Overview Presentation
Winnipeg's Wastewater Pollution Prevention Plan

Presented to the Clean Environment Commission

January 20, 2003

City of Winnipeg – Water and Waste Department

Overview of Plan

Outline

- Introduction
- Plan to Improve Wastewater Treatment
  - Ammonia reduction
  - CSO control
  - Effluent Limits
  - Nutrients
  - System Reliability
- Financial Impact and Options

Overview of Plan

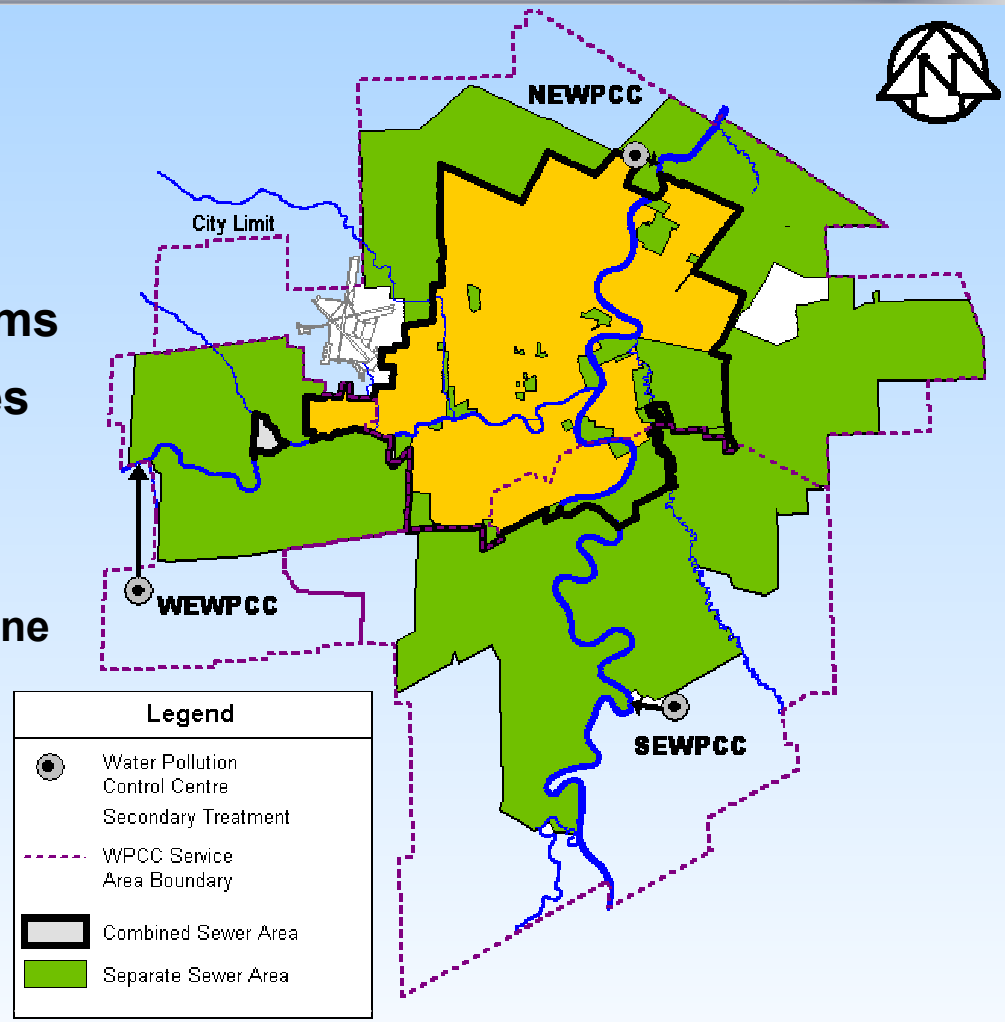
Introduction

- **Major considerations**
  - **Address the issues of disinfection, CSOs, Ammonia, nutrients, effluent limits, reliability.**
  - **Provide a scientific basis for action.**
  - **Provide a schedule of implementation.**
  - **Provide for the operation, maintenance and eventual replacement of assets.**
  - **Provide the required financial resources to carry out the plan.**

Overview of Plan

Introduction

- **Existing Systems**
  - 5 Interceptor Sewer systems
  - 3 Pollution Control Centres
  - 79 CSO locations
  - 231 Land drainage outlet
    - 101 to Red and Assiniboine
  - 2 Major Rivers



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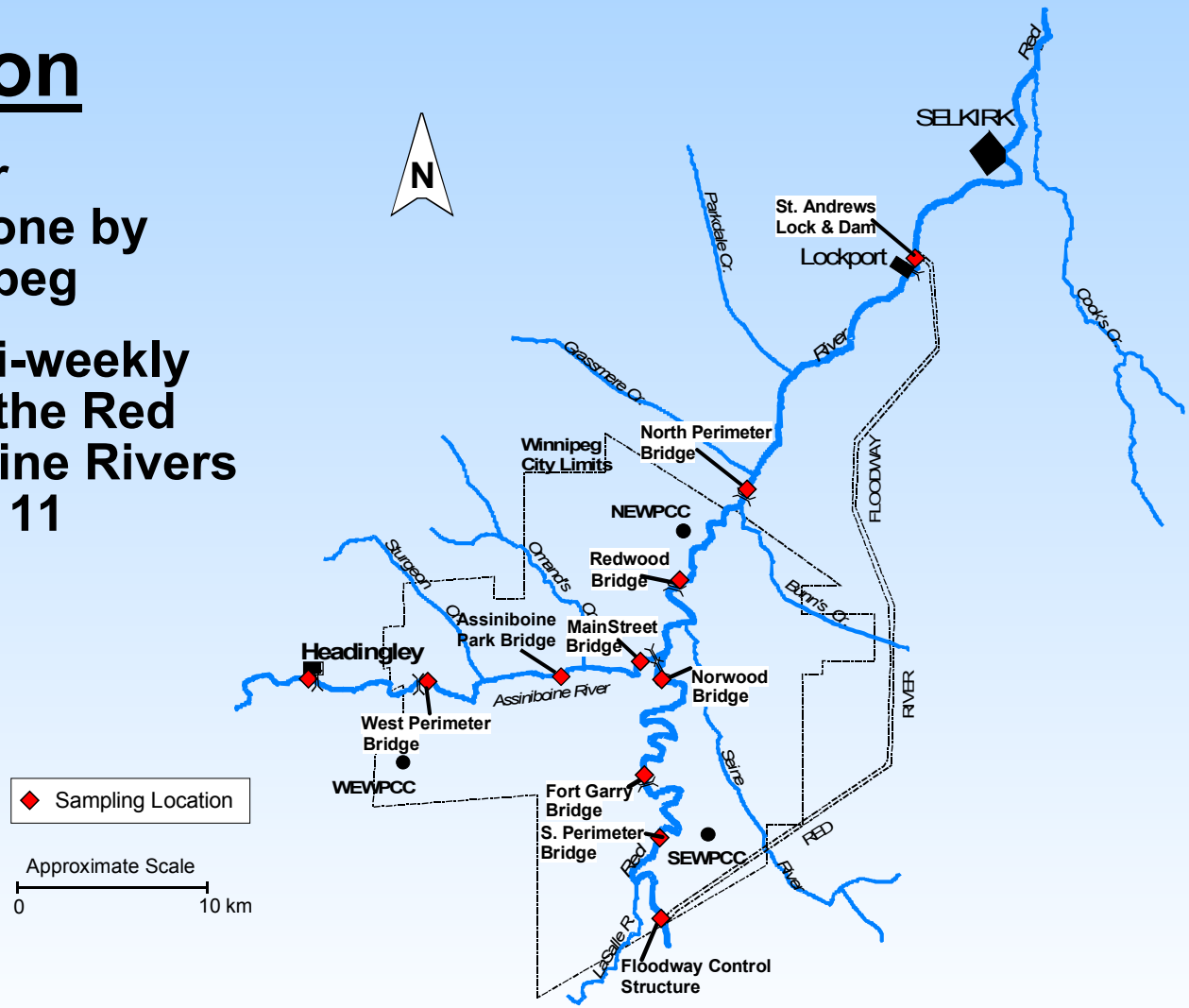
Introduction

- Routine River Monitoring done by City of Winnipeg
- Year-round bi-weekly sampling on the Red and Assiniboine Rivers since 1977 at 11 locations.



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Introduction

- **Scientific Basis:**
  - **The Red and Assiniboine Rivers Ammonia - Criteria Study, November 2002.**
  - **The Combined Sewer Overflow Management Study, November 2002.**
  - **The Nitrification Technical Study, November 2002.**
  - **Executive Summary: Ammonia Reduction in City of Winnipeg Wastewater Effluent, November 2002.**
  - **Nutrient Characterization of Discharges from Winnipeg**
  - **Effluent Discharges Limits for Winnipeg's Water Pollution Control Centres**

Overview of Plan

Plan to Improve

- A near- and long-term implementation plan has been developed covering CSO, Ammonia, Disinfection (and Biosolids).
- Supported by Environmental Projects Reserve (EPR) fund.
- Does not include other system or treatment plant upgrades that might be needed during the same timeframe
- Costs are in 2002 dollars and no inflation allowance has been included.
- Approved by City Council December 11, 2002

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Plan to Improve

Component	Capital $ (Million)	Year Started	Year Completed
NEWPCC Disinfection	**$ 15**	2003	2004
Centrate Ammonia Treatment at NEWPCC	**$ 10**	2003	2004
CSO Control Program			
(Stage Ia) - SCADA, Demo, Weirs	**$ 14**	2003	2005
(Stage Ib) - Integrate with BFR	**$ 26**	2005	2043
(Stage II) - In line storage	$ 50	2028	2033
(Stage III) - Additional storage	$ 181	2033	2050
WEWPCC Disinfection	$ 3	2050	2051
Effluent Nutrient Control			
NEWPCC	$ 127	2019	2022
SEWPCC	$ 47	2022	2025
WEWPCC	$ 7	2025	2026
Sub-Total	**$480**		
Biosolids Program			
(Stage I) - Pelletization and Storage	**$ 30**	2007	2010
(Stage II) - Thermophilic conversion	$ 20	2012	2014
TOTAL	**$530**		

- Approximately **$75 Million** to be supported by EPR in next 10 years

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Plan to Improve

- **Elements:**
  - **Disinfection and ammonia reduction (centrate) are priorities.**
  - **Disinfection at the WEWPCC can be deferred indefinitely.**
  - **Long-term CSO control strategy to achieve a target of 4 overflows.**
  - **Allows for a new biosolids management system.**
  - **45 to 50 year program must be flexible to deal with major uncertainties with future program.**
  - **Allows for long-term nutrient control**
  - **Additional research, studies, monitoring, dialogue with the Regulator, and public consultation to be conducted in next 10 years to better assess needs, timing, and costs of future actions.**

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Plan to Improve

- **Financial Considerations**
  - Capital funding from EPR, $7 million/year for first 10 years
  - Preserves “pay-as-you-go” as much as possible for first 10 years
  - Wastewater improvements will not delay water treatment plant
  - Increase to the EPR will be necessary after ten years
  - Need to add inflation to meet timeframes

Annual EPR (Millions)	Timeframe (Years)
$7.0	2003 to 2012
$14.0	2013 to 2022
$21.0	2023 to 2032

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Ammonia Reduction

- Ammonia (NH_3), a natural by-product of decomposing human and animal waste, is in the treated wastewater (effluent) released to the rivers.
- Ammonia can be toxic to fish at high concentrations
- Studies undertaken to:
  - Understand rationale of existing and evolving regulations
  - Understand abundance, distribution, behavior and health of aquatic life
  - Determine toxicity of ammonia to local aquatic species
  - Explore treatment options and costs

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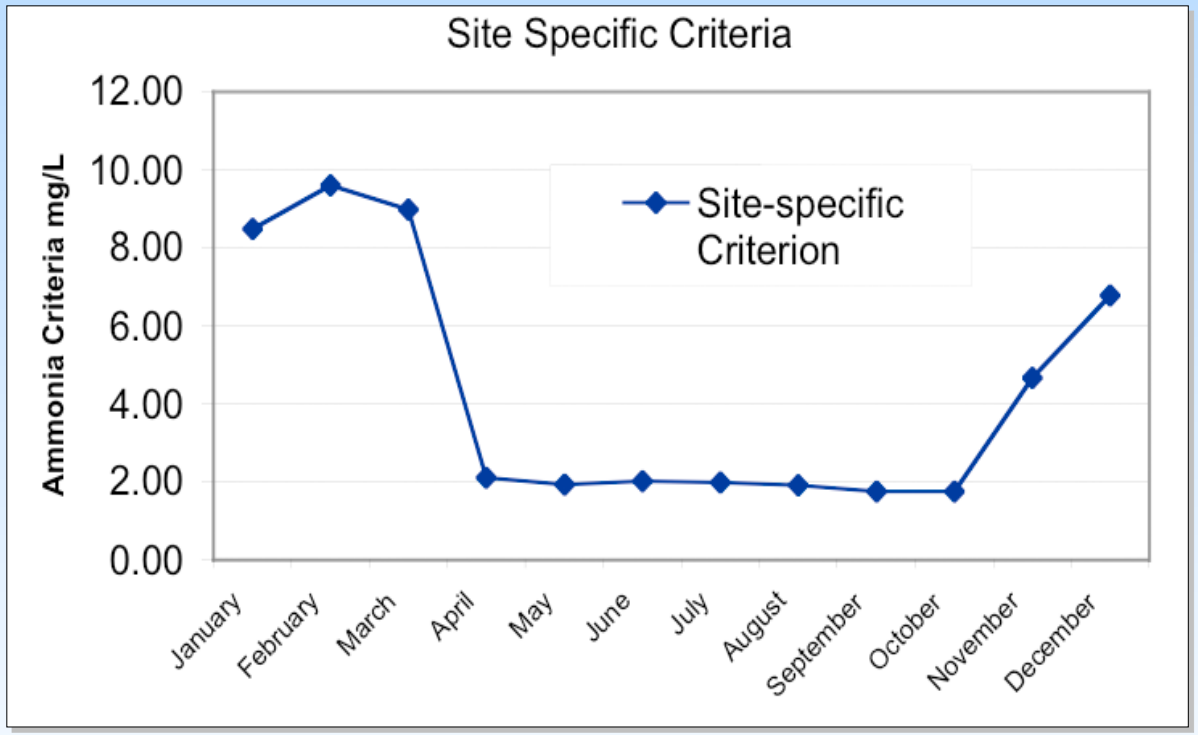
Ammonia Reduction

- Application of Ammonia Criteria
- Involves several important science-based and site-specific considerations
  - Allowable ammonia concentration
  - Exposure
  - Flow allocation
  - Period of Record for Design Flow



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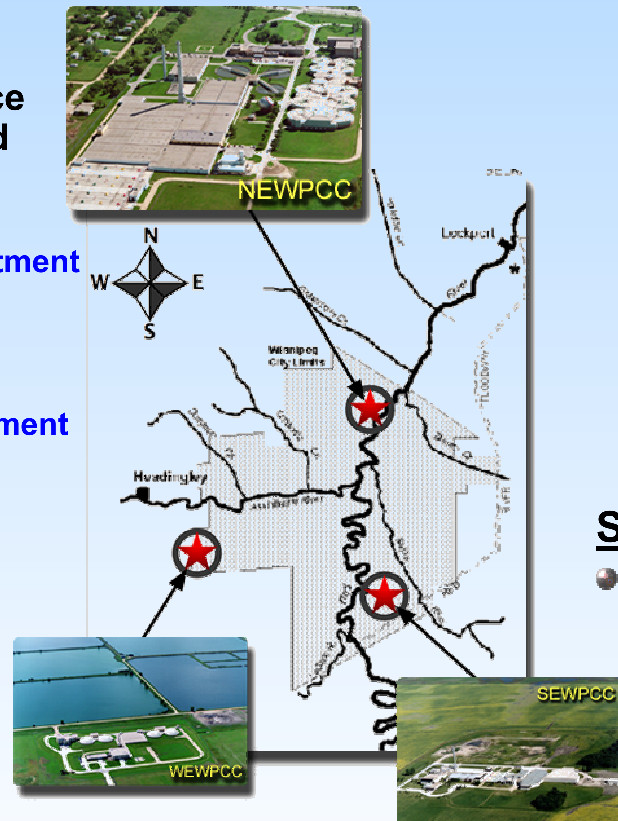
Ammonia Reduction

- City Proposal to Meet Protective Criteria

NEWPCC

- In longer term, additional treatment to further reduce ammonia may be required
  - 10-year will meet City's proposed criteria
  - Implement Centrate Treatment (2005)
    - $10 Million
    - Monitor
  - Potential additional treatment
    - $0 to 122 Million



WEWPCC

- Continue use of polishing ponds for ammonia removal
  - Potential modification
    - $4 Million

SEWPCC

- Continue secondary treatment process
  - Monitor:
    - Plant performance
    - River Quality
    - Wastewater flows
  - Potential additional treatment
    - $0 to 33 Million

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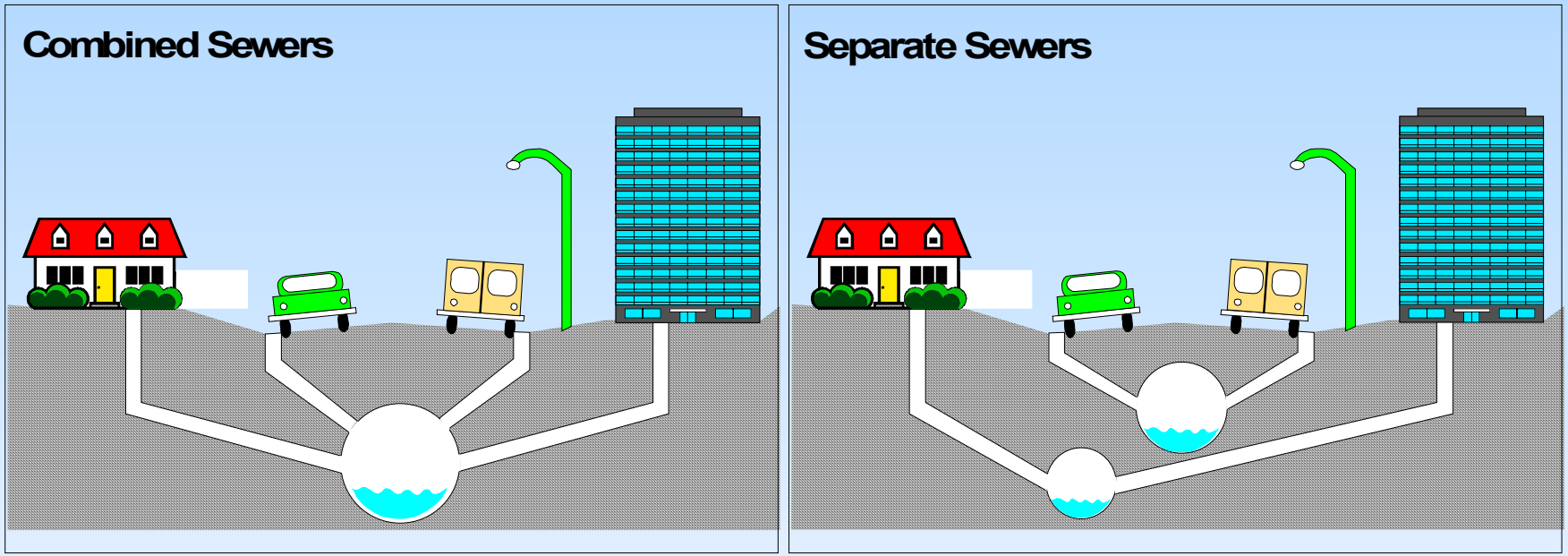
Combined Sewer Overflow (CSO) Control



- Older parts of the City (pre 1960)
- Approximately 30% of City has combined sewers
- CSO – dilute mixture of sewage and land drainage
- The major impact is a temporary increase in fecal coliform levels in the rivers above objectives

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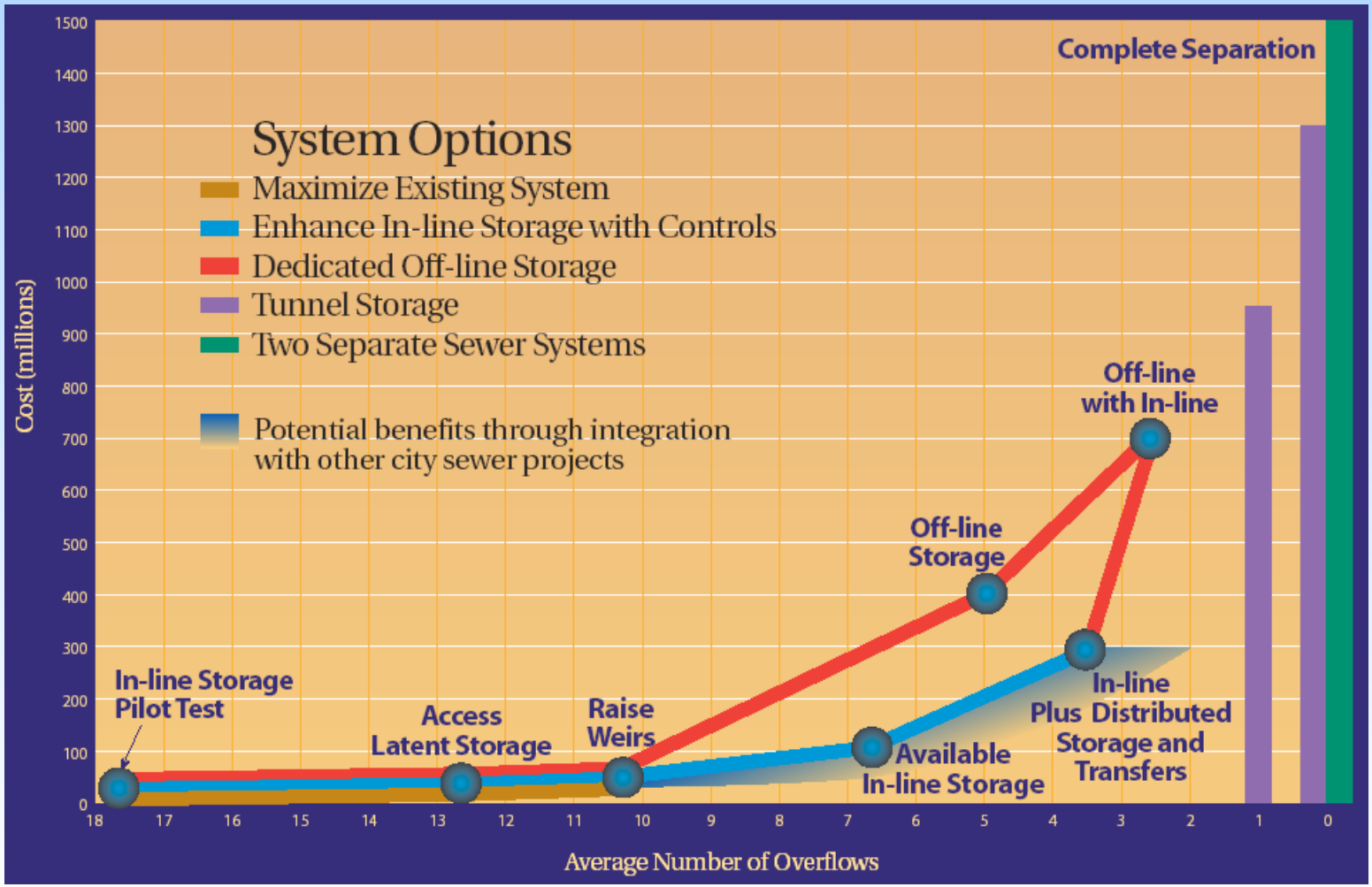
CSO Control: Cost/Benefit Trade-off



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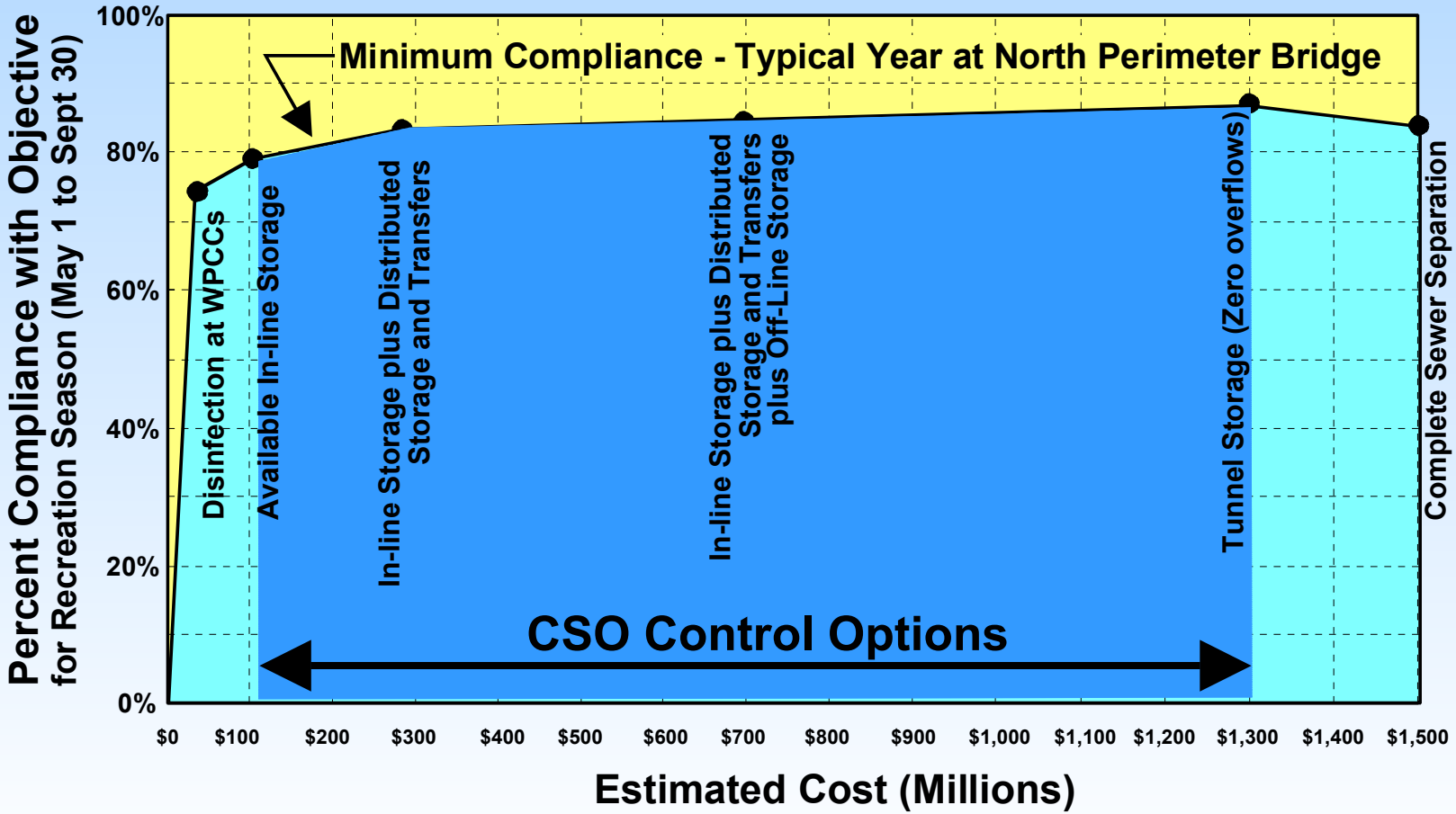
Compliance with Fecal Coliforms Objective
of 200 organisms/100mL for Different Control Scenarios



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Combined Sewer Overflow (CSO) Control:

- **Long-term CSO control program be adopted in principle to reduce overflow events**
  - **City-wide average of 4 events per summer recreation season (reduced from 18 events)**
  - **Within a 45 to 50 year timeframe**
  - **Estimated capital cost: $270 Million**

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Effluent Limits

- Water Pollution Control Centres (WPCCs) are partially licensed under The Environment Act
- CEC Hearing Process will be used to establish appropriate license limits
- Base on the existing secondary treatment performance for:
  - 5-day Carbonaceous Biochemical Oxygen Demand ($CBOD_5$),
  - Total suspended solids (TSS)
- Limits for fecal coliform be established to protect summer recreational use of Rivers.
  - Disinfection is essentially complete at SEWPCC and WEWPCC
  - NEWPCC will be completed in 2005, which will satisfy compliance with microbiological objectives.

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Nutrients

- **Winnipeg's contribution to Lake Winnipeg is small:**
  - **~ 6.3% of annual phosphorous (P) load****
  - **~ 5.2% of annual nitrogen (N) load****
- **Limits for N and P not be established until:**
  - **Province completes basin-wide Nutrient Management Study, and**
  - **Province conducts stakeholder and public consultations.**
- **Could cost as much as $181 Million if required at all three WPCCs**

*** Source: Manitoba Conservation, Nov 2002: " A Preliminary Estimate of Total Nitrogen and Total Phosphorus Loading to Streams in Manitoba, Canada".*

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Systems Reliability

- **Risk/Criticality Assessments**
  - **City to undertake Risk and Criticality Assessments at the three WPCCs**
    - **Assess reliability and backup capability of treatment systems**
    - **Estimate mitigation costs, and develop risk reduction plan**
    - **Implement mitigation measures to prevent discharge of untreated sewage**
  - **12-month study, to be complete in 2004**

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Financial Impact and Options

- Pollution prevention plan to be supported by the current annual EPR funding at $7 M for next 10 years
- Financial uncertainties
  - Actual costs of projects versus estimates
  - Inflation over extensive time periods
  - Other infrastructure costs

Overview of Plan

Financial Impact and Options

- A commitment to a higher (or lower) degree of control for:
  - Ammonia
  - CSOs
  - Nutrients
- Make improvements at a faster (or slower) rate
  - Increase EPR sooner to $14 or $21 million per year
- The regulator(s) will issue the license(s) that determine the final outcome