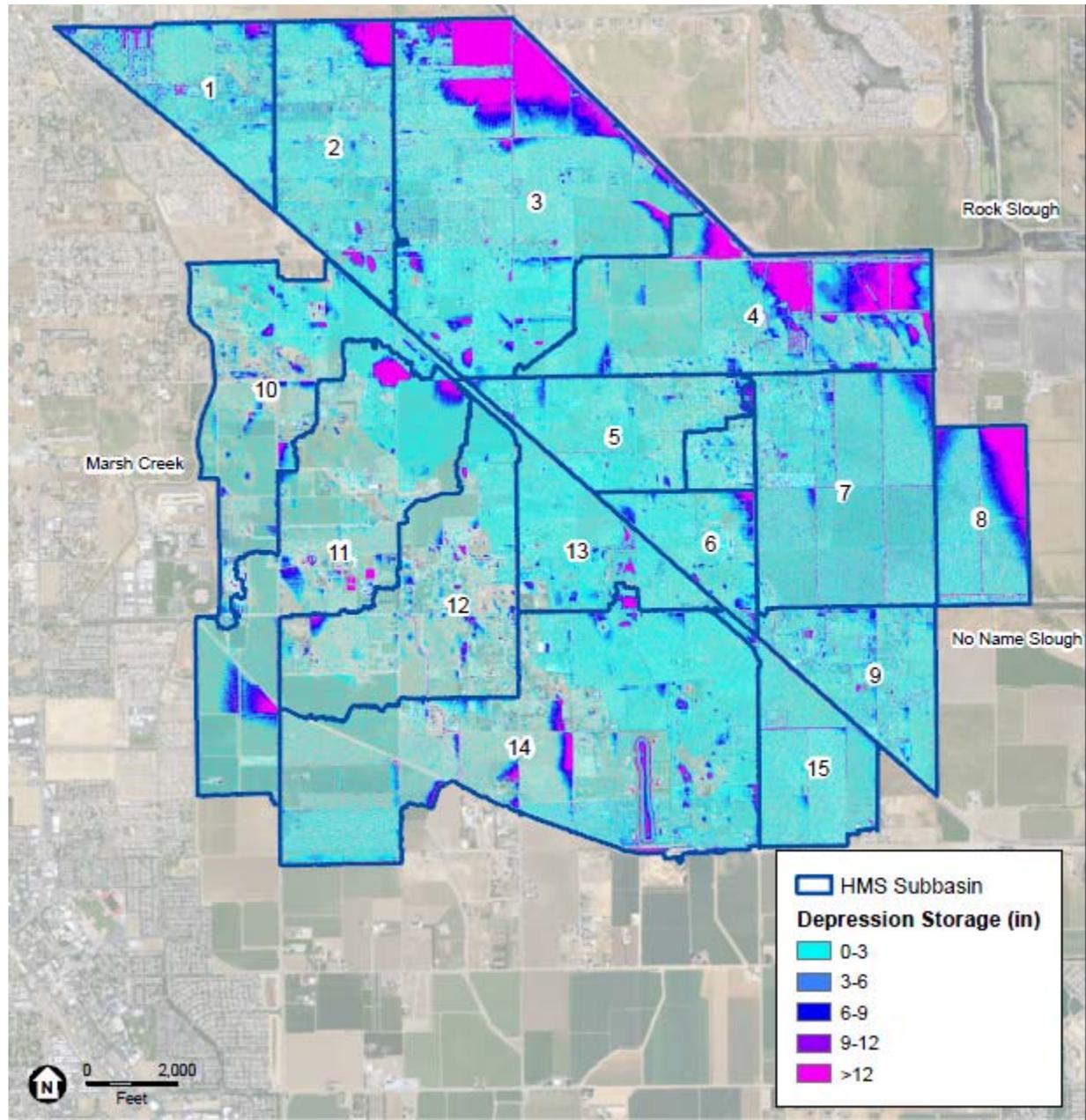
- **2002 Hydrology Study**
 - W/ County and Knightsen Community
 - Hydrology & Water Quality BMP recommendations
 - Identified the Nunn Property as an ideal location for BMPs
- **Implementation Hurdles**
 - Property Ownership & Funding – Inter-related issues
- **East Contra Costa Habitat Conservancy**
 - Purchased 645 AC Nunn Property in 2014
 - Joint Flood Conveyance / Water Quality with Habitat Restoration
- **Prop 1 Funding for Stormwater Projects**
 - Requires Storm Water Resources Plan
 - Identify & Rank BMPs for flood benefits, water quality, and recharge

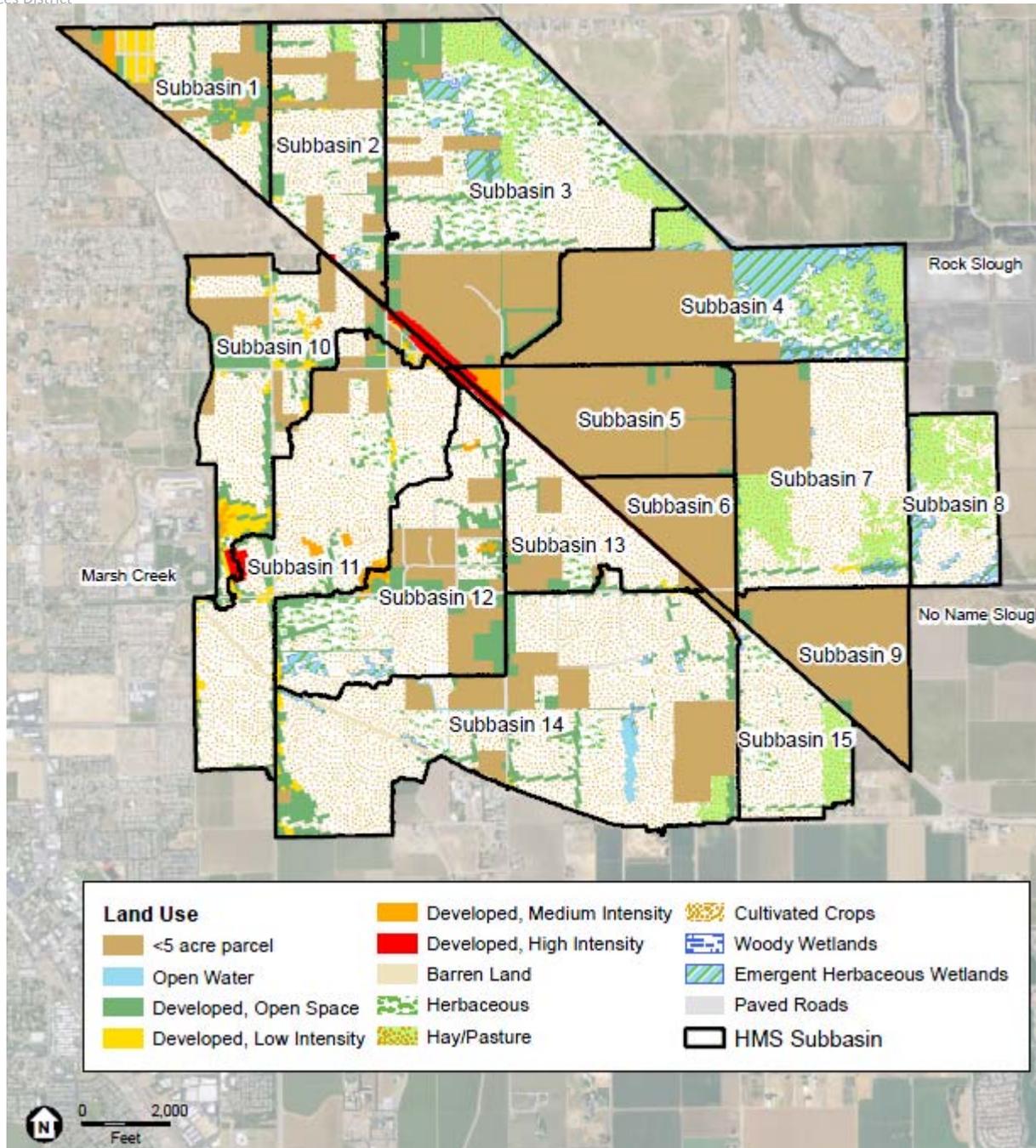


Knightsen SWRP – For Prop 1 Grant Application

- **Update Hydrology**
 - HEC HMS model
 - New Developments - Update boundaries
 - Land Use – Horse properties & potential build out
- **Hydraulics Recommendations**
 - Ditch & Culvert sizes to address flooding
 - Routing changes to deliver water to Restoration Parcel
- **BMP Concepts**
 - Developed 7 BMPs to address Flood Routing, Water Quality & GW Recharge
 - BMP Cost Estimates – Design, Permitting, Construction
 - Rank each BMP – Flood, WQ, & Recharge benefits



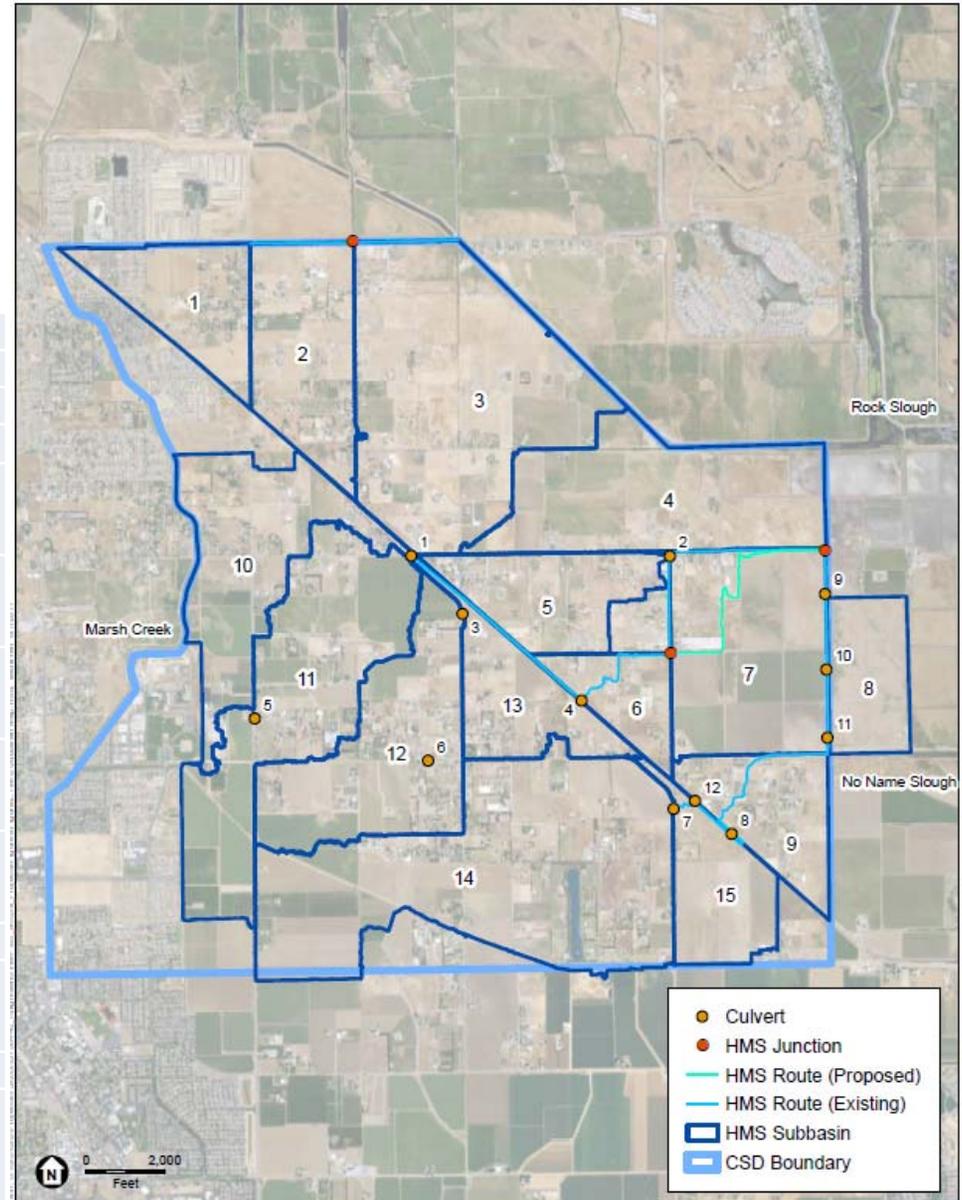




Updated Hydrology

Existing Land Use, Flow (cfs)

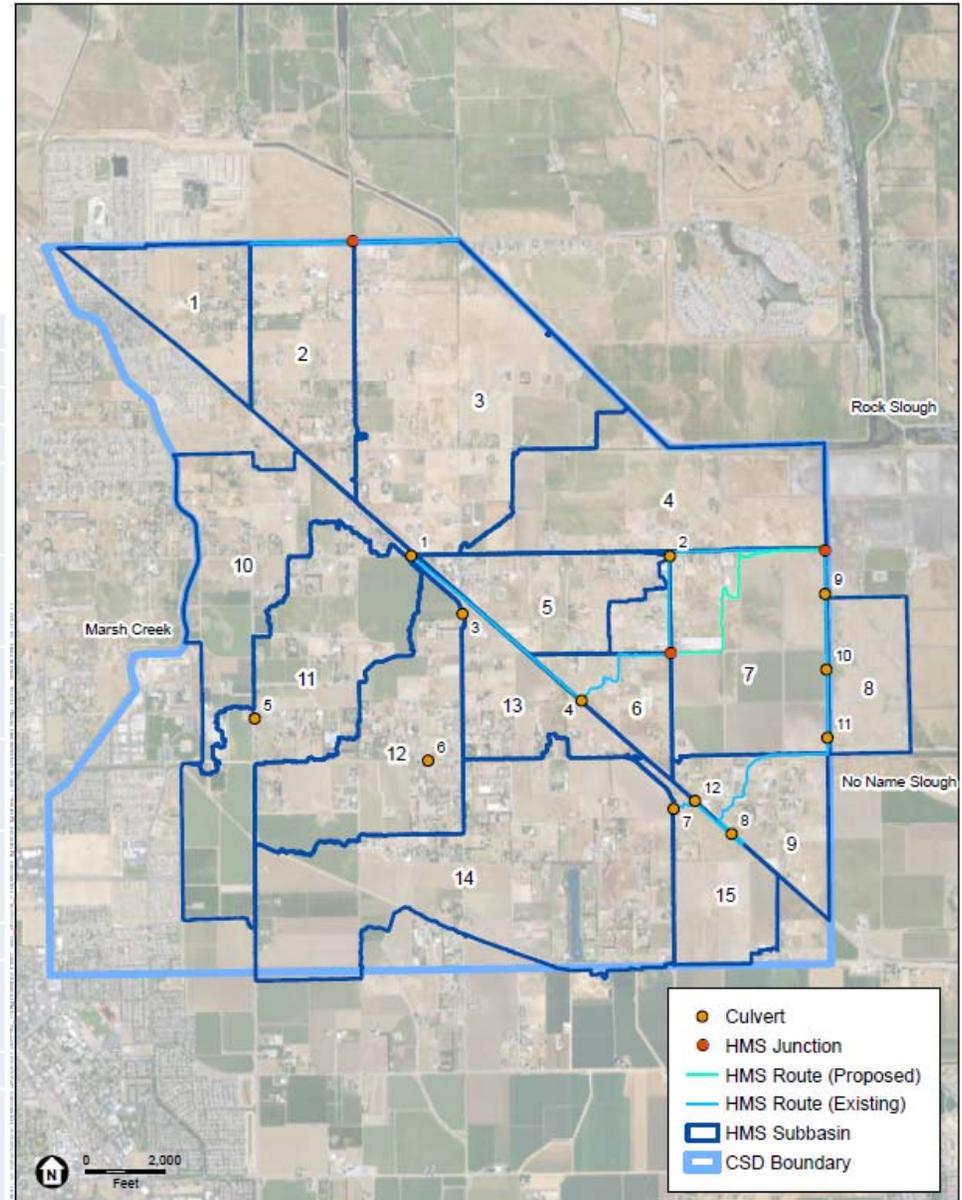
Location	Drainage Area (mi ²)	Existing Conditions			Proposed Diversions		
		Recurrence Interval (years)			Recurrence Interval (years)		
		5	10	25	5	10	25
Culverts							
Downtown Knightsen (C1)	1.56	36.5	44.2	51.8	23.8	28.7	33.7
Delta Rd & Bryon Hwy (C2)	3.28	75.3	91	106.9	21.5	25.8	30.4
Eden Plains Road (C3)	0.71	26.1	31.5	37.1	26.1	31.5	37.1
Railroad Culvert (C4)	2.61	63.5	76.7	90.1	63.5	76.7	90.1
Proposed Culvert @ Knightsen	0.92	N/A	N/A	N/A	12.9	15.6	18.3
Reach							
Power Tower Ditch (R3)	4.02	76.4	92.2	108.4	74.7	90.2	106
Junction							
Bryon Hwy at Ironhorse Rd (J2)	2.82	65.2	78.8	92.6	65.2	78.8	92.6



Updated Hydrology

Build Out Land Use, Flow (cfs)

Location	Drainage Area (mi ²)	Existing Conditions			Proposed Diversions		
		Recurrence Interval (years)			Recurrence Interval (years)		
		5	10	25	5	10	25
Culverts							
Downtown Knightsen (C1)	1.56	36.5	44.2	51.8	23.8	44.2	33.7
Delta Rd & Bryon Hwy (C2)	3.28	85.7	103.4	121.6	31.2	37.5	44.1
Eden Plains Road (C3)	0.71	26.1	31.5	37.1	26.1	69.6	37.1
Railroad Culvert (C4)	2.61	63.5	76.7	90.1	63.5	76.7	90.1
Proposed Culvert @ Knightsen	0.92	N/A	N/A	N/A	12.9	15.6	18.3
Reach							
Power Tower Ditch (R3)	4.02	91.8	110.8	130.2	87.1	105.1	123.6
Junction							
Bryon Hwy at Ironhorse Rd (J2)	2.82	70.6	85.3	100.2	70.6	85.3	100.2



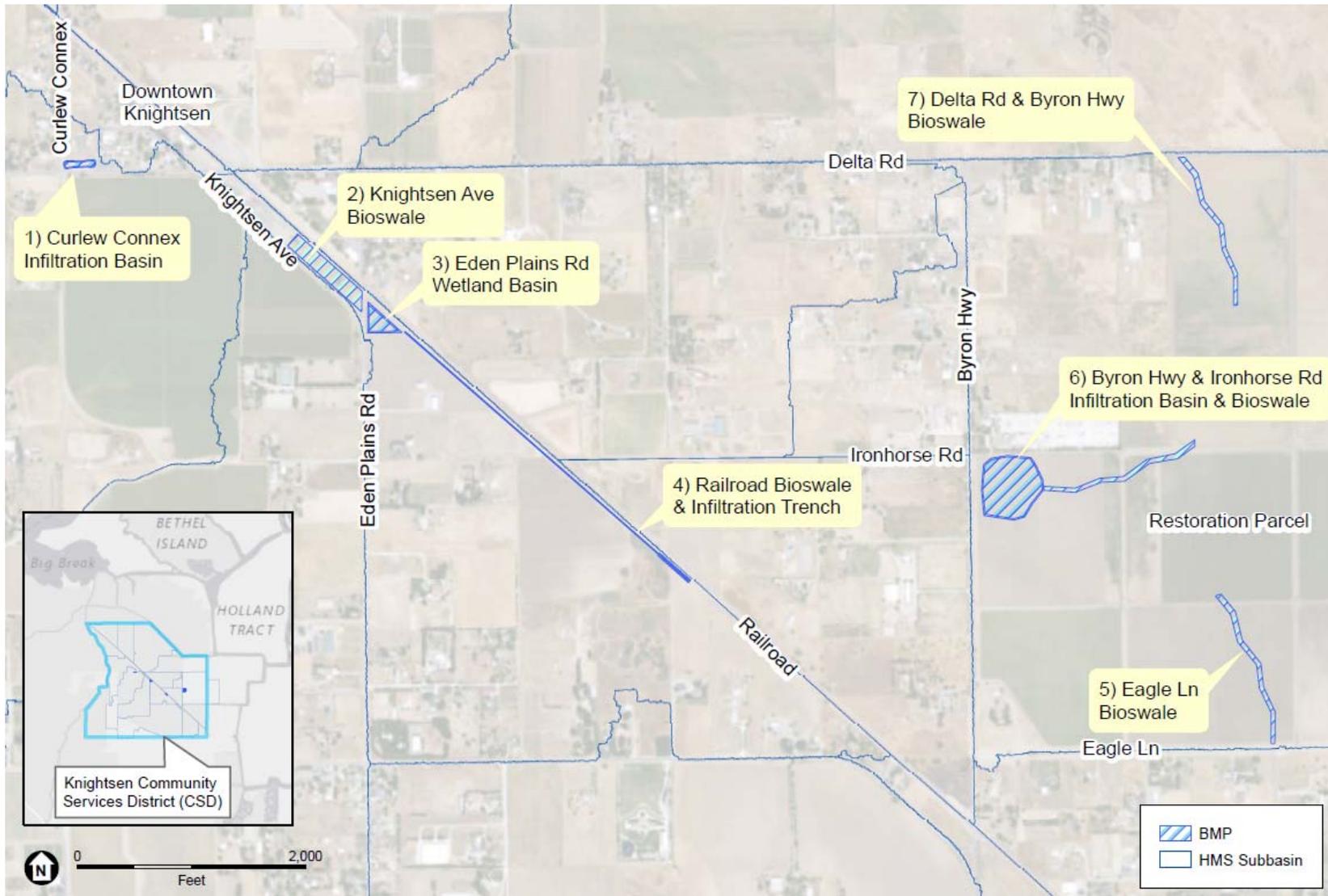
Culvert Capacity Calculations

- **Culvert at Downtown Knightsen**
 - Under capacity for all land use and drainage conditions
 - Needs to be replaced with larger culvert
- **Culvert at Delta Rd & Byron Hwy**
 - Sufficient capacity for existing land use, proposed drainage conditions & build out land use, proposed drainage for 5-yr storm

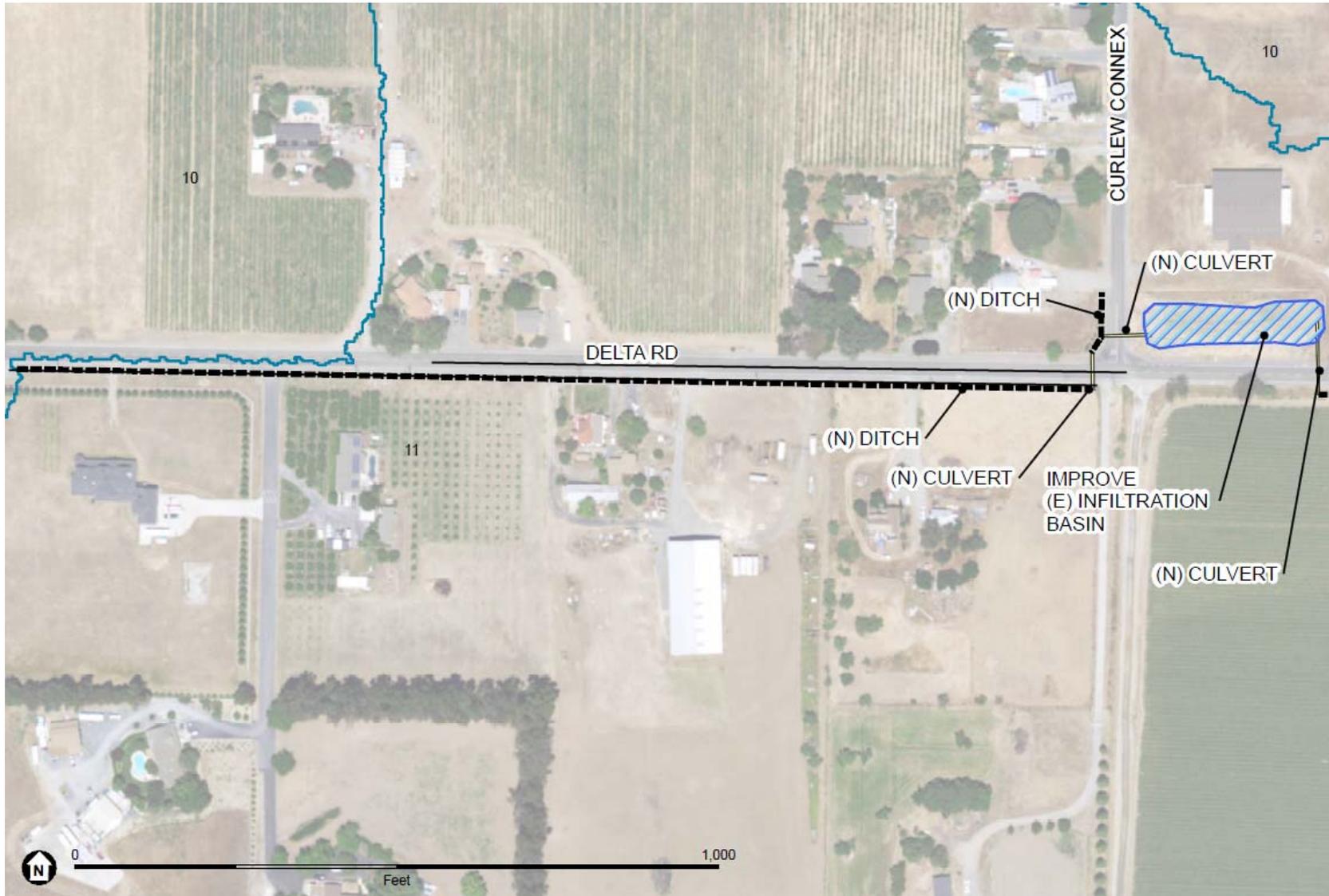
Location	Culvert Diameter (in)	Q _{cap} (cfs) for Existing Conditions	Existing Land Use						Build Out Land Use		
			Existing Drainage			Proposed Drainage					
			Recurrence Interval (years)								
			5	10	25	5	10	25	5	10	25
Culverts											
Downtown Knightsen (C1)	24	18	36.5	44.2	51.8	23.8	28.7	33.7	23.8	28.7	33.7
Culvert Diameter (in) Needed to Convey Flow			(2) 18"	(2) 18"	(2) 18"	(2) 15"	(2) 15"	(2) 15"	(2) 15"	(2) 15"	(2) 15"
Delta Rd & Bryon Hwy (C2)	30	35	75.3	91	106.9	21.5	25.8	30.4	31.2	37.5	44.1
Culvert Diameter (in) Needed to Convey Flow			(2) 21"	(2) 24"	(2) 27"	(1) 24"	(1) 27"	(1) 30"	(1) 30"	(1) 33"	(1) 36"



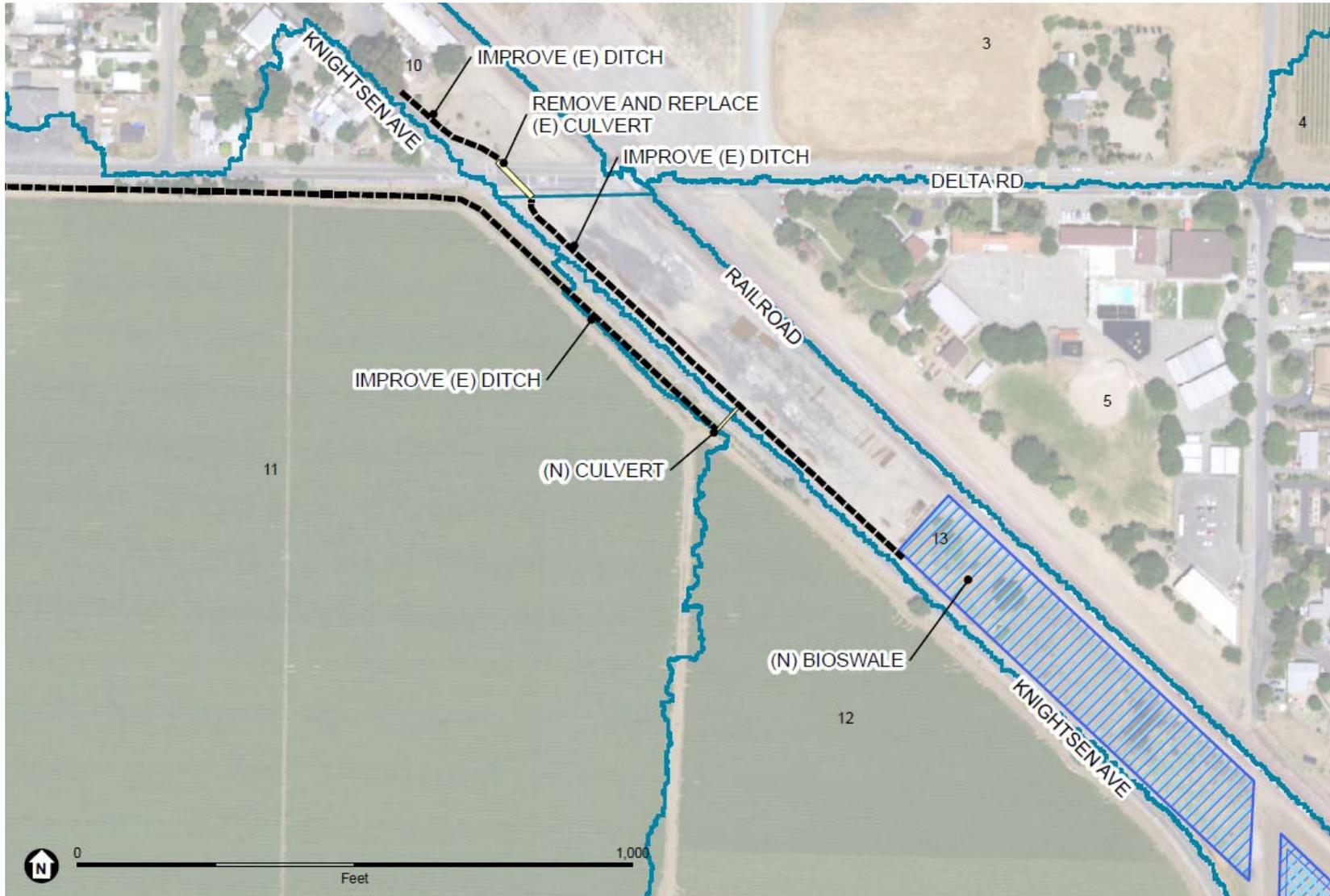
BMPs – Proposed Projects



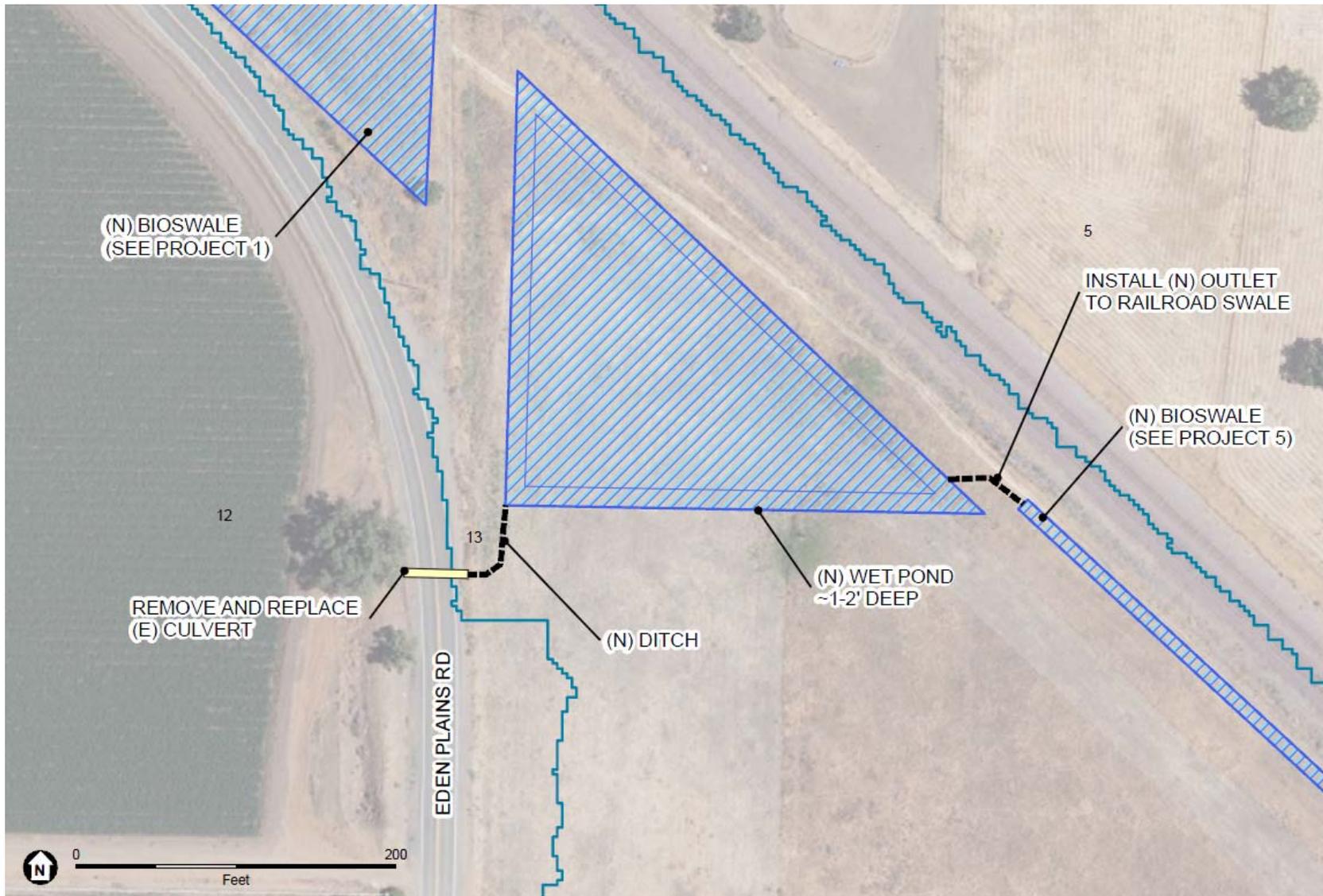
1) Curlew Connex Infiltration Basin



2) Knightsen Ave Bioswale



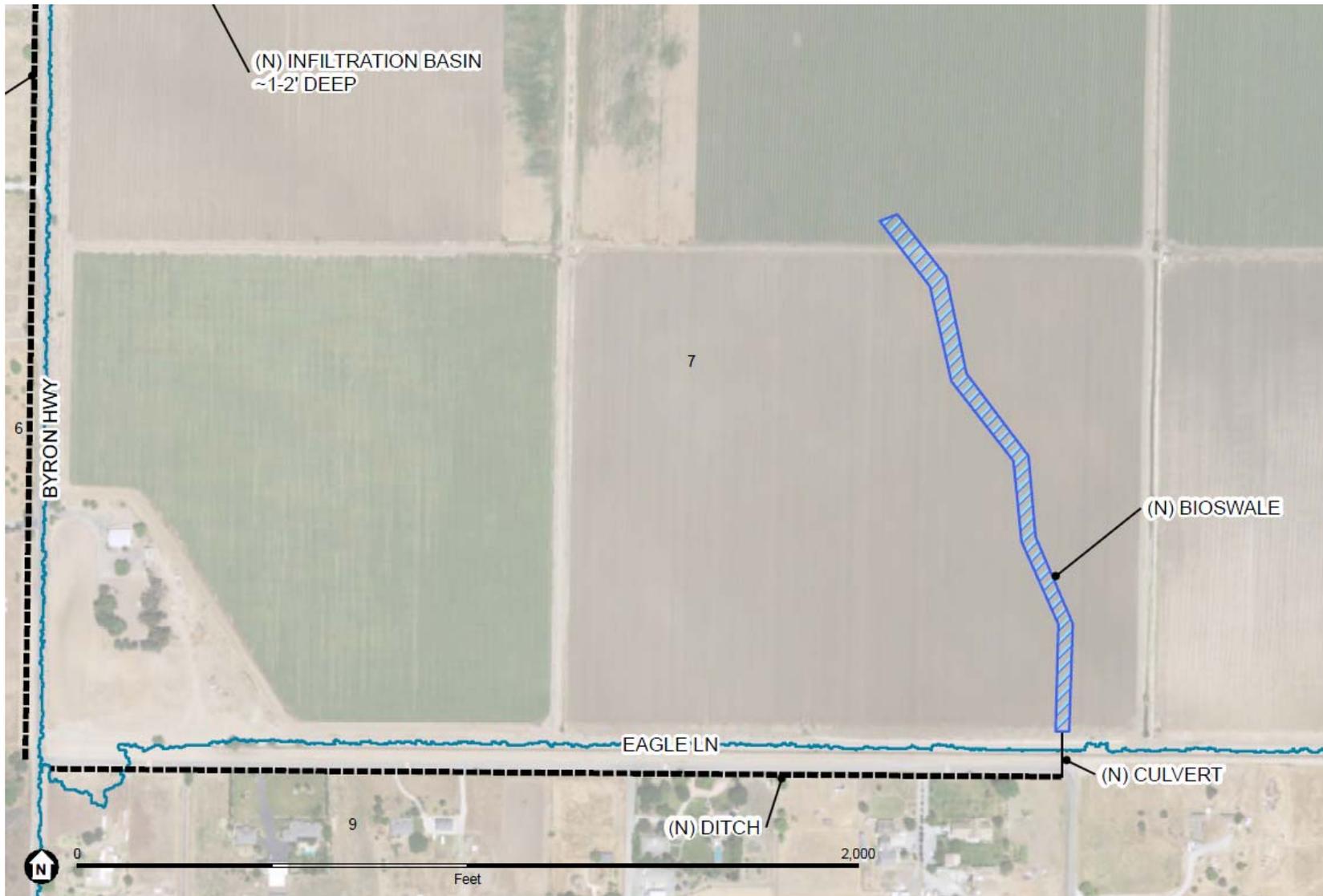
3) Eden Plains Road Wetland Basin



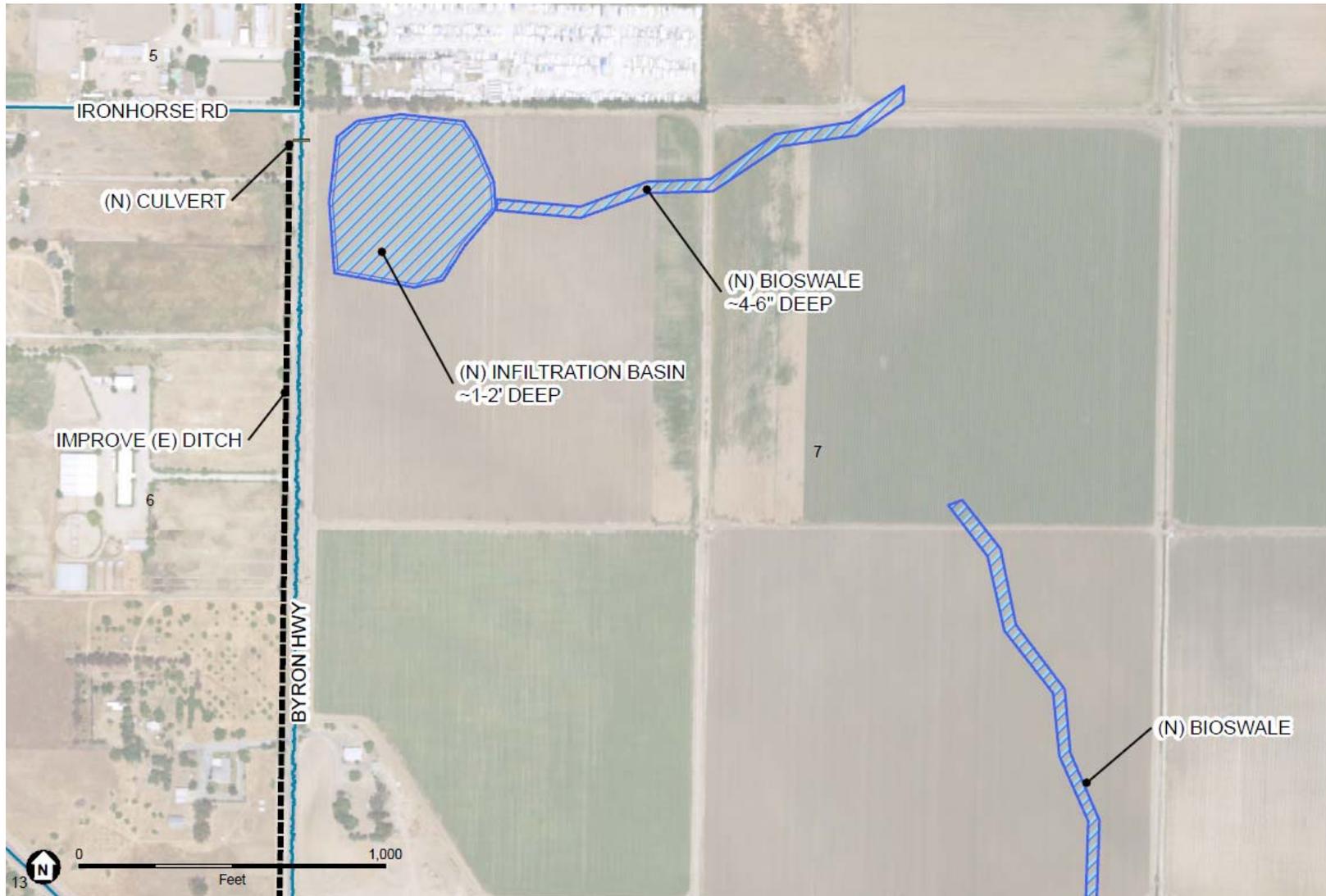
4) Railroad Bioswale & Infiltration Trench



5) Eagle Ln Bioswale



6) Byron Hwy & Ironhorse Rd Infiltration Basin & Bioswale



7) Byron Hwy / Delta Rd Drainage & Bioswale

