



Successful Biosolids Recycling

A Municipal Case Study



John Thompson and Elaine Collis
Regional Municipality of Durham

**Building Trust & Partnership
Between Biosolids Generating and Receiving Communities**

WEAO / BUC Seminar

Dec 12, 2007

Outline



- Background
 - Regional Municipality of Durham
 - Wastewater system overview
- Biosolids Management Program
 - Overview
 - Historical perspective
- Best Management Practices
 - Program Fundamentals
 - Field Operations
- Communications and Public Relations
- Durham Nursery Enhancement Program



Regional Municipality of Durham

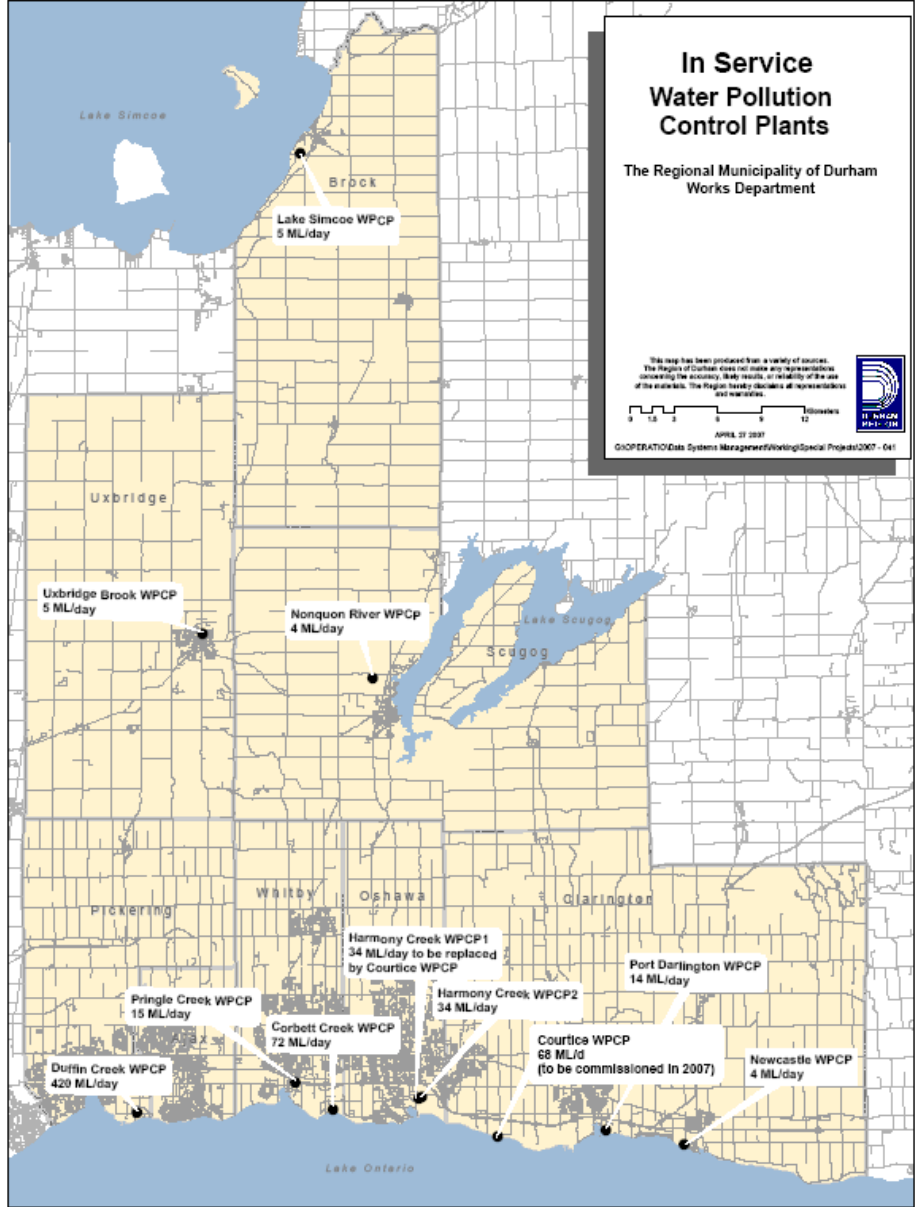
- Durham Region lies just east of Toronto in the Golden Horseshoe
- Eight area municipalities: Pickering, Ajax, Whitby, Oshawa, Clarington, Uxbridge, Scugog, and Brock
- 2500 km² / 960 miles²
- Approximately 604,000 residents
- The southern part of Durham has experienced rapid growth of its residential, industrial and commercial sectors in the past decade
- North Durham is predominantly rural with a thriving agricultural sector and the environmentally important Oak Ridges Moraine



Region of Durham Wastewater Systems

- Estimated 2007 sanitary service population:
 - Urban areas – 548,000
 - Rural areas – 56,000
- 11 wastewater treatment facilities:
 - 8 mechanical plants
 - 6 produce anaerobically digested biosolids
 - 2 produce aerobically digested biosolids
 - 3 lagoon systems





Biosolids Management Program

- Biosolids production:
 - 2006
 - total - 195,000 m³
 - on land – 40,000 m³
 - ❖ 21% of total volume
 - 2007
 - estimated total – 204,000 m³
 - on land – 64,000 m³
 - ❖ 31% of total volume



Historical Perspective

1983 - award of biosolids haulage and land application contract
- contract administration and program oversight provided by Region staff on a 'part-time' basis
- first sketched site maps and site documentation

1989 - creation of full time position dedicated exclusively to biosolids program

2000 - contract renewed for additional five year period

2001 to 2003 - introduction of Best Management Practices
- GPS utilized to verify application areas and rates
- introduction of electronic mapping and GIS

2003 - second full time position added to program
- development of standard operating procedures

2003/2004 - proposal to amend existing contract

2004 - Biosolids Master Plan

2005 - RFP/award of contract
- NMS for Harmony Creek WPCP

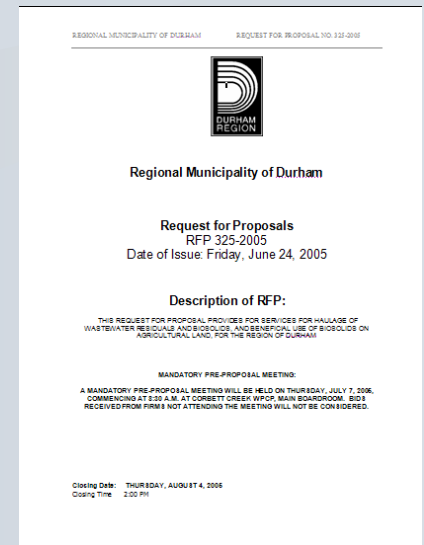


RFP Award Process

Objectives

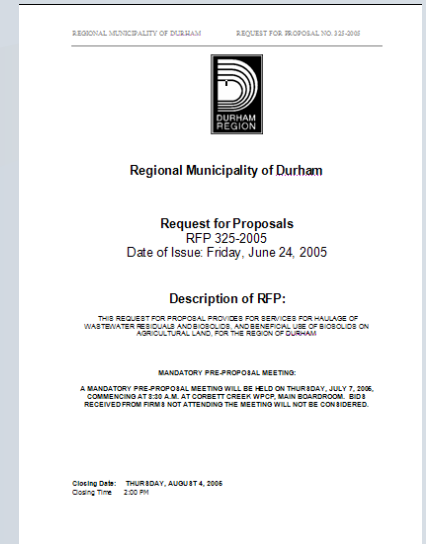
To award a quality-based contract through a competitive process:

- Select the best contractor based upon developed parameters
- Utilize a timely, streamlined process that is transparent and defensible
- Exceed the minimum regulatory requirements and enhance the BMP-based biosolids program



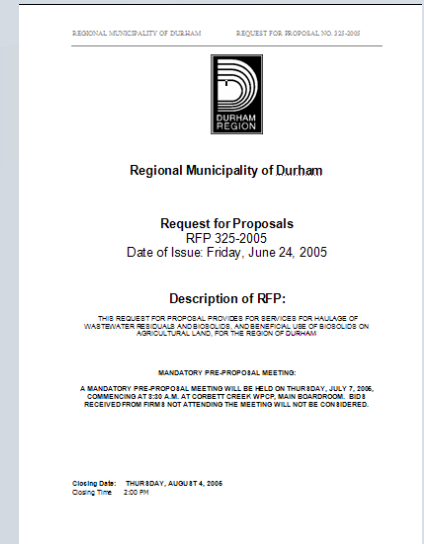
RFP Award Process

1. Retain qualified consultant
2. Meet with MOE
3. Develop contractor interest
4. Council and Works Committee communications
5. RFP preparation
6. Mandatory Bidder's Meeting
7. RFP evaluation
8. Contract negotiations and award



RFP Award Process

RFP Preparation



- Team-based approach: technical, operations, financial and legal
- Draw on experience of other municipalities
- Existing documents: technical scope of work and purchasing RFP template
- Enhanced BMP's (communications, application rates, record keeping, calibration)
- Legal and administrative issues (insurance, performance bonds, fixed price contract)
- Evaluation criteria


RFP Award Process

Proposal Evaluation

- two-step approach using previously developed evaluation criteria:
 - Independent technical evaluation
 - Workshop to select preferred proponent



REGIONAL MUNICIPALITY OF DURHAM REQUEST FOR PROPOSAL NO. 325-2005



Regional Municipality of Durham

Request for Proposals
RFP 325-2005
Date of Issue: Friday, June 24, 2005

Description of RFP:
THIS REQUEST FOR PROPOSAL PROVIDES FOR SERVICES FOR MAINTENANCE OF WASTEWATER RESIDUALS AND BIOLOGICAL AND BENEFICIAL USE OF BIOLOGICALS ON AGRICULTURAL LAND FOR THE REGION OF DURHAM!

MANDATORY PRE-PROPOSAL MEETING:
A MANDATORY PRE-PROPOSAL MEETING WILL BE HELD ON THURSDAY, JULY 7, 2005, COMMENCING AT 2:00 P.M. AT CORBETT CREEK WPCOR MAIN BOARDROOM. BIDS RECEIVED FROM FIRMS NOT ATTENDING THE MEETING WILL NOT BE CONSIDERED.

Closing Date: THURSDAY, AUGUST 4, 2005
Closing Time: 2:00 PM


RFP Award Process

Contract Negotiations and Award

- minimal technical discussions
- no substantial cost discussion
- contractual language, billing practices, indemnification and insurance
- timelines



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Request for Proposals
RFP 325-2005
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THIS REQUEST FOR PROPOSAL PROVIDES FOR SERVICES FOR MAINTENANCE OF WASTEWATER RESIDUALS AND BIOSOLIDS, AND BENEFICIAL USE OF BIOSOLIDS ON AGRICULTURAL LAND FOR THE REGION OF DURHAM.

MANDATORY PRE-PROPOSAL MEETING:

A MANDATORY PRE-PROPOSAL MEETING WILL BE HELD ON THURSDAY, JULY 7, 2005, COMMENCING AT 9:30 A.M. AT CORSEY CREEK WPCF MAIN BOARDROOM. BIDS RECEIVED FROM FIRMS NOT ATTENDING THE MEETING WILL NOT BE CONSIDERED.

Closing Date: THURSDAY, AUGUST 4, 2005
Closing Time: 2:00 PM

Best Management Practices Overview

(Program Fundamentals and Field Operations)

- Procedures/Checklists
 - Standardized procedures for loading, sampling and billing at all 8 WPCPs
 - Standardized procedures for field operations
- GIS
- GPS
- Biosolids Sampling and Analysis
- Monitoring
- Communications



Program Fundamentals:

Sample Procedure



Jurham Region Plant Operations Division	IMS WI MANUAL	IMS-EM WI – WBP-04
Title: Biosolids Sampling		
Approved by: John Thompson	Date: May 26, 2006	Revision: 1 Page 1 of 3

BIOSOLIDS SAMPLING

DESCRIPTION:

In order to ensure that biosolids, being land applied or blended at the centralized storage, meet requirements outlined in the relevant legislation and to keep records of biosolids characteristics, the following procedure must always be followed when taking samples for laboratory analysis.

SAFETY EQUIPMENT:

Employees shall wear gloves while sampling liquid biosolids.

PROCEDURE:

Corbett Creek and Harmony Creek WPCPs

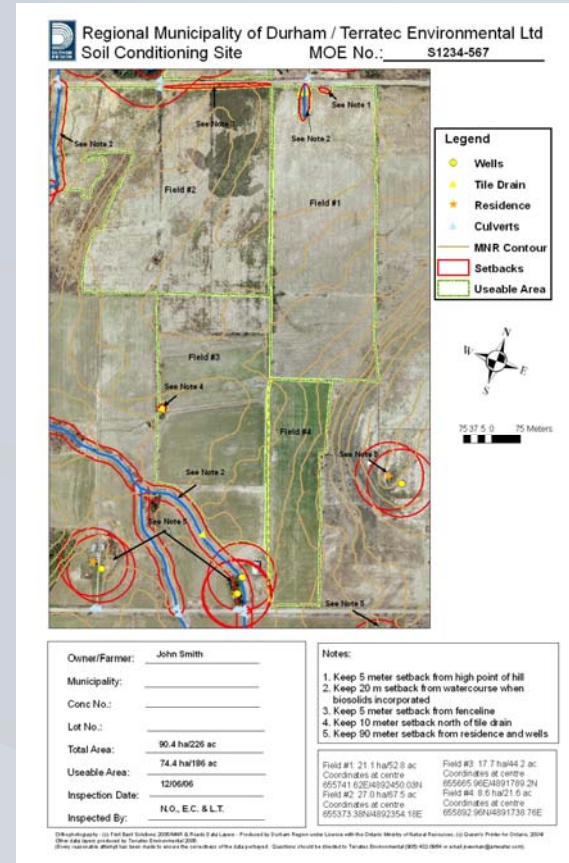
- Drivers of haulage vehicles collect a grab sample from each load and pour into designated covered container provided at the loading station. Containers are to be placed in the refrigerator. Plant Operations staff combine samples for the mixed composite. Individual containers can be rinsed and used again.
- A grab sample is collected daily by Plant Operations staff, once per 24 hour period (Mon to Fri), from the mixed composite of all samples taken for the period and analyzed for Total Solids.
- An additional sample is also collected weekly from the mixed composite by Plant Operations staff, a General Sample Submission Form is completed and the form and sample are submitted to the Regional Environmental Lab (REL) for analysis.
- The container should be emptied after lab samples are taken from the composite
- Parameters to be analyzed at the REL include:
 - Total kjeldahl nitrogen
 - Ammonia and ammonium nitrogen
 - Nitrate and nitrite nitrogen
 - Total phosphorous
 - Total solids
 - Total volatile solids
 - Regulated metals and Potassium
 - E.Coli

Port Darlington and Newcastle WPCPs

- Plant Operations staff collect a representative grab sample from loading pipe 2 times per month and submit to REL.
- Parameters to be analyzed at the REL include:
 - Total kjeldahl nitrogen
 - Ammonia and ammonium nitrogen
 - Nitrate and nitrite nitrogen
 - Total phosphorous
 - Total solids
 - Total volatile solids
 - Regulated metals and Potassium
 - E.Coli

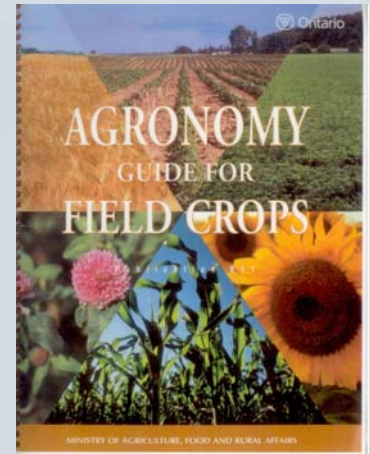
Field Operations

- Joint pre-approval inspections with MOE
- Mapping (GIS)
 - Accurate
 - Facilitates gathering of data for site C. of A. applications (i.e. ownership data, soil hydrologic group, etc.)
 - Facilitates interpretation by field staff at time of spreading
 - Improves credibility



Field Operations:

Agronomically-based application rate



Maximum Application Rate Worksheet																								
Section 1 Site (MOE No.): _____ Farmer: _____ Location: _____ Conc.: _____ Lot: _____ Municipality: _____ Field No.: _____ Section (attach map): _____																								
Section 2 Ownership Confirmed: <input type="checkbox"/> Y/N Date: _____ Verify Site Map: <input type="checkbox"/> Y/N Site Inspected: <input type="checkbox"/> Y/N Date: _____ Concerns: _____																								
Section 3 Dates of previous application(s): _____																								
<table border="1"> <thead> <tr> <th></th> <th>Imperial</th> <th></th> <th>Metric</th> </tr> </thead> <tbody> <tr> <td>Application Area (ac):</td> <td>_____</td> <td>x 0.4 =</td> <td>Application Area (ha):</td> </tr> <tr> <td>Total Volume Applied (gal):</td> <td>_____</td> <td>x 4.5 =</td> <td>Total volume applied (L):</td> </tr> <tr> <td>Total Solids Applied (lbs/ac):</td> <td>_____</td> <td>x 1.12 =</td> <td>Total Solids Applied (kg/ha):</td> </tr> <tr> <td>Total Nitrogen Applied (lbs/ac):</td> <td>_____</td> <td>x 1.12 =</td> <td>Total Nitrogen Applied (kg/ha):</td> </tr> </tbody> </table>						Imperial		Metric	Application Area (ac):	_____	x 0.4 =	Application Area (ha):	Total Volume Applied (gal):	_____	x 4.5 =	Total volume applied (L):	Total Solids Applied (lbs/ac):	_____	x 1.12 =	Total Solids Applied (kg/ha):	Total Nitrogen Applied (lbs/ac):	_____	x 1.12 =	Total Nitrogen Applied (kg/ha):
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Total Nitrogen Applied (lbs/ac):	_____	x 1.12 =	Total Nitrogen Applied (kg/ha):																					
Section 4 Soil Analysis: Check Box (-) Phosphorus _____ ppm pH > 6.0 _____ Any Restrictions Y/N _____ If yes, explain: _____																								
Section 5 Maximum Metal Loadings / 5 yrs Exceeded: Y / N If yes, biosolids application is not allowed																								
Section 6 Biosolids Analysis:																								
	WPCP	Date of Analysis	Analysis mg/L	Imperial (mg/L x 0.0100) lbs/1000gal	Metric (mg/L / 1000) kg/m3																			
TKN																								
Inorganic N*																								
Organic N**																								
Available N***																								
Total Phosphorus (P)																								
Total Phosphate (P ₂ O ₅) (Tot. P x 2.29)																								
Total Potassium (K) (Tot. K x 1.29)																								
Total Solids																								
*Inorganic nitrogen NH ₄ + N ₂ + NO ₃ **Organic N = TKN - NH ₄ ***Available N = Inorganic + 30% Organic																								
Section 7 PART A: Maximum Rate of Application for Inorganic Nitrogen (135kg/ha) = 120 lbs/ac Total Applied Inorganic N (previous application) = _____ kg/ha																								

PART C:	Constraints to application on Schedule 'B' <input type="checkbox"/> Y/N If yes explain _____			
	Maximum Rate of Application (re: constraint(s) on Schedule 'B')	gal/ac		
		m ³ /ha		
PART D:	Crop to be grown _____			
	OMAFRA Fertilizer Recommendation (Publication No. 811)			
	Field Conditions: bare soil / crop residue / cover crop / standing crop			
	Other Conditions: _____			
Section 8				
	Maximum Allowable Rate	gal/ac		
	(Lowest Rate from any of Parts A to C)	m ³ /ha		
	Recommended Rate	gal/ac		
	(see notes for explanation)	m ³ /ha		
Section 9	Total Volume Applied At Recommended Rate (Section 8)			
	X _____ ac = _____ gallons			
	(Maximum Allowable Rate - Section 8)			
	X _____ ha = _____ m ³			
	Fertilizer Equivalents (re: recommended application rate)			
		Analysis	APPLIED AT MAXIMUM RATE*	
		(lbs/1,000 gal) (kg/m ³)	(lb/ac)	(kg/ha)
		Inorganic N		
		Organic N		
		Available N		
		Total P ₂ O ₅		
		Available P ₂ O ₅ (40% of Total)		
		Total K ₂ O		
		Available K ₂ O (80% of Total)		
		Solids		
	*Nutrients Applied at Recommended Rate Calculation (gal/ac or m ³ /ha) X _____ / 1000 = _____ lb/ac			
	(Maximum Allowable Rate - Section 8) _____ kg/m ³ = _____ kg/ha			
	Rate - Section 8)			
Section 10	Notes/Calculations:			
	Completed by: _____	Date: _____		

Field Operations



- Computerized recordkeeping and tracking system
- Flagging and pre-tilling of spreading boundaries
- Project signage at every site

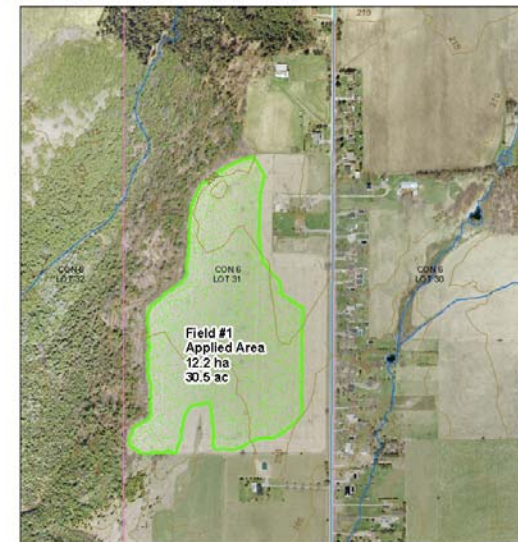


Field Operations

- Use of GPS to verify application area
- Upload to GIS and produce maps for farmer



S3912-3456, Field #1, John Smith
Con.X, Part of LotXX1, Municipality of X
Applied Area (October, 2007)



Legend

- Lot Con Boundary
- Roads
- Drainage Line
- GISADMIN.contours_2005
- Applied Area



150 75 0 150 Meters

Applied Area prepared by the Regional Municipality of Durham Works Department, 2007
Roads - GISADMIN.SURM, Esri/Inra - Street Line Road Network, (S) DM11 to 0141
GISADMIN.Lot_Con_Bound - Contours and Drainage produced under license
with the Ontario Ministry of Natural Resources, copyright Queen's Printer for Ontario, 2002
Orthophotography provided by (c) Air & Space Solutions, 2005
(Every reasonable attempt has been made to show the correct map data portrayed.
Questions should be directed to Durham Region Works Dept.
(905) 516-5144 (Email - basco@region.durham.on.ca)
Map produced by E. Gibbs, Basco/Works Coordinator, October 2007.


Projection: UTM Zone 17, NAD 83

Field Operations:

Follow-Up Report

- Nutrients applied are reported as fertilizer equivalents
- Package sent to farmer includes map of area applied and current soil analysis



 Report on Biosolids Applied to Agricultural Land					
Site and Application Data					
Farm Operator: _____			Field Number: _____		
M.O.E. Site Number: _____			Date Applied: _____		
Area Covered: _____					
Total Amount Applied: _____					
Application Method: _____					
Nutrient Content					
	Analysis Date	Analysis mg/L	Concentration kg/m ³	Approximate m ² /ha	Approximate kg/ha
Total Kjeldahl Nitrogen (TKN)					
Ammonia/Ammonium (NH ₃ /NH ₄)					
Available N (Inorganic ¹ + 30% Organic N ²) ³					
Total Phosphorous					
Applied P ₂ O ₅ (P * 2.29)					
Available Phosphate P ₂ O ₅ (40% P ₂ O ₅) ³					
Total Potassium					
Applied Potash K ₂ O (K * 1.2)					
Available K ₂ O (90% K ₂ O) ³					
Solids					
¹ Inorganic = NH ₃ /NH ₄ ² Organic N = TKN - Inorganic N ³ Availability based on calculations from OMAF Publications 811 and 611.					
Weather:			Field Conditions:		
<input type="checkbox"/> warm (>25° C) <input type="checkbox"/> average <input type="checkbox"/> cool (<10° C)			<input type="checkbox"/> wet <input type="checkbox"/> dry		
<small>Note: Every reasonable attempt has been made to ensure the correctness of the data portrayed. Questions should be directed to Teralec Environmental Ltd (905)432-0956</small>					

Communications and Public Relations

- Monthly meetings with contractor
- Municipal/neighbour notification
- Field and vehicle signage with contact information
- Council presentations
- Agricultural community activities and associations
- Open houses
- Communications with OMAFRA, MOE, WEO
- Sewer Use By-law office
- Program brochure
- Region website



Durham Nursery Enhancement Program



QUESTIONS ?

