

Core Area Wastewater Treatment Program

Presentation to CALWMC
12 May 2010 – Part 1

The logo for CRD (Central Region District Council) features the letters 'CRD' in a stylized, white, sans-serif font. The 'C' and 'R' are connected at the top, and the 'D' is separate. The logo is set against a dark teal background that is part of a larger decorative graphic at the bottom of the slide.

Making a difference...together

Questions/Issues from April 28 CALWMC

- Price elasticity of demand for water
- Continuation of water conservation programs
- Solids capture before treatment
- Regional sustainability – ‘node’ development and resource recovery/Dockside Green type developments
- Build for today’s capacity to allow for innovation and ‘nodal’ development
- Water use projections and capacity
- New communities/development/innovation
- Resource utilization
- Safety/risk factors based on analysis not rule of thumb
- Water reuse opportunities
- Residuals disposal/handling



Water Demand

The logo for CRD, consisting of the letters 'CRD' in a stylized, white, sans-serif font. The 'C' and 'R' are connected, and the 'D' is separate. The logo is positioned on a teal background that features a wavy, water-like pattern.

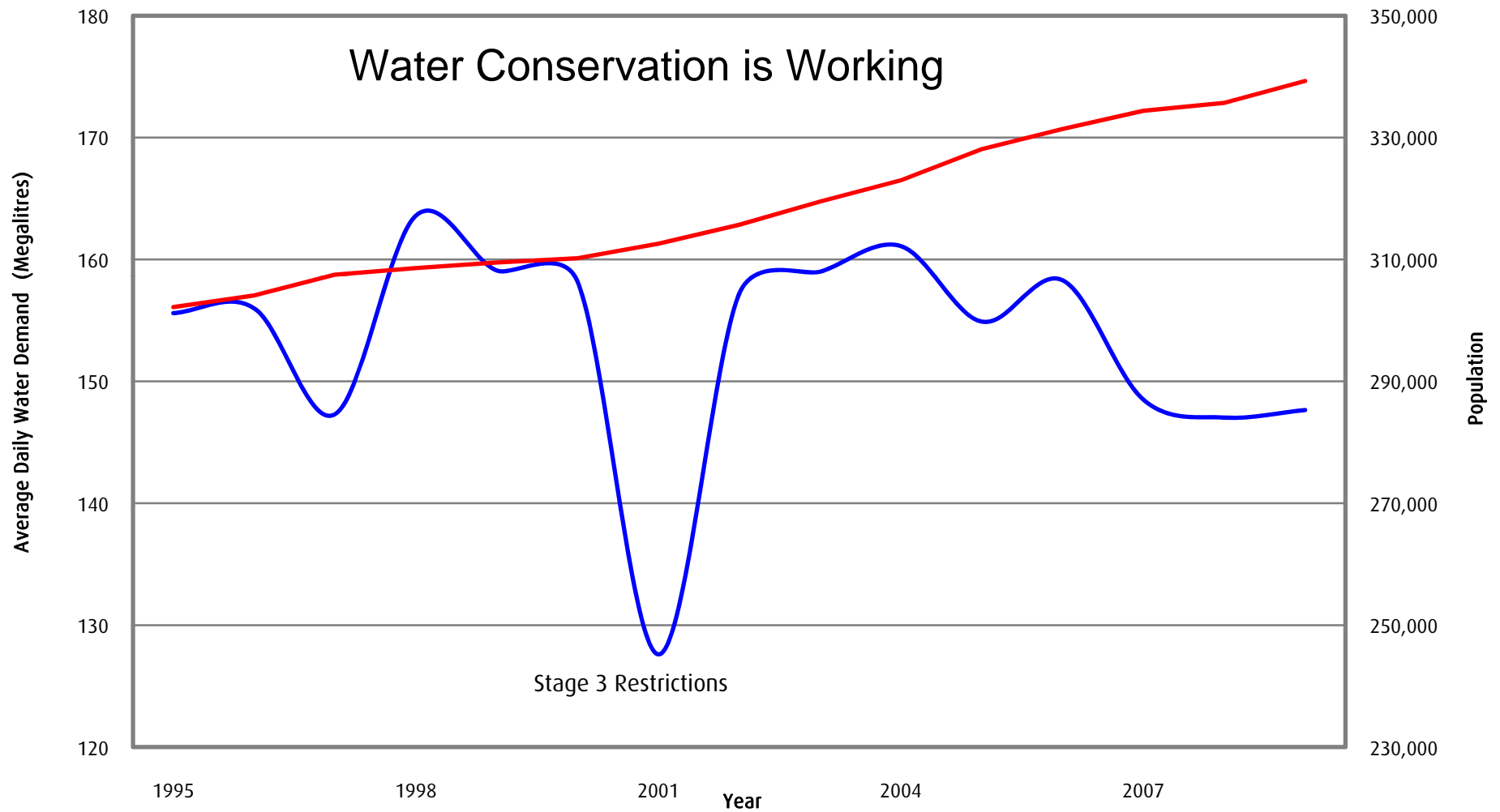
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- Water conservation introduced in mid - 1990's
- ULF Toilet Rebates¹
- Hi-efficiency washing machine rebates¹
- Educational initiatives
- ICI sector audits and rebates

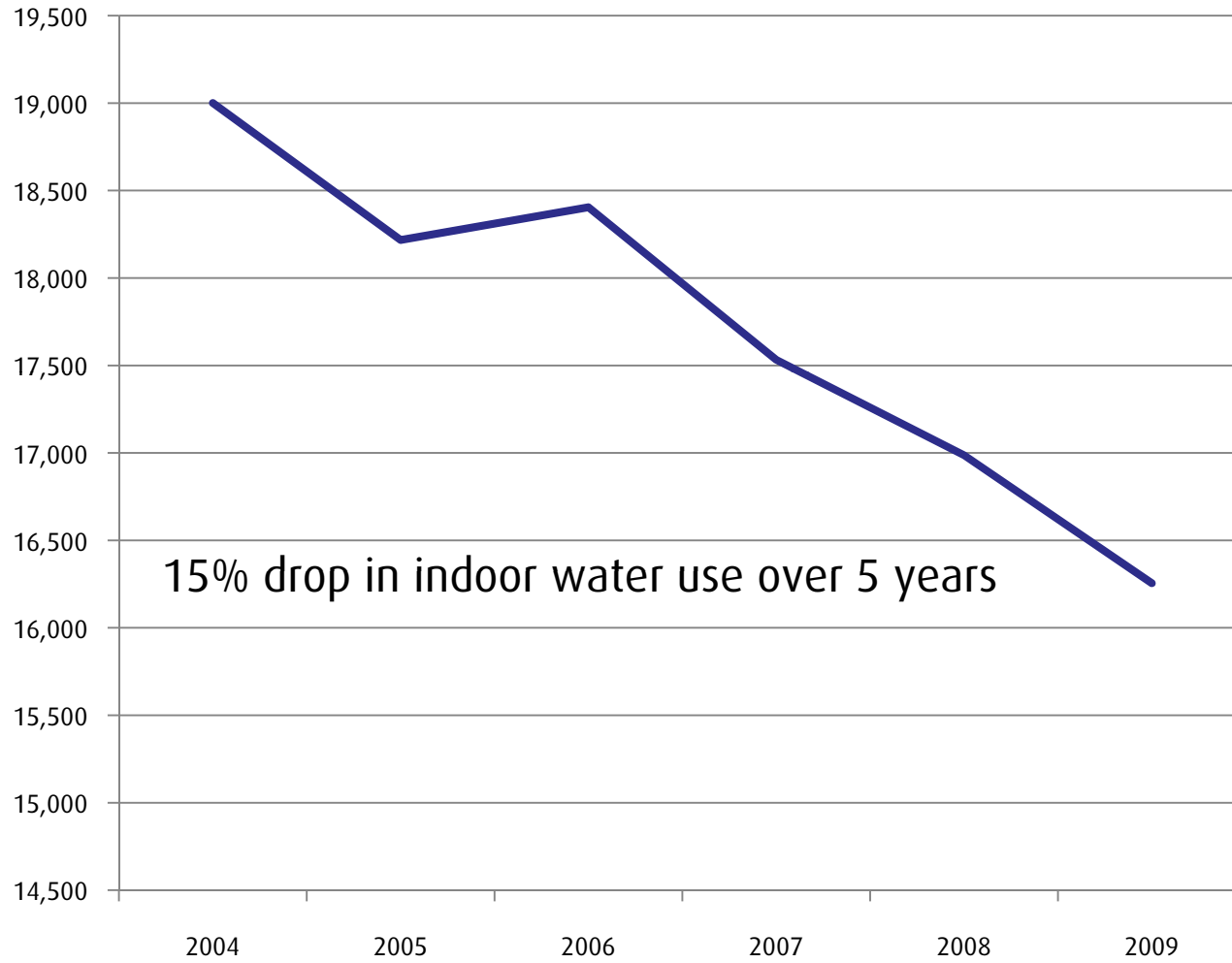
Note 1 Cancelled January 1, 2010



Population and Water Demand in Greater Victoria, 1995-2009

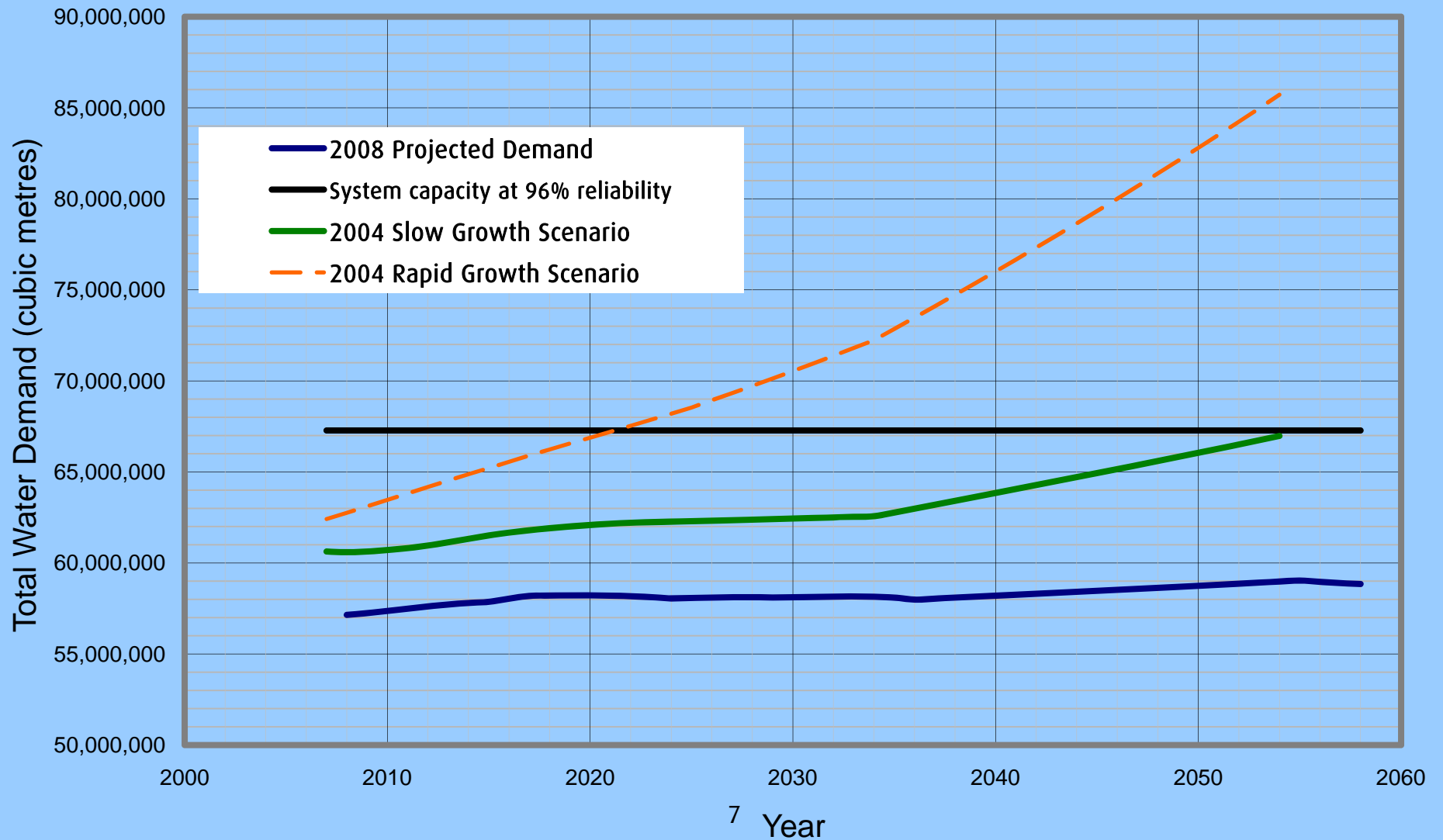


Indoor Water Use October - March



CRD Water Demand Projection

2008 Projection and "Moderate DSM" projections from 2004 Strategic Plan Review



- Lower water consumption will lower the volume but not the organic loading



Wastewater Fundamentals



Stantec

CRD

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Sources of Wastewater

- Residential domestic flows (RD)
- Industrial, commercial, institutional flows (ICI) – PE
- Infiltration & inflow – GWI
- Sum of above to arrive at design flows:

Average Dry Weather Flow (ADWF) =

RD + ICI + GWI (summer months)

- In winter hydraulic flows are higher due to increased infiltration during storm events

- 2010 - 206 L / C / D
- 2030 - 195 L / C / D
- 2065 - 184 L / C / D

GW (summer)

- 2010 - 22.4 ML/d
- 2030 - 24.1 ML/d
- 2065 - 26.1 ML/d

Assumes continued declining trend in water use



Wastewater Terminology

- Solids can be divided into organic and inorganic
- Organic solids:
 - generally of human, animal or vegetable origin 80 – 90 gm/c/d (BOD) CRD: 87gm/c/d
- Inorganic solids:
 - sand, silt, clay and other inert matter contained in wastes discharged to the sewers (TSS)

- Biodegradable Organic Matter:
 - Typically measured using Biochemical Oxygen Demand (BOD) Test
- BOD:
 - is a measure of oxygen consumed by bacteria and other organisms when decomposing organic matter
 - typically used to indicate “strength” of wastewater
 - ranges from 200-300 mg/L for domestic wastewater
 - currently at 212 mg/L for Core Area wastewater
 - impacts sizing of secondary treatment and biosolids treatment

Design Organic (BOD) Loads

- 2010 – 212 mg/L with current ADWF
- 2030 – 240 mg/L with projected 2030 ADWF
- 2065 – 275 mg/L with projected 2065 ADWF

‘Strength’ increases as water use declines.



Determining Flows and Loads

- Use population equivalent projections
- Use per capita flows
- Use organic loads
- Calculate flows & loads
- Assumes Westshore fully serviced by 2030



Federal and Provincial Regulations

1. Effluent criteria – never to be exceeded (Provincial Municipal Sewage Regulation)
 - BOD (organic matter) 45 mg/L
 - Total suspended solids 45 mg/L
2. Effluent criteria – monthly average of at least 5 samples per week (Federal Regulation)
 - BOD (organic matter) 25 mg/L
 - Total suspended solids 25 mg/L
3. Secondary treatment – 2 x ADWF (as per MSR)
4. Primary treatment – 2-4 x ADWF (as per MSR)

Designed for Hydraulic Capacity

- Head Works (up to 4X ADWF)
- Primary Treatment (up to 4X ADWF)
- Secondary Treatment (up to 2X ADWF)
- Disinfection (up to 2X ADWF)
- Pumping Peak Wet Weather Flow
- Outfall Peak Wet Weather Flow
- Organic loading drives sizing of secondary process and biosolids treatment

Note: Important to maintain source control program to manage organic loading



Design Redundancy

Unit Process/Component	Reliability
Influent pump station	<ul style="list-style-type: none">• Two pumps minimum• Station to be capable of handling peak design flow with largest out of service
Preliminary treatment: <ul style="list-style-type: none">• Screens• Grit removal	<ul style="list-style-type: none">• Two minimum• Capable of handling peak design flow with largest out of service
Primary treatment: <ul style="list-style-type: none">• Removal of suspended solids	<ul style="list-style-type: none">• Multiple units• Remaining capacity with largest unit of service must be for 50% of design maximum flow
Secondary Treatment <ul style="list-style-type: none">• Removal of organic matter	<ul style="list-style-type: none">• Multiple units• Remaining capacity with largest unit of service must be for 75% of design maximum flow

Design Redundancy

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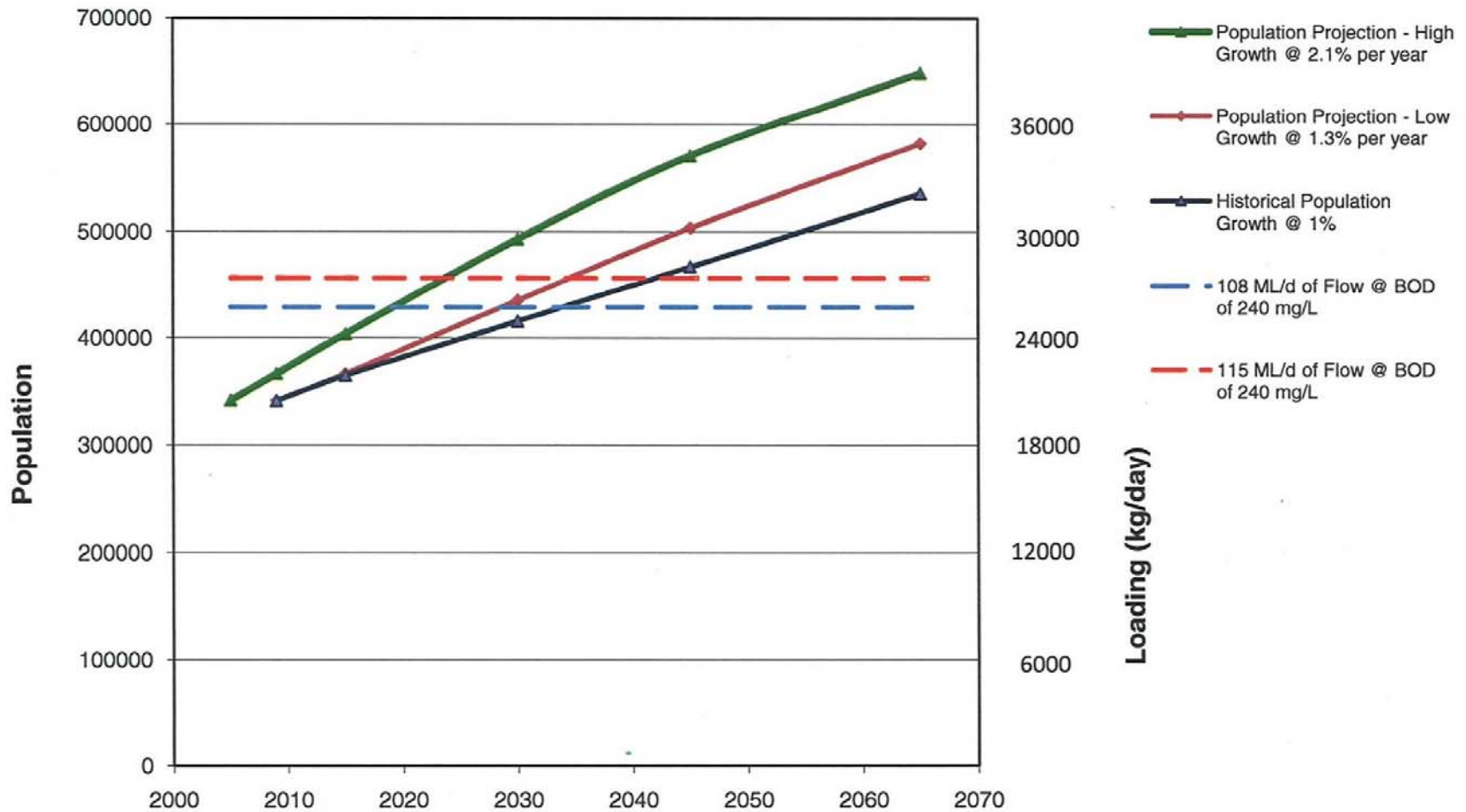
Design Redundancy *(continued)*

Unit Process/Component	Reliability
UV Disinfection	<ul style="list-style-type: none">• Multiple units• Remaining capacity with largest unit of service must be for 50% of design maximum flow
Effluent pump station	<ul style="list-style-type: none">• Two pumps minimum• Station to be capable of handling peak design flow with largest out of service
Outfall	<ul style="list-style-type: none">• Peak wet weather flowflow
Stabilization of primary and secondary sludge	<ul style="list-style-type: none">• Multiple units• Remaining capacity with largest unit of service must be for 50% of design maximum flow



Figure 2.8
Serviced Population and Capacity of Secondary Treatment Plant

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Year



Projected ADWF - 2030

CRD Population Growth Scenario	Domestic Sewage Flow (ML/d)	Ground Water Infiltration (ML/d)	Projected ADWF (ML/d)
Low Rate of Growth	84.3	24.1	108.4
High rate of Growth	96.2	24.1	120.3
Historical Rate of Growth	81.1	24.1	105.2



Summary of Assumptions

- Westshore serviced by 2030
- Water use will continue to decline
- Organic loading will increase
- Population numbers correspond with CRD Planning and Protective Service forecasts



Provincial Expectations

The logo for the Capital Regional District (CRD), consisting of the letters 'CRD' in a stylized, white, sans-serif font.

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Provincial Expectations

- Three key expectations:
 - Biosolids processing - innovation
 - IRR - opportunities
 - Current proven technology - cost effectiveness
- Will not fund future capacity
- Not supportive of water re-use
- No expectation on number of plants



Questions?

