

Parksville Water Use Plan

Council Meeting

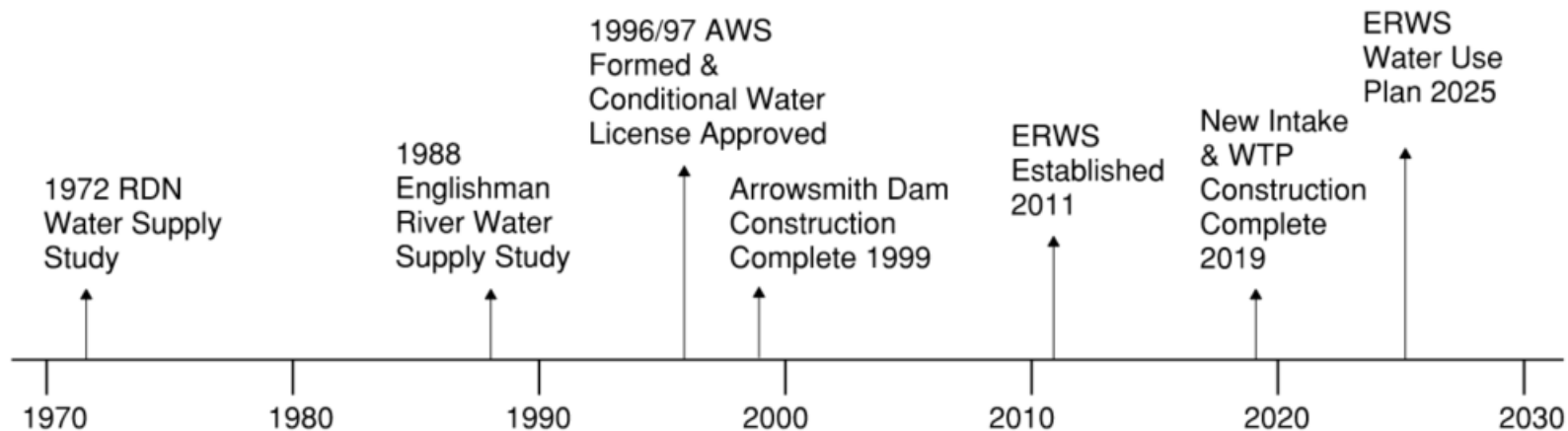
June 16, 2025



Water Use Plan Objectives



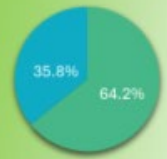
- Document history of system (ERWS and AWS)
- Provide a summary of data sources, tools & methodologies
- Review of existing water supply system capacity under current demands
- Develop water balance scenarios for the current (status quo), future system (incl. future climate & demands) & environmental flow needs (EFN)
- Review water supply system resiliency considering future climate spatial and temporal variability and source availability
- Determine capital infrastructure and demand management strategies to meet needs of community
- Review of opportunities to offset system costs and capitalize on power generation possibilities





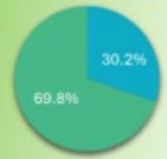
**Update #26
April 2025**

**April:
ERWS Consumption**



■ Parkville ■ RDN

**April:
Production Source**



■ Wells ■ ERWS

**April:
Total Production
(Wells & ERWS)**



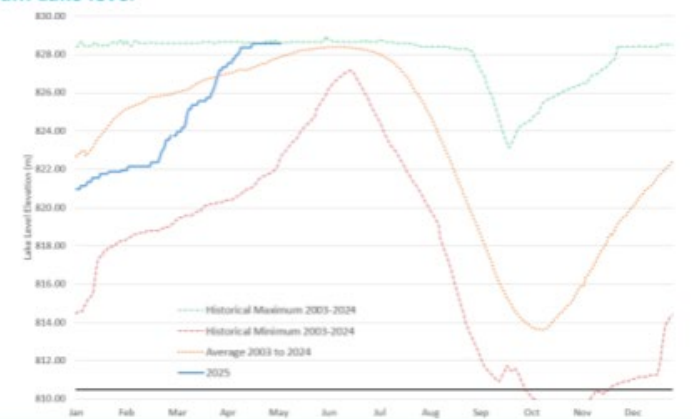
Englishman River Water Service

- Operators focused on preparing the plant for increased summer flows.
- Optimization of the ultrafiltration recovery rate allowed the plant to process 2,000 m³ between maintenance cleans, significantly reducing production waste and boosting overall efficiency.
- Operators made progress completing some of the chemical room safety audit action items including:
 - New spill containment and an emergency shower/eye wash station were sourced and installed.
 - A drench hose with eye wash nozzles was added next to the existing outdoor emergency shower at the chemical fill station.
 - A splash guard tray was designed, fabricated, and installed beneath overhead chemical lines to prevent potential leaks from posing risks. Flange and valve guards were also sourced and ordered to provide additional protection.

Arrowsmith Water Service

- Dam was accessible throughout April; operators were able to complete weekly inspections.
- Cross-ditch work completed.
- Operators prepared the roof for the upcoming solar panels installation.
- Snow Water Equivalent at Mount Cokely currently below average.
- The dam has been spilling since mid-April.

Dam Lake level



Water System – Arrowsmith Lake



Arrowsmith Lake Dam

- Construction complete in 1999 and started operation in 2001
- 14.5 m high x 75 m long concrete gravity dam on bedrock
- Full Storage El. - 828.5 m



Arrowsmith Lake Reservoir

- Total Storage – 9 million m³ (Water Licence C134068)



Water System – Arrowsmith Lake Storage and LLO Outflow

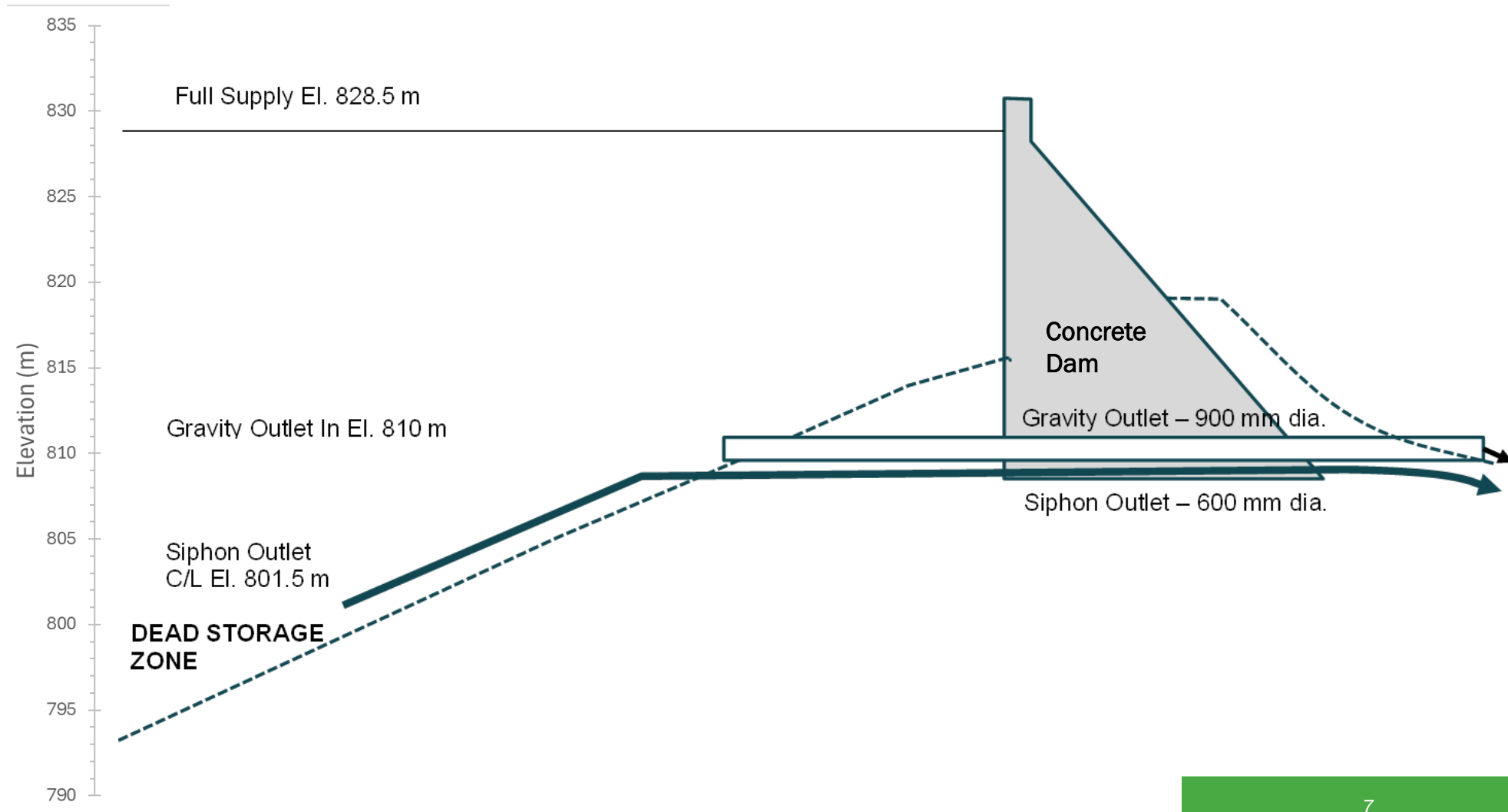


Gravity Storage Zone

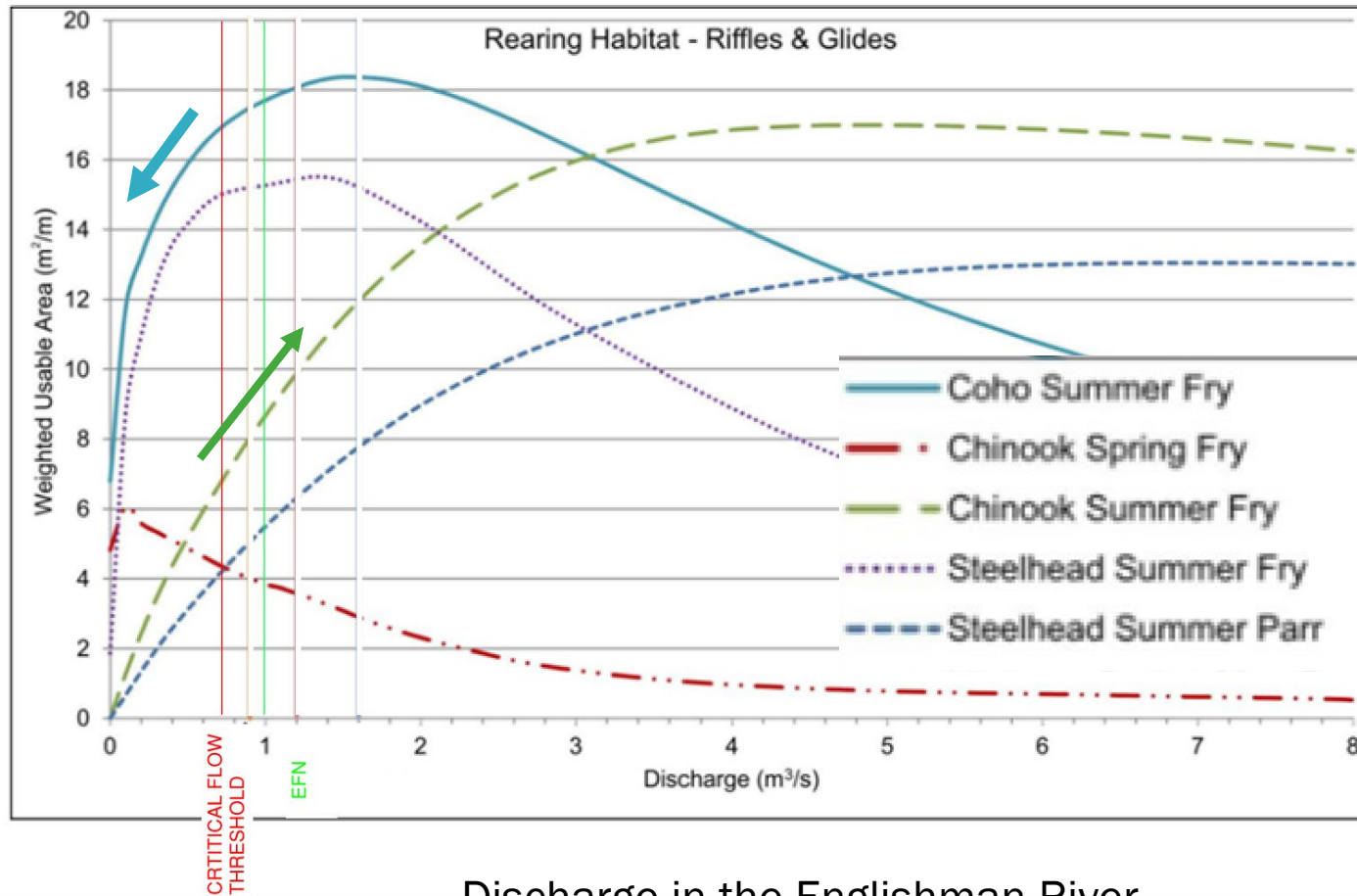
- Storage Volume
7 million m³
- Outlet Capacity
65.7 MLD to 115.8 MLD
(0.76 m³/s to 1.34 m³/s)

Siphon Storage Zone

- Storage Volume
2 million m³
- Outlet Capacity
Up to 65.7 MLD
(0.76 m³/s)



Water System – Environmental Flow Needs



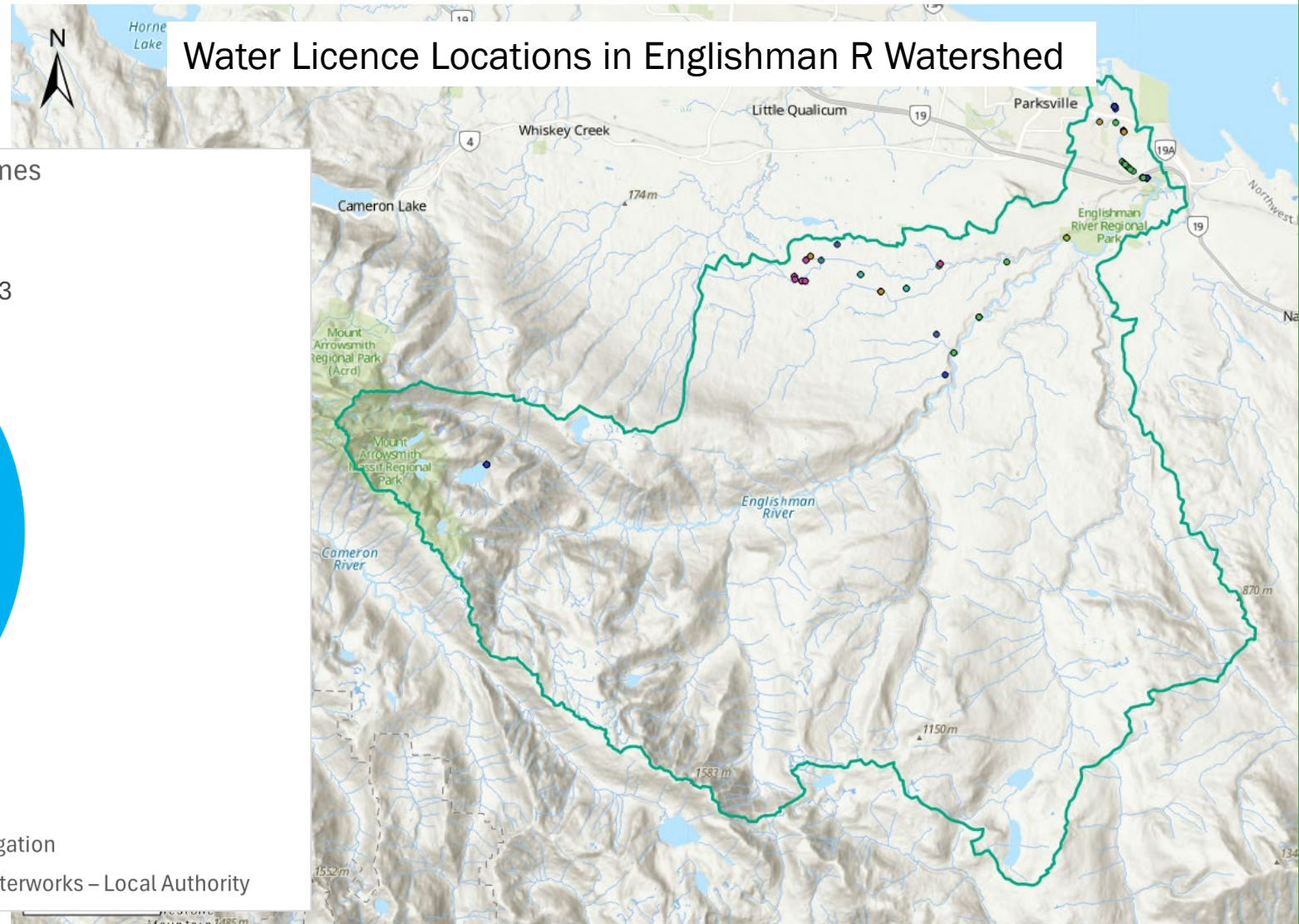
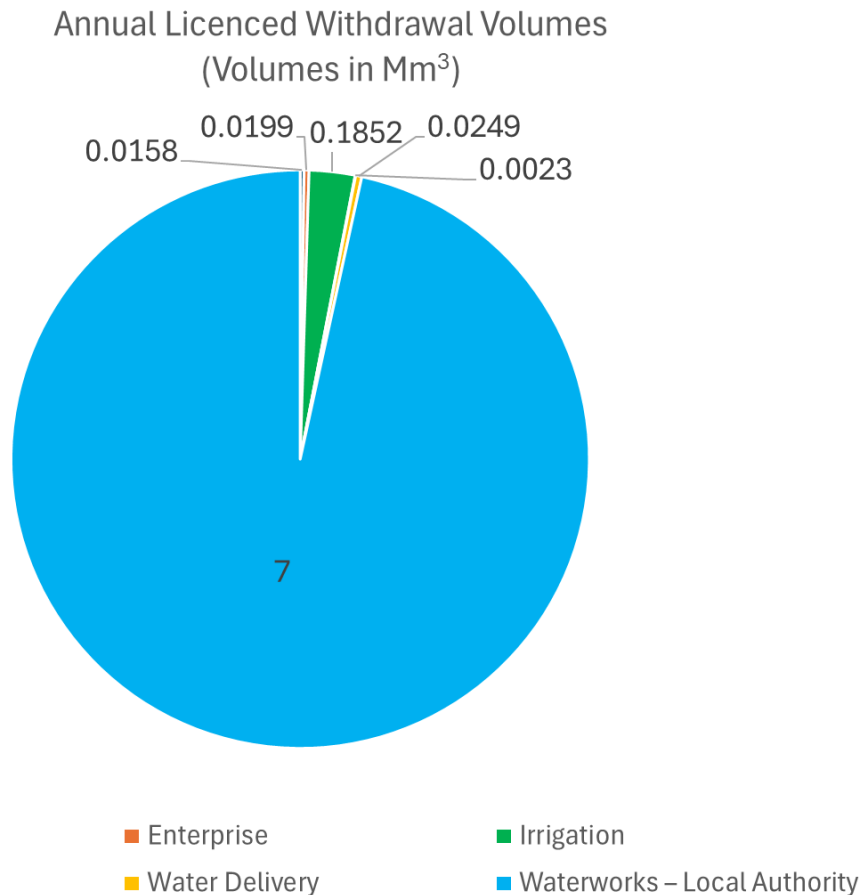
Discharge in the Englishman River

Source: LGL, 2014

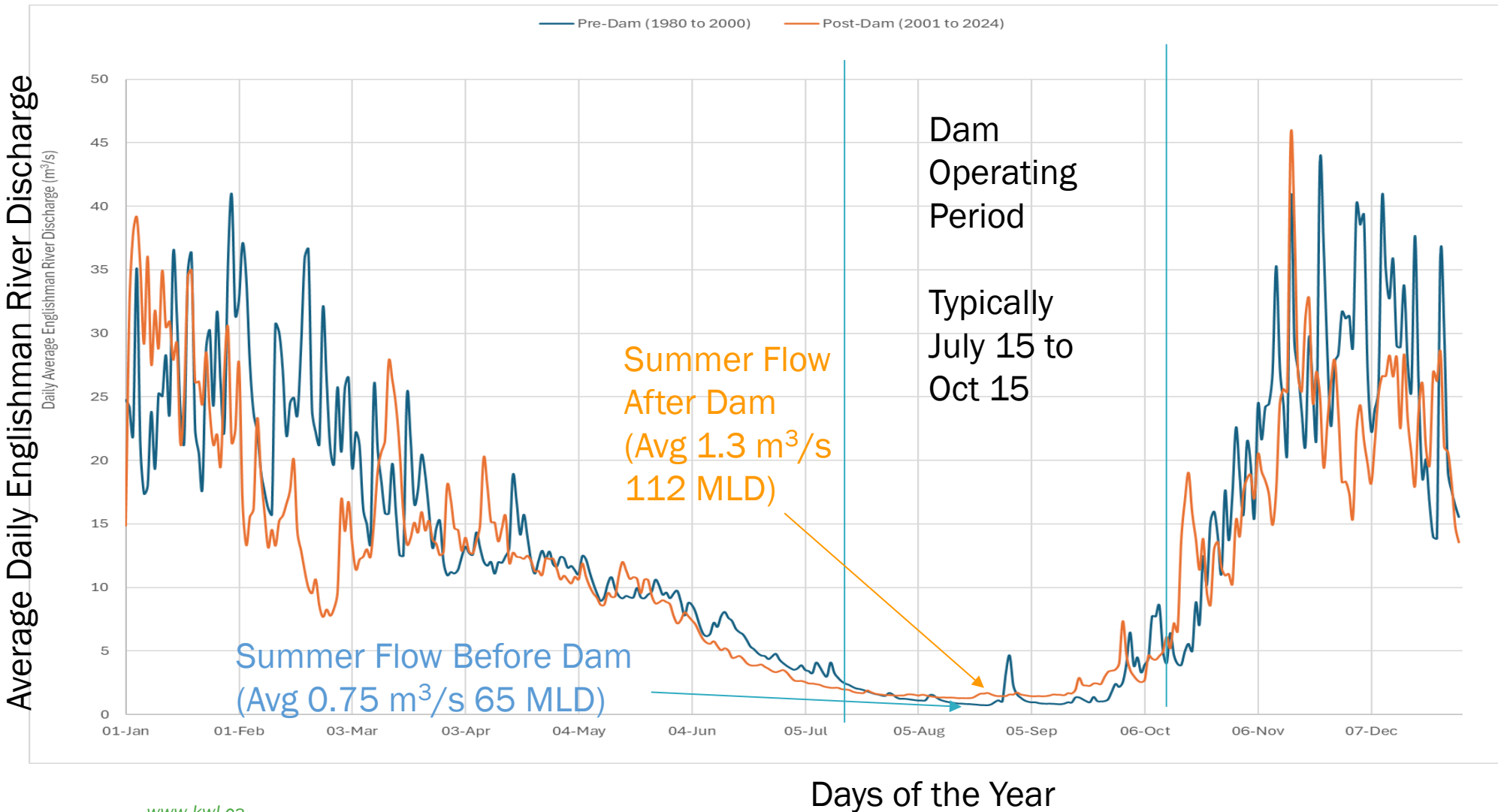
- 1996 Water License
EFN - 1.13 m³/s
Critical flow - 0.7 m³/s
- Min. flow of ~1.6 m³/s at the WSC gauge
(included the EFN plus the maximum withdrawal at original)
- 2025 Operating Rule -
Recommending 1.0 m³/s EFN.
Measured at the gauge
(ie: after withdrawal is taken)
(Currently being reviewed by regulators)

Water Licences

Water Licence Locations in Englishman R Watershed



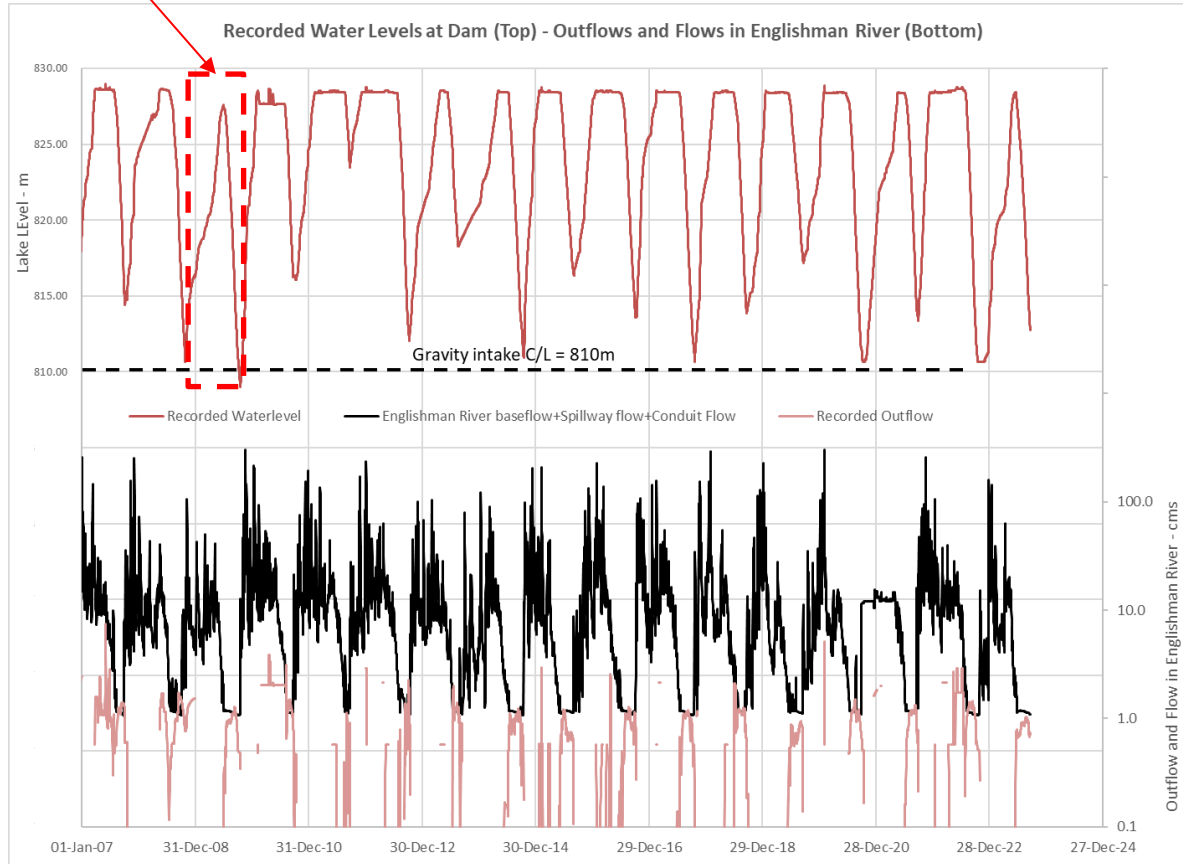
Water System – Arrowsmith Lake Storage and LLO Outflow



Water System – Arrowsmith Lake Storage and LLO Outflow

Arrowsmith Water Level
Englishman R Flow

2008/2009



Period (2007 to 2023)

Dam Operating Season

- Natural river flow at intake < EFN + withdrawals
- Dam outlet valves opened
- Supplement natural baseflows to support EFN + Withdrawal
- Reservoir levels drop over operating season

Non-operating Season

- Natural river flow at intake > EFN + withdrawals
- Dam outlet valves closed
- Reservoir refilled from watershed area

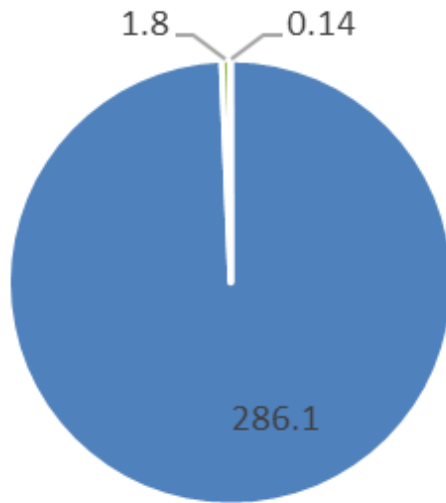
EFN and withdrawals supported for about 3 months from storage collected from 1.5% of total watershed area.

Water System – Englishman River & EFN



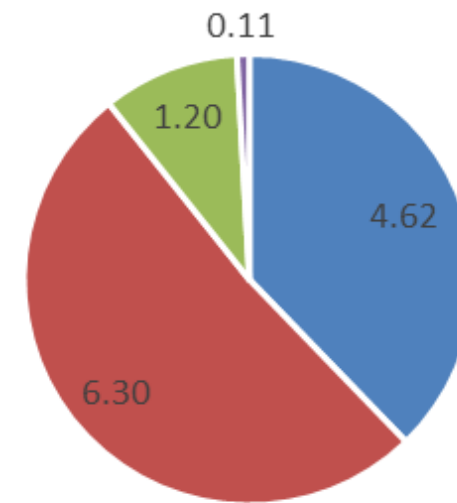
Relative total volume of Englishman River Flow at Intake
2008 to 2009

Dam Non-Operating Period
(Volumes in Mm^3)



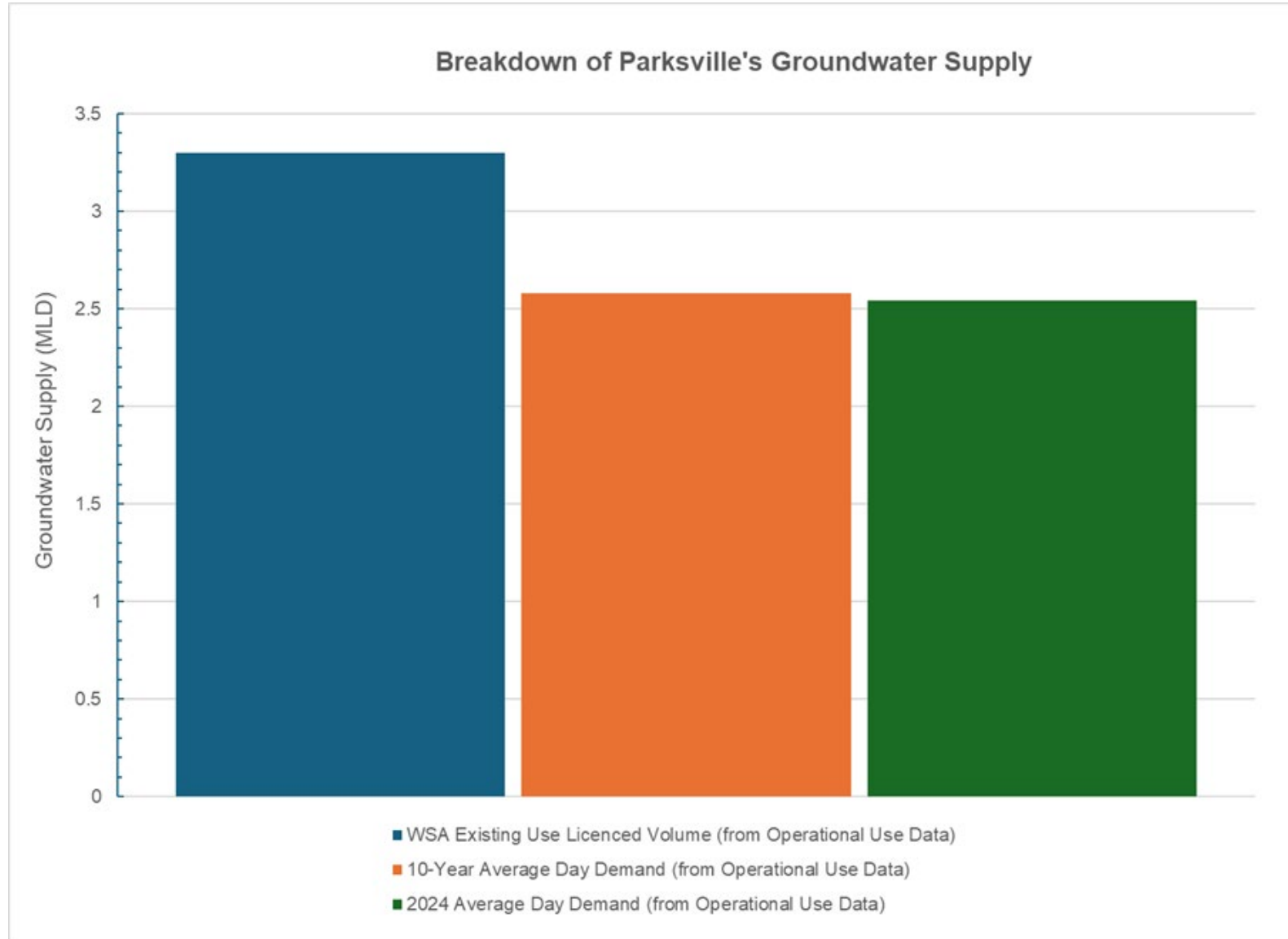
■ Natural Flow ■ EFN Support ■ Withdrawal ■ Other licences

Dam Operating Period
(Volumes in Mm^3)



■ Natural Flow ■ EFN Support ■ Withdrawal ■ Other licences

Water System- Groundwater



Water System – Intake & WTP

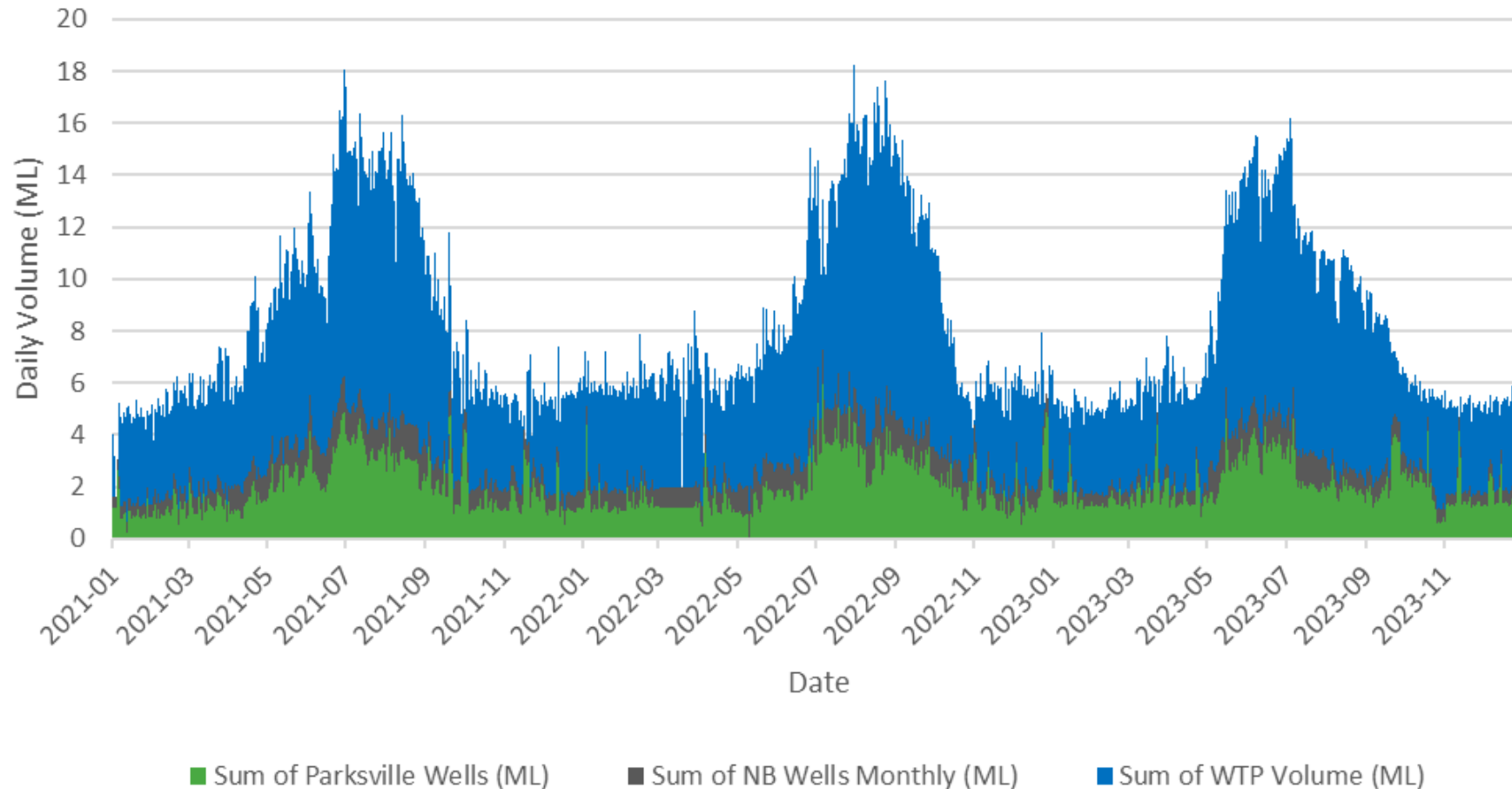
Facility	Nominal Existing Capacity (MLD)	Nominal Expanded Capacity (MLD)	Data Source
Intake Screen and Weir	48	48	(1)
Raw Water Pump Station	19	48	(1)
Raw Water Supply Main to WTP	48	48	(1)
Water Treatment Plant	16	47.3	(2)
High Lift Pump Station	19	48	(1)
Notes: 1. CH2MHill, Water Intake, Treatment Plant, and Supply Mains, Final Pre Design Report, June 5, 2014. 2. Englishman River Water Service Water Treatment Plant Operations Update, January 9, 2023.			



Water System Source Flow



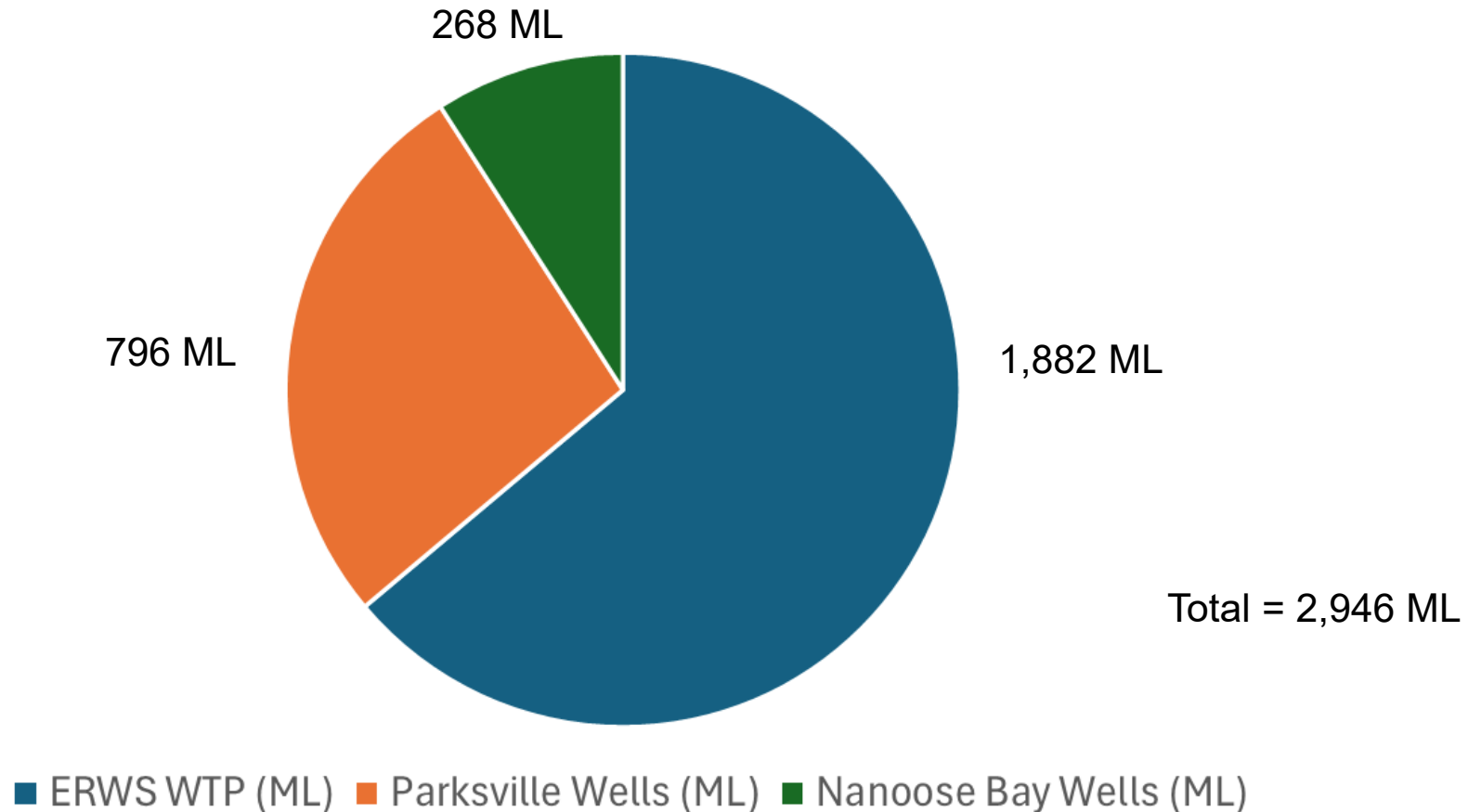
Daily source flow from ERWS WTP, Railway Station & Springwood wells,
and Nanoose Bay Peninsula wells



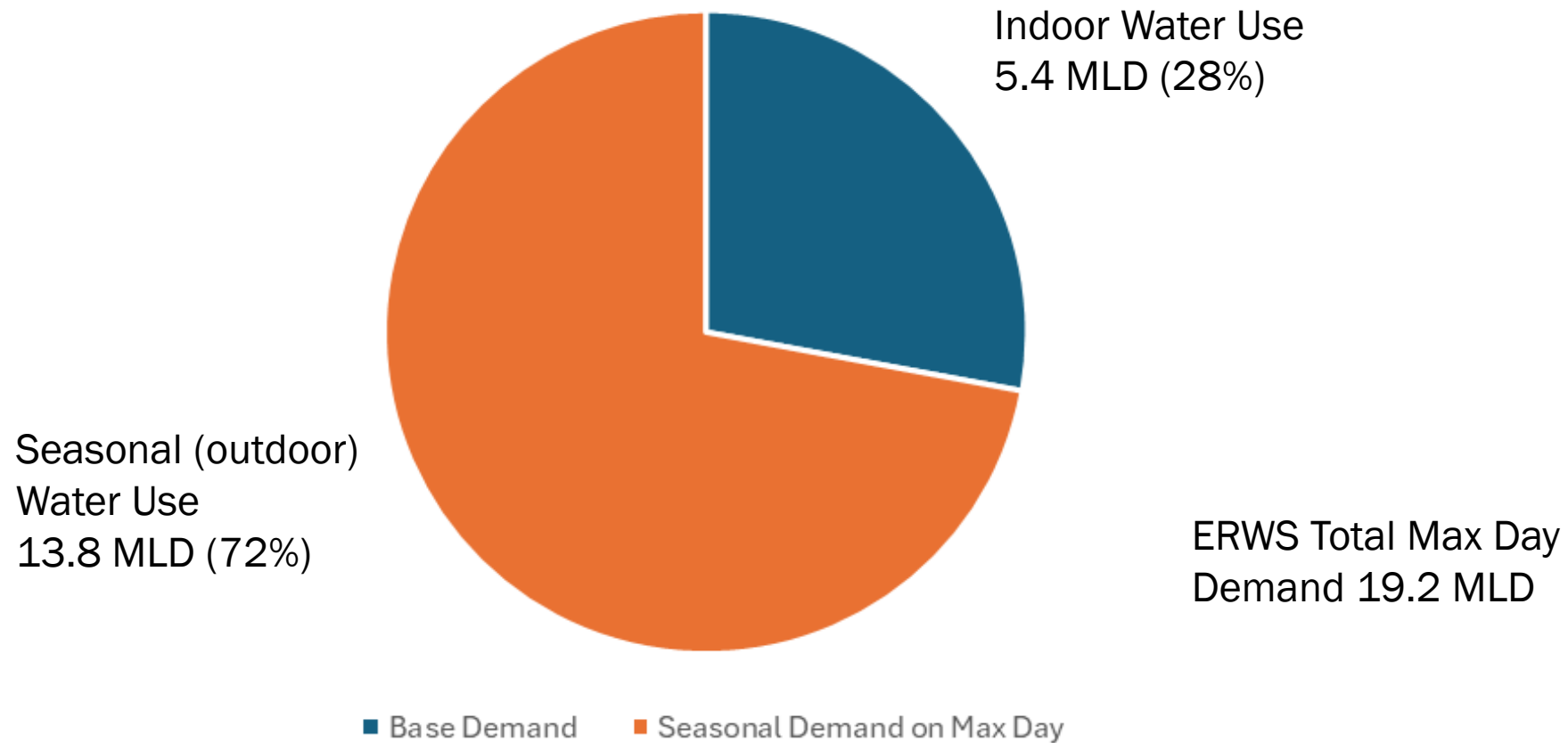
Water System Source Flow



Annual Volume from ERWS WTP, Railway Station & Springwood Wells, and
Nanoose Bay Peninsula Wells for 2021 – 2023



Components of Existing Max Day Water Demands



Base Water Demand (Indoor Residential Only)



2024 per Capita Unit Rates:

- Parksville 156 L/ca/day
- Nanoose 139 L/ca/day

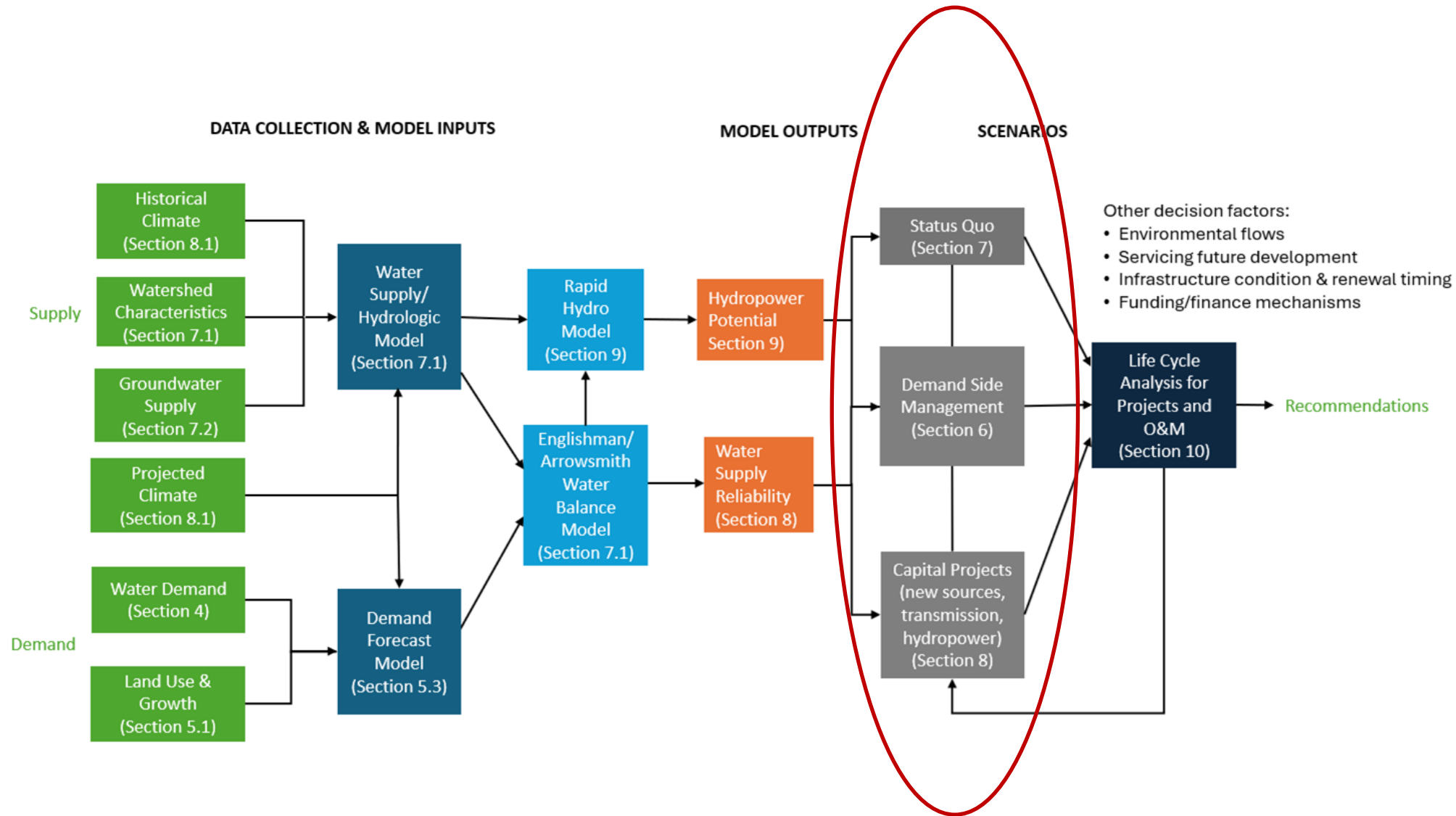
2014 rates:

- Parksville 156 L/ca/day
- Nanoose 163 L/ca/day

Comparable Municipalities:

- Town of Sidney – 160 L/ca/day (2025)
- City of Nanaimo – 146 L/ca/day (2023)
- City of Courtenay – 279 L/ca/day (2023)
- Town of Comox – 218 L/ca/day (2023)
- City of White Rock – 190 L/ca/day (2024)
- City of Richmond – 185 L/ca/day (2022)
- City of Surrey – 200 L/ca/day (2019)
- District of Oak Bay – 180 L/ca/day (2018)
- French Creek – 170 L/ca/day (2013)

Water Use Plan



Water Balance Model

- Model represents historical inflows to Arrowsmith Lake & baseflows to Englishman River
- Temporal distribution of raw water intake withdrawals
- Seasonal operational periods:
 - Dam releases (June – Oct)
 - Reservoir refill (Nov – May)
- Reservoir characteristics including stage-storage relationship for the high LLO and low (siphon) LLO
- Optimize reservoir operation to satisfy EFN and community needs

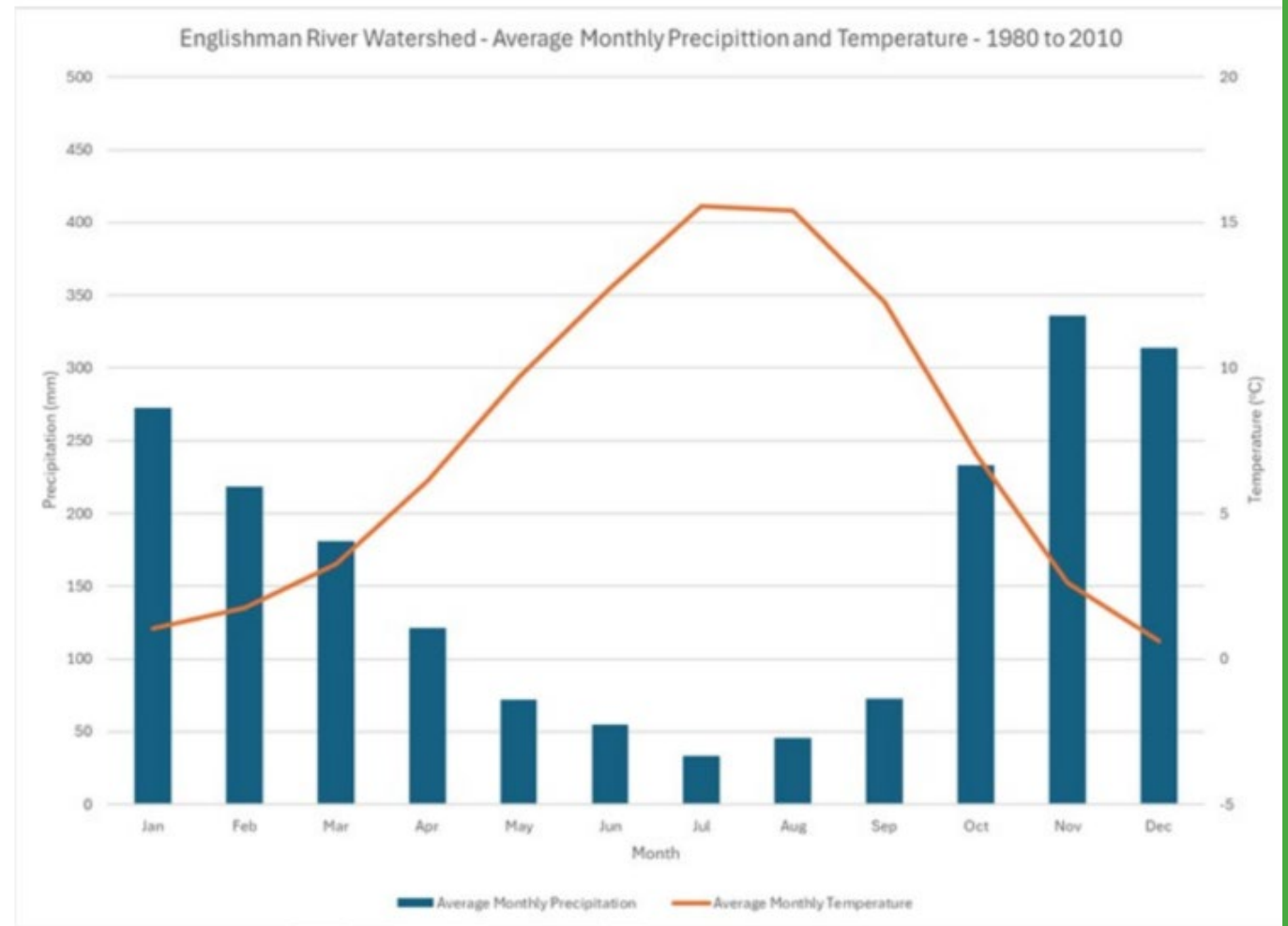
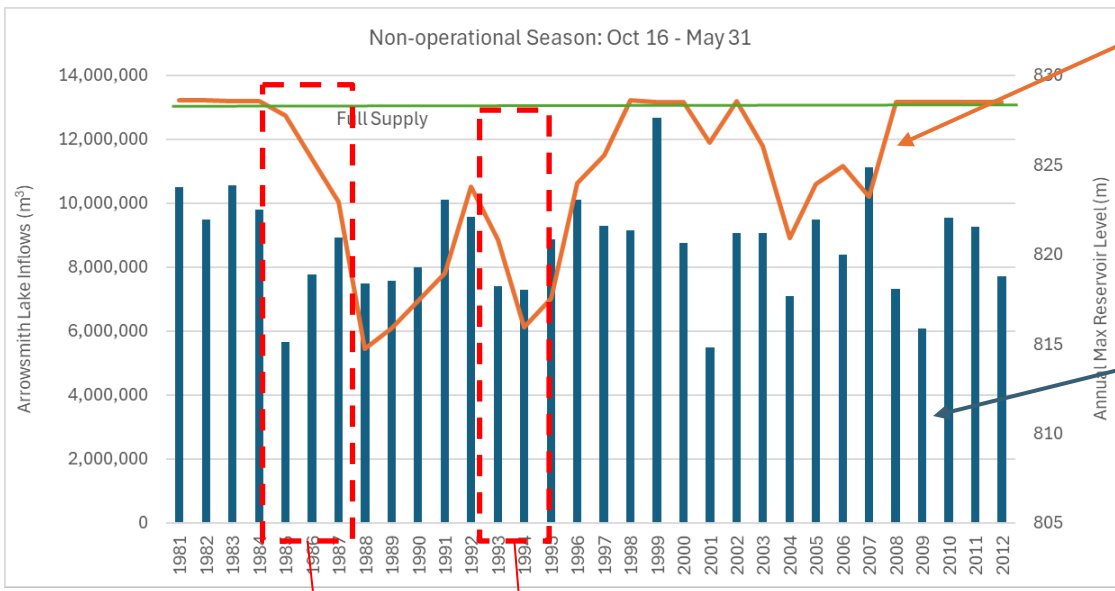


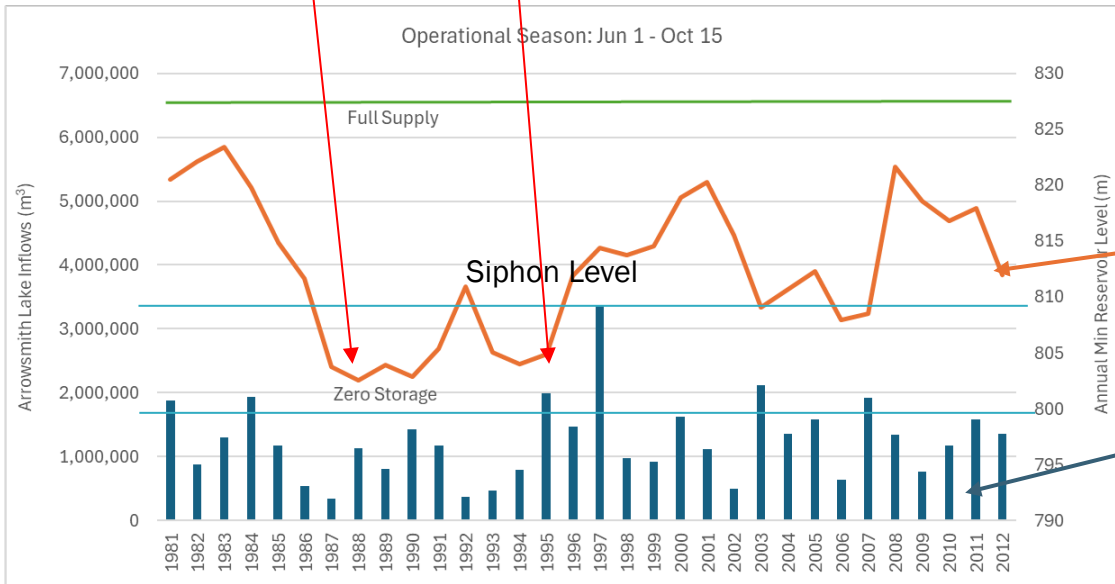
Figure 7-1: Monthly Average Precipitation and Temperature (1980-2010)

Modelled Water System Reliability 1981 to 2012



Annual Max Water Level

Non-operational season
inflow volumes



Annual Min Water Level

Dam operational season
inflow volumes

Baseline Water System Reliability – 1981 to 2023



Recommended EFN	1.0 m ³ /s
Reliability to Support EFN*	~8 out of 10 years on avg
Max Annual Deficit (m ³)	~ 1.2 Million m ³
Lake Level Reliability - Siphon Level	70%
Annual Max. Weeks Flow is Supported by Siphon	23
Lake Level Reliability – Zero Storage	100%

- Reliability governed by year over year drought during period in mid 1980s and 2004 to 2007
- Reliability assessment does not consider implementation of Stage 3 or Stage 4 watering restrictions

Climate Change Impacts

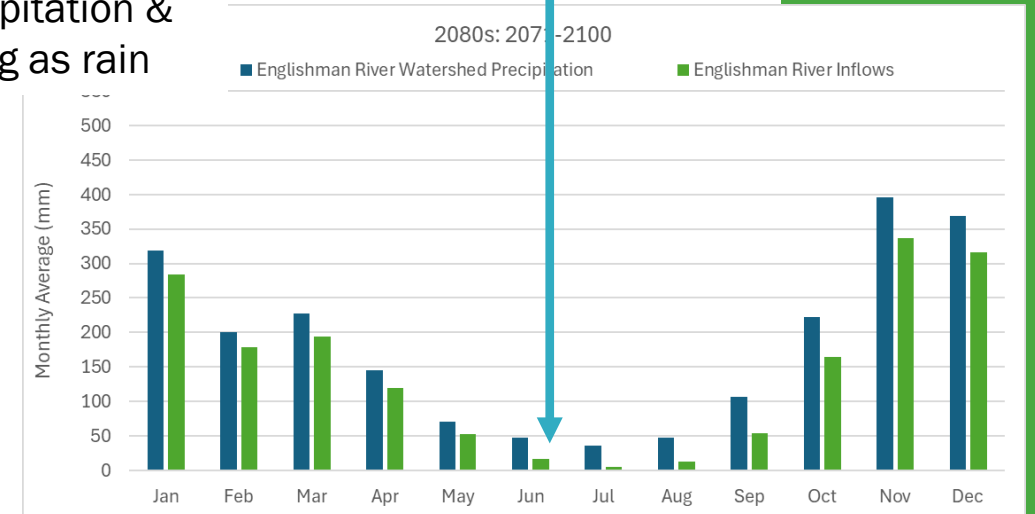
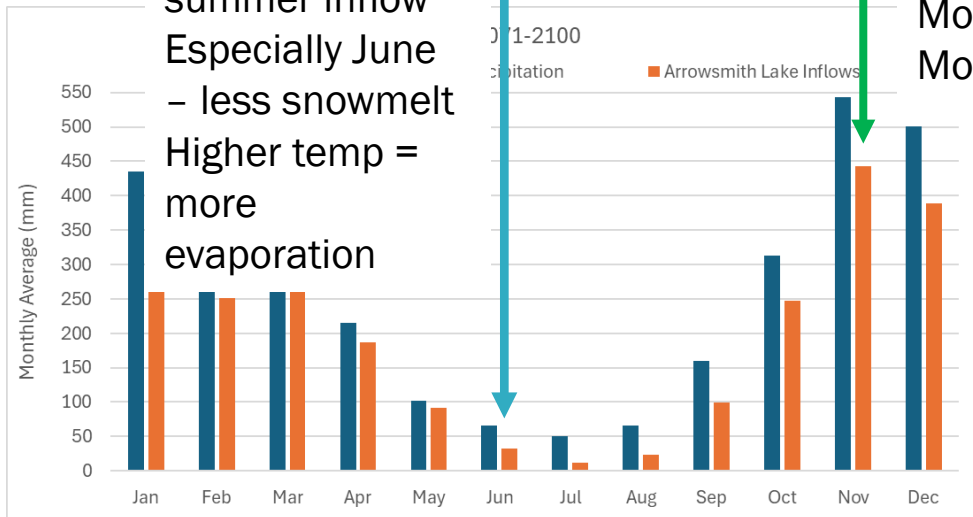
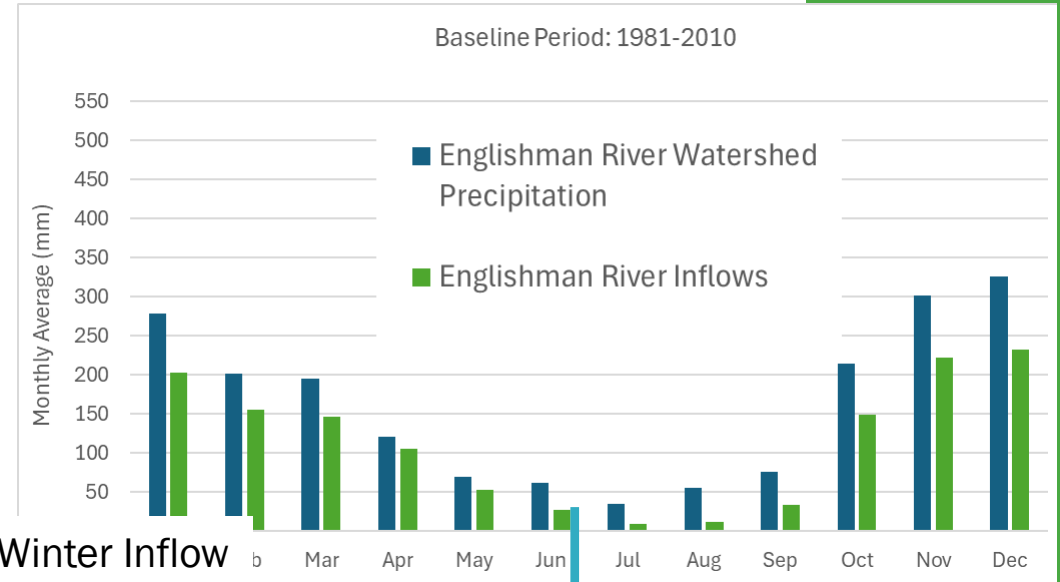
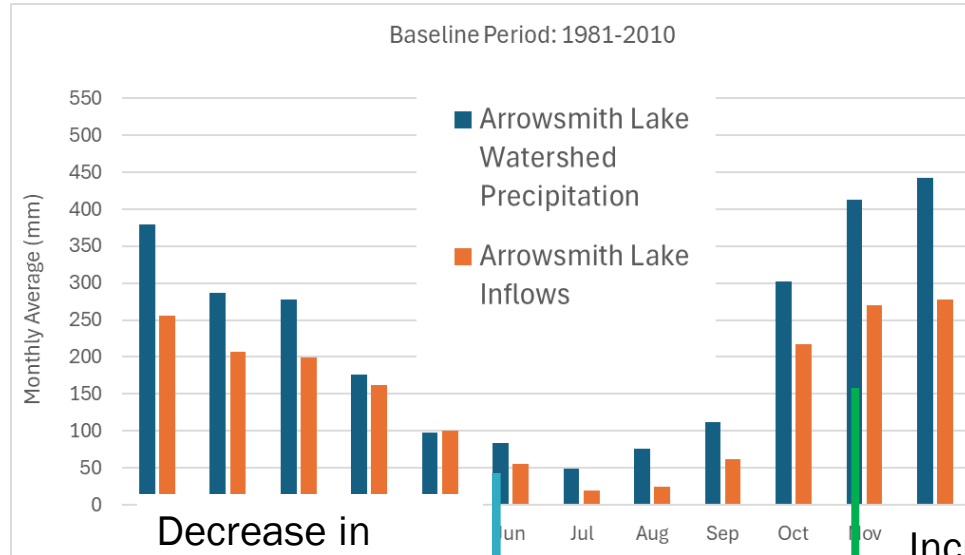


Arrowsmith Lake

Englishman R Watershed

Baseline (1981 to 2010)

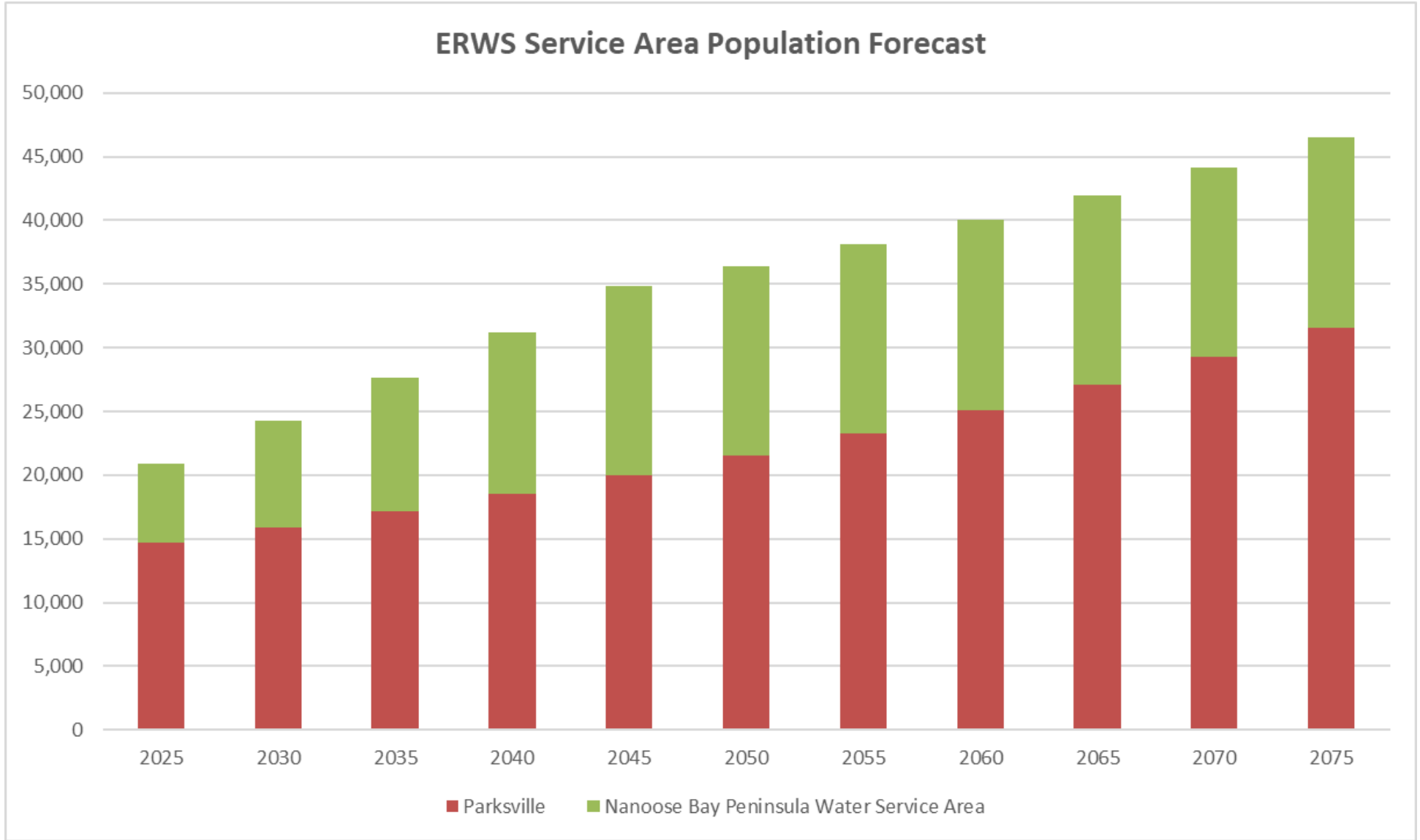
2080s (2071 to 2100)



Decrease in summer inflow
Especially June
- less snowmelt
Higher temp = more evaporation

Increase Winter Inflow
More precipitation & More falling as rain

Future Population



How Much Water Do We Use?

4-person household
100 m² irrigated yard



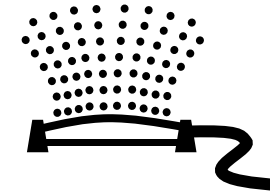
395 m³/year

1-person apartment unit
no irrigation



91 m³/year

Lawn sprinkler left on
overnight



9.6 m³

4-person household
100 m² irrigated yard
Efficient fixtures and appliances



249 m³/year

2 person household
4,000 m² (1 acre) irrigated yard



1,383 m³/year

Small vacant house
0.1 L/s undetected leak



3,146 m³/year

Water Demand Management Strategies



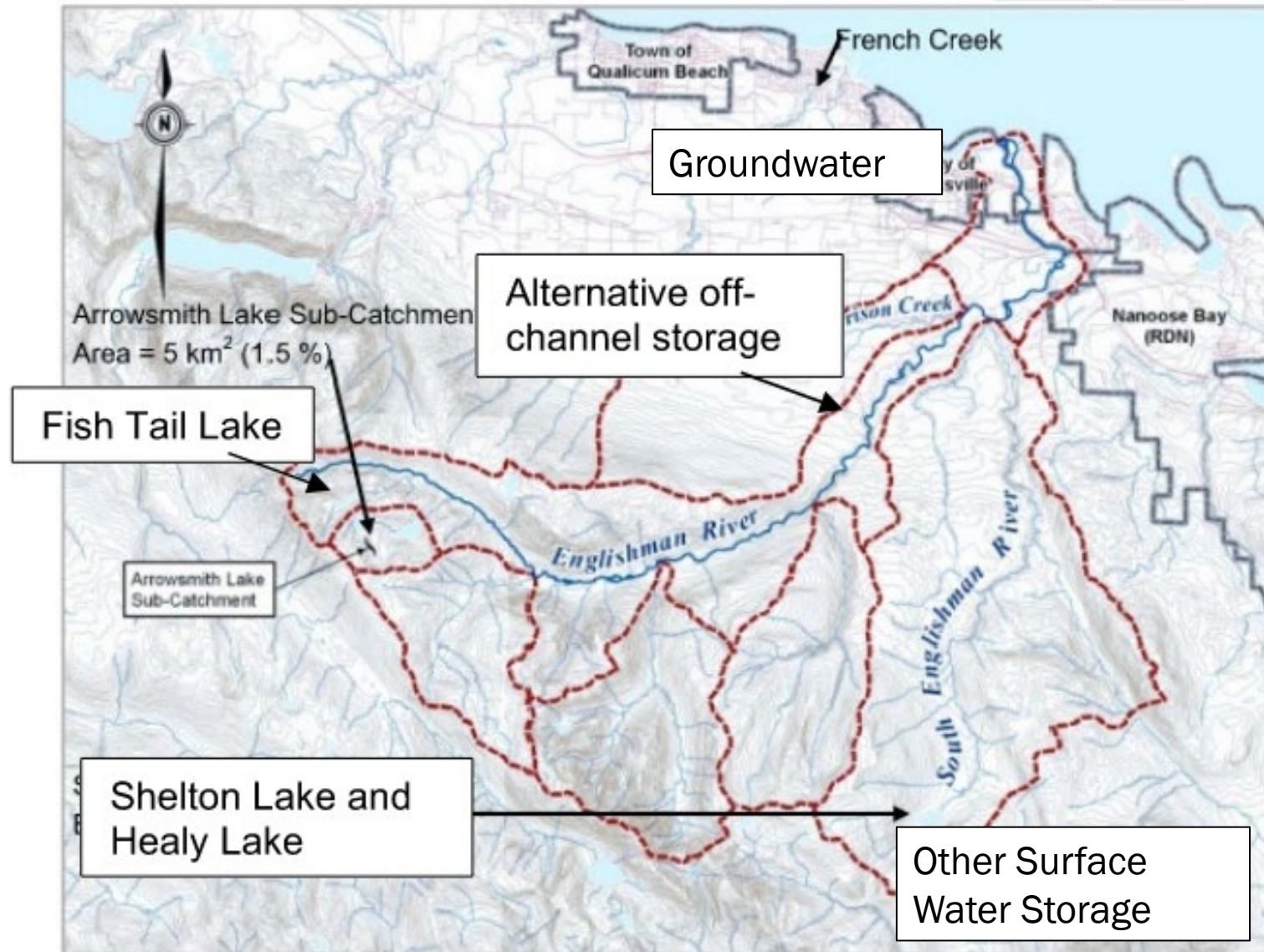
Current Strategies:

- RDN Team WaterSmart
- Watering Restrictions (City now aligned with RDN)

Additional Strategies to Consider:

- Increase water meter reading and billing frequency
- Conversion to AMI (or smart) water meters
- Rebates (e.g. RDNs rainwater barrels, soil amendments)
- Irrigation upgrades & technology improvements (e.g. rain sensors, smart controllers, drip irrigation)
- Home water use audits
- More education and outreach
- Municipal Policy for new development (e.g. irrigation and smart metering)

Future Source Review



Initial Considerations for Future Sources



Surface Water Storage Opportunities

Arrowsmith Lake

Some limited capacity to support additional storage.

Healey/Shelton Lakes –

New dam – 4 to 5 m high x 250 m long (at Shelton Lake)

Relatively easy access (from Nanaimo Lakes)

EFN in South Englishman R.

Consideration around environmental impacts and impacts to forest lands

Fishtail Lake

New dam - ~ 10 m high x 50 m long

Difficult / Costly Access

Lower EFN requirement than Healey Shelton

Other Surface Water Sites

Will review other sites previously identified

Carry out options comparison analysis (Cost, Environmental, Forestry, etc.)

Initial Considerations for Future Sources



Other Water Supply Opportunities

Alternative Off Channel Storage along Englishman River

1.2 million cu m = 3m deep by 40 ha (~ 55 soccer fields)

Limited area within the floodplain / impacts to riparian vegetation

Land ownership

Potential for supplementing baseflows, but difficult to quantify

Protecting / Enhancing wetlands and riparian zones is a benefit but

Ground Water

Additional Groundwater to support Community Supply?

Regional Supply

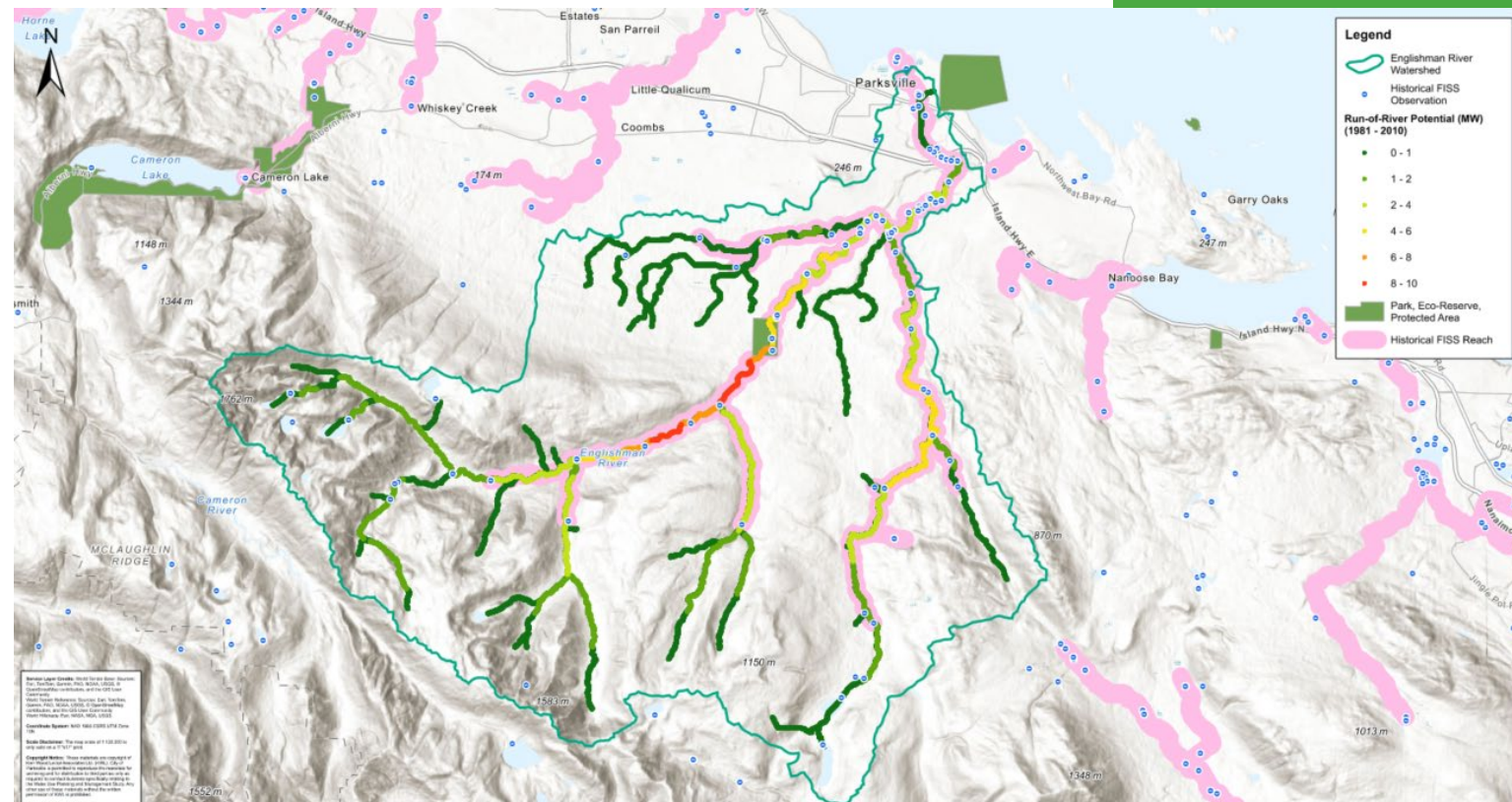
Review Opportunities for a regional water supply across RDN

Hydro & Solar Power



Power generation potential:

- Arrowsmith Dam Hydropower (not economical)
- Fishtail Hydropower (not economical)
- Remainder of watershed not viable
- Solar at key facilities:
 - Englishmen River Pump Station
 - WTP
 - Springwood



Next Steps



- Complete water balance scenarios for the future system (incl. climate & demands) & environmental flow needs (EFN)
- Determine capital infrastructure requirements and demand management strategies to meet needs of community
- Review of opportunities to offset system costs and capitalize on power generation possibilities
- Determine feasibility for new sources and timing for implementation
- Complete draft Water Use Plan
- Present findings to staff and Council in fall 2025



Contact Information



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Arrowsmith Lake Dam –Inflow Volumes

