

High Hazard Dam Release - Downstream Floodplain Impacts Ranking Tool and Database

CASFM - CRS Committee
Denver, CO

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COLORADO
Division of Water Resources
Department of Natural Resources

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Colorado Dam Safety

Goals of Discussion

- Show a Flooding Hazard related to dam operations that has been identified
- Show the High Hazard Dam Release - Floodplain Impacts Database and Ranking Tool
- Discuss next steps - Uses to reduce risk to communities, uses for additional CRS Credits

Dam Safety and CRS

- CRS Coordinators Manual, Section 630/631

Because of the threat of flooding from *dam failure or dam operations*, the Community Rating System (CRS) credits cooperation among state dam safety officials, dam owners and operators, and local emergency managers. Credit is for state and local dam safety programs that:

- *Help make the needed information available*,
- Improve communications among operators of the dams and downstream communities, and
- Develop warning and response plans for dam failures.

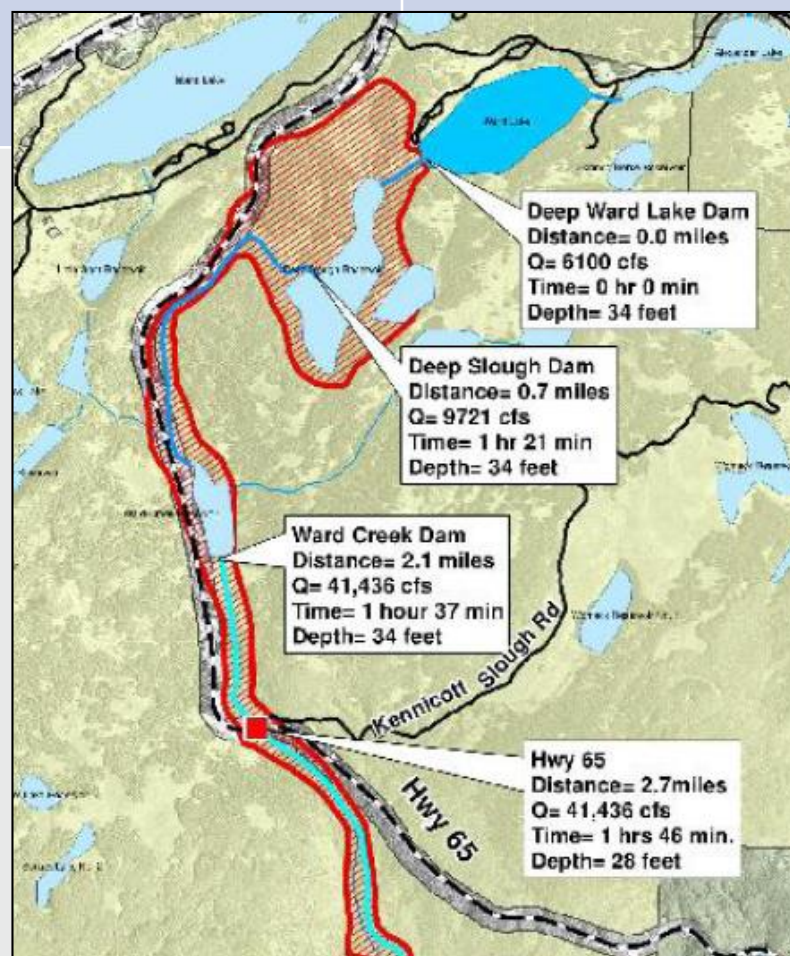
The credit is keyed to addressing the areas at risk from the failure of a high-hazard potential dam. A “high-hazard-potential dam” is one for which *failure or operational errors* will probably cause loss of human life downstream. Communities must contact their state dam safety office to determine if they are affected by such a dam.

Inundation Mapping Primer

| Location | 100-year Peak Flow | Routed Dam Failure Peak Flow |
|--|--------------------|------------------------------|
| Ward Creek at 11.5 miles below Ward Lake dam | 1,010 cfs (USGS) | 33,709 cfs |

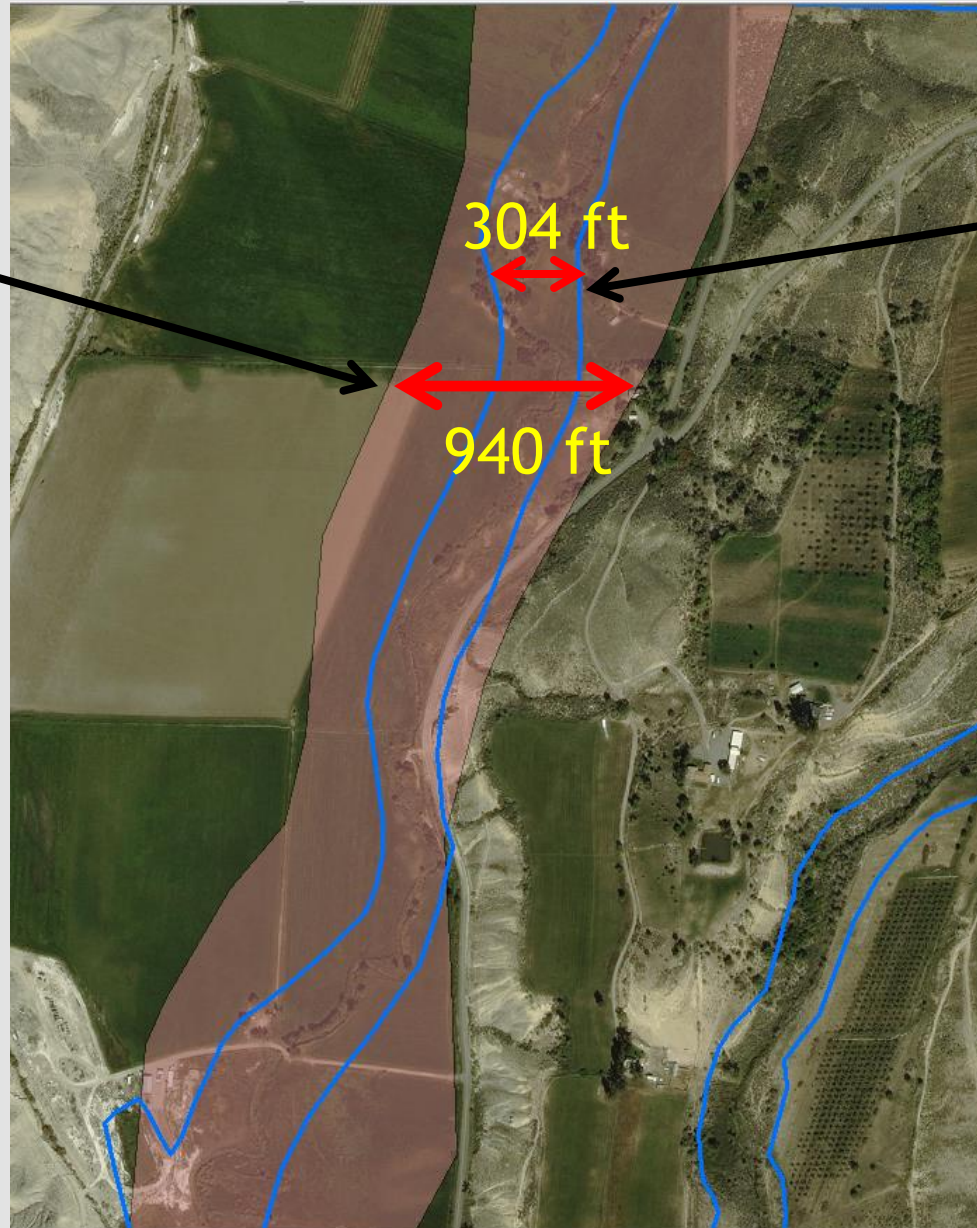
Why so large?

- Dam is fully breached in one-hour or less.
- Assumes dams below Ward Lake fail due to overtopping; cascading and cumulative flows



Inundation Mapping Primer

Ward Lake
Inundation
Mapping



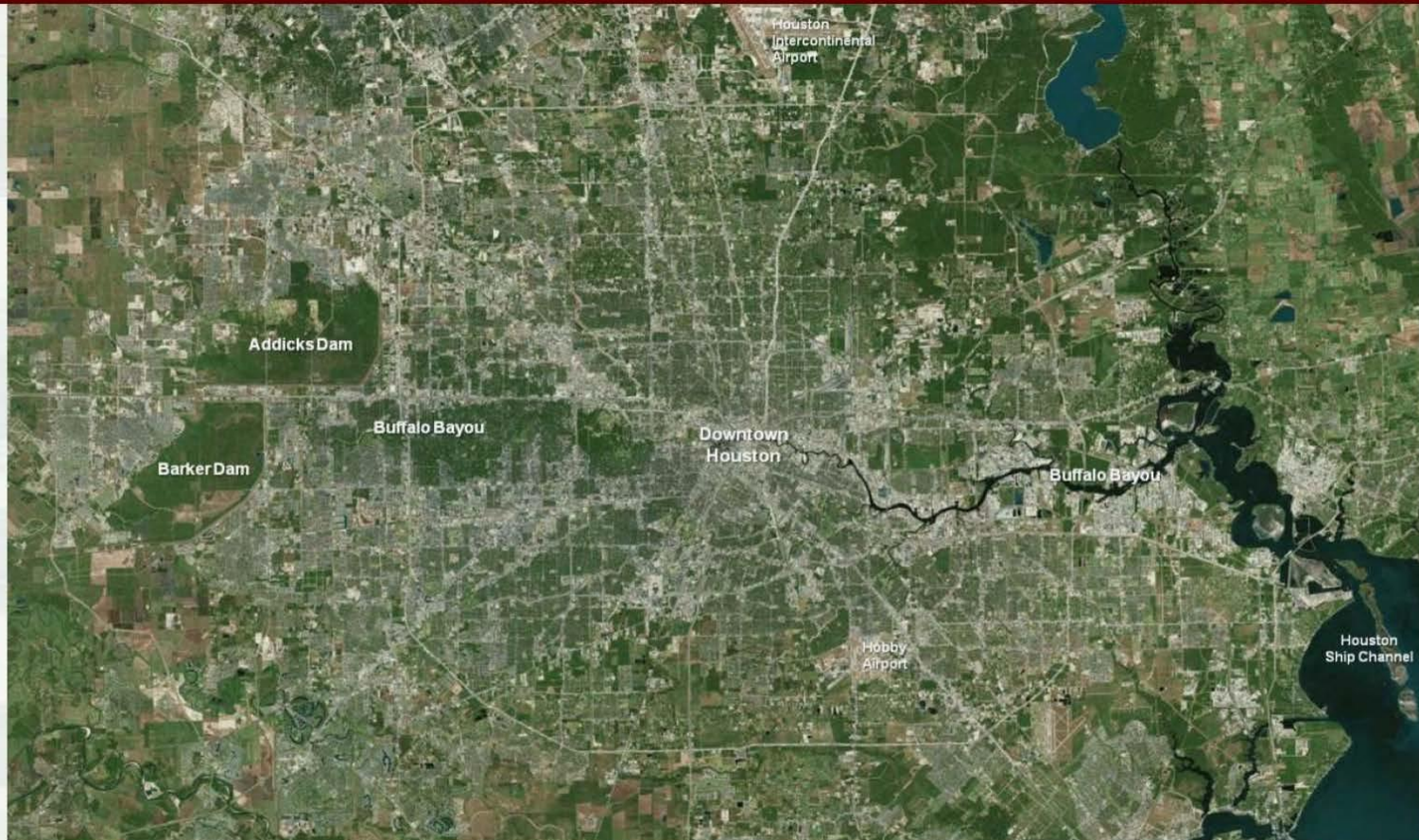
FEMA 100-yr
floodplain

Flood Operation - Button Rock Dam 2013



Barker and Addicks Dams

Houston – 2009



BUILDING STRONG®

Addicks and Barker Reservoirs

Section 216 Watershed Study

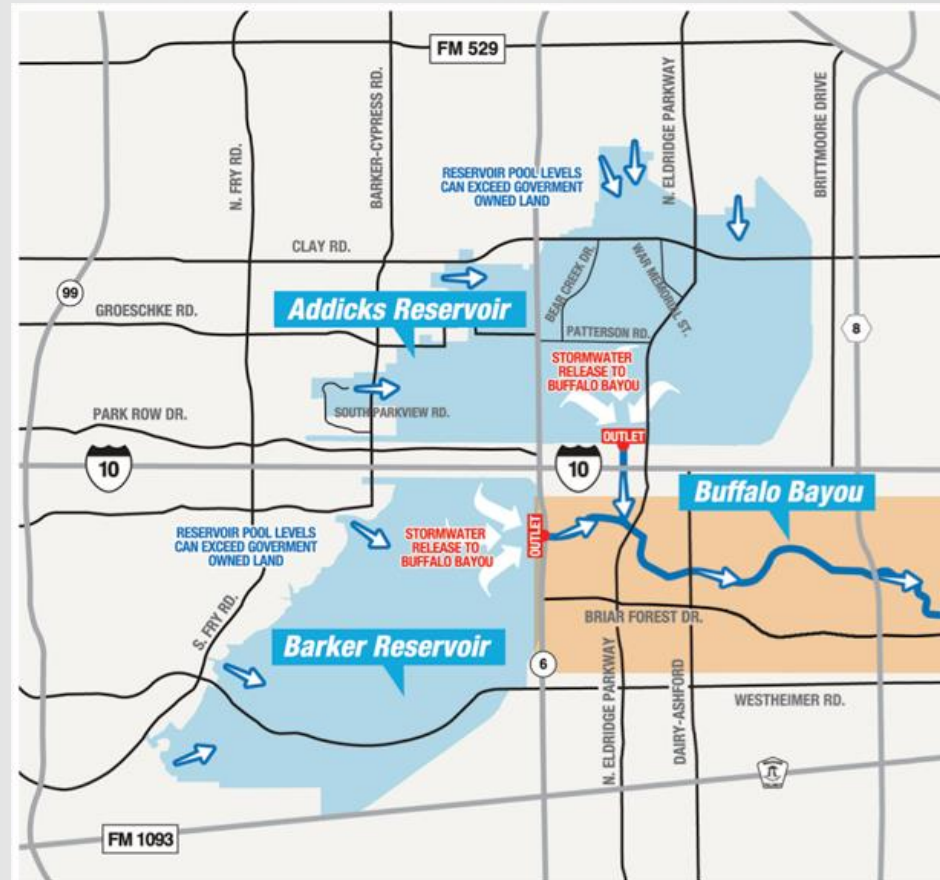
- **A study is required to identify and recommend a plan to address the risk associated with the potential flow around the ends of the dams when the reservoir level reaches the crests of their respective auxiliary spillways.**
- **The study will also address the non-breach flood risk and potential operational concerns upstream and downstream of Addicks and Barker Dams.**
- **HCFCFCD Non-Federal Sponsor Letter of Intent (50% cost share)**
- **Start of Study is contingent on appropriation of Federal funding**



BUILDING STRONG®

Barker and Addicks Dams

- Flood control dams built in 1940
- Water surface in reservoir rising at $\frac{1}{2}$ ft per hour
- Record high elevation
- Outlets opened, releasing 4,000 cfs each



Neighborhoods around Addicks and Barker Reservoir



What Did We Learn?

- Colorado in 2013 and 2015, Oroville and Houston in 2017 show dams operating as designed but still cause dangerous flooding downstream
- Dam Emergency Action Plans have maps for dam failure inundation - of no use in operations release flooding scenarios

Project to highlight the Gap?

- \$95,000 project, Funded by NDSP States Grants (\$45K) and Colorado Water Conservation Board grant (\$50k)
- Created a High Hazard Dam Release - Downstream Floodplain Impacts Database and Ranking Tool
 - Dam Information
 - Spillway data
 - Outlet data
 - Population at risk
 - Compares spillway and outlet flows to FEMA 100-year flows, basin areas, etc
 - Promote and share the database and tools with Floodplain and emergency managers

Database



Colorado Division of Water Resources

High Hazard Dam Release - Downstream Floodplain Impacts Study

Revision Date: 6/23/2017

| | | | Dam Info | Spillways | Outlet Works | Dam | Streamflow Statistics at Dam | Initial Ranking | | Secondary Ranking | | FEMA | Hydraulic Analysis |
|-------------------|--------|---------|------------------------------|---------------------------|-----------------------|---------------------------------------|--|--------------------------|--------------------|----------------------------|--------------------|-----------------------------|----------------------------------|
| | | | Expand > | Expand > | Expand > | Expand > | Expand > | Expand > | | Expand > | | Expand > | Expand > |
| Dam Name | Dam ID | NID ID | Kmz | Controlled Capacity (cfs) | Outlet Capacity (cfs) | Total Max. Controlled Discharge (cfs) | Dam and/or Main Channel Drainage Area (mi ²) | Initial Ranking by Total | Dam Not Considered | Secondary Ranking by Total | Dam Not Considered | FIS Profile | Hydraulic Analysis Performed by: |
| GREEN MOUNTAIN | 360106 | CO01658 | Google Earth | 25,000 | 1530.0 | 26530.0 | 582.28 | 35 | | 27 | | FIS Profile | |
| JOHN MARTIN | 670215 | CO01283 | Google Earth | | 13780.0 | 13780.0 | 18482.30 | 152 | | 80 | | N/A | |
| MAPLE GROVE | 070219 | CO00203 | Google Earth | 13365 | 102.0 | 13467.0 | 10.40 | 2 | | 2 | | FIS Profile | YW |
| GRANBY | 510108 | CO01656 | Google Earth | 12000 | 435.0 | 12435.0 | 312.08 | 72 | | 100 | | N/A | |
| CHATFIELD | 080324 | CO01281 | Google Earth | | 8300.0 | 8300.0 | 3020.77 | 5 | | 4 | | FIS Profile | YW |
| CHERRY CREEK | 080116 | CO01280 | Google Earth | | 8100.0 | 8100.0 | 385.67 | 12 | | 12 | | FIS Profile | YW |
| WILLIAMS FORK | 510127 | CO00717 | Google Earth | 6400 | 620.0 | 7020.0 | 230.07 | 36 | | 49 | | N/A | |
| OLYMPUS | 040134 | CO01662 | Google Earth | | 5767.0 | 5767.0 | 155.20 | 46 | | 72 | | FIS Profile | |
| PUEBLO | 140133 | CO00299 | Google Earth | | 5767.0 | 5767.0 | 1546.84 | 45 | | 22 | | FIS Profile | |
| TRINIDAD | 190122 | CO00050 | Google Earth | | 5500.0 | 5500.0 | 671.86 | 10 | | 10 | | N/A | |
| MCPHEE RESERVOIR | 710106 | CO02707 | Google Earth | | 5000.0 | 5000.0 | 819.12 | 111 | | 141 | | FIS Profile | |
| DILLON | 360104 | CO00875 | Google Earth | | 4400.0 | 4400.0 | 334.09 | 18 | | 44 | | No Profile | |
| STRONGBLA SPRINGS | 080101 | CO00210 | Google Earth | | 4000.0 | 4000.0 | 2507.38 | 57 | | 38 | | FIS Profile | YW |

- Main Categories

- Dam Information, dam ID, google earth KMZ
- Spillway Capacity, rating curve pdf's
- Outlet Capacity, rating curve pdf's
- Total Controlled outlet
- Stream flow
- Ranking
- FEMA
- Hydraulic Analysis, safe channel capacity combined with controlled release

Database - General Info



Colorado Division of Water Resources

High Hazard Dam Release - Downstream Floodplain Impacts Study


Revision Date: 7/19/2017


General Info

< Hide

| Dam Name | Dam ID | NID ID | kmz | Latitude | Longitude | County | Stream | CO Database Dam Drainage Area (mi ²) | Drawing Link |
|---------------------------|--------|---------|------------------------------|-----------|-------------|---------|-----------------------|---|------------------------------|
| CHAMBERS LAKE | 030115 | CO00127 | Google Earth | 40.602945 | -105.844305 | LARIMER | JOE WRIGHT CREEK | 32.0001 | Rating Curve |
| BOYD LAKE | 040105 | CO00157 | Google Earth | 40.420683 | -105.024510 | LARIMER | BIG THOMPSON RIVER | 17.3001 | Rating Curve |
| CACHE LA POUDE | 030327 | CO00851 | Google Earth | 40.540859 | -104.959188 | LARIMER | CACHE LA POUDE RIVER | 20.7001 | Rating Curve |
| OLYMPUS | 040134 | CO01662 | Google Earth | 40.376669 | -105.488890 | LARIMER | BIG THOMPSON RIVER | 158.0006 | |
| COMANCHE | 030121 | CO00130 | Google Earth | 40.584751 | -105.644767 | LARIMER | BEAVER CREEK | 11.9407 | Rating Curve |
| COBB LAKE | 030119 | CO00129 | Google Earth | 40.651943 | -104.972889 | LARIMER | CACHE LA POUDE RIVER | 2.9000 | Rating Curve |
| PARK CREEK | 030308 | CO00146 | Google Earth | 40.837019 | -105.151586 | LARIMER | PARK CREEK | 3.3063 | Rating Curve |
| MILTON SEAMAN | 030223 | CO00143 | Google Earth | 40.706665 | -105.237222 | LARIMER | N FORK CACHE LA POUDE | 541.0022 | Rating Curve |
| FOSSIL CREEK | 030135 | CO01165 | Google Earth | 40.491669 | -104.993891 | LARIMER | FOSSIL CREEK | 28.2595 | Rating Curve |
| TERRY LAKE | 030326 | CO00850 | Google Earth | 40.617021 | -105.076241 | LARIMER | DRY CREEK | 4.8594 | Rating Curve |
| ELDER | 030131 | CO01164 | Google Earth | 40.646795 | -105.040012 | LARIMER | CACHE LA POUDE RIVER | 0.7203 | Rating Curve |
| JOE WRIGHT | 030402 | CO01766 | Google Earth | 40.559393 | -105.871100 | LARIMER | JOE WRIGHT CREEK | 5.4000 | Rating Curve |
| WATER SUPPLY NO 3 | 030332 | CO00154 | Google Earth | 40.657354 | -105.088223 | LARIMER | DRY CREEK | 0.5094 | Rating Curve |
| PANHANDLE | 030307 | CO00145 | Google Earth | 40.850076 | -105.645837 | LARIMER | PANHANDLE CREEK | 17.8126 | Rating Curve |
| DRY CREEK | 040246 | CO02922 | Google Earth | 40.294552 | -105.161262 | LARIMER | DRY CREEK | 1.5938 | Rating Curve |
| NORTH POUDE # 6 | 030303 | CO00841 | Google Earth | 40.669267 | -105.026774 | LARIMER | CACHE LA POUDE RIVER | 10.6000 | Rating Curve |
| NORTH POUDE # 3 | 030238 | CO00838 | Google Earth | 40.732523 | -105.038438 | LARIMER | BOXELDER CREEK | 3.3797 | Rating Curve |
| FLOOD CONTROL BASIN NO. 1 | 030526 | CO02905 | Google Earth | 40.662377 | -105.103313 | LARIMER | DRY CREEK | | Rating Curve |
| DOUGLAS | 030126 | CO01163 | Google Earth | 40.703867 | -105.087077 | LARIMER | DRY CREEK | 46.4064 | Rating Curve |
| LOVELAND WATER STORAGE | 040217 | CO00823 | Google Earth | 40.429754 | -105.211406 | LARIMER | BIG THOMPSON RIVER | 1.2094 | Rating Curve |
| HOURLGLASS | 030209 | CO00138 | Google Earth | 40.582258 | -105.631438 | LARIMER | BEAVER CREEK | 0.4906 | Rating Curve |
| WATER SUPPLY NO 4 | 030333 | CO01759 | Google Earth | 40.645167 | -105.085321 | LARIMER | DRY CREEK | 0.3000 | Rating Curve |
| LONG DRAW | 030217 | CO00140 | Google Earth | 40.503510 | -105.772549 | LARIMER | LA POUDE PASS CREEK | 8.4094 | Rating Curve |
| INDIAN CREEK | 030210 | CO00139 | Google Earth | 40.660435 | -104.960381 | LARIMER | INDIAN CREEK | 17.1501 | Rating Curve |

Database - Spillways and Outlets





Colorado Division of Water Resources

High Hazard Dam Release - Downstream Floodplain Impacts Study

Revision Date: 7/19/2017

| Dam Name | General Info | | | Spillways | | Outlet Works |
|---------------------------|--------------|---------|------------------------------|------------------------------|-------------------------|--|
| | Dam ID | NID ID | kmz | < Hide | | < Hide |
| | | | | Controlled Capacity (cfs) | Total Capacity (cfs) | Outlet Capacity (cfs) |
| CHAMBERS LAKE | 030115 | CO00127 | Google Earth | | 54399 | 1700.0 4-3' X 4' CONC* |
| BOYD LAKE | 040105 | CO00157 | Google Earth | | 42700 | 800.0 1. Pump station with invert at GH 0.0 2. Hillsboro transfer outlet with invert at GH 2 |
| CACHE LA POUUDRE | 030327 | CO00851 | Google Earth | | 34441 | 575.0 60"RCP |
| OLYMPUS | 040134 | CO01662 | Google Earth | | 21200 | 5767.0 18"RCP+6.25'X8* |
| COMANCHE | 030121 | CO00130 | Google Earth | | 15179 | 444.0 30" X 44" ARCH* |
| COBB LAKE | 030119 | CO00129 | Google Earth | | 9110 | 633.0 48"R/C,U/S SUBMERGED, D/S PIPE |
| PARK CREEK | 030308 | CO00146 | Google Earth | | 19147 | 335.0 42" SQUARE CONCRETE |
| MILTON SEAMAN | 030223 | CO00143 | Google Earth | | 47600 | 1680.0 18' TUNNEL |
| FOSSIL CREEK | 030135 | CO01165 | Google Earth | | 88100 | 393.0 60" RCP |
| TERRY LAKE | 030326 | CO00850 | Google Earth | | 4780 | 325.0 48" RCP,D/S GOES TO 60"RCP ADD |
| ELDER | 030131 | CO01164 | Google Earth | | 2321 | 330.0 60" RCP |
| JOE WRIGHT | 030402 | CO01766 | Google Earth | | 3875 | 600.0 72" RCP |
| WATER SUPPLY NO 3 | 030332 | CO00154 | Google Earth | | 2154 | 358.0 3' X 4' RCP |
| PANHANDLE | 030307 | CO00145 | Google Earth | | 20060 | 135.0 33" CONC |
| DRY CREEK | 040246 | CO02922 | Google Earth | | 2964 | 173.0 36" steel pipe controlled by a 30" and 10" cone valves to release water downstream |
| NORTH POUUDRE # 6 | 030303 | CO00841 | Google Earth | | 15500 | 280.0 48" RCP |
| NORTH POUUDRE # 3 | 030238 | CO00838 | Google Earth | | 9000 | 109.0 36" HDPE & RCP |
| FLOOD CONTROL BASIN NO. 1 | 030526 | CO02905 | Google Earth | | 14395 | 438.0 UNGATED 5 FOOT BY 5 FOOT OPENING |
| DOUGLAS | 030126 | CO01163 | Google Earth | | 39750 | 350.0 48" WSP |
| LOVELAND WATER STORAGE | 040217 | CO00823 | Google Earth | | 4000 | 255.0 54" Steel |
| HOURLASS | 030209 | CO00138 | Google Earth | | 5930 | 180.0 33" RCP |
| WATER SUPPLY NO 4 | 030333 | CO01759 | Google Earth | | 1861 | 150.0 2' X 3' ROCK |
| LONG DRAW | 030217 | CO00140 | Google Earth | | 1600 | 560.0 54" RCP |
| INDIAN CREEK | 030210 | CO00139 | Google Earth | | 18000 | 210.0 4 FT X 4 FT CO* |


Database - Dam Info



Study

| Dam | | | | | | | | | | | | | |
|---------------------------|---------------------------------------|------|-------------|------|----------------------|----------------------------------|-----------------|---------------|---------------|---------------------|------------------|---------------------------------------|--|
| Dam Name | Total Max. Controlled Discharge (cfs) | Type | Off Channel | PAR | Social Vulnerability | Distance to Downstream Town (mi) | Downstream Town | Height (feet) | Length (feet) | Dam Safety Engineer | Owner Type | Owner | |
| | | | | | | | | | | | | | |
| CHAMBERS LAKE | 1700.0 | RE | N | 121 | -10.3 | 43.0 | FORT COLLINS | 55 | 2125 | KEB | Private | WATER SUPPLY & STORAGE CO. | |
| BOYD LAKE | 800.0 | RE | O | 3489 | 5.1 | 0.1 | LOVELAND | 40 | 10729 | JHB | Private | GREELEY-LOVELAND IRRIGATION COMPAN | |
| CACHE LA POUFRE | 575.0 | RE | T | 3028 | 2.8 | 1.0 | TIMNATH | 43 | 3100 | KEB | Private | CACHE LA POUFRE RESERVOIR CO. | |
| OLYMPUS | 5767.0 | RE | N | | | 25.0 | LOVELAND | 45 | 1951 | JHB | Federal | RECLAMATION | |
| COMANCHE | 444.0 | RE | N | 66 | -10.3 | 33.0 | FORT COLLINS | 46 | 1430 | KEB | Local Government | CITY OF GREELEY DEPT. OF WATER RESOUR | |
| COBB LAKE | 633.0 | RE | O | 6346 | 2.7 | 12.0 | WINDSOR | 58 | 1000 | KEB | Private | WINDSOR RESERVOIR & CANAL CO. | |
| PARK CREEK | 335.0 | RE | N | | | 17.0 | FORT COLLINS | 108 | 1005 | KEB | Private | NORTH POUDRE IRR. CO. | |
| MILTON SEAMAN | 1680.0 | RE | N | 1070 | 0.8 | 10.0 | LAPORTE | 115 | 410 | KEB | Local Government | CITY OF GREELEY DEPT. OF WATER RESOUR | |
| FOSSIL CREEK | 393.0 | RE | N | | | 3.0 | WINDSOR | 42 | 6650 | KEB | Private | NORTH POUDRE IRR. CO. | |
| TERRY LAKE | 325.0 | RE | T | 7258 | 9.4 | 0.1 | FORT COLLINS | 38 | 6400 | KEB | Private | LARIMER & WELD RESERVOIR CO. | |
| ELDER | 330.0 | RE | O | 265 | -1.9 | 5.0 | FORT COLLINS | 21.2 | 1700 | KEB | Private | WINDSOR RESERVOIR & CANAL CO. | |
| JOE WRIGHT | 600.0 | RE | N | | | 46.0 | FORT COLLINS | 123 | 2300 | KEB | Local Government | CITY OF FORT COLLINS | |
| WATER SUPPLY NO 3 | 358.0 | RE | T | 1579 | 1.3 | 2.0 | FORT COLLINS | 41 | 1694 | KEB | Private | WATER SUPPLY & STORAGE CO. | |
| PANHANDLE | 135.0 | RE | N | 7 | -5.8 | 32.0 | FORT COLLINS | 53 | 1000 | KEB | Private | CRYSTAL LAKES WATER & SEWER ASSOCIAT | |
| DRY CREEK | 173.0 | RE | N | 582 | -5.7 | 0.2 | BERTHOUD | 52 | 4817 | JHB | Public Utility | LITTLE THOMPSON WATER DISTRICT | |
| NORTH POUDRE # 6 | 280.0 | RE | T | | | 5.0 | FORT COLLINS | 41.6 | 2584 | KEB | Private | NORTH POUDRE IRR. CO. | |
| NORTH POUDRE # 3 | 109.0 | RE | T | | | 2.0 | WELLINGTON | 39.26 | 1600 | KEB | Private | NORTH POUDRE IRR. CO. | |
| FLOOD CONTROL BASIN NO. 1 | 438.0 | RE | N | | | 1.0 | FORT COLLINS | 20 | 2100 | KEB | Local Government | CITY OF FORT COLLINS | |
| DOUGLAS | 350.0 | RE | N | 4447 | 6.7 | 8.0 | FORT COLLINS | 39 | 2800 | KEB | Private | WINDSOR RESERVOIR & CANAL CO. | |
| LOVELAND WATER STORAGE | 255.0 | RE | O | 1145 | -4.1 | 5.0 | LOVELAND | 112 | 1748 | JHB | Local Government | CITY OF LOVELAND | |
| HOURLASS | 180.0 | RE | T | 55 | -10.3 | 37.0 | FORT COLLINS | 45 | 2400 | KEB | Local Government | CITY OF GREELEY DEPT. OF WATER RESOUR | |
| WATER SUPPLY NO 4 | 150.0 | RE | T | 90 | 3.4 | 2.0 | FORT COLLINS | 28 | 1110 | KEB | Private | WATER SUPPLY & STORAGE CO. | |
| LONG DRAW | 560.0 | RE | N | | | 37.0 | FORT COLLINS | 84 | 1830 | KEB | Private | WATER SUPPLY & STORAGE CO. | |
| INDIAN CREEK | 210.0 | RE | N | | | 16.0 | TIMNATH | 34 | 2600 | KEB | Private | NORTH POUDRE IRR. CO. | |

Database - StremStats Info



| | | | | | | | | | | | | | | | |
|---|---------------------------------------|----------------------|---|-------------------------------|---------------------------|---------|---|---------|---------|---------|----------|----------|----------|----------|--|
|  | | | | | | | 6-hour precipitation that is expected to occur on average once in 100 years | | | | | | | | |
| | | Mean Basin Elevation | Mean basin slope computed from 10 m DEM | Percent of area above 7500 ft | Mean Annual Precipitation | | | | | | | | | | |
| | Streamflow Statistics at Dam | | | | | | | | | | | | | | |
| | < Hide | | | | | | | | | | | | | | |
| | Dam and/or Main Channel Drainage Area | Elev | BasinSlope | EL7500 | PRECIP | I6H100Y | PK2 | PK5 | PK10 | PK25 | PK50 | PK100 | PK200 | PK500 | |
| | (mi ²) | (ft) | (%) | (%) | (in) | (in) | (cfs) | (cfs) | (cfs) | (cfs) | (cfs) | (cfs) | (cfs) | (cfs) | |
| | | | | | | | | | | | | | | | |
| CHAMBERS LAKE | 31.93 | 10532.76 | 27.85 | 100.00 | 41.80 | 2.23 | 593.00 | 756.00 | 856.00 | 937.00 | 1070.00 | 1150.00 | 1200.00 | 1310.00 | |
| BOYD LAKE | 23.82 | 5056.74 | 2.55 | 0.00 | 15.17 | 4.40 | 439.00 | 1540.00 | 2910.00 | 5610.00 | 8490.00 | 12400.00 | 17400.00 | 25900.00 | |
| CACHE LA POUFRE | 18.56 | 5050.05 | 2.63 | 0.00 | 14.65 | 4.23 | 269.00 | 898.00 | 1660.00 | 3130.00 | 4680.00 | 6790.00 | 9400.00 | 13800.00 | |
| OLYMPUS | 155.20 | 9924.70 | 40.05 | 99.68 | 32.04 | 2.97 | 1240.00 | 1650.00 | 1930.00 | 2150.00 | 2530.00 | 2750.00 | 2940.00 | 3290.00 | |
| COMANCHE | 16.02 | 10774.54 | 27.49 | 100.00 | 23.92 | 2.74 | 107.00 | 158.00 | 193.00 | 235.00 | 284.00 | 321.00 | 353.00 | 416.00 | |
| COBB LAKE | 2.49 | 5184.31 | 3.20 | 0.00 | 15.06 | 4.26 | 43.40 | 144.00 | 265.00 | 498.00 | 742.00 | 1080.00 | 1490.00 | 2190.00 | |
| PARK CREEK | 3.48 | 6026.11 | 13.06 | 0.00 | 16.31 | 3.81 | 61.10 | 192.00 | 342.00 | 617.00 | 894.00 | 1260.00 | 1700.00 | 2430.00 | |
| MILTON SEAMAN | 564.64 | 7737.81 | 19.90 | 59.92 | 18.78 | 3.08 | 1030.00 | 1930.00 | 2770.00 | 4000.00 | 5270.00 | 6730.00 | 8340.00 | 10800.00 | |
| FOSSIL CREEK | 29.09 | 5042.63 | 5.02 | 0.00 | 15.12 | 4.45 | 516.00 | 1820.00 | 3450.00 | 6670.00 | 10100.00 | 14900.00 | 20900.00 | 31100.00 | |
| TERRY LAKE | 4.33 | 5114.49 | 3.56 | 0.00 | 15.31 | 4.54 | 100.00 | 359.00 | 682.00 | 1320.00 | 2010.00 | 2980.00 | 4180.00 | 6260.00 | |
| ELDER | 0.72 | 5109.57 | 0.81 | 0.00 | 15.25 | 4.46 | 14.00 | 55.10 | 107.00 | 211.00 | 323.00 | 480.00 | 676.00 | 1020.00 | |
| JOE WRIGHT | 6.01 | 10648.52 | 26.89 | 100.00 | 44.06 | 2.22 | 179.00 | 229.00 | 258.00 | 289.00 | 329.00 | 350.00 | 364.00 | 403.00 | |
| WATER SUPPLY NO 3 | 0.50 | 5136.80 | 3.24 | 0.00 | 15.31 | 4.51 | 26.70 | 102.00 | 198.00 | 388.00 | 594.00 | 881.00 | 1240.00 | 1870.00 | |
| PANHANDLE | 17.76 | 9588.72 | 18.03 | 100.00 | 25.81 | 2.77 | 127.00 | 184.00 | 225.00 | 267.00 | 320.00 | 363.00 | 398.00 | 460.00 | |
| DRY CREEK | 1.64 | 5345.47 | 10.54 | 0.00 | 16.29 | 4.40 | 64.30 | 238.00 | 455.00 | 883.00 | 1340.00 | 1970.00 | 2760.00 | 4130.00 | |
| NORTH POUFRE # 6 | 11.70 | 5292.52 | 2.72 | 0.00 | 15.39 | 4.24 | 160.00 | 526.00 | 963.00 | 1810.00 | 2690.00 | 3900.00 | 5380.00 | 7880.00 | |
| NORTH POUFRE # 3 | 3.35 | 5350.23 | 1.73 | 0.00 | 15.51 | 4.15 | 73.20 | 248.00 | 456.00 | 856.00 | 1270.00 | 1840.00 | 2530.00 | 3710.00 | |
| FLOOD CONTROL BASIN NO. 1 | 55.96 | 5591.18 | 8.99 | 0.00 | 15.95 | 4.10 | 501.00 | 1580.00 | 2840.00 | 5250.00 | 7750.00 | 11100.00 | 15200.00 | 22100.00 | |
| DOUGLAS | 44.53 | 5667.24 | 9.83 | 0.00 | 16.08 | 4.03 | 396.00 | 1230.00 | 2200.00 | 4030.00 | 5920.00 | 8450.00 | 11500.00 | 16600.00 | |
| LOVELAND WATER STORAGE | 1.17 | 5518.25 | 16.88 | 0.00 | 17.51 | 4.89 | 54.40 | 215.00 | 425.00 | 854.00 | 1330.00 | 2000.00 | 2850.00 | 4370.00 | |
| HOURLASS | 16.89 | 10732.64 | 27.79 | 100.00 | 23.63 | 2.75 | 109.00 | 161.00 | 198.00 | 240.00 | 291.00 | 329.00 | 362.00 | 428.00 | |
| WATER SUPPLY NO 4 | 0.85 | 5121.12 | 3.58 | 0.00 | 15.34 | 4.53 | 38.00 | 144.00 | 278.00 | 545.00 | 833.00 | 1240.00 | 1740.00 | 2620.00 | |
| LONG DRAW | 8.52 | 10725.52 | 27.33 | 100.00 | 40.72 | 2.40 | 200.00 | 260.00 | 295.00 | 333.00 | 382.00 | 409.00 | 429.00 | 478.00 | |
| INDIAN CREEK | 17.15 | | | | | 3.95 | 188.00 | 585.00 | 1040.00 | 1900.00 | 2780.00 | 3950.00 | 5370.00 | 7710.00 | |

Database - Ranking





| Dam Name | Ranking | | | | | | | | | | | | | | | |
|---------------------------|--------------------|--|------|---------------------------------------|------|-------------------------------|------|------------------------------|------|---------------------------|------|---------------------------|------|-------------|-------------------|--|
| | < Hide | | | | | | | | | | | | | | | |
| | Weight=> | | | | | | | | | | | | | | | |
| | | Ranking 1 | | Ranking 2 | | Ranking 3 | | Ranking 4 | | Ranking 5 | | 1/Total | | Ranking 6 | | |
| | Dam Not Considered | Drainage Area/Total Max. Controlled Discharge* | | Q100/Total Max. Controlled Discharge* | | Distance to Downstream Town** | | Q100/Total Spillway Capacity | | Max. Controlled Discharge | | 1/Total Spillway Capacity | | Total Score | Composite Ranking | |
| | | Value | Rank | Value | Rank | Value | Rank | Value | Rank | Value | Rank | Value | Rank | | | |
| CHAMBERS LAKE | | 0.01878 | 56 | 0.67647 | 21 | 43.0 | 357 | 0.02114 | 27 | 0.00059 | 28 | 0.00002 | 21 | 510 | 21 | |
| BOYD LAKE | | 0.02977 | 84 | 15.50000 | 174 | 0.1 | 1 | 0.29040 | 232 | 0.00125 | 56 | 0.00002 | 28 | 575 | 34 | |
| CACHE LA POUDRE | | 0.03227 | 89 | 11.80870 | 163 | 1.0 | 74 | 0.19715 | 182 | 0.00174 | 69 | 0.00003 | 36 | 613 | 45 | |
| OLYMPUS | | 0.02691 | 80 | 0.47685 | 14 | 25.0 | 329 | 0.12972 | 138 | 0.00017 | 8 | 0.00005 | 53 | 622 | 47 | |
| COMANCHE | | 0.03609 | 95 | 0.72297 | 24 | 33.0 | 344 | 0.02115 | 28 | 0.00225 | 83 | 0.00007 | 72 | 646 | 53 | |
| COBB LAKE | | 0.00394 | 16 | 1.70616 | 68 | 12.0 | 268 | 0.11855 | 129 | 0.00158 | 64 | 0.00011 | 105 | 650 | 55 | |
| PARK CREEK | | 0.01038 | 42 | 3.76119 | 103 | 17.0 | 305 | 0.06581 | 82 | 0.00299 | 98 | 0.00005 | 57 | 687 | 68 | |
| MILTON SEAMAN | | 0.33610 | 169 | 4.00595 | 104 | 10.0 | 249 | 0.14139 | 144 | 0.00060 | 29 | 0.00002 | 23 | 718 | 74 | |
| FOSSIL CREEK | | 0.07402 | 120 | 37.91349 | 191 | 3.0 | 142 | 0.16913 | 166 | 0.00254 | 89 | 0.00001 | 10 | 718 | 74 | |
| TERRY LAKE | | 0.01333 | 47 | 9.16923 | 150 | 0.1 | 1 | 0.62343 | 288 | 0.00308 | 102 | 0.00021 | 152 | 740 | 79 | |
| ELDER | | 0.00218 | 9 | 1.45455 | 59 | 5.0 | 174 | 0.20681 | 188 | 0.00303 | 99 | 0.00043 | 212 | 741 | 80 | |
| JOE WRIGHT | | 0.01001 | 37 | 0.58333 | 20 | 46.0 | 360 | 0.09032 | 104 | 0.00167 | 65 | 0.00026 | 167 | 753 | 85 | |
| WATER SUPPLY NO 3 | | 0.00141 | 6 | 2.46089 | 84 | 2.0 | 103 | 0.40901 | 257 | 0.00279 | 94 | 0.00046 | 216 | 760 | 87 | |
| PANHANDLE | | 0.13155 | 147 | 2.68889 | 92 | 32.0 | 339 | 0.01810 | 20 | 0.00741 | 163 | 0.00005 | 54 | 815 | 100 | |
| DRY CREEK | | 0.00947 | 36 | 11.38728 | 159 | 0.2 | 1 | 0.66464 | 291 | 0.00578 | 137 | 0.00034 | 192 | 816 | 101 | |
| NORTH POUDRE # 6 | | 0.04178 | 99 | 13.92857 | 171 | 5.0 | 174 | 0.25161 | 217 | 0.00357 | 107 | 0.00006 | 71 | 839 | 108 | |
| NORTH POUDRE # 3 | | 0.03076 | 87 | 16.88073 | 177 | 2.0 | 103 | 0.20444 | 185 | 0.00917 | 185 | 0.00011 | 106 | 843 | 110 | |
| FLOOD CONTROL BASIN NO. 1 | | 0.12777 | 145 | 25.34247 | 184 | 1.0 | 74 | 0.77110 | 299 | 0.00228 | 84 | 0.00007 | 74 | 860 | 120 | |
| DOUGLAS | | 0.12723 | 144 | 24.14286 | 183 | 8.0 | 224 | 0.21258 | 192 | 0.00286 | 95 | 0.00003 | 32 | 870 | 125 | |
| LOVELAND WATER STORAGE | | 0.00460 | 18 | 7.84314 | 140 | 5.0 | 174 | 0.50000 | 272 | 0.00392 | 114 | 0.00025 | 163 | 881 | 128 | |
| HOURLGLASS | | 0.09381 | 132 | 1.82778 | 72 | 37.0 | 346 | 0.05548 | 69 | 0.00556 | 133 | 0.00017 | 136 | 888 | 134 | |
| WATER SUPPLY NO 4 | | 0.00565 | 19 | 8.26667 | 144 | 2.0 | 103 | 0.66631 | 292 | 0.00667 | 147 | 0.00054 | 224 | 929 | 148 | |
| LONG DRAW | | 0.01521 | 50 | 0.73036 | 25 | 37.0 | 346 | 0.25563 | 218 | 0.00179 | 71 | 0.00063 | 235 | 945 | 154 | |
| INDIAN CREEK | | 0.08167 | 125 | 18.80952 | 179 | 16.0 | 301 | 0.21944 | 197 | 0.00476 | 121 | 0.00006 | 59 | 982 | 169 | |

Database - Nearest Consequences

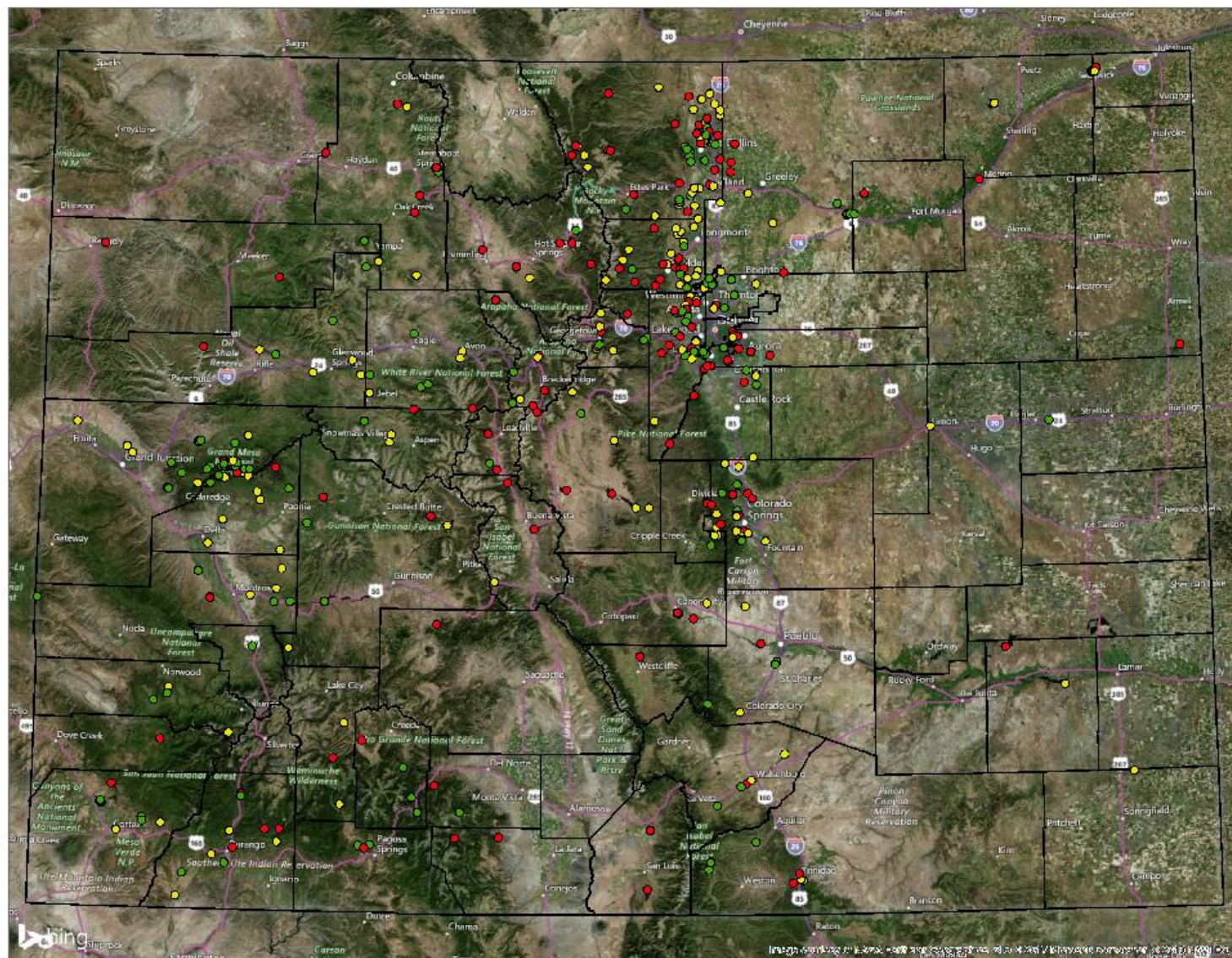
|   | | | | | |
|--|---|--|--|---|---|
| Dam Name | | Consequence Analysis | | | |
| | | < Hide | | | |
| | | First Impacted Downstream Road kmz | First Impacted Downstream Road Drainage Area (mi²) | First Impacted Downstream Structure kmz | First Impacted Downstream Structure Drainage Area (mi²) |
| CHAMBERS LAKE | ✓ | Google Earth | 35.20 | Google Earth | 138.17 |
| BOYD LAKE | ✓ | Google Earth | 23.83 | Google Earth | 23.84 |
| CACHE LA POUFRE | ✓ | Google Earth | 18.85 | Google Earth | 23.71 |
| OLYMPUS | ✓ | Google Earth | | Google Earth | |
| COMANCHE | ✓ | Google Earth | | Google Earth | |
| COBB LAKE | ✓ | Google Earth | 2.57 | Google Earth | 271.93 |
| PARK CREEK | ✓ | Google Earth | 4.29 | Google Earth | 4.30 |
| MILTON SEAMAN | ✓ | Google Earth | | Google Earth | |
| FOSSIL CREEK | ✓ | Google Earth | 30.23 | Google Earth | 31.10 |
| TERRY LAKE | ✓ | Google Earth | | Google Earth | |
| ELDER | ✓ | Google Earth | 2.93 | Google Earth | 2.93 |
| JOE WRIGHT | ✓ | Google Earth | 12.99 | N/A | N/A |
| WATER SUPPLY NO 3 | ✓ | N/A | N/A | Google Earth | 0.56 |
| PANHANDLE | ✓ | Google Earth | | Google Earth | |
| DRY CREEK | ✓ | Google Earth | 1.87 | Google Earth | 3.69 |
| NORTH POUDRE # 6 | ✓ | Google Earth | | Google Earth | |
| NORTH POUDRE # 3 | ✓ | Google Earth | | Google Earth | |
| FLOOD CONTROL BASIN NO. 1 | ✓ | Google Earth | | Google Earth | |
| DOUGLAS | ✓ | Google Earth | 51.10 | Google Earth | 57.70 |
| LOVELAND WATER STORAGE | ✓ | Google Earth | 1.26 | Google Earth | 314.63 |
| HOURLASS | ✓ | Google Earth | 17.51 | Google Earth | 20.52 |
| WATER SUPPLY NO 4 | ✓ | Google Earth | 1.01 | Google Earth | 1.05 |
| LONG DRAW | ✓ | Google Earth | 89.60 | Google Earth | 138.17 |
| INDIAN CREEK | ✓ | Google Earth | 19.00 | Google Earth | 19.00 |

Database - FEMA FIS Info

|   | | | | | | | |
|--|-----------------------------|--|---------------------|--------------------------|-------------------------|-------------------------|---------------------------|
| FEMA | | | | | | | |
| Dam Name | < Hide | | | | | | |
| | FIS Profile | Flooding Source and Location | Drainage Area (mi²) | PEAK DISCHARGES (cfs) | | | |
| | | | | 10-Percent Annual Chance | 2-Percent Annual Chance | 1-Percent Annual Chance | 0.2-Percent Annual Chance |
| CHAMBERS LAKE | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| BOYD LAKE | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| CACHE LA POUUDRE | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| OLYMPUS | FIS Profile | At Lake Estes Below Dry Gulch | 156 | 2250 | 3800 | 4700 | 7200 |
| COMANCHE | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| COBB LAKE | FIS Profile | Downstream of confluence w/Boxelder Ck | 1537 | 6750 | 13200 | 17400 | 32400 |
| PARK CREEK | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| MILTON SEAMAN | No Profile | N/A | N/A | N/A | N/A | N/A | N/A |
| FOSSIL CREEK | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| TERRY LAKE | FIS Profile | No data within vicinity of dam | | | | | |
| ELDER | FIS Profile | Upstream of Confluence with Dry Creek | | 5370 | 10200 | 13300 | 24100 |
| JOE WRIGHT | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| WATER SUPPLY NO 3 | FIS Profile | At Confluence with Cache La Poudre River | 63.3 | 381 | 805 | 1195 | |
| PANHANDLE | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| DRY CREEK | FIS Profile | No data within vicinity of dam | | | | | |
| NORTH POUUDRE # 6 | FIS Profile | No data within vicinity of dam | | | | | |
| NORTH POUUDRE # 3 | FIS Profile | At interstate 25 | 515 | 4300 | 8800 | 11500 | 21000 |
| FLOOD CONTROL BASIN NO. 1 | FIS Profile | At Confluence with Cache La Poudre River | 63.3 | 381 | 805 | 1195 | |
| DOUGLAS | FIS Profile | No data within vicinity of dam | | | | | |
| LOVELAND WATER STORAGE | FIS Profile | No data within vicinity of dam | | | | | |
| HOURGLASS | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| WATER SUPPLY NO 4 | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| LONG DRAW | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| INDIAN CREEK | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

[illegible]

Ranked Dams



Colorado High Hazard Dam Release - Downstream Floodplain Impacts Study

NOTES:

Basemap Service Layer Credits:
Bing Maps Hybrid - Image courtesy of
USGS Earthstar Geographics SIO © 2017
Microsoft Corporation © 2017 HERE © AND

Legend:

Release Risk

- High
- Moderate
- Low



0 15 30 60
Miles



Gannett Fleming

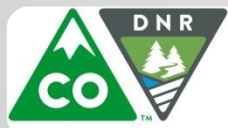
July 2017

Example 1 - Warren Lake

- Facts
 - Dam Height 23 ft
 - Storage capacity 2185 cfs
 - Spillway Capacity 1045 cfs
 - Drainage Basin 0.44 sq mi
 - Outlet Capacity 74 cfs
 - 2-yr stream stat 97 cfs
 - 100-yr stream stat discharge 3610 cfs
 - Population at risk 2541
 - Ranking 306 of 416
 - FEMA no data
 - Safe channel capacity 40 cfs

Single Dam Sheet

- Dam Height 23 ft
- Storage capacity 2185 cfs
- Drainage Basin 0.44 sq mi
- Spillway Capacity 1045 cfs
- Outlet Capacity 74 cfs
- 2-yr stream stat 97 cfs
- 100-yr stream stat discharge 3610 cfs
- Population at risk 2541
- Ranking 306 of 416
- FEMA no data
- Safe channel capacity 40 cfs



COLORADO
Division of Water Resources
Department of Natural Resources



Colorado Division of Water Resources
High Hazard Dam Release
Downstream Floodplain Impacts Study

WARREN LAKE

| | | |
|---------------|----------------------|------------------------------------|
| DAM ID | 030330 | Go to Google Earth |
| NID ID | CO00852 | Latitude 40.535 |
| County | LARIMER | Longitude -105.055 |
| Stream | CACHE LA POUDE RIVER | |

| | | | |
|--|------|---|----|
| Dam Drainage Area, DA (mi ²) | 1.45 | Outlet Works Capacity (cfs) | 74 |
| 100-Yr StreamStats Discharge (Q ₁₀₀) (cfs) | 3610 | Total Maximum Controlled Discharge, Q _{cont} (cfs) | 74 |
| Total Spillway Capacity, Q _{SW} (cfs) | 1045 | | |



Ranking Summary

| | | | |
|---|-----|---------------------------------------|-----|
| R1: DA/Q _{cont} | 195 | R4: Q ₁₀₀ /Q _{SW} | 339 |
| R2: Q ₁₀₀ /Q _{cont} | 195 | R5: 1/Q _{cont} | 216 |
| R3: Dist. To DS Town | 142 | R6: 1/Q _{SW} | 261 |

Composite Ranking 306 **LOW** Rankings reported out of 416 total dams

Consequence Analysis

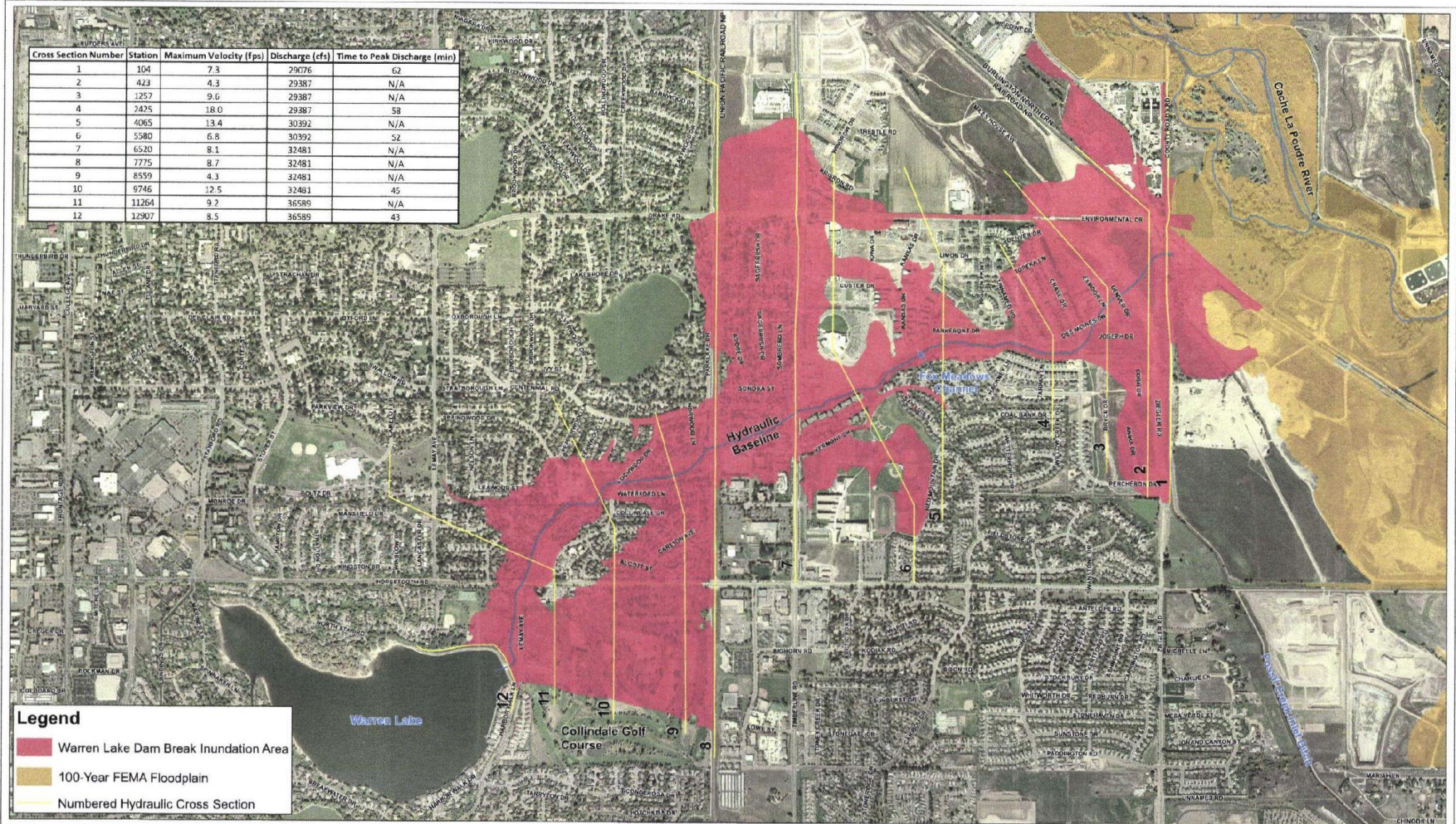
| | |
|----------------------------------|------|
| Population at Risk (PAR) | 2541 |
| Social Vulnerability Index (SVI) | -9.1 |

LOW

Estimated first impacted downstream road [View in Google Earth](#)
Estimated first impacted downstream structure [View in Google Earth](#)

| | LOW | MODERATE | HIGH |
|---------------|------------------|-------------|------------------|
| SVI | LESS THAN -4.7 | -4.7 TO 0.4 | GREATER THAN 0.4 |
| TOTAL RANKING | GREATER THAN 278 | 139 TO 278 | LESS THAN 139 |

Warren Lake Inundation Map



0 625 1,250 2,500 Feet
1 inch equals 625 feet

Warren Lake Reservoir Dam (ID #030330)
Dam Break Inundation Mapping
Ft. Collins, CO



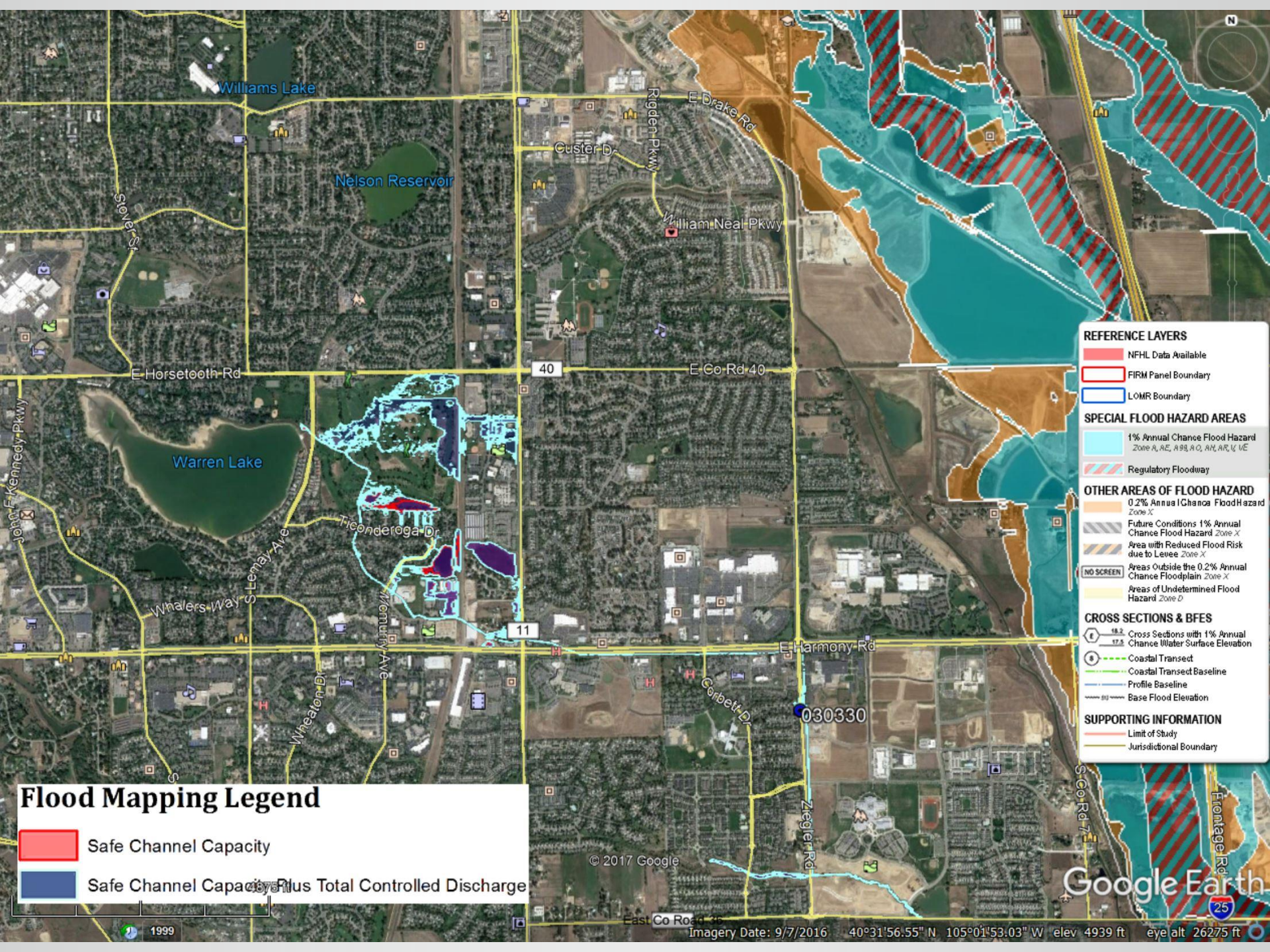
Anderson Consulting Engineers, Inc.
Civil • Water Resources • Environmental

1-18-11

Hydraulic Analysis Summary

| | |
|---|---|
| Dam Name | WARREN LAKE |
| Dam ID | 030330 |
| Safe Channel Capacity (cfs) | 40 |
| Safe Channel plus Total Max. Controlled Discharge Qcont (cfs) | 114 |
| | Safe Channel Capacity Mapping in Google Earth |
| Reference Flow 1 (cfs) | 98 |
| Reference Flow 1 Frequency and Source | 2-year (SS) |

Hydraulic Analysis Findings The safe channel capacity of the reach downstream of Warren Lake Dam is estimated to be 40 cfs. The maximum controlled discharge is 74 cfs. For comparison, the 2-year peak discharge estimated by StreamStats is 98 cfs. The downstream impact area is urban with high density. The first impacted road downstream of the dam is Ziegler Road. A small portion of the road may be inundated by approximately 0.5 feet at a peak discharge of approximately 40 cfs. The first impacted structures downstream of the dam are located southwest of intersection of S Timberline Road and Timberline Lane. The structure may be flooded at a peak discharge of approximately 40 cfs.



Flood Mapping Legend

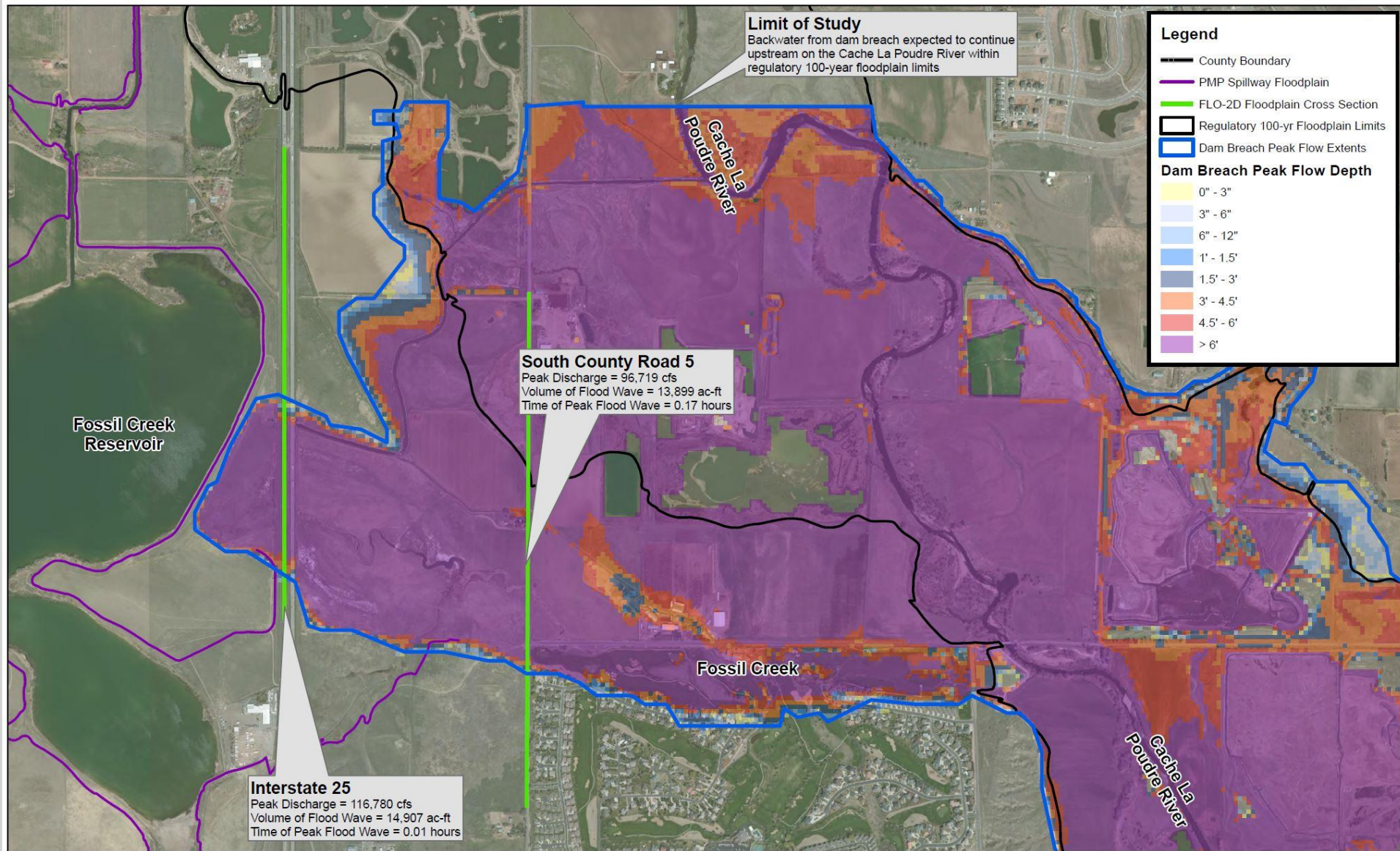
- Safe Channel Capacity
- Safe Channel Capacity Plus Total Controlled Discharge

- REFERENCE LAYERS**
- NFHL Data Available
 - FIRM Panel Boundary
 - LOMR Boundary
- SPECIAL FLOOD HAZARD AREAS**
- 1% Annual Chance Flood Hazard
Zone A, AE, A99, AO, AH, AR, X, VE
 - Regulatory Floodway
- OTHER AREAS OF FLOOD HAZARD**
- 0.2% Annual Chance Flood Hazard
Zone X
 - Future Conditions 1% Annual Chance Flood Hazard
Zone X
 - Area with Reduced Flood Risk due to Levee
Zone X
 - Areas Outside the 0.2% Annual Chance Floodplain
Zone X
 - Areas of Undetermined Flood Hazard
Zone D
- CROSS SECTIONS & BFES**
- Cross Sections with 1% Annual Chance Water Surface Elevation
 - Coastal Transect
 - Coastal Transect Baseline
 - Profile Baseline
 - Base Flood Elevation
- SUPPORTING INFORMATION**
- Limit of Study
 - Jurisdictional Boundary

Warren Lake - Zone X



Fossil Creek Dam - Inundation Map



Example - Fossil Creek Dam

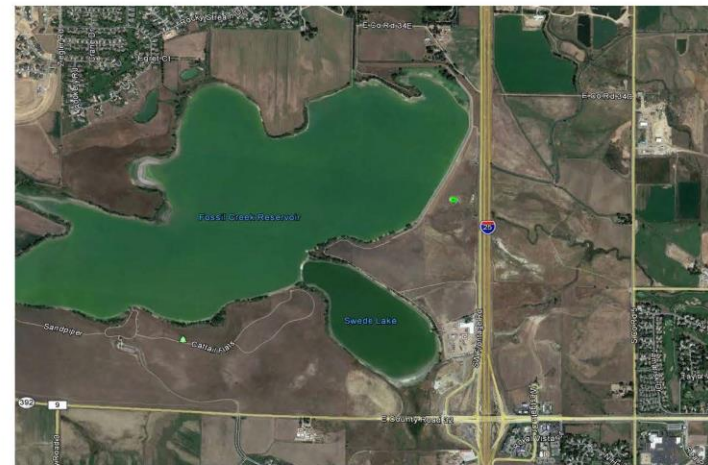
- Dam Height 42 ft
- Storage capacity cfs
- Drainage Basin 29 sq mi
- Spillway Capacity 88,100 cfs
- Outlet Capacity 393 cfs
- 2-yr stream stat 516 cfs
- 100-yr stream stat discharge 14,900 cfs
- Population at risk
- Ranking 74
- FEMA no data
- Safe channel capacity 616 cfs



Colorado Division of Water Resources
High Hazard Dam Release
Downstream Floodplain Impacts Study

FOSSIL CREEK

| | | | |
|--|--------------|---|----------|
| DAM ID | 030135 | Go to Google Earth | |
| NID ID | CO01165 | Latitude | 40.492 |
| County | LARIMER | Longitude | -104.994 |
| Stream | FOSSIL CREEK | | |
| Dam Drainage Area, DA (mi ²) | 29.09 | Outlet Works Capacity (cfs) | 393 |
| 100-Yr StreamStats Discharge (Q ₁₀₀) (cfs) | 14900 | Total Maximum Controlled Discharge, Q _{cont} (cfs) | 393 |
| Total Spillway Capacity, Q _{SW} (cfs) | 88100 | | |



Ranking Summary

| | | | |
|---|-----|---------------------------------------|-----|
| R1: DA/Q _{cont} | 120 | R4: Q ₁₀₀ /Q _{SW} | 166 |
| R2: Q ₁₀₀ /Q _{cont} | 191 | R5: 1/Q _{cont} | 89 |
| R3: Dist. To DS Town | 142 | R6: 1/Q _{SW} | 10 |

Composite Ranking 74 **HIGH** Rankings reported out of 416 total dams

Consequence Analysis

| | |
|---|--------------------------------------|
| Population at Risk (PAR) | N/A |
| Social Vulnerability Index (SVI) | N/A |
| Estimated first impacted downstream road | View in Google Earth |
| Estimated first impacted downstream structure | View in Google Earth |

| | LOW | | MODERATE | | HIGH |
|---------------|------------------|--|-------------|--|------------------|
| SVI | LESS THAN -4.7 | | -4.7 TO 0.4 | | GREATER THAN 0.4 |
| TOTAL RANKING | GREATER THAN 278 | | 139 TO 278 | | LESS THAN 139 |

Hydraulic Analysis Summary

| | |
|---|---|
| Dam Name | FOSSIL CREEK |
| Dam ID | 030135 |
| Safe Channel Capacity (cfs) | 616 |
| Safe Channel plus Total Max. Controlled Discharge Qcont (cfs) | 1009 |
| | Safe Channel Capacity Mapping in Google Earth |
| Reference Flow 1 (cfs) | 516 |
| Reference Flow 1 Frequency and Source | 2-year (SS) |
| Reference Flow 2 (cfs) | 3450 |
| Reference Flow 2 Frequency and Source | 10-year (SS) |

Hydraulic Analysis Findings The safe channel capacity of the reach downstream of Fossil Creek Dam is estimated to be 616 cfs. The maximum controlled discharge is 393 cfs. For comparison, the 2-year peak discharge estimated by StreamStats is 516 cfs; the 10-year peak discharge estimated by StreamStats is 3450 cfs. The downstream impact area is rural. The first impacted roads downstream of the dam are South County Road 5, South County Road 3, and County Road 32 East. The roads may be overtopped at a peak discharge of approximately 616 cfs. The first impacted structure downstream of the dam is located at the end of Watson Drive. The residential house may be flooded at a peak discharge of approximately 616 cfs.

Flood Mapping Legend

- Safe Channel Capacity
- Safe Channel Capacity Plus Total Controlled Discharge

REFERENCE LAYERS

- NFHL Data Available
- FIRM Panel Boundary
- LOMR Boundary

SPECIAL FLOOD HAZARD AREAS

- 1% Annual Chance Flood Hazard
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard
- Future Conditions 1% Annual Chance Flood Hazard
- Area with Reduced Flood Risk due to Levee
- Areas Outside the 0.2% Annual Chance Floodplain
- Areas of Undetermined Flood Hazard

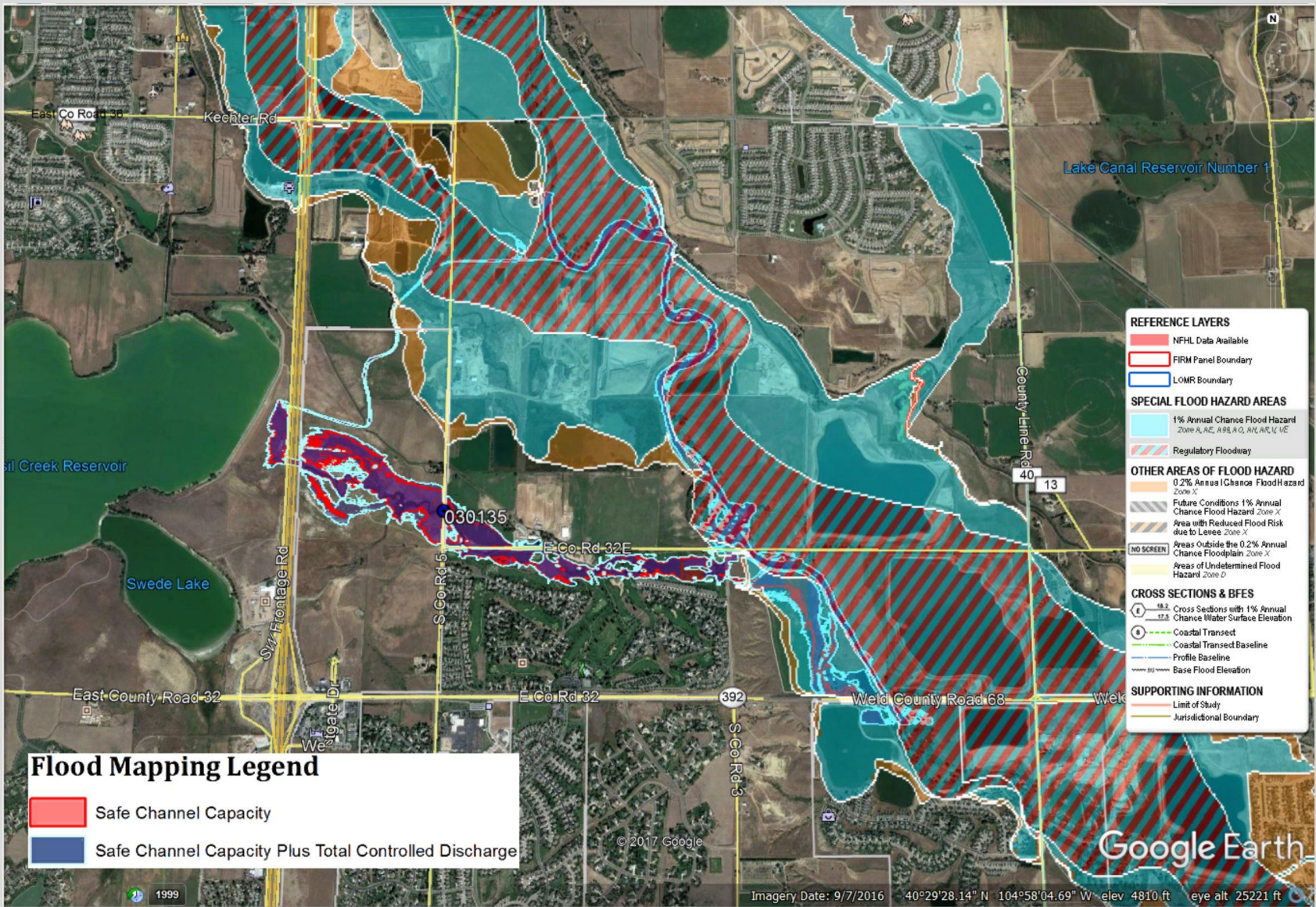
CROSS SECTIONS & BFES

- Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Base Flood Elevation

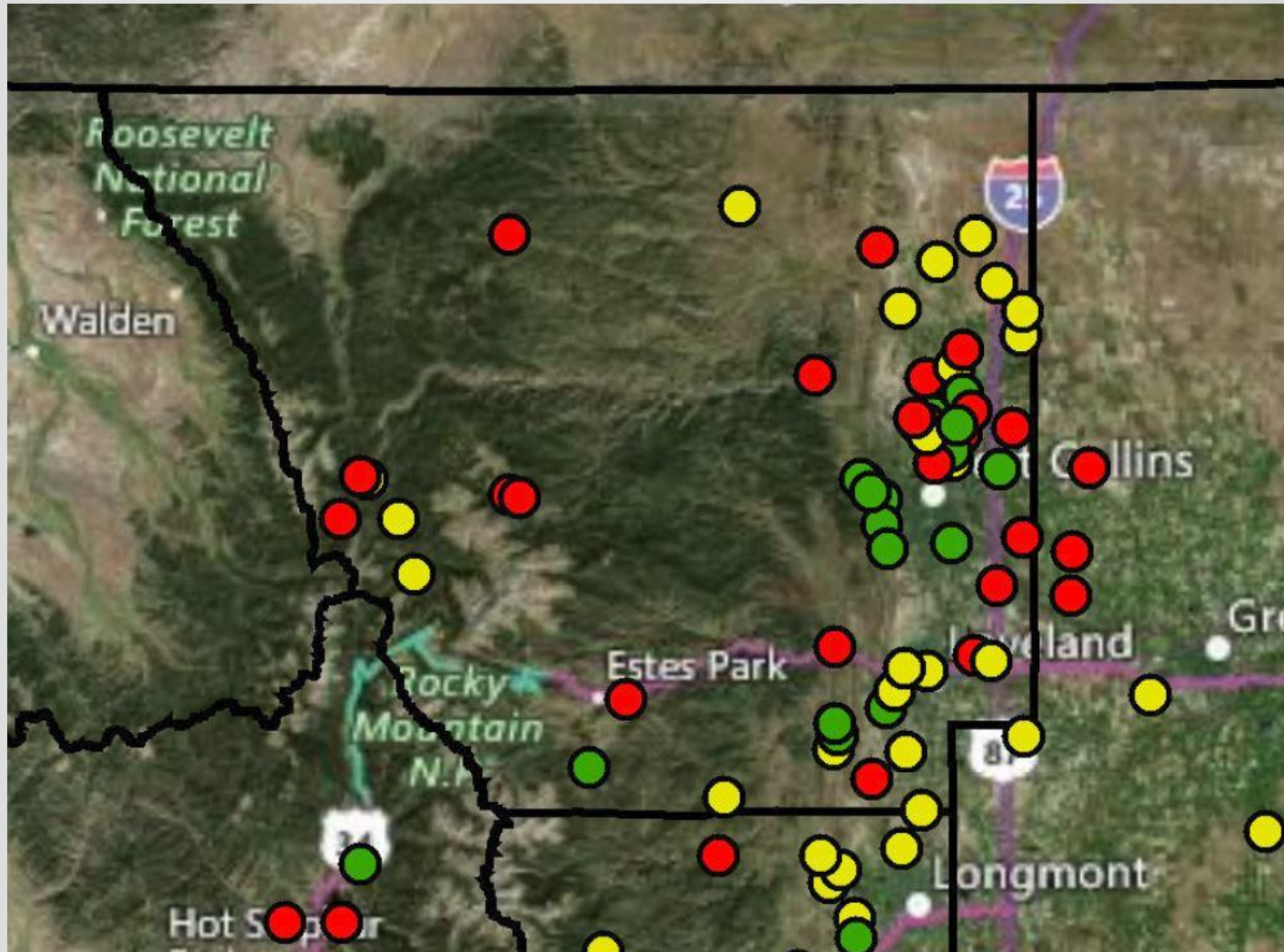
SUPPORTING INFORMATION

- Limit of Study
- Jurisdictional Boundary

Imagery Date: 9/7/2016 40°29'28.14" N 104°58'04.69" W elev 4810 ft eye alt 25221 ft



Larimer County High Hazard Dam Release High Risk Rankings (21)



Message

- We know the Risk exists
- Colorado Dam Safety has attempted to define and rank the severity of the risk
- We now have a tool for screening level ranking
- Examples demonstrate utility of detailed evaluations
- Floodplain and Emergency managers can use this screening level information to assess their risks
- Floodplain and Emergency managers make the decision on where additional detailed safe channel capacity analysis should be done

Questions - Next Steps

- Do Floodplain and Emergency managers have authority to further assess the risk of High Hazard Dam releases in their areas?
- Do Floodplain and Emergency managers have a responsibility to further assess the risk of High Hazard Dam releases in in their areas?
- Are Floodplain and Emergency managers willing to use this info to further assess the risk of High Hazard Dam releases in in their areas?
- Would NDSP Research Workgroup consider funding a pilot project with CO Dam Safety and City of Ft Collins/Larimer Cty, CO to further these efforts?

Questions?

Sunday SEPTEMBER 15, 2013 • DENVERPOST.COM • THE DENVER POST

★★ SECTION B

DENVER & THE WEST

DONATE: Contribute to flood-relief efforts. »2B

FORECAST: More rain expected Sunday. »6B

Front Range Flooding

“Normal has changed”

Fifth person presumed dead while authorities work to get hundreds to safety



Jon Cook drives down Hygiene Road with his father, Bob, while looking over flooding of neighboring properties Saturday in Hygiene. Resident of the town helped one another salvage personal belongings from flooded homes. Craig F. Walker, The Denver Post



COLORADO
Division of Water Resources

Department of Natural Resources

Image Source: Denver Post