Trego Hydroelectric Project
FERC Project No. 2711

Exhibit A
Description of Project

Final License Application

Prepared for

Northern States Power Company
a Wisconsin Corporation

Prepared by

Mead & Hunt
meadhunt.com

November 2023

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APPENDICES

LIST OF ABBREVIATIONS

Applicant	Northern States Power Company, a Wisconsin corporation
cfs	cubic feet per second
DSM	demand side management
FERC	Federal Energy Regulatory Commission
FLA	Final License Application
FOE	Focus on Energy
kV	Kilovolt
kVA	Kilovolt-Ampere
kW	Kilowatt
MSL	mean sea level
MWh	Megawatt-hours
NGVD	National Geodetic Vertical Datum, 1929
NSPW	Northern States Power Company, a Wisconsin corporation
O&M	Operation and management
Project	Trego Hydroelectric Project
PURPA	Public Utility Regulatory Policies Act
USGS	United States Geological Survey

1. Project Description

The Trego Hydroelectric Project (Project) is owned and operated by Northern States Power Company, a Wisconsin Corporation (NSPW, Applicant, or Licensee). The Project is located on the Namekagon River in the Town of Trego, Washburn County, Wisconsin approximately 100 miles northeast of the City of Minneapolis, Minnesota. **Appendix A-1** includes a map depicting the general location of the Project. **Appendix A-2** includes an aerial photograph showing the Project's primary facilities. The Project has an authorized capacity of 1,200 kilowatts (kW) and includes a reservoir, dam, powerhouse, tailrace or tailwater, transmission equipment, and appurtenant equipment. These features are described in the following paragraphs.[1]

2. Description of Dam Structures

The dam is approximately 642 feet long[2] and 43.5 feet high.[3] From left to right looking downstream, the main structures of the dam consist of a left earth embankment, powerhouse, sluice spillway, radial gate spillway, and a right earth embankment.

2.1 Earth Embankments

The dam features two earth embankments. From a perspective looking downstream, there is the left earth embankment and the right earth embankment. The powerhouse, sluice spillway, and radial gate spillway separate the left and right embankments.

2.1.1 Left Earth Embankment

The left earth embankment extends approximately 110 feet from the left bank to the left end of the powerhouse. It has a maximum height of approximately 35 feet[4] with an approximately 15-foot-wide crest at elevation 1040.0 feet National Geodetic Vertical Datum (NGVD).[5] The upstream face slopes at 3:1 (H:V) to elevation 1029.0 feet NGVD where there is a 3-foot-wide horizontal bench followed by a 3:1 slope to tie into natural ground. The downstream face has an approximately 19-foot-wide horizontal bench that serves as a driveway to the powerhouse followed by a 1.5:1 slope to an old road cross section that ties into natural ground.

The embankment is vegetated with grass and weeds and is constructed of sandy fill material with a concrete core wall that extends approximately 80 feet from the left end of the powerhouse and has a top of wall elevation of 1036.0 feet NGVD. Approximately 50 feet of the core wall from the left end of the powerhouse has steel sheet piling extending from the bottom of the concrete core wall into a hardpan layer beneath the native sand and gravel soils. Beyond the sheet piling, the core wall is founded on native sand and gravel soils. Riprap protects the upstream face of the embankment above elevation 1029.0 feet NGVD.

[1] Unless otherwise cited, all facility description attributes are from the Supporting Technical Information Document dated March 2017 (NSPW, 2017).
[2] Left earth embankment 110 feet, powerhouse 60 feet, sluice spillway 6 feet, radial gate spillway 86 feet, and right earth embankment 380 feet.
[3] The top of the operator deck on the radial gate spillway is elevation 1042.0 feet NGVD and the river bottom downstream is 998.5 feet NGVD per Exhibit F-2. For the purposes of this application, mean sea level (MSL) and NGVD are considered the same datum.
[4] The height is based on the difference in elevation between the crest and the upstream toe as shown on NSPW drawing NX-55236.
[5] The crest elevation is shown on Exhibit F-2.

2.1.2 Right Earth Embankment

The right earth embankment extends approximately 380 feet from the right abutment of the radial gate spillway to the right bank. It has a maximum height of approximately 35 feet[6] with an approximately 12-foot-wide crest at elevation 1040.0 feet NGVD.[7] The upstream face slopes at 3:1 to elevation 1029.0 feet NGVD where there is a 3-foot-wide horizontal bench followed by a 3:1 slope to tie into natural ground. The downstream face slopes at 2:1 to tie into either an old road cross section or natural ground.

The embankment is vegetated with grass and weeds and is constructed of sandy fill material with a concrete core wall that extends approximately 200 feet from the right end of the radial gate spillway and has a top of wall elevation of 1036.0 feet NGVD. Approximately 90 feet of the core wall from the right end of the radial gate spillway has steel sheet piling extending from the bottom of the concrete core wall into a hardpan layer beneath the native sand and gravel soils. Beyond the sheet piling, the core wall is founded on native sand and gravel soils. Riprap protects the upstream face of the embankment above elevation 1029.0 feet NGVD, and articulated concrete block protects an area near the toe of the downstream face adjacent to the end of the radial gate spillway retaining wall.

2.2 Powerhouse

The powerhouse is 59.5 feet long (left to right) and extends approximately 99 feet downstream from its upstream foundation wall to the downstream end of the tailrace apron (58 feet for the powerhouse substructure and 41 feet for the tailrace apron) (NSPW, 1991). The overall height of the powerhouse is 74 feet. The substructure is concrete and the superstructure is brick masonry that extends approximately 32 feet from the generator floor to the roof. The substructure extends 42 feet from the invert of the draft tube bay at elevation 995.0 feet NGVD to the generator floor at elevation of 1037.0 feet NGVD.

A 16.5-foot-long partial extension of the upper portion of the powerhouse substructure extends southwestward and into the left earth embankment. The extension increases the overall length of the affected portion of the substructure to 59.5 feet. The flood elevation of this partial extension is approximately 30 feet higher than the invert of the draft tube bay. The top of the extension matches the powerhouse floor elevation of 1037.0 feet NGVD. The southwest wall of this extension is supported by bearing piles. This extension provides an approximately 15-foot by 28-foot basement area for the powerhouse which contains a boiler room for the heating system, storage room, and restroom.

The powerhouse is founded on hardpan located approximately 8 feet below the river bottom. This hardpan layer is approximately 15 feet thick. Sand and gravel underlie the hardpan. Steel sheet piling is driven 13 feet into the hardpan along the entire length of the powerhouse.

The powerhouse also contains an integral intake structure, turbines, and generators and forms a tailrace downstream.

2.2.1 Intake Structure

The integral intake structure is vertically separated into two bays. The left passage is 13.5 feet wide, and the right passage is 21 feet wide (NSPW, 1991). The intake has a total width of 37 feet with the top of the

[6] The height is based on the difference in elevation between the crest and the upstream toe as shown on NSPW drawing NX-55236.
[7] The crest elevation is shown on Exhibit F-1.

intake deck at elevation 1036.0 feet NGVD. The trash rack sills are at elevation 1014.0 feet NGVD while the floor of each flume is two feet higher at elevation 1016.0 feet NGVD (NSPW, 1991).

The top of the trashracks in both bays is angled downstream 15° from vertical to facilitate cleaning. Their height as measured along the angled axis is 17.75 feet with a flow height of 17.5 feet.[8] The trashracks are submerged at all times under the required reservoir operating elevations and have a clear spacing of 1.5 inches.

Trashrack raking is conducted on an as-needed basis year-round. Raking is typically not necessary during the winter while summer raking is conducted every couple weeks. Spring and fall experience the most debris and thus require the most raking with fall being the busiest. Woody debris and vegetation are passed downstream, while trash is removed and disposed with other trash at the facility.

2.2.2 Turbines

The Project contains two James Leffel Company vertical Francis-Type turbines (NSPW, 1991). Unit #1 has a 56-inch runner and a rated capacity of 1,095 horsepower at 164 revolutions per minute with a minimum discharge capacity of 140 cfs and a maximum discharge capacity of 385 cfs (NSPW, 1991).Unit #2 has a 47.5-inch runner and a rated capacity of 785 horsepower at 180 revolutions per minute with a minimum discharge capacity of 100 cfs and a maximum discharge capacity of 278 cfs (NSPW, 1991).

The powerhouse has a minimum hydraulic capacity of 100 cfs and a maximum hydraulic capacity of 663 cfs (NSPW, 1991). The average head at the Project is 31 feet.

2.2.3 Generators

The powerhouse features two generators manufactured by Electric Machinery Manufacturing Company. Unit 1 consists of an 875 kilovolt-Ampere (kVA), 700 kilowatt (kW) generator at 80% power factor and 2.4 kilovolt (kV), 60 cycle, 164 rpm alternator. The unit is controlled by an oil pressure governor (NSPW, 1991). Unit 2 consists of a 625 kVA, 500 kW generator at 80% power factor and 2.4 kV, 60 cycle, 180 rpm alternator. The unit is controlled by an oil pressure governor (NSPW, 1991).

2.2.4 Tailrace

The tailrace is approximately 130 feet wide and extends downstream from the powerhouse for approximately 70 feet. Both the powerhouse and spillways discharge directly to the Namekagon River. The tailrace has a depth of approximately 9 feet at the downstream edge of the powerhouse under a normal tailwater elevation of 1004.0 feet NGVD.

2.3 Sluice Spillway

The sluice spillway is located adjacent to the right end of the powerhouse and is a 6-foot-wide former log sluice that has an Obermeyer crest gate at the upstream end of the sloping floor. The spillway extends 45 feet from the bottom of the foundation slab at elevation 997.0 feet NGVD to the top of the operating deck at elevation 1042.0 feet NGVD. The spillway is an approximately 99-foot-long hollow concrete structure composed of a foundation slab, upstream wall, and sloping floor with training walls connecting the

[8] The height is scaled from Exhibit F-2.

upstream sill at elevation 1028.0 feet NGVD to the stilling basin apron at elevation 998.5 feet NGVD. The interior of the hollow section is partially filled with sand to elevation 1005.0 feet NGVD.

The spillway contains a 6-foot-wide by 8-foot-high pneumatically operated Obermeyer gate. There is a bubbler pipe in front of the gate and the concrete on the sides of the gate is heated via pex pipe located within the concrete for winter operations.

2.4 Radial Gate Spillway

The radial gate spillway is an Ambursen dam that is approximately 86 feet long and extends 112 feet downstream from its upstream foundation wall to the downstream end of the stilling basin. The spillway is 45 feet high from the bottom of the foundation slab elevation of 997.0 feet NGVD to the top of the operating deck at elevation 1042.0 feet NGVD.[9] The spillway contains three steel radial gates that are each 25.5 feet wide by 10 feet high separated by 2.5-foot-wide concrete piers. The center gate is heated for winter operations. The gate sill elevation is 1026 feet NGVD and top of gate elevation is 1036.0 feet NGVD when closed. The gates are lifted by a traveling gate hoist. A sloping 28-foot-long concrete apron with end sill basin is located downstream of the spillway (NSPW, 1991).

3. Description of Reservoir

The reservoir encompasses 435.2 acres with a gross storage capacity of approximately 4,352 acre-feet at the maximum reservoir elevation of 1,035.2 feet NGVD. It has a maximum depth of 35 feet at the dam and an estimated average depth of 10 feet. The substrate consists of 95% sand and 5% muck (WI Department of Natural Resources, n.d.). The drainage area at the Project is 488 square miles (NSPW, 1991).

4. Transmission and Substation Equipment

There is a 40-foot-long, 2.4 kV, three phase 500 MCM 5 kV cable extending from the powerhouse to a 2,000 kVA, 2.4 kV to 23.9 kV transformer housed in the 16-foot by 32-foot substation attached to the east side of the powerhouse. The high voltage side of the transformer is the point of interconnect with NSPW's non-project distribution system and NSPW is the entity receiving the Project generation.

5. Appurtenant Equipment

Appurtenant equipment includes, but is not limited to, bearing lubrication systems, powerhouse ventilation systems, spillway gate lifting equipment, protective devices, and metering devices.

6. Project Operation

The Project currently operates in a run-of-river mode where discharge measured immediately downstream of the Project tailrace approximates the sum of inflows into the Project reservoir. This mode of operation minimizes the potential for adverse impacts on water quality, aquatic habitat, and other aquatic resources. NSPW maintains a target reservoir elevation of 1,034.9 feet NGVD, with fluctuations limited to 0.3 feet around the target elevation (i.e., between 1,034.6 feet and 1,035.2 feet NGVD).

[9] Elevations taken from Exhibit F-2.

Under the proposed operation, just prior to spring runoff or for emergency operations, the Applicant may deviate from the maximum reservoir elevation by no more than 0.5 feet to remove ice from the spillway for dam safety purposes. The duration of the deviation shall be no longer than necessary (typically less than a few days) to remove the ice and will be conducted as a planned deviation under the requirements outlined in Section 5.5 of Exhibit E.

NSPW is not proposing any material changes to operations under the subsequent license.[10]

An operator is assigned to oversee the daily operation and routine maintenance of both the Trego and Hayward Projects. Eight-hour coverage is provided five days a week, Monday-Friday. The operator for the facility is on call 24 hours per day, seven days per week. The plant is manually operated with controls installed for automatic shutdown in case of operational emergencies. Whenever a unit or plant shutdown occurs, or if there is a high or low water alarm, the continually staffed control center at the Licensee's Wissota Hydroelectric Project is automatically notified.

For emergency operation of the facility, an operator is available 24 hours a day and can also be supported by the operator from White River Hydro, local line crews, the Ashland Bay Front Plant maintenance staff, and personnel from NSPW's Hydro Maintenance Department in Chippewa Falls, Wisconsin.

7. Safe Management, Operation, and Maintenance

NSPW has a robust Owners Dam Safety Program (ODSP) that incorporates all dam safety inspection requirements, monitoring responsibilities, and communications as required by the Federal Energy Regulatory Commission (FERC) for a dam of this classification. NSPW also ensures that adequate resources are available to fulfill all the requirements and obligations under the ODSP. The ODSP was revised and submitted to FERC on June 28, 2019 (NSPW, 2019).

NSPW developed a public safety plan in consultation with the FERC. The plan is reviewed on an annual basis to determine if changes are necessary. The plan was last updated in 2015 (NSPW, 2015).

8. Average Annual Generation

Average annual generation for the Trego Project averaged approximately 8,732 Megawatt-hours (MWh) for the five-year period ending in 2022. Annual generation figures from 2018 to 2022 are shown in **Table A-1**.

Table A-1 Annual Generation from 2018 to 2022

Year	Annual Generation (MWh)
2018	9,389
2019	9,838
2020	9,325
2021	7,858
2022	7,249
5-year average	8,732

[10] Due to the short duration of the ice removal events, the proposed deviations for ice removal are not considered a material change in operations.

9. River Flow Characteristics

The Trego Dam has a drainage area of 488 square miles. Monthly flow duration curves for the Trego Project were developed based on NSPW's operational data. While there is a USGS gage in the vicinity of the Trego Project, it does not record the daily flow data necessary to develop flow duration curves. The USGS Gage No. 05331833 at Leonards, Wisconsin, which does provide daily flow data, is not located close enough to the Project to provide statistically accurate flow information. Based on NSPW's data for the period of January 2017 to December 2022, the mean flow at the Project was 588 cfs. The maximum annual calendar year flow at the Project was 722 cfs in 2019 and the minimum annual calendar year flow was 463 cfs in 2022. Monthly minimum, average, and maximum flows at the Trego Project from 2017 to 2022 are shown in **Table A-2**.

Table A-2 Monthly Flows at the Trego Project, 2017 to 2022[11]

Month	Minimum Monthly Flow (cfs)	Mean Monthly Flow (cfs)	Maximum Monthly Flow (cfs)
January	336	472	901
February	320	448	1,013
March	326	575	1,283
April	474	862	2,063
May	444	798	1,819
June	386	667	2,020
July	327	520	840
August	319	474	995
September	236	533	1,015
October	306	664	1,463
November	334	562	870
December	311	489	828

Source: (Mead & Hunt, 2023)

Streamflow duration data refers to the percentage of time a given flow is equaled or exceeded. Monthly flow duration curves and the annual exceedance table are based on data collected for the period of record from January 2017 to December 2022 and are included in **Appendix A-3**.

NSPW is not proposing any material changes in Project operations.[12]

10. Purpose of the Project

The purpose of the Project is to generate renewable hydroelectric energy. NSPW is a public utility that produces, purchases, transmits, and distributes power to retail customers. The power generated by the Trego Hydroelectric Project is delivered to NSPW's system for sale to customers.

[11] Flow data developed from NSPW operational records.
[12] Due to the short duration of the ice removal events, and their timing during high-inflow periods (which coincides with the natural hydrologic cycle), the proposed planned deviations for ice removal are not considered a material change in operations.

11. Estimated Project Cost

The Project is an existing FERC licensed facility. As of December 31, 2022 the net book value (net investment) was calculated at $227,703 and the gross book value was calculated at $1,916,897. These figures will include the land and land rights, structures and improvements, waterway improvements, generating equipment, accessories, and miscellaneous equipment.

12. Estimated Costs of Proposed Environmental Measures[13]

The estimated capital and additional annual Operation and Maintenance (O&M) costs for proposed environmental measures are outlined in **Table A-3**.

Table A-3 Estimated Capital and Additional O&M Costs for Proposed Environmental Measures at the Trego Project

Item	Capital Cost	O&M Cost
Develop Aquatic and Terrestrial Species Plan and conduct biennial invasive surveys.	$40,000	$25,000/35,000[14]
Conduct an erosion survey of the Project's shoreline, including the tailwater area, within 5 years of license issuance and every 5 years thereafter. However, the frequency may be reduced based upon the results from the previous surveys.	$0	N/A[15]
Develop Historic Properties Management Plan in consultation with the Wisconsin SHPO, NPS, and interested Native American Nations to follow requirements outlined in the 1993 Programmatic Agreement.	$20,000	$25,000[16]
Provide a one-time payment not to exceed $150,000 to the TLD to conduct invasive species management and control activities over the term of the subsequent license. This one-time commitment would be in lieu of the annual reimbursement NSPW currently provides TLD for aquatic vegetation harvesting.	$150,000	$1,000[17]
Develop a Compliance Monitoring Plan including deviation reporting and agency consultation requirements	$50,000[18]	$5,000

[13] The costs included in this section are new costs to the Project for the environmental measures and do not include the previous costs for similar measures implemented under the current license. The costs for the similar measures implemented under the current license are included in the historical O&M costs outlined in Section 17.
[14] $25,000 is the cost per rapid response survey, $35,000 is the cost per ATIS survey.
[15] Cost for shoreline erosion survey is listed with the cost for the HPMP survey every 10 years.
[16] $20,00 is the additional cost per survey event every 10 years. $5,000 is the annual cost to implement the HPMP.
[17] The additional O&M cost listed is the annualized cost for NSPW to file a report with the Commission every three years discussing the annual management activities completed by the TLD utilizing the one-time payment,
[18] Capital costs include $20,000 for the display of operations data on a website and $30,000 for development of the plan.

Item		Capital Cost	O&M Cost
Recreational Measures	At the South Tailwater Access, review and maintain or improve signage, including Part 8 signage to ensure it meets current FERC standards and add signage to include a map showing the location of all public recreation facilities that provide water access within the Project boundary.	$7,000	$500[19]
	At the North Tailwater Access, review and maintain or improve signage, including portage trail directional signage, and Part 8 signage to ensure it meets current FERC standards and add signage to include a map showing the location of all public recreation facilities that provide water access within the Project boundary.	$7,000	$500
	The walk-through gate opening will be widened to allow easier carry-in access.	$2,000	$0
	Continue to maintain the existing portable restroom facilities at the North Tailwater Access/Canoe Portage site during the open water recreation season during the term of the license.	$0	$0
	Conduct routine maintenance of NSPW's FERC-approved recreation sites over term of license.	$0	$2,000
	Conduct recreational site monitoring and prepare a report every 6 years as currently required under Article 408 of the Existing Trego License	$0	$35,000
	Implement the Cave Bat BITP/A for any routine vegetation maintenance at NSPW's FERC-approved recreation sites.	$0	$1,000
	Implement Wood Turtle BITP/A for maintenance work at NSPW's FERC-approved recreation sites as long as the turtle remains a listed species.	$0	$1,000
Total Cost		**$276,000**	**$N/A[20]**

*cost per survey event

[19] Additional O&M cost for maintenance of new signage.
[20] The total O&M costs are not listed here because not all the costs are incurred annually.

13. License Application Development Costs

The costs for NSPW to relicense under the Traditional Licensing Process through the filing of the Final License Application (FLA) are estimated to be $277,870.

14. Estimated Value of On-Peak and Off-Peak Power

The Project operates in a run-of-river mode of operation; therefore, this section is not applicable.

15. Average Annual Increase or Decrease in Project Generation and Value of Power Due to Changes in Project Operations

NSPW is not proposing a change in Project operation. Therefore, no changes in generation are expected and the average annual amount and value of project power for the term of the new license is projected to remain the same.

16. Remaining Undepreciated Net Investment, or Book Value, of the Project

The undepreciated net investment of the Project is $227,703 (book cost of $1,916,897 less accumulated depreciation of $1,689,194).

17. Annual Operation and Management Costs

The average annual cost to operate and maintain the Trego Project for the period 2018-2022 is $207,283. These costs are outlined in **Table A-4** and include general O&M expenses, insurance, taxes, and depreciation. A breakdown of the individual components of the general O&M expense category is shown in **Table A-5**.

Table A-4 Annual Operation and Management Costs for the Trego Project

Item	Cost
General O & M Expenses (5-year average)	$129,791
Insurance	N/A[21]
2022 Property Taxe207,283	$12,289
2022 Depreciation	$65,203
Average Annual O & M Cost	**$207,283**

Table A-5 Cost Breakdown of General O&M Expense Category[22] (2018 to 2022

Cost	2018	2019	2020	2021	2022	2018-2022 Mean
Employee Expenses	$1,402	$3,679	$2,639	$3,195	$1,189	$2,367
IT Costs	$984	$0	$0	$0	$0	$984

[21] NSPW pays a lump sum for insurance costs per operating company (i.e., NSPW, NSPM), therefore there are no insurance costs specific to the Trego Project.
[22] Includes administrative costs.

Cost	2018	2019	2020	2021	2022	2018-2022 Mean
Labor	$82,629	$107,057	$91,696	$91,831	$84,600	$91,583
Materials & Commodities	$8,613	$18,848	$7,893	$7,768	$4,050	$9,435
Miscellaneous	$24,574	$19,725	$14,259	$16,511	$15,284	$18,071
Outside Services	$4,627	$16,121	$3,803	$15,294	$952	$8,160
Total General O&M Costs	**$122,829**	**$165,430**	**$120,020**	**$134,599**	**$106,075**	**$129,791**

18. One-Line Diagram of Electrical Circuits

The One-line Diagram of Electrical Circuits is shown in **Appendix A-4**.

19. Lands of the United States

The Trego Project is located within the St. Croix National Scenic Riverway, which was established as a result of the enactment by Congress of the Wild and Scenic Rivers Act in 1968 (National Park Service, n.d.). However, there are no federal land reservations within the current or proposed Project boundaries.

20. Public Utilities Regulatory Policy Act

The Licensee is not seeking benefits under the Public Utility Regulatory Policies Act (PURPA) as it pertains to the Projects.

21. Supporting Design Report

A supporting design report for the Trego Project, considered Critical Energy Infrastructure Information, is already on file with the Commission for this Project.

22. Applicant's Electricity Consumption Efficiency Improvement Programs

The Applicant is committed to energy conservation by using demand side management (DSM) measures as a means to meet customer energy needs. Cost-effective DSM resources, in the form of capacity and energy savings, are in essence "purchased" from the customer through incentives, subsidies, rate structures, or other means needed to meet system DSM goals and commitments. NSPW offers programs for its residential, business, and agricultural customers. Specific options in these programs include but are not limited to:

Residential Programs

- Residential Rate Plans
    - Time of Day Service
    - Optional Off-Peak Service
    - Savers Switch Credit
- Residential Rewards {Focus on Energy (FOE)[23]}
    - Energy Saving Tips
    - Home rebates
        - Home Performance
        - Simple Energy Efficiency
        - New Homes
- Renewable Choices
    - Renewable Connect
    - Solar Connect Community
    - Net metering

Business Programs

- Equipment Rebates
- Energy Audits
- Renewable Programs
    - Renewable Connect
    - Solar
    - Working with Third Party Providers
- Energy Efficient Buildings
    - Multi-Family Building Efficiency (FOE)
    - Custom Efficiency
    - Efficient Facilities (FOE)
    - Energy Benchmarking
- Rate Programs
    - Electric Rate Savings
    - Savers Switch for Business

Farm Programs

- Farm Rewiring
- Agriculture and Farm Rebates

NSPW's conservation programs have been approved by the Public Service Commission of Wisconsin.

[23] Funded through the Focus on Energy® program. Focus on Energy® is Wisconsin's energy efficiency and renewable resource program. It is funded by Wisconsin's investor-owned utilities and participating municipal and electric cooperative utilities, including NSPW's parent company, Xcel Energy.

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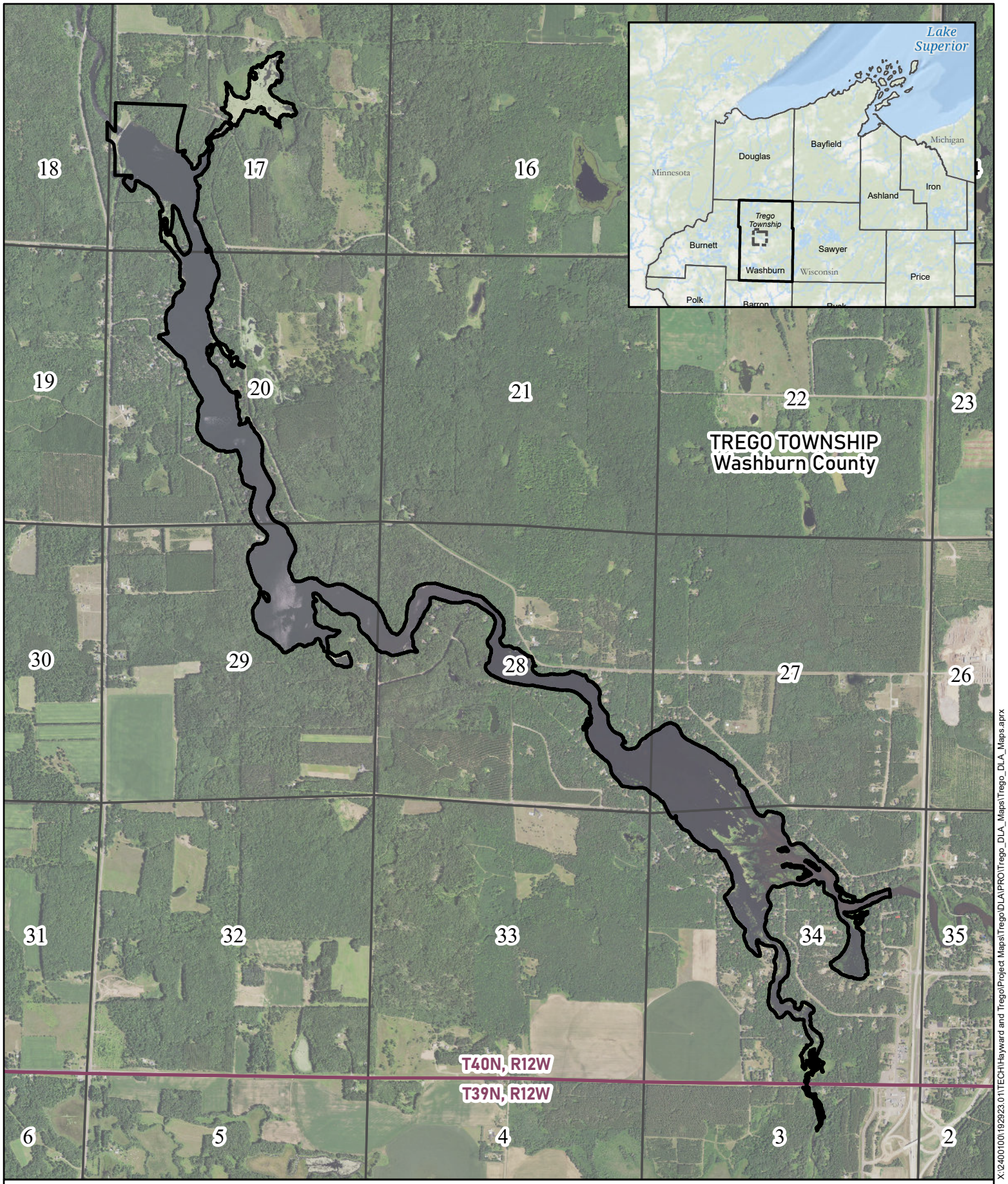
APPENDIX A-1 General Location of the Trego Project



Proposed Project Boundary

Township Range

Section

N

0 1,000 2,000 Feet

Note: the impounded Proposed Project Boundary is established at elevation 1,035.2 feet NGVD 1929.

Xcel Energy®

Mead & Hunt

Trego Hydroelectric Project
Orthophotographic Map

FERC No. 2711

Source Layer: WI 2022 NAIP (natural color, 0.6-meter resolution); Wisconsin Department of Natural Resources GIS Open Data Portal

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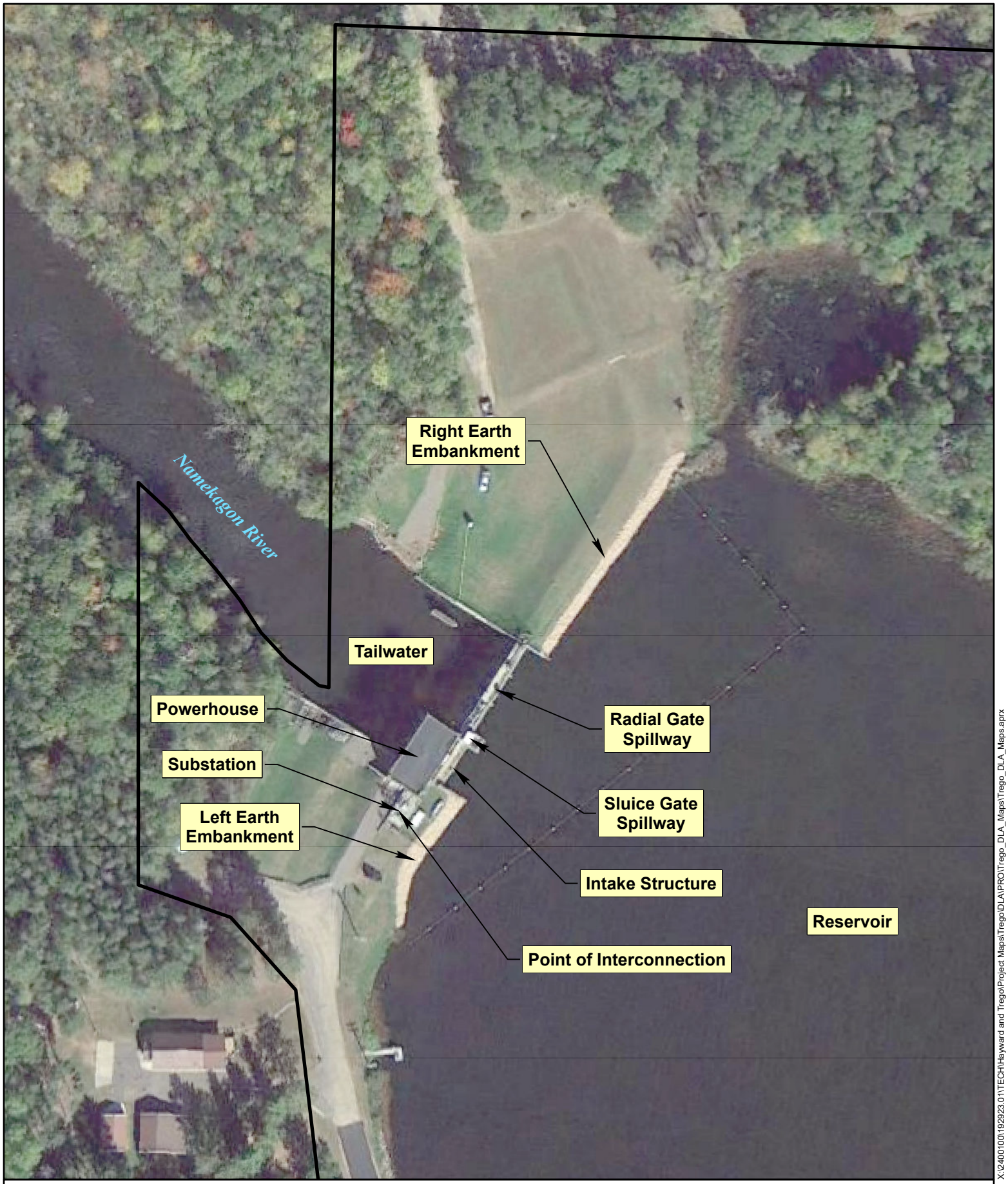
APPENDIX A-2 Trego Project Facilities



Proposed Project Boundary

N

0 50 100 Feet

Note: the impounded Proposed Project Boundary is established at elevation 1,035.2 feet NGVD 1929.

Xcel Energy®

Mead & Hunt

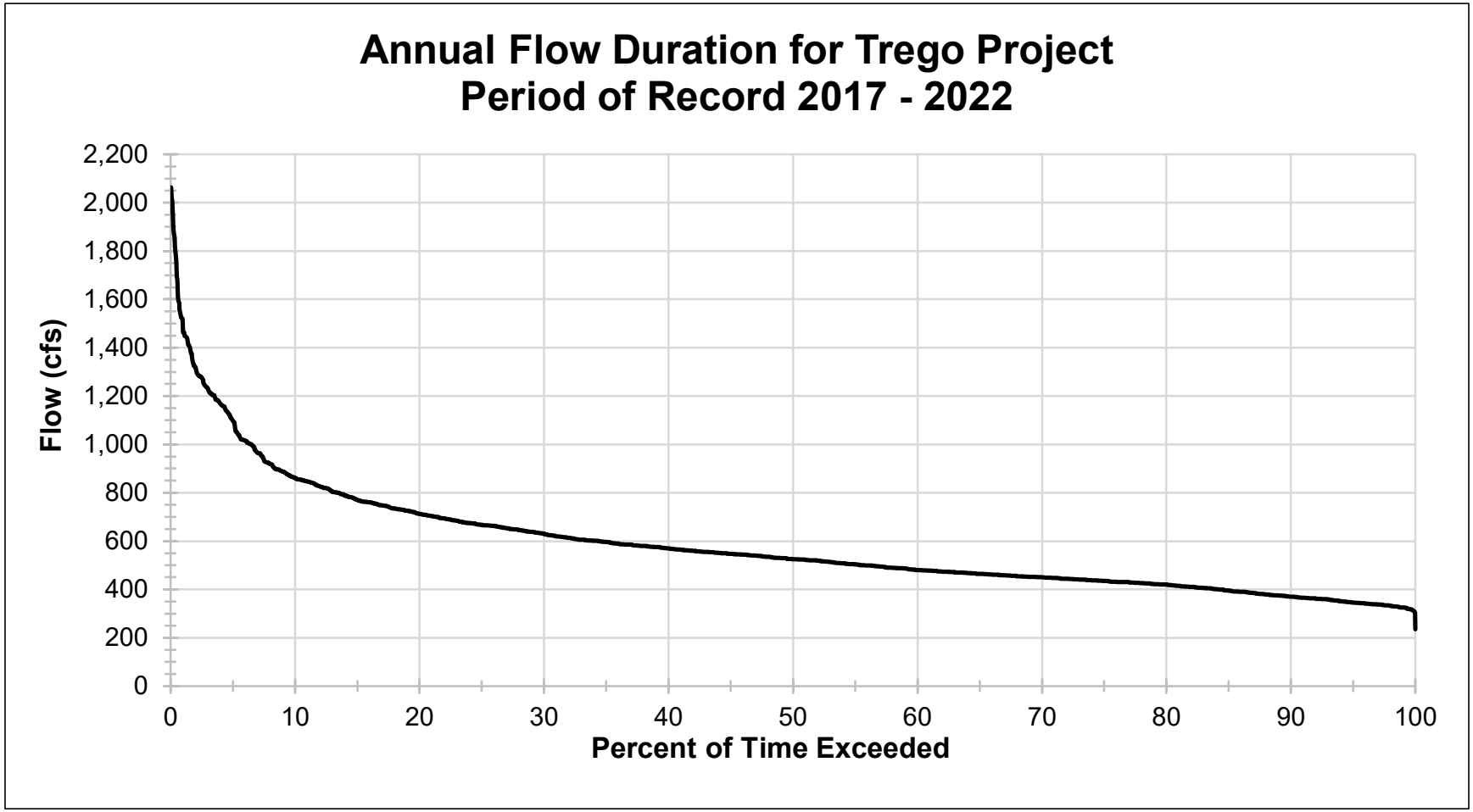
Trego Hydroelectric Project
Project Facilities

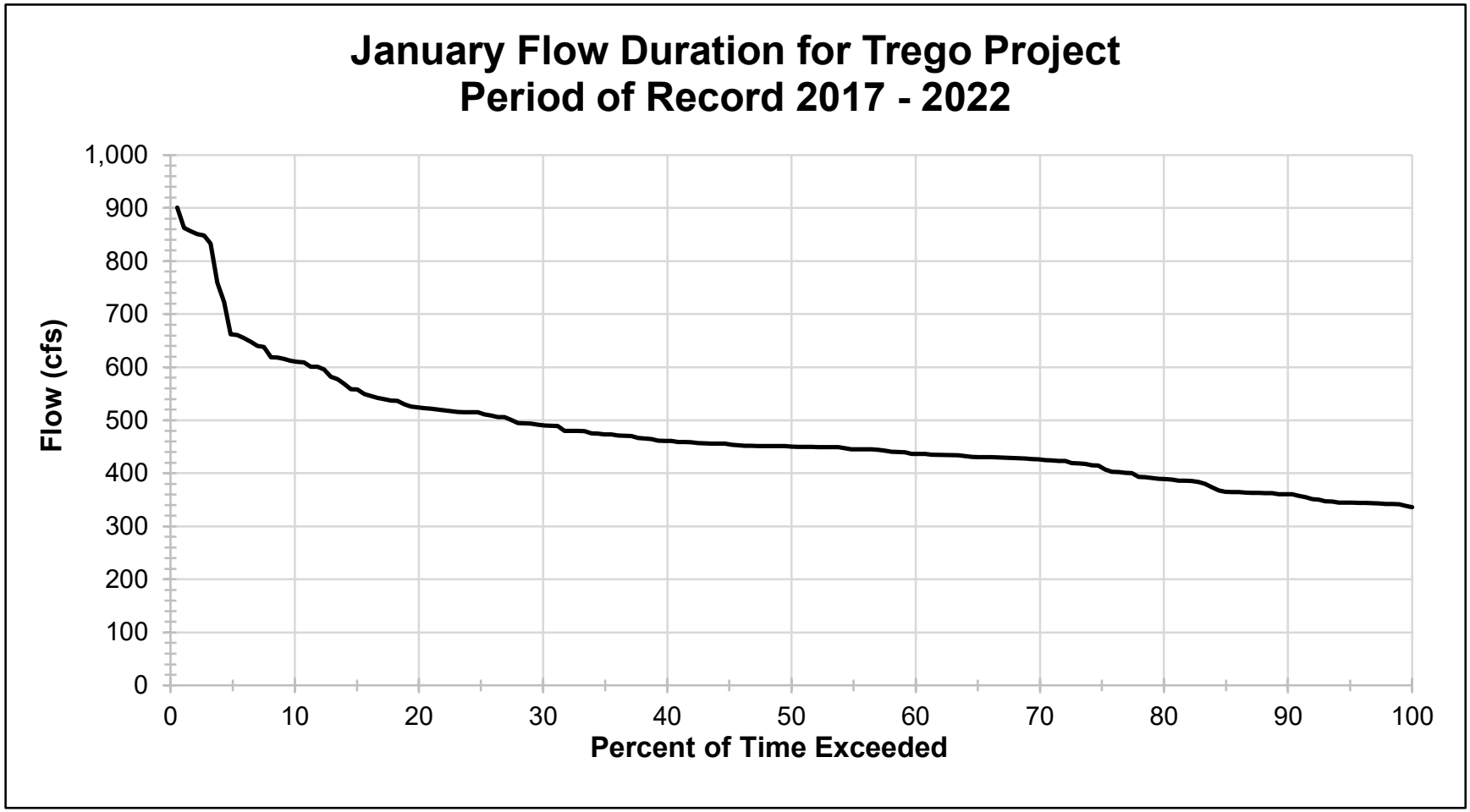
FERC No. 2711

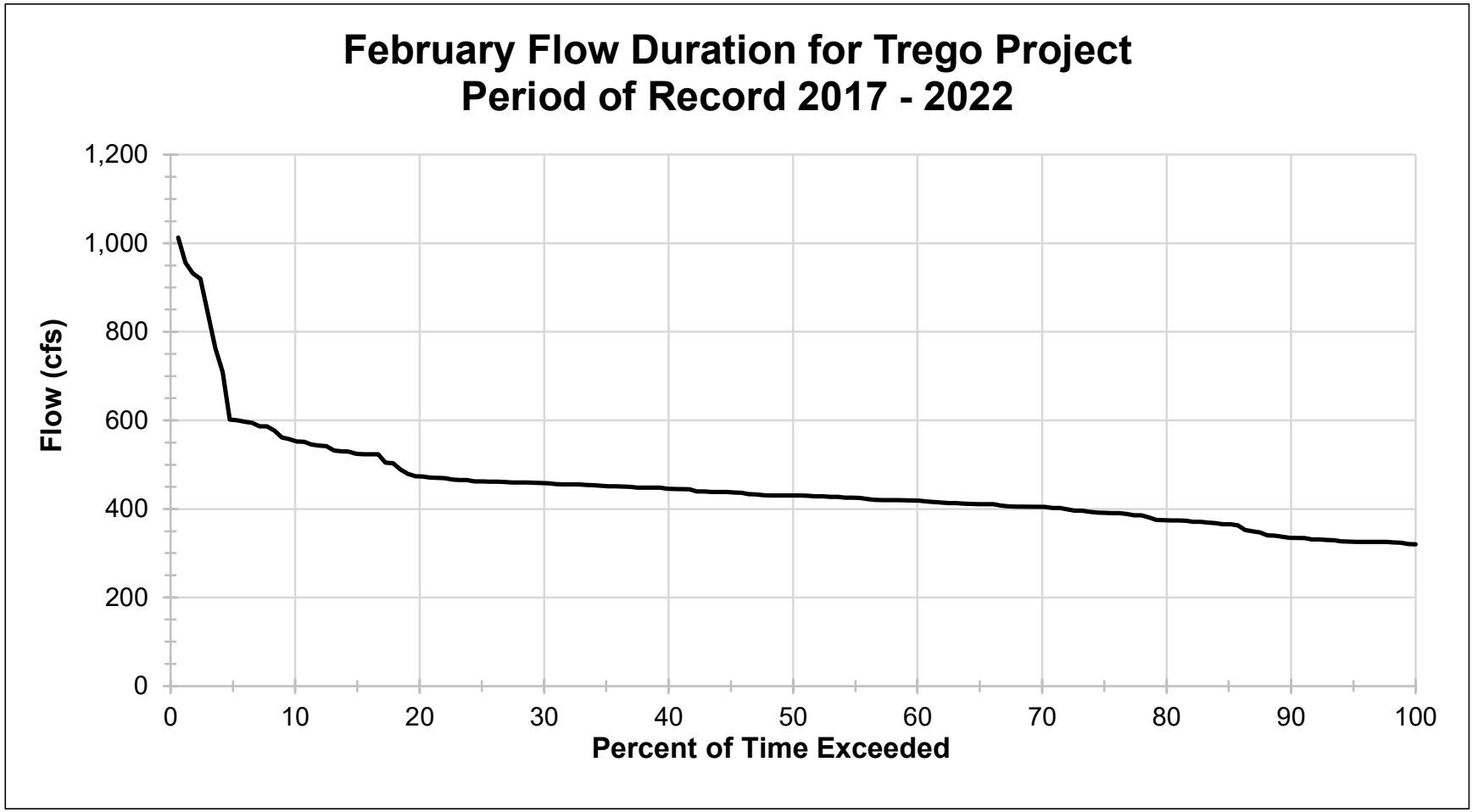
Source Layer: Google Earth, image date 09/28/2015

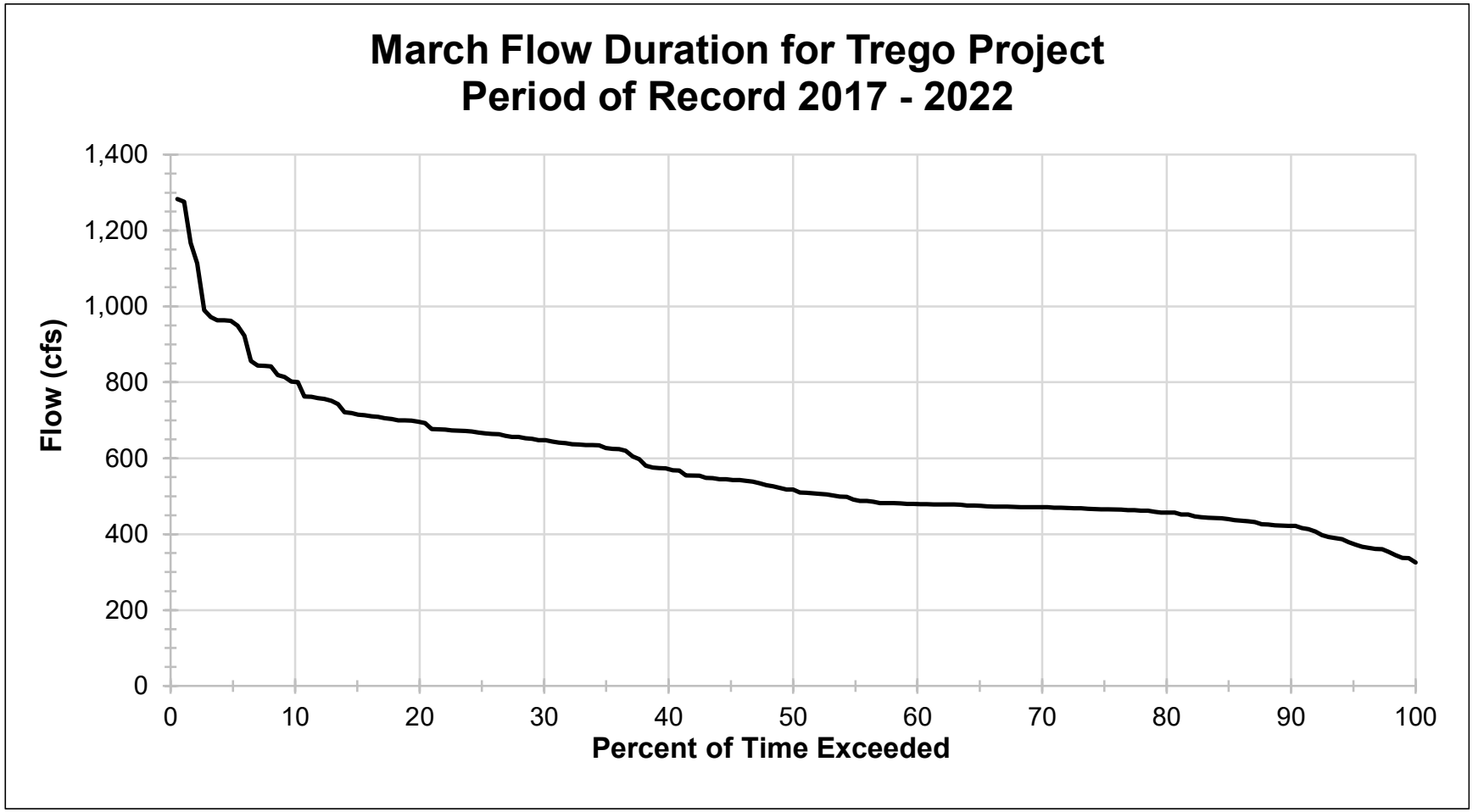
X:\24001000\192923.011\TECH\Hayward and Trego\Project Maps\Trego\DLA\PRO\Trego_DLA_Maps\Trego_DLA_Maps.aprx

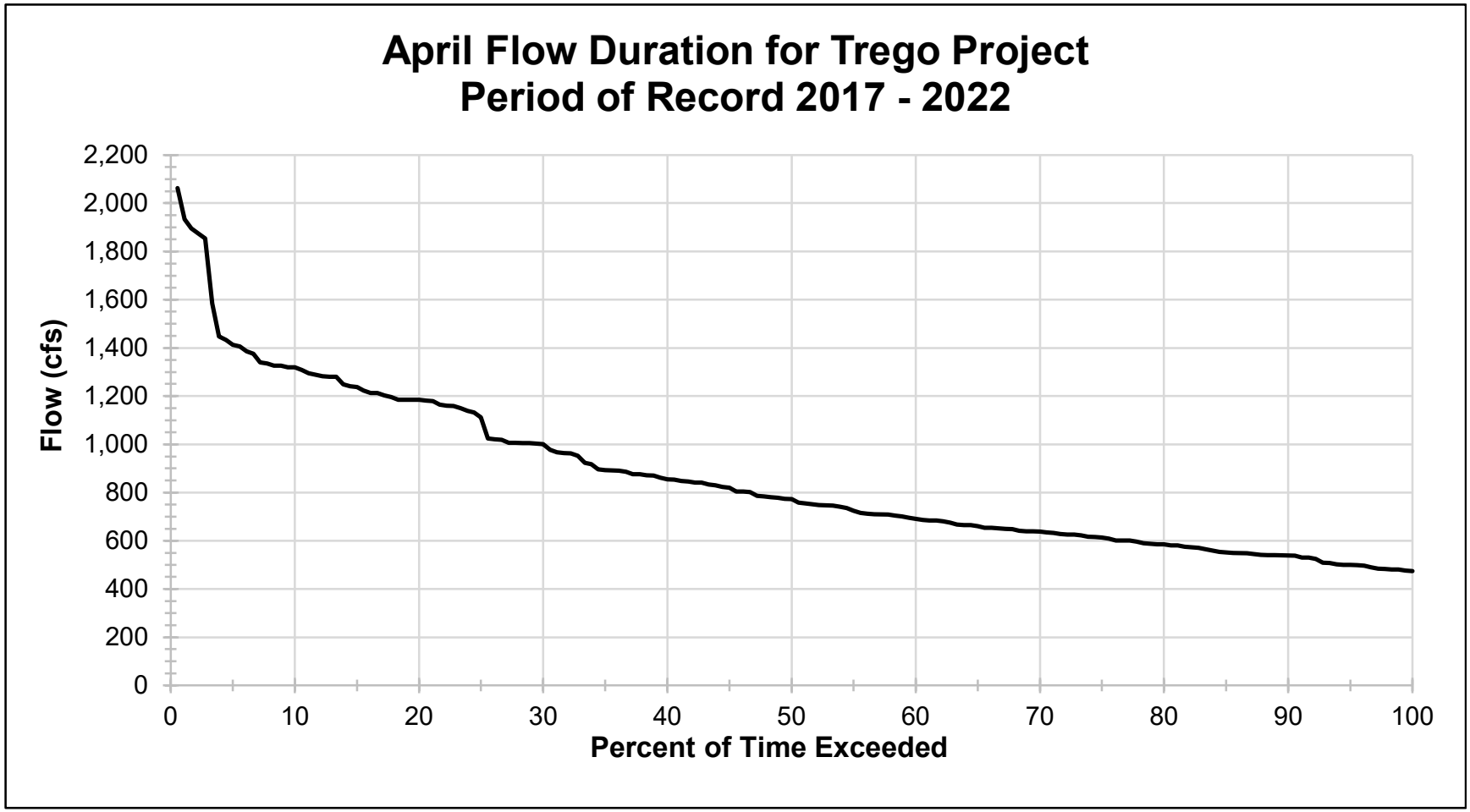
APPENDIX A-3 Trego Project Annual Flow Duration Curves and Exceedance Table

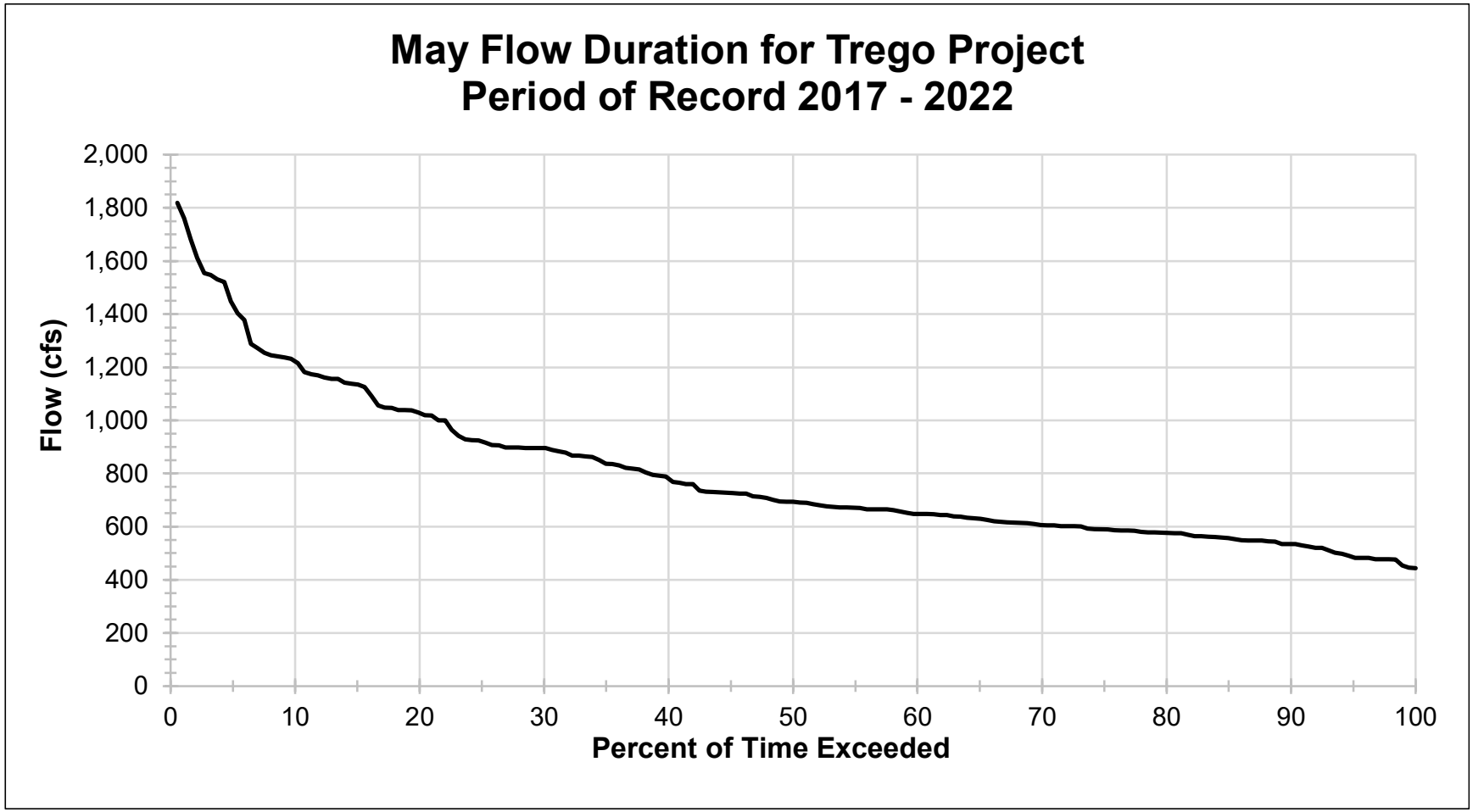

Annual Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded

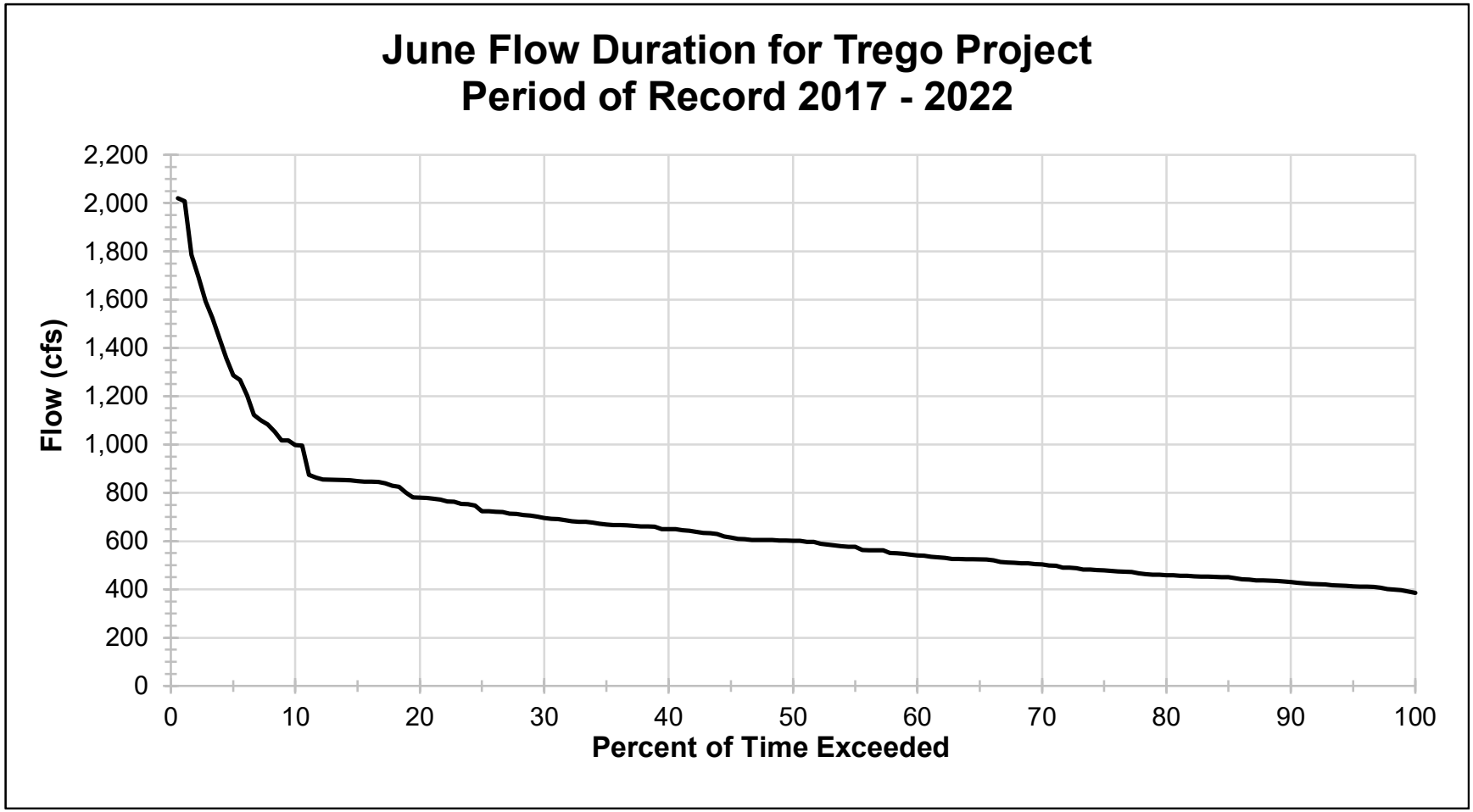

January Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
1,000
900
800
700
600
500
400
300
200
100
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded

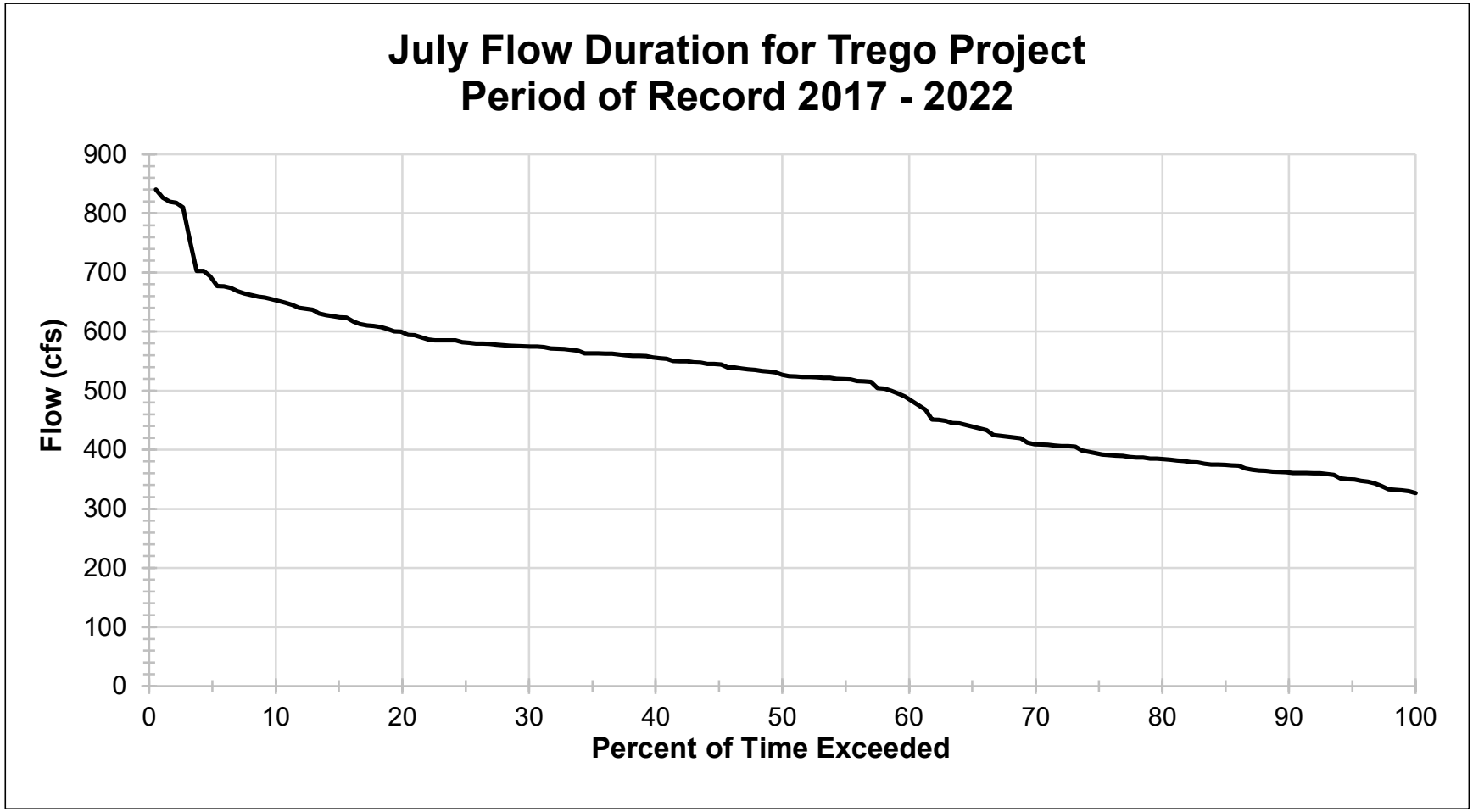

February Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
1,200
1,000
800
600
400
200
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded

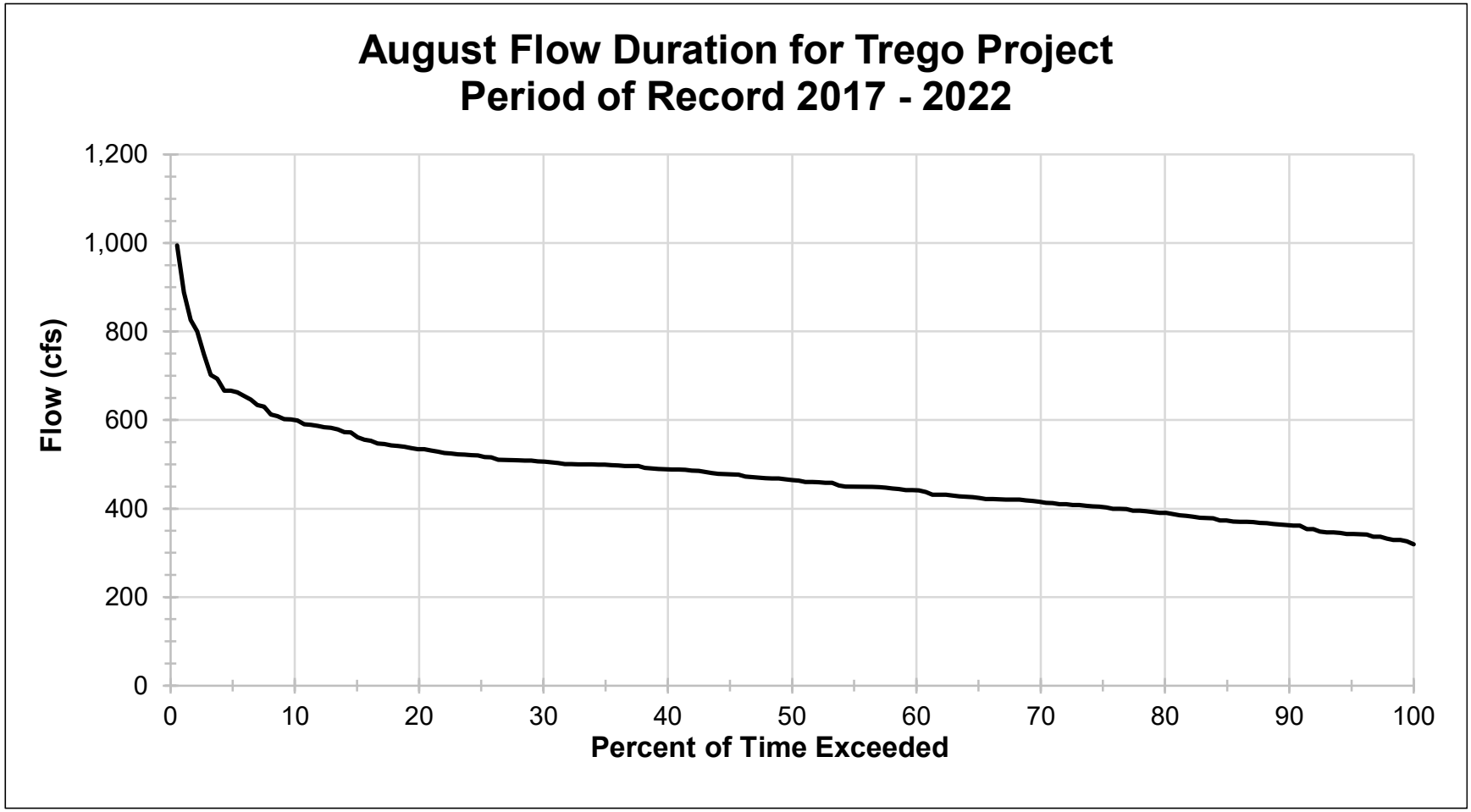

March Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
1,400
1,200
1,000
800
600
400
200
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded

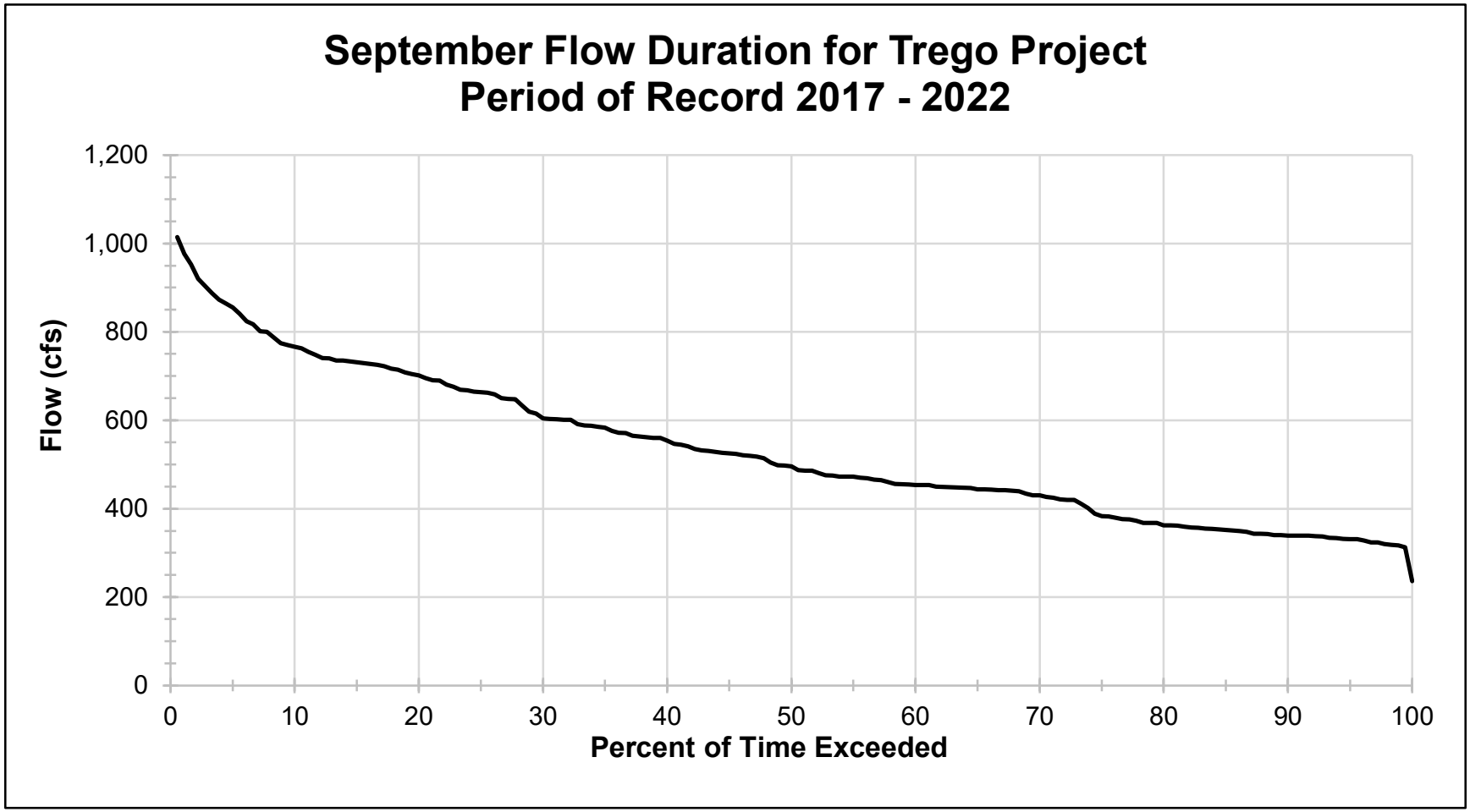

April Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded

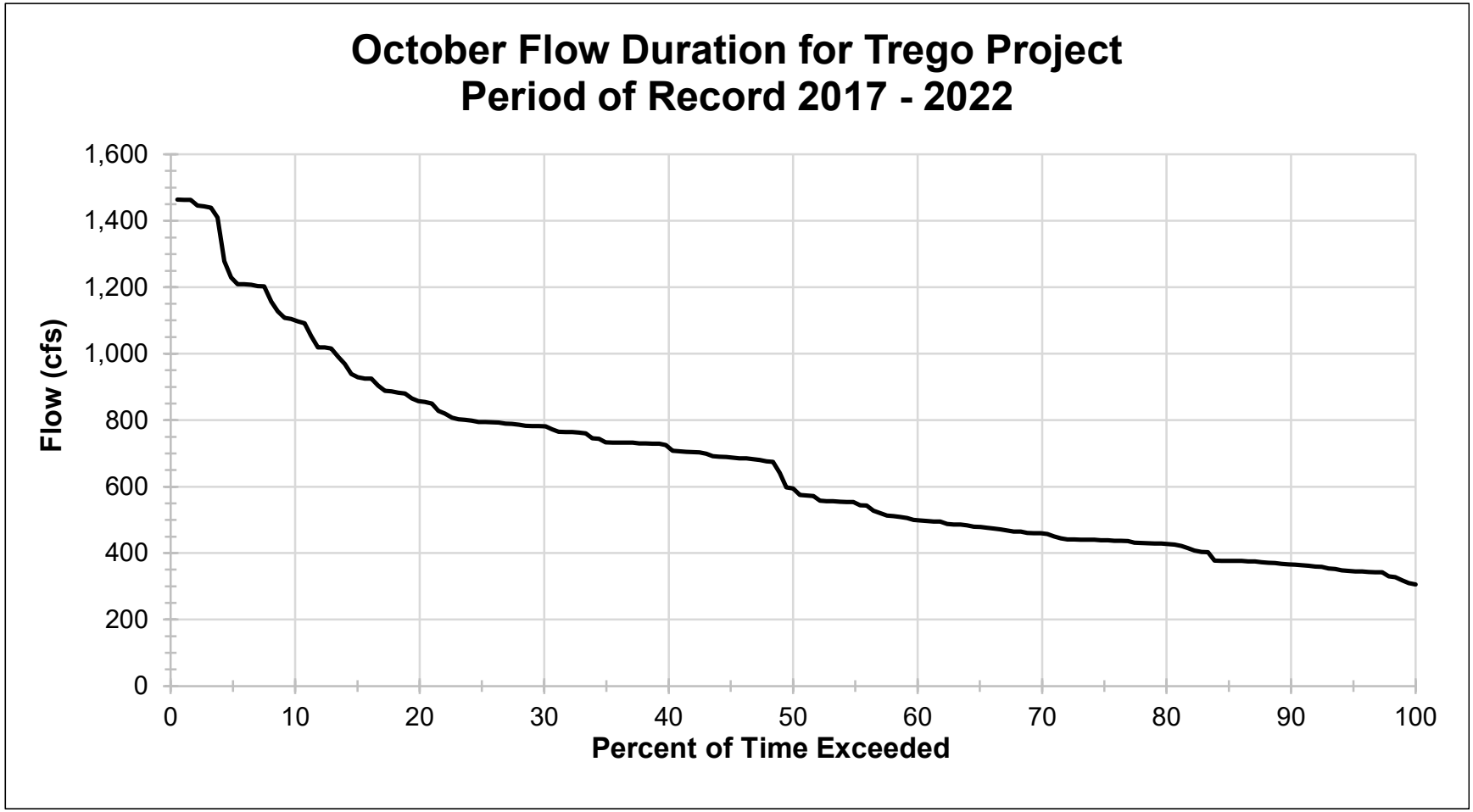

May Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded

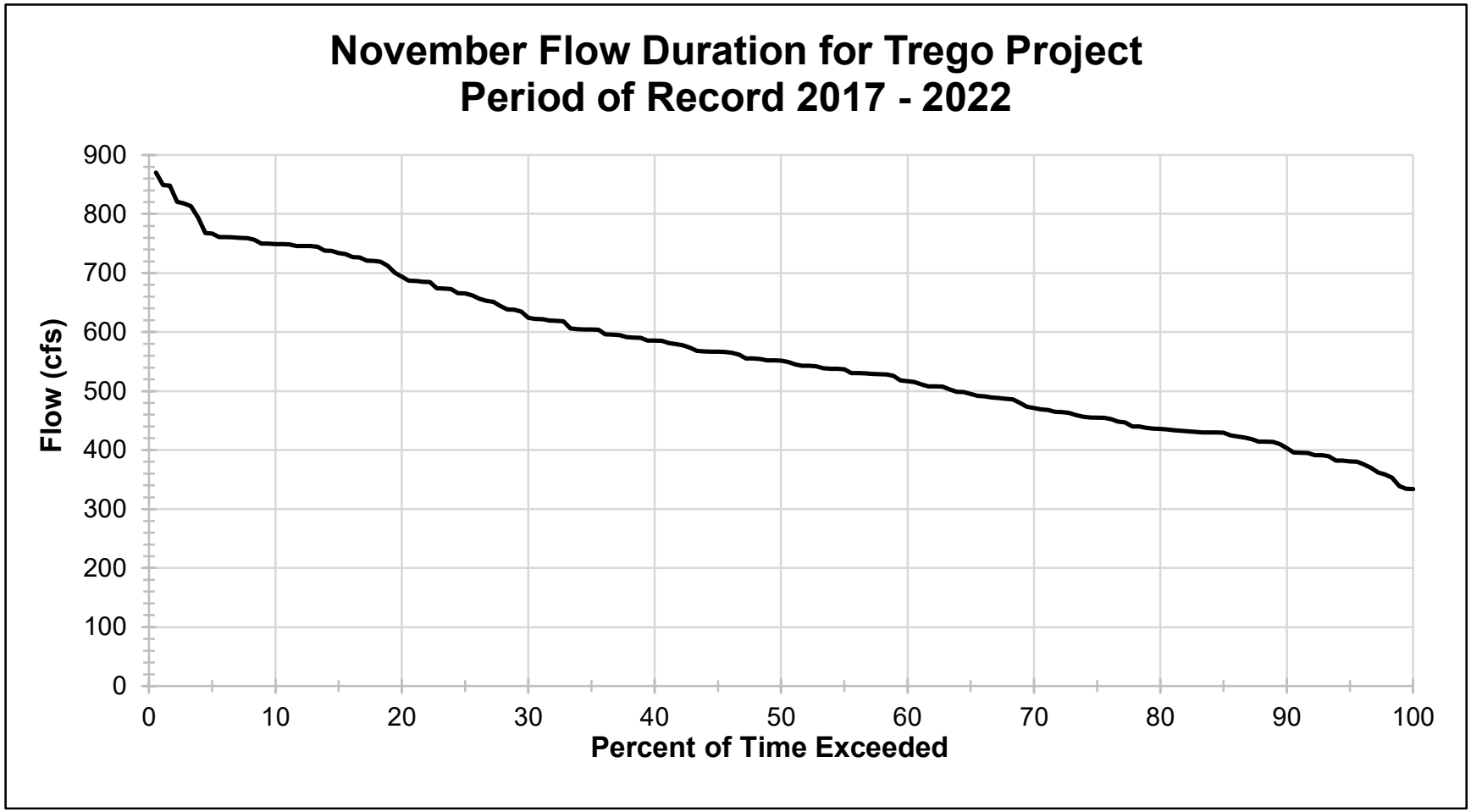

June Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
2,200
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded

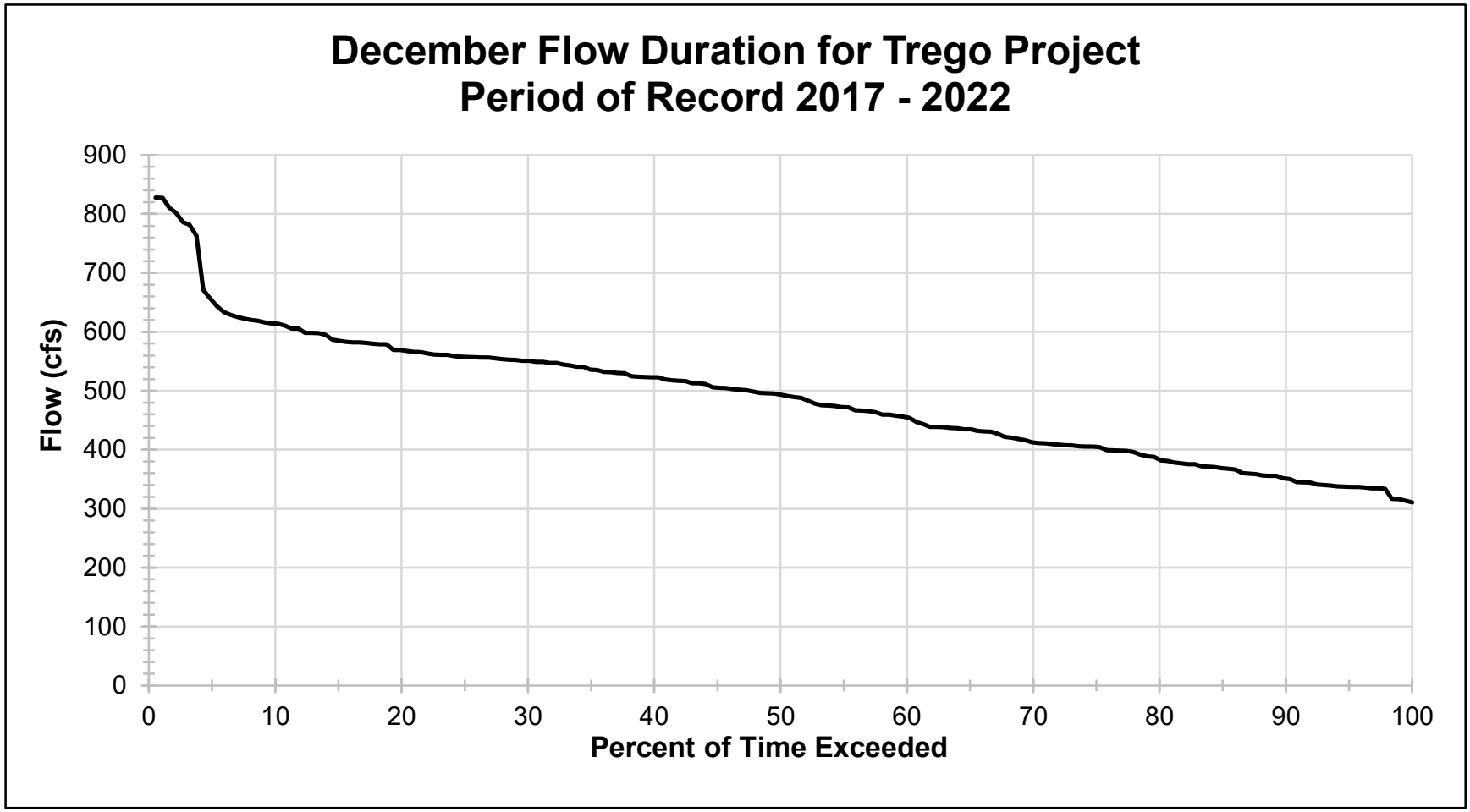

July Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
900
800
700
600
500
400
300
200
100
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded


August Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
1,200
1,000
800
600
400
200
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded


September Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
1,200
1,000
800
600
400
200
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded


October Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
1,600
1,400
1,200
1,000
800
600
400
200
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded

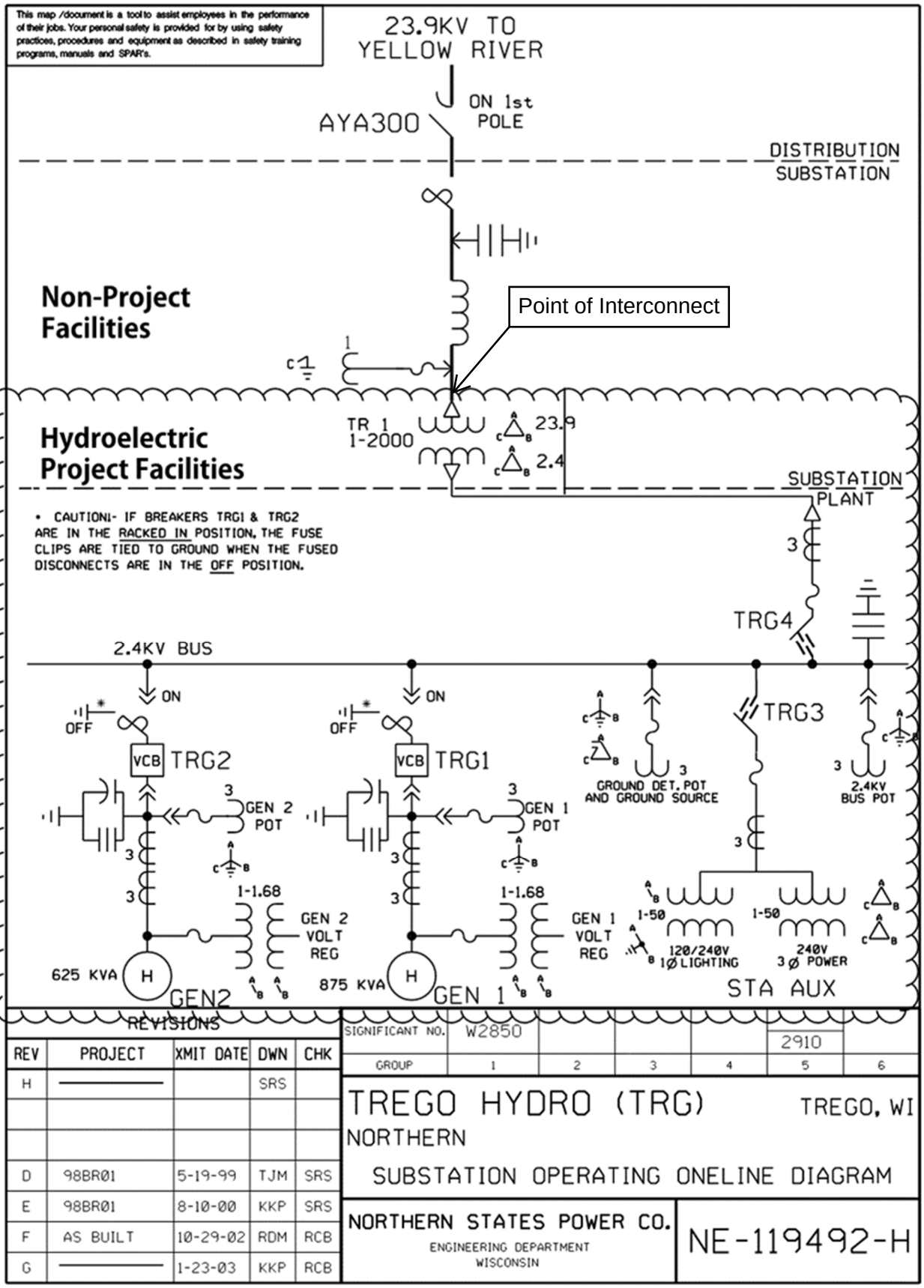

November Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
900
800
700
600
500
400
300
200
100
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded


December Flow Duration for Trego Project
Period of Record 2017 - 2022
Flow (cfs)
900
800
700
600
500
400
300
200
100
0
0
10
20
30
40
50
60
70
80
90
100
Percent of Time Exceeded

Flow Duration for Trego Project (Period of Record 2017 - 2022)

Percent of Time	January	February	March	April	May	June	July	August	September	October	November	December	Annual
95	345	326	379	501	490	413	350	343	331	347	381	337	345
90	360	335	422	540	535	430	362	363	339	366	403	352	370
85	365	365	440	552	557	450	374	373	352	377	429	368	395
80	390	375	457	585	578	459	385	391	362	429	436	388	420
75	415	391	465	614	590	480	394	404	383	439	455	405	435
70	426	405	471	638	606	503	410	415	430	460	471	412	450
65	431	411	476	662	631	525	445	426	444	480	495	435	465
60	437	420	480	691	648	541	490	442	454	500	517	457	480
55	446	426	491	736	671	576	520	450	472	554	538	473	503
50	451	430	517	773	694	601	527	465	496	595	551	493	525
45	455	438	545	820	730	615	545	478	525	690	567	505	547
40	461	446	573	855	789	650	556	489	554	725	585	523	569
35	473	452	627	894	838	668	563	499	584	733	604	536	596
30	492	460	648	1,001	896	696	575	507	604	782	624	551	630
25	515	462	668	1,112	925	724	582	520	663	795	665	558	667
20	524	474	696	1,184	1,030	780	600	534	702	857	694	569	713
15	559	525	720	1,237	1,138	850	626	572	735	938	734	587	772
10	612	558	802	1,320	1,232	999	655	601	767	1,105	749	614	862

APPENDIX A-4 Trego Project One-Line Diagram of Electrical Circuits



REVISIONS

REV	PROJECT	XMIT DATE	DWN	CHK
H	———		SRS	
D	98BR01	5-19-99	TJM	SRS
E	98BR01	8-10-00	KKP	SRS
F	AS BUILT	10-29-02	RDM	RCB
G	———	1-23-03	KKP	RCB

SIGNIFICANT NO.	W2850				2910	
GROUP	1	2	3	4	5	6

TREGO HYDRO (TRG)

TREGO, WI

NORTHERN

SUBSTATION OPERATING ONELINE DIAGRAM

NORTHERN STATES POWER CO.
ENGINEERING DEPARTMENT
WISCONSIN

NE-119492-H