# Overview Presentation
# Winnipeg's Wastewater Pollution Prevention Plan

**Presented to the Clean Environment Commission**

**January 27, 2003**

**City of Winnipeg – Water and Waste Department**

# Overview of Plan

## Outline

- Introduction
- Plan to Improve Wastewater Treatment
  - Disinfection
  - Ammonia reduction
  - Nutrients
  - CSO control
- Financial Impact and Options

# Overview of Plan

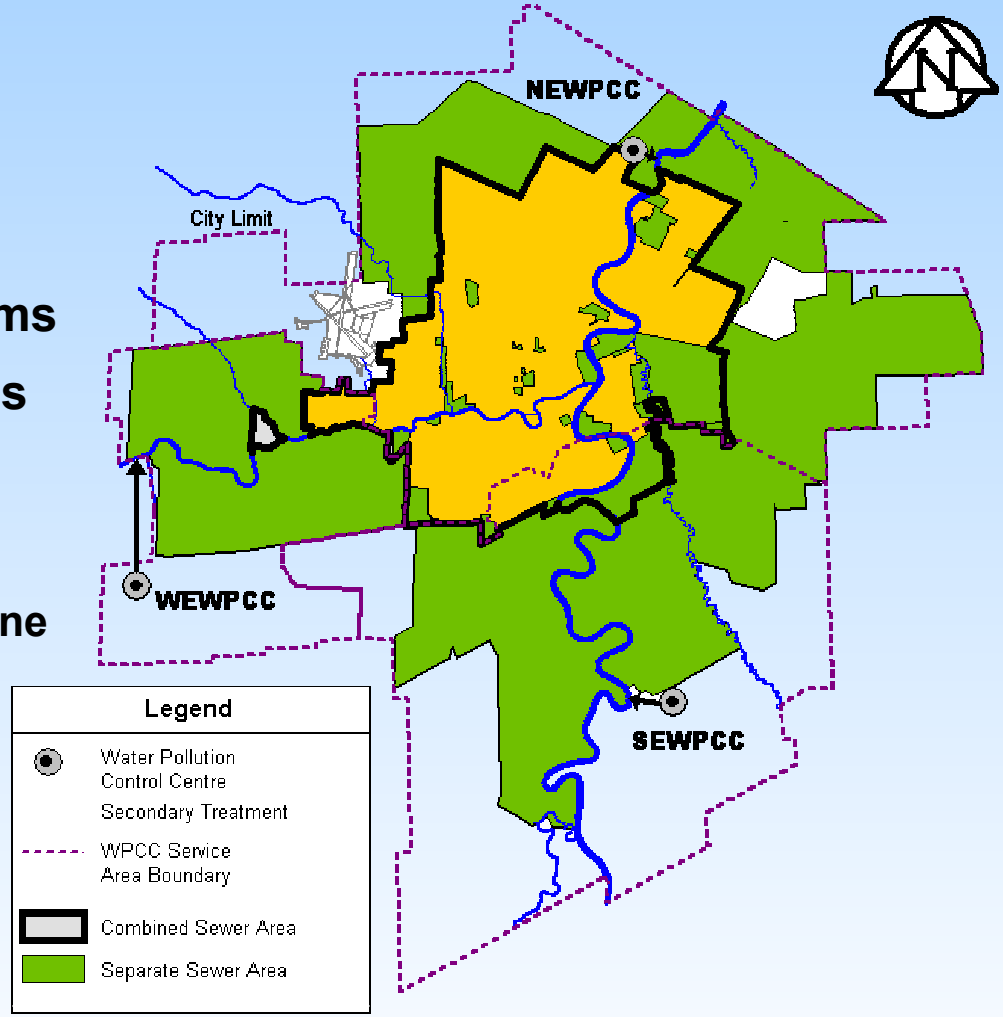
## Introduction

- **Major considerations**
  - **Address the issues**
  - **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

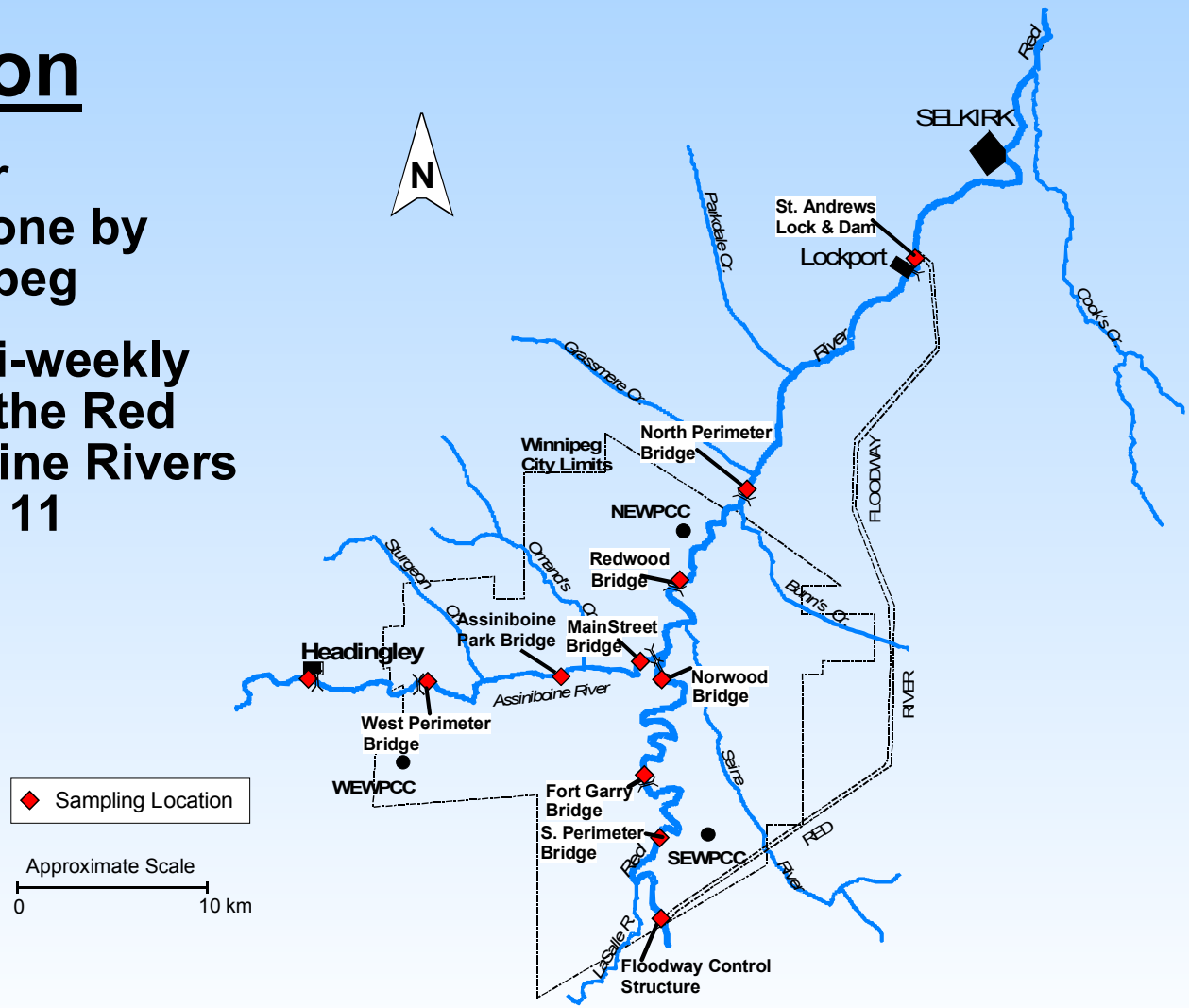
- **Existing Systems**
  - 5 Interceptor Sewer systems
  - 3 Pollution Control Centres
  - 79 CSO locations
  - 231 Land drainage outlet
    - 101 to Red and Assiniboine
  - 2 Major Rivers



# Overview of Plan

## 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.



# Overview of Plan

## 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
- Supported by Environmental Projects Reserve (EPR) fund.
- Does not include costs for 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

# Overview of Plan

## 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

# Overview of Plan

## Plan to Improve.

- **Elements:**
  - **Disinfection and ammonia reduction (centrate) are priorities.**
  - **Disinfection at the WEWPCC can be deferred indefinitely.**
  - **Allows for long-term nutrient control.**
  - **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.**
  - **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.**

# Overview of Plan

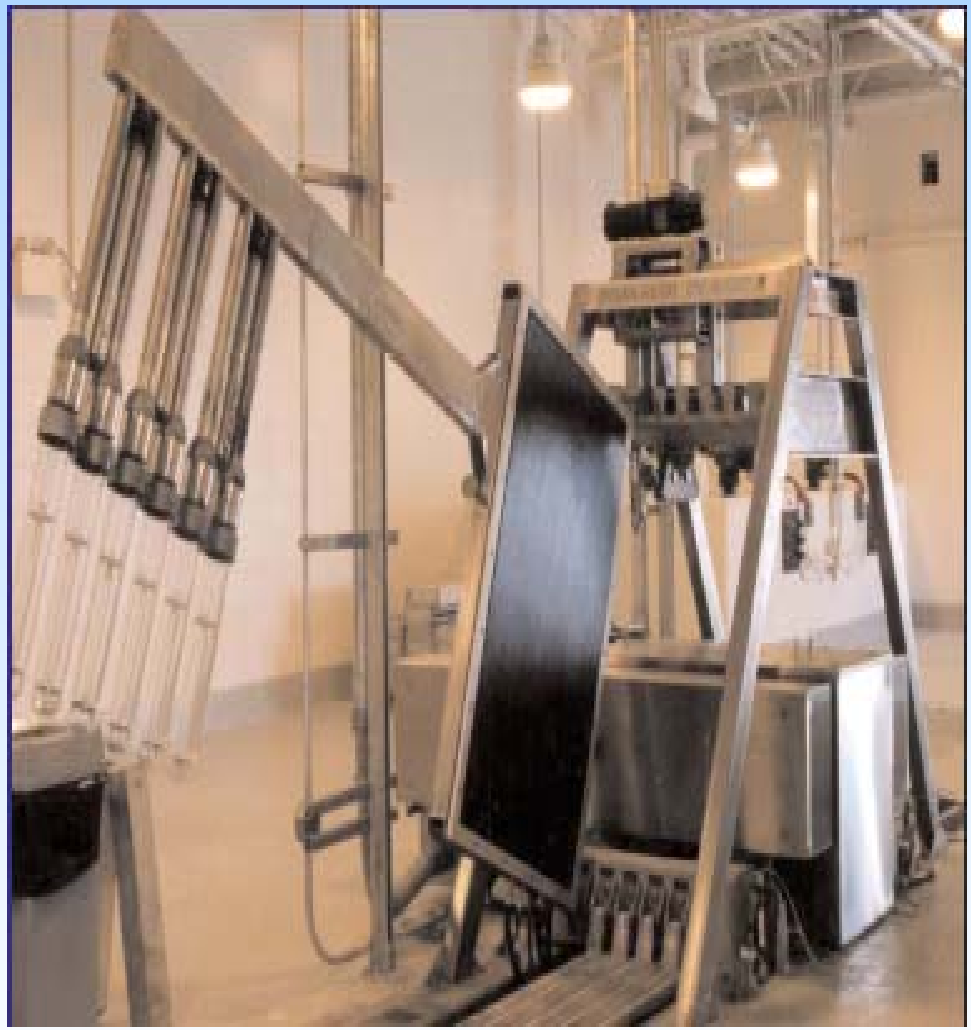
## Plan to Improve

- **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 |

# Overview of the Plan

- **Disinfection**
  - In place at the SEWPCC
  - Not required at the WEWPCC
  - RFP out for NEWPCC
  - In place for May 1, 2005



# Overview of Plan

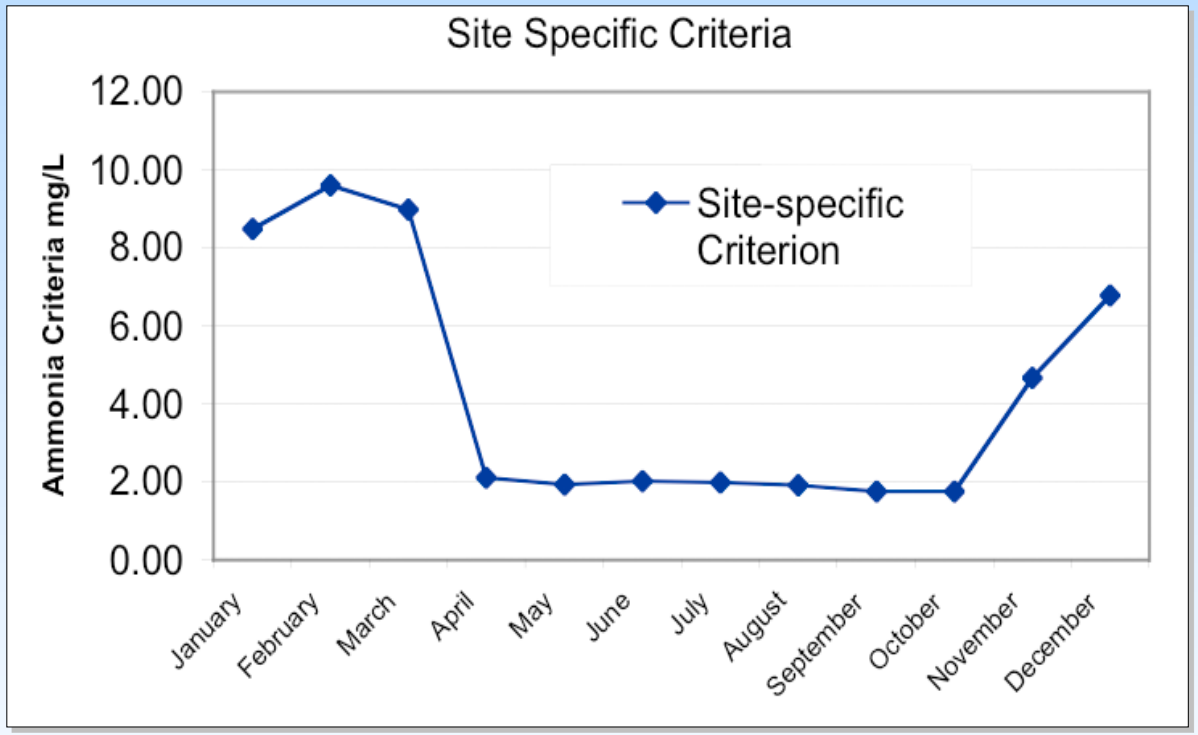
## Ammonia Reduction

- 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

# Overview of Plan

## 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



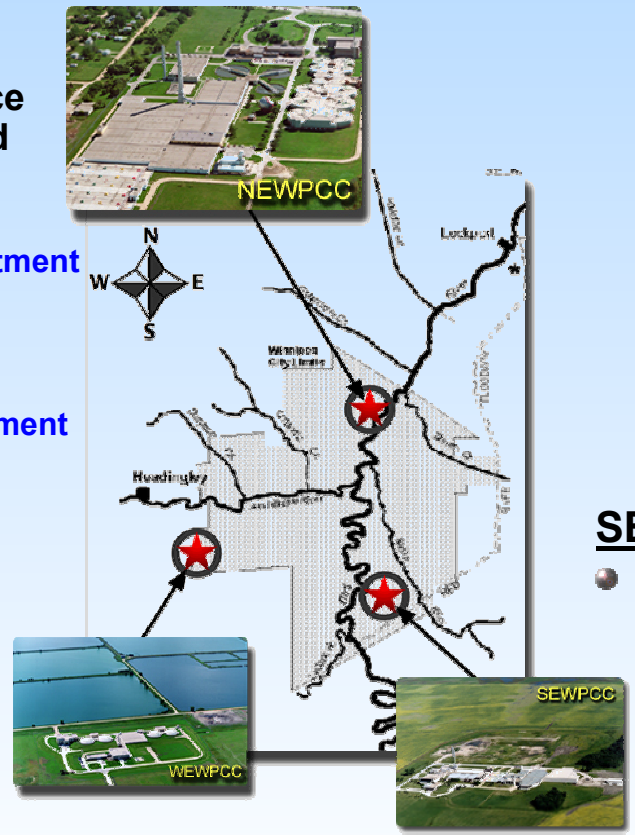
# Overview of Plan

## 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

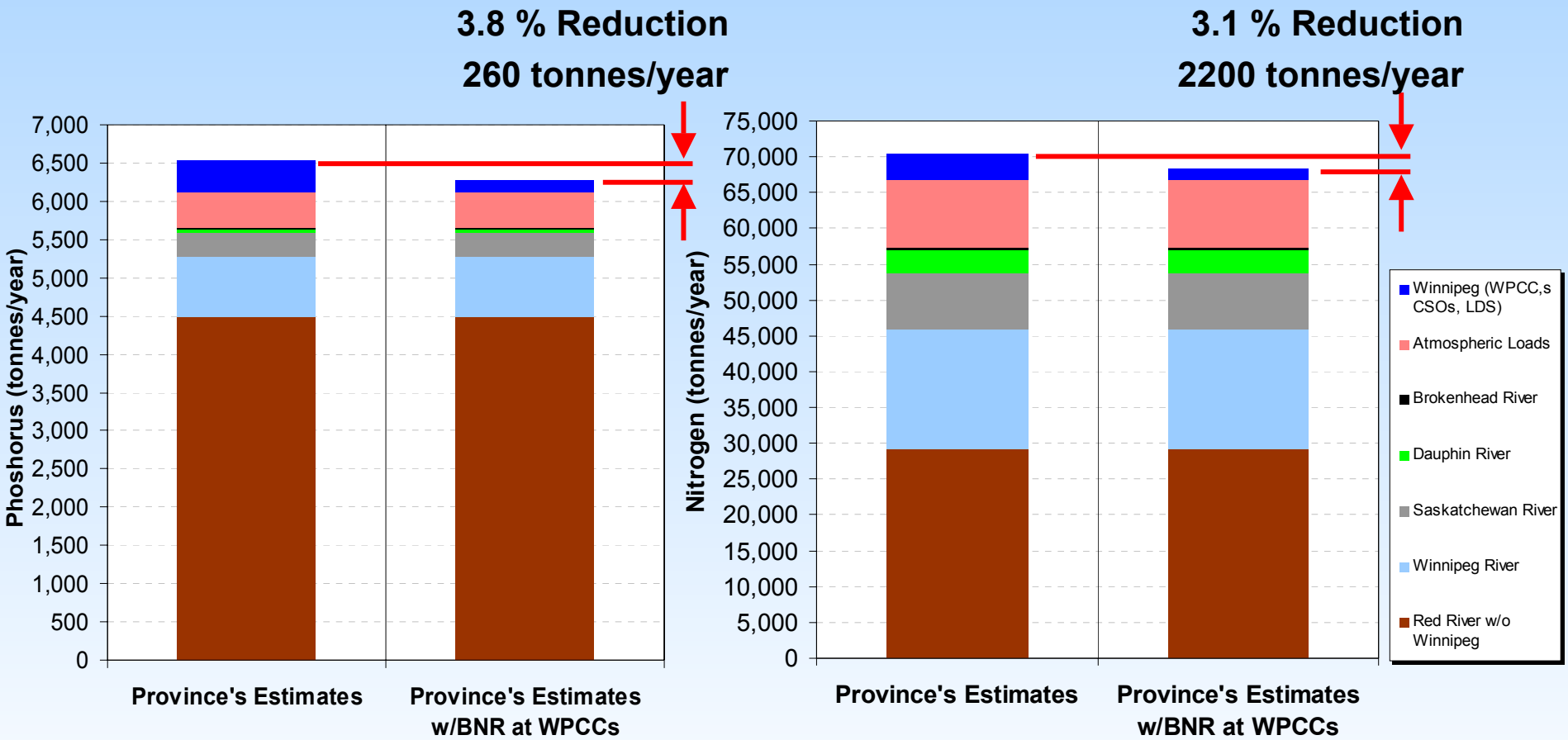
# Overview of Plan

## Nutrients

- Winnipeg's contribution to Lake Winnipeg is:
  - ~ 6.3% of annual phosphorous (P) load**
  - ~ 5.2% of annual nitrogen (N) load**
- The plan includes $181 million for nutrient control.
- The City recommends that limits for N and P not be established until:
  - Province completes basin-wide Nutrient Management Study, and
  - Province conducts stakeholder and public consultations
    - Fair and equitable plan involving
      - Municipal
      - Industrial
      - Agriculture
      - Cottage Owners
      - Upstream Neighbours

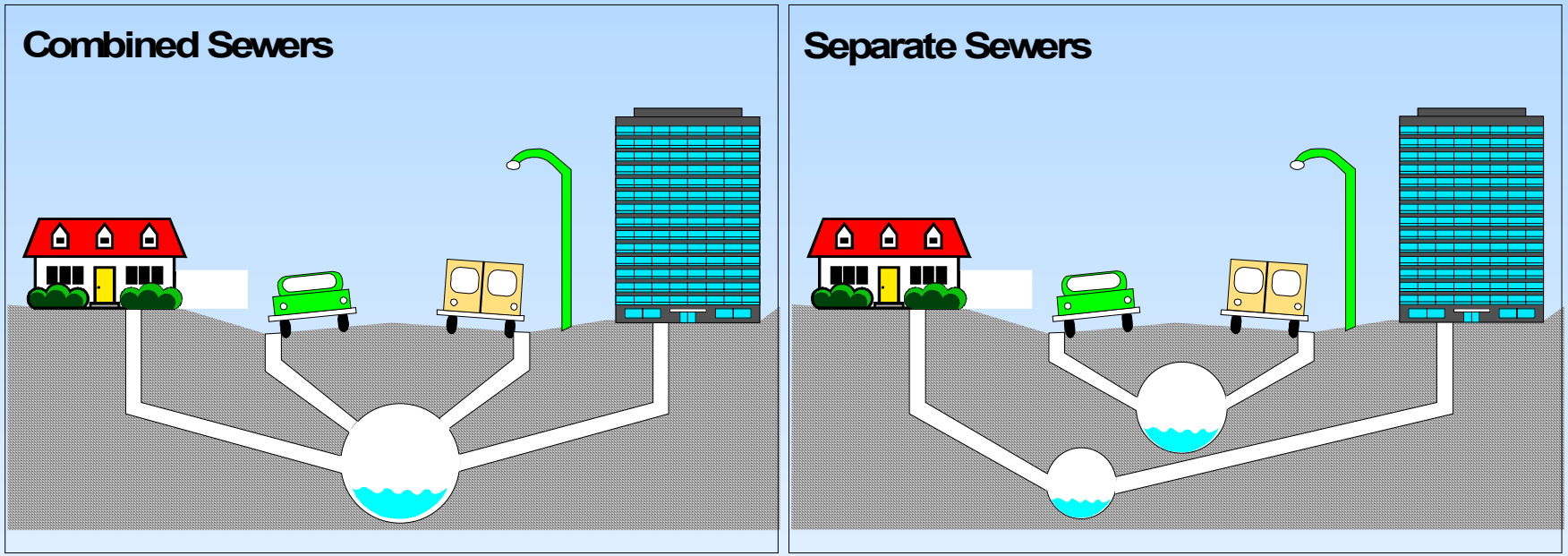
# Nutrient Characterization

## Nutrient Removal at All Winnipeg WPCCs $181 Million



# Overview of Plan

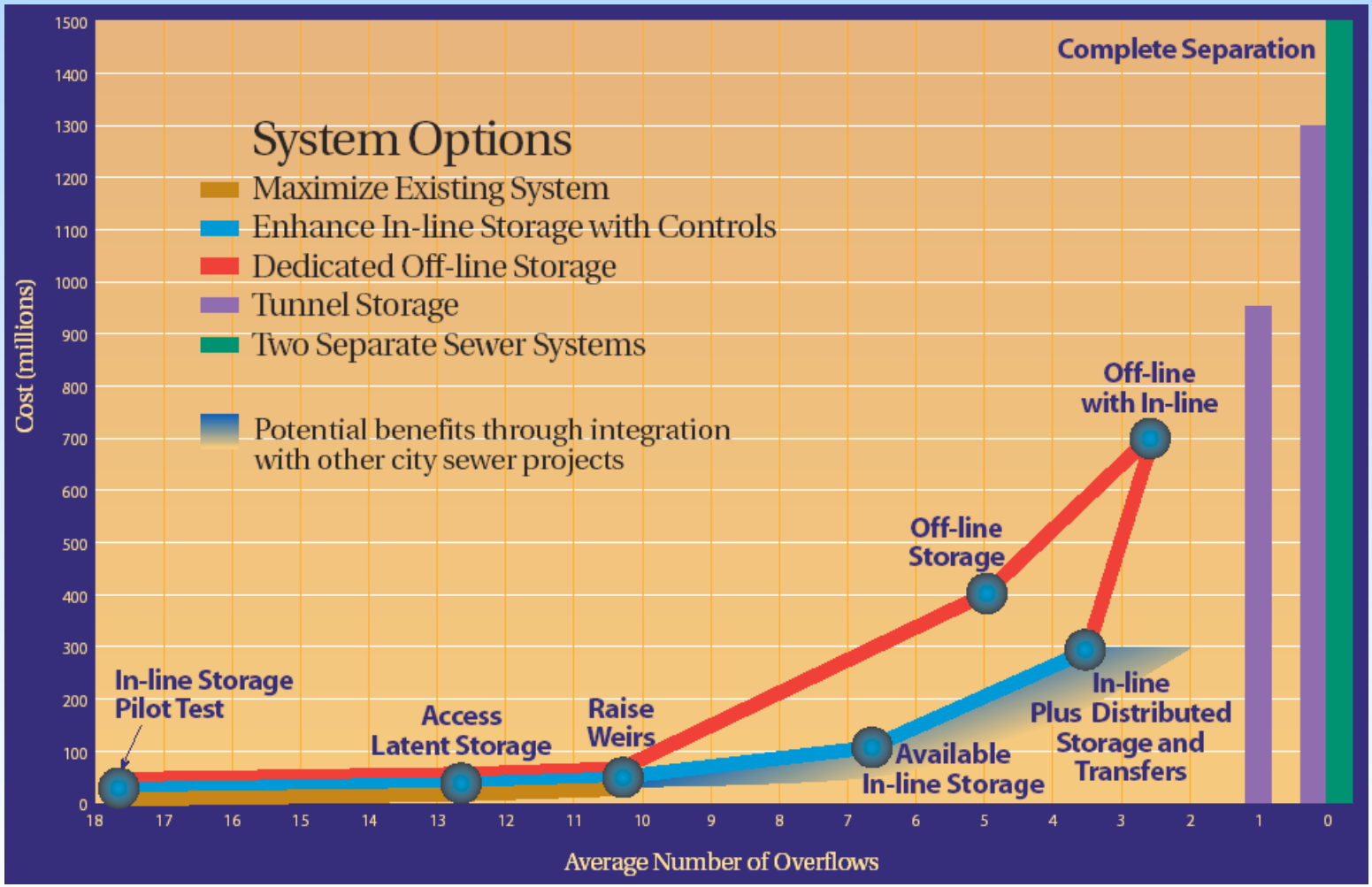
## Combined Sewer Overflow (CSO) Control




- 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

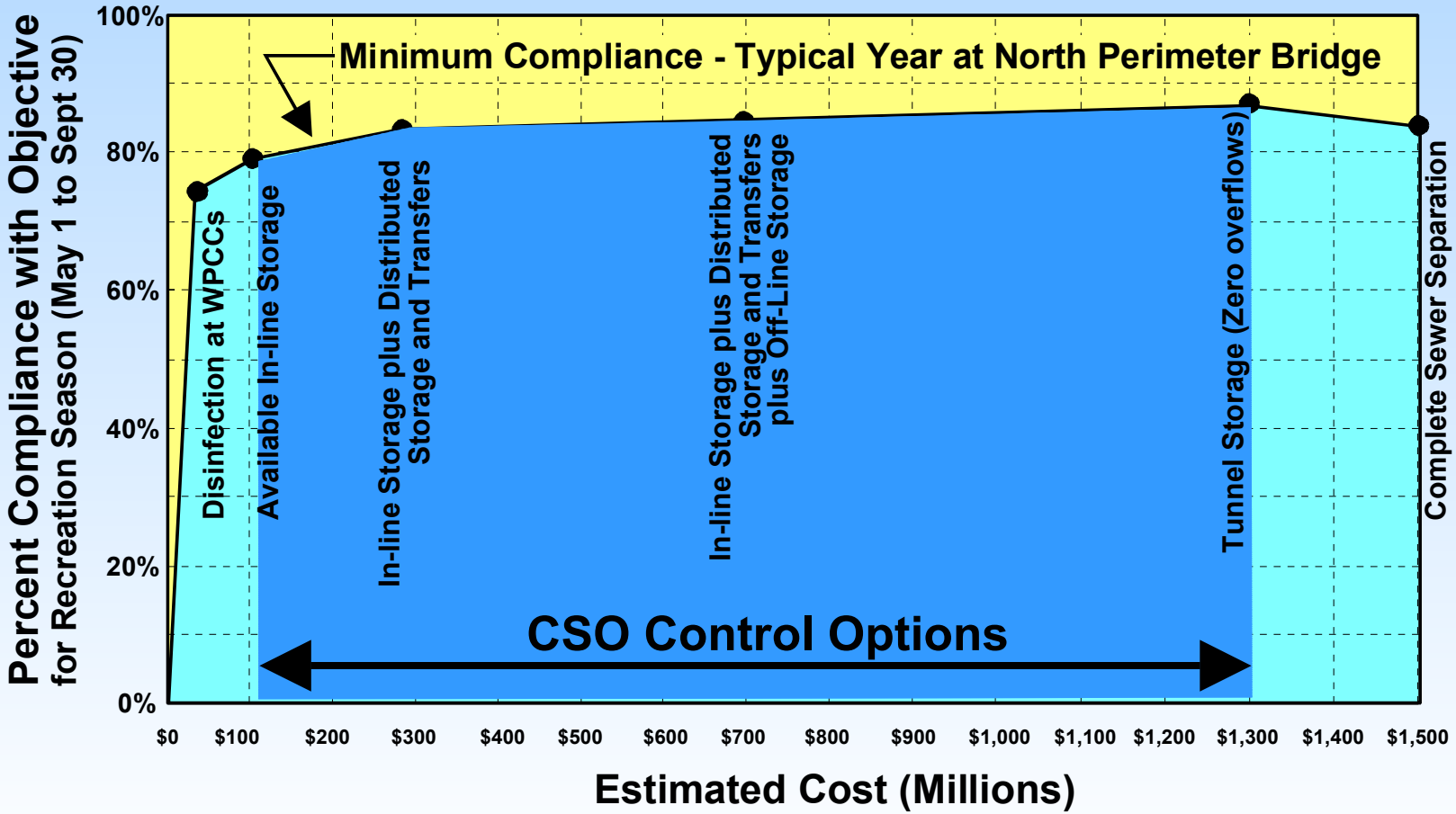
# Overview of Plan

## CSO Control: Cost/Benefit Trade-off



# Overview of Plan

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



# Overview of Plan

## 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**

# Overview of Plan

## Effluent Limits

- Base on the existing secondary treatment performance for:
  - 5-day Carbonaceous Biochemical Oxygen Demand ($CBOD_5$),
  - Total suspended solids (TSS)
- Ammonia limit based on science and site specific flow allocations to allow for future development
- Limits for fecal coliform be established to protect summer recreational use of Rivers.

# Overview of Plan

## Systems Reliability

- **Risk/Criticality Assessments**
  - **City will respond to recommendations for design and operational changes at the NEWPCC**
  - **City will 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**

# Overview of Plan

## 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