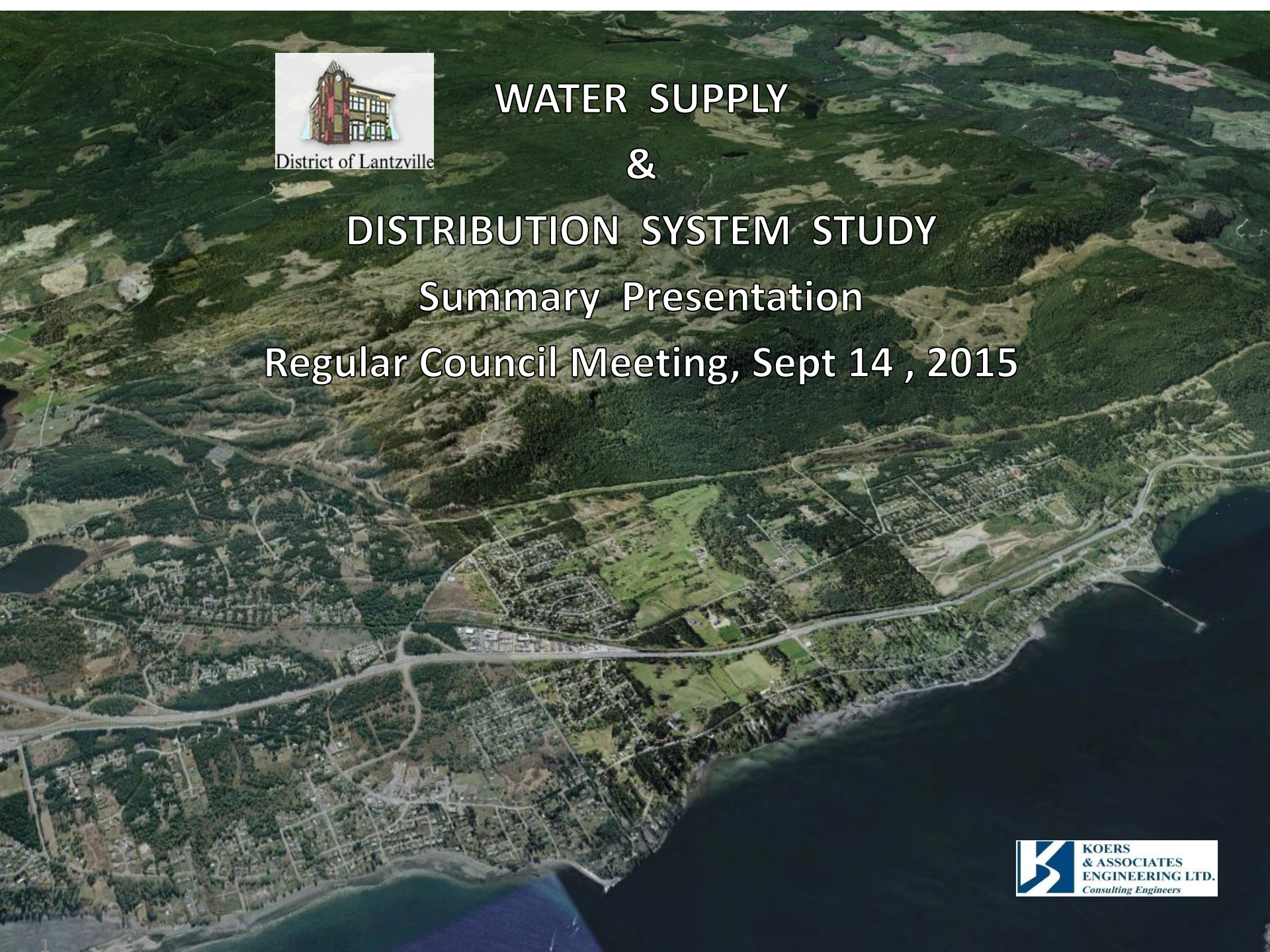
District of Lantzville
WATER SUPPLY
&
DISTRIBUTION SYSTEM STUDY
Summary Presentation
Regular Council Meeting, Sept 14 , 2015
KOERS
& ASSOCIATES
ENGINEERING LTD.
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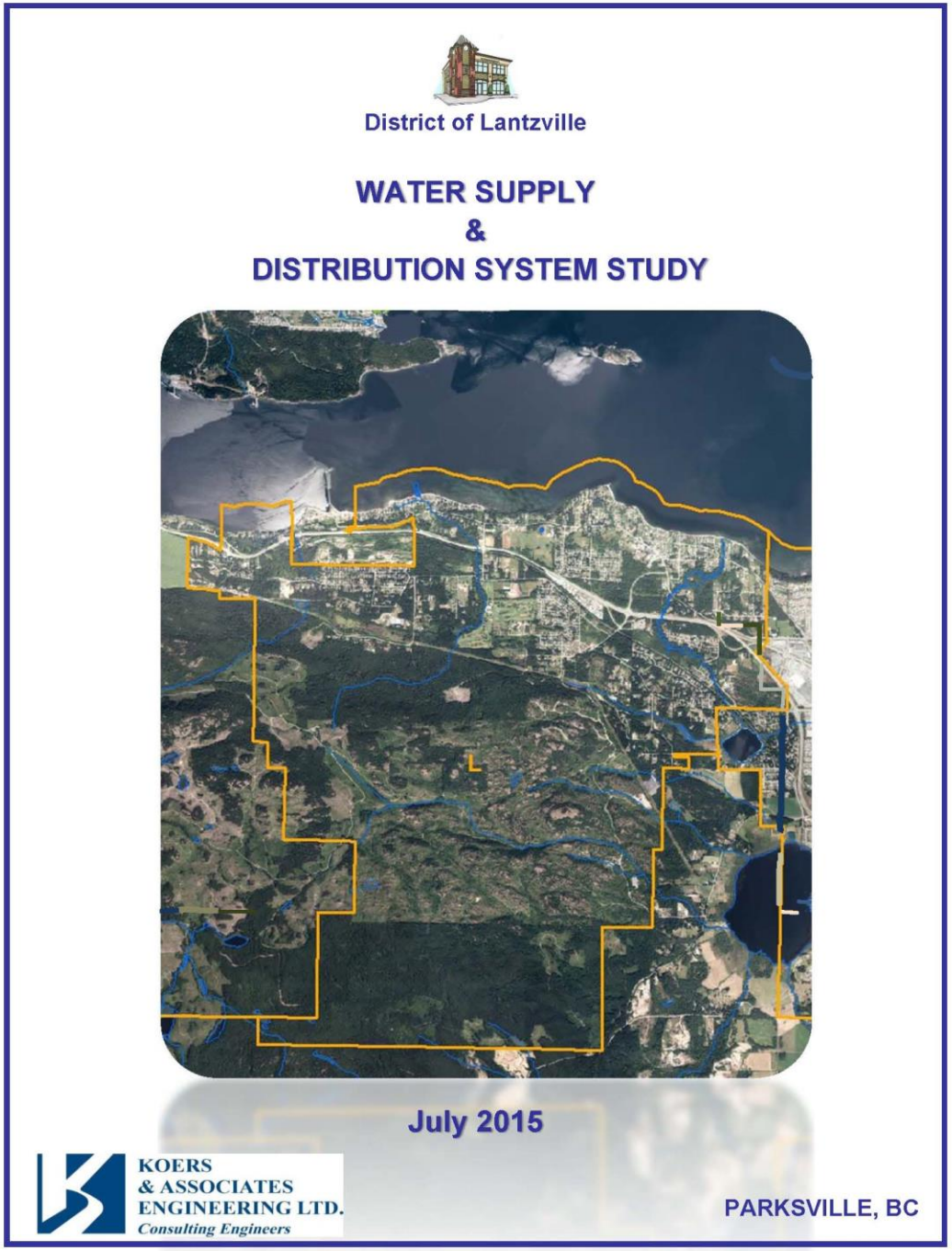

Study Purpose

- Assess the present & future capacity of the District's water supply source.
- Review historical water demands. Compare with those of other municipalities
- Review and compare design standard water demands with those of other municipalities.
- Analyze the ability of the water distribution system to deliver domestic and fire flow demands.
- Provide recommendations to maintain an adequate level of service both now and in the future.

District of Lantzville

1 Water Supply (wellfield capacity)

2 Water Use (how much and where)

3 Serving Additional Properties

4 Infrastructure Works

5 Recommendations

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District of Lantzville

Part 1 Water Supply

- District Wellfield (location & pumping rates)
- Wellfield Aquifer
- Wellfield Yield

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District of Lantzville

Water Supply Source

Four Wells

1979	#4	728 m^3/day	(8.4 L/s)
1983	#6	543 m^3/day	(6.3 L/s)
1986	#9	190 m^3/day	(2.2 L/s)
1990	#12	566 m^3/day	(6.6 L/s)

Estimated current maximum pumping rate when all pumps operating simultaneously:

2,027 m^3/day

(23 L/s)

Wellfield discharges into Ware Rd Reservoir where it is treated (chlorinated).

Treated water pumped to Aulds Rd Reservoir.

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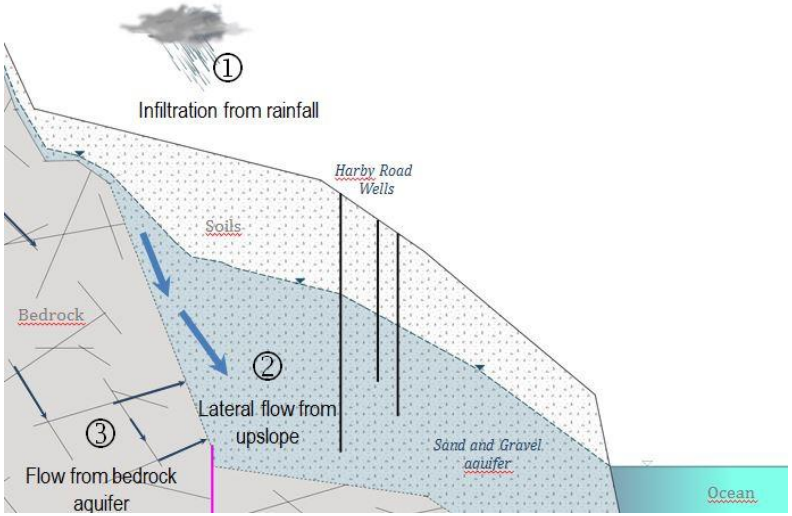
District of Lantzville

Wellfield Aquifer Description

LHC Lowen Hydrogeology Consulting Ltd.
PO Box 45024 Victoria, B.C. V9A-0C3 Phone: 250 -595-0624 Fax: 1-855 -286-8001 Website: www.lowenhc.ca

- The aquifer that the District's well extract water from is labelled #215 by the Ministry of Environment.
- The groundwater level fluctuates throughout the year. Review of water levels revealed up to 3 m of change from the wet winter to dry summer months.
- Aquifer recharge is dependent on:
  - precipitation (snow/rainfall) in the upland area that infiltrates into the ground, and
  - may also be recharged in part by groundwater flowing through the underlying bedrock.



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Wellfield Yield

LHC Lowen Hydrogeology Consulting Ltd.
PO Box 45024 Victoria, B.C. V9A-0C3 Phone: 250 -595-0624 Fax: 1-855 -286-8001 Website: www.lowenhc.ca

- Current Conditions
- Future Conditions (New Well No. 6 & Redevelopment/Upgrade of 4, 9, 12)

Well No.	Date Drilled	Well Diameter (mm)	Water Level Depth (m)	Well Depth (m)	Well Motor (Hp)	Estimated Current Capacity (m^3/day)	Estimated Safe Pumping Yield (July/Aug 2014 & Feb 2015 Pumping Tests)		
							Individual	Simultaneous	
							(m^3/day)	(m^3/day)	% of Total
4	Aug 1979	200	1.1	21	20	728	1,019	901	37 %
6	April 1983	200	- 0.5 *	16	10	543	836	668	27 %
9	Oct 1986	200	3.3	24	5	190	352	281	12 %
12	Oct 1990	200	0.5	21	10	566	718	574	24 %
					Wellfield Estimated Maximum Yield:	2,027	-	2,424	100 %
					2014 Maximum Day Demand:	1,421		1,421	59 %
					Estimated Maximum Difference:	606 (7 L/s)		1,003 (12 L/s)	41 %

Note:
* Indicates Well No. 6 is an artesian well with a static water level of 0.5 m above ground.

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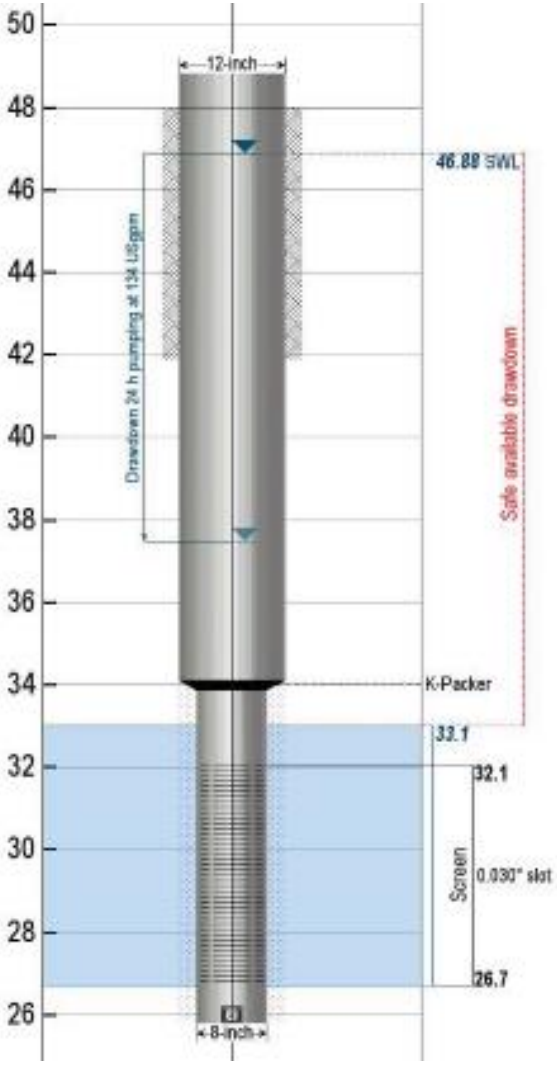
Long-term safe yield

The long-term safe yield of a well was determined by extrapolating the pump test drawdown to a 100 days of pumping, calculating the specific capacity at 100 days and utilizing the safe available drawdown.

Safe available drawdown

For confined aquifer conditions, as is the case for the District of Lantzville, is dependent on the distance between the static water level and the top of the aquifer.



District of Lantzville

Part 2 Water Demands

- Annual, Monthly, Average Day & Maximum Day Demands (historic)
- Revenue & Non-Revenue Water
- Water Demand by Land-Use
- Design Demands

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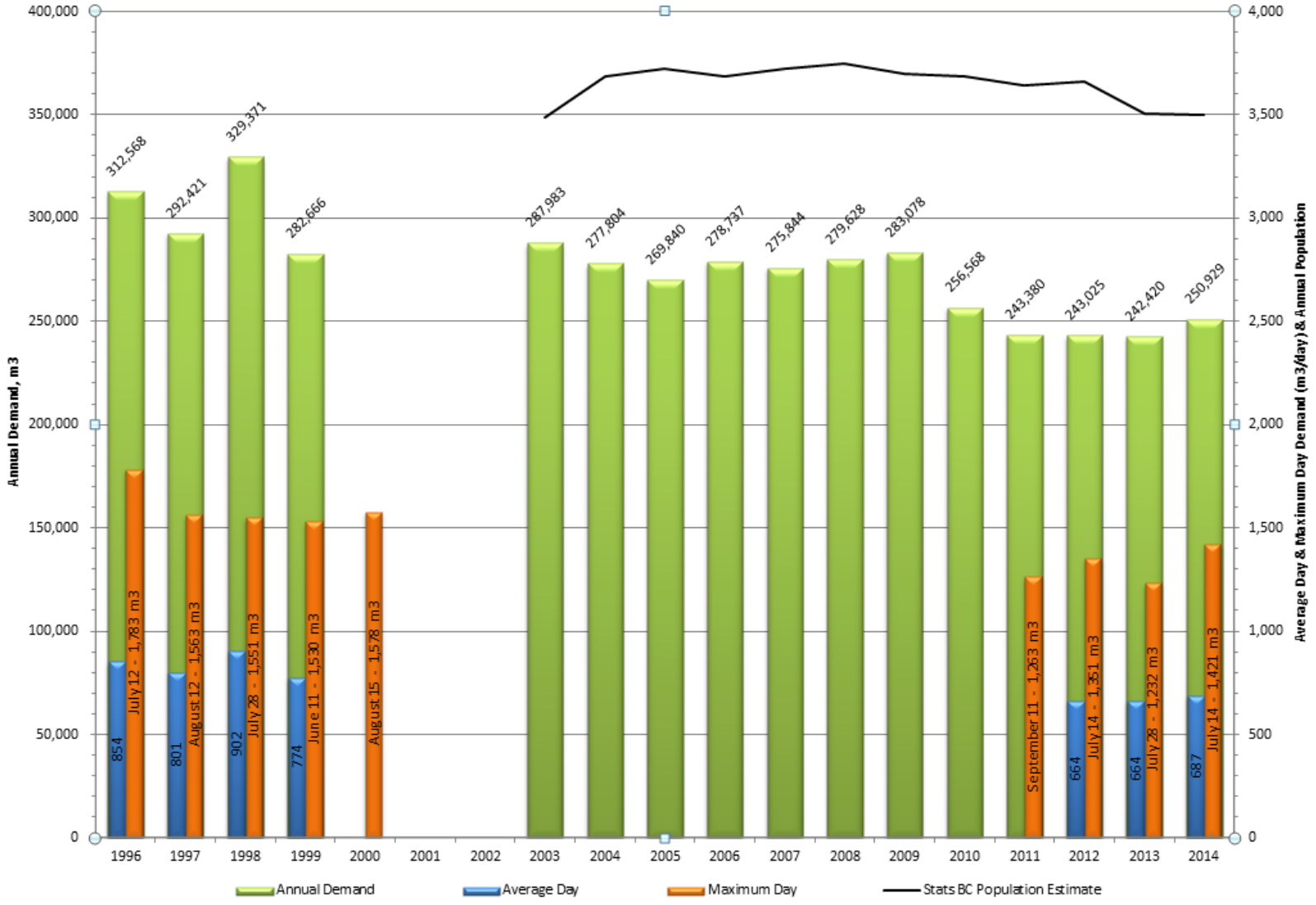
District of Lantzville

Annual, Maximum Day & Average Day Demands
1996 - 2015



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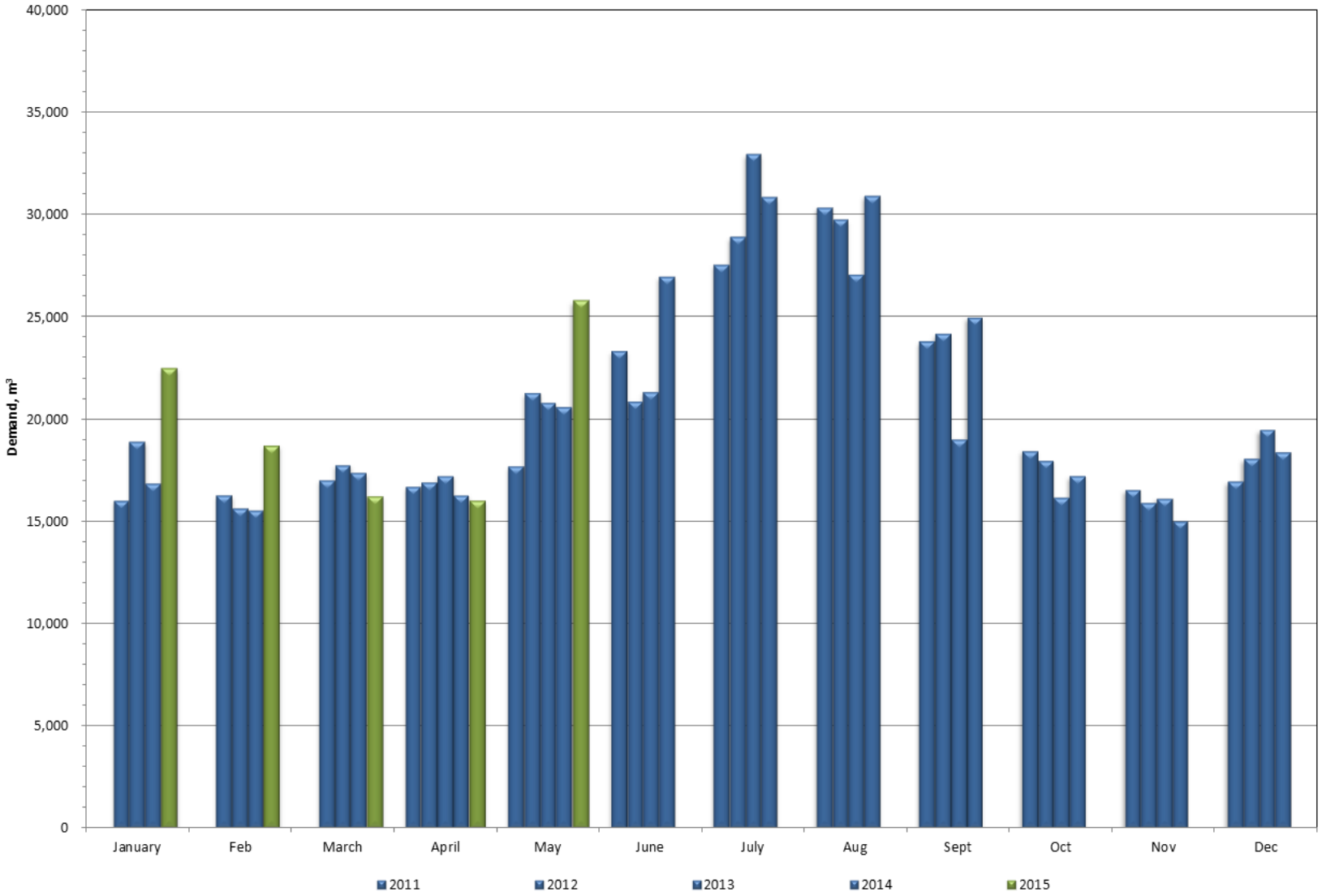
Monthly Demands
2011 – 2015



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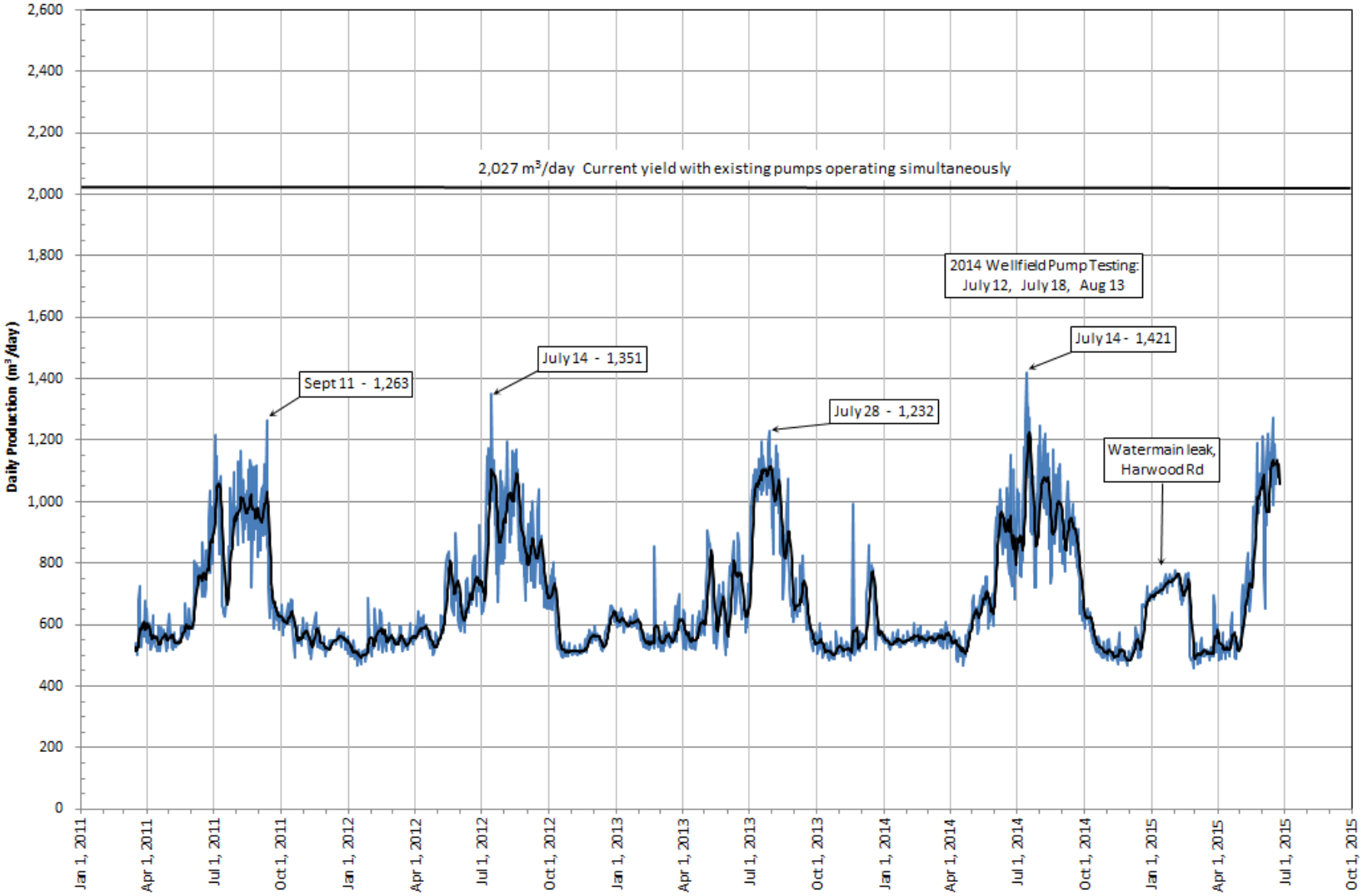
Daily Demand
March 2011 – June 2015



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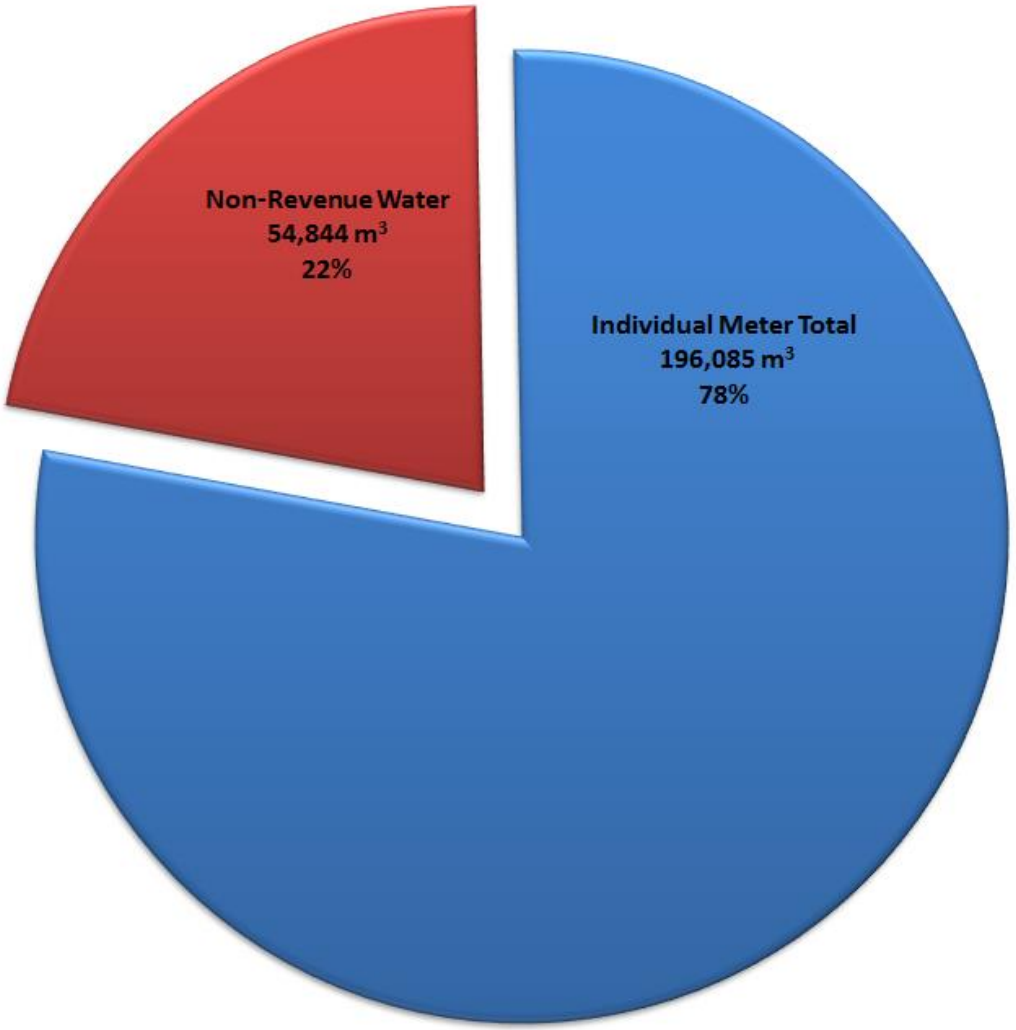
Revenue & Non-Revenue Water, 2014

22% Non-Revenue.

While a noticeable amount, it is not unexpected or unusual for a water system of this size, age and operating pressures.



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Non-Revenue Water Sources

Non-revenue water encompasses unbilled authorized consumption and apparent and real system losses, which may consist of:

Unbilled Authorized Consumption

- Watermain flushing
- Sewer main flushing
- Fire department training and actual fire fighting
- Public boulevard and playfield irrigation

Apparent Losses

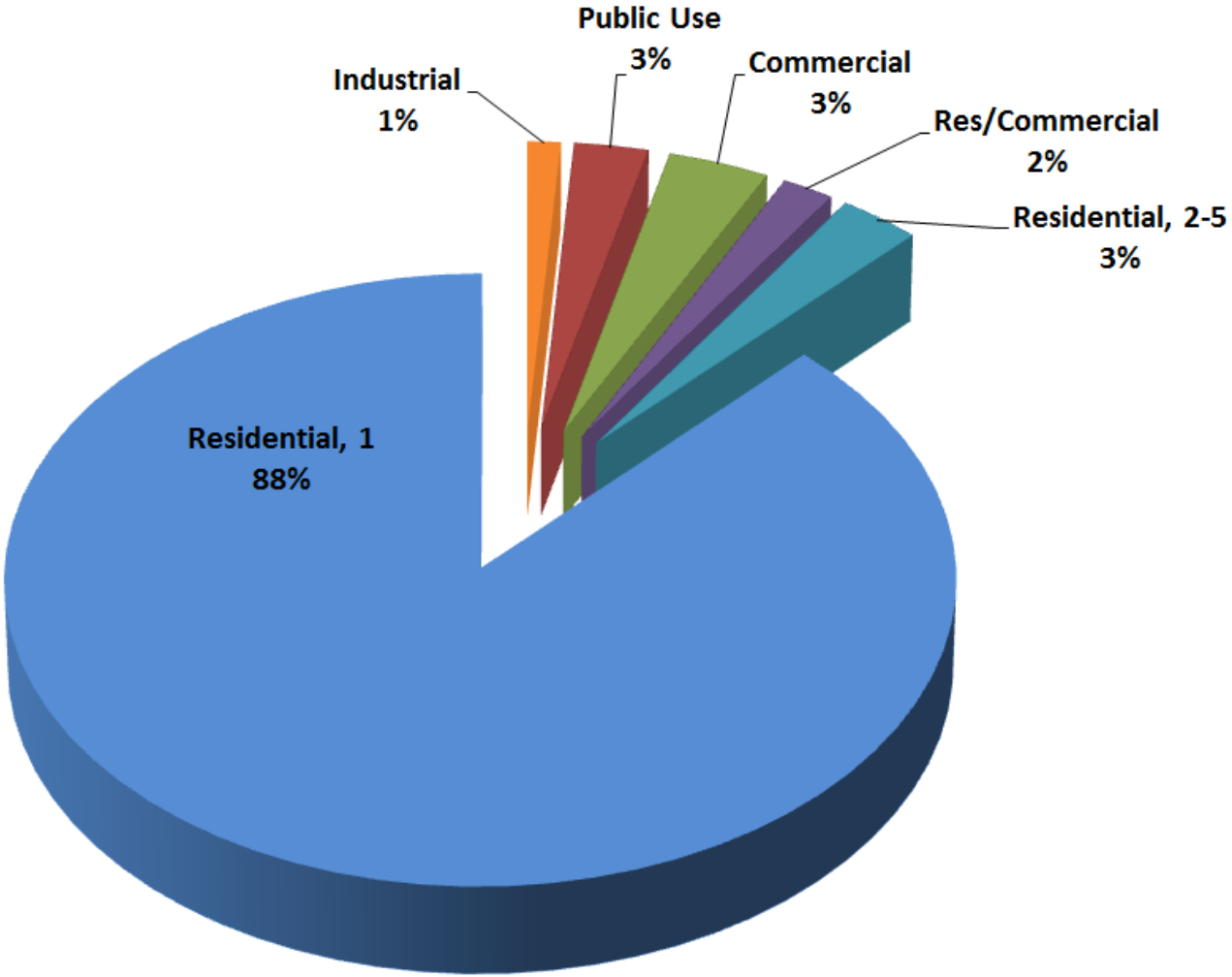
- Water theft
- Metering inaccuracies

Real Losses

- Leakage on transmission and/or distribution mains
- Leakage on service connections up to the customer's meter

District of Lantzville

Revenue Water, 2014



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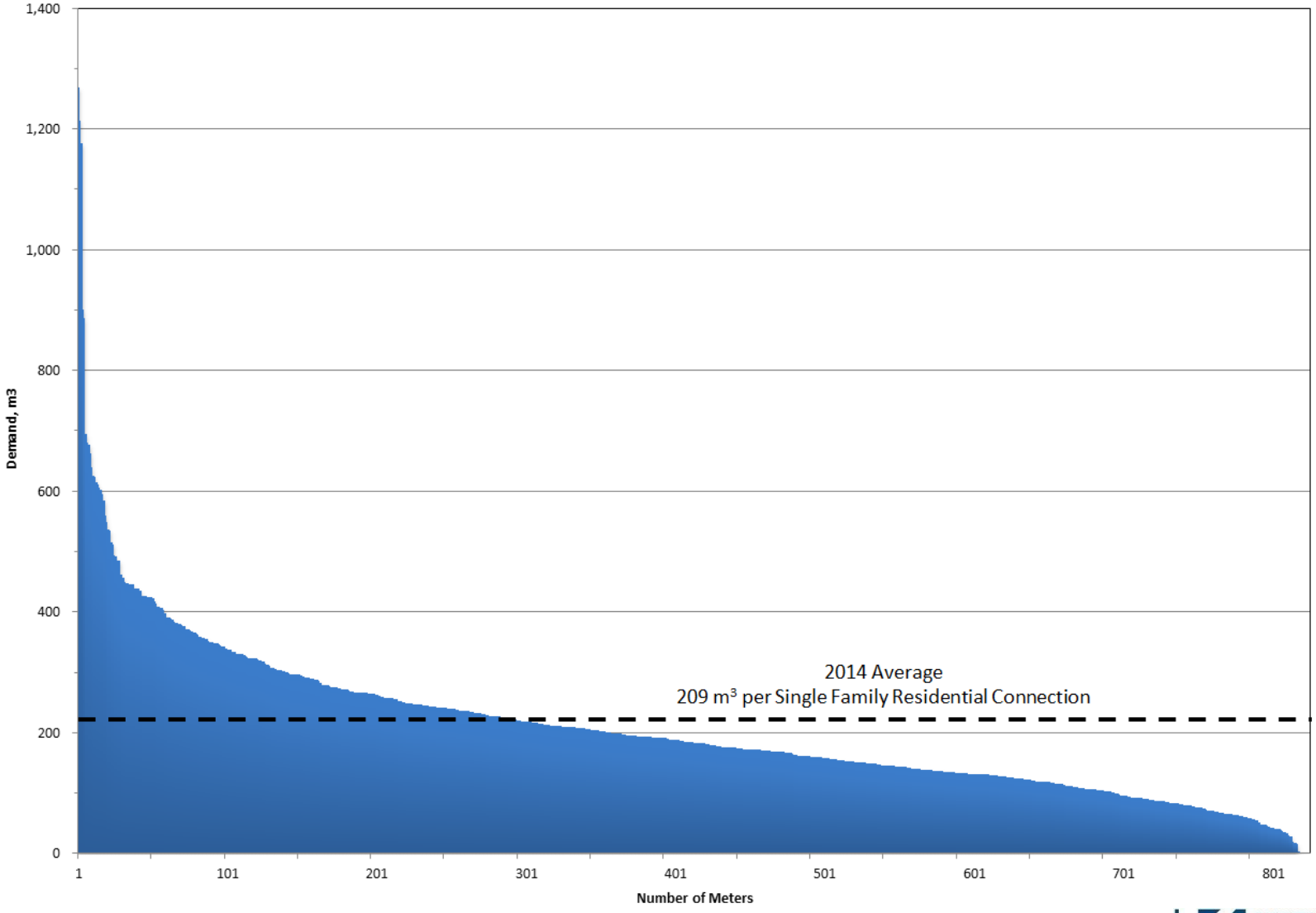
SF Residential Water Use, 2014



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District of Lantzville

Demand by Land-Use
Compared to other Municipalities (2012)

Municipality	Annual Metered Water Demand (2012)		
	Single Family (m^3/dwelling)	Multi-Family (m^3/dwelling)	Commercial (m^3/unit)
Tofino	182	110	590
Parksville	199	n/a	2,130
Lantzville	218	n/a	523
Nanaimo	251	165	n/a
Nanoose Bay Water Service Area	256	204	571
Comox	290	150	4,032
Comox Valley Water Local Service Area	382	264	771

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District of Lantzville

Per Capita Demand
Compared to other Municipalities

Community	Study Year	2011 Canada Census Population	Study Per Capita Demand			
			Average Day (lpcd)		Maximum Day (lpcd)	Max/ Total Ave
			Residential	Total		
Gold River	2002	1,267	786	866	2,252	2.6
Ucluelet	2012	1,627	996	1,270	2,129	1.7
Tofino *	2000	1,876	331	1,008	2,168	2.2
Lantzville *	2015	3,643	246	321	663	2.1
Ladysmith *	2013	8,691	430		729	1.7
Qualicum Beach	2003	8,687	---	570	1,420	2.5
Parksville *	1995	11,977	---	540	1,180	2.2
Comox	2013	13,627	---	490	840	1.7
Port Alberni *	1995	17,743	366	1,118	1,777	1.6
Courtenay	2003	24,099	---	635	1,417	2.2
Campbell River	2001	31,186	---	635	2,100	3.3
Nanaimo *	1998	83,810	---	540	1,050	1.9
Average (excluding Tofino/Ucluelet)		---	---	703	1,581	---

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District of Lantzville

Design Demand
Compared to other Municipalities

Municipality	Municipal Per Capita Demand Design Standards			
	Average Day (lpcd)	Maximum Day (lpcd)	Max/Ave Ratio	Peak Hour (lpcd)
MMCD *	300	600	2	900
Nanaimo	455	1,135	2.5	1,820
Fairwinds		1,168	-	-
Parksville	570	1,364	2.4	1,700
Lantzville	-	1,380	-	-
Qualicum Beach	-	1,780	-	3,150
Courtenay	635	2,100	3.3	3,000
Comox	635	2,100	3.3	3,000
Campbell River	635	2,100	3.3	3,000

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District of Lantzville

Part 3 Servicing Additional Properties

- OCP Water Service Area
- Based on Year 2014 Demands
- Based on Design Demands
- Water Conservation (BC Government)
- Climate Change

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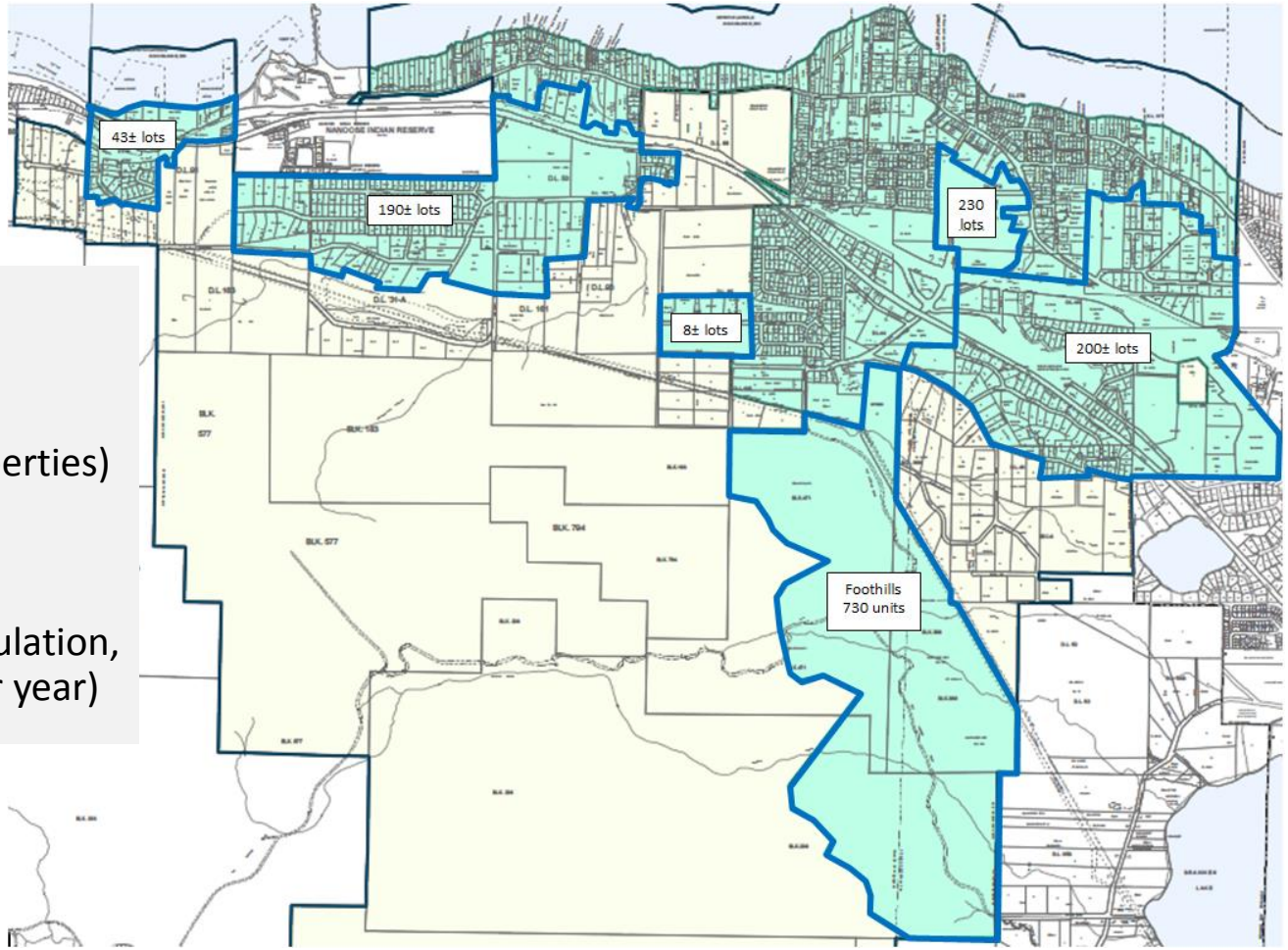
District of Lantzville

OCP Water Service Area

885 Lots (serviced)
+ 441 Lots (developed)
= 1,326 Lots
+ 239 Lots (Lantzville Properties)
+ 790 Lots (Foothills)

2,355 TOTAL

(2.7x increase, 5,700± Population, Year 2065 @ 1% growth per year)



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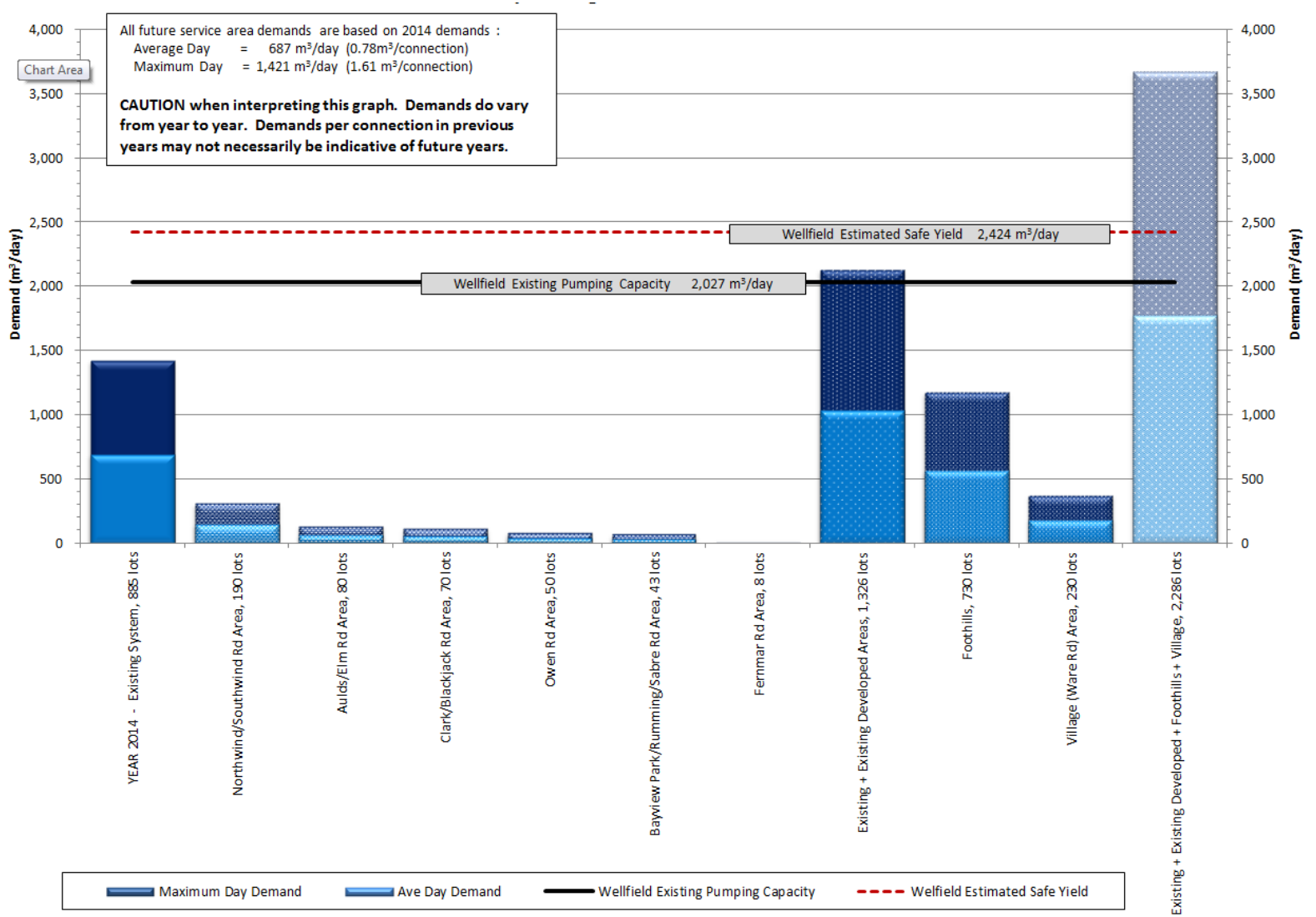
District of Lantzville

No. of Properties Serviced
based on 2014 Average & Maximum Day Demand



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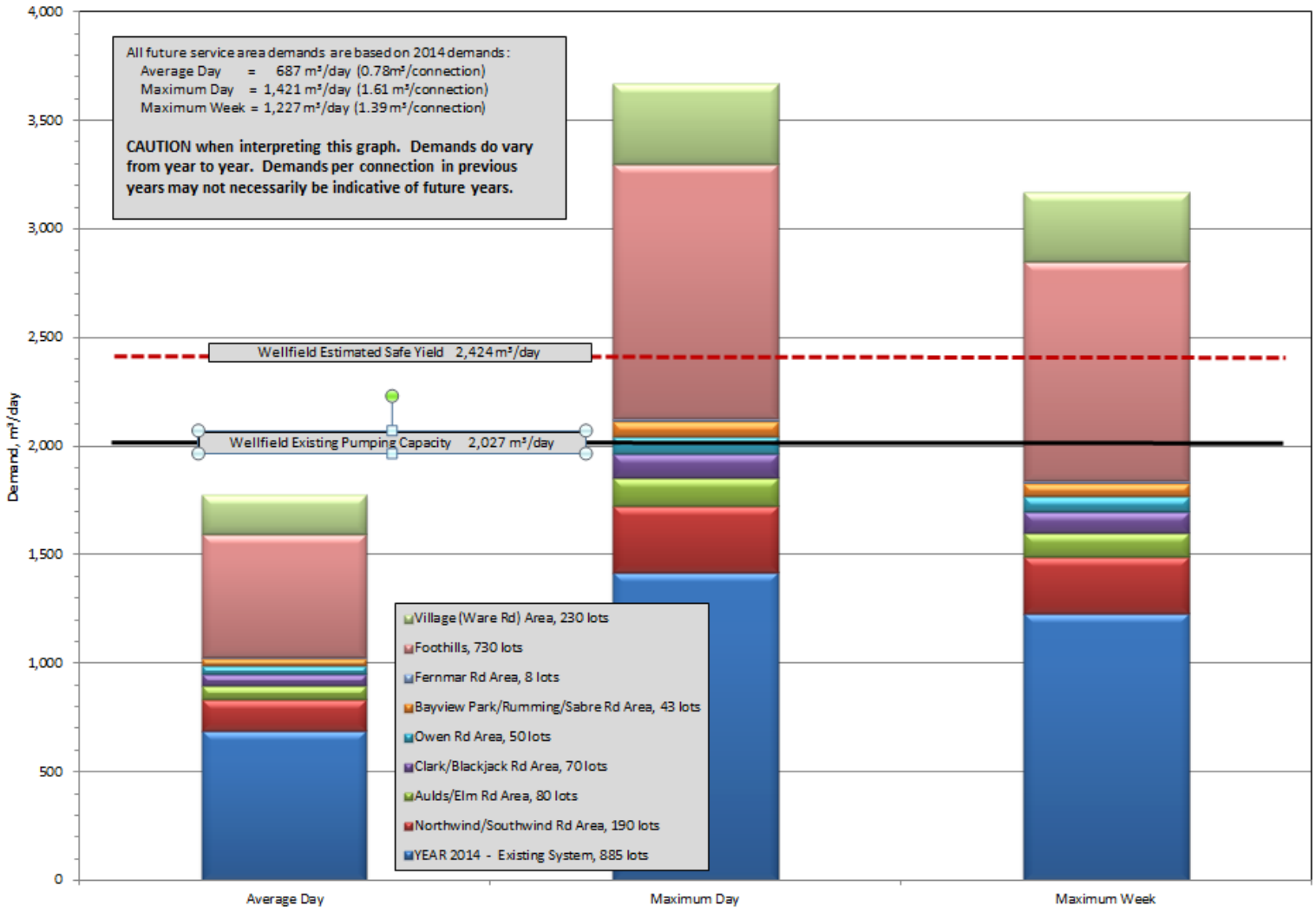
District of Lantzville

No. of Properties Serviced
based on 2014 Average & Maximum Day Demand



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District of Lantzville

Maximum No. of Lots Serviced for Varying Design Demands

Description	Max Day	Municipal Design Demand, Maximum Day				
Municipality	DoL (July 14, 2014)	(Nanaimo)	(Fairwinds)	(Parksville)	(DoL, on-site well)	(Qualicum Beach)
Maximum Day Demand - Lpcd	663	1,135	1,168	1,364	1,380	1,780
- Per Connection (m^3) *	1.61	2.79	2.87	3.36	3.39	4.38

Description	Number of Lots Serviced based on Maximum Day Design Demand					
At maximum pumping of 1,421 m^3/day	(which equates to 70% of 2,027 m^3/day or 59% of 2,424 m^3/day)					
Maximum Number of Service Connections:	885	511	497	424	421	326
At maximum pumping of 1,630 m^3/day	(which equates to 80% of 2,037 m^3/day or 67% of 2,424 m^3/day)					
Maximum Number of Service Connections:	1,012	584	568	485	481	372
At maximum pumping of 1,833 m^3/day	(which equates to 90% of 2,037 m^3/day or 76% of 2,424 m^3/day)					
Maximum Number of Service Connections:	1,139	657	639	546	541	418
At maximum pumping of 2,027 m^3/day	(which equates to 100% of 2,027 m^3/day or 84% of 2,424 m3/day)					
Maximum Number of Service Connections:	1,265	730	710	606	601	465
At maximum pumping of 2,182 m^3/day	(which equates to 90% of 2,424 m^3/day)					
Maximum Number of Service Connections:	1,355	782	760	649	644	498
At maximum pumping of 2,424 m^3/day	(which equates to 100% of 2,424 m^3/day)					
Maximum Number of Service Connections:	1,505	869	845	721	715	553

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District of Lantzville

BC Living Water Smart Program

- 2008, provincial government launched Living Water Smart program emphasizing water conservation.
- Program requires 50% of new municipal water needs to be acquired through conservation by Year 2020.
- It is not known if this program will be applied to groundwater licensing and if so, what further reduction of DoL's (already low) demands can be achieved.

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District of Lantzville

Climate Change

A long-term shift in weather conditions and is measured by changes in a variety of climate indicators (e.g. temperature, precipitation, wind) including both changes in average and extreme conditions.

Government of Canada climate change website says:
(www.climatechange.gc.ca):

- Over the period 1948 to 2010, the average annual temperature in Canada has warmed by 1.6 °C, a higher rate of warming than in most other regions of the world.

- Future warming will be accompanied by other changes, including the amount and distribution of rain, snow, and ice and the risk of extreme weather events such as:
  - heat waves,
  - heavy rainfalls and related flooding,
  - dry spells and/or droughts, and
  - forest fires.

District of Lantzville

Climate Change

The potential impact climate change may have on either the District's water supply source (Aquifer #215) or changes in water demands by the consumers, is not known.

Generally, it is expected that the Vancouver Island region will experience:

- drier summers, and
- wetter winters.

District of Lantzville

Part 4 Infrastructure Works

- Additional Reservoir Storage

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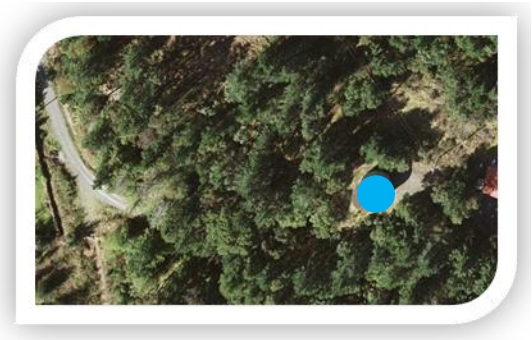
District of Lantzville

Reservoir Storage Volumes

Upper Pressure Zone (Aulds Rd) Reservoir



Description	Calculation	Required Volume, m^3 in Year		
		2014	2040	
			Low	High
Fire Storage	75 L/s for 2 hrs	540	540	
Peaking Storage	25% of Max Day	91	231	359
Emergency Storage	25% of (Fire + Peaking Storage)	158	193	213
	Total Required Storage Volume:	790	964	1,112
	Current Reservoir Storage Volume:	240	240	240
	Resulting Storage Surplus/Deficit	**550**	**724**	**872**

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District of Lantzville

Reservoir Storage Volumes

Lower Pressure Zone (Ware Rd) Reservoir

Description	Calculation	Required Volume, m^3 in Year		
		2014	2040	
			Low	High
Fire Storage	200 L/s (for 2 hrs) to 250 L/s (for 3 hrs)	1,440 – 2,700	1,440	2,700
Peaking Storage	25% of Max Day	264	375	583
Emergency Storage	25% of (Fire + Peaking Storage)	426 – 741	1,175	1,226
	Total Required Storage Volume:	2,130 – 3,705	2,270	4,105
	Current Reservoir Storage Volume:	1,887	1,887	1,887
	Resulting Storage Surplus/Deficit:	243 – 1,818	383	2,218
	Potential Available Fire Storage in High Pressure Zone:	100 *	540	540
	Resulting Storage Surplus/Deficit	**143 – 1,718**	**157**	**1,678**

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District of Lantzville

Recommendations

- Apply for and secure a groundwater licence from the provincial government.
- Try to increase production of wellfield to the estimated long-term safe yield of 2,424 m^3/day (28 L/s) by:
  - Replacing Well No. 6
  - Redeveloping Wells 4, 9 & 12.
- Increase reservoir storage volumes.
- Upgrade watermains to improve fire fighting capabilities.
- Continue replacement of aging (AC) watermains.
- Secure additional water supply source(s) in order to service the properties within the OCP Map 7 – Water Service Area

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District of Lantzville

Comments & Questions

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