

CITY COUNCIL

AGENDA

Monday, August 29, 2016 – Council Chambers, City Hall

Call to Order:	2:30 PM
Recess:	5:00 PM to 6:00 PM

1. IN CAMERA

1.1. Motion to In Camera - Human Resource Matter FOIP 24(1)(d) and Land Matter FOIP 23(1)(a)

1.2. Motion to Revert to Open Meeting

2. MINUTES

2.1. Confirmation of the Minutes of the Monday, August 15, 2016 Regular Council Meeting

(Agenda Pages 1 – 15)

2.2. Confirmation of the Minutes of the Tuesday, August 16, 2016 Mid Year Budget Review Meeting

(Agenda Pages 16 – 22)

3. POINT OF INTEREST

4. REPORTS

4.1. Environmental Advisory Committee Resolution: Recommended Actions to Support Air Quality by Reducing Fine Particulate Matter in Red Deer

(Agenda Pages 23 – 151)

- .2. Council Representation on the Alberta Urban Municipalities Association (AUMA)
(Agenda Pages 152 – 153)

- 4.3. Approval of Council Meeting Dates for 2017
(Agenda Pages 154 – 158)

- 4.4. Police and Emergency Services Dispatch
(Agenda Pages 159 – 159)

- 4.4.a. Motion to Table

5. BYLAWS

- 5.1. Bylaw 3357/F-2016 - Proposed Bylaw to add "secondary suite" as a discretionary use on the subject site
(Agenda Pages 160 – 170)

- 5.1.a. Consideration of First Reading of the Bylaw

- 5.2. Disposition of Municipal Reserve Land Use Bylaw 3357/V-2016
(Agenda Pages 171 – 180)

- 5.2.a. Consideration of First Reading of the Bylaw

6. NOTICES OF MOTION

- 6.1. Notice of Motion Submitted by Councillor Lawrnece Lee re: Secondary Suites
(Agenda Pages 181 – 237)

- 6.1.a. Motion to Lift from the Table

7. ADJOURNMENT



UNAPPROVED - M I N U T E S

**of the Red Deer City Council Regular Meeting
held on, Monday, August 15, 2016
commenced at 2:33 P.M.**

PRESENT: Mayor Tara Veer

Councillor Buck Buchanan

Councillor Paul Harris

Councillor Ken Johnston

Councillor Frank Wong

Councillor Dianne Wyntjes

City Manager, Craig Curtis

Director of Corporate Transformation, Lisa Perkins

Director of Communications & Strategic Planning, Julia Harvie-Shemko

Director of Community Services, Sarah Cockerill

Director of Corporate Services, Paul Goranson

Acting Director of Development Services, Jim Jorgensen

Director of Human Resources, Kristy Svoboda

Director of Planning Services, Tara Lodewyk

City Clerk, Frieda McDougall

Deputy City Clerk, Samantha Rodwell

Corporate Meeting Administrator, Amber Senuk

Committees Coordinator, Lynn Iviney

City Solicitor, Natasha Wirtanen

Engineering Services Manager, Wayne Gustafson

Recreation, Parks & Culture Manager, Shelley Gagnon

Planning Manager, Emily Damberger

Senior Planner, Randa James

Senior Planner, Orlando Toews

ABSENT: Councillor Tanya Handley

Councillor Lawrence Lee

Councillor Lynne Mulder

**I. IN CAMERA MEETING****I.1. Motion to In Camera - Legal Matter FOIP 27(1)(a)**

Moved by Councillor Dianne Wyntjes, seconded by Councillor Ken Johnston

Resolved that Council of The City of Red Deer agrees to enter into an In-Camera meeting of Council on Monday, August 15, 2016 at 2:34 p.m. and hereby agrees to exclude the following:

- All members of the media; and
- All members of the public

to discuss a Legal Matter as protected under the Freedom of Information & Protection of Privacy Act, Section 27(1)(a)

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

I.2. Motion to Revert to Open Meeting

Moved by Councillor Ken Johnston, seconded by Councillor Frank Wong

Resolved that Council of The City of Red Deer agrees to enter into an Open meeting of Council on Monday, August 15, 2016 at 2:58 p.m.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED



2. MINUTES

2.1. Confirmation of the Minutes of the Monday, July 18, 2016 Regular Council Meeting

Moved by Councillor Dianne Wyntjes, seconded by Councillor Buck Buchanan

Resolved that Council of The City of Red Deer hereby approves the Minutes of the July 18, 2016 Regular Council Meeting as transcribed.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

3. REPORTS

3.1. Ice Facilities Plan

Mr. Mike Roma with RC Strategies provided an overview of this item.

Moved by Councillor Paul Harris, seconded by Councillor Dianne Wyntjes

Resolved that Council of The City of Red Deer, having considered the report from Recreation, Parks & Culture, dated August 15, 2016 re: Ice Facilities Plan hereby authorizes Administration to proceed with implementing the Principles to Guide the Development of Future Ice Surfaces and approves the Ice Facilities Plan, in principle, as a planning document.

IN FAVOUR: Mayor Tara Veer, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

OPPOSED: Councillor Buck Buchanan

MOTION CARRIED



3.2. North Red Deer Regional Water Services Commission - Interim Water Transfer & Water Line Purchase

Moved by Councillor Ken Johnston, seconded by Councillor Dianne Wyntjes

Resolved that Council of The City of Red Deer having considered the report from Engineering Services, dated August 15, 2016 re: North Red Deer Regional Water Services Commission (NRDRWSC) – Interim Water Transfer & Water Line Purchase hereby agrees that a formal request be submitted to the NRDRWSC for the provision of water to the Central Park water trunk according to the existing agreement between The City of Red Deer and The Commission dated October 8, 2004.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

Moved by Councillor Buck Buchanan, seconded by Councillor Ken Johnston

Resolved that Council of The City of Red Deer having considered the report from Engineering Services, dated August 15, 2016 re: North Red Deer Regional Water Services Commission (NRDRWSC) – Interim Water Transfer & Water Line Purchase hereby directs Administration enter into an agreement for the supply of water according to provisions in the existing agreement between The City of Red Deer and The Commission dated October 8, 2004, and subsequent to Legal Services review.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

Moved by Councillor Buck Buchanan, seconded by Councillor Dianne Wyntjes



Resolved that Council of The City of Red Deer having considered the report from Engineering Services, dated August 15, 2016 re: North Red Deer Regional Water Services Commission (NRDRWSC) – Interim Water Transfer & Water Line Purchase hereby agrees that a formal request be submitted to the NRDRWSC for the purchase of the existing NRDRWSC trunk line from the existing meter vault, located adjacent the intersection of Hwy 2A/Hwy 11A, north to the Blindman River and that the finalization of the purchase agreement is subject to Legal Services review, budget and Ministerial approval.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

3.3. Request to Rescind Council Policy "4317-C Pedestrian Crosswalk Delineation"

Moved by Councillor Buck Buchanan, seconded by Councillor Dianne Wyntjes

Resolved that Council of The City of Red Deer, having considered the report from Engineering Services, dated July 18, 2016 re: Request to Rescind Council Policy "4317-C Pedestrian Crosswalk Delineation" hereby agrees to rescind the Council Policy 4317-C Pedestrian Cross Walk Delineation, effective August 15, 2016.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

4. BYLAWS

4.1. Proposed 2016 Off-Site Levy Rates - Bylaw 3549/A-2016

Moved by Councillor Ken Johnston, seconded by Councillor Paul Harris



SECOND READING: That Bylaw 3549/A-2016 (an amendment to the Off-Site Levy Bylaw to set the off-site levy rates for 2016) be read a second time.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

Moved by Councillor Ken Johnston, seconded by Councillor Paul Harris

THIRD READING: That Bylaw 3549/A-2016 be read a third time.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

5. REPORTS - continued

5.1. North of IIA Major Area Structure Plan - Request to Purchase Land from Red Deer County

Moved by Councillor Buck Buchanan, seconded by Councillor Frank Wong

Resolved that Council of The City of Red Deer having considered the report from the Planning Department, dated August 2, 2016 and the correspondence from the Red Deer County dated July 18, 2016 re: North of Highway IIA Major Area Structure Plan – Request to Purchase Land by Red Deer County hereby approves Red Deer County's request to purchase lands located at Block OT, Plan 7212KS, NW 4-39-27-4 within the North of IIA Major Area Structure Plan (MASP).

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong,



Councillor Dianne Wyntjes

MOTION CARRIED

6. NOTICES OF MOTION

6.1. Notice of Motion Submitted by Councillor Lawrence Lee Re: Secondary Suites

Moved by Councillor Dianne Wyntjes, seconded by Councillor Ken Johnston

Resolved that Council of The City of Red Deer, having considered the report from Legislative Services, dated August 4, 2016, re: Notice of Motion Submitted by Councillor Lawrence Lee re: Secondary Suites hereby agrees to table the Notice of Motion for up to two weeks as Councillor Lee will not be present at the Monday, August 15, 2016 Council Meeting.

IN FAVOUR: Mayor Tara Veer, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

OPPOSED: Councillor Buck Buchanan

MOTION TO TABLE CARRIED

6. BYLAWS - continued

6.1. Proposed Land Use Bylaw Amendment 3357/L-2016 - 94 Burnt Park Drive / To allow a Medical Marihuana Facility as a Use

Mayor Veer declared a conflict of interest as she received representation from the applicant on this matter outside of Council's formal process. Mayor Tara Veer left chambers at 4:28 p.m. and Councillor Frank Wong assumed the chair.

Moved by Councillor Buck Buchanan, seconded by Councillor Ken Johnston

Resolved that Council of The City of Red Deer hereby agrees to lift from the table Land Use Bylaw Amendment 3357/L-2016.



IN FAVOUR: Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

ABSENT: Mayor Tara Veer

MOTION TO LIFT FROM THE TABLE CARRIED

First reading of Bylaw 3357/L-2016 as tabled on July 18, 2016 was back on the floor.

Moved by Councillor Buck Buchanan, seconded by Councillor Lynne Mulder

FIRST READING: That Bylaw 3357/L-2016 (a Land Use Bylaw amendment to allow a federally licensed Medical Marihuana Facility (MMF) located at 94 Burnt Park Drive (Lot 14, Block 1, Plan 052 4232) be read a first time.

IN FAVOUR: Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

ABSENT: Mayor Tara Veer

MOTION CARRIED

Council recessed at 5:08 p.m. and reconvened at 6:03 p.m.

7. PUBLIC HEARINGS

7.1. Land Use Bylaw Amendment 3357/S-2016

Mayor Veer declared open the Public Hearing for Land Use Bylaw Amendment 3357/S-2016, an amendment to add further definitions for patios and decks. As no one was present to speak for or against the bylaw, Mayor Tara Veer declared the Public Hearing closed.

Moved by Councillor Buck Buchanan, seconded by Councillor Frank Wong



SECOND READING: That Bylaw 3357/S-2016 (a Land Use Bylaw Amendment to add further definitions for patios and decks) be read a second time.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

Moved by Councillor Buck Buchanan, seconded by Councillor Frank Wong

THIRD READING: That Bylaw 3357/S-2016 be read a third time.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

7.2. Various Amendments for 20 Adamson Avenue, Aspen Ridge:

I. Supplementary Report

- a. East Hill Major Area Structure Plan Amendment - Bylaw 3499/B-2016**
- b. Aspen Ridge Neighbourhood Area Structure Plan Amendment - Bylaw 3217/D-2016**
- c. Land Use Bylaw 3357/O-2016**

Mayor Veer declared open the Joint Public Hearing for Bylaw 3499/B-2016, an amendment to the East Hill Major Area Structure Plan to add text and figure amendments, Bylaw 3217/D-2016, an amendment to the Aspen Ridge Neighbourhood Area Structure Plan and Bylaw 3357/O-2016, a Land Use Bylaw Amendment to redistrict the property from A1 Future Urban Development District to R1A Residential (Semi-Detached Dwelling) District. As no one was present to speak for or against the bylaws, Mayor Tara Veer declared the Public Hearing closed.

Moved by Councillor Ken Johnston, seconded by Councillor Paul Harris



SECOND READING: That Bylaw 3499/B-2016 (an amendment to the East Hill Major Area Structure Plan to add text and figure amendments) be read a second time.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

Moved by Councillor Ken Johnston, seconded by Councillor Paul Harris

THIRD READING: That Bylaw 3499/B-2016 be read a third time.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

Prior to consideration of Second Reading of Bylaw 3217/D-2016 the following Motion to Amend was introduced.

Moved by Councillor Dianne Wyntjes, seconded by Councillor Paul Harris

Resolved that Council of The City of Red Deer having considered the report from Planning Services, dated July 13, 2016 re: Various Amendments for 20 Adamson Avenue, Aspen Ridge Supplementary Report, East Hill Major Area Structure Plan Amendment Bylaw 3499/B-2016, Aspen Ridge Neighbourhood Area Structure Plan Amendment Bylaw 3217/D-2016 and Land Use Bylaw Amendment 3357/O-2016 hereby agrees to amend the bylaw by the replacement of the maps and figures to reflect Option 3.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong,



Councillor Dianne Wyntjes

MOTION TO AMEND CARRIED

Moved by Councillor Frank Wong, seconded by Councillor Buck Buchanan

SECOND READING: That Aspen Ridge Neighbourhood Area Structure Plan Amendment Bylaw 3217/D-2016, as amended, be read a second time.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

Moved by Councillor Frank Wong, seconded by Councillor Buck Buchanan

THIRD READING: That Aspen Ridge Neighbourhood Area Structure Plan Bylaw 3217/D-2016 be read a third time.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

Prior to consideration of Second Reading of Land Use Bylaw Amendment 3357/O-2016, the following Motion to Amend was introduced.

Moved by Councillor Dianne Wyntjes, seconded by Councillor Paul Harris

Resolved that Council of The City of Red Deer having considered the report from Planning Services, dated July 13, 2016 re: Various Amendments for 20 Adamson Avenue, Aspen Ridge Supplementary Report, East Hill Major Area Structure Plan Amendment Bylaw 3499/B-2016, Aspen Ridge Neighbourhood Area Structure Plan Amendment Bylaw 3217/D-2016 and Land Use Bylaw Amendment 3357/O-2016



hereby agrees to amend the bylaw by replacing the map to reflect Option 3.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION TO AMEND CARRIED

Moved by Councillor Frank Wong, seconded by Councillor Buck Buchanan

SECOND READING: That Bylaw 3357/O-2016 9a Land Use Bylaw amendment to redistrict the property from AI Future Urban Development District to RIA Residential (Semi-Detached Dwelling) District), as amended, be read a second time.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

Moved by Councillor Frank Wong, seconded by Councillor Buck Buchanan

THIRD READING: That Bylaw 3357/O-2016 be read a third time.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

**7.3. Proposed Land Use Bylaw 3357/T-2016
Proposed Amendments of the East Hill Major Area Structure Plan -
Bylaw 3499/C-2016
Proposed Amendment of the Lancaster Meadows Outline Plan**



Mayor Tara Veer declared open the Public Hearing for Bylaw 3357/T-2016, a Land Use Bylaw Amendment to redesignate ± 2.02 hectare (± 5.00 acre) parcel in the Lancaster Meadows area from AI – Future Urban Development District to C5 – Commercial (Mixed Use) District. Dr. Kamal Daniel, Dr. Ehab Girgis and Mr. Hani Kirollos were present to speak to this item. As no one else was present to speak for or against the bylaws, Mayor Tara Veer declared the Public Hearing closed.

Moved by Councillor Dianne Wyntjes, seconded by Councillor Paul Harris

SECOND READING: That Bylaw 3357/T-2016 (a Land Use Bylaw Amendment to redesignate a +2.02 hectare (+5.00 acre) parcel in the Lancaster Meadows area from AI- Future Urban Development District to C5 - Commercial (Mixed Use) District) be read a second time.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

Moved by Councillor Dianne Wyntjes, seconded by Councillor Paul Harris

THIRD READING: That Bylaw 3357/T-2016 be read a third time.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong,

Councillor Dianne Wyntjes

MOTION CARRIED

Moved by Councillor Paul Harris, seconded by Councillor Dianne Wyntjes

SECOND READING: That Bylaw 3499/C-2016 (an amendment to the East Hill Major Area Structure Plan) be read a second time.



IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

Moved by Councillor Paul Harris, seconded by Councillor Dianne Wyntjes

THIRD READING: That Bylaw 3499/C-2016 be read a third time.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

Moved by Councillor Ken Johnston, seconded by Councillor Buck Buchanan

Resolved that Council of The City of Red Deer having considered the report from the Planning Department, dated July 4, 2016 re: Proposed Amendment of the Land Use Bylaw – Bylaw 3357/T-2016, Proposed Amendment of the East Hill Major Area Structure Plan Bylaw 3499/C-2016 and Proposed Amendment of the Lancaster Meadows Outline Plan hereby agrees to amend the Lancaster Meadows Outline Plan to identify the subject site for commercial uses.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

8. ADJOURNMENT

Moved by Councillor Buck Buchanan, seconded by Councillor Dianne Wyntjes

Resolved that Council of The City of Red Deer hereby agrees to adjourn the Monday,



August 15, 2016 Regular Council Meeting of Red Deer City Council at 7:19 p.m.

IN FAVOUR:

Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

MAYOR

CITY CLERK



UNAPPROVED - M I N U T E S

of the Red Deer City Council Mid-Year Budget Review held on, Tuesday, August 16, 2016 commenced at 9:00 AM

PRESENT: Mayor Tara Veer
Councillor Buck Buchanan
Councillor Paul Harris
Councillor Ken Johnston
Councillor Lynne Mulder
Councillor Frank Wong
Councillor Dianne Wyntjes

City Manager, Craig Curtis
Director of Corporate Transformation, Lisa Perkins
Director of Communications & Strategic Planning, Julia Harvie-Shemko
Director of Community Services, Sarah Cockerill
Director of Corporate Services, Paul Goranson
Acting Director of Development Services, Jim Jorgensen
Director of Human Resources, Kristy Svoboda
Director of Planning Services, Tara Lodewyk
City Clerk, Frieda McDougall
Deputy City Clerk, Samantha Rodwell
Financial Services Manager, Dean Krejci

ABSENT: Councillor Tanya Handley
Councillor Lawrence Lee

**I. IN CAMERA MEETING****I.1. Motion to In Camera - Human Resource Matter FOIP 24(1)(a)**

Moved by Councillor Buck Buchanan, seconded by Councillor Dianne Wyntjes

Resolved that Council of The City of Red Deer agrees to enter into an In-Camera meeting of Mid-Year Budget on Tuesday, August 16, 2016 at 9:03 a.m. and hereby agrees to exclude the following:

- All members of the media; and
- All members of the public

to discuss a Human Resource Matter as protected under the Freedom of Information & Protection of Privacy Act, Section 24(1)(a)

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Lynne Mulder, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

I.2. Motion to Revert to Open Meeting

Moved by Councillor Buck Buchanan, seconded by Councillor Paul Harris

Resolved that Council of The City of Red Deer agrees to enter into an Open Meeting of Mid-Year Budget on Tuesday, August 16, 2016 at 9:30 a.m.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Lynne Mulder, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED



2. INTRODUCTION

City Manager, Craig Curtis provided an introduction to the mid-year budget process.

3. FINANCIAL OVERVIEW AND UPDATE

Financial Services Manager, Dean Krejci provided a financial update.

Council recessed at 10:30 a.m. and reconvened at 10:46 a.m.

Councillor Wyntjes left Council Chambers at 10:47 a.m. and returned at 10:52 a.m.

4. REPORTS

4.1. Parks Formal Landscape Tree Replacements

Council accepted the report for information.

4.2. Temporary Procurement Resources

Council accepted the report for information.

4.3. Collicutt Centre Parking Lot Lighting Report

Councillor Harris left Council Chambers at 11:27 a.m. and returned at 11:29 a.m.

Moved by Councillor Ken Johnston, seconded by Councillor Dianne Wyntjes

Resolved that Council of The City of Red Deer having considered the report from Recreation, Parks & Culture, dated July 11, 2016 re: Collicutt Centre Parking Lot Lighting Upgrade hereby approves \$38,650.37 for the Collicutt Centre Parking Lot Lighting Upgrade Project in the 2016 Capital Budget funded by Municipal Climate Change Action Centre grant.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Ken Johnston, Councillor Lynne Mulder, Councillor Frank Wong,



Councillor Dianne Wyntjes

ABSENT: Councillor Paul Harris

MOTION CARRIED

4.4. AFRRCS Radio System Upgrade

Moved by Councillor Lynne Mulder, seconded by Councillor Buck Buchanan

Resolved that the Council of The City of Red Deer, having considered the report from Corporate Services dated July 21, 2016 re: AFRRCS Radio System Upgrade hereby approves a capital budget of \$335,000 in the 2016 Capital Budget funded from the Radio Replacement Reserve.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Lynne Mulder, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

4.5. Westpark Middle School Partnership

Moved by Councillor Dianne Wyntjes, seconded by Councillor Ken Johnston

Resolved that Council of The City of Red Deer having considered the report from Recreation, Parks & Culture, dated August 16, 2016 re: West Park Middle School Partnership hereby supports Administration entering into an agreement with the Red Deer Public School District #104 to provide a grant of up to a maximum of \$198,370 in the 2016 Operating Budget funded by the operating Reserve - Tax Supported towards the construction of community spaces as outlined in this report contingent upon no additional operating costs to The City.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Lynne Mulder, Councillor Frank Wong, Councillor Dianne Wyntjes



MOTION CARRIED

4.6. Gaetz Avenue / Taylor Drive and Highway 2 Interchange Improvements

Moved by Councillor Buck Buchanan, seconded by Councillor Ken Johnston

Resolved that Council of The City of Red Deer having considered the report from Electric, Light & Power Services, dated July 25, 2016 re: Gaetz Avenue / Taylor Drive and Highway 2 Interchange Improvements hereby agrees to:

- Establish a new EL&P project in the 2016 Capital Budget for the QEII Highway feeder realignment in the amount of \$1.578M funded by the EL&P Capital Reserve; and
- Establish a new Engineering project in the 2016 Capital Budget for the design of intersection improvements at Taylor Drive and 19 Street in the amount of \$153,000 funded by the Capital Projects Reserve.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Lynne Mulder, Councillor Frank Wong, Councillor Dianne Wytjes

MOTION CARRIED

4.7. Fine Revenue Report - 2016

Council accepted the report for information.

4.8. Parking Sustainability Report

Council accepted the report for information.

5. MOTION TO ADD TO THE AGENDA

Moved by Councillor Buck Buchanan, seconded by Councillor Ken Johnston



Resolved that Council of The City of Red Deer hereby agrees to add consideration of a Human Resource Matter to the Tuesday, August 16, 2016 Mid-Year Budget Agenda.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Lynne Mulder, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

Moved by Councillor Buck Buchanan, seconded by Councillor Dianne Wyntjes

Resolved that Council of The City of Red Deer having considered an In Camera Human Resource report hereby accepts the direction as outlined and directs that the contents of the report be protected as provided for under the Freedom of Information and Protection of Privacy Act, as follows:

- 24(1) The head of a public body may refuse to disclose information to an applicant if the disclosure could reasonably be expected to reveal
 - (a) Advice, proposals, recommendations, analyses or policy options developed by or for a public body or a member of the Executive Council.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Lynne Mulder, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

6. SUMMARY OF MID-YEAR BUDGET DECISIONS

Financial Services Manager, Dean Krejci provided a summary of the Mid-Year Budget decisions.



7. **ADJOURNMENT**

Moved by Councillor Buck Buchanan, seconded by Councillor Paul Harris

Resolved that Council of The City of Red Deer hereby agrees to adjourn the Tuesday, August 16, 2016 Mid-Year Budget meeting at 11:59 a.m.

IN FAVOUR: Mayor Tara Veer, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Ken Johnston, Councillor Lynne Mulder, Councillor Frank Wong, Councillor Dianne Wyntjes

MOTION CARRIED

MAYOR

CITY CLERK



July 27, 2016

Environmental Advisory Committee Resolution: Recommended Actions to Support Air Quality by Reducing Fine Particulate Matter in Red Deer

Environmental Services

Report Summary & Recommendation:

On May 18, 2016 the Environmental Advisory Committee (EAC) passed a resolution to bring forward to City Council. The resolution recommends actions The City can take to improve air quality in Red Deer. In addition to presenting the resolution on behalf of EAC and offering a staff response to the resolution, this report provides background on fine particulate matter and on the work being led by The Government of Alberta together with other stakeholders to address the region's fine particulate matter air quality concerns for Council's consideration.

Recommendation:

It is respectfully recommended that City Council review the Environmental Advisory Committee resolution dated May 18, 2016, pertaining to air quality protection and fine particulate matter concerns in the Red Deer Region, and that Administration be directed to consider these actions in the development of the upcoming renewal of the Environmental Master Plan to commence in 2017.

City Manager Comments:

I support the recommendation of Administration.

Craig Curtis
City Manager

Proposed Resolution

Resolved that Council of The City of Red Deer, having considered the report from Environmental Services dated July 27, 2016 re: Environmental Advisory Committee Resolution: Recommended Actions to Support Air Quality by Reducing Fine Particulate Matter in Red Deer hereby directs Administration to consider the following actions in the development of the upcoming renewal of the Environmental Master Plan to commence in 2017:

1. Increased public education on ways to improve air quality
2. A tree planting policy
3. Additional tree plantings within the City to increase the density of trees.



Report Details

Background:

On May 18, 2016 the Environmental Advisory Committee (EAC) passed a resolution recommending actions The City can take to improve air quality in Red Deer. This resolution came about following the Committee's review of the Government of Alberta documents released in April 2016 dealing with PM_{2.5} in Red Deer. The EAC resolution identified points the Committee feels are the next and best actions for The City of Red Deer to take in protecting local air quality.

Issue

Air quality is an important environmental issue. One aspect of air quality is fine particulate matter. Fine particulate matter refers to bits in the air, which come in a range of sizes, and are found in either solid particle or liquid form. Particles less than 2.5 micrometers in diameter (PM_{2.5}) are referred to as "fine" particulate and are believed to pose the largest health and environmental risks. Many man-made and natural sources contribute to the particles or react once in the atmosphere to form particulate matter. These sources can be "point sources" such as industrial sites or "non-point sources" such as gas and diesel powered vehicles or buildings being heated and cooled with natural gas and electricity.

Discussion:

Between 2011 and 2013, Red Deer failed to achieve Canadian Ambient Air Quality Standards for PM_{2.5}. The Red Deer air zone exceeded national levels both as measured for a 24-hour period and annual averages. The exceedances were measured at Red Deer Riverside monitoring station. Under the national standards, once a PM_{2.5} exceedance has occurred it is mandatory that the Province produce a response plan. Even in the event that the levels decline in a subsequent year, once the exceedance has occurred for a location, it is required that a response plan be put in place identifying actions to achieve reductions/prevent further exceedances.

In addition to the need to address past levels and prevent further exceedances, it is important to recognize that government standards are becoming more stringent. Therefore, ongoing effort by communities to reduce PM_{2.5} will be necessary to meet national air quality standards.

Government of Alberta Red Deer Fine Particulate Matter Response Plan

Beginning in 2013, Government of Alberta launched work on a regional response plan to address Red Deer's exceedance of national PM_{2.5} standards. Prior to the initiation of Red Deer's response plan, the Government of Alberta completed the Capital Region Response for the Edmonton region. The Edmonton area has also experienced exceedances.



A multi-stakeholder Advisory Committee was convened in Red Deer to provide advice to The Province in the drafting of the Response Plan. Advisory Committee members included City of Red Deer Environmental Services staff, staff from Red Deer and Lacombe counties, a member of the public from Red Deer, Parkland Airshed Management Zone (PAMZ) and Alberta Health representatives, and representatives of other stakeholder organizations and local industries.

In April 2016, the Alberta Government released the Red Deer area Fine Particulate Matter Response Plan. The response plan consists of three documents:

1. Red Deer Fine Particulate Matter Response **Science Report** – scientific investigation of the influences affecting fine particulate matter concentration at the Riverside monitoring station. The science report is intended to inform the development of appropriate actions to reduce fine particulate levels.
2. Red Deer Fine Particulate Matter **Response** – plan of the Government of Alberta and local advisory stakeholders identifying actions both committed to and proposed to address fine particulate matter in Red Deer. The intent is to establish a regionally collaborative approach and recognize the influence stakeholders have in supporting the management of the issue.
3. Government of Alberta **Action Plan** – document communicating the Province's commitment and transition to managing towards the national requirements and actions to address the Red Deer Air Quality results and air quality throughout Alberta.

While the plans are written/released, and while the Government of Alberta has lead responsibility for implementation; all stakeholders including The City of Red Deer need to work together to implement the plans in order to improve air quality and PM_{2.5} levels. The Advisory Committee will continue to have a role in ongoing implementation of the Response Plan and in monitoring and reporting on the Response progress. Quarterly to semi-annual meetings of the Advisory Committee are anticipated. The City of Red Deer and all Advisory Committee members will be asked for updates on the actions underway in their jurisdiction.

What Actions are noted in the Response for the City of Red Deer?

The Response Plan lists the actions each Advisory Committee member is committed to or is considering a commitment to. The actions listed for the City of Red Deer are taken directly from the Environmental Master Plan and/or related departmental work plans. These actions are:

- Idle Free Program – focused in the community
- Idle Free Schools
- Greening The City's fleet strategy
- Corporate Idle Free Policy
- BOLT regional transit service
- Trail system – maintenance, installation, and planning for biking/walking system
- Consider ongoing enhancements to City Transit Service



- LED traffic light and street light replacement project
- Purchase of green power for corporate buildings and raising awareness of green power alternatives in the community
- Work with PAMZ to continue to host two permanent air monitoring stations
- Track/report on Environmental Master Plan air metrics including PM_{2.5}
- Support carpool promotion programs
- Encourage integrated transportation/movement study options such as transit and trails
- Consider modelling of traffic light optimization (proposed)
- Investigate recommendations or guidelines for new construction (such as homes and commercial buildings) to address building energy intensity/conservation for new builds or retrofits (proposed)
- Work with the Government of Alberta to develop and implement PM_{2.5} education and engagement program
- World Car Free Day programming

Environmental Advisory Committee

At their May 18 meeting, EAC reviewed the Response Plan and accompanying documents. Following discussion, EAC passed the following resolution:

“Resolved that the Environmental Advisory Committee, having discussed ways to improve air quality in Red Deer, hereby requests Council give consideration to the following:

1. Increased public education on ways to improve air quality
2. A tree planting policy
3. Additional tree plantings within the City to increase the density of trees;

and forwards this to Council for consideration.”

Analysis:

The purpose of the EAC, in part, as outlined in the Committees Bylaw, Bylaw No. 3520/2014, is to “recognize the importance of environmental issues that Council and the community share”. The protection of air quality is a key environmental issue for The City, the community, and the region. Each contribute to ambient air quality and play a role in helping to address issues of clean air. Further, the EAC is mandated to:

- Review and make recommendations to Council and/or Administration on environmental policies, plans and bylaws;

In keeping with this mandate, EAC has endeavoured to learn about air quality in the Red Deer Region. In the past five years, the Committee has received presentations from several groups with air expertise including PAMZ, Alberta Environment and Parks, and Mr. Alan



Smith of the Canadian Clean Air Alliance. The Committee also provided input into several City initiatives related to particulate matter reduction. These initiatives ranged from idle free education and regulations to restrictions on wood burning boilers to greening the fleet to carpooling. This work has been significant in helping the Committee establish air quality knowledge.

Environmental Master Plan

In addition to being linked to the Committee's mandate, the actions recommended by the EAC are consistent with the City of Red Deer Environmental Master Plan (EMP). The Air Focus area of the EMP establishes a goal "to improve the air quality and reduce emissions." One of the EMP metrics to measure how well The City is achieving the air goal is; "maintain and lower ambient concentration of airborne pollutants, not exceeding the maximums defined by the Canada Wide Standard and Alberta Environment". The maximum for PM_{2.5} linked to the national standards at the time the plan was drafted for the 5 year target (2015) was 20 µg/m³. However, the national standards have recently been amended and replaced (and made more stringent). In 2015, the Canadian Ambient Air Quality Standards (CAAQS) replaced the Canada Wide Standard for fine particulate matter and ground-level ozone. The CAAQS trigger/threshold for preventing air quality deterioration is 10 µg/m³ (24 hour).

Education Programs

The actions recommended by the EAC include increased education programs on air quality. Education is a tool used by most jurisdictions addressing air quality. In Canada, as one example, The Government of Canada indicates on their website that they use the Air Quality Health Index (AQHI) "as a public information tool that helps Canadians protect their health on a daily basis from the negative effects of air pollution. This tool has been developed by Health Canada and Environment and Climate Change Canada, in collaboration with the provinces and key health and environment stakeholders".

Education is also a key focus of the Government of Alberta Response Plan Objectives. The Government of Alberta Response focuses on "engagement to empower the public and stakeholders to reduce ambient fine particulate matter through education on the state of air quality and on how they can take action". Information around choosing alternative transportation and striving for conservation in home energy use, are examples of how public education can inform and encourage actions to reduce PM_{2.5}. Consequently, expanding education within the City of Red Deer Environmental Services programs would be consistent with the EMP and the work of Alberta Environment and Parks and the Red Deer Response Advisory Committee.

Tree Policy and Tree Planting

The EAC resolution also recommends The City create a tree policy and undertake more tree planting. With regard to the role trees play in reducing PM_{2.5}, research and case studies from around the world indicate that tree planting and maintenance supports the goal of reducing particulate matter. For example, US Forest Service researchers (in a 2014 edition of *Arborist News*) found tree canopy removed between 4.7 tonnes of PM_{2.5} per year



in New York and up to 64.5 tonnes of PM_{2.5} in Atlanta, Georgia. Removal amounts vary depending on tree species, amount of tree cover, weather/climate, and pollution concentration.

Staff Review

Environmental Services and Recreation, Parks, and Culture have reviewed the resolution passed by EAC.

With regard to education on air quality, Environmental Services indicates:

- staff currently provide a range of environmental education programs some of which focus partially or fully on air quality
- many of the education programs noted in the Response Plan are led by The City of Red Deer (e.g. idle free school program, World Car Free day, EMP air metrics reporting).
- Alberta Environment and Parks is working to enlarge the education programs offered by the Provincial Government to Albertans to improve understanding of air quality and fine particulate matter.
- Advisory Committee members will be kept informed and involved in the efforts being led by the Province.
- many actions that reduce PM_{2.5} are the same actions that lower Green House Gas (GHG) emissions. Therefore, some of the current work around GHG reduction and community energy and emissions reduction plans (CEEP) can serve to interlap with PM_{2.5} engagement/action education.
- the EMP will be reviewed in 2017, air issues are likely to figure prominently. Therefore, it is reasonable to expect that the updated EMP will contain further air education activities or actions.
- any additional level of service in providing community outreach or education, above the current work plan for 2016-17 will require additional resourcing.

With regard to tree planting and policy:

- Recreation, Parks and Culture states there is no policy on tree planting for the purpose of expanding Red Deer's urban tree canopy related to environmental sustainability.
- there are some actions and policies pertaining to tree installation in new developments for reasons such as neighbourhood aesthetics or as replacement trees (e.g. standards and guidelines for tree installation in new developments can be found in the Land Use Bylaw and The Engineering Design Guidelines and Contract Specifications)
- there are a number of programs for vegetating parks and for trees as a memorial commemoration; including the Arbour Day seedling program, corporate tree dedication and sponsorship programs, and memorial tree program.
- Parks runs a tree replacement program for specific trees which have failed from age, storms, pests, and disease.
- the Urban Forest Management Plan to be worked on in 2016/2017 is expected address general tree planting policy/trees as part of urban sustainability.



- The City has previously supported community tree planting, including leverage funding with grants to maximize resources.

Overall, Parks indicates that they are supportive of the EAC resolution to increase tree planting, and would suggest tree replacement, natural area reclamation funding, and tree program initiatives could also support the objective of clean air/reduction of fine particulate matter. Financial resources would need to be approved by Council to expand tree related operations and programs.

In summary, both an expanded education program and expanded tree planting would support the objective of reducing PM_{2.5}. Both require an on-going resource commitment by The City to be effective; tree maintenance and planting to expand tree canopy are investments rather than one time actions and education effectiveness depends on reinforcement/ongoing programming to make a lasting/growing impact. Therefore, these actions would have a financial cost to the city depending on the scale and specific approaches.

Future work on the Urban Forest Plan and the Environmental Master Plan 5-year review and renewal could include these actions for consideration (would mean implementation would be after 2017), and allow additional attention to budgeting in future work planning. Taking action sooner would require specific Council direction and more immediate budget consideration.

Recommendation:

It is respectfully recommended that City Council review the Environmental Advisory Committee resolution dated May 18, 2016, pertaining to air quality protection and fine particulate matter concerns in the Red Deer Region, and that Administration be directed to consider these actions in the development of the upcoming renewal of the Environmental Master Plan to commence in 2017.

**ENVIRONMENTAL ADVISORY COMMITTEE**

DATE: May 18, 2016
TO: Red Deer City Council
FROM: Environmental Advisory Committee
RE: Improving Air Quality in Red Deer

At the Wednesday, May 18, 2016 meeting of the Environmental Advisory Committee, the Committee discussed ways to improve air quality in Red Deer.

After discussion, the motion as set out below was introduced and passed:

Resolved that the Environmental Advisory Committee, having discussed ways to improve air quality in Red Deer, hereby requests Council give consideration to the following:

1. Increased public education on ways to improve air quality
2. A tree planting policy
3. Additional tree plantings within the City to increase the density of trees;

and forwards this to Council for consideration.

The above is submitted for Council's consideration.

Respectfully submitted,

Reg Warkentin
Chair, Environmental Advisory Committee

c: Tim Ainscough, Environmental Services Manager
Nancy Hackett, Environmental Initiatives Supervisor



**Red Deer Air Zone Fine Particulate Matter Response
Government of Alberta Action Plan**

April 2016

Any comments or questions regarding the content of this document may be directed to:

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Alberta Environment and Parks
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10025 – 106 Street
Edmonton, Alberta T5J 1G4
<http://aep.alberta.ca>

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Priority Issue

Fine particulate matter, also known as PM_{2.5}, can be directly emitted from industrial and non-industrial sources in Alberta (primary fine particulate matter). Fine particulate matter also forms in the atmosphere from various reactions of precursor gases. This type is known as secondary fine particulate matter. Preliminary modelling and monitoring in the Capital Region and Red Deer has shown that fine particulate matter are predominantly secondary. For the Red Deer station, the prime likely precursors are oxides of nitrogen, sulphur dioxide, ammonia and volatile organic compounds. The emissions inventories for the Red Deer air zone identify the primary sources for these precursor gases as: transportation, coal-fired power-plants, petro-chemical manufacturing and upstream oil and gas activity. As is the case with all secondary pollutants, it is the control and reduction of precursor gases that is the key and focus of planning solutions. To this effect, the Government of Alberta is committed to action to effectively meet the CAAQS in the Red Deer air zone.

Purpose

For the reporting period 2011 - 2013, the Red Deer Air Zone failed to achieve the Canadian Ambient Air Quality Standards (CAAQS) for fine particulate matter (PM_{2.5}) for both 24-hour and annual averaging periods. Alberta is committed to taking action to reducing emissions for the region.

Alberta Environment and Parks and stakeholders collaboratively developed the Red Deer Fine Particulate Matter Response plan initially in response to an exceedance of the 24-hour PM_{2.5} Canada-wide Standard (CWS) that was in force for the 2009 - 2011 reporting period. The plan presented here is intended to supplement those commitments to update the response to take into consideration the more recent CAAQS requirements.

Current Context

The 24-hour Red Deer Fine Particulate Matter Response was initiated in 2013 in response to an exceedance of the Canada-wide Standard (CWS) for fine particulate matter for the 2009 - 2011 reporting period. The Red Deer Fine Particulate Matter Response is an action plan outlining Government of Alberta and stakeholder commitments to actions to reduce PM_{2.5} in the Red Deer Air Quality Management Area, whose boundaries are shown in Figure 1.

In 2012, the Canadian Ambient Air Quality Standards (CAAQS) for fine particulate matter and ozone were set, replacing the former Canada-wide Standards. The first CAAQS assessment results for Alberta were published in September 2015 for the 2011 to 2013 monitoring period - Alberta: Air Zones Report 2011-2013. A summary of the comparison of the former CWS assessment results and new CAAQS assessment results for Red Deer are presented in Table 1.

In order to meet these new standards, the Government of Alberta is committing to further actions in addition to those set out in the Red Deer Fine Particulate Matter Response.

Table 1: Air Quality Results for the Red Deer Riverside Ambient Air Quality Monitoring Station

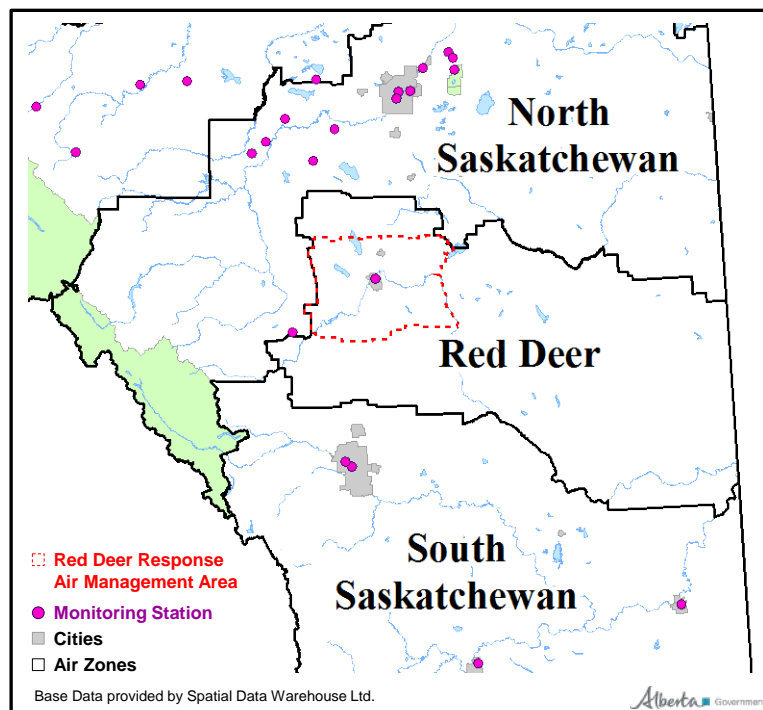
Former CWS PM _{2.5} Standard (µg/m ³)		Former CWS Results		Current CAAQS PM _{2.5} Standard (µg/m ³)	Current CAAQS Standard Results
		2009-2011	2010-2012		2011-2013
24-hour	30	32.0	31.3	28	30
Annual	n/a	n/a	n/a	10	11.4

Comparison of Former CWS and Current CAAQS Standards

The former CWS and current CAAQS use ambient data from stations located in communities and areas accessed by the public. Both standards include calculations using data collected over a three year period and both exclude extreme events, such as forest fires. Differences between the two include:

- *Annual Standards* - The CAAQS include a 24-hour and an annual standard, while the former framework was limited to a 24-hour standard. The calculation method for the 24-hour CAAQS and CWS are comparable. The 24-hour standard is intended to protect against short-term elevated fine particulate matter concentrations and the annual standard is intended to protect against prolonged exposure to fine particulate matter.
- *24-hour Standard* - Although both CAAQS and CWS include a 24-hour standard, the 24-hour CAAQS are more stringent than the former CWS. Even more stringent CAAQS are proposed to come into effect in 2020.
- *Reporting Boundaries* - The CAAQS are used to manage air quality within defined air zones, while under the former CWS, management areas were not predefined. Air zone boundaries in Alberta are designed to align with the Land-use Framework regions. The new Red Deer air zone under CAAQS is larger than the management area defined under the former CWS Red Deer air zone, namely the City of Red Deer and surrounding counties (see Figure 1). Air management within the newly defined and larger air zone will include management of emissions within the previously defined Red Deer area as well as emissions within and possibly outside the larger Red Deer air zone.

Figure 1: Comparison of the Red Deer Air Zone for CAAQS Implementation and the Red Deer Air Quality Management for the Red Deer Fine Particulate Matter Response



Government of Alberta Commitment to Implement CAAQS

Alberta is committed to implementing the national Air Quality Management System, including taking action to reduce emissions, as required, in each air zone to meet the CAAQS requirements.

Alberta Environment and Parks developed and published the Alberta Implementation of the Air Zone Management Framework for Fine Particulate Matter and Ozone in September 2015. In addition to providing information on air zone boundaries and monitoring stations used for CAAQS reporting, the policy sets management planning requirements and timelines. Air zones in the orange and red management level are required to develop a management plan to achieve CAAQS and/or further improve ambient air quality within two years of CAAQS reporting. For completeness, a summary comparison of the management action levels under the Clean Air Strategic Alliance PM_{2.5} and Ozone Management Framework that was based on CWS and current management framework is provided in Table 2.

As the Red Deer Air Zone is the only zone exceeding the CAAQS, Alberta's priority for action is to reduce concentrations in that zone. Note, however, that several of the policies and management actions can apply provincially to improve protection of air quality.

Table 2: Comparison of Air Zone Management Levels under the Former CWS and Current CAAQS Fine Particulate Matter Standards

	Former CASA PM _{2.5} Framework (CWS)	Air Zone Management Framework for Fine Particulate Matter and Ozone (CAAQS)	
	24-hour	24-hour	Annual
Action	Mandatory Plan to Reduce Below Canada-wide Standards	Actions for Achieving Air Zone CAAQS	
Standard	30 µg/m ³	28 µg/m ³	10.0 µg/m ³
Action	Management Plan	Actions for Preventing CAAQS Exceedances	
Trigger/Threshold	20 µg/m ³	19 µg/m ³	6.4 µg/m ³
Action	Surveillance Actions	Actions for Preventing Air Quality Deterioration	
Trigger/Threshold	15 µg/m ³	10 µg/m ³	4.0 µg/m ³
Action	Baseline Monitoring and Data Gathering	Actions for Keeping Clean Areas Clean	

Government of Alberta Commitment to Improve Air Quality in Red Deer Air Zone

In addition to actions and commitments outlined in the Red Deer Fine Particulate Matter Response, Alberta Environment and Parks is committed to additional actions to effectively meet the CAAQS in the Red Deer air zone.

Alberta Environment and Parks will undertake action in the following areas to reduce air emissions:

1. *Policy Actions* – In addition to newly released Alberta Implementation of the Air Zone Management Framework for Fine Particulate Matter and Ozone policy defining requirements to ensure the CAAQS are achieved, Alberta is assessing additional policies that can be applied in stressed airsheds like Red Deer. Technology and equipment standards and policy for point sources such as large industry and non-point sources such as transportation will be assessed.

Point sources include various large industry, and Alberta Environment and Parks will assess various source and equipment-specific policies. This includes assessing the application of up-to-date emission requirements for large emission sources such as boilers, heaters and turbines.

Management of non-point source emissions such as from the transportation sector must also be considered, including education and awareness programs.

2. *Industrial Operating Approval Condition Actions* – Large industrial facilities in Alberta operate under the terms and conditions stipulated in their respective approvals documents, which include emission control standards. These standards are updated when the facility approvals are renewed on a 10-year cycle.
3. *Planning Actions* – Alberta's Land-use Framework established seven new land-use regions and called for the development of a regional plan for each region. These plans focus on managing the cumulative impact of all development in a region. Each of the seven land use plans are in different stages of completion; the Red Deer plan has not been started. Alberta Environment and Parks will continue to advance regional plans and associated management frameworks, including the fast tracked development of an air quality management framework for the Red Deer region.

Alberta Environment and Parks is also committed to continuing to work collaboratively with stakeholders to implement the Red Deer Fine Particulate Matter Response.

4. *Knowledge Improvement and Engagement Actions* – Currently, Alberta has the largest network of air monitoring stations in Canada. Most population centres of over 20,000 people are or will soon be equipped with at least one continuous air monitoring site.

Alberta Environment and Parks will work with local airshed organization and other partners to advance the knowledge of fine particulate matter and its precursors in the Red Deer area. This includes supplementing the long term particulate matter mass measurements with measurement of particulate matter composition. Knowledge of particulate matter composition provides information on origin and potential source(s). In areas of varied and complex emissions, knowledge of particulate matter composition is needed to effectively manage air quality. This information will facilitate identification of appropriate actions as well as provide information on the effectiveness of actions taken.

Additional Information

Information on the national Air Quality Management System, of which the CAAQS are a part, can be found on the Canadian Council of Ministers of the Environment web site at:

- <http://www.ccme.ca/en/resources/air/aqms.html>.

Information on Alberta's Implementation of the Air Zone Management Framework for Fine Particulate Matter and Ozone can be found at:

- <http://aep.alberta.ca/air/management-frameworks/canadian-ambient-air-quality-standards-for-particulate-matter-and-ozone/documents/ImplementationFramework-PM-Ozone-Sep2015.pdf>

The 2011-2013 ambient air quality report for air zones, fact sheets on the results for the Red Deer and other zones can be found at:

- <http://aep.alberta.ca/air/management-frameworks/canadian-ambient-air-quality-standards-for-particulate-matter-and-ozone/default.aspx>

Historical information on the management of PM_{2.5} and ozone in Alberta before the CAAQS, which was based on the Canada-wide Standards, including the results of the assessments for the 2010-2012 and earlier periods, can be found at:

- <http://aep.alberta.ca/air/management-frameworks/canadian-ambient-air-quality-standards-for-particulate-matter-and-ozone/particulate-matter-and-ozone-management-history.aspx>

Further information on the Red Deer Fine Particulate Matter Response can be found at:

- <http://aep.alberta.ca/air/management-frameworks/canadian-ambient-air-quality-standards-for-particulate-matter-and-ozone/red-deer-response.aspx>

RED DEER FINE PARTICULATE MATTER RESPONSE

SCIENCE REPORT

APRIL 2016

Red Deer Fine Particulate Matter Science Report

Note from the Secretariat:

Management Approach of the Red Deer Fine Particulate Matter Response and Science Report

The Red Deer Fine Particulate Matter Science Report (herein: the science report) was developed in response to the exceedance of the Canada-wide Standard for fine particulate matter at Red Deer Riverside monitoring station. Following an exceedance, a management response is mandatory. The goal of the management response is to use scientific investigation to inform the development of actions to reduce observed fine particulate matter concentrations. The science report represents a compendium of the shared understanding of the influences, both natural and anthropogenic, affecting fine particulate matter concentrations at Red Deer Riverside monitoring station. A shared understanding rooted with scientific investigation is essential for multi-stakeholder collaboration to identify, develop and implement management actions to ultimately address the issue. The collective scientific understanding also includes the acknowledgement of gaps in knowledge. The science report highlights these gaps as recommendations for future scientific investigation. Continued development of management actions requires the aggressive perusal of these gaps.

The Science Report is an accompanying document to the Red Deer Fine Particulate Matter Response and was developed in context of the goal of the Response.

Mandate

The science report was developed to provide a resource of scientific knowledge to inform the development of the management response. The science report attempts to balance the need for scientific input in three key areas:

- Understanding of ambient fine particulate matter observations
- Addressing stakeholder questions that arose during the science investigation
- Informing the management response, including the selection of the boundary of focus and the identification of management actions.

Building an understanding of observations at Red Deer Riverside monitoring station is critical in determining the focus, priority, and urgency of management actions. The objective of the science report is to provide as complete an analysis as possible, of available information, in order to best characterize sources and phenomenon affecting fine particulate matter concentrations at Red Deer Riverside monitoring station. Gaps exist in the current state of knowledge and there is a need to complete additional monitoring and analysis exercises in order to better inform the understanding of the

observations at Red Deer Riverside monitoring station. To this end, a list of recommendations has been included in the science report for future investigation.

Also, addressing stakeholder concerns is an essential component of the science report. Stakeholder input and feedback was incorporated throughout the development of the science report, with this information informing the types of investigations included in the science report. Addressing stakeholder concerns with scientific investigation enabled a collective understanding of the fine particulate matter issue.

The building of a shared, science-based understanding of the fine particulate matter exceedance at Red Deer Riverside monitoring station enabled the investigations documented in the science report to inform the development of the response and associated management actions.

Key Findings

These findings form the basis of the shared understanding of the fine particulate matter issue to date. The assumptions that these findings are based on, are detailed within the report:

- Newer monitoring technologies have improved our observations of fine particulate matter. These improved observations have enabled the identification that fine particulate matter concentrations at Red Deer Riverside monitoring station are exceeding national standards.
- Meteorological phenomenon influence the occurrence of high concentrations of fine particulate matter. Common conditions exacerbate the dispersion of pollutants and result in high fine particulate matter concentrations, thereby highlighting a need for management action to reduce emissions.
- Fine particulate matter observed at Red Deer Riverside monitoring station is most likely dominated by secondary fine particulate matter species. Many source sectors are likely contributing precursor gasses which participate in the formation of secondary fine particulate matter.

Recommendations for future investigation

In order to confirm any assumptions used to build the shared understanding of the fine particulate matter issue several key areas of scientific investigation are recommended. Each of these scientific investigations are anticipated to fill current knowledge gaps and result in an improved shared understanding of the scientific information.

- Increase understanding of the species composition of particulate matter in the Red Deer air quality management area
- Apportion fine particulate matter to sources in the Red Deer air quality management area
- Broaden the understanding of spatial and temporal variations of fine particulate matter and its precursors

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Executive Summary

Alberta committed to achieving the Canada-wide Standard for fine particulate matter in 2003 (CASA, 2003). Measurements of fine particulate matter at Red Deer Riverside monitoring station have been used to assess achievement of the Canada-wide Standard under the Clean Air Strategic Alliance Particulate Matter and Ozone Management Framework (CASA, 2003; Alberta's implementation of the Canada-wide standards for particulate matter and ozone). In the 2009-2011 assessment (AESRD, 2012b), Red Deer Riverside monitoring station was found to have exceeded the Canada-wide Standard for particulate matter and as a result, the development of a mandatory plan to reduced fine particulate matter concentrations to below the Canada-wide Standard was initiated. The Red Deer Fine Particulate Matter Science Report represents a compendium of the current state of knowledge regarding the causes of the exceedance at Red Deer Riverside monitoring station.

The Red Deer Fine Particulate Matter Science report was developed in conjunction with the Red Deer Fine Particulate Matter response. The response outlines the management actions identified by a multi-stakeholder advisory committee, to address the exceedance of the Canada-wide Standard. The advisory committee utilized the science summarized herein to develop effective management actions to be degree to which current knowledge could support. Stakeholders selected for the advisory committee comprised those most likely to have a significant role in affecting fine particulate matter concentrations in Red Deer. Scientific evidence (summarized herein) indicates that secondary fine particulate matter species are expected to be a large contributor to the high fine particulate matter concentrations observed in Red Deer. Of secondary fine particulate matter species, those formed through reactions with nitrogen dioxide are anticipated to be significant. Therefore, an area encompassing Lacombe County and Red Deer County was delineated as an area of high source contributions of nitrogen dioxide; through an analysis of passive nitrogen dioxide monitoring. The Red Deer Fine Particulate Matter Science report and the Red Deer Fine Particulate Matter response delineate these and the immediately surrounding counties as the "Red Deer air quality management area." Investigations and conclusions described herein are limited to the areas within these boundaries.

Red Deer Riverside monitoring station is located within an urban center, the City of Red Deer, which includes and is surrounded by varied emission sources of fine particulate matter and fine particulate matter precursor gasses. Observations of fine particulate matter concentrations at Red Deer Riverside monitoring station are somewhat limited in fully characterizing the cause of the exceedance. A major limitation is the fact that high temporal resolution fine particulate matter monitoring data cannot distinguish between different types of particulate matter species. Additionally, as monitoring technology has improved, Red Deer Riverside monitoring station has been upgraded over-time, resulting in a dataset measured using three separate methodologies. Therefore several additional sources of information were analyzed in conjunction. These sources of information included emissions inventory information for the City of Red Deer and surrounding areas, data from other monitoring stations in Red Deer and in other areas of the province, and information obtained as part of the Capital Region Fine Particulate Matter Science Report. The analysis of the fine particulate matter concentrations measured at Red Deer Riverside monitoring station, in conjunction with the other data, revolved around three key

topics, which helped to characterize the cause of the exceedance. The key findings related to each topic were:

Measurement of particulate matter:

Secondary fine particulate matter species are expected to comprise a significant portion of the total fine particulate matter mass during wintertime days with high concentrations of fine particulate matter. The upgrading of fine particulate matter monitoring technology to Federal Equivalency Method standards at Red Deer Riverside monitoring station was likely a large factor behind observation of the exceedance. Federal Equivalency Method compliant instruments provide a more accurate measurement of fine particulate matter concentrations due to their improved ability to measure secondary fine particulate matter species; a large positive step change in concentrations was observed after the upgrade. Therefore, the switch to the new standard in monitoring technology enabled the detection of fine particulate matter concentrations that had previously gone unmeasured and enabled the determination that secondary fine particulate matter was present in Red Deer.

Influence of meteorology:

Fine particulate matter events occur most frequently during the colder months (October-March), but were observed to occur in all months. Seasonal and diurnal meteorological fluctuations influence fine particulate matter concentrations to a great degree. Generally, meteorological phenomenon that affect the dispersion of pollutants have the biggest impact on fine particulate matter concentrations; low wind speeds characterize these phenomenon. Temperature inversions are a major meteorological phenomenon, characterized by low wind speeds, which trap cold air near the surface of the earth and prevent the mixing of pollutants. Throughout the year, nocturnal temperature inversions have a diurnal influence on fine particulate matter concentrations and during the colder months temperature inversions driven by large-scale weather systems are frequent and may limit dispersion for several days at a time. Fine particulate matter event days were associated with southerly winds at Red Deer Riverside monitoring station, an association that is likely driven in large part by the alignment of the Red Deer river valley relative to the monitoring station.

Evidence of secondary particulate matter and potential sources:

As a consequence of similar meteorological conditions, due to large-scale weather systems in Alberta, Edmonton, Red Deer and Calgary can experience high particulate matter concentrations concurrently. With similar emissions sources in these urban locations, the observation of coincident high particulate matter concentration enables comparisons, particularly between the more detailed measurements of fine particulate matter outside of the Red Deer area. In Edmonton, nitrogen dioxide driven species of secondary fine particulate matter were observed to be dominant in the formation of fine particulate matter events in the colder months. The implications of the observations in Edmonton suggest that Red Deer, with an abundance of nitrogen dioxide sources, as demonstrated through emissions inventories and monitoring, is likely to be impacted significantly by secondary fine particulate matter species

formed through reactions with nitrogen dioxide. A major source of nitrogen dioxide in Red Deer, and nearby Red Deer Riverside monitoring station is from transportation. Although some fine particulate matter (expected as primary fine particulate matter) emitted from nearby transportation related sources is expected to influence the concentrations at Red Deer Riverside monitoring station, these impacts are not significant enough to be the sole cause of the observed exceedance. Therefore transportation emissions from other major transportation corridors in Red Deer are more likely to be influencing concentrations of fine particulate matter (as secondary fine particulate matter) measured at Red Deer Riverside monitoring station. These conclusions are similar to those reached in Edmonton. The degree of impact of transportation related emissions on observed fine particulate matter concentrations, however cannot be fully quantified without further data collection and analysis. Therefore, with the current state of knowledge, other emissions sources capable of participating in the formation of secondary fine particulate matter (e.g. industrial emissions), cannot be ruled out for influencing the observation of high concentrations of fine particulate matter.

Recommendations for future investigation

The science report is intended to represent a snapshot of the current state of knowledge regarding fine particulate matter at the time of the development of the fine particulate matter response. It is intended to document the understanding of the exceedance of the fine particulate matter Canada-wide Standard to date and inform the development of management actions included in the fine particulate matter response. Several knowledge gaps have been identified within the science report and in order to continue to make progress on the development and implementation of new management actions, continued scientific investigation is necessary. The following recommendations are prioritized based on the scope of the knowledge gaps identified and the relative need of the scientific investigation to develop future management actions.

Recommendation	
Description	Rationale
Increase understanding of the species composition of particulate matter in the Red Deer air quality management area	
<ul style="list-style-type: none"> Commence a sampling study in the Red Deer air quality management area to identify the species composition of particulate matter during event and non-event days. 	Rationale: Speciation has not been measured in Red Deer. In order to confirm assumptions made in the science report, this assessment is essential.

Apportion fine particulate matter to sources in the Red Deer air quality management area	
<ul style="list-style-type: none"> Undertake source apportionment modelling using CMAQ, separate from or in conjunction with ongoing work in the Capital Region. Additional specific investigations may include: <ul style="list-style-type: none"> Investigate home heating emissions (including emissions impacts from different fuel types). Understand diurnal variations in home heating emissions with respect to fine particulate matter concentration variations. Undertake a detailed analysis to determine whether variations in vehicle traffic due to changes in the local economy of Red Deer may impact fine particulate matter concentrations 	<p>Rationale: The relationship between fine particulate matter concentrations and specific emissions sources in Red Deer is poorly understood. A sector based source apportionment would fill this gap by identifying key source sectors which have the most significant impacts on fine particulate matter concentrations. This initiative will help to implement current management actions and develop new management actions if gaps exist.</p>
<ul style="list-style-type: none"> Investigate NO to NO₂ conversion in order to contextualize the locality of emissions impacting Red Deer Riverside station. Understanding the degree of transport to which NO_x has undergone may allow for determining source contribution regions affecting Red Deer Riverside. 	<p>Rationale: The relationship between fine particulate matter concentrations and specific emissions sources in Red Deer is poorly understood. Contextualizing the measured NO_x emissions in terms of their NO and NO₂ components will help localize potential emission sources and aide in source apportionment.</p>
Broaden the understanding of spatial and temporal variations of fine particulate matter and its precursors	
<ul style="list-style-type: none"> Continue to investigate the suitability of using RDPS (Regional Deterministic Prediction System) Output (a meteorological model capable of predicting atmospheric stability) to identify temperature inversions over Red Deer and integrate these results into future investigations if determined to be suitable. 	<p>Rationale: Upper air soundings are not available in Red Deer therefore determining the impact of inversions is reliant on other meteorological information. Characterization of the suitability of the RDPS meteorological model output to the Red Deer area will help provide more confidence in establishing the link between fine particulate matter event days and atmospheric temperature inversions.</p>

Broaden the understanding of spatial and temporal variations of fine particulate matter and its precursors	
<ul style="list-style-type: none"> Investigate influence of large scale (100s of km) meteorological systems on multi-station fine particulate matter events in order to better understand conditions favorable for fine particulate matter event days. 	<p>Rationale: Multi-station fine particulate matter events were observed across the Edmonton-Calgary corridor. Observations from monitoring stations suggest similar meteorological phenomena are driving these events. However, no investigation of large-scale phenomena have been performed to date, leaving a gap in knowledge.</p>
<ul style="list-style-type: none"> Investigate the potential for terrain to influence meteorology in the Red Deer area and determine what influence this may have on fine particulate matter concentrations. A modelling investigation may be most suited to this question. 	<p>Rationale: Terrain effects are recognized in meteorology and air quality science and the City of Red Deer, along with associated air quality monitoring stations, sit below two large ridges and within a substantial river valley. The effect of these terrain features has not been characterized.</p>

1. Introduction

1.1.Purpose

In 2003, Alberta committed to achieving the Canada-wide Standard for fine particulate matter (PM_{2.5}) (established by the Canadian Council of Ministers of the Environment in 2000; CCME, 2000) through implementation of the Clean Air Strategic Alliance Particulate Matter and Ozone Management Framework (CASA, 2003). Implementation of this framework involved performing annual assessments on all air quality monitoring stations in the province measuring fine particulate matter or ozone. Fine particulate matter concentrations were assessed at each station with sufficient data. Action levels were then assigned to each station with respect to the assessed fine particulate matter concentration. The action levels in the Clean Air Strategic Alliance Fine Particulate Matter and Ozone Management Framework are listed in Figure 1.

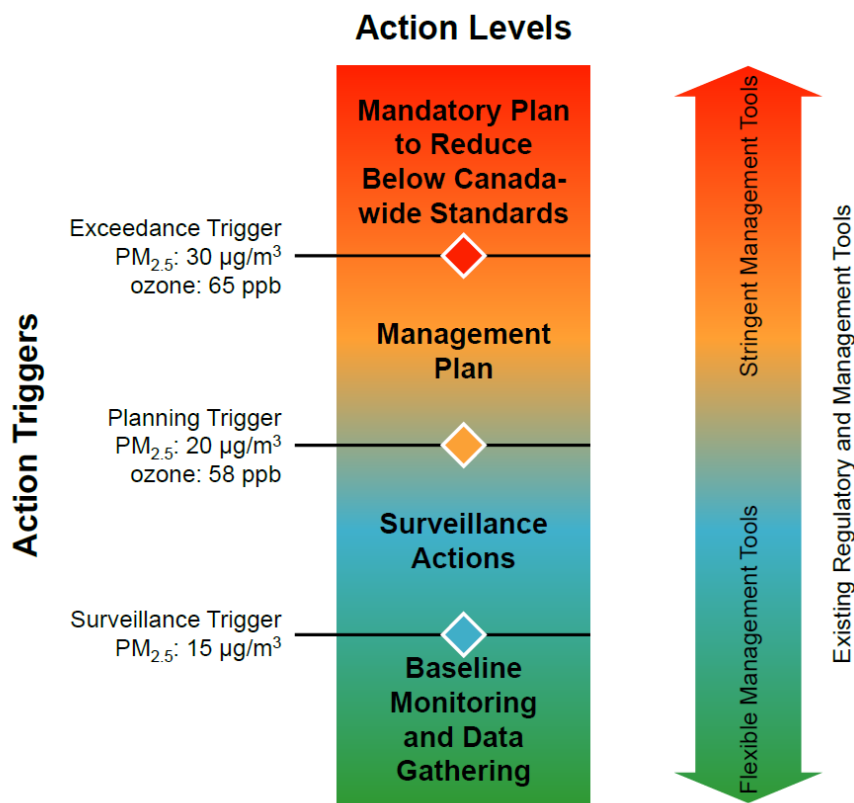


Figure 1: Action triggers and levels of the Clean Air Strategic Alliance Fine Particulate Matter and Ozone Management Framework (CASA, 2003). The exceedance trigger is equivalent to the Canada-wide standard.

Red Deer Riverside monitoring station has been assessed as part of the Clean Air Strategic Alliance Fine Particulate Matter and Ozone Management Framework since its inception, and in 2009-2011 assessment (AESRD, 2013b), released in January 2013, the station was placed into the “Mandatory Plan to Reduce Below Canada-wide Standards” action level under the framework. Assignment to this action level indicates that Red Deer Riverside monitoring station exceeded the Canada-wide standard of 30 µg/m³ and that a plan to reduce the observed concentrations at this station must be developed. The Red

Deer Fine Particulate Matter Response documents the plan developed in conjunction with stakeholders, to reduce concentrations to below the Canada-wide Standard.

The Red Deer Fine Particulate Matter Science Report (herein: “the science report”) was developed in an effort to characterize the cause of the exceedance of the Canada-wide Standards at Red Deer Riverside monitoring station. The science report was developed internally by Alberta Environment and Parks with external consultation with the Parkland Airshed Management Zone Technical Working Group. The intent of the science report was to investigate the cause of the exceedance of the Canada-wide Standards, to the highest degree that available data can support. To guide the development of the Red Deer Fine Particulate Matter Response, strong science support was determined to be essential. The science report focuses on Red Deer Riverside monitoring station. At the time of the exceedance the only other permanent continuous air quality monitoring station in the vicinity of the City of Red Deer was Caroline monitoring station. For the 2009-2011 Clean Air Strategic Alliance Particulate Matter and Ozone Management Framework assessment (AESRD, 2013b), Caroline monitoring station was reported to be in the “Baseline Monitoring and Data Gathering” action level. The “Baseline Monitoring and Data Gathering” action level is the lowest of the four levels under the Clean Air Strategic Alliance Particulate Matter and Ozone Management Framework (CASA, 2003). For this reason, investigating the observed fine particulate matter concentrations at Caroline monitoring station was not a focus of the science report.

Red Deer Riverside monitoring station continued to exceed the Canada-wide standard in the 2010-2012 Clean Air Strategic Alliance Fine Particulate Matter and Ozone Management Framework assessment (released in April 2014; AESRD, 2014), therefore work to manage fine particulate matter concentrations in the vicinity of Red Deer River monitoring station, and to further characterize the cause of these exceedances, remains important. Starting in 2015, the Canadian Ambient Air Quality Standards have been implemented, replacing the Canada-wide Standards for the assessment of fine particulate matter and ozone in Canada. The implementation of the Canadian Ambient Air Quality Standards is important as it they replace the Canada-wide Standard for fine particulate matter with a new, more stringent limit. The new limit for fine particulate matter is $28 \mu\text{g}/\text{m}^3$; it is based on the three year average of the annual 98th percentile 24-hour average concentration. Additionally, a new assessment metric and associated limit, based on the annual average of fine particulate matter concentrations is being introduced. The new annual average Canadian Ambient Air Quality Standard for fine particulate matter is based on a three year average of annual fine particulate matter concentrations averages. The Canadian Ambient Air Quality Standards are based on the Population Improvement Approach (which strives for improvements in air quality for more Canadians over time), therefore they are set to become more stringent in 2020. With new, more stringent standards being implemented a focus on reducing fine particulate matter concentrations to below these standards is important.

1.2.Particulate Matter

Particulate matter is comprised of liquid or solid particles suspended in the atmosphere. These particles can range across several orders of magnitude in size (10^{-3} – $100 \mu\text{m}$ in diameter) and may originate from a wide variety of sources. For the purposes of measurement, particulate matter can be classified into a number of size fractions. Fine particulate matter is composed of particles less than or equal to $2.5 \mu\text{m}$.

micrometres in diameter, and is the focus of the science report. The fine particulate matter size fraction is of interest as particles of this diameter or less are able pass through the respiratory tract of the human body and enter the lungs.

Particulate matter can be broadly categorized into two categories determined by emission source. Primary particulate matter is defined as any particulates that are emitted directly to the atmosphere as liquid or solid particles from their source. Examples of primary particulate matter sources include unpaved roads (which emit primary particulate matter as dust; as particles of crustal (rock) matter) and the combustion of fossil fuels (which emit primary particulate matter as soot; as particles of elemental carbon).

Secondary particulate matter is defined as any particulates that form within the atmosphere as a result of reactions involving precursor compounds. The exact nature of these reactions varies depending on the atmospheric concentration of various precursor compounds, however the products can be easily categorized into organic and inorganic products. Inorganic secondary particulate matter includes species such as ammonium nitrate and ammonium sulphate, which form through atmospheric reactions of the precursor gases: ammonia, oxides of nitrogen and sulphur dioxide. The precursor gases involved in the formation of inorganic secondary fine particulate matter are emitted from a wide variety of point and non-point sources ranging from agricultural emissions to an assortment of combustion related emissions. Reactions forming ammonium nitrate and ammonium sulphate occur in equilibrium, therefore the concentrations of the reactants are key in limiting the production of these compounds. An investigation carried out as part of the Capital Region Fine Particulate Matter Science Report (AESRD, 2015) indicated that within the Capital Region, ammonia appears to be non-limiting, indicating that concentrations of oxides of nitrogen and sulphur dioxide are key in determining the formation of ammonium nitrate and ammonium sulphate, respectively. The formation of organic secondary fine particulate matter is more complex than the formation of inorganic species due to the large assortment of potential precursor compounds in the atmosphere as well as the potential for these compounds to undergo phase changes in order to form secondary fine particulate matter. The vast majority of organic secondary fine particulate matter forms through reactions involving volatile organic compounds as precursors. Volatile organic compounds can be emitted from natural non-point sources or from a range of anthropogenic point and non-point sources.

1.3.Description of Region

1.3.1. Sensitive receptors and natural landscape

The City of Red Deer is located in central Alberta. The city is home to 100 807 people (2015 municipal census). Other major population centers within the vicinity of the City of Red Deer include the Town of Sylvan Lake (population: 13 015 (2013 municipal census)), the City of Lacombe (population: 12 728 (2014 municipal census)), the Town of Innisfail (population 7 922 (2013 municipal census)), Town of Blackfalds (population: 7 858 (2014 municipal census)) and the Town of Penhold (population: 2 476 (2012 municipal census)). Outside of these populated areas, land immediately adjacent to the City of Red Deer supports a mix of land uses, from unincorporated residential areas (approximate population of 2600 within 10 kilometres of the City of Red Deer border) to light industrial and agriculture. Beyond this

distance, Red Deer and Lacombe counties, with the exception of the noted major population centers, are predominantly rural and land use is mostly agricultural with sporadic industrial use. Two counties, Red Deer County (population: 18,351 (2011 Federal census)) and Lacombe County (population: 10 312 (2011 Federal Census)) encompass these lands. Figure 2 shows a map of the sensitive receptors in the vicinity of the City of Red Deer.

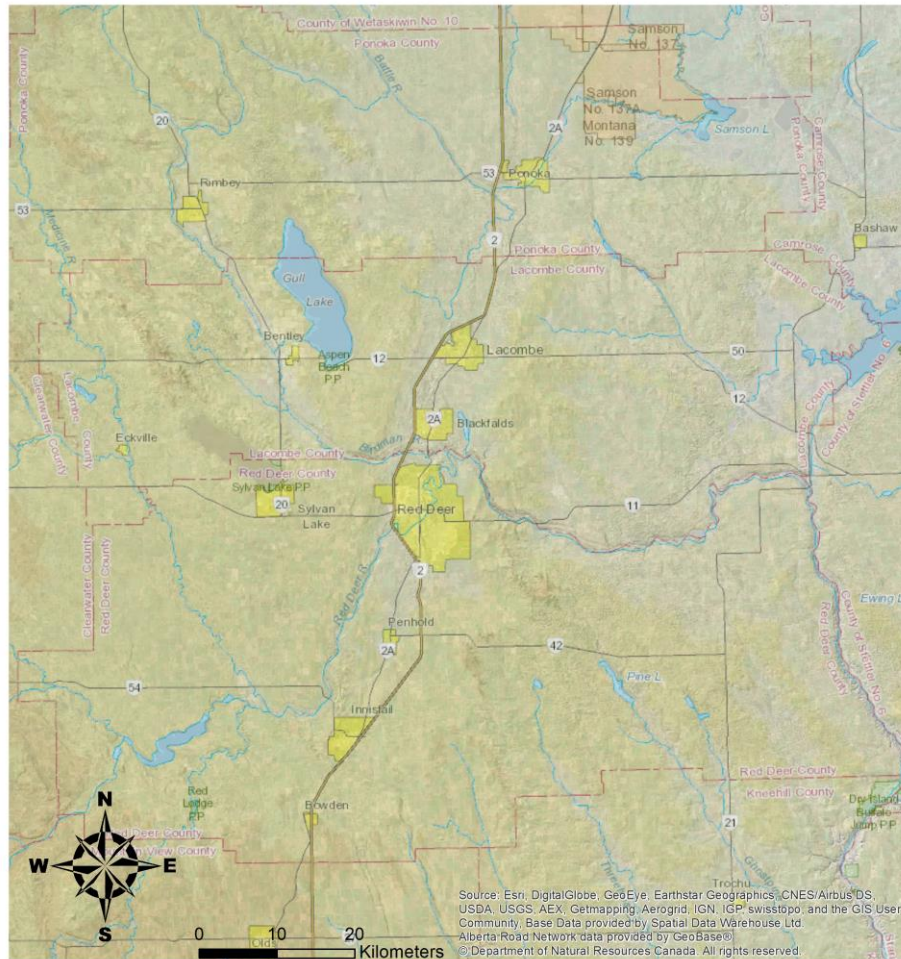


Figure 2: Map of sensitive receptors in the vicinity of the City of Red Deer.

The natural landscape in the Red Deer area is comprised of parkland with rolling terrain. Drainage features ranging from broad shallow valleys to deeply incised canyons dominate topographical relief. The City of Red Deer is located on relatively flat land centered around the Red Deer River valley (Figure 3). The Red Deer River valley walls range in size from 20-60 metres deep and the river travels in a north-easterly direction through the city (Figure 3). The city and river valley, where the river runs through the city, are located in a broad valley demarcated by broad north-south oriented ridges which rise 100-150 metres above the Red Deer River and are spaced approximately 20 km apart.

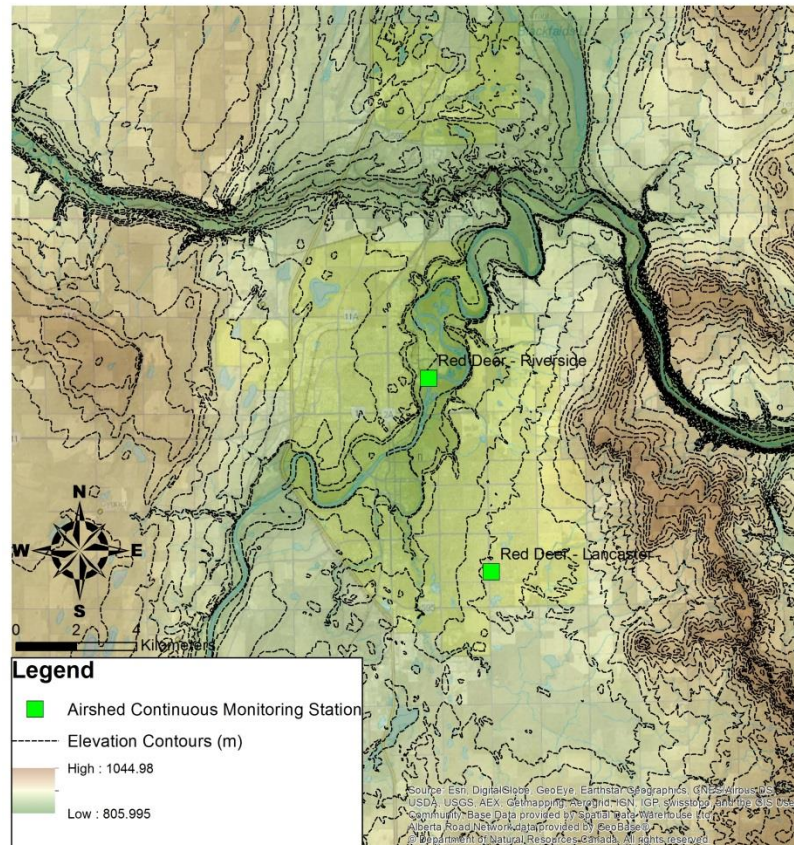


Figure 3: Topographical relief in the vicinity of the City of Red Deer. Contour lines are at 10 metre intervals. The locations of Red Deer Riverside and Red Deer Lancaster monitoring stations are indicated.

1.3.2. Regional Emissions Profile

Emission sources within the Red Deer area range from large point sources to collectively significant non-point sources. In order to characterize the distribution of emissions from various source sectors, three pollutants of concern were identified; Nitrogen dioxide and sulphur dioxide – known precursors to the formation of secondary fine particulate matter, and fine particulate matter (PM_{2.5}) – measured/estimated emissions of primary fine particulate matter. Emissions sources in the Red Deer area were determined from the 2008 Alberta Air Emissions Inventory. Point sources were classified into three key sectors: upstream oil and gas, chemicals industry and other industrial. Other industrial emissions included emissions from petroleum product transportation, electrical power generation, the grain industry and the cement, concrete and asphalt industry. Non-point source data were only available by census subdivision (representing incorporated municipalities such as cities, towns, villages and summer villages), therefore the emissions profile for the Red Deer area was generated using emissions data from all point and non-point sources from census subdivisions contained within census division 8. The boundaries of Census division 8 are defined by the boundaries of its three constituent counties, Red Deer county, Lacombe county and Ponoka county. Non-point sources were classified into several key sectors: On-road transportation, off-road transportation, residential and commercial heating, open area sources, and miscellaneous sources. Open area sources include emissions from agricultural operations, construction operations, dust from roads (paved and unpaved), prescribed burning and waste

processing. Miscellaneous non-point sources include incineration sources (e.g. cremation), industrial sources, air transportation, rail transportation, emissions from structural fires and miscellaneous emissions from cigarette smoking and meat cooking.

1.3.2.1. Nitrogen dioxide

Industrial point sources account for 65% of nitrogen dioxide emissions in census division 8 (Figure 4 and Figure 5). The vast majority of point source emissions (and more than half of all emissions) of nitrogen dioxide are from upstream oil and gas facilities (Figure 5). These facilities are for the most part distributed throughout census division 8 and are largely located outside of population centers (Figure 6). Other industrial point sources include emissions from chemicals manufacturing and other industrial activities (Figure 5). Point source emissions do not undergo substantial seasonal fluctuations. The balance of nitrogen dioxide emissions in census division 8 (35%) are associated with non-point source emissions from a number of sectors (Figure 5). Non-point source emissions are highest in the City of Red Deer, Red Deer, Lacombe and Ponoka counties. Of the sectors contributing to non-point source emissions, transportation related emissions are predominant, accounting for 84% of non-point source emissions of nitrogen dioxide and 30% of nitrogen dioxide from all sources (point and non-point) in census division 8 (Figure 5). Transportation related emissions are approximately evenly split between off-road and on-road sources (Figure 5). On-road emissions are highest from those sub-divisions with the greatest populations and therefore the highest road usage (Figure 7). On-road sources do not undergo significant seasonal variation and are expected to be consistent year round. Off-road emissions sources are dominated by diesel-fueled vehicles such as construction and agricultural equipment. Smaller contributions come from off-road vehicles and devices with small engines, such as all-terrain vehicles, yard equipment and aquatic vessels. Contributions of off-road transportation emissions are concentrated near population centers (Figure 8). These activities are largely season dependent and therefore it is expected that off-road emissions are largest in the warmer months. Other significant non-point source emissions of nitrogen dioxide are from residential and commercial heating and other miscellaneous sources.

1.3.2.2. Sulphur dioxide

Emissions of sulphur dioxide in census division 8 are approximately 20 times less than nitrogen dioxide emissions (Figure 4) and are dominated by upstream oil and gas point sources (accounting for nearly 90% of all emissions of sulphur dioxide; Figure 5). Sulphur dioxide emitting point sources are distributed sparsely throughout census division 8 and are located outside of population centers (Figure 9). One large industrial point source emitting just over 200 tonnes per year of SO₂ is located near the City Red Deer. Non-point source emissions of sulphur dioxide are predominantly from residential and commercial heating and off-road transportation (Figure 5). The City of Red Deer and Red Deer County have the highest emissions of non-point source SO₂ emissions. Sulphur dioxide releasing non-point sources include emissions from the heating of buildings as well as emission from heavy duty diesel engines, both of which are concentrated near populated areas (Figure 9).

1.3.2.3. Fine particulate matter

Nearly the entirety (97%) of fine particulate matter (attributed as primary fine particulate matter) that is emitted in census division 8 is from non-point sources (Figure 4). Open area sources dominate the non-

point source emission of primary fine particulate matter (96% of the non-point source emitted fine particulate matter; Figure 5) which is largely emitted as dust from unpaved roads and in smaller quantities from construction operations and agriculture. Red Deer County is the largest source of non-point source emitter of primary fine particulate matter (Figure 10). While Un-paved roads are found within Red Deer, Lacombe and Ponoka counties, Red Deer County’s location, encompassing the City of Red Deer, means that traffic loads on rural un-paved roads are higher than in the other counties, and subsequently result in more emissions of fine particulate matter. Significant non-point source construction operations may occur anywhere within census division 8, however these emissions can be expected to be concentrated around population centers. In addition, these emissions are expected to be focused throughout the warmer snow-free months (April-September) as construction operations are limited in the wintertime as snow-cover and ground freeze-up makes construction difficult. These same natural processes also act to limit the emission of fine particulate matter from un-paved roads. Point source emissions of fine particulate matter are collectively small, with the largest contributions coming from the chemicals manufacturing industry (Figure 10).

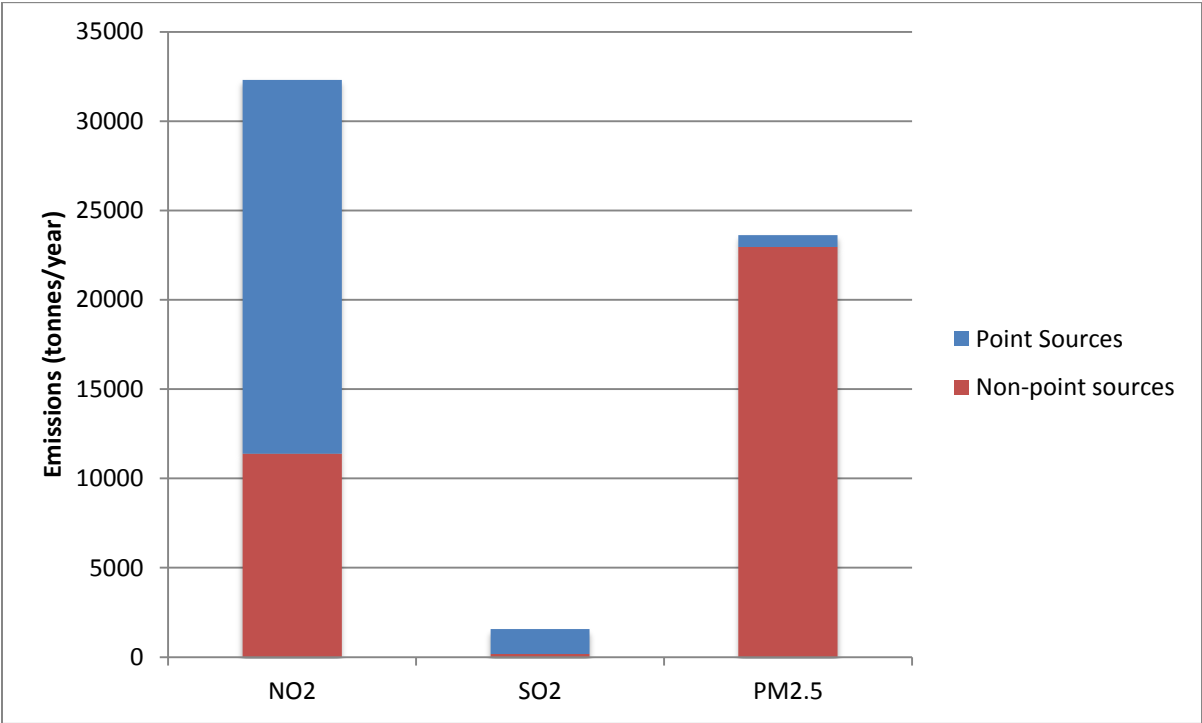


Figure 4: Yearly emissions of fine particulate matter precursors and primary fine particulate matter by point sources and non-point sources in census division 8

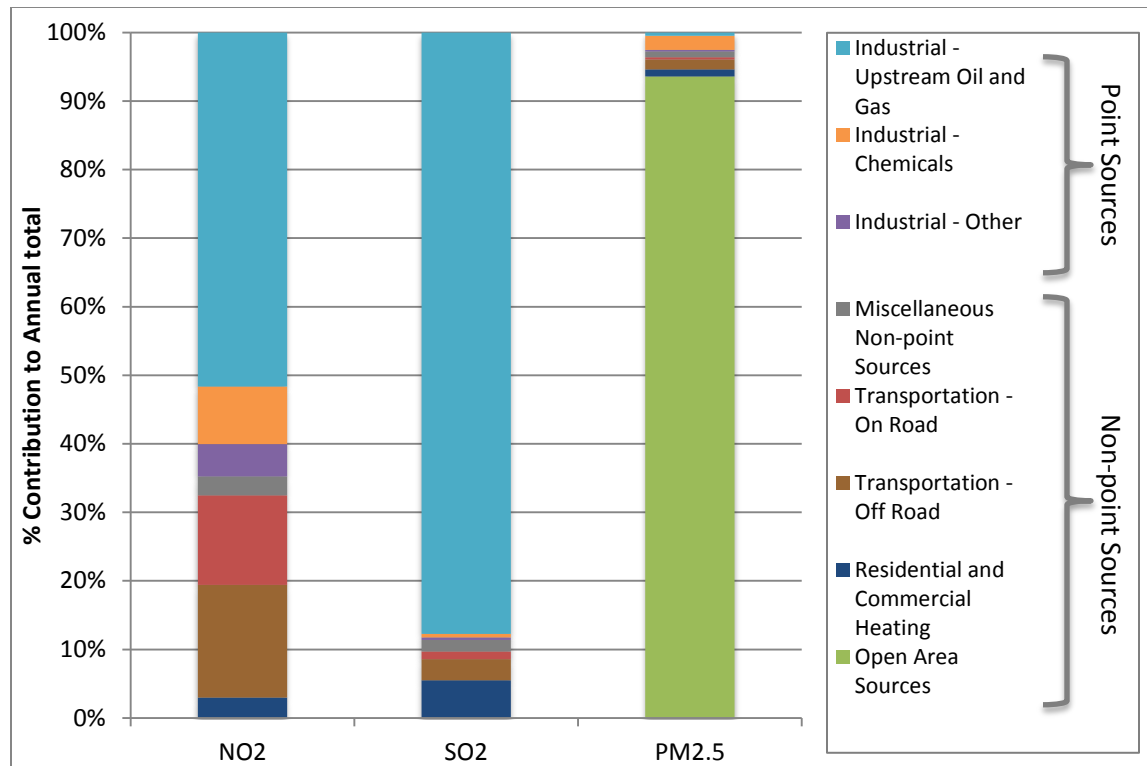


Figure 5: Sector-based breakdown of yearly fine particulate matter precursor and primary fine particulate matter emissions in census division 8.

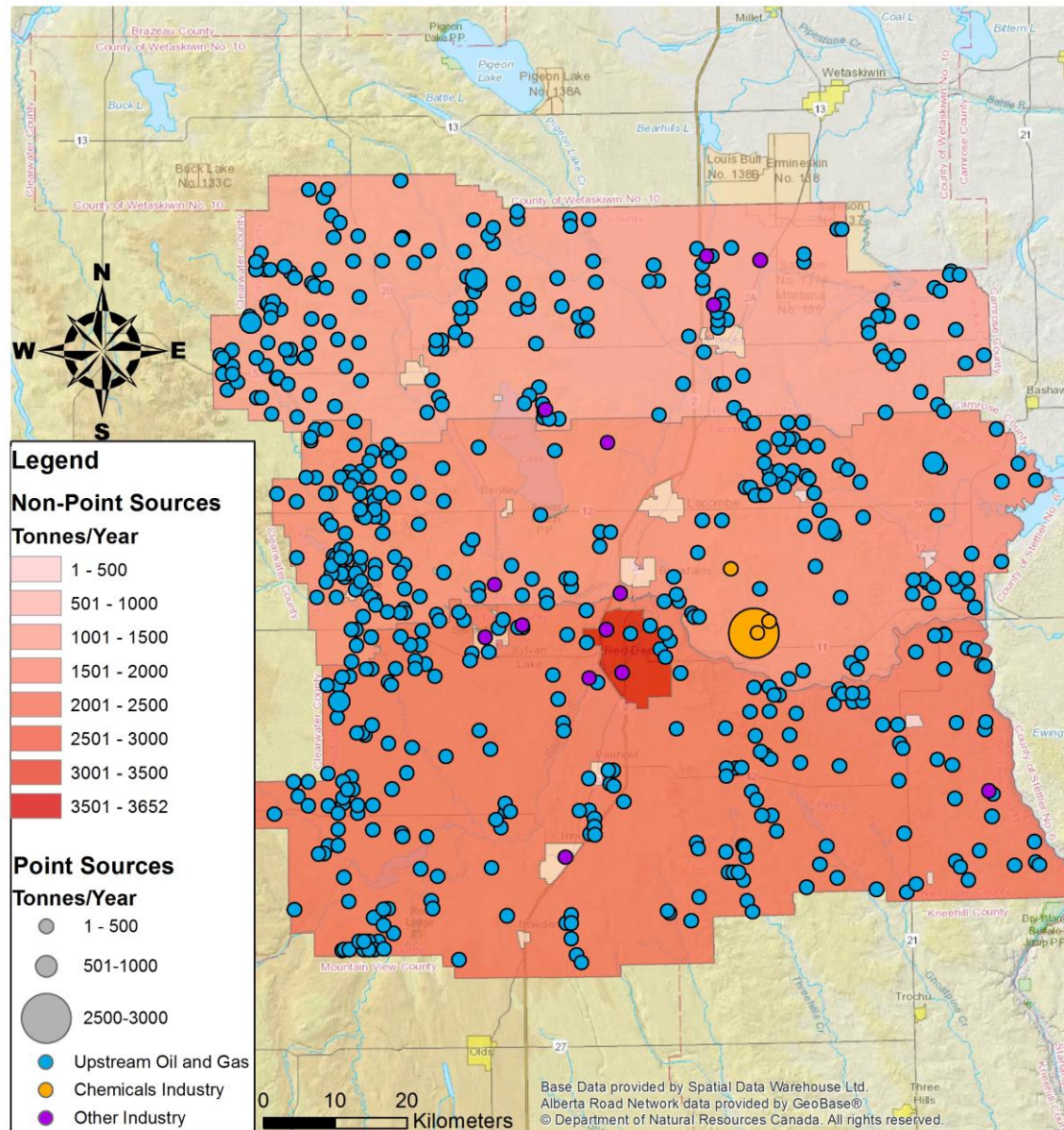


Figure 6: Yearly Nitrogen dioxide emissions from point (circles) and non-point (area colour) sources in Census Division 8. Emissions were derived from the 2008 Alberta Air Emissions Inventory. Point sources are divided into three key sectors and are identified by their total annual emissions. Non-point source emissions are identified as annual totals from each of 25 census subdivisions (e.g. cities, towns, etc.) in Census Division 8.

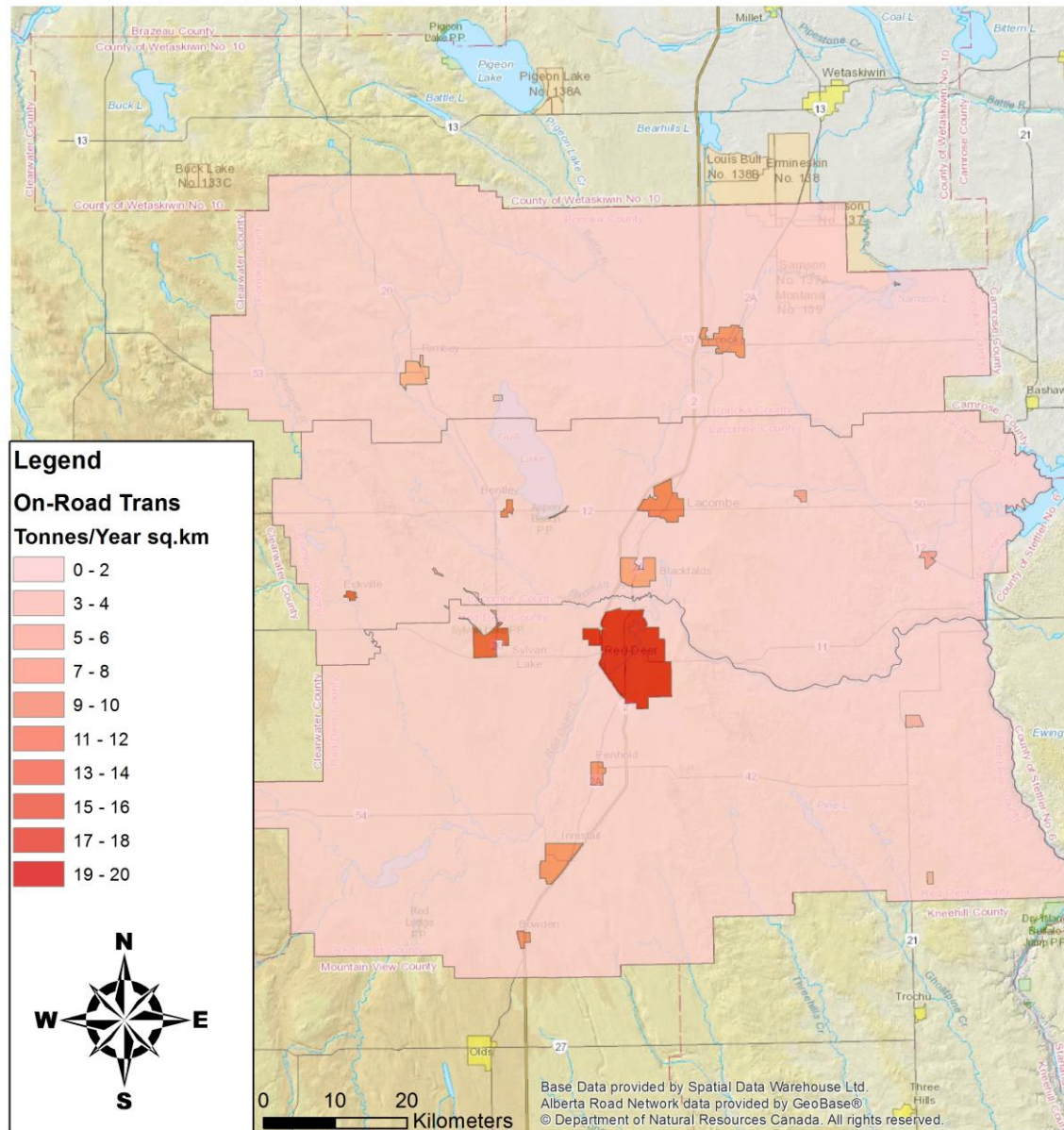


Figure 7: Yearly emissions of Nitrogen dioxide per unit area (tonnes per year squared kilometre) from on-road transportation related non-point sources in Census Division 8. Emissions were derived from the 2008 Alberta Air Emissions Inventory. Emissions per unit area were derived from the total on-road transportation related non-point source emission in each census subdivision divided by the area of each subdivision.

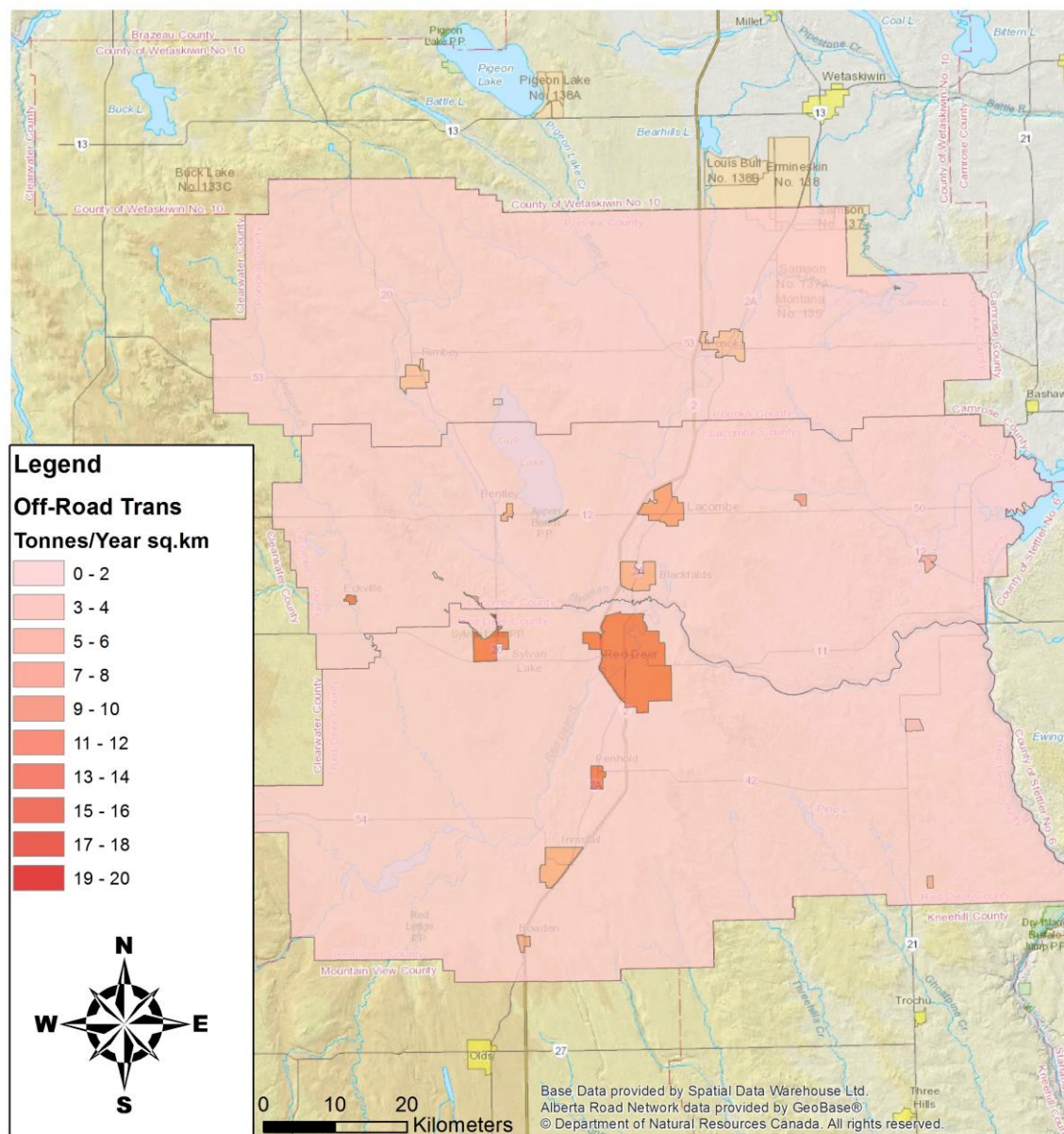


Figure 8: Yearly emissions of Nitrogen dioxide per unit area (tonnes per year squared kilometre) from off-road transportation related non-point sources in Census Division 8. Emissions were derived from the 2008 Alberta Air Emissions Inventory. Emissions per unit area were derived from the total off-road transportation related non-point source emission in each census subdivision divided by the area of each subdivision.

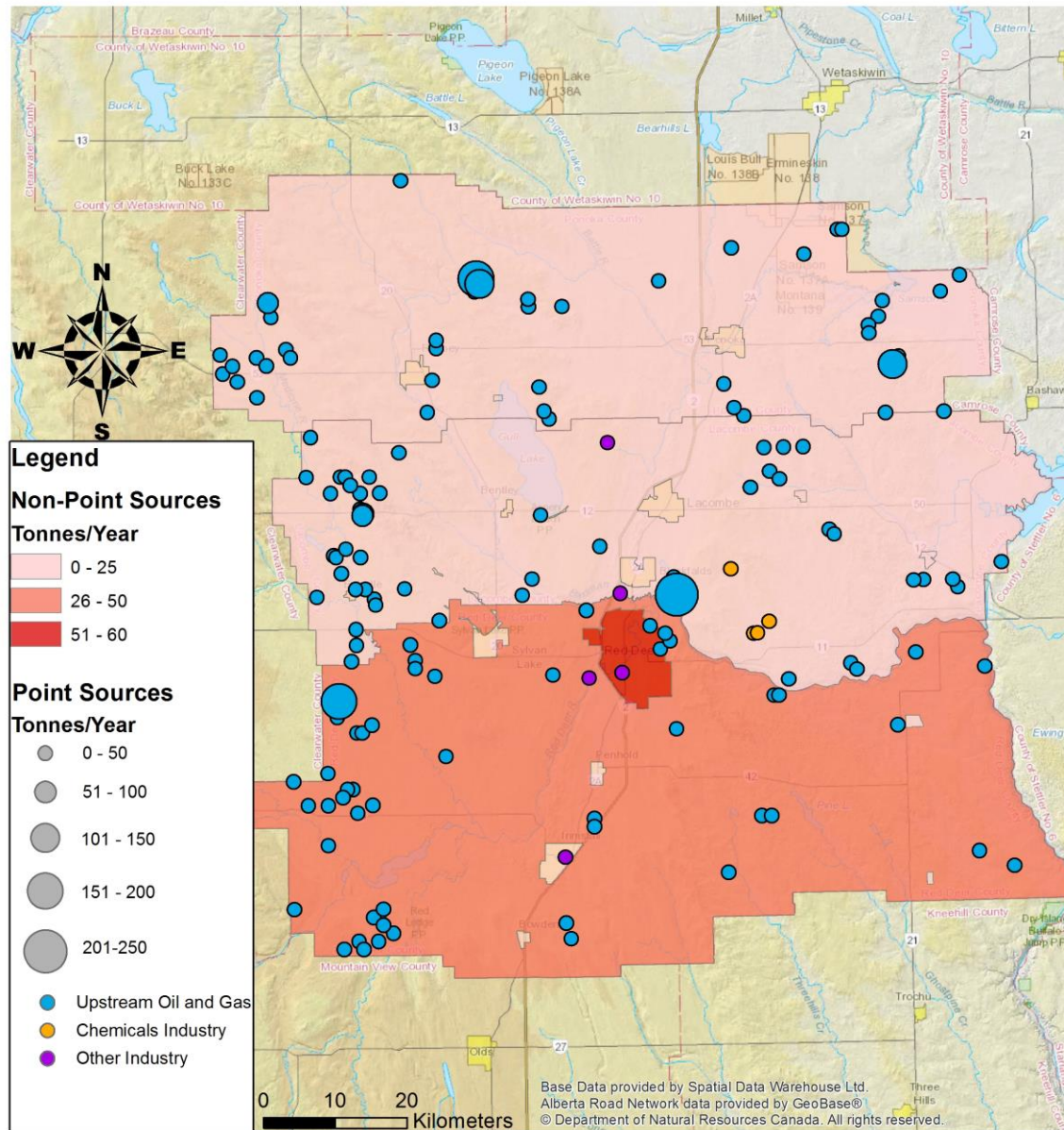


Figure 9: Yearly Sulphur dioxide emissions from point and non-point sources in Census Division 8. Emissions were derived from the 2008 Alberta Air Emissions Inventory. Point sources are divided into three key sectors and are identified by their total annual emissions. Non-point source emissions are identified as annual totals from each of 25 census subdivisions (e.g. cities, towns, etc.) in Census Division 8.

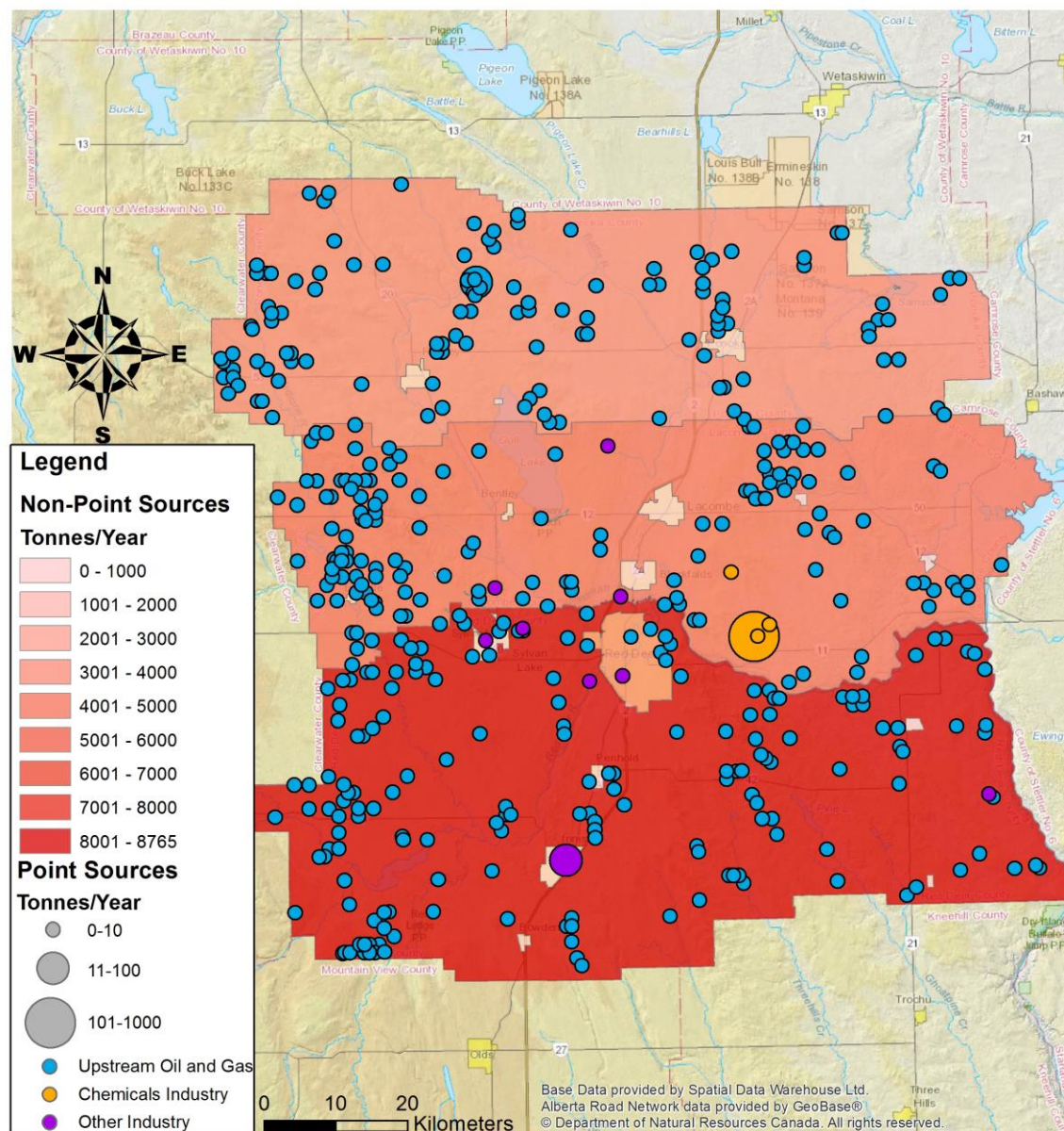


Figure 10: Yearly fine particulate matter (as primary fine particulate matter) emissions from point and non-point sources in Census Division 8. Emissions were derived from the 2008 Alberta Air Emissions Inventory. Point sources are divided into three key sectors and are identified by their total annual emissions. Non-point source emissions are identified as annual totals from each of 25 census subdivisions (e.g. cities, towns, etc.) in Census Division 8.

1.4. Description of Monitoring Stations

Monitoring of the ambient air in the Red Deer area is undertaken by the Parkland Airshed Management Zone. The Parkland Airshed Management Zone currently has a total of three permanent continuous ambient monitoring stations: two within the City of Red Deer (Red Deer Riverside monitoring station and Red Deer Lancaster monitoring station) and one near the Village of Caroline (Caroline monitoring station). The Parkland Airshed Management Zone also operates one portable continuous ambient monitoring station (David McCoy portable station; which is deployed in response to localized air quality issues, or for research purposes) and a network of 32 passive ambient monitoring stations (passive

monitoring stations are co-located with Red Deer Riverside, Red Deer Lancaster and the David McCoy portable monitoring station). Passive monitoring stations are equipped to measure sulphur dioxide, nitrogen dioxide, and ozone concentrations. Additional details about the entire Parkland Airshed Management Zone network of monitoring stations can be found in the Parkland Airshed Management Zone Ambient Air Monitoring Plan (PAMZ, 2015).

Ambient air monitoring in the City of Red Deer has occurred since 1999 at the Red Deer Riverside monitoring station. The Red Deer Riverside monitoring station is located within the Red Deer River valley in the industrialized portion of northeast Red Deer (Figure 3 and Figure 11). The monitoring station is adjacent to a collector roadway, Riverside Drive, and is nearby the City of Red Deer civic yards (Figure 11). Red Deer Riverside monitoring station was established by Alberta Environment and Parks, who also operated the station until 2005, when operation of the station was assumed by the Parkland Airshed Management Zone. Red Deer Riverside monitors ambient concentrations of sulphur dioxide, hydrogen sulphide, oxides of nitrogen, fine particulate matter, ozone, carbon monoxide, non-methane hydrocarbons, methane, total hydrocarbons and meteorological parameters.

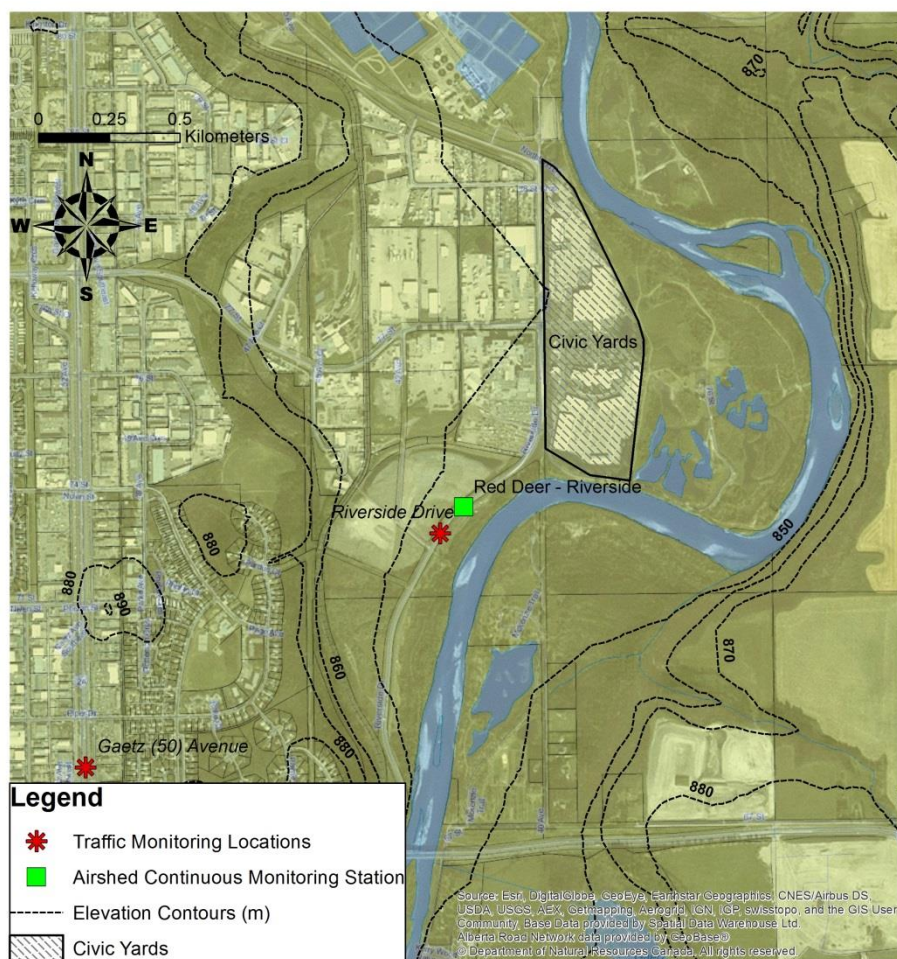


Figure 11: Location of Red Deer Riverside monitoring station with respect to the Red Deer River, Red Deer River valley, City of Red Deer civic yards and nearby roadways. Elevation contours are at 10m intervals. Traffic volume measurement locations on nearby roadways are indicated.

In the late fall of 2014, the Parkland Airshed Management Zone re-purposed one of its two portable monitoring stations into a permanent monitoring station located within the Lancaster neighborhood of southeast Red Deer (Figure 3). The rationale for adding Red Deer Lancaster monitoring station to the Parkland Airshed Management Zone network was to provide a monitoring location within the City of Red Deer more representative of the ambient conditions experienced by the majority of residents. Red Deer Lancaster station is located within a large residential area, outside of the Red Deer River valley (approximately 50 metres higher in elevation than Red Deer Riverside station; Figure 3) and near an arterial roadway (30th Avenue). The site occupied by the permanent Red Deer Lancaster station was first established in late 2012 and was used by one of the Parkland Airshed Management Zone portable monitoring stations during the winters of 2012-2013 and 2013-2014. Red Deer Lancaster monitors ambient concentrations of sulphur dioxide, total reduced sulphur, oxides of nitrogen, fine particulate matter, ozone, non-methane hydrocarbons, methane, total hydrocarbons and meteorological parameters.

Caroline monitoring station is located in a rural/agricultural setting approximately 70 kilometres southwest of the City of Red Deer. Caroline monitoring station was established as a compliance monitoring station for the upstream oil and gas industry and was subsequently transitioned into Parkland Airshed Management Zone network in 1999. Caroline monitors sulphur dioxide, total reduced sulphur, oxides of nitrogen, fine particulate matter, ozone, total hydrocarbons and meteorological parameters.

2. Observations

Continuous fine particulate matter concentrations encompassing the period of October 2007 through to May 2014 were obtained from the Clean Air Strategic Alliance Data Warehouse (CASA, 2015) for Red Deer Riverside, Red Deer Lancaster and Caroline monitoring stations. This period was selected as it represents the span of time from which Red Deer Riverside was recognized as entering into the “Surveillance actions” action level (2007-2009) under the Clean Air Strategic Alliance Particulate Matter and Ozone Management Framework (AESRD, 2012) through to the present. Data available through the Clean Air Strategic Alliance are rigorously quality controlled.

Figure 12, Figure 13 and Figure 14 show hourly averaged fine particulate matter concentration measurements at Red Deer Riverside, Red Deer Lancaster and Caroline monitoring stations, respectively. Dates with fine particulate matter concentrations associated with forest fires, as identified at Red Deer Riverside monitoring station, have been removed (as occurs with the assessment fine particulate matter under the Clean Air Strategic Alliance Particulate Matter and Ozone Management Framework (CASA, 2003b). Monthly averages were calculated and displayed to aid in the identification of trends. In order to identify differences in monitoring technologies between stations and over time, monitoring technologies were annotated in the figures by colour: Blue for TEOM-SES, Red for TEOM-FDMS, Green for SHARP 5030 and Purple for BAM. A detailed discussion of these monitoring technologies and the implications of these technologies on the measured fine particulate matter concentrations can be found in section 3.1.

2.1.Red Deer Riverside

Observations of fine particulate matter concentrations at Red Deer Riverside monitoring station were variable throughout the period of October 2007 to May 2014 (Figure 12). Concentrations were generally low and stable from October 2007 to May 2009 (Figure 12). A notable step change in observed concentrations occurred following the change from TEOM-SES to TEOM-FDMS monitoring technology in May 2009 (Figure 12). A detailed discussion on the changes in monitoring technologies at Red Deer Riverside monitoring station can be found in section 3.1. Following the switch in monitoring technologies observed concentrations were overall higher and more variable, with significant increases in concentrations during the winters of 2009-2010, 2010-2011 and 2012-2013 (Figure 12). A discussion on the seasonal variation of fine particulate matter can be found in section 3.2. No step change was observed following the switch from TEOM-FDMS to SHARP monitoring technology in August 2013. A discussion around this monitoring technology change can be found in section 3.1.

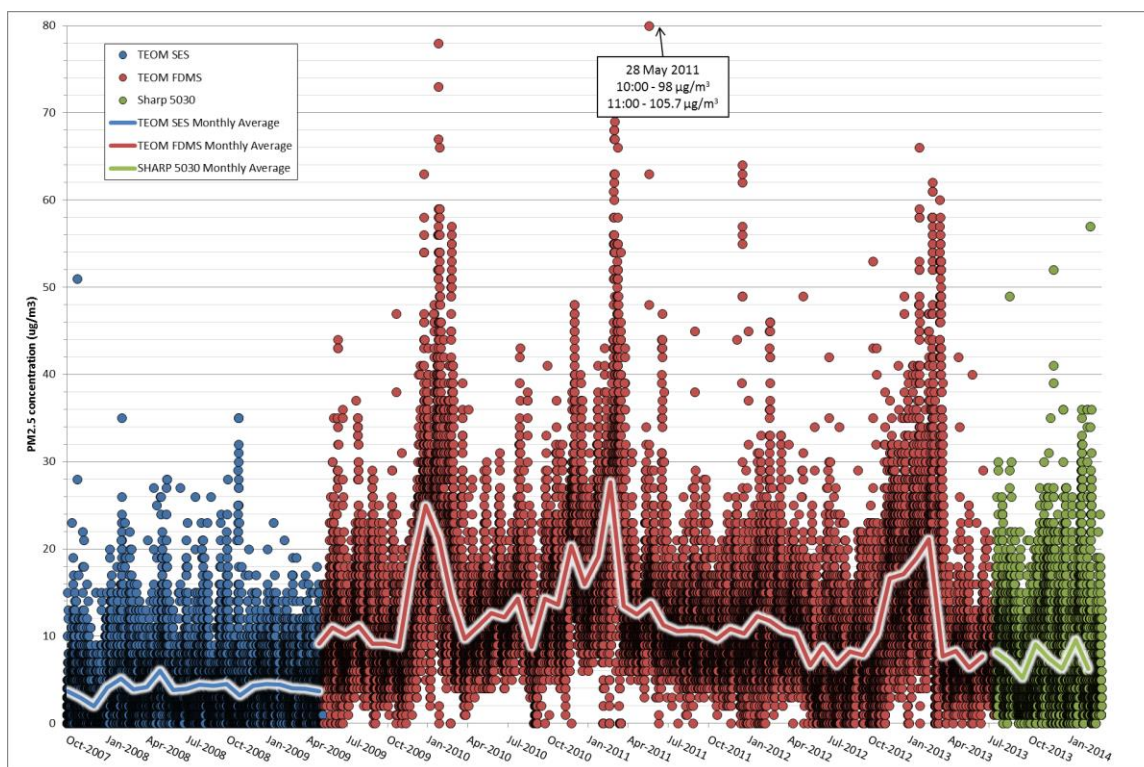


Figure 12: Time series of hourly and monthly average fine particulate matter concentrations as measured at Red Deer Riverside station from October 2007 to May 2014. Note: Data presented between September 2009 and July 2013 were rounded to the nearest integer to match the rounding methods used throughout the rest of the period.

2.2.Red Deer Lancaster

Observations of fine particulate matter concentrations at Red Deer Lancaster station were limited to a small portion of the period between October 2007 to May 2014. Monitoring at the Red Deer Lancaster site was undertaken starting in October 2012 through to March 2013 and again from June 2013 to May 2014 (Figure 13). During the period with observations available, despite utilizing a different monitoring technology than Red Deer Riverside monitoring station, observed fine particulate matter concentrations were similar; in terms of overall trend and magnitude. Due to limited availability of data, particularly,

the lack of at least one continuous year of data, fine particulate matter concentrations at Red Deer Lancaster will not be discussed in further detail in the science report.

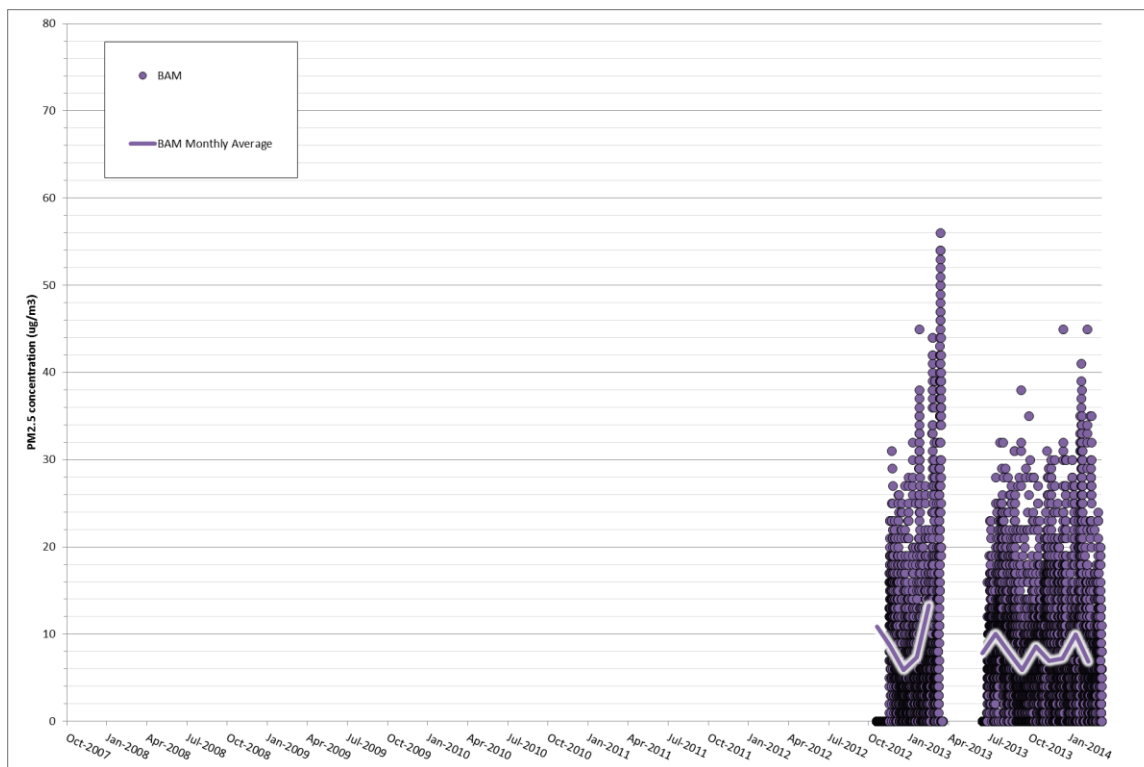


Figure 13: Time series of hourly and monthly average fine particulate matter concentrations as measured at Red Deer Lancaster station from October 2007 to May 2014.

2.3.Caroline

Observed concentrations of fine particulate matter at Caroline monitoring station were somewhat variable through the period of October 2007 to May 2014 (Figure 14). In general, observed concentrations were much lower at Caroline monitoring station than at Red Deer Riverside (Figure 14). Periodic increases in fine particulate matter concentrations were observed to occur during the summer months and can largely be attributed to forest fires. Wintertime concentrations were typically very low. Due to the overall low concentrations of fine particulate matter observed at Caroline monitoring station, particularly during the wintertime when concentrations at Red Deer Riverside monitoring station are high, no further discussion of the observations from this station will be included in the science report.

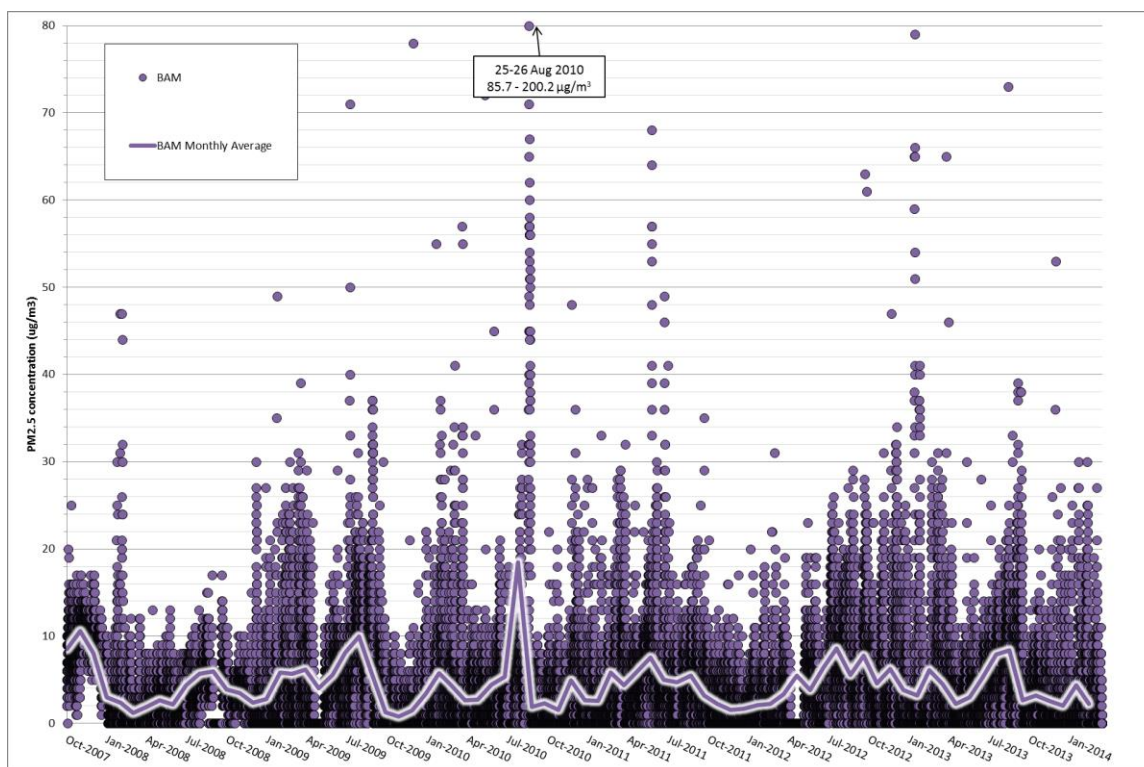


Figure 14: Time series of hourly and monthly average fine particulate matter concentrations as measured at Caroline monitoring station from October 2007 to May 2014. Note: Data presented between September 2009 and July 2013 were rounded to the nearest integer to match the rounding methods used throughout the rest of the period.

3. Discussion

The following discussion attempts to characterize the circumstances driving the exceedance of the Canada-wide Standards at Red Deer Riverside monitoring station. Three main discussion topics were derived from a series of investigative questions developed internally by Alberta Environment and Parks. The development of investigative questions was informed by an interest in exploring variables expected to impact fine particulate matter concentrations as well as to address specific questions raised by stakeholders. These discussions focus primarily on the observations from Red Deer Riverside monitoring station but also draw upon other data where appropriate. The following three topics form the body of the discussion:

Measurement of Particulate Matter (Section 3.1)

This discussion focuses on the methodologies used in the continuous measurement of fine particulate matter in the ambient atmosphere. Different technologies have been used at Red Deer Riverside monitoring station over time and the associated methods used may have implications on the measured concentrations.

Influence of Meteorology (Section 3.2)

This discussion focuses on the influence of meteorological variables on the observed fine particulate matter concentrations at Red Deer Riverside monitoring station.

Evidence of secondary particulate matter and potential sources (Section 3.3)

This discussion focuses on the fact that with currently available information is not possible to confirm whether the observed fine particulate matter concentrations are predominantly primary or secondary fine particulate matter. Without this information, the determination of which source sectors are contributing most strongly to the observed fine particulate matter concentrations is impaired. Discussions of a number of smaller investigations form the body of this section. These topics include the exploration of multi-station fine particulate matter events and the impact of traffic from nearby roadways. The evidence presented points to the formation of secondary fine particulate matter as a key driver of fine particulate matter concentrations in the Red Deer area.

3.1.Measurement of Particulate Matter

Red Deer Riverside monitoring station has been measuring fine particulate matter concentrations since 2001. During the period of time spanning its operation to date, monitoring technology for fine particulate matter has improved and as such, instrumentation changes have been made twice at Red Deer Riverside monitoring station, once in 2009 and again in 2013. As noted in section 1.1, Red Deer Riverside monitoring station was identified as having exceeded the Canada-wide standard for fine particulate matter in the 2009-2011 Clean Air Strategic Alliance Particulate Matter and Ozone Management Framework assessment (AESRD, 2013). This assessment coincides with the adoption of a new monitoring method and instrument at Red Deer Riverside monitoring station as well as the previously identified step-change in fine particulate matter concentrations observed in May 2009. It is important to characterize the differences between the monitoring technologies that have been used at Red Deer Riverside monitoring station in order to understand their potential contribution to variations in observed fine particulate matter concentrations over time.

Table 1: History and technical details of fine particulate matter monitoring equipment at Red Deer Riverside station.

Instrument	Measurement Method	Monitoring period
TEOM SES	Tapered Element Oscillating Micro-balance with Sample Equilibrium System <i>Inlet temperature: 40°C</i>	2001 – May 12 2009
TEOM FDMS	Tapered Element Oscillating Micro-balance with Filter Dynamics Measurement System	<i>Used for reporting:</i> May 12 2009 – August 13 2013 <i>Co-located measurement:</i> August 13 2013 – April 2015
SHARP 5030	Nephelometry calibrated via Beta Attenuation <i>Inlet temperature: Variable according to Relative Humidity</i>	August 13 2013 - Present

3.1.1. Monitoring Principles of Operation and Rationale for Analyzer Upgrades at Red Deer Riverside Station

Until 2009 the Tapered Element Oscillating Microbalance Sample Equivalent System (TEOM-SES) fine particulate matter monitor operated at the Red Deer Riverside monitoring station. This technology utilizes an oscillating microbalance to continuously measure particulate matter mass accumulation while known quantities of air are drawn over the microbalance; particulate matter concentration is then calculated from the particulate mass and volume of air collected during each sample interval. Particulate bound water is driven off with a heated inlet prior to measurement to enable characterization of the true “dry” particulate mass and to reduce instrument maintenance associated with excess moisture. Research conducted by the instrument manufacturer and others, intended to determine the efficacy and representativeness with which the instrument measures the sum of the various fine particulate matter species, concluded that the heated inlet was affecting measurements. The heated inlet, intended to drive off only particulate bound water, was also determined to be systematically volatilizing some of the fine particulate matter species present in the atmosphere, resulting in a lower measured particulate mass than is actually present in the ambient atmosphere. The species most easily volatilized as a result of the heated inlet were found to be the relatively volatile ammonium nitrate and organic matter species; both common secondary fine particulate matter species. Various adjustments have been attempted by the instrument manufacturer, over time, to lower the inlet temperature to a level that would avoid volatilizing the volatile fine particulate matter species. However, regardless of temperature (temperatures were lowered from the original design of the instrument at 50°C to 40°C and ultimately 30°C) some degree of losses were still apparent. The TEOM SES instrument at Red Deer Riverside was operated with an inlet temperature of 40°C. In order to better account for the volatile species lost to the older TEOM-SES technology, a new inlet heating methodology, titled the Filter Dynamics Measurement System (FDMS), was integrated into the TEOM analyzer giving rise to the TEOM-FDMS fine particulate matter monitor. In short, the problem of lost volatile species was solved by the FDMS. Two different particle mass concentration measurements are performed by the Tapered Element Oscillating Microbalance sensor: a base measurement of the incoming ambient air heated to 30°C as would occur

in a TEOM-SES instrument and a reference measurement of the ambient air stripped of volatile particulates by a filter chilled to 4°C. The difference in masses measured by the Tapered Element Oscillating Microbalance is therefore equivalent to total mass of volatile and non-volatile particulates in the ambient atmosphere. On May 12, 2009, a Tapered Element Oscillating Microbalance Filer Dynamics Measurement System (TEOM-FDMS) instrument was installed at Red Deer Riverside to replace the outdated TEOM-SES instrument that had been in operation at the station since 2001. No subsequent measurements were made with the TEOM-SES at Red Deer Riverside

Difficulties maintaining reliable operation of TEOM-FDMS instruments has led to the adoption of more reliable particulate matter monitoring instruments within the Province of Alberta since 2009. Challenges with TEOM-FDMS instruments include large hour-to-hour swings in reported concentrations, substantial numbers of hours lost due to negative values, high maintenance hours (affecting overall station up-time), and high cost of replacement and consumable parts. The US EPA has recognized a number of fine particulate matter instruments that are able to account for volatile species of fine particulate matter as being Federal Equivalency Method equivalent (US EPA 2014). One of the recognized instruments, the Synchronized Hybrid Ambient Real-time Particulate (SHARP) 5030 instrument was selected to replace the TEOM-FDMS at Red Deer Riverside station in 2013. In brief, the SHARP 5030 instrument utilizes nephelometry (a type of photometry method which measures light scatter from particulates) to measure particulate concentration in real time. The nephelometric measurements are continuously calibrated with a synchronized beta attenuation sensor (this method uses a filter tape to collect particulates over a given period of time; the degree to which particulates attenuate (block) beta rays from a radioactive source is strongly correlated to ambient concentration). The SHARP 5030 instrument began operation on August 1, 2013 and continues in operation to present. While no longer used for ambient concentration reporting the TEOM-FDMS remained in operation at Red Deer Riverside monitoring station until April 2015. This was implemented in an effort to determine whether there are notable differences between the concentrations reported by the TEOM-FDMS and the SHARP 5030 instruments at Red Deer Riverside monitoring station. The availability of a substantial set of co-located measurements allows for the characterization of the comparability of the two measurement techniques (TEOM-FDMS vs SHARP 5030) with respect to the concentrations measured at Red Deer Riverside monitoring station.

3.1.2. Comparability of Fine Particulate Matter Monitoring Technologies Used at Red Deer Riverside

Differences in the analytical methods of various fine particulate matter monitoring instruments are known (e.g. TEOM-SES vs TEOM FDMS) to have an effect on the concentrations measured by these instruments. For this reason detailed investigations into the impact of changes in instrumentation on the measured fine particulate matter concentrations at Red Deer Riverside monitoring station have been conducted by the Parkland Airshed Management Zone and Alberta Environment and Parks. The Parkland Airshed Management Zone tasked NOVUS Environmental in 2012 to examine observed fine particulate matter concentrations at Red Deer Riverside monitoring station during the period of 2008-2011 and characterize the effect that instrument changes, among other factors, may have had on the data (NOVUS Environmental, 2012). Alberta Environment and Parks further explored the fine particulate

matter data from Red Deer Riverside monitoring station (including co-located TEOM-FDMS and SHARP 5030 measurements) as well as additional co-located measurements made at Edmonton McIntyre monitoring station (co-located measurements between a TEOM-SES and TEOM-FDMS instrument).

3.1.2.1. Parkland Airshed Management Zone NOVUS Environmental Report

NOVUS Environmental compiled fine particulate matter concentration data from 2008 to 2011 at Red Deer Riverside monitoring station (NOVUS Environmental, 2012). They analyzed the data utilizing hourly, daily, monthly, and annual averaged concentrations by comparing measurements prior to the adoption of TEOM-FDMS to the measurements after the adoption of TEOM-FDMS. Other pollutants such as oxides of nitrogen, volatile organic compounds, and carbon monoxide were also analyzed to understand any trends in the historical data.

Figure 15 shows a normalized comparison (all measurements scaled relative to the 2008 annual average of each respective pollutant) of monthly fine particulate matter concentrations during the periods before and after the 2009 switch in analyzer technologies. Following the adoption of TEOM-FDMS, fine particulate matter concentrations increased drastically, by an approximate factor of 2.5 greater than 2008 measurements (Figure 15). Additionally, following the adoption of TEOM-FDMS observed concentrations underwent strong seasonal variations to as much as 6.5 times greater than peak 2008 measurements (Figure 15). Seasonal patterns as observed with TEOM-FDMS measured concentrations, indicated that concentrations are highest, and most different from TEOM-SES measured concentrations, in the wintertime (approximately from October to March; Figure 15). During the rest of the year concentrations are lower and the difference between TEOM-SES and TEOM-FDMS measurements are smaller, however TEOM-FDMS measured concentrations remain a factor of 2 greater (Figure 15). There was no significant seasonal pattern observed for fine particulate matter concentrations as measured by TEOM-SES prior to 2009, suggesting that the concentrations measured by TEOM-SES did not vary significantly between seasons (NOVUS Environmental, 2012).

The NOVUS Environmental report also compared the seasonal variation for other pollutants (NOVUS Environmental, 2012). Carbon monoxide and oxides of nitrogen were selected due to their association with emission sources in the City of Red Deer (e.g. transportation emissions from the nearby Riverside Drive) and both showed strong seasonal patterns (Figure 15). Higher concentrations were observed in the winter and lower concentrations were observed throughout the rest of the year (Figure 15). These seasonal variations were similar to the seasonal trend observed for fine particulate matter measured with TEOM-FDMS, however there was no appreciable difference in the magnitude of the variations of the other pollutants during the period before or after May 2009 (Figure 15). Seasonal variations in volatile organic compound concentrations were also consistent year to year (Figure 15). The fact that seasonal variations for carbon monoxide, oxides of nitrogen and volatile organic compounds, did not differ substantially from before 2009 to the period after suggests that a systematic difference in measured concentrations was limited to fine particulate matter measurements; only fine particulate matter underwent a change in instrumentation during this period. Therefore the report concluded that fine particulate matter concentrations were affected by the change in monitoring technology (NOVUS Environmental, 2012). Whether the entire increase in measured concentrations was associated with the

instrumentation change or due to other factors is also discussed within this report and is detailed in section 3.3.

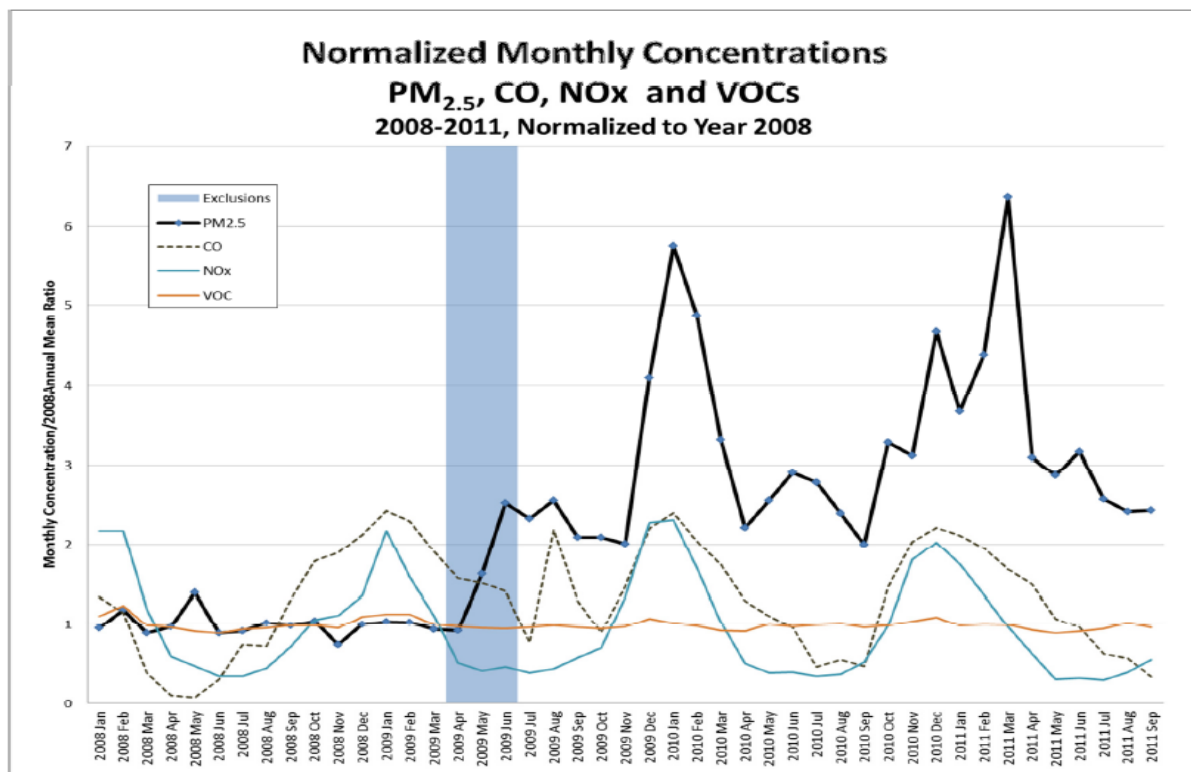


Figure 15: Normalized monthly concentrations for PM_{2.5}, CO, NO_x, and VOCs. The normalization is based on 2008 annual concentrations. For example, if the normalized concentration equals 1, the real monthly concentration is the same as the 2008 annual mean concentration. Forest fire related particulate matter spike values were removed in August 2010. The blue section indicates the period the TEOM FDMS was installed and the Civic Yard was phased in.

3.1.2.2. *Alberta Environment and Parks Investigation*

The results of the NOVUS report, identifying the presence of previously unobserved seasonal patterns after the adoption of TEOM-FDMS, in addition to the substantial step-change in hourly concentrations noted in May 2009, highlighted the need for an investigation comparing the measurement technologies utilized at Red Deer Riverside monitoring station. Specifically higher fine particulate matter concentrations observed via TEOM-FDMS in the winter, as compared to TEOM-SES, suggests that this technology better characterizes some aspect of the particulate matter speciation that was previously not measured by TEOM-SES; a species likely comprising a large portion of wintertime fine particulate matter.

Unfortunately there were no collocated measurements (measurements taken by both instruments at the same location at the same time) available from Red Deer Riverside monitoring station for TEOM-SES and TEOM-FDMS, making it difficult to characterize any systematic impacts that the analyzer change may have had on the observed concentrations. However, co-located measurements with TEOM-SES and TEOM-FDMS are available from Edmonton McIntyre monitoring station. Edmonton McIntyre station is located in South Edmonton and has operated co-located TEOM-SES and TEOM-FDMS instruments since

November 2006. The TEOM-FDMS is identical to that used at Red Deer Riverside monitoring station, however the TEOM-SES utilizes an inlet temperature of 30°C, lower than the inlet temperature of 40°C utilized by the TEOM-SES at Red Deer Riverside monitoring station. These data were explored in detail to contextualize the impacts expected from the instrument change at Red Deer Riverside monitoring station.

As noted in section 3.1.1, approximately a year and a half of co-located SHARP-5030 and TEOM-FDMS measured concentrations were made at Red Deer Riverside monitoring station. These data were utilized to contextualize the differences in these two Federal Equivalency Method recognized instruments and discuss the potential systematic impacts on the data resulting from the instrument change to SHARP-5030 in August 2013.

In order to determine the comparability of monitoring methods and characterize any systematic changes as a result (specifically between TEOM-SES vs TEOM-FDMS, and TEOM-FDMS vs SHARP-5030) both sets of co-located data were compared in an identical manner. Linear regressions (a slope of 1 and y-intercept of 0 indicating representative monitoring techniques) were used to compare each set of co-located data using three metrics. Hourly concentrations were compared to characterize instantaneous instrument response to fine particulate matter concentrations. Twenty four hour averaged concentrations were also compared to characterize broad comparability between methods by averaging over hour to hour differences. Lastly data above the 98th percentile of twenty four hour averages were compared in an effort to characterize the events with the highest fine particulate matter concentrations; the 98th percentile of twenty four hour averages was used in reporting for against the Canada-wide standards and will be used in reporting for the Canadian Ambient Air Quality Standards.

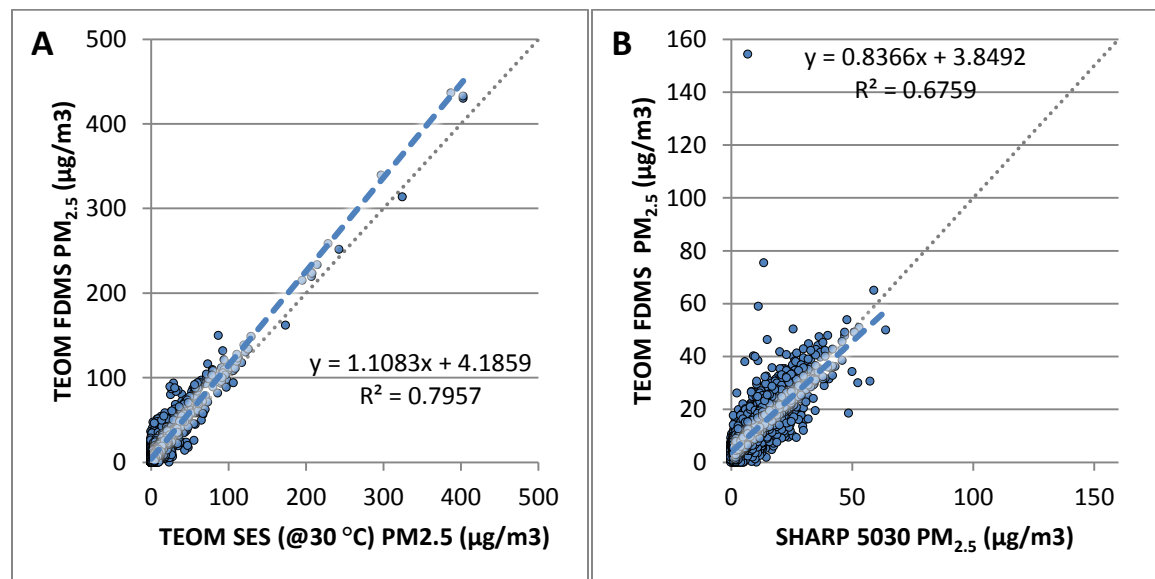


Figure 16: A) Comparison of TEOM-FDMS versus TEOM-SES @ 30 Celsius hourly PM_{2.5} concentration measurements at Edmonton McIntyre monitoring station during 2008-2011. B) Comparison of SHARP-5030 versus TEOM-FDMS hourly PM_{2.5} concentration measurements at Red Deer Riverside monitoring station during 2013-2015

Linear regressions of hourly fine particulate matter concentrations as measured by TEOM-SES versus TEOM-FDMS (Figure 16A) and SHARP-5030 versus TEOM-FDMS (Figure 16B) indicate that these instruments respond slightly differently to concentrations in the ambient air. These differences are distinct and the relationship between the instrument pairs can be used to indicate what systematic effects may be expected from changes between analyzers. Both co-located pairings failed, to some degree, to respond to the same ambient concentrations with identical measured concentrations (as indicated by an R^2 value less than 1). The SHARP-5030 versus TEOM-FDMS (Figure 16B) had a somewhat poorer reproduction of ambient concentrations than the TEOM-SES versus TEOM-FDMS pairing (Figure 16A). The poorer apparent performance of the SHARP-5030, as determined by R^2 value may be exacerbated by the measurement technique used by this instrument which is entirely different than that used in the TEOM-FDMS; the TEOM-SES and TEOM-FDMS share the same basic analysis method with different sample pre-treatments.

Both co-located pairings have linear regressions with slopes that trend away from 1, indicating a systematic bias in concentrations with one measurement method consistently either under-reporting or over-reporting the ambient concentration. However, the slope cannot be discussed in isolation, because at y-intercept is significant at the typical concentrations measured at Red Deer Riverside monitoring station. With respect to the TEOM-SES versus TEOM-FDMS (Figure 16A), the slope of 1.1 indicates that TEOM-FDMS measurements are consistently larger than the equivalent TEOM-SES measurements and that the difference in reported concentrations between these two instruments is larger at higher ambient concentrations. Additionally the y-intercept of 4.2 indicates that there is a systematic bias between measurements, with the TEOM-FDMS reading, on average $4.2 \mu\text{g}/\text{m}^3$, higher than the TEOM-SES. These observations are consistent with the methodological differences between the two instruments; that is that the TEOM-FDMS captures more volatile species than the TEOM-SES, and that these volatile species make up a higher composition of fine particulate matter on days with the highest total concentrations of fine particulate matter. This observation is also similar in magnitude to the step-change observed at Red Deer Riverside monitoring station between the reporting of fine particulate matter concentrations by TEOM-SES to the reporting by TEOM-FDMS. Therefore, the observed change in fine particulate matter concentrations during the change in analyzers at Red Deer Riverside monitoring station may have been almost entirely driven by the systematic change in analyzers.

With respect to the SHARP-5030 versus TEOM-FDMS comparison (Figure 16B), the slope of 0.84 indicates that TEOM-FDMS measurements are consistently smaller than the equivalent SHARP-5030 measurements. It also indicates that the difference in reported concentrations between these two instruments is larger at higher ambient concentrations. However, the magnitude of the y-intercept, of 3.8, places the linear regression in an interesting position with respect to ambient concentrations. The linear regression suggests that ambient concentrations of $23.6 \mu\text{g}/\text{m}^3$ will be measured identically by both instruments. Higher concentrations would be reported via SHARP-5030 above this value and higher concentrations would be reported via TEOM-FDMS below this value. While the concentration differences are substantial, the overall positioning of the linear regression suggests that at higher concentrations the SHARP-5030 reports equivalent or slightly larger fine particulate matter concentrations than the TEOM-FDMS, indicating equivalent, or perhaps better, capture of volatiles.

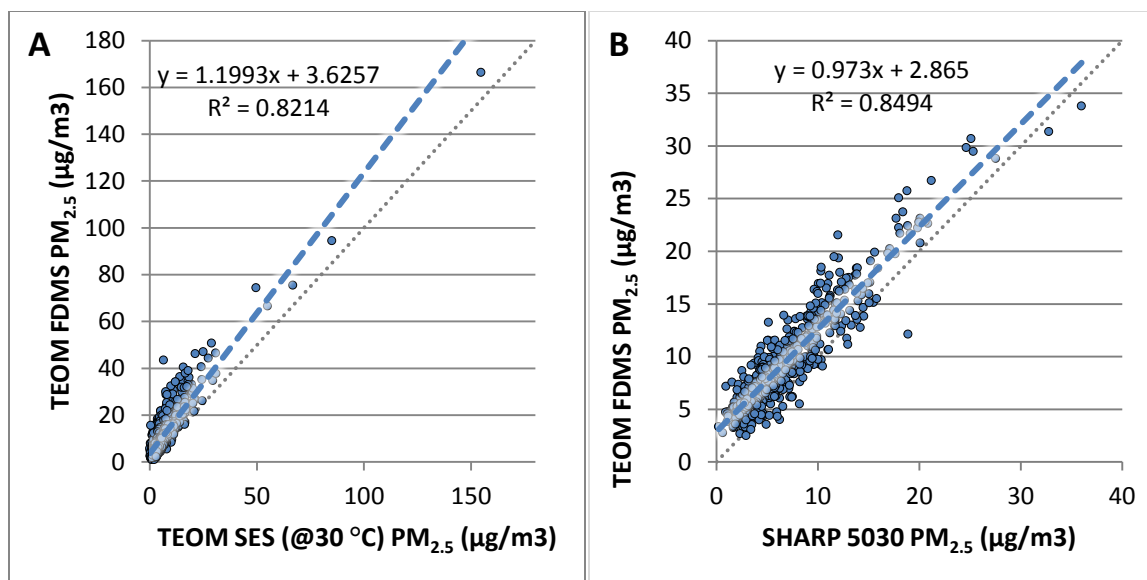


Figure 17: A) Comparison of TEOM-FDMS versus TEOM @ 30 Celsius twenty hour average PM_{2.5} concentration measurements at Edmonton McIntyre monitoring station during 2008-2011. B) Comparison of SHARP-5030 versus TEOM-FDMS twenty hour average PM_{2.5} concentration measurements at Red Deer Riverside monitoring station during 2013-2015

Linear regressions of twenty four hour averaged TEOM-SES versus TEOM-FDMS (Figure 17A) and SHARP-5030 versus TEOM-FDMS (Figure 17B) measurements indicate that the averaged measurements reported by these instruments systematically differ from the regressions of the hourly data, indicating that averaging has a significant effect on the data. Both twenty four hour averaged co-located pairings had similar R^2 values that were larger than the equivalent hourly comparisons. Part of this improvement is most likely related to the fact that averaging removes some of the hour to hour variation between instruments.

The linear regression for the twenty four hour TEOM-SES versus TEOM-FDMS (Figure 17A) pairing was similar to the linear regression for the hourly data, with a slope greater than 1 and a positive intercept. Most importantly however, the slope for the twenty four hour data was 1.2, which is steeper than that for the hourly data indicating that on days with higher concentrations the TEOM-FDMS reported concentrations are 20% larger than those measured by TEOM-SES.

The linear regression for the twenty four hour SHARP-5030 versus TEOM-FDMS (Figure 17A) pairing was different in comparison to the linear regression for the hourly data, with a slope very close to 1 and a smaller positive intercept. This indicates that on a twenty four hour average basis, the SHARP-5030 responds nearly equivalently to the TEOM-FDMS across all ambient concentrations. However the magnitude of the y-intercept suggests that the resultant concentrations as measured by the SHARP-5030 are typically 2.9 µg/m³ smaller than those measured by the TEOM-FDMS. This apparent systematic bias towards smaller concentrations as measured by SHARP-5030 on a twenty four hour basis could be the result of the higher measurement of fine particulate matter by TEOM-FDMS at lower concentrations; hourly concentrations below 23.6 µg/m³ comprising the vast majority of the dataset. Therefore, as the new annual average Canadian Ambient Air Quality Standard takes these lower concentrations into account, it is expected that the bias observed between the TEOM-FDMS and the

SHARP-5030 via the twenty four hour regression will be similar for the annual averages calculated. It is likely that there will be some systematic bias between the annual average Canadian Ambient Air Quality Standards calculated with TEOM-FDMS observations versus SHARP-5030 observations, with the expected tendency for SHARP-5030 derived calculations to be less than those calculated with TEOM-FDMS.

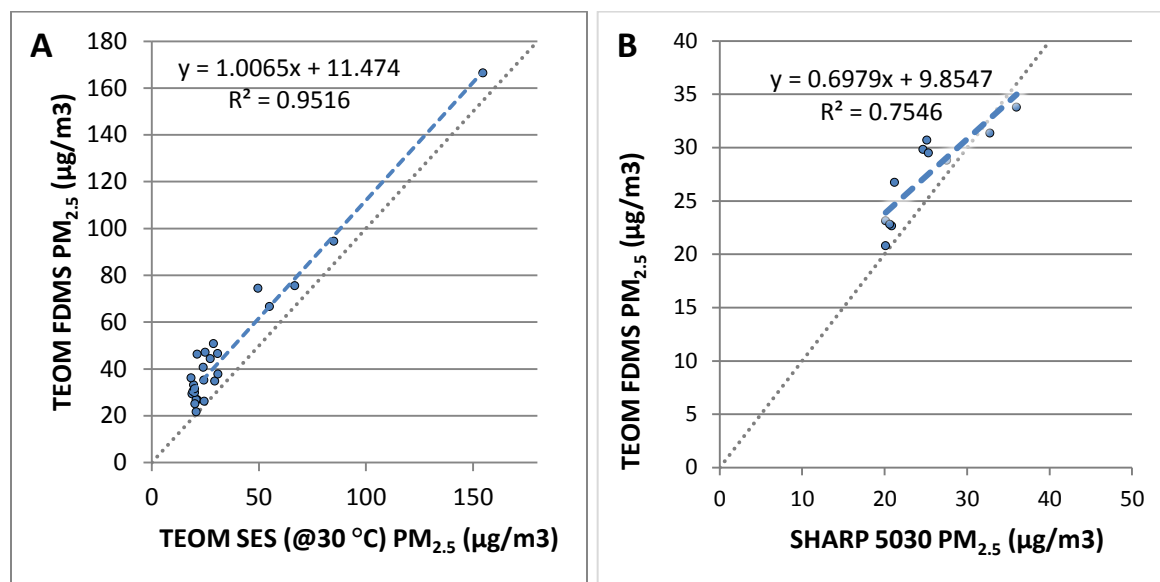


Figure 18: A) Comparison of 24 hour average $PM_{2.5}$ measurements greater than the 98th percentile as measured by collocated TEOM-FDMS and TEOM-SES (@ 30 Celsius) instruments at Edmonton McIntyre monitoring station during 2008-2011. B) Comparison of 24 hour average $PM_{2.5}$ measurements greater than the 98th percentile as measured by collocated SHARP-5030 and TEOM-FDMS instruments at Red Deer Riverside monitoring station during 2013-2015.

Linear regressions of twenty four hour averaged TEOM-SES versus TEOM-FDMS (Figure 18A) and SHARP-5030 versus TEOM-FDMS (Figure 18B) measurements above the 98th percentile indicate that the highest averaged measurements reported by these instruments systematically differ from the remainder of the averaged concentrations.

The twenty four hour averaged concentrations greater than the 98th percentile comparison of co-located TEOM-SES versus TEOM-FDMS (Figure 18A) was highly linear with a slope of 1 and R^2 of 0.95. Therefore the response between these instruments on an averaged basis is very similar across all high concentration days. However a substantial y-intercept suggests that on average days with high fine particulate matter concentrations are measured 11.5 $\mu g/m^3$ less by the TEOM-SES than the TEOM-FDMS. The implication of this difference is that on the days with the highest fine particulate matter concentrations (greater or equal to the 98th percentile) the TEOM-SES measurements are not accounting for approximately 30% of the particulate mass measured by the TEOM-FDMS.

The twenty four hour averaged greater than the 98th percentile comparison of co-located SHARP-5030 versus TEOM-FDMS (Figure 18B) was similar to the results for hourly data, however with a shallower slope and a larger y-intercept. Similar to the hourly comparison, the slope and y-intercept places the linear regression in an interesting position with respect to ambient concentrations. The linear regression

suggests that ambient concentrations of $32.6 \mu\text{g}/\text{m}^3$ will be measured identically by these instruments with higher concentrations being reported via SHARP-5030 above this value. Fine particulate matter concentrations can be expected to be measured higher by TEOM-FDMS than by SHARP-5030 below this value. The 98th percentile of twenty four hour average Canadian Ambient Air Quality Standard is set at $28 \mu\text{g}/\text{m}^3$ between 2015 and 2020. Previous assessments of fine particulate matter at Red Deer Riverside monitoring station under the Canada-wide standards (achievement is based on the same 98th percentile of twenty four hour averages metric) have placed the 3 year average of this metric at 11.7-31.4 $\mu\text{g}/\text{m}^3$. Therefore, adoption of SHARP-5030 technology may result in a systematic reduction in observed 98th percentile values. It is important to note that less data were available for the comparison of SHARP-5030 versus TEOM-FDMS than for TEOM-SES versus TEOM-FDMS (10 versus 26 data points).

3.1.3. Implications of the adoption of FEM analyzers on the measurement of $\text{PM}_{2.5}$

Federal Equivalency Method fine particulate matter monitors clearly measure higher fine particulate matter concentrations than co-located non-federal equivalency method monitors. The tendency for the difference between federal equivalency method and non-federal equivalency method analyzers to vary seasonally suggests that federal equivalency method analyzers capture some species of fine particulate matter more effectively and that those species vary in concentration seasonally. The speciation of fine particulate matter concentrations in Alberta is measured at Edmonton McIntyre on a regular basis (every third day). These data were analyzed in the Capital Region Fine Particulate Matter Science Report (AESRD, 2015) for the period between 2006 and 2011, and the results are summarized below.

Significant seasonal differences in the atmospheric speciation of fine particulate matter were observed. Figure 19 shows that on average, the fine particulate matter mass was higher in the colder season (October-March) than the warmer season (April-September). A closer analysis of the cold season event days (event days were defined as twenty four hour averages $> 20 \mu\text{g}/\text{m}^3$), those periods with the biggest differential between non-federal equivalency method and federal equivalency method analyzers reveals that ammonium nitrate and organic matter are the two most prominent components (accounting for 66% of the total fine particulate mass; Figure 20) of the fine particulate matter mass. Volatile fine particulate matter species are liable to be volatilized in non-federal equivalency method analyzers, of which ammonium nitrate and organic matter are most susceptible (Wilson et al., 2002). Therefore it is likely that the increase in concentrations observed with federal equivalency method analyzers is directly related to the ability of these instruments to better account for the volatile fractions of secondary particulate matter which comprise the majority of fine particulate matter mass on high concentration days; this is particularly true for the most volatile specie ammonium nitrate, which, in Edmonton, accounts for nearly half of the fine particulate matter mass on high concentration days.

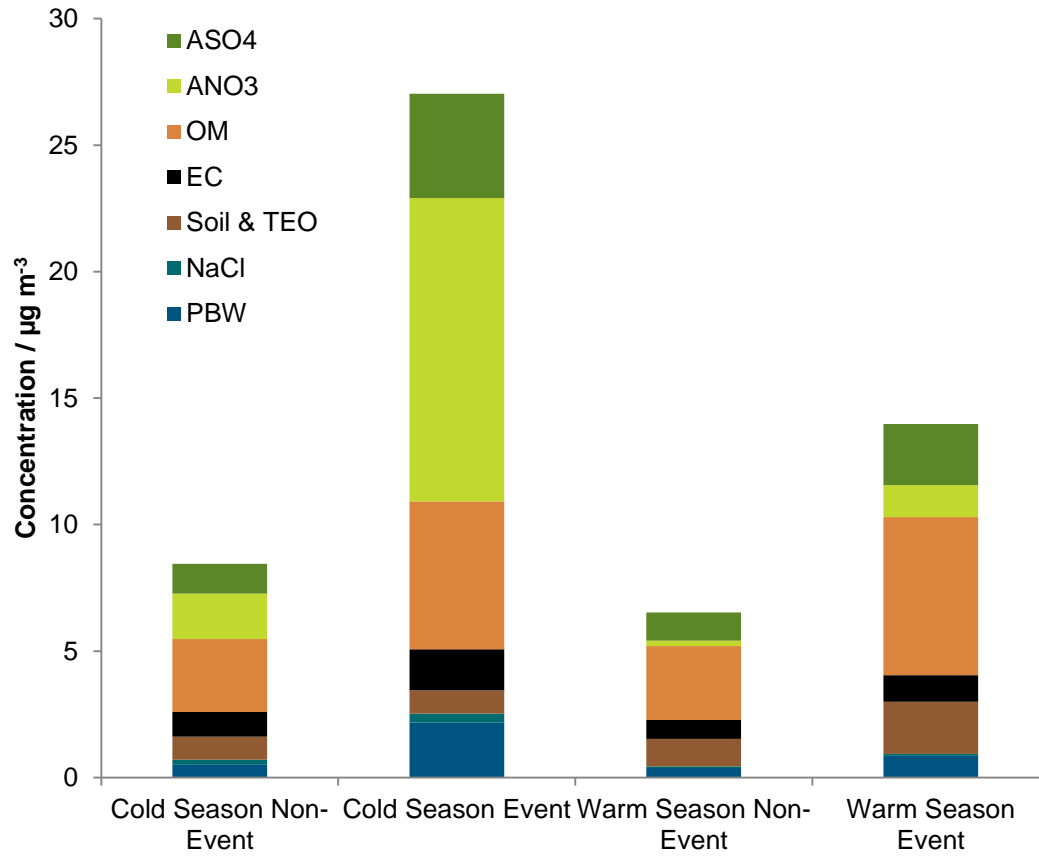


Figure 19: Speciation of PM_{2.5} concentrations for non-event days (24 hour average <20 ug/m³) versus event days (24 hour average >20 ug/m³) in the cold (October-March) and warm seasons (April-September) at Edmonton McIntyre monitoring station (2006-2011). (ASO₄ – Ammonium sulphate, ANO₃ – Ammonium nitrate, OM – organic matter, EC – Elemental carbon, Soil & TEO – Soil particles and Trace elements, NaCl – Salt particulates, PBW – Particle bound water)

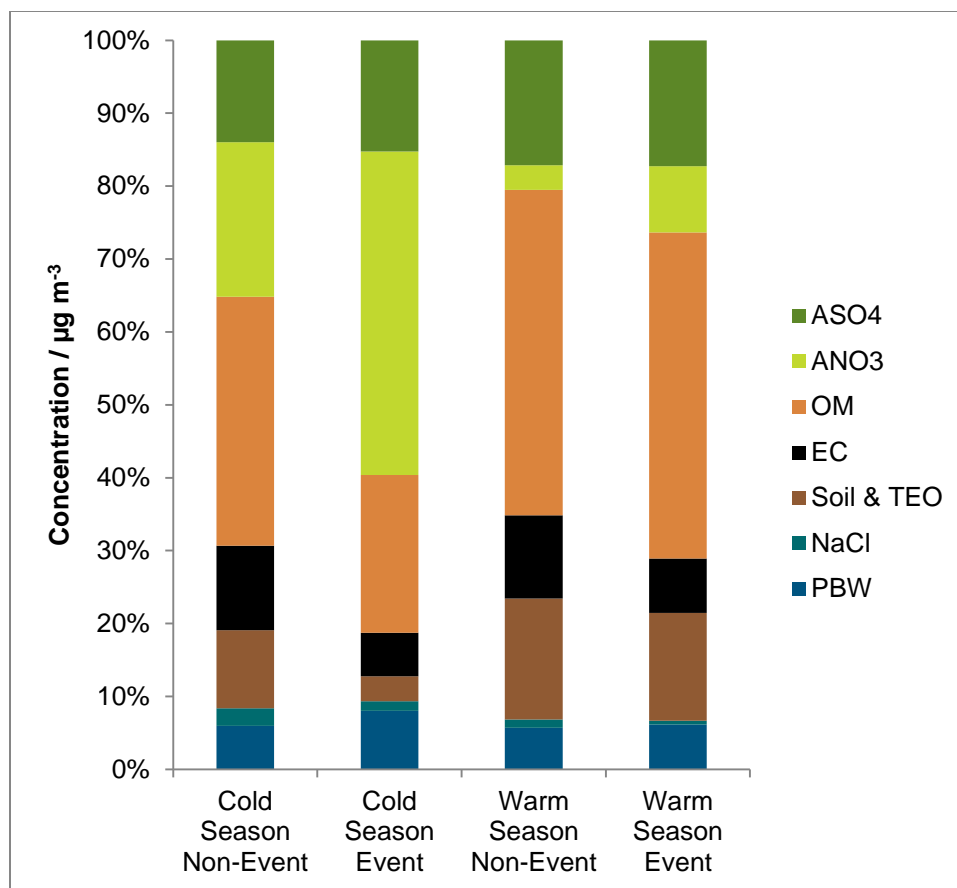


Figure 20: Speciation of $PM_{2.5}$ as a percentage of total particulate mass for non-event days (24 hour average $<20 \mu g/m^3$) versus event days (24 hour average $>20 \mu g/m^3$) in the cold (October-March) and warm seasons (April-September) at Edmonton McIntyre monitoring station (2006-2011). (ASO4 – Ammonium sulphate, ANO3 – Ammonium nitrate, OM – organic matter, EC – Elemental carbon, Soil & TEO – Soil particles and Trace elements, NaCl – Salt particulates, PBW – Particle bound water)Influence of meteorology

Taken in the context of Red Deer Riverside monitoring station, the similar magnitude of the step change in concentrations, after the adoption TEOM-FDMS technology, to the differences observed in the Edmonton McIntyre monitoring station co-located TEOM-SES versus TEOM-FDMS comparison, suggests that a significant component of the ambient fine particulate matter species were being lost due to volatilization. Adoption of a federal equivalency method analyzer at Red Deer Riverside monitoring station therefore had a significant impact on the observed fine particulate matter concentrations, potentially contributing almost fully to the observed step change in fine particulate matter concentrations in May 2009. With respect to the composition of fine particulate matter at Red Deer Riverside monitoring station, the observation of seasonality in the TEOM-FDMS measured concentrations suggest that volatile species are present in larger quantities in the winter than in the summer. Given the precursor emissions in the vicinity of the City of Red Deer, the volatile species likely to be present in the atmosphere are ammonium nitrate and to some extent volatile organics. This would be similar to the speciation observed in Edmonton. The observational evidence indicates that the high wintertime fine particulate matter concentrations that impact Red Deer Riverside monitoring station are largely composed of secondary fine particulate matter.

Into the future, the use of a SHARP-5030 monitor at Red Deer Riverside monitoring station is unlikely to have as substantial an impact on observed concentrations as the previous change to TEOM-FDMS due to the relative reproducibility of these instruments at high fine particulate matter concentrations. In terms of future assessment against the CAAQS (Annual average and 3 year 98th percentile 24 hour average), the relative differences in collocated measurements between TEOM-FDMS and SHARP-5030 at Red Deer Riverside monitoring station, in the range typical of ambient concentrations in the City of Red Deer (~10ug/m³ annual average, ~30 ug/m³ 98th percentile), may have a systematic impact on these assessments. Specifically, the SHARP-5030 analyzer was observed to record lower concentrations than the TEOM-FDMS at concentrations in the range reported in previous Clean Air Strategic Alliance Particulate Matter and Ozone Management Framework assessments, putting some degree of negative pressure on the assessed metrics. This difference is not expected to be to the same order of magnitude as the difference between assessed metrics using non-federal equivalency method analyzers.

3.2.Influence of Meteorology

Fine particulate matter concentrations at Red Deer Riverside monitoring station were observed to vary substantially throughout the year. These variations were characterized in order to determine the nature of the variations and hypothesize potential driving mechanisms. The data were analyzed by summarizing the distribution of event days with respect to time and meteorological parameters. Event days were defined as twenty four hour averaged concentrations (midnight-midnight) greater than 19 µg/m³. Dates associated with forest fire smoke were removed from analysis (A total of 14 events were removed with an average concentration of 47 µg/m³). The use of event days for analysis is consistent with the methodology used by the Capital Region Fine Particulate Matter Science Report (AESRD, 2015), updated from 20 µg/m³ to 19 µg/m³ to align with the new Canadian Ambient Air Quality Standards. The number of fine particulate matter events were compared on a monthly basis, with respect to wind speed and with respect to wind direction in order to delineate temporal patterns of fine particulate matter events and the relation of fine particulate matter events to meteorological parameters.

At Red Deer Riverside monitoring station it is evident that non-forest fire related fine particulate matter event days can occur in all seasons, however the majority of event days occur between October and March (Figure 21). There is some variability between years, as to the frequency of non-forest fire related event days, however in all years, the number of events occurring between October and March is greater than the balance of the year (Figure 21). These observations are consistent with the findings of the Capital Region Fine Particulate Matter Science Report (AESRD, 2015). The report concluded that events were more frequent during the colder months due to the seasonal variation of meteorological conditions, such as the increased frequency of temperature inversions during the wintertime.

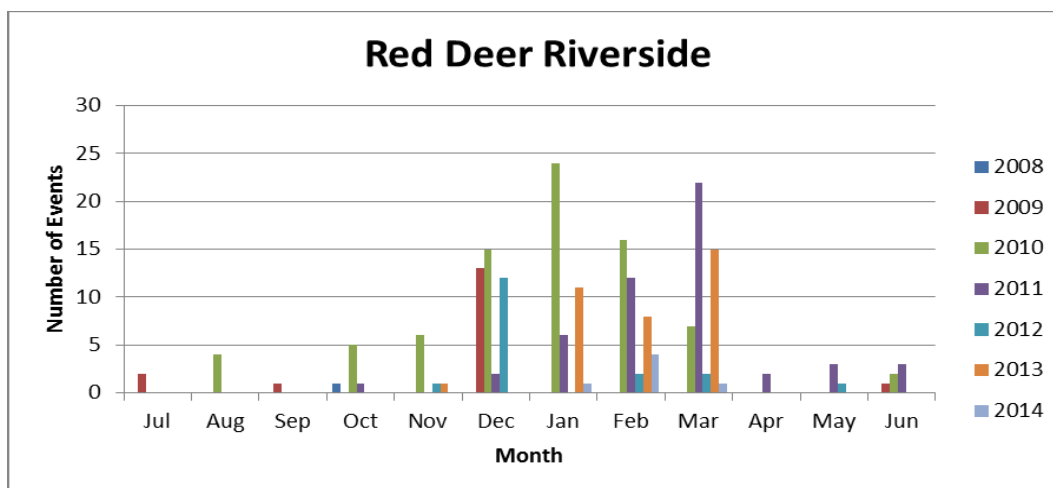


Figure 21: Seasonal distribution of fine particulate matter event days

Fine particulate matter event days are distinctly associated with low to moderate wind speeds (Figure 22). Lower wind speeds inhibit dispersion of fine particulate matter and other pollutant gases. During the wintertime, the period experiencing the highest frequency of fine particulate matter events, lower wind speeds are often associated with temperature inversions in the atmosphere. Temperature inversions occur when cold air is trapped near the surface by a layer of warmer air aloft. This condition prevents air that has been warmed due to daytime heating from rising and mixing, and dispersing pollutants. As mentioned above, the Capital Region Fine Particulate Matter Science Report investigated inversion frequencies throughout the year. It was determined that the frequency of inversions increased from October through March, an observation consistent with the occurrence of fine particulate matter event days (AESRD, 2015). Therefore, the report concluded that mechanisms affecting dispersion, of which temperature inversions are a major contributor, were a major driving force behind fine particulate matter event days in the Capital Region. This conclusion was reached through the analysis of atmospheric soundings collected twice-daily within the Capital Region in conjunction with fine particulate matter concentrations. There are no atmospheric sounding sites within a representative distance of the City of Red Deer, therefore it is not possible to confirm whether the frequency of inversions throughout the year is similar to the Capital Region. However, the seasonal variation of event days and the association of event days with lower wind speeds provides suggests that dispersion limiting mechanisms are driving fine particulate matter events at Red Deer Riverside monitoring station.

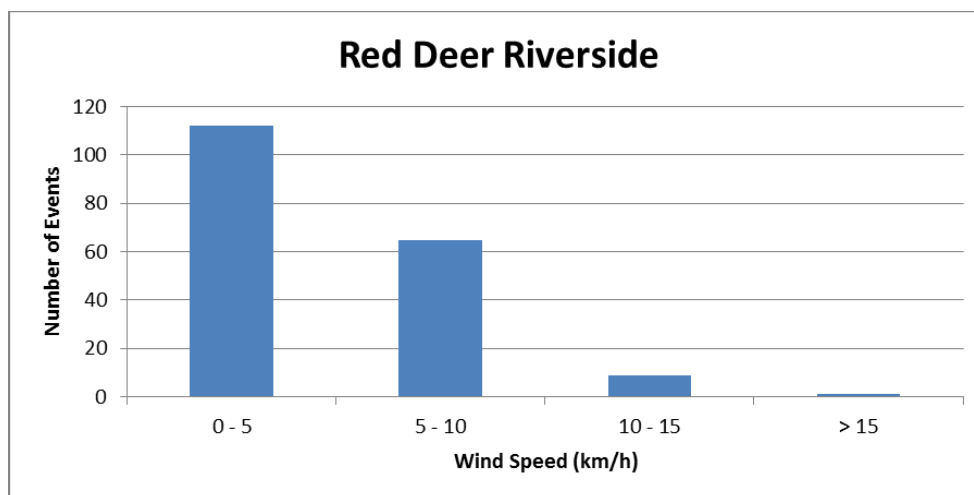


Figure 22: Distribution of fine particulate matter event days with respect to wind speed

Analysis of the wind directions associated with fine particulate matter events at Red Deer Riverside monitoring station indicates that the vast majority of events were associated with southerly wind directions (Figure 23). Often strong associations with specific wind directions may indicate strong impacts from a specific source upwind, however, upwind of Red Deer Riverside monitoring station there is no single large source of fine particulate matter. Additionally, the association of low wind speeds with fine particulate matter event days is problematic as wind direction data becomes more variable at lower wind speeds. Therefore, in the case of Red Deer Riverside monitoring station, the association of fine particulate matter with southerly wind directions is likely related to other phenomenon. One such phenomenon may be topographical channeling, where winds are funneled between prominent topographical features, resulting in a winds constrained to a narrow range of specific directions. The Red Deer River valley, where the Red Deer Riverside monitoring station is located, is a significant linear topographical feature within the City of Red Deer, and as such, some degree of topographic channeling can be expected (Figure 3). The north-south orientation of the Red Deer River valley in the vicinity of Red Deer Riverside monitoring station may be channeling the observed winds and resulting in a dominant direction observed during event days. This association may be exacerbated by other meteorological conditions, such as weather patterns which are likely to result in conditions that limit dispersion.

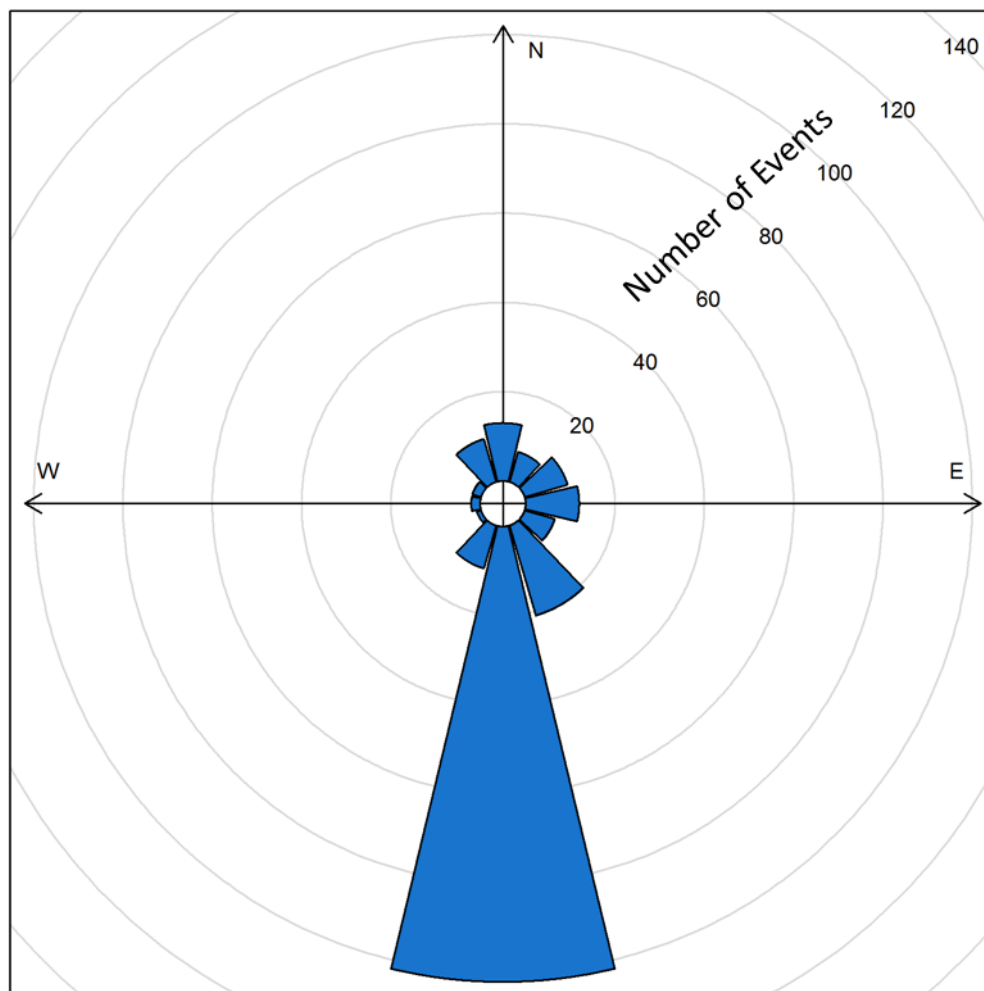


Figure 23: Distribution of event days as observed at Red Deer Riverside monitoring station with respect to wind direction.

The limited available data from monitoring conducted at the Lancaster monitoring station site were analyzed for comparison to the patterns observed at Red Deer Riverside monitoring station. Similar to Red Deer Riverside monitoring station, monitoring from the Lancaster monitoring station site indicated that fine particulate matter events were observed. However, as less than one full year of data are available it is not possible to comment on the seasonality of these events. More data is necessary from Lancaster monitoring station in order to confirm whether the seasonal distribution of events and the association with meteorological information is similar to Red Deer Riverside monitoring station. Lancaster monitoring station became a permanent monitoring station in December 2014, thus a comparison of measurements from all seasons at the Lancaster site will be able to be made in the near future.

3.3.Evidence of secondary particulate matter and potential sources

Since measurements of the ambient fine particulate matter species composition (used to determine the proportions of primary and secondary fine particulate matter species) have not been made at Red Deer Riverside monitoring station, the proportions of primary and/or secondary fine particulate matter measured in Red Deer cannot be confirmed. However, through specific investigations a number of

inferences can be derived, ranging from the contribution of some specific sources to the observed particulate matter concentrations at Red Deer Riverside monitoring station to the potential for fine particulate matter concentrations to be driven by secondary fine particulate matter formation.

3.3.1. Multi-station events: Meteorology and source locations

Fine particulate matter events days frequently occur concurrently at air quality monitoring stations in the Edmonton, Red Deer and Calgary areas during the wintertime (October-March). An example of an extended period of correlated fine particulate matter concentrations at monitoring stations in the Edmonton, Red Deer and Calgary areas is shown in Figure 24. This event, in February-March 2011, was selected as an example of a multi-station event due to the siting of the two Parkland Airshed Management Zone portable air monitoring stations along the transportation corridor between Calgary and Red Deer. Throughout the period shown in Figure 24, changes in twenty four hour averaged fine particulate matter concentrations closely mirror each other at most stations, especially those in Edmonton and Red Deer. In order to show the spatial distribution of observed fine particulate matter concentrations during a multi-station event, observed from February 19, 2011 were mapped (February 19, 2011 marks a peak in fine particulate concentrations at stations in Edmonton, Calgary and Red Deer). In brief, mapping was carried out by plotting the twenty four hour averaged fine particulate matter concentrations, measured on February 19, 2011, from 19 air quality monitoring station within the vicinity of Edmonton, Calgary and Red Deer in ArcGIS (Figure 25). A spatial interpolation, achieved through nearest neighbour interpolation, was then completed to interpolate expected concentrations between stations (see figure caption for details; Figure 25). Similar to that identified in Figure 24, fine particulate matter concentrations were highest in areas of high population density (e.g. within Edmonton, Calgary or Red Deer) with lower concentrations measured outside of these areas (Figure 25). This finding is consistent across multi-station events, that is, fine particulate matter concentrations are highest at stations nearby high concentrations of sources. Therefore it is likely that the presence of an abundance of sources within Edmonton, Calgary and Red Deer, enable the development of events under conducive meteorological conditions. The presence of frequent multi-station events suggests that sources within Edmonton, Calgary and Red Deer are contributing to fine particulate matter events and that these multi-station events are driven by large scale meteorology which influence large areas within similar meteorological conditions.

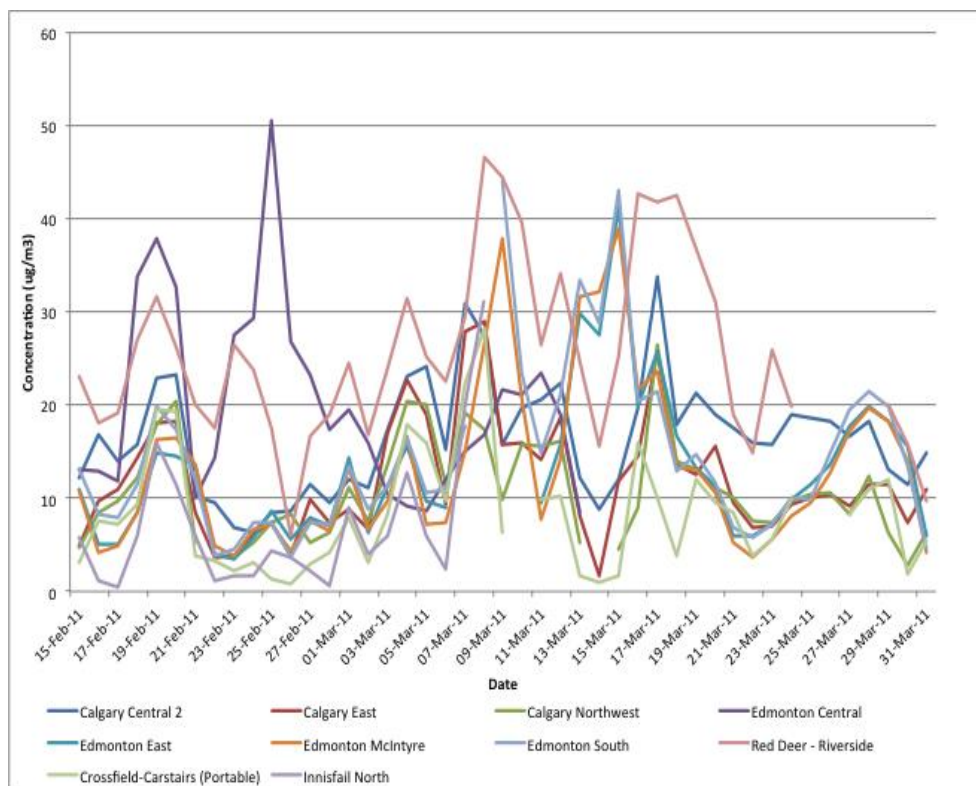


Figure 24: Twenty four hour averaged fine particulate matter concentrations between February 15, 2011 and March 31, 2011 at 10 air quality monitoring stations in Edmonton, Calgary and Red Deer.

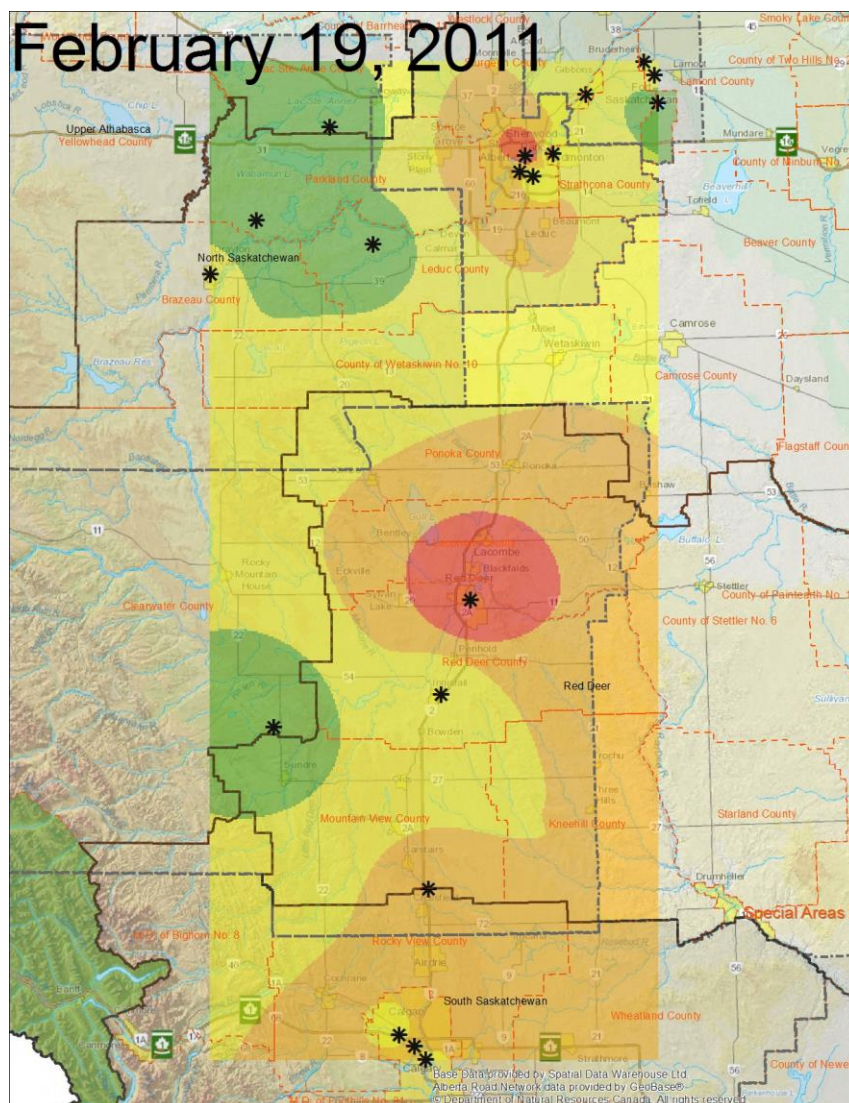


Figure 25: Spatial distribution of fine particulate matter concentrations as measured at air quality monitoring stations in the Edmonton-Calgary corridor on February 19, 2011. Spatial distribution determined by nearest neighbour interpolation, therefore distribution is most accurately defined in areas with a greater density of air quality monitoring stations. Ambient concentrations of fine particulate matter in rural areas away from air quality monitoring stations are most likely over-estimated.

Based on information presented in section 4.1 of the Capital Region Fine Particulate Matter Science Report (AESRD, 2015), regarding the speciation of fine particulate matter on event days in the Capital Region, the majority of fine particulate matter is composed of secondary species. Of the secondary species, ammonium nitrate and organic matter are dominant. An important precursor to ammonium nitrate is nitrogen dioxide. Therefore, while the species composition of fine particulate matter is unknown in Red Deer (due to the fact that it has not been assessed) investigating the distribution nitrogen dioxide emissions and observed nitrogen dioxide concentrations in the Red Deer area may inform where these precursor gases are highest and most likely to contribute to secondary particulate matter formation.

To assess the spatial distribution of nitrogen dioxide in the vicinity of the City of Red Deer, data from the Parkland Airshed Management Zone passive monitoring station network was utilized. Monthly averaged nitrogen dioxide concentrations from 32 passive monitoring stations for the winters (October-March) of 2009, 2010, and 2011 (this period was selected as it coincides with the Clean Air Strategic Alliance Particulate Matter and Ozone Framework Assessment period that initiated the investigation documented within this science report) were plotted in ArcGIS (Figure 26). A spatial average using nearest neighbour interpolation was used to interpolate concentrations between the passive monitoring stations in order to characterize the spatial distribution of nitrogen dioxide in the Red Deer Area. The highest concentrations of nitrogen dioxide were found within the City of Red Deer and the immediate area (e.g. central Red Deer County, south-central Lacombe County, Town of Blackfalds, City of Lacombe; Figure 26). Concentrations quickly dropped with distance from the City of Red Deer (Figure 26). These observations are consistent with section 1.3.2.1 which identified non-point source precursor emissions to be highest within the City of Red Deer. Additionally, several point sources of varying size can be found within the City of Red Deer and immediate area.

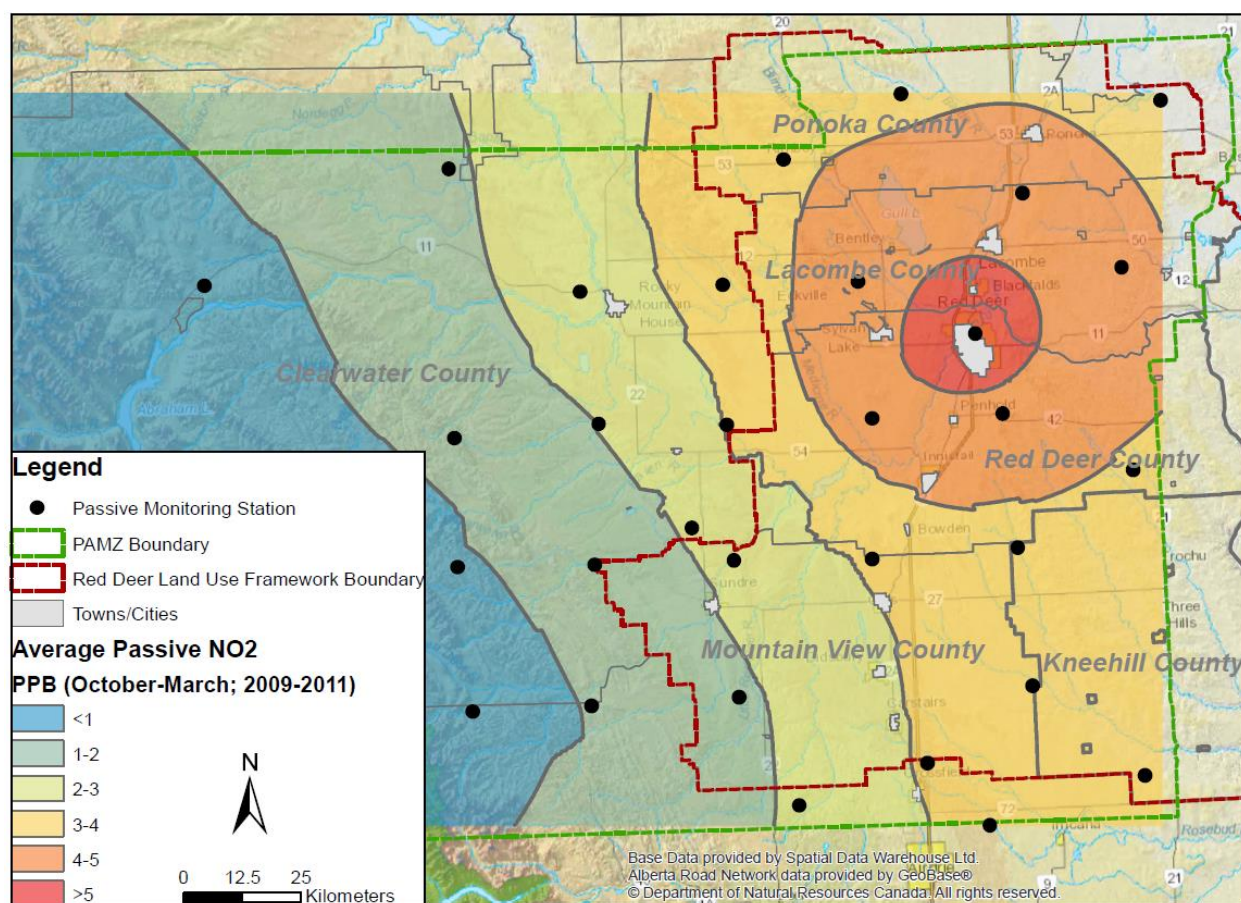


Figure 26: Spatial distribution of averaged monthly nitrogen dioxide concentrations as measured at 32 passive monitoring stations in the Parkland Airshed Management Zone. Measurements from October-March of 2009, 2010 and 2011 were averaged. Spatial distribution determined by nearest neighbour interpolation.

Red Deer Riverside monitoring station experiences fine particulate matter event days concurrent with monitoring stations in other locales known to suffer from wintertime fine particulate matter concentrations driven by secondary particulate matter species. With high concentrations of nitrogen dioxide emitters in the Red Deer area, corroborated by monitoring data, it appears likely that fine particulate matter concentrations at Red Deer Riverside monitoring station are influenced by secondary particulate matter formation. This conclusion is supported by the discussion in section 3.1 which identified monitoring based evidence suggesting the existence of volatile fine particulate matter species at Red Deer Riverside monitoring station. An assessment of secondary fine particulate matter species, through measurements at Red Deer Riverside monitoring station, is needed to confirm this assumption.

3.3.2. Transportation related emissions from nearby sources: Evidence for secondary fine particulate matter formation

Red Deer Riverside monitoring station is located approximately 20 metres away from an industrial collector road, Riverside Drive (Figure 11). This road services an industrial area and since May 2009 has acted as a conduit for traffic to and from the City of Red Deer civic yards, which was constructed 600m North of Red Deer Riverside monitoring station in 2009 (Figure 11). Primary fine particulate matter is released from motor vehicles as well as operations at the Red Deer civic yards and such emissions could have the potential to affect measurements at Riverside monitoring station considering the proximity of the station to the roadway and the City of Red Deer civic yards. The primary particulate matter emissions are in addition to the emission of known secondary particulate matter precursors from the combustion of fuels used by vehicles travelling on Riverside Drive or within the City of Red Deer civic yards. Two investigations were completed to determine the impact of transportation related emissions on the observed fine particulate matter concentrations at Red Deer Riverside monitoring station and are documented below.

3.3.2.1. *Parkland Airshed Management Zone NOVUS Environmental Report*

NOVUS Environmental completed a study of the Red Deer Riverside monitoring station, which in part aimed to determine whether operations at the City of Red Deer civic yards, or traffic on Riverside Drive may have resulted in the observed fine particulate matter events (NOVUS Environmental, 2012). The conclusions from this report provide insight into the potential impact these particular nearby sources may have had on the observed fine particulate matter concentrations at Red Deer Riverside monitoring station.

The report approached the investigation as a modelling exercise. NOVUS Environmental compared modelled transportation related emissions on roads nearby Red Deer Riverside monitoring station prior to the construction of the City of Red Deer civic yards and after the opening of the City of Red Deer civic yards. Fine particulate matter emissions were estimated and modelled from traffic counts on two roadways (Riverside Drive and 77 Street) in the vicinity of Red Deer Riverside monitoring station as well as estimates of emissions based on anticipated operations at the City of Red Deer civic yards (NOVUS Environmental, 2012). These emissions were modelled in CALPUFF and the resultant fine particulate matter concentrations were compared to actual observations. The model did not attempt to provide a

species breakdown of fine particulate matter, therefore the results of the study only speak to the relative impact of these emission sources on the monitoring station. The results do not enable conclusions to be drawn as to whether the impact is from primary or secondary fine particulate matter produced as a result of the modelled activities.

The report determined that as a result of the construction of the City of Red Deer civic yards, traffic in the vicinity of Red Deer Riverside monitoring station increased, resulting in an estimated 13-20% increase in fine particulate matter concentrations at Red Deer Riverside monitoring station (NOVUS Environmental, 2012). The increase was found to be attributed to the increase in motor vehicle traffic along Riverside Drive, whereas the addition of bus traffic to the nearby roads was determined to not be significant. The report concluded that while a modest increase in fine particulate matter concentrations likely occurred due to increased traffic after the construction of the City of Red Deer civic yards, the increase was not of sufficient magnitude to have resulted in the high concentrations noted in the 2008-2010 Clean Air Strategic Alliance Particulate Matter and Ozone Management Framework assessment (NOVUS Environmental, 2012). Therefore the fine particulate matter mass attributable to increases in traffic along Riverside Drive corresponds to only a small fraction of that measured during event days, likely indicating that additional sources, other than just traffic emissions from Riverside Drive, 77 Street and emissions from operations at the City of Red Deer civic yards, are responsible for contributing to event day concentrations.

3.3.2.2. Environment and Parks investigation

To further explore whether the observed fine particulate matter events at Red Deer Riverside monitoring station may have been the result of the station's siting near Riverside Drive an investigation was also carried out by Alberta Environment and Parks. This investigation compared air quality and meteorological measurements at Red Deer Riverside monitoring station to traffic distributions from Riverside Drive in an effort to determine whether emissions from vehicular traffic may have resulted in the fine particulate matter events observed at Red Deer Riverside monitoring station. Traffic distributions from other nearby roads were also included in this investigation to explore the impact of traffic emissions from larger, more distant roads on Red Deer Riverside monitoring station.

Traffic data were obtained for three roads near Red Deer Riverside monitoring station (Figure 27, Table 2). This data consisted of an hourly count of vehicles travelling both ways along a given segment of each selected roadway. While not a measure of emissions produced by the vehicles travelling on the roadway, traffic count data are an appropriate proxy for transportation related emissions as they show the distribution of potential emission sources present along each roadway (i.e. individual vehicles) over time (e.g. more vehicles equates to more emissions). The road names, classifications, traffic count measurement locations and data sources for each of the three roads are contained in Table 2. The traffic count measurement locations in reference to Red Deer Riverside and Red Deer Lancaster monitoring stations are shown in Figure 27.

Table 2: Traffic count locations and metadata

Road Name	Classification	Location w/r to Riverside Monitoring Station	Traffic Count Location	Data source
Riverside Drive	Collector	Approx 20m West	Between 67 th Street and Olymel Access	Novus Environmental Report (Counts data from 2009; Novus Environmental, 2012)*
Gaetz/50 th Avenue	Arterial	Approx 1.6km Southwest	Between 67 th and 68 th Street	Stantec in October 2003 for Tues-Thurs window, and data were provided by the City of Red Deer*
Queen Elizabeth II Highway	Highway	Approx 5.1km Northwest	0.1km North of Highway 11A interchange	Alberta Transportation and an average of all Winter (Oct-Mar) weekdays from 2009-2010 were used in the investigation**

*These data sources represent the most recent data available for these roadways. Development in the area has been limited and land use patterns have not changed substantially since the measurement of this data, therefore these data are expected to be representative of current traffic distribution.

** Data are available to current, however this data period was selected as it coincides with the observation of high fine particulate matter events at Red Deer Riverside monitoring station.

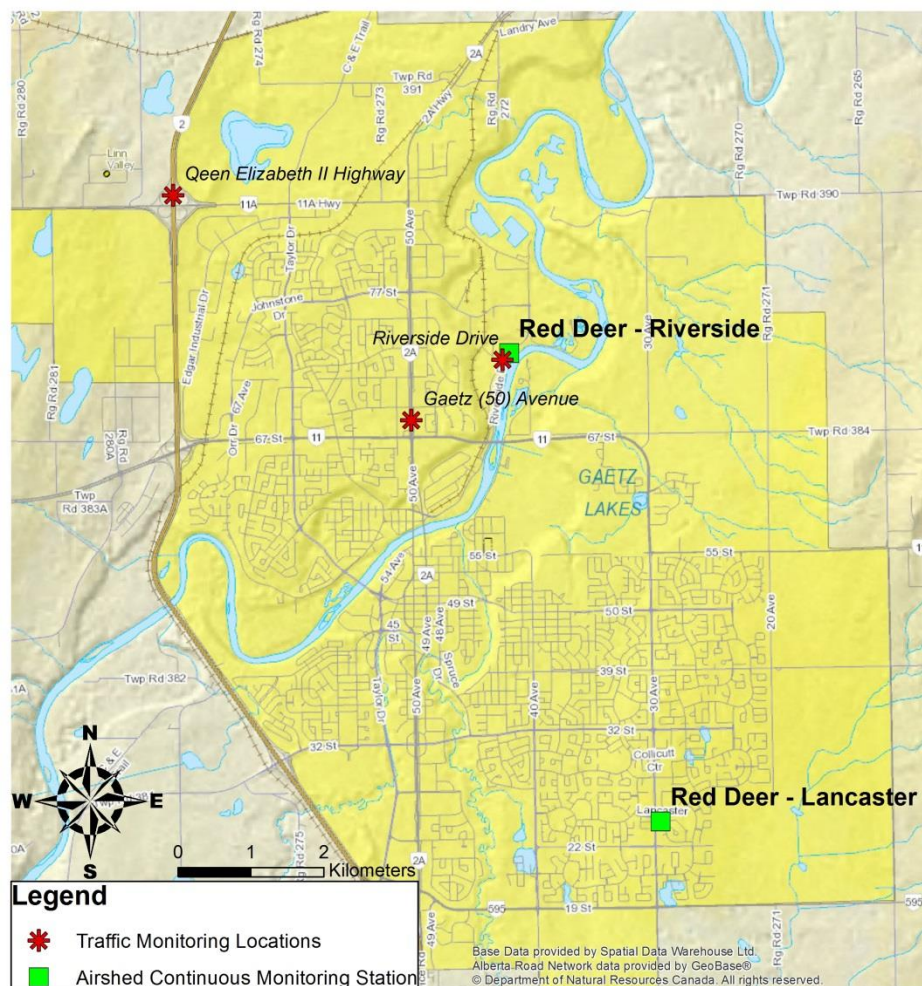


Figure 27: Locations of traffic monitoring locations in relation to Red Deer Riverside and Red Deer Lancaster air quality monitoring stations.

Riverside Drive is an industrial collector road with relatively light traffic (Figure 28 and Figure 29). The inclusion of larger, nearby roadways was to develop a comparison between Riverside Drive and other roadways in the City of Red Deer, as well as to establish the magnitude of transportation related emissions at other locations within the city. All three roads shared similar diurnal traffic distributions with peak volumes occurring around the afternoon rush hour (Figure 28 and Figure 29). Morning peak traffic volumes were somewhat more modest in comparison to the afternoon peak in all cases (Figure 28 and Figure 29). Midday traffic volumes on Riverside Drive and Queen Elizabeth II Highway initially dropped below the volume observed during the morning peak and subsequently rose back to the afternoon peak traffic volume (Figure 28 and Figure 29). Midday traffic volumes on Gaetz/50th Avenue were varied but generally increased in a linear fashion from the morning rush hour volume to that of the afternoon rush hour volume (Figure 28 and Figure 29). All three roads service zones of commercial and industrial development likely owing to the similar shape of their overall traffic volume distributions. Total traffic volume however was much greater on Gaetz/50th Avenue and Queen Elizabeth II Highway than on Riverside Drive, by a factor of five (Figure 28 and Figure 29).

Traffic volume distribution data were compared to air quality parameters at Red Deer Riverside monitoring station on event days and non-event days (137 event days and 515 non-event days were identified). Pollutants associated with transportation emissions were selected: fine particulate matter, total oxides of nitrogen, and carbon monoxide. Total oxides of nitrogen measurements were further speciated into nitric oxide and nitrogen dioxide concentrations to gain further insight into the potential sources of emissions measured at each station (oxides of nitrogen emissions from high temperature combustion, such as from internal combustion engines, are predominantly composed of nitric oxide; over time the nitric oxide is converted to nitrogen dioxide in the atmosphere). These data were also supplemented by the inclusion of wind speed data to help correlate meteorological influences on the observed concentrations. Overall, substantial differences in fine particulate matter, oxides of nitrogen and carbon monoxide concentration magnitudes were observed between event and non-event days. Specifically, concentrations of fine particulate matter, oxides of nitrogen and carbon monoxide were approximately 2.5, 1.9 and 1.5 times higher at Red Deer Riverside monitoring station on event days (Figure 28) than on non-event days (Figure 29). Additionally, wind speeds were, on average, higher on non-event days with a higher degree of variation between diurnal minimum and maximum speeds (Figure 28 and Figure 29).

At Red Deer Riverside monitoring station, two distinct peaks in fine particulate matter concentrations were evident, one morning peak (near the end of the morning rush hour) and a late evening peak, around 9-10PM on both event (Figure 28) and non-event (Figure 29) days. Strong morning peaks in oxides of nitrogen and carbon monoxide concentrations were observed at Red Deer Riverside on event (Figure 28) and non-event (Figure 29) days. Smaller, less pronounced increases in oxides of nitrogen and carbon monoxide concentrations were also observed during the evening hours. These evening increases were most pronounced on event days and remained substantially smaller than the associated morning peaks (Figure 28 and Figure 29). Of the components of oxides of nitrogen, nitric oxide comprised a significantly larger component during the morning peak than at any other time, and comprised a substantially larger fraction on event days (Figure 28) than on non-event days (Figure 29). Wind speeds were generally stable during the night-time hours with broad peaks during the daylight hours with maximums centered near solar noon. These patterns are consistent with sunlight driven mixing of the atmosphere (Figure 28 and Figure 29).

At Red Deer Riverside monitoring station, median fine particulate matter concentrations co-vary in a pattern similar to oxides of nitrogen and carbon monoxide concentrations. However this pattern is offset, resulting in peaks in fine particulate matter occurring as much as 4 hours after peaks in oxides of nitrogen and carbon monoxide (Figure 28 and Figure 29). Fine particulate matter concentrations do not co-vary with traffic. The lack of association of fine particulate matter concentrations with traffic counts suggests that primary fine particulate matter emissions from the traffic on Riverside Drive are not resulting in the fine particulate matter events at Red Deer Riverside station. Instead it is likely that emissions of precursor gasses, susceptible to producing secondary fine particulate matter, are driving fine particulate matter concentrations at Red Deer Riverside station; several observations re-enforce this assumption. Peaks of oxides of nitrogen and carbon monoxide, especially those associated with the

morning rush-hour, increase nearly simultaneously with traffic volume while fine particulate matter concentrations increase after a lag of as much as four hours (Figure 28 and Figure 29). This lag may be due to the formation of secondary particulate matter from transportation related precursor gases. Due to the time of formation associated with secondary particulate matter, attribution of specific precursor emissions sources to measured fine particulate matter concentrations is difficult as even in relatively calm atmospheric conditions, some degree of transport has likely occurred. Speciation of oxides of nitrogen into its constituent components of nitric oxide and nitrogen oxides yields useful insight into the likely origin locations of these emissions. During the daytime, and especially at the morning peak, oxides of nitrogen concentrations are especially enriched in nitric oxide. Nitric oxide emitted in large quantities by transportation related sources, in addition to other combustion processes, and is oxidized by tropospheric ozone into nitrogen dioxide relatively quickly. The enrichment of the oxides of nitrogen with nitric oxide, specifically during times of elevated traffic volume likely indicates that transportation related emissions within the Red Deer area are likely a major source of precursor gases for the formation of secondary particulate matter. It is important to note that other combustion sources also exist in the Red Deer area, including industrial sources as well as those from home heating. Further investigation of the speciated oxides of nitrogen data is recommended to better characterize the potential distances of the sources emitting precursor gases. This may help identify the radius from which sources, transportation related or otherwise, may have the potential to influence the observed fine particulate matter events.

Meteorological phenomena have significant effects on the observed concentrations of fine particulate matter, oxides of nitrogen and carbon monoxide at Red Deer Riverside monitoring station. Temperature inversions are a very common meteorological phenomenon during the winter months, which typically result in calm atmospheric conditions near the surface of the earth around sunrise which give way to increased dispersion via atmospheric mixing driven by daytime heating. The increased frequency of temperature inversions during the winter months was shown by the Capital Region Fine Particulate Matter Science Report to influence the increased incidence of event days during the winter time. At Red Deer Riverside monitoring station, wind speeds are lower on event days (which are more frequent during the winter months) than on non-event days (Figure 28 and Figure 29). Additionally, stable wind speed conditions throughout the nighttime and into the morning, indicates that dispersion is being limited until wind speeds rise towards midday (Figure 28). These observations are consistent with the presence of inversions limiting dispersion to a greater degree on event days than on non-event days, resulting in higher concentrations of pollutants at Red Deer Riverside monitoring station. This process has the potential to be exacerbated in valley bottoms, where Red Deer Riverside monitoring station is located, due to atmospheric subsidence. At Red Deer Riverside station it is likely that the morning peak in fine particulate matter concentrations is related to reduced dispersion of pollutants (stable and low wind speeds) associated with a period of high transportation related emissions (morning rush-hour). The peak through the later evening hours is likely related to night-time cooling and set-up of a nocturnal temperature inversion which again limits dispersion (stable and low wind speeds) as transportation emissions begin to taper off from the evening rush-hour peak. It is evident that inversion conditions act to limit the dispersion of emissions and are likely a major contributor to the formation of secondary particulate matter. Other emission sources within the Red Deer area (ex. industry, home heating) are

also likely to contribute to the formation of secondary fine particulate matter (as they release precursor gasses) and future research should be focused on determining their potential impact in conjunction with transportation emissions, especially through the understanding of the magnitude of these emissions and their diurnal variation.

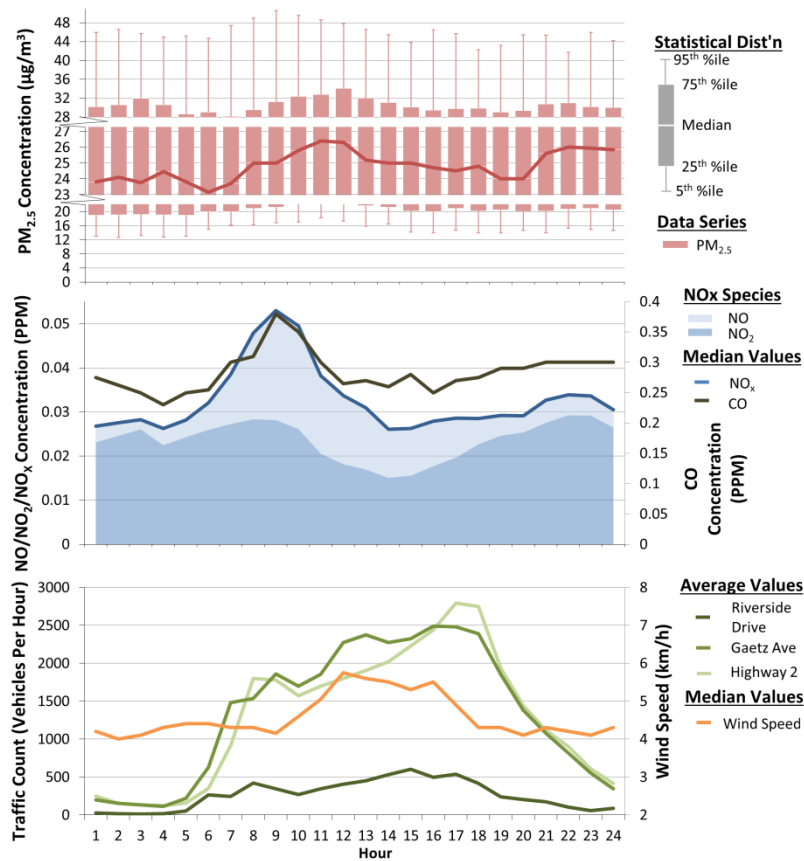


Figure 28: Event day diurnal variation of fine particulate matter, oxides of nitrogen, and carbon monoxide concentrations at Red Deer Riverside station in relation to wind speed data observed at this station and traffic counts within the city of Red Deer.

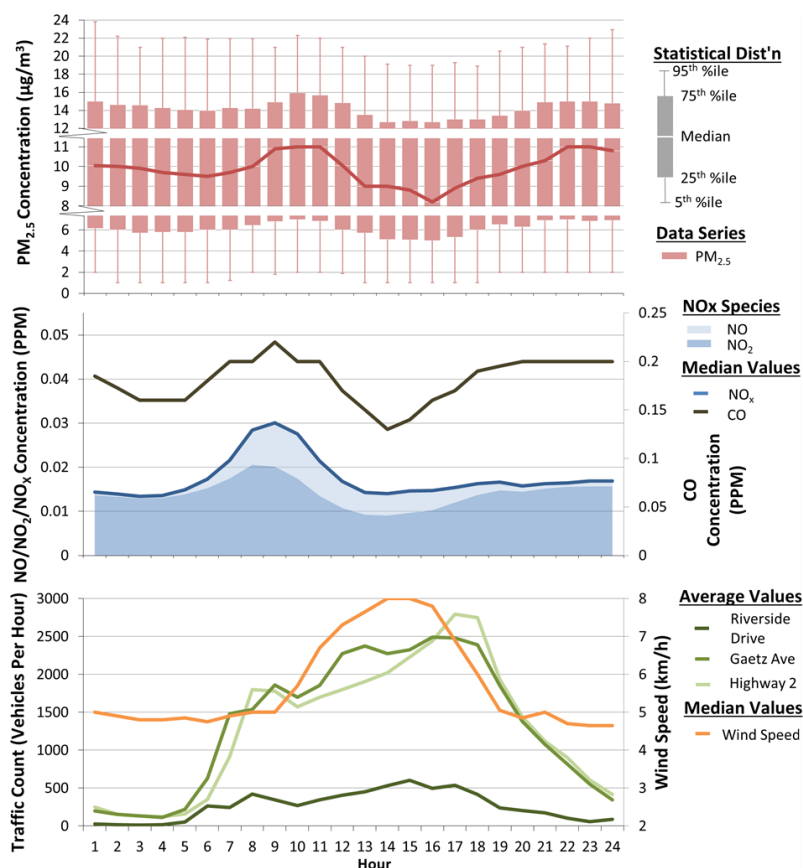


Figure 29: Non-event day diurnal variation of fine particulate matter, oxides of nitrogen, and carbon monoxide concentrations at Red Deer Riverside station in relation to wind speed data observed at this station and traffic counts within the city of Red Deer.

4. Summary

The work presented in the science report attempts to summarize the investigation, to date, in response to the exceedance of the Canada-wide Standard at Red Deer Riverside monitoring station. The science report analyzed historical data from Red Deer Riverside monitoring station, and in conjunction with supplementary information from other air monitoring stations in Alberta and the Capital Region Fine Particulate Matter Science Report, attempted to characterize the cause of the exceedance. Three main topics of discussion were identified through the investigative process and the conclusions reached, to the best that available data can support, are summarized below. Additionally, throughout the development of the science report, where knowledge gaps were identified recommendations for future investigations to address these gaps were formulated. These recommendations, prioritized to address the most significant gaps first, are summarized below.

4.1. Summarizing the three topics of discussion:

Measurement of particulate matter:

Changes in fine particulate matter monitoring technology at Red Deer Riverside monitoring station had a substantial impact on observed concentrations and a switch to newer monitoring methodologies was most likely a major contributing factor to the observation of the exceedance of the Canada-wide Standard. Newer methodologies for the measurement of fine particulate matter are more accurately able to account for volatile species, which were previously lost to volatilization prior to measurement in older instruments. Thus, the step change in concentrations of fine particulate matter after the adoption of newer analyzers is likely, in part, a reflection of the measurement of the volatile species of fine particulate matter at Red Deer Riverside for the first time. The volatile fine particulate matter species of ammonium nitrate and organic matter, both considered secondary fine particulate matter, are therefore expected to comprise a significant component the total fine particulate matter mass on event days; an observation consistent with fine particulate matter speciation measurements made in the Capital Region. Seasonal variations observed in the concentrations of fine particulate matter after the adoption of newer monitoring technologies also suggest that secondary fine particulate matter is a significant driver of fine particulate matter during the winter and comprises a much smaller component of total particulate mass during the summer.

Influence of meteorology:

Fine particulate matter concentrations vary on seasonal and diurnal temporal scales at Red Deer Riverside monitoring station. Fine particulate matter event days (concentrations greater than $19 \mu\text{g}/\text{m}^3$) were observed to occur in all seasons but were most common during the colder months (October-March). Higher frequencies of fine particulate matter events in the colder months were also found in the Capital Region and were found to correlate with increased frequencies of meteorological phenomenon, such as temperature inversions. The correlation of event days with low wind speeds at Red Deer Riverside suggests that temperature inversions are likely important in the formation of event days as low wind speeds in the wintertime are most often associated with temperature inversions. Strong alignment of event day concentrations with southerly wind directions was likely a meteorological manifestation of wind channeling down the Red Deer River valley.

Evidence of secondary particulate matter and potential sources:

Determining the species composition of the event day fine particulate matter concentrations was not possible as speciation monitoring was not performed in Red Deer. However, specific investigations added strength to the conclusion that secondary fine particulate matter was driving event day concentrations in Red Deer. Red Deer Riverside monitoring station experiences fine particulate matter event days concurrent with other air quality monitoring stations in Edmonton, Calgary and their surrounding areas. Research from the Capital Region determined that fine particulate matter was

dominantly formed through atmospheric reactions with nitrogen dioxide and volatile organic compounds to form secondary fine particulate matter species. Due to the high density of nitrogen dioxide emitting sources in Red Deer, verified through monitoring data, and the concurrent events observed along the Calgary-Edmonton corridor, secondary fine particulate matter species are expected to be driving fine particulate matter concentrations on event days. Major nitrogen dioxide emission sources in the City of Red Deer are related to transportation, thus determining the potential contribution of these sources to measured fine particulate concentrations was identified as being important to the development of appropriate management actions. A study completed for the Parkland Airshed Management Zone (NOVUS Environmental, 2012) indicated that transportation related sources in the vicinity (approximately 1-2 km from) Red Deer Riverside monitoring station had some impact on the observed measured fine particulate matter concentrations. Impacts were not large enough however to have caused the exceedance. Further analysis of fine particulate matter concentrations at Red Deer Riverside monitoring station, in conjunction with other transportation related pollutants and traffic volume measurements on major adjacent roads indicated that transportation related emissions were likely influencing secondary fine particulate matter concentrations. This conclusion was determined from the observed lag in fine particulate matter concentrations following traffic volume peaks. However, as the degree of impact of transportation related emissions on fine particulate matter concentrations was not explicitly quantifiable, other emission sources with similar potential to produce secondary fine particulate matter could not be ruled out as having an influence on observed event day concentrations.

4.2.Recommendations for future investigation

This investigations and discussions contained within the science report represent the current state of knowledge regarding fine particulate matter in the Red Deer area. Significant gaps remain, however. Specifically, many assumptions reached to date were based on corroborative evidence from other regions sharing similarities with Red Deer. In order to provide conclusive evidence, with which concrete and effective management actions for fine particulate matter can be developed, a number of recommendations for future work have been developed. These recommendation were developed in order to address significant gaps in the state of knowledge identified in the science report. Presented below is a prioritized list of recommendations anticipated to provide information to fill in knowledge gaps.

Recommendation	
Description	Rationale
Increase understanding of the species composition of particulate matter in the Red Deer air quality management area	
<ul style="list-style-type: none"> Commence a sampling study in the Red Deer air quality management area to identify the species composition of particulate matter during event and non-event days. 	Rationale: Speciation has not been measured in Red Deer. In order to confirm assumptions made in the science report, this assessment is essential.

Apportion fine particulate matter to sources in the Red Deer air quality management area	
<ul style="list-style-type: none"> Undertake source apportionment modelling using CMAQ, separate from or in conjunction with ongoing work in the Capital Region. Additional specific investigations may include: <ul style="list-style-type: none"> Investigate home heating emissions (including emissions impacts from different fuel types). Understand diurnal variations in home heating emissions with respect to fine particulate matter concentration variations. Undertake a detailed analysis to determine whether variations in vehicle traffic due to changes in the local economy of Red Deer may impact fine particulate matter concentrations 	<p>Rationale: The relationship between fine particulate matter concentrations and specific emissions sources in Red Deer is poorly understood. A sector based source apportionment would fill this gap by identifying key source sectors which have the most significant impacts on fine particulate matter concentrations. This initiative will help to implement current management actions and develop new management actions if gaps exist.</p>
<ul style="list-style-type: none"> Investigate NO to NO₂ conversion in order to contextualize the locality of emissions impacting Red Deer Riverside station. Understanding the degree of transport to which NO_x has undergone may allow for determining source contribution regions affecting Red Deer Riverside. 	<p>Rationale: The relationship between fine particulate matter concentrations and specific emissions sources in Red Deer is poorly understood. Contextualizing the measured NO_x emissions in terms of their NO and NO₂ components will help localize potential emission sources and aide in source apportionment.</p>
Broaden the understanding of spatial and temporal variations of fine particulate matter and its precursors	
<ul style="list-style-type: none"> Continue to investigate the suitability of using RDPS (Regional Deterministic Prediction System) Output (a meteorological model capable of predicting atmospheric stability) to identify temperature inversions over Red Deer and integrate these results into future investigations if determined to be suitable. 	<p>Rationale: Upper air soundings are not available in Red Deer therefore determining the impact of inversions is reliant on other meteorological information. Characterization of the suitability of the RDPS meteorological model output to the Red Deer area will help provide more confidence in establishing the link between fine particulate matter event days and atmospheric temperature inversions.</p>

Broaden the understanding of spatial and temporal variations of fine particulate matter and its precursors	
<ul style="list-style-type: none"> Investigate influence of large scale (100s of km) meteorological systems on multi-station fine particulate matter events in order to better understand conditions favorable for fine particulate matter event days. 	Rationale: Multi-station fine particulate matter events were observed across the Edmonton-Calgary corridor. Observations from monitoring stations suggest similar meteorological phenomena are driving these events. However, no investigation of large-scale phenomena have been performed to date, leaving a gap in knowledge.
<ul style="list-style-type: none"> Investigate the potential for terrain to influence meteorology in the Red Deer area and determine what influence this may have on fine particulate matter concentrations. A modelling investigation may be most suited to this question. 	Rationale: Terrain effects are recognized in meteorology and air quality science and the City of Red Deer, along with associated air quality monitoring stations, sit below two large ridges and within a substantial river valley. The effect of these terrain features has not been characterized.

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RED DEER FINE PARTICULATE MATTER RESPONSE

APRIL 2016

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MANDATE

The Red Deer Fine Particulate Matter Response was initiated in 2013 in response to an exceedance of the Canada-wide Standard (CWS) for fine particulate matter at the Red Deer Riverside ambient air monitoring station under the former Clean Air Strategic Alliance *Particulate Matter and Ozone Management Framework*. The *CASA Particulate Matter and Ozone Management Framework*, based on the 24-hour CWS has been Alberta's platform for CWS implementation for the past decade. The *Red Deer Fine Particulate Matter Response*, developed according to the requirements set out in the former framework, is an action plan of the Government of Alberta and stakeholder commitments to address the fine particulate matter issue in the Red Deer area. The *Red Deer Fine Particulate Matter Response* focuses science investigation and management actions on an area defined as the Red Deer Air Quality Management Area. The Red Deer air quality management area is a place-based management area within the Red Deer Air Zone.

Although the mandate to develop the mandatory response action plan was triggered by the CWS, implementation and progress of the Response will be assessed, evaluated, and reported on against the numerical Canadian Ambient Air Quality Standards (CAAQS), which were introduced in 2015. For more information on Alberta's transition to managing for CAAQS in the Red Deer Air Zone, refer to the Red Deer Air Zone Fine Particulate Matter Response: Government of Alberta Action Plan (herein referred to as the GoA Action Plan) published with this Response. Implementation of this Red Deer Fine Particulate Matter Response will continue to inform and align with the provincial approach to managing toward the CAAQS in the Red Deer Air Zone while continuing to focus on the priority fine particulate matter issue in the Red Deer air quality management area, as defined in this action plan.

EXECUTIVE SUMMARY

The Red Deer Fine Particulate Matter Response (the Response) was initiated in 2013 when Alberta Environment and Parks published the annual ambient air quality assessment for the 2009-2011 data period found that Red Deer Riverside ambient air quality monitoring station exceeded the CWS for fine particulate matter. The results triggered the development of a mandatory response action plan (the Response) to address the exceedance as required in the former *CASA Particulate Matter and Ozone Management Framework*. For more on Alberta's transition to managing toward the CAAQS for fine particulate matter, refer to the accompanying GoA Action Plan.

A preliminary science investigation indicated that secondary fine particulate matter and meteorological conditions were factors in the CWS exceedances. This investigation drew on findings from the Capital Region Fine Particulate Matter Response. The investigation highlights that managing major sources of nitrogen dioxide and volatile organic compounds may be effective means of reducing secondary fine particulate matter. Major sources include transportation, upstream oil and gas facilities and to a lesser extent chemical manufacturing, as well as residential and commercial heating. Details from the science investigation are summarized in the Red Deer Fine Particulate Matter Science Report, released as an accompanying document to this Response.

From the science investigation findings, Alberta Environment and Parks was able to define the boundary for the Red Deer Fine Particulate Matter Response based on ambient air quality information available in 2014 relevant to observations at the Red Deer Riverside ambient air monitoring station. The defined air quality management area includes stakeholders anticipated to be contributing to the fine particulate matter issue and was established with the intent to better understand the local air quality conditions and to identify areas where emission reductions are necessary to improve the local air quality.

The Response demonstrates the regionally collaborative approach to better understand the fine particulate matter issue within the identified Red Deer air quality management area and recognizes the influence that other stakeholders have in supporting the management of this issue. The Response and accompanying GoA Action Plan communicate the Government of Alberta's commitments and transition to managing toward the CAAQS within the Red Deer Air Zone.

Air quality management is complex and warrants leadership from Alberta Environment and Parks with strong stakeholder engagement. As a result, the collaborative approach to develop the Response is threefold:

1. A multi-stakeholder Advisory Committee was convened in 2014 to provide strategic advice to Alberta Environment and Parks in development of the Response.
2. Alberta Environment and Parks worked closely with Parkland Airshed Management Zone (PAMZ) Technical Working Group to receive and gather feedback on the science investigation into the fine particulate matter issue within the air quality management area.

3. Alberta Environment and Parks worked closely with the PAMZ Communications Committee to develop an education and engagement strategy to inform the public and broader stakeholders about the fine particulate matter issue in the air quality management area, the Response, and next steps.

At the beginning of 2015, the CAAQS replaced the CWS for fine particulate matter and ground-level ozone. The boundary to achieve the CAAQS differs from the CWS approach. For more information on these differences, refer to the accompanying GoA Action Plan. Although the mandate to develop the Response was triggered by the CWS, in order to be consistent, responsive, and future-focused to the increasingly stringent national standards for fine particulate matter, the goal of the Response is to reduce ambient fine particulate matter concentration and remain below the numerical CAAQS as measured at ambient air quality monitoring stations within the Red Deer air quality management area. The three main objectives to achieve this goal in the Red Deer air quality management area are:

Action: The development and implementation of management actions that can be implemented throughout the year to achieve measurable reductions of fine particulate matter concentrations;

Investigation: Scientific investigation to improve knowledge of fine particulate matter in the Red Deer air quality management area; and

Engagement: Engagement to promote public and stakeholder actions to work towards a solution to the fine particulate matter issue.

Alberta Environment and Parks and the Advisory Committee members compiled an inventory of committed and proposed actions to address the management gaps identified during the development of the Response. These actions are based on the above three objectives and are intended to address emission sources contributing to the fine particulate matter issue within the defined Red Deer air quality management area. For more information on the Government of Alberta commitments to meeting the CAAQS in the Red Deer Air Zone, refer to the accompanying GoA Action Plan.

ACKNOWLEDGEMENTS

This document was developed using a collaborative, multi-stakeholder approach with representation from the Government of Alberta, industries, municipalities, public members, and the Parkland Airshed Management Zone. Members and participants engaged their organizations and dedicated their time in the completion of the Response and associated documents.

Red Deer Advisory Committee

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 Aaron Rognvaldson – Husky Energy
 Adam Jensen (alternate) – Alberta Health Services
 Allison Fisher – Shell Canada
 Andrea Brack – NOVA Chemicals
 Andrew Treu – Red Deer County
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 Dale Freitag (alternate) – Lacombe County
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PRIORITY ISSUE

Fine particulate matter can be emitted directly into the atmosphere as primary fine particulate matter or it can be formed in the atmosphere from precursor gases reacting under certain meteorological conditions as secondary fine particulate matter.

Alberta Environment and Parks performs annual ambient air quality assessments for fine particulate matter concentration, in addition to other pollutants using data collected at ambient air quality monitoring stations throughout Alberta. The PAMZ monitoring network, operating in the Red Deer area, includes both passive and continuous monitoring stations. Within the network there are three continuous ambient air monitoring stations – Riverside, Caroline, and Lancaster, as shown in Figure 1 – which continuously measure fine particulate matter concentration and report it to the CASA Data Warehouse. Caroline monitoring station is located approximately 60 kilometres southwest of Red Deer and 16 kilometres south-southeast of the Town of Caroline. The Riverside station is located within the City of Red Deer, adjacent to the Three Mile Bend recreation area and near Riverside industrial area. The Lancaster monitoring station, located in the Lancaster Green neighbourhood of south Red Deer, was temporarily deployed for the winters of 2012 – 2013 and 2013-2014 before becoming a permanent continuous monitoring station in December 2014. Table 1 captures the classification and initial date of operation for the three monitoring stations.

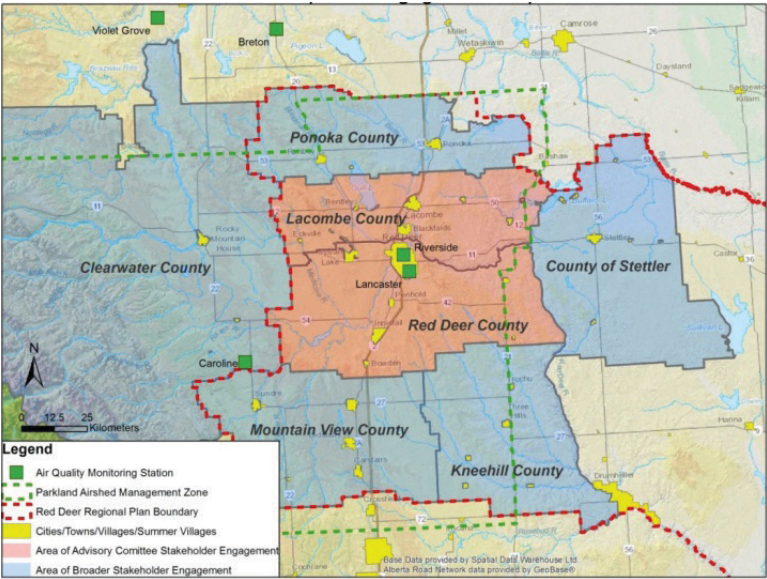


Figure 1: Map of the Active Continuous Ambient Air Quality Monitoring Stations in the Red Deer Air Quality Management Area.

Table 1: Active Continuous Ambient Air Quality Monitoring Stations within the Red Deer Air Quality Management Area*

Monitoring Station	Commencement of Operation	Classification
Riverside	May 1, 2005	Commercial
Caroline	January 12, 1999	Rural
Lancaster	Winter 2012-2013 Winter 2013-2014 December 2014 - present	Residential

**See Response section “Air Quality Management Area” for a definition of this area and how it related to the Red Deer Air Zone for CAAQS management and the Red Deer Land-use Framework regional plan boundary*

Each monitoring station is assigned a management action level based on the annual ambient air quality assessments for fine particulate matter concentration. The actions associated with lower action levels provides time to address ambient concentrations. Each higher management action level prescribes successively more stringent management actions, including their priority and urgency.

At the time of the 2009-2011 ambient air quality assessment, Riverside and Caroline monitoring stations met the data completeness requirements and were used in determining the assignment of the management action levels to the monitoring stations.

The annual assessment for the 2009-2011 data period identified that Riverside monitoring station exceeded the CWS for fine particulate matter, placing the station in the ‘Mandatory Plan to Reduce Below the CWS’ action level, as described in the CASA Particulate Matter and Ozone Management Framework. The former CASA Particulate Matter and Ozone Framework is Alberta’s approach to achieving the CWS.

Figure 2 shows the fine particulate matter concentrations for the current and previous annual assessments at Riverside monitoring station. The station exceeded the national standards for fine particulate matter for the 2010-2012 annual assessment (released in April 2014).

Managing particulate matter is important because health-related studies have linked particulate matter – especially fine particulate matter- to cardiac and respiratory diseases such as asthma, bronchitis, emphysema, and various

forms of heart diseases. Smaller particles (fine particulate matter) can penetrate deeper into the lungs, irritating the respiratory system, reducing the effective surface area of oxygen exchange, or transferring toxic and carcinogenic compounds in fine particulate matter into the blood stream. Particulate matter can also affect plant health, the balance of nutrients in soil and water, and can contribute to soil and water toxicity.

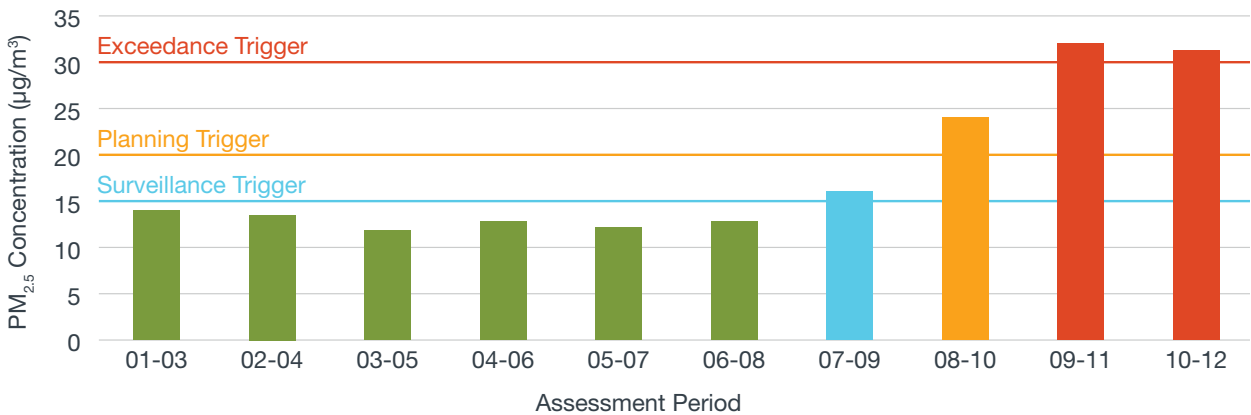


Figure 2: The CASA Particulate Matter and Ozone Management Framework Annual Assessment for 2001-2002 reported against the CWS for fine particulate matter.

AIR QUALITY MANAGEMENT IN ALBERTA

Air quality management in Alberta has evolved over time to adapt to changing needs and improved knowledge. Air quality has traditionally been managed for industrial facilities, specific populations, and ecologically sensitive areas, and has recently evolved to a cumulative effects management approach.

In October 2012, the Canadian Council of Ministers of the Environment (CCME), with the exception of Quebec, agreed to begin implementing a new Air Quality Management System (AQMS). The AQMS is a national approach to air quality management in Canada, developed in partnership between Environment Canada, individual provinces, territories, non-government organizations, and industry. The goal of the AQMS is to achieve better air quality and significant health and environmental benefits for Canadians by keeping clean areas clean and through continuous improvement. The AQMS considers the contributions from regulated and non-regulated sources, point and non-point sources, and offer regulatory and non-regulatory actions that can be applied to achieve the CAAQS. The use of thresholds, management levels, and limits in the AQMS ensures that a comprehensive and proactive approach is taken to protect air quality in accordance with the principles of keeping clean areas clean and continuous improvement. This approach has been adopted into the Land-use Framework regional air quality management frameworks in Alberta, which allows for proactive management of air quality that can address the unique pressures, conditions, and requirements of air zones within the province. The Red Deer Air Quality Management Framework will be developed as part of the Red Deer Regional Plan. More information on how air quality is managed in Alberta can be found in Appendix A.

FINE PARTICULATE MATTER MANAGEMENT

Just as air quality management has evolved over time, so too has management specific to fine particulate matter. When the National Ambient Air Quality Objectives (NAAQS) for Total Suspended Particles (TSP) were established under the *Clean Air Act* in 1970s, the health and environmental effects related to the finer fractions of particulate matter were not well understood. Even in the 1980s, the role of particulate matter as a major component of smog was not recognized. Through the 1990s, evidence of the serious health implications of inhaling particulate matter grew with scientific studies. This has led to the establishment of the CWS for particulate matter in 2000.

In 2001, the federal government declared particulate matter less than 10 microns in diameter (PM₁₀) to be toxic and included it in the *Canadian Environmental Protection Act* (1999), with an emphasis on the finer fraction (PM_{2.5}) of fine particulate matter. In 2003, the primary precursors to secondary particulate matter – nitrogen oxides (NO_x), volatile

organic compounds (VOCs), sulphur dioxide (SO₂), and ammonia (NH₃) were also declared to be toxic on the basis of their contribution to particulate matter formation.

Key initiatives that drive fine particulate matter management in the Red Deer air quality management area are highlighted in the bullets below. It should be acknowledged that not all of these initiatives are focused directly on reducing precursor emissions to secondary fine particulate matter. Nevertheless, they each play distinct and important roles in the overall management of fine particulate matter.

KEY INITIATIVES FOR FINE PARTICULATE MATTER IN THE RED DEER AIR QUALITY MANAGEMENT AREA

National

- Air Quality Management System
 - The AQMS includes work to address emissions from mobile sources. Priorities are to reduce emissions through advanced transportation technologies and proper vehicle maintenance, initiatives targeting in-use diesel vehicles and engines, and by greening fleets.
 - The CWS for fine particulate matter have been in effect since 2000. These standards establish an inter-governmental commitment to reduce fine particulate matter and its associated risks to human health and the environment. These standards were replaced by increasingly more stringent CAAQS. Jurisdictions are expected to report their annual assessments and manage air quality against CAAQS starting in 2015.
 - Policies such as the base-level industrial emissions requirements (BLIERs) ensure that all industrial sources across the country are meeting at least the national standards. The first three of these BLIERs apply to the cement sector, gas-fired non-utility boilers and heaters, and stationary gas-fuel fired engines.

Provincial

- The Alberta Ambient Air Quality Objectives provide the provincial 24-hour and annual objectives for fine particulate matter.
- Under BLIERs, industrial release source limits help to ensure pollution prevention and control technologies are adopted to adequately protect the environment.
- Key provincial management frameworks, such as the Acid Deposition Management Framework and the Emissions Management Framework for the Alberta Electricity Sector, guide the management reduction of fine particulate matter and precursor pollutants, such as nitrogen oxides and sulphur dioxide.

Regional

- The PAMZ Ozone Management Plan was developed in 2008 as a result of the region's air quality monitoring stations exceeding the CASA Particulate Matter and Ozone Management Framework 'Management Plan' action trigger of 58 parts per billion for ozone. Ozone is formed through photochemical reactions between nitrogen oxides and volatile organic compounds. Therefore, management of ozone and its precursors will also assist in the management and reduction of fine particulate matter concentration in the Red Deer air quality management area.

INVESTIGATING THE CAUSE OF THE EXCEEDANCES

The Red Deer Fine Particulate Matter Science Report (the Science Report) was developed in an effort to characterize the cause of the fine particulate matter exceedance at Red Deer Riverside monitoring station in order to inform the Response and accompanying management action. The Science Report was developed internally by Alberta Environment and Parks with external consultation from the PAMZ Technical Working Group. The intent of the Science Report was to investigate the cause of the exceedance, to the highest degree that available data can support to inform direction and stringency of management actions by sector.

The Science Report focuses on Red Deer Riverside monitoring station. The only other permanent continuous air quality monitoring station in the vicinity of the City of Red Deer in 2013 was the Caroline monitoring station (60 kilometre distance). For the 2009-2011 assessment, Caroline monitoring station was reported to be in the 'Baseline Monitoring and Data Gathering' action level which is the lowest of the four action levels under the CASA Particulate

Matter and Ozone Framework. For this reason, investigating the observed fine particulate matter concentrations at Caroline monitoring station was not a focus of the Science Report.

Three main discussion topics were derived from a series of investigative questions developed by Alberta Environment and Parks. The development of the investigative questions was informed by the need to inform management actions to reduce ambient fine particulate matter levels and as the need to address specific questions raised by stakeholders. These discussions focused primarily on the observations from Red Deer Riverside monitoring stations but also drew upon additional data where appropriate. While some of the key findings are summarized below; details on the full investigation, findings, and recommendations can be found in the Red Deer Fine Particulate Matter Science Report.

MEASUREMENT OF PARTICULATE MATTER

Red Deer Riverside monitoring station has been measuring fine particulate matter concentrations since 2001. Monitoring technology for fine particulate matter has improved and as such, instrumentation changes have been made twice at Red Deer Riverside station—once in 2009 and again in 2013. The 2009-2011 CWS ambient air quality assessment for fine particulate matter coincided with the adoption of a new monitoring method and instrument at Red Deer Riverside. The step-change in fine particulate matter concentrations observed in March 2009 occurred at the same time as the monitoring change. It is important to acknowledge the differences between the monitoring technologies at Red Deer Riverside in order to better understand its influence on the observed fine particulate matter concentration.

INFLUENCE OF METEOROLOGY

Event days are defined as 24-hour averaged fine particulate matter concentrations (midnight-midnight) greater than $19\mu\text{g}/\text{m}^3$. At Red Deer Riverside monitoring station, it is evident that non-forest fire related fine particulate matter event days can occur in all seasons, however, the majority of the event days occur between October and March as shown in Figure 3. There is some variability between years, as to the frequency of non-forest fire related event days, however in all years, the number of events occurring between October and March is greater than the balance of the year. Event days with elevated fine particulate matter concentration as a result of forest fire are removed from the provincial ambient air quality annual assessment.

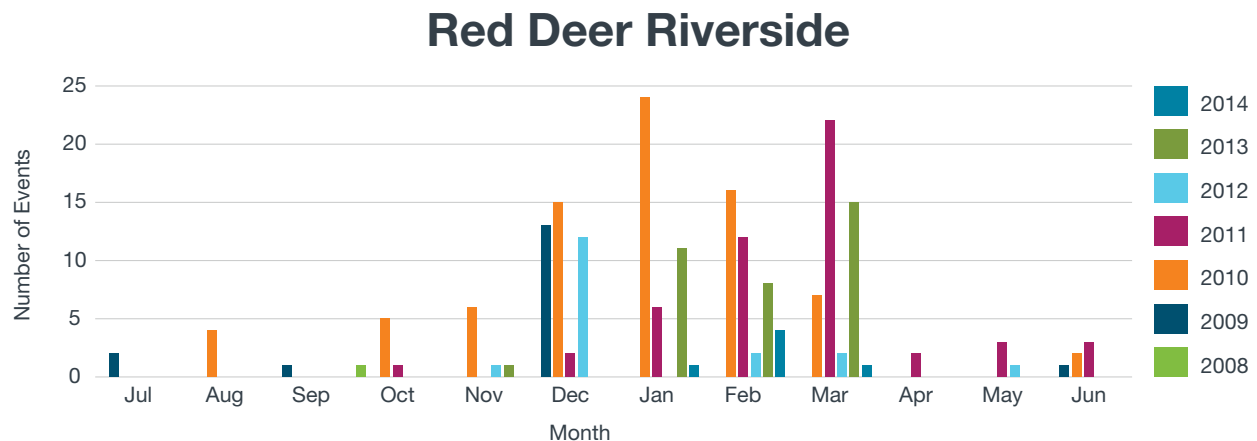


Figure 3: Seasonal distribution of fine particulate matter event days

Fine particulate matter event days are distinctly associated with low to moderate wind speeds and temperature inversions. Lower wind speeds inhibit dispersion of fine particulate matter and other pollutant gases. Temperature inversions occur when cold air is trapped near the surface by a layer of warmer air aloft. This condition prevents air that has been warmed due to daytime heating from rising and mixing and consequently, dispersing pollutants.

The seasonal variation of event days and the association of event days with lower wind speeds suggest that dispersion limiting mechanisms are driving fine particulate matter events at Red Deer Riverside monitoring station.

The vast majority of events were associated with southerly wind direction; however, upwind of Red Deer Riverside monitoring station, there is no single large source of fine particulate matter. Therefore, in the case of Red Deer Riverside monitoring station, the association of fine particulate matter with southerly wind directions is likely related to other phenomenon. One such phenomenon may be topographical channeling.

MULTI-STATION EVENTS

Fine particulate matter event days frequently occur concurrently at air quality monitoring stations in the Edmonton, Red Deer, and Calgary areas during the wintertime (October to March). Twenty-four hour averaged fine particulate matter concentrations measured on event days in February 2011, from 19 air quality monitoring stations within the vicinity of Edmonton, Calgary, and Red Deer were compared. The findings showed that fine particulate matter concentrations were highest simultaneously in areas of higher population density with lower concentrations measured outside of these areas.

The presence of frequent multi-station events suggest that sources within Edmonton, Calgary, and Red Deer are contributing to fine particulate matter events, and that these multi-station events are driven by large scale meteorology which influences large areas of the province at the same time.

IMPLICATIONS OF THE SCIENCE REPORT FINDINGS

The findings of the science investigation provide valuable information to better understand the factors contributing to the fine particulate matter issue. The science investigation determines that effective management should focus on reducing nitrogen dioxide emissions. Key sources of nitrogen dioxide in the Red Deer air quality management area are upstream oil and gas facilities and transportation related emissions, such as on-road mobile sources and off-road diesel vehicle sources. The Science Report includes recommendations for next steps to continue to inform appropriate management decisions in the Red Deer air quality management area.

RED DEER AIR QUALITY MANAGEMENT AREA

Findings from the science investigation for the exceedance of the 24-hour CWS for fine particulate matter suggest that wintertime fine particulate matter concentrations in Red Deer behave similarly to that observed in Alberta's Capital Region. Without speciation data in the Red Deer area, results from the Capital Region monitoring survey were used to infer that wintertime fine particulate matter concentrations might be driven by the formation of ammonium nitrate, for which nitrogen dioxide is a precursor compound. Based on this assumption the spatial distribution of nitrogen dioxide as shown in Figure 4 was used to define the boundary for the Red Deer Air Quality Management Area. This area consists of the 'Area of Broader Stakeholder Engagement', which includes Ponoka County, Mountain View County, Kneehill County, and Clearwater County. Although these counties contain some area of higher nitrogen dioxide concentrations, they do not have the same population or industrial density as Red Deer County and Lacombe County.

The air quality management area also includes the geographic area titled, 'Area of Advisory Committee Stakeholder Engagement', which includes Red Deer County, Lacombe County, and the towns, villages, summer villages, and cities contained within their boundary. The vast majority of the nitrogen dioxide sources expected to be contributing to the fine particulate matter issue are located in this geographic area.

Both the engagement boundaries for the 'Area of Broader Stakeholder Engagement' and 'Area of Advisory Committee Stakeholder Engagement' are shown in Figure 5. Additional information on how the engagement boundaries were defined can be found in the corresponding Red Deer Fine Particulate Matter Science Report.

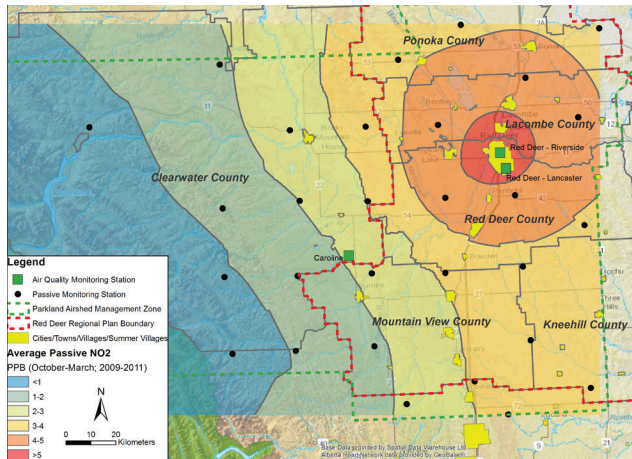


Figure 4: Spatial Distribution of Nitrogen Dioxide.

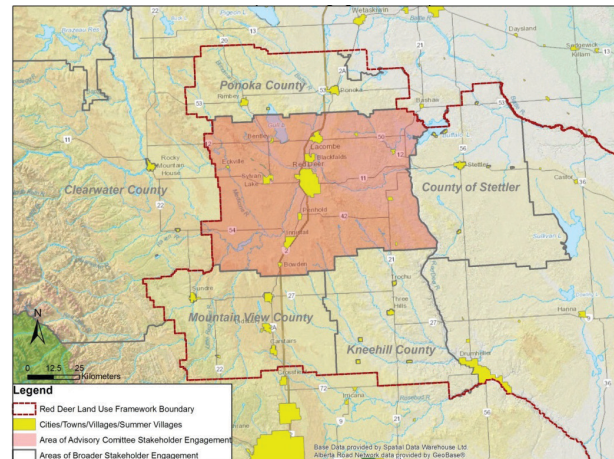


Figure 5: The Red Deer Air Quality Management Area, highlighted in red, was established through analyzing the nitrogen dioxide spatial average.

INDUSTRIES AND BUSINESSES IN THE RED DEER AIR QUALITY MANAGEMENT AREA

The Red Deer air quality management area is located in central Alberta, approximately mid-way between Edmonton and Calgary, bisected by the Queen Elizabeth II Highway (QEII). The QEII is Alberta's busiest highway, which sees more than nine million trips annually by automobiles. Over 74 per cent of the province's population lives along this along the QEII transportation route.

Within the air quality management area, many traditional and emerging businesses and industry sectors are expanding. Traditional sectors include oil and gas; petrochemical; agriculture; food and beverage processing; distribution, wholesale, and retail services; and tourism. Newly emerging sectors include telecommunications and wireless services; biotechnology; value-added agriculture; software development; electronics; and microelectronics.

Industrial and commercial properties within the air quality management area include petrochemical manufacturing (NOVA Chemicals, Dow Chemical Canada ULC, and MEGlobal Canada Inc.), energy industry (Husky Energy, etc.), and other industries (Agrium, Ineos, etc.). Knowledge-based professions, scientific, and technical services supporting the oil and gas industry are largely made up of small firms. The manufacturing industry also continues to grow with metal fabrication as the largest sector of manufacturing in the area followed by machinery, wood cabinetry, and food processing.

The air quality management area also includes a strong agricultural sector. Much of the rural land within the Red Deer development area is actively used for growing crops, feeding livestock, and providing lumber and mineral resources. Intensive farms include dairy, feed lots, hog operations, poultry operations, greenhouses, bison ranches, elk farms, and a variety of exotic animal farms. Access to primary resources is vital to the strong agriculture and agri-processing industry with major meat producers like Olymel and Nossack Food Groups.

Economic growth within the air quality management area is due to its central location in Alberta and proximity to the QEII Highway, which offer businesses an ideal place for transportation, warehousing, and distribution. The Red Deer air quality management area, Calgary Census Metropolitan Red Deer air quality management area, Calgary Census Metropolitan Area, and the Edmonton Census Metropolitan Area are expected to experience the strongest growth within the province. Within the air quality management area, Red Deer, Lacombe, Sylvan Lake, Blackfalds, Penhold, Olds, Innisfail, and Stettler are among the fastest growing communities.

RED DEER AIR QUALITY MANAGEMENT AREA EMISSIONS PROFILE

Emission sources within the Red Deer air quality management area range from large point sources to collectively significant non-point sources. In order to characterize the distribution of emissions from various point and non-point sources, three pollutants of concern were identified: nitrogen dioxide and sulphur dioxide (known precursors to the formation of secondary fine particulate matter), and primary fine particulate matter. Emission sources in the Red Deer air quality management area were determined from the 2008 Alberta Air Emissions Inventory. Details on how the non-point sources were calculated and outlined in the Red Deer Fine Particulate Matter Science Report. Figure 6 shows the sector-based breakdown of nitrogen dioxide sulphur dioxide, and primary fine particulate matter.

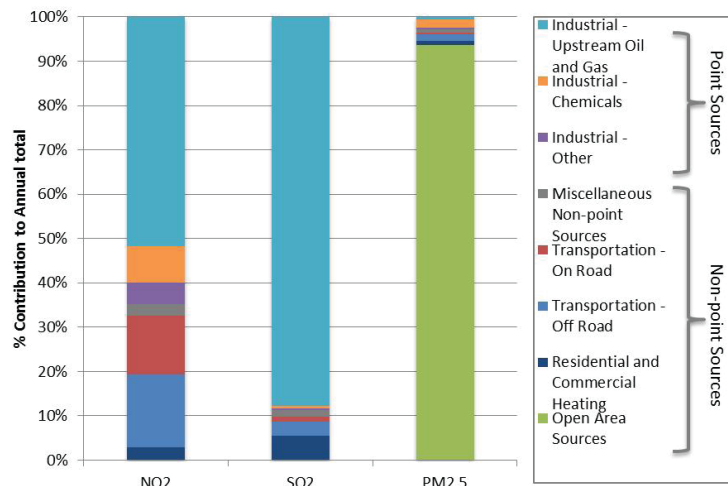


Figure 6: Sector-based breakdown of the fine particulate matter precursors and primary fine particulate matter emissions in Census Division 8.

NITROGEN DIOXIDE (NO₂)

Industrial point sources emit 65 per cent of nitrogen dioxide in the Red Deer air quality management area. The vast majority of point source emissions and more than half of all emissions of nitrogen dioxide are from upstream oil and gas facilities. These facilities are for the most part distributed throughout the Red Deer air quality management area and are largely located outside of population centres. Other industrial point sources include emissions from chemical manufacturing and other industrial activities. Point source emissions do not undergo substantial seasonal fluctuations.

Non-point source emissions are highest in the City of Red Deer as well as Red Deer, Lacombe, and Ponoka counties. Of the sectors contributing to non-point source emissions, transportation related emissions are predominant, accounting for 84 per cent of non-point source emissions of nitrogen dioxide and 30 per cent of nitrogen dioxide from all sources (point and non-point). Other significant non-point source emissions of nitrogen dioxide are from residential and commercial heating and other miscellaneous sources.

Point source is a term used to describe emissions from a single discharge source that can be easily identified. Within the context of this Response, point sources were classified into three key sectors:

- Upstream oil and gas
- Chemical industry
- Other industry which include emissions from petroleum product transportation, electric power generation, and the various industries such as the grain, cement, and asphalt industries.

Emissions from **non-point sources** are spatially distributed emissions from common point, line, or area sources, caused by the release of pollutants from many different and diffuse sources (aggregated sources of emissions). This aggregation is done because the emission sources are either too small and numerous, too geographically dispersed, or too geographically large to be estimated or presented by a single point. Within the context of this Response, non-point sources were classified into several key sectors:

- On-road transportation
- Off-road transportation
- Residential and commercial heating
- Open area sources include emissions from agriculture operations, construction operations, dust from roads (paved and unpaved), prescribed burning, and waste processing
- Miscellaneous sources include incineration sources (e.g. cremation), industrial sources, air transportation, rail transportation, emissions from structural fires, and miscellaneous emissions from cigarette smoking and meat cooking

Of the transportation related emissions, it is approximately evenly split between off-road and on-road sources. On-road emissions are highest from those areas with the greatest populations and therefore the highest road usage. On-road sources do not undergo significant seasonal variation and are expected to be consistent year round. Off-road emissions sources are dominated by diesel fueled vehicles such as construction and agricultural equipment. Smaller contributions come from off-road vehicles and devices with small engines, such as all-terrain vehicles, yard equipment, and aquatic vessels. Contributions to off-road transportation emissions are concentrated near population centres. These activities are largely season dependent and therefore it is expected that off-road emissions are largest in the warmer months.

SULPHUR DIOXIDE (SO₂)

Emissions from sulphur dioxide are approximately 20 times less than nitrogen dioxide emissions in the Red Deer air quality management area and are dominated by upstream oil and gas point sources (accounting for nearly 90 per cent of all sulphur dioxide emissions). Sulphur dioxide emitting point sources are distributed sparsely throughout the Red Deer air quality management area and are mostly located outside of population centres.

Non-point source emissions of sulphur dioxide are predominantly from residential and commercial heating and off-road transportation. The City of Red Deer and Red Deer County have the highest emissions of non-point source sulphur dioxide emissions. Sulphur dioxide releasing non-point sources are concentrated near populated areas.

PRIMARY FINE PARTICULATE MATTER (PM_{2.5})

Point source emissions of primary fine particulate matter are collectively small, with the largest contributions coming from the chemical manufacturing industry.

Nearly the entirety (97 per cent) of primary fine particulate matter is emitted as non-point source emission. Open area sources dominate the non-point source emissions of primary fine particulate matter, which is largely emitted as dust from unpaved roads, and in smaller quantities from construction operations and agriculture. While unpaved roads are found within Red Deer, Lacombe, and Ponoka counties, Red Deer County's location (encompassing the City of Red Deer) means that traffic loads on rural unpaved roads are higher than in other counties, and subsequently result in more emissions of fine particulate matter.

Non-point source emissions from construction operations are expected to be concentrated around population centres and are focused throughout the warmer snow-free months (April – September) as construction operations are limited in the wintertime due to snow-cover and ground freeze-up. These same natural processes also act to limit to emissions of fine particulate matter from unpaved roads.

STAKEHOLDER ENGAGEMENT WORKSHOPS

In January 2015, stakeholders within the 'Area of Broader Stakeholder Engagement' were invited to a workshop on the fine particulate matter issue. The purpose of the information session was to:

- Build awareness and understanding among stakeholders in the Red Deer air quality management area about the fine particulate matter issue;
- Explain how the multi-stakeholder advisory committee and Alberta Environment and Parks were moving forward to prepare the Response; and
- Facilitate discussion about potential actions that could help reduce fine particulate matter in the Red Deer air quality management area.

In June 2015, stakeholders within the 'Area of Broader Stakeholder Engagement' were asked for feedback on the draft Response in a discussion guide format. Feedback from the engagement workshop and discussion guide was incorporated into the Response and implementation plan. A complete list of attendees at the January 2015 session is listed in Appendix B.

JURISDICTIONAL SCAN

A focused jurisdictional scan was completed to explore fine particulate matter management in Golden, British Columbia, and Whitehorse, Yukon. This built upon the existing jurisdictional scan completed as part of the Capital Region Fine Particulate Matter Response. Additionally, the jurisdictional scan evaluated the communications efforts undertaken by the State of Utah during implementation of their fine particulate matter State Implementation Plan.

The focused jurisdictional scan highlighted that both meteorology (temperature inversions and stagnant conditions) and topography can create ideal conditions for higher concentrations of fine particulate matter. These higher concentration events are a symptom of the impact of emission sources on ambient air quality levels, which impact human health. The jurisdictional scan also noted that source apportionment is an important tool in aiding the development of management strategies. Actions pertaining to engagement and communication are critical first steps to ensure that the broader stakeholders and the public are informed of the issue before implementation of policies and regulations. Management actions in other jurisdictions were shown to range from a combination of voluntary and behavioural changes to more stringent regulatory actions. Key learnings from each jurisdiction are summarized below.

GOLDEN, BRITISH COLUMBIA

- The town of Golden and the Columbia-Shuswap Regional District are subject to frequent high levels of particulate matter. Temperature inversions are common in communities located in mountain valleys or in areas that are nestled up against a mountain range where, coupled with stagnant conditions, inversions can prevent upward mixing of the air and result in the build-up of pollutants near the surface. Temperature inversions and stagnant conditions are prevalent during the winter season when daylight hours are reduced.
- The town was chosen as the location for a source apportionment study by the BC Ministry of Environment because of its historical particulate matter (PM₁₀) and fine particulate matter (PM_{2.5}) concentration levels, which have historically been well above the provincial average. Golden was also selected because of its representative topography and sources of a typical interior community in BC. Common sources contributing to high PM levels include wood-stoves, open burning, transportation, rail yards, wood processing, and road dust. The goals of the source apportionment study in Golden were to add to the knowledge base of the air quality in the airshed, and aid the development of management strategies.
- Golden and District Air Quality Committee – a society open to all Golden residents, industry, local, and regional government – is currently drafting an Air Quality Management Plan. Key aspects of the plan include information gathering and sharing, public education, conducting ongoing research, and enhancing public engagement.

WHITEHORSE, YUKON

- A recent study by the World Health Organization ranked Whitehorse as having the best air quality in the world. While the city's sustainability programs aren't designed specifically to address air quality, initiatives like public transit, bike, and pedestrian paths collectively can have an impact. Challenges for the city has been encouraging people not to idle their vehicles.

STATE OF UTAH

- During the winter, the Wasatch Front (the cities and towns along the western edge of Wasatch Mountain Range) suffers from multi-day wintertime air pollution episodes in which the concentration of fine particulate matter exceeds the National Ambient Air Quality Standards. The bulk of the fine particulate matter observed during these multi-day wintertime episodes are ammonium nitrate (58 per cent), organic carbon (20 per cent), ammonium sulphate (nine per cent) and elemental carbon (five per cent). Precursors of ammonium nitrate particulates are nitrogen oxides and volatile organic compounds.
- Utah's Department of Environmental Quality (the Division of Air Quality) noted that any solutions will require a community response. Consequently, before implementing controls that will limit individual freedom to burn wood or drive cars for example, a great deal of resources have been invested in engagement and communications to ensure that there is consistent messaging and knowledge about the issue.

GUIDING PRINCIPLES

The guiding principles reflect the Response's cumulative effects approach to managing ambient air quality in the Red Deer air quality management area. These principles provide the direction for development and implementation of the Response.

- **Alignment with existing initiatives:** the intent of the Response is to support, rather than replace existing frameworks, policies, and regulations. Aligning the Response's components and management with current initiatives supports and leverages existing work.
- **Regional coordination and shared ownership:** during periods of high fine particulate matter concentration in Red Deer, elevated concentrations of varying magnitude at other monitoring stations in Edmonton and Calgary are also typically observed, likely because of large scale meteorological events. As a result of the multi-station occurrence and complexity of the issue, regional coordination through shared ownership in the form of engagement and participation from all relevant stakeholders will help to maintain and improve air quality in the area.
- **Science-based:** effective management actions that will lead to measureable reductions in fine particulate matter concentration must be identified based on best available knowledge and investigative findings of sources. Understanding the conditions and contributions from sources promotes refinement of solutions to the issue.
- **Adaptive management:** the Response at the time of publication reflects the current knowledge and understanding of the issue. Through continuous commitment to further advancing knowledge and understanding of the issue, it is expected that management decisions will also be refined and updated. This adaptive management process, which uses new information to inform management decisions, is an iterative process.
- **Continuous improvement:** similar to an iterative process, the principle of continuous improvement is about actively considering remedial and preventative actions. Stakeholders may use improved technologies and methods to reduce emissions from anthropogenic sources towards the long-term goal of reducing overall ambient concentration of fine particulate matter.
- **Accountability:** through the reporting and evaluation process outlined in the Response, the Red Deer Advisory Committee will meet on a quarterly basis to ensure management actions are implemented. A status report on progress of implementation will be shared publicly every three years and evaluation of the Response will occur every five years.



Figure 7: The Red Deer Fine Particulate Matter Response Logic Model: Understanding and Evaluating a Complex System

THE RESPONSE

Using the logic model systems thinking approach shown in Figure 7, this section bring together knowledge of the key sources and pressures within the Red Deer air quality management area, and feedback from stakeholders, including the public, learnings from other jurisdictions, and scientific findings to develop the Response. Components of the Response include the goal, objectives, outcomes, management actions, reporting, and evaluation criteria sections.

Achieving the goal of the Response requires a proactive and future-focused approach. To achieve this, three main objectives were chosen to recognize the importance of educating (engagement), researching (investigation), and adapting to new information to make informed management actions (action).

Acknowledging that this issue is complex and management actions may take several years before the effect of the actions may be realized, implementation will occur in phases which allows for an iterative process for achieving outcomes and the increasingly more stringent CAAQS for fine particulate matter. Outcomes were identified for the goal and objectives within each phase to realistically describe where we see ourselves and what we hope to achieve within each phase. Consequently, each phase will focus on implementing the identified management actions to ensure the outcomes and goal is met.

Part of implementation is reporting to the public on the progress of implementation, which will occur every three years into each phase and an overall evaluation of the Response will occur at the end of each phase or every five years.

Each component of the Response – the goal, objectives, outcomes, reporting to the public, and evaluation – are described in detail below.

GOAL

The Response was triggered by the CWS however, with CAAQS to be implemented in 2015, the intention of the Response is to manage and reduce ambient fine particulate matter concentration within the defined air quality management area and to measure the effort against the numerical CAAQS at ambient air quality monitoring stations within the Red Deer air quality management area. Therefore the goal of the Response is to:

Reduce ambient fine particulate matter concentration and remain below the numerical CAAQS as measured at ambient air quality monitoring stations within the Red Deer air quality management area.

OBJECTIVES

In order to achieve the goal, three objectives were chosen. All three objectives are essential during each phase of implementation and are not specified according to priority. Each objective interacts with each other and collectively supports achievement of the goal and outcomes of the Response.

OBJECTIVE 1 – ACTION

Identify and develop management actions that can be implemented throughout the year to achieve measureable reductions in ambient fine particulate matter concentrations and precursors.

OBJECTIVE 2 – INVESTIGATION

Continue to improve knowledge of fine particulate matter in the Red Deer air quality management area. Improvement in knowledge can inform the cause of the exceedances and provide insight into better managing the issue.

OBJECTIVE 3 – ENGAGEMENT

Empower the public and stakeholders to reduce ambient fine particulate matter through promotion of outreach and education on the state of air quality in the Red Deer air quality management area and on how they can take action.

IMPLEMENTATION PHASES

Implementation of the management actions identified in the Response will occur in three phases. Table 2 highlights the implementation phases as being aligned with when CAAQS is anticipated to become more stringent. The need for phased implementation of the Response addresses the fact that developing and implementing management actions is complex and may take several years before some actions can be implemented or the effects of the actions to be realized. This approach acknowledges the principle of continuous improvement to ensure ambient concentrations of fine particulate matter continue to remain below the national standards.

Table 2: Red Deer Fine Particulate Matter Response Implementation Phases

Phases	
Phase 1	2015 – 2020
Phase 2	2020 – 2025
Phase 3	2025 – 2030

OUTCOMES

Outcomes were identified in order to set reasonable targets for where we hope to see ourselves and what we expect to achieve within each phase as a result of implementing the management actions listed in Table 5. Table 3 shows the outcomes for the goal and objectives for each phase of implementation of the Response. Establishing outcomes will inform overall evaluation of the Response. For more information on Alberta’s transition to managing to the CAAQS in the Red Deer Air Zone, refer to the accompanying GoA Action Plan.

Table 3: Red Deer Fine Particulate Matter Response Outcomes by Objective and Phase

Phase 1 (Underway – 2020)	Phase 2 (2020-2025)	Phase 3 (2025 – 2030)
Goal		
Reduce ambient fine particulate matter concentration and remain below the numerical Canadian Ambient Air Quality Standards (2015 CAAQS) within the Red Deer air quality management area as measured at the monitoring stations.	Reduce ambient fine particulate matter concentration and remain below the numerical Canadian Ambient Air Quality Standards (2020 CAAQS) within the Red Deer air quality management area as measured at the monitoring stations.	Reduce ambient fine particulate matter concentration and remain the numerical below Canadian Ambient Air Quality Standards (2025 CAAQS) within the Red Deer air quality management area as measured at the monitoring stations.
Objective 1: Action		
Phase 1 committed and proposed actions are implemented. Implemented actions will be refined based on new information.	Phase 2 committed and proposed actions are implemented. Implemented actions will be refined based on new information.	Phase 3 committed and proposed actions are implemented. Implemented actions will be refined based on new information.
Objective 2: Investigation		
Government of Alberta and stakeholders including the public increases their knowledge of the conditions, factors, and sources that contribute to the event days observed during the winter months and issues related to year-round management of PM _{2.5} .	Government of Alberta and stakeholders including the public continue to increase their knowledge of the conditions, factors, and sources that contribute to the event days observed during the winter months and issues related to year-round management of PM _{2.5} .	Government of Alberta and stakeholders including the public are knowledgeable of the conditions, factors, and sources that contribute to the event days observed during the winter months and issues related to year-round management of PM _{2.5} .
Objective 3: Engagement		
Stakeholders including the public are aware about the fine particulate matter issue and begin applying their knowledge to take action to address the event days observed during the winter months and issues related to year-round management of PM _{2.5} .	Stakeholders including the public apply their knowledge to changing their attitudes to take meaningful actions to address the event days observed during the winter months and issues related to year-round management of PM _{2.5} .	Stakeholders including the public take meaningful actions to address the event days observed during the winter months and issues related to year-round management of PM _{2.5} .

MANAGEMENT ACTIONS

Based on the current information and understanding about key sectors and pressures within the Red Deer air quality management area, Alberta Environment and Parks and the Advisory Committee members compiled an inventory of management actions to contribute to the overall management of fine particulate matter in the Red Deer air quality management area as documented in Table 5. The list of actions identifies management actions by Alberta Environment and Parks and the Advisory Committee that directly or indirectly manage fine particulate matter or precursor gases within the Red Deer air quality management area based on:

- Committed to: what is currently being done or actions that are not yet happening, but are budgeted for and approved.
- Proposed: Actions that stakeholders are considering, but have not received budget or been approved.

Table 4 defines the terms used for each column in Table 5.

Table 4: Key terms and definitions used in organizing the management actions as shown in Table 5

Definitions	
Sector	The economic sectors identified to be potential contributors to the fine particulate matter issue. Ongoing investigative efforts regarding the relative contribution of the source sectors will help provide additional information to prioritize management efforts. Further details on the rationale for considering these sectors in the Response are outlined in Appendix C.
Timeframe	When the identified management action is expected to begin implementation. <ul style="list-style-type: none"> ▪ Ongoing: current and active management actions that have been implemented before the official implementation of the Response ▪ Underway: management actions that were being implemented during the development of the Response ▪ Phase 1: identified management actions in the Response to begin implementation in 2015 ▪ Phase 2: identified management actions in the Response to begin implementation in 2020 ▪ Phase 3: identified management actions in the Response to begin implementation in 2025
Action	Management action identified that are expected to directly or indirectly result in the reduction of fine particulate matter and precursors.
Lead	Lead(s) are responsible for ensuring successful implementation and reporting back to the Advisory Committee on progress of the management action.
Status	<p>Committed: Management Actions that are -</p> <ul style="list-style-type: none"> a. Already implemented and currently happening b. Not yet happening but are budgeted and approved <p>Proposed: Management actions that are not yet happening and have not been budgeted or approved but are being considered for implementation.</p>

The management actions are organized by objective and by common strategies. Associated with each management action are the lead, status of the action, and the timeframe which correspond to the implementation phases to show when the action is expected to begin implementation.

The action list (Table 5) is not intended to be exhaustive. Instead, it is to provide the baseline and a clear picture of what key stakeholders in the Red Deer air quality management area are currently doing and proposing to do manage fine particulate matter. Others in the Red Deer air quality management area can consider these examples and identify where further actions could be helpful. In future iterations of the Response, through ongoing investigation, reporting to the public, and evaluation of the Response, the management actions list will be refined and additional management actions will be identified and implemented, as applicable.

Appendix D identifies and lists proposed management actions without Lead organized by objective and sector. The management actions in Appendix D are considered as 'proposed new management actions' and were generated by the broader stakeholders during discussion at the January 2015 information workshop and throughout the development of the Response by the Advisory Committee members. The intent of Appendix D is to document the ideas generated throughout the development process to encourage other stakeholders within the Red Deer air quality management area to adopt and adapt the examples during implementation of the Response.

Table 5: Committed and Proposed Management Actions by Alberta Environment and Parks and the Advisory Committee

OBJECTIVE 1: ACTION				
Sector	Timeframe	Action	Lead	Status
Transportation and Energy	Reduce Fuel Consumption			
	Underway to Phase 1	Implement areas of identified change including engagement of Councillor's and staff, vehicle fuel consumption, facilities, and new initiatives to create improvement.	Lacombe County	Proposed
Transportation	Reduce Fuel Consumption			
	Underway	Evaluate fuel consumption of vehicle and machinery fleet, including identifying energy conservation measures that will help lower the operating costs and decrease the environmental impacts of the fleet.	Lacombe County	Committed
	Underway	Develop and implement an internal idle reduction program for the County; includes the County vehicles, machinery, Councillors, and staff.	Lacombe County	Committed
	Underway	Idle Free program launched in the community which includes a large range of education materials, marketing and advertising tools, prompts, and signage posted in key locations in the community. Sign locations include city facilities, recreation and arts centres, City Hall, Red Deer College, businesses, churches, and others.	City of Red Deer	Committed
	Underway	Idle Free School program: Education program around the benefits of being an idle-free school. Program includes teachers' manual, school assembly presentation, communications support, and signage (signage is co-sponsored with partner Lafarge Canada).	City of Red Deer	Committed
	Underway	Greening the Fleet Strategy for the City of Red Deer	City of Red Deer	Committed
	Phase 1	Anti-idling signs are posted at drop-off locations at Red Deer Regional Hospital (completed). This example could be extended to other AHS buildings in the Red Deer area/region (proposed).	Alberta Health Services	Committed and Proposed

Transportation	Phase 1 (2017)	Design and construct two remote shops (one in the east end of the County, one in the west end of the County) to increase operational efficiencies and reduce travel time.	Lacombe County	Committed
	Reduce Emissions with Proper Vehicle Management, Maintenance, and Technology			
	Underway	Lacombe County and Sylvan Lake have started pilot projects to reduce idling times to reduce health and environmental effects. Throughout the project, PAMZ will document and evaluate the process and use the learnings to develop an idle reduction tool kit that other municipalities can use in central Alberta.	Lacombe County	Committed
	Underway	City of Red Deer adopted and is implementing a greening the fleet strategy for corporate vehicles. Red Deer also has a corporate idle free policy for fleet.	City of Red Deer	Committed
	Underway	Dust Control Incentive Program: offer a cost share incentive program to County residents for the purchase and application of dust abatement in front of their residence.	Red Deer County	Committed
	Underway	Improve fleet maintenance through an Integrated Asset Management Plan	Red Deer County	Committed
	Underway	Regional transit services: "BOLT" regional transit service launched as a partnership with Lacombe, Blackfalds, and the City of Red Deer. Regional Transit service between Red Deer County and the City of Red Deer successfully operating.	Various municipalities	Committed
	Underway to Phase 1 (2017+)	Fleet has practical idling procedures in place, while not negatively effecting operational efficiencies; vehicle replacement ensures current advanced emissions systems and technology, and ensures maintenance programs are current.	Lacombe County	Committed
	Phase 1	The use of plug-in interior vehicle warmers in Lacombe County vehicles could be explored and introduced where applicable.	Lacombe County	Proposed
	Phase 1	Could consider writing key elements/ requirements into RFP and RFT for projects provided they are consistent with internal trade agreements and Alberta Purchasing Connection.	Lacombe County	Proposed

Transportation	Create Environments that Encourage Alternative Modes of Transportation			
	Underway	Design and construction of multi-use trails within rural areas, allowing connection to adjoining municipalities.	Lacombe County	Committed
	Underway	Almost all development is low density and does not provide an opportunity to consider public transportation. Currently cooperating with urban centres to provide transportation related to special needs.	Lacombe County	Committed
	Underway	Installation, maintenance, and planning for extensive trail system including walking and biking paths.	City of Red Deer	Committed
	Underway	Construction and maintenance of rural trail systems as well as planning for future expansion of trails through open space and concept planning	Red Deer County	Committed
	Underway	Work with the City of Red Deer to provide RDT service extensions to Gasoline Alley and the Hamlet of Springbrook.	Red Deer County	Committed
	Underway	Continued investigation in the area of waste-to-energy technologies to reduce our need to transport solid waste to landfill outside of the County.	Red Deer County	Committed
	Underway	City of Red Deer providing and considering new transit programs to improve rider services, such as Google Maps and allowing pets on buses. Also to reduce impact by purchasing right-sized buses.	City of Red Deer	Committed
	Underway	Provide support and guidance to assist municipalities when making decisions on land-use planning for improved environmental outcomes.	Alberta Environment and Parks	Committed
Energy	Reduce Energy Consumption			
	Underway	Evaluate energy consumption of facilities, including identifying energy conservation measures that will help lower the operating costs and decrease the environmental impacts of the buildings.	Lacombe County	Committed
	Underway	Consider alternative energy sources (solar power) during the design and construction of two remote shops. Based on the experience gained, solar power may be expanded to other facilities.	Lacombe County	Committed
	Underway	LED traffic light and street light replacement program.	City of Red Deer	Committed

Energy	Underway	Increase Green Power for corporate building as well as working with the community to increase community awareness of green power alternatives.	City of Red Deer	Committed
	Underway	For internal purchases, will continue to look at energy efficiency when purchasing equipment and vehicles.	Lacombe County	Committed
	Phase 1	Can amend standards and specifications to require any new generator being proposed as part of a communal water/wastewater facility to be natural gas generated.	Lacombe County	Proposed
	Phase 1 (2018+)	LED Street Light Replacement Program.	Lacombe County	Proposed
	Land-use Bylaw Amendment			
	Underway	Amendment made to Red Deer County Land-use Bylaw to allow for green energy development.	Red Deer County	Committed
Industrial	Ensure facilities meet regulatory requirements for fine particulate matter emissions and precursors			
	Underway – Phase 1	Develop and deliver an Air Emissions Management Program focusing on EPEA approval holders in the Red Deer area to manage and reduce emissions for fine particulate matter and its precursors.	Alberta Environment and Parks	Committed
	Underway	The Alberta Energy Regulator regulates upstream oil and gas facilities within the Red Deer Air Quality Management Area; where these facilities are known to emit NO _x , SO ₂ , and VOCs. Existing requirements, such as Directive 060 are already in place. Collaborate with Environment and Parks in implementation of the Response.	Alberta Energy Regulator	Committed
	Underway	Reducing NO _x emissions from existing equipment. Major capital expenditures provide the most efficient opportunity to upgrade emission controls and will reduce emission intensity. These opportunities are tied to capital stock turnover timing and major expansions.	NOVA	Committed and Proposed
	Underway	Will continue to look at ways to minimize emissions from owned facilities.	Lacombe County	Committed

	Reduction and Control of Fugitive Emissions			
	Underway	Annual Leak Detection and Repair Program for Fugitive Emissions. Lead industries have a longstanding fugitive emissions control program. Lead industry is defined as the industry responsible for reporting back on the committed management action. At the Advisory Committee table, this currently although subject to change, includes Husky Energy, Shell Canada, NOVA Chemicals, Dow Chemical Canada ULC, MEGlobal Canada Inc.	Lead Industry	Committed
Residential	Reduce fine particulate matter emissions and precursors			
	Phase 1	Alberta Health Services and AEP to collaborate and develop specific messaging for when air quality advisories are issued to encourage public action. Part of developing specific messaging can be informed by the current work to analyze and draw draft findings around fine particulate matter events and health impacts to Albertans.	Alberta Health Services Alberta Environment and Parks	Proposed
	Phase 1	During high Air Quality Health Index days driven by fine particulate matter, AEP will work with municipalities to address burning. Part of this initiative will heavily focus on education to inform the public about the effect and impact of wood fire/garbage/yard waste burning on air quality. Additional initiatives can include: <ul style="list-style-type: none"> ▪ Wood burning complaint forms ▪ Free yard waste pick up during spring, summer, and fall ▪ Brushing and chipping program to decrease burning 	Alberta Environment and Parks	Proposed
	Phase 1	Can consider a guideline for southern exposure as part of the MDP review. Lacombe County does not have the expertise to develop guidelines and best practices for construction and renovation of homes however can facilitate the dissemination of information available through industry.	Lacombe County	Proposed

Objective 2 - Investigation				
Sector	Timeframe	Action	Lead	Status
All	Monitoring and Data			
	Underway	City of Red Deer partners with PAMZ to host monitoring stations at two permanent locations within city limits and regularly reviews and shares data.	City of Red Deer Parkland Airshed Management Zone	Committed
	Underway	Track and report annually to City Council and public on PM _{2.5} and other pollutant level as part of the City of Red Deer's Environmental Master Plan annual reports.	City of Red Deer	Committed
	Phase 1	Review the programs and initiatives being done by neighbouring communities and stakeholders (idle free, carpool, LED lighting)	Red Deer County	Proposed
	Phase 1	<p>Advancing the knowledge of fine particulate matter and its precursors to inform management actions in the Red Deer air quality management area:</p> <ul style="list-style-type: none"> ▪ Increase understanding of the species composition of particulate matter ▪ Broadening the understanding of the spatial and temporal variation of fine particulate matter and its precursors ▪ Continued modelling studies to understand the formation, dispersion and deposition of particulate matter in the region. ▪ Conduct a monitoring network assessment, as required to better design a monitoring program to better understand the sources of fine particulate matter and its precursors. ▪ Investigate other sources of fine particulate matter and its precursors from non EPEA-approved small businesses and operations <p>For more information on Alberta's transition to managing to the CAAQS for fine particulate matter, refer to the accompanying GoA Action Plan.</p>	Parkland Airshed Management Zone Alberta Environment and Parks Alberta Environmental Monitoring, Evaluation and Reporting Agency	Proposed
Transportation and Energy	Understand Impacts			
	Underway	Support carpool promotion programs (for employees, for residents, for customers).	City of Red Deer	Committed
	Underway	Integrated Transportation/Movement Study encouraging public transit and increased multi-use trails.	City of Red Deer	Committed

Transportation and Energy	Underway to Phase 1 (2015)	Understand Lacombe County's impact on the environment regarding energy consumption; includes energy audits of vehicle fuel consumption, energy audit of facilities, identification of current best management practices, and Councillor and staff engagement.	Lacombe County	Committed
	Phase 1	Traffic Light optimization based modelled traffic flow, update model with real time data.	City of Red Deer	Proposed
	Identify Areas for Change			
	Underway to Phase 1 (2016)	Identify potential areas for change around vehicle fuel consumption, facilities, best management practices, alternative energy sources, and engagement of Councillor and staff.	Lacombe County	Proposed
	Phase 1	Improvements to fleet operations and maintenance by reviewing policy.	Red Deer County	Proposed
	Phase 1	Include air quality awareness as part of our tendering packages to promote air quality stewardship with our contractors.	Red Deer County	Proposed
Small Businesses and Operations	Understand impacts			
	Phase 1	Better understand contributions from small businesses and manufacturing that do not require an Environmental Protection and Enhancement Act (EPEA) approval to the fine particulate matter issue. This knowledge will inform us on the impact on air quality and help us identify partners and promote collaborations.	Alberta Environment and Parks	Proposed
	Phase 1	Assist in the dissemination of information relative to emissions from small businesses	Lacombe County	Proposed
Residential	Phase 1	Collaborate in the identification of industry and businesses that are large emitters of air pollution through the planning and environmental department.	Lacombe County	Proposed
	Understand impacts			
	Underway	Gather statistics on the number of patients that present with respiratory related illnesses to Red Deer Emergency Department of Health Link calls. Overlap with air quality data.	Alberta Health Services	Committed

	Phase 1	Investigate the development of guidelines or recommended best practices for new construction to address building energy intensity for both new construction and potentially for renovation of older buildings as well.	City of Red Deer	Proposed
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Objective 3 - Engagement				
Sector	Timeframe	Action	Lead	Status
All	Communicate and Promote Responsible Actions to Reduce Fine Particulate Matter Event Days			
	Ongoing	AEP will engage with municipalities to inform and provide support for implementation of the Response.	Alberta Environment and Parks	Committed
	Ongoing	Use of Air Quality Health Index as a public and health care education communications tool.	Alberta Environment and Parks	Committed
	Underway	Develop and implement a PM2.5 Education and Engagement Strategy that identifies target audiences, strategies, and outline best practices for each sector.	All stakeholders	Committed
	Phase 1	Increase public knowledge about air quality. Have link to AEP website or specific information on AHS website and information available through Health Link.	Alberta Health Services	Proposed
	Phase 1	Educate residents on PM2.5 through County News, website, and social media.	Red Deer County	Proposed
	Phase 1	Become a member of PAMZ.	Red Deer County	Proposed
Transportation	Communicate and Promote Responsible Actions to Reduce Air Emissions			
	Underway	Provide Councillors, staffs and the community with education and awareness about idling.	Lacombe County	Committed
	Underway	Engage additional schools into the Idle Free program. There are 16 schools within the City and two in the region that have successfully used the program and been designated as Idle Free. Summer interns are hired to conduct idle free education and observations/audits and research reports.	City of Red Deer	Committed

Transportation	Underway	Recognition and celebration of World Car Free Day aims to reduce car dependency, ultimately reducing air pollution by encouraging residents to leave their car at home and find alternative ways to get around. This has included the City of Red Deer offering free transit services for the entire day as a method to encourage ridership.	City of Red Deer	Committed
	Underway	Facility Idle Free Education Program: Signs are installed across NOVA Chemicals Joffre site to encourage anti-idling for both personal and fleet vehicles.	NOVA Chemicals	Committed
	Underway	NOVA Chemicals uses carpool.ca to allow carpoolers to find carpool partners. Initiatives are held annually to promote carpooling.	NOVA Chemicals	Committed
	Underway	Voluntary Vehicle Emission Testing Program – NOVA Chemicals own equipment to test vehicle emissions and supports vehicle emission testing programs for its employees, community, and in partnership with PAMZ in Red Deer. Emission clinics educate people on vehicle maintenance and the impact of their vehicle on the environment.	NOVA Chemicals	Committed
	Phase 1	During voluntary vehicle emissions testing events, educate about the impact on air quality from altering a vehicle's air emissions control system. Potential to expand service and education to partners (i.e. vehicle dealerships)	Parkland Airshed Management Zone	Committed
	Phase 1	Education brochures on anti-idling for schools to include in beginning of year information packages.	Alberta Health Services	Proposed
Energy	Communicate and Promote Responsible Actions to Reduce Energy			
	Underway	Provide Councillors, staff, and the community with education and awareness about energy consumption.	Lacombe County	Committed
Industrial	Report on continuous improvements related to fine particulate matter			
	Underway	Share a list of improvements implemented by industry that impact and manages for fine particulate matter. Update the list periodically. The intent is to give industry the opportunity to demonstrate continuous improvement and proactive management by publically share what management initiatives have already been implemented.	Lead Industry	Proposed

Communicate and Promote Responsible Actions to Reduce Fine Particulate Matter Event Days				
Residential/ Others	Phase 1	Give air quality presentations for health care professionals.	Alberta Health Services	Proposed

EDUCATION AND ENGAGEMENT STRATEGY

Collaborative planning and decision-making are central to the legitimacy and effectiveness of public policy and programs. Air quality management is multi-faceted requiring the participation of numerous affected people, industries, and agencies. By combining efforts and working together, stakeholders will achieve a better understanding of local priorities, needs, and expectations as well as broader appreciation of current research, trends, and potential solutions.

The Education and Engagement Strategy is intended to coordinate outreach and education efforts to empower the public and stakeholders to reduce ambient fine particulate matter by informing them on the state of air quality in the Red Deer air quality management area, on how it impacts them, and on what they can do to help.

Using a logic model approach, the strategy is being developed by Alberta Environment and Parks with strategic advice from Parkland Airshed Management Zone Communications Committee and the Red Deer Advisory Committee. The Education and Engagement Strategy is a living document that will be revised and refined as new information is made available during implementation. Alberta Environment and Parks will lead the implementation of the Education and Engagement Strategy in collaboration with the Advisory Committee members.

As shown in Figure 8, the Strategy identifies who could contribute to the achievement of the goal (target audiences), how each sector can contribute, what role they play in developing the literacy outcomes, how the desired outcomes will be effectively and efficiently achieved given the current situation, available resources, and priorities.

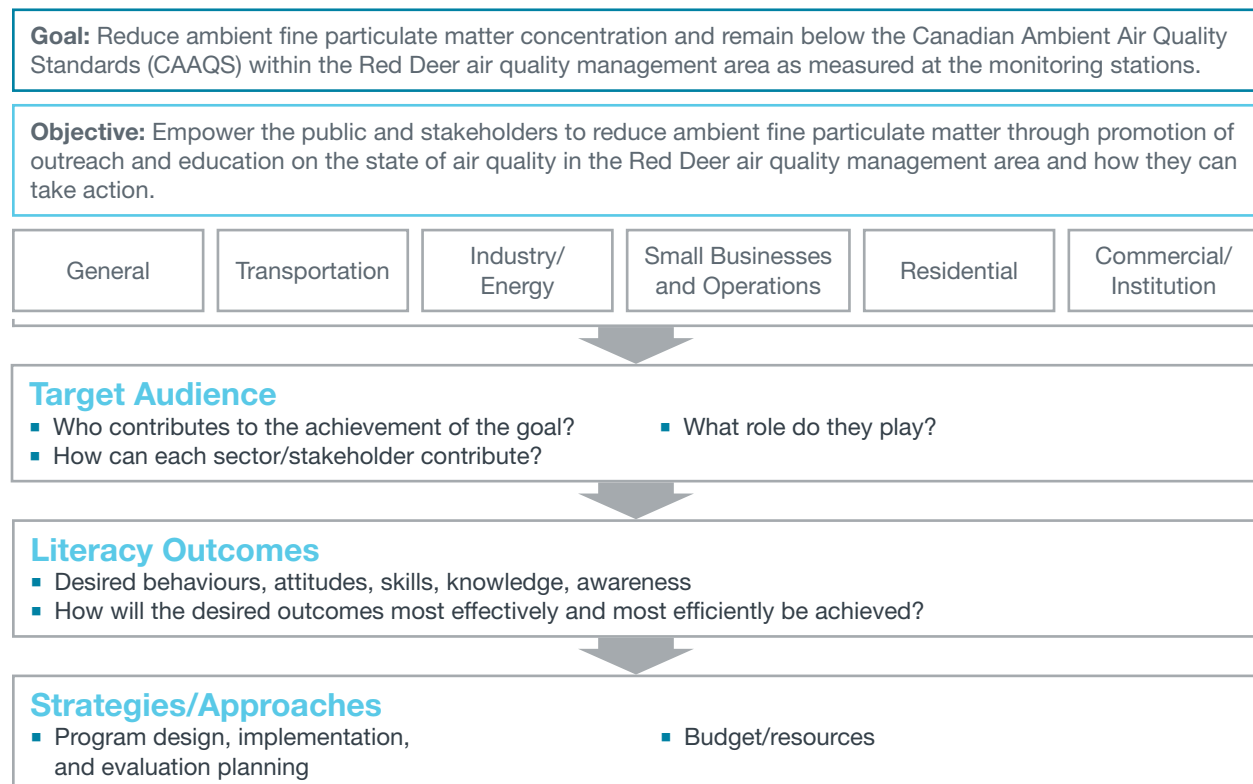


Figure 8: The Red Deer Fine Particulate Matter Response Education and Engagement Strategy Logic Model

From the feedback gathered during the development of the Education and Engagement Strategy, five priority areas of work were identified for implementation with recommended strategies and approaches as outlined in Table 6.

Table 6: The Red Deer Fine Particulate Matter Response Education and Engagement Strategy Logic Model

Priority Area of Work	Strategies and Approach
General Air Quality Education and Outreach	<ul style="list-style-type: none"> ▪ Partner with other department and agencies including Alberta Health Services ▪ Leverage special events like Clean Air Day ▪ Strategic, coordinated public communication and outreach on air quality event days ▪ Create visual, innovative, attention grabbing demonstrations and display to make air quality issues 'come to life' ▪ Targeted publications for school audiences, agricultural sector, small businesses, etc. that include key options for taking action ▪ Potential to align with one simple act for air quality ▪ Expand and enhance voluntary vehicle emissions testing clinics
Mobile Source Education	<ul style="list-style-type: none"> ▪ Expand PAMZ Idle Free Campaign to broader audience ▪ Partner with Alberta Health Services and engage other provincial departments and agencies including Department of Transportation for opportunities to promote and enhance idle free, vehicle emissions testing and advanced non-point source emissions management
Promoting Industrial Excellence	<ul style="list-style-type: none"> ▪ Identify best practices for large and small industry ▪ Work with chambers of commerce and Alberta Innovate & Advanced Education for small industry and small operations ▪ Enhance and expand on Action HERO award ▪ Communicate and celebrate industrial achievement in accomplishing continual improvement plans ▪ Engage and align with Climate Change secretariat and GOA ministries on development of incentive programs
Promoting Municipal Excellence	<ul style="list-style-type: none"> ▪ Enhance and expand on Action HERO award ▪ Work one-on-one with municipalities to explore options, transportation strategies and infrastructure, develop strategic planning processes to factor in environmental outcomes ▪ Facilitate collaboration, networking, and communication between municipalities to share successes and create partnerships ▪ Engage on organization similar to the ALIDP (Alberta Low Impact Development Partnership) but for air quality management
Energy Education	<ul style="list-style-type: none"> ▪ Align with Climate Change Strategy implementation and One Simple Act program

PROGRESS REPORT

Following issuance of the Response, the Advisory Committee will continue to meet quarterly to share updates and progress on implemented actions and to ensure the forum exist for accountability, collaboration, and transparent administration. Reporting to the public will occur three years into each phase of implementation. The intent is to share a progress update, identify new management actions, and reflect on what can be improved for the next phase of implementation.

The progress on implementation will be publically reported and will speak to:

- Progress on implementation of management actions, investigation, and engagement;
- Highlight findings from ongoing investigative work;
- Acknowledge other national and provincial initiatives that might also have an impact on the goal of the Response;
- Outline any trends in fine particulate matter in light of the most recent and past air quality annual assessments with respect to meteorology;
- Note any changes to the population and economy within the air quality management area; and
- Identify what worked and what can be improved upon.

EVALUATION

Effectiveness of the Response in reaching its goal will be evaluated every five years, which corresponds to the end and beginning of implementation phases.

The intent of the five year evaluation period is to assess whether the management actions being implemented in each phase are effective in meeting the goal and outcomes of the Response. As part of evaluation, the Response and Science Report will also be comprehensively reviewed for the purpose of applying adaptive management, incorporating new scientific findings, acknowledging new stresses on the environment, and aligning with provincial and national initiatives. The review will serve to update the documents and to incorporate new information.

It is important to acknowledge that there are obvious challenges to making the causation link between the management actions being implemented in the Response to the ambient fine particulate matter concentration as measured at the monitoring stations. However, by identifying indicators to assess the ambient conditions, the frequency and magnitude of the events observed, the expected emissions reduction where applicable, and outcomes; we can expect that if our actions are effective, then the indicators outlined in Table 7 will demonstrate actions are having the intended impact on improving air quality in the area.

By working through the implementation of the management actions, committing to increasing our general and scientific knowledge of the issue, ensuring transparent reporting back to the public on progress, and evaluating the Response using indicators, Alberta Environment and Parks in collaboration with stakeholders will be able to inform management decisions that are based on the best available information.

Table 7: Proposed indicators for evaluating the Red Deer Fine Particulate Matter Response

Proposed Indicators	What is it measuring?	Rationale
Canadian Ambient Air Quality Standards (CAAQS)	Ambient fine particulate matter concentration	If the implemented management actions are effective then we can expect to see a reduction in ambient fine particulate matter concentration.
Event Days	Frequency and magnitude	If the implemented management actions are effective then we can expect to see a reduction in the number of event days reported.
Emission Reduction	The estimated reduction in precursor emissions as a result of implementing management actions identified in the Response.	Efforts will be made to quantify the estimated reduction in precursor emissions, where feasible from implementing management actions.
Outcomes	The implementation targets are achieved.	Evaluate whether targets are met in each implementation phase by Objective.

NEXT STEPS

Implementation will continue to focus on delivery of the management actions and initiatives specified under each of the three objectives. For Phase One, the priorities for Alberta Environment and Parks are:

OBJECTIVE 1 – ACTIONS

- Implement and develop Phase One committed and proposed management actions.

OBJECTIVE 2 – INVESTIGATION

- Refine scientific knowledge of the issue through speciation monitoring and source apportionment modeling.

OBJECTIVE 3 – ENGAGEMENT

- Implement the Education and Engagement Strategy.
- Continue the Advisory Committee process with quarterly meetings to begin reporting on and tracking progress of implemented management actions.

SUMMARY – HOW IT ALL FITS TOGETHER

The Government of Alberta recognizes the importance of air quality and is committed to leading the implementation of the Response. The complexity of the fine particulate matter issue highlights how all stakeholders and sectors have levers for action and power to influence that complement the Government of Alberta in managing air quality.

Air quality management is complex where all jurisdictions and stakeholders in the Red Deer air quality management area can contribute to the better management of fine particulate matter. The public expects stakeholders to work together to responsibly manage and prevent air quality from deteriorating, and strive for continuous improvements in air quality.

With the 2015 release of the CAAQS results (2011-2013 data) as part of the AQMS, it is important to understand where the Response fits into the overall system. The Response is the first step to delivering on regional air quality management in the Red Deer air quality management area and sets up the regionally collaborative approach to manage the fine particulate matter issue. It recognizes that actions need to continue to be implemented with new actions to be developed over time informed by new information. It also recognizes the need to align with Alberta's transitional approach to managing toward the CAAQS for fine particulate matter. For more information on this transition to CAAQS, refer to the accompanying GoA Action Plan.

Given the complexity of the issue and the multitude of potential sources contributing to the issue, the Response incorporates both regulatory and non-regulatory actions to address point and non-point sources. Regulatory actions fall to the government agencies to implement through facility operating conditions. Non-regulatory actions include information outreach to educate, encourage voluntary undertaking of activities, enable behavioral change, and establish partnerships and agreements between different levels of government, stakeholders, and the public. This collaboration between multiple players demonstrates a regionally coordinated approach critical to the success of managing a complex issue and will set the foundation for the regional Red Deer Air Quality Management Framework under the Land-use Framework.

The issue of elevated fine particulate matter concentration will continue to be of importance as the national standards for fine particulate matter and ground-level ozone become more stringent. As a result, the Government of Alberta is exploring a number of possible options to reduce air pollution emissions, including more stringent standards for industry, standards for vehicles, and increased air monitoring. Efforts are being made to learn how jurisdictions in non-attainment of national fine particulate matter standards manage for point and non-point sources. This will inform development of management tools specific to Alberta.

As the Government of Alberta continues to scope out the provincial policy direction and supporting management tools to managing for CAAQS across the Red Deer Air Zone, the current regional work of developing and implementing the Red Deer Fine Particulate Matter Response within the Red Deer Air Quality Management Area will inform provincial policy and planning over the medium and long-term. Alberta Environment and Parks is currently developing an initiative in both the Red Deer and Capital Region air quality management areas. The air emissions management program will focus on EPEA approval holders within Red Deer air quality management area to manage and reduce particulate matter and its precursors. The program will align with Alberta's transition to managing to the CAAQS for fine particulate matter. For more information on the CAAQS, refer to the accompanying GoA Action Plan.

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ABBREVIATIONS AND ACRONYMS

AEMERA	Alberta Environmental Monitoring, Evaluation and Reporting Agency
AEP	Alberta Environment and Parks
AER	Alberta Energy Regulator
AQHI	Air Quality Health Index
AQMS	Air Quality Management System
BLIERS	National base-level industrial emissions requirements
CAAQS	Canadian Ambient Air Quality Standards
CASA	Clean Air Strategic Alliance
CCME	Canadian Council of Ministers of the Environment
CWS	Canada-wide Standard
EPEA	Environmental Protection and Enhancement Act
FDMS	Filter Dynamic Measurement System
FEM	Federal Equivalent Method
LED	Light-emitting Diode
LEEDS	Principles
LiDAR	Light Detection And Ranging
MDP	Municipal Development Plan
NAAQS	National Ambient Air Quality Objectives
NH ₃	Ammonia
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PAMZ	Parkland Airshed Management Zone
PM ₁₀	Particulate Matter Less than 10 Microns in Diameter
PM _{2.5}	Fine Particulate Matter
QEII	Queen Elizabeth II Highway

RDPS	Regional Deterministic Prediction System
SHARP	Synchronized Hybrid Ambient Real-time Particulate
SO ₂	Sulphur Dioxide
TEOM-SES	Tapered Element Oscillating Microbalance Sample Equivalent System
TSP	Total Suspended Particles
US EPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds

GLOSSARY

Acid Deposition Management Framework

Sulphur dioxide (SO₂) and nitrogen oxides (NO_x) are the main acid-forming pollutants. The Alberta Acid Deposition Management Framework (2008) is based on four levels of acid deposition. Each of the levels of deposition corresponds with specific management practices.

Action Level

An action level is one of four levels of the Clean Air Strategic Alliance Particulate Matter and Ozone Management Framework, e.g., Baseline Monitoring and Data Gathering, Surveillance Actions, Management Plan or Mandatory Plan to Reduce Below the Canada-wide Standards (or Canadian Ambient Air Quality Standards starting in 2015).

Air Quality

The composition of air, with respect to quantities of pollutants therein, and/or a measure of the health-related and visual characteristics of the air; used most frequently in connection with standards against which the contribution of the particular pollutant source can be compared.

Air Quality Management System

The national Air Quality Management System (AQMS) is a comprehensive approach for reducing air pollution in Canada. It is the product of unprecedented collaboration by the federal, provincial, and territorial governments and stakeholders.

Air Quality Objective

A numerical concentration, value, or narrative statement which is intended to provide protection of the environment and human health to the extent that is technically and economically feasible, and is socially and politically acceptable.

Airshed

An airshed is a geographic area that, because of emissions, topography, climate and meteorology, typically experiences similar air quality.

Air Zones

Air zones are a place-based approach to managing local air quality. In Alberta, the air zones assume the regional land-use boundaries with the exception of Lower and Upper Peace being considered as one air zone. Consequently, there are six air zones – Peace (Lower and Upper Peace regions), Lower Athabasca, Upper Athabasca, North Saskatchewan, South Saskatchewan, and Red Deer. Air management can be guided by an Air Zone Management Framework and will be considered in the regional air quality management framework to ensure proactive measures are taken to protect air quality in accordance with the principles of continuous improvement and keeping clean areas clean.

Ambient Air

Outside air; any portion of the atmosphere not confined by walls and a roof to which the general public has access.

Ambient Air Quality Trigger

An ambient air quality trigger is a concentration set at a value lower than the ambient air quality limit. The ambient air quality triggers are intended to provide sufficient time to react to prevent reaching the ambient air quality limit.

Ammonia (NH₃)

A pungent colorless gaseous compound of nitrogen and hydrogen that is very soluble in water and can easily be condensed into a liquid by cooler temperature and pressure.

Approval

Under the Environmental Protection and Enhancement Act (EPEA), “approval” means an approval issued in respect of an activity, and includes the renewal of an approval.

Base-Level Industrial Emissions Requirements (BLIERs)

BLIERs are one component for consideration when developing provincial source emission requirements and industrial approvals; but are not the sole consideration. Alberta, like all other jurisdictions, is entitled to set more stringent requirements especially where the BLIERs do not align with provincial policy. The BLIERs represent minimum national source-based standards.

Canadian Ambient Air Quality Standards

The Canadian Council of Ministers of the Environment is developing Canadian Ambient Air Quality Standards that will be established as objectives under the Canadian Environmental Protection Act (1999), and will replace the existing Canada-wide Standards. These new standards will be developed for particulate matter and ozone first, and then for nitrogen oxides, sulphur dioxide, and volatile organic compounds. The standards will set triggers to promote proactive measures to keep clean areas clean and for continuous improvement.

Canada-wide Standards

Canada-wide Standards are inter-governmental agreements developed under the Canadian Council of Ministers of the Environment to address environmental protection and health risk issues. The standards represent a commitment to reducing the concentrations of substances such as fine particulate matter and ozone in ambient air.

Clean Air Strategic Alliance (CASA)

The Clean Air Strategic Alliance is multi-stakeholder partnership, composed of representatives selected by industry, government, and non-government organizations, which recommends strategies to assess and improve air quality in Alberta.

Continuous Monitoring

Continuous monitoring involves monitoring the quality of the ambient air on a continuous basis. This can provide the greatest resolution but may be costly due to capital and operating expenses. Data from continuous monitoring can be stored in different time blocks, such as one-hour averages or five-minute averages. Typically, fine particulate matter and gases such as ozone and sulphur dioxide are continuously monitored. Continuous monitoring can be carried out on a long-term or temporary basis.

Cumulative Effects

Cumulative effects are the combined effects of past, present, and foreseeable human activities over time on the environment, economy, and society in a particular place. The combination of activities can produce effects that are different in scale, nature, or extent from the effects of individual activities alone.

Emissions Management Framework for the Alberta Electricity Sector

The Clean Air Strategic Alliance (2003) Emissions Management Framework for the Alberta Electricity Sector aims at continuous improvement of air emissions standards for electricity generation through seven key components: standards for new units, requirements for existing units, stakeholder review at five-year intervals, monitoring transparency and accountability, continuous improvement, renewable and alternative energy, and energy efficiency and conservation.

Fine Particulate Matter

Refers to airborne particles that are 2.5 microns or less in diameter.

Fine Particulate Matter Event

“Event days” are those days where the 24-hour average fine particulate matter concentration is equal to or greater than 20 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$); this is equivalent to exceeding the planning trigger into Level 3. The 24-hour concentration is calculated from midnight to midnight. The fine particulate matter concentration of 20 micrograms per cubic meter was adopted from the Management Plan Action Level in the Clean Air Strategic Alliance PM and Ozone Framework.

Industrial Release Limits Policy

The intent of this policy is to provide a clear process for developing industrial release limits that ensures the appropriate level of pollution prevention and control technologies are adopted and that the environment is adequately protected. This involves determining the achievable release limits based on the capability of the most effective demonstrated pollution prevention and control technologies.

Inversions

Also called a thermal inversion, temperature inversions occur when the normal decrease in air temperature with increasing altitude is reversed and air above the ground is warmer than the air below it. With temperature inversions, cold air sinks to the ground level and stays there because it is denser than warm air. The conditions become stagnant and pollutants are trapped at ground level.

Iterative

The process of revising and improving with the aim of approaching a desired goal with each revision.

Nitrogen Dioxide (NO_2)

Toxic pungent reddish-brown gas formed by the reaction of atmospheric ozone with the nitric oxide produced from combustion.

Nitrogen Oxides (NO_x)

A general term pertaining to nitrogen monoxide (NO) and nitrogen dioxide (NO_2). Nitrogen oxides are typically created during combustion processes, and are major contributors to smog formation and acid deposition.

Non-point Source

Non-point source is a pollution source that is not recognized to have a single point of origin. It is often characterized by the release of pollutants from many different and diffuse sources (aggregated sources of emissions). This aggregation is done because the emission sources are either too small and numerous, too geographically dispersed, or too geographically large to be estimated or represented by a single point.

Ozone (O_3)

Refers to an oxygen compound (O_3) occurring in the form of a gas in the atmosphere at ground level.

Passive Monitoring

Passive monitoring involves exposing a reactive surface to the air, which results in transfer of the pollutant by diffusion from the air to the monitor's surface. The exposed surfaces are analyzed to determine the pollutant concentration. The sampling rate for some passive monitors is adjusted based on wind speed, temperature, and humidity.

Point Source

A point source is a stationary location or fixed facility from which substances are discharged.

Primary Pollutant

A primary pollutant is one that is emitted into the atmosphere directly from the source of the pollutant and retains the same chemical form.

Regional Monitoring

Regional stations are strategically located to represent areas with multiple emission sources.

Secondary Pollutant

A secondary pollutant is one that is formed by atmospheric reactions of precursor of primary emissions. Secondary pollutants undergo a chemical change once they reach the atmosphere. An example of a secondary pollutant is ozone created from organic vapours given off at a gasoline station. The organic vapours react with sunlight in the atmosphere to produce the ozone, the primary component of smog. Control of secondary pollutants is generally more problematic than that of primary pollutants, because mitigation of secondary pollutants requires the identification of the precursor compounds and their sources as well as an understanding of the specific chemical reactions that result in the formation of the secondary pollutants.

Source Apportionment

This is a process of taking measurements and tracking down the sources of a substance through receptor modelling, which helps in identifying the sources and the extent of contribution to the substance.

Source (of Emissions)

There are many sources of emissions, but these have generally been grouped into two categories: emissions from point and non-point sources. A point source is a stationary location or fixed facility from which substances are discharged. A non-point source is a pollution source that is not recognized to have a single point of origin. Common non-point emission sources are agriculture, forestry, urban, mining, construction, and city streets.

Sulphur Dioxide (SO₂)

A strong smelling, colourless gas that is formed by the combustion of fossil fuels containing sulphur. Sour gas processing plants, oil sands processing plants, and coal-fired power generating plants are major sources of sulphur dioxide.

Volatile Organic Compounds (VOCs)

VOCs are carbon-containing compounds that evaporate into the air at room temperature. VOCs contribute to the formation of smog and/or may be toxic. Common sources include gasoline, alcohol, and the solvents used in paints.

APPENDIX A: AIR QUALITY MANAGEMENT IN ALBERTA

Air quality management in Alberta has evolved over time to adapt to changing needs and improved knowledge and can be traced back to 1945 when a section of Alberta's *Public Health Act* was amended to follow the evaluation of air quality complaints. Alberta's Department of Health was responsible for programs to assess and control air pollution in Alberta until 1971, when Canada's first environment department, the Alberta Department of Environment was created. Soon after, Alberta's *Clean Air Act* was passed, which allowed the environment minister to make a range of regulations related to ambient air quality standards, emission standards, and monitoring methods. In 1992, the *Clean Air Act* was replaced with the *Environmental Protection and Enhancement Act*.

Air quality has traditionally been managed for industrial facilities, specific populations, and ecologically sensitive areas through environmental assessments, regulatory approvals, code of practices, and enforcement. Other management approaches for point sources include ambient air quality objectives, source performance standards, plume dispersion modelling, ambient air and source emission monitoring, environmental reporting, emission inventories, compliance education and prevention programs, and research. Point sources are defined as a stationary location or fixed facility from which substances are discharged.

By 2007, with increased population and industrial growth, the Government of Alberta recognized that management of air quality must not only be approached on a project-by-project basis but must also consider a cumulative effects management approach at a regional scale. Comprehensive regional air management was phased in to meet the evolving need to inform and address stakeholders' concerns on local issues, such as public health, impact of new facilities, and regional development. Today, cumulative effects management continues to establish outcomes for an area by balancing environmental, economic, and social considerations and implementing appropriate plans and tools to ensure those outcomes are met. This approach also recognizes the need to develop strategies to manage non-point sources as well as the point sources. Non-point sources are those sources too diverse or widespread to regulate through the traditional approval method. Jurisdictional issues and the number of sources also add to the complexity of regulating and management of non-point sources.

APPENDIX B: ATTENDEES AT THE INFORMATION WORKSHOPS

Organization	Name
Aaron Rongvaldsen	Husky Energy
Andrea Brack	NOVA Chemicals
Andrew Treu	Red Deer County
Barry Bennett	Agrium
Bonnie Denhaan	Parkland Airshed Management Zone/Public Member
Brigette Duniece	Permolex
Cajun Paradis	Lacombe County
Crissy Handziuk	NOVA Chemicals
Colin Hartloper	NOVA Chemicals
David Brand	Town of Sylvan Lake
Ed Williams	Richardson
Elton Lawes	NOVA Chemicals
Fiona Slessor	Alberta Environment and Parks

Jay Williamson	Arc Resources
Jeff Hanger	RDRWA
Jim Gendron	LTG Consulting
Jim Robertson	Waskasoo Environmental Education Society
Jim Saltvold	Parkland Airshed Management Zone/Public Member
John Tchir	Alberta Environment and Parks
Kelly Bauer	Alberta Health Services
Kevin Warren	Parkland Airshed Management Zone/Public Member
Koray Ander	ConocoPhillips
Laura Polasek	Alberta Environment and Parks
Lauren Maris	City of Red Deer
Lisa Avis	Alberta Environment and Parks
Maria Vavro	Alberta Environment and Parks
Mark Maciejewski	Border Paving
Matthew Parsons	Environment Canada
Maxwell Mazur	Alberta Environment and Parks
Mikaela McQuade	Canadian Association of Petroleum Producers
Noor Alif	Alberta Environment and Parks
Pervez Sunderani	Alberta Environment and Parks
Phoenix Le	Alberta Environment and Parks
Randall Barrett	Alberta Environment and Parks
Reg Warkentin	Red Deer Chamber of Commerce
Renata Coderre	Coderre and Company
Rene Michalak	Rethink Red Deer
Robert McBrien	NOVA Chemicals
Robert Pole	Alberta Environment and Parks
Sharina Kennedy	Alberta Environment and Parks
Shelly Morris	Alberta Environmental Monitoring, Evaluation, and Reporting Agency
Steve Quine	MEGlobal Canada Inc.
Sue Arrison	Parkland Airshed Management Zone /Public Member

APPENDIX C: SOURCE SECTORS AND RATIONALE

Sector	Rationale
Transportation	The transportation sector includes all activities that relate to on-road and off-road vehicles. Certain transportation types including aircraft and marine vessels have not been considered as these modes are unlikely to be managed at an airshed level in Alberta. Precursor emissions in on-road and off-road vehicle exhaust may react in the atmosphere to form secondary fine particulate matter. Primary fine particulate matter is emitted through construction operations and unpaved roads. In addition to including policies that impact transportation, infrastructure and land-use play a key role in shaping travel patterns, which are linked to traffic congestion, greenhouse emissions, air pollution, and fuel consumption.
Industrial	The industrial sector includes all activities related to the processing and assembling of raw materials. Precursor emissions from industrial activities such as petroleum refining, chemical production, metal manufacturing, oil and gas extraction, and natural gas use and processing may react in the atmosphere to form secondary fine particulate matter. All industrial activities related to the production and upstream distribution of crude oil, bitumen, coal, and natural gas are covered in this sector. These activities can produce nitrogen oxides and sulphur dioxide emissions which contribute to smog, acid rain, and the formation of fine particulate matter.
Small Businesses and Operations	Some aspect of the upstream oil and gas industries do not require an approval or registration under a code of practice. These types of facilities are the smaller, more common types such as well sites, batteries, compressor stations, and activities such as drilling and completions. Any such activity must conform to ambient air quality objectives. This sector is important as it is a potential non-point source currently not managed through regulations, approvals, or codes of practice.
Residential	The residential sector includes all activities and equipment related to residential buildings including: space heating, water heating, air conditioning, and lighting, refrigeration, cooking, and running a variety of other appliances. This sector is important as it is a potential non-point source currently not managed through regulation, approvals, or codes of practice.
Commercial/Institutional	The commercial and institutional sector includes non-manufacturing business establishments, government, schools, hospitals, and public organizations. This sector is important as it is a potential non-point source currently not managed through regulation, approvals, or codes of practice.

APPENDIX D: PROPOSED NEW MANAGEMENT ACTIONS

Objective 1: Action	
Sector	Action
Residential	Layout new subdivisions so that every lot has southern exposure which can be used for passive solar gain.
	Develop a guideline/recommended best practices for new construction to address building energy intensity applicable to the Red Deer Region.
	Develop a guideline/recommended best practice for renovating older homes focused on energy conservation applicable to the Red Deer Region. Provide home energy audit information, workshops, tools, or supports to resident to assist in reducing energy use.
	Inform new home buyers of the latest and best building practices.
Energy	Restrict the use of diesel generators.
	Incorporate more solar energy into Alberta's energy mix.
	Financial incentives are a valuable tool for encouraging less PM output. Credits/deductions for high efficiency furnaces, efficient vehicles, or for business that update/invest in new equipment that would reduce energy consumption.
	Consider Leadership in Energy & Environmental Design (LEED) principles when replacing a building or roof
Industry	Review facility emissions in affected areas and look for ways to help meet plan objectives.
	Through study, determine the facility regional effects and impacts on NOx and PM2.5. Currently not properly understood.
Transportation	Provide incentives for public transportation.
	Expand the campaign to encourage the use of plug-in interior vehicle warmers as an alternative to idling to warm up the interior. Expand on the literature, diesel technology etc. (ex. Set a time limit on remote starters).
All	Consider key elements/requirements that can be written into RFP and RFT for construction, public works, and environmental services. What can be asked of those who work in service delivery to do better (i.e. age and quality of equipment used)?

Objective 2: Investigation	
Sector	Action
Transportation and Energy	Traffic light optimization based modelled traffic flow, update model with real time data.
	Investigate the availability of automatic shutoff and starting devices to reduce idling when (fleet) vehicle is waiting for a traffic signal to change.
	Investigate opportunities to build solar ready for water heating to remove combustion sources.
	Investigate the contribution of secondary fine particulate matter precursor emissions from small engines and off-road vehicles (lawnmowers, leaf blowers, snow blowers, all-terrain vehicles like snowmobile, quads, etc.). Consider programs or incentives that municipalities could offer to reduce contributions from these sources (e.g. other jurisdictions have used partnerships with retailers for trade programs where you can trade in your gas powered mower for a rebate towards an electric or manual one).
	Look into the effectiveness and feasibility of developing parking lots for carpooling and park n' bike.
Small Businesses and Operations	Better understand contributions from small businesses and manufacturing (not regulated through EPEA). This knowledge will help us identify partners and promote collaborations.
	Investigate how stakeholders can identify industries and businesses that are large emitters of air pollution and investigate the tools available to work with them for emission reduction. This knowledge will help identify partners and promote collaboration.
Objective 3: Engagement	
Sector	Action
All	Expand public health education around what is PM2.5 and associated health impacts.
	Get everyone (at the meeting) on the PAMZ newsletter list so that the airshed can keep them updated.



DATE: August 31, 2016

TO: Nancy Hackett, Environmental Initiatives Supervisor

FROM: Frieda McDougall, Legislative Services Manager

SUBJECT: Environmental Advisory Committee Resolution:
Recommended Actions to Support Air Quality by Reducing
Fine Particulate Matter in Red Deer

Reference Report:

Environmental Services, dated July 27, 2016

Resolution:

At the Monday, August 29, 2016 Regular Council Meeting, Council passed the following Resolutions:

Resolved that Council of The City of Red Deer, having considered the report from Environmental Services dated July 27, 2016 re: Environmental Advisory Committee Resolution: Recommended Actions to Support Air Quality by Reducing Fine Particulate Matter in Red Deer hereby directs Administration to consider the following actions in the development of the upcoming renewal of the Environmental Master Plan to commence in 2017:

1. Increased public education on ways to improve air quality
2. A tree planting policy
3. Additional tree plantings within the city to increase the density of trees.

Report back to Council: No



Frieda McDougall
Manager

- c. Director of Development Services
Environmental Services Manager

ENVIRONMENTAL ADVISORY COMMITTEE

DATE: May 18, 2016
TO: Red Deer City Council
FROM: Environmental Advisory Committee
RE: Improving Air Quality in Red Deer

At the Wednesday, May 18, 2016 meeting of the Environmental Advisory Committee, the Committee discussed ways to improve air quality in Red Deer.

After discussion, the motion as set out below was introduced and passed:

Resolved that the Environmental Advisory Committee, having discussed ways to improve air quality in Red Deer, hereby requests Council give consideration to the following:

1. Increased public education on ways to improve air quality
2. A tree planting policy
3. Additional tree plantings within the City to increase the density of trees;

and forwards this to Council for consideration.

The above is submitted for Council's consideration.

Respectfully submitted,



Reg Warkentin
Chair, Environmental Advisory Committee

c: Tim Ainscough, Environmental Services Manager
Nancy Hackett, Environmental Initiatives Supervisor



August 12, 2016

Council Representation on the Alberta Urban Municipalities Association (AUMA)

Legislative Services

Report Summary & Recommendation:

To support Council's goal of developing strong partnerships with other levels of government it is recommended that Council support members of Council allowing their names to stand for the AUMA Board of Directors and/or an AUMA Committees.

As per Council's policy, representation on external committee's should be formally endorsed by resolution.

City Manager Comments:

Council's direction is requested.

Craig Curtis
City Manager

Proposed Resolution

Resolved that Council of The City of Red Deer having considered the report from Legislative Services department, dated August 12, 2016 re: Council Representation on the Alberta Urban Municipalities Association (AUMA), hereby agrees to

1. Endorse the nomination of:
 - a. _____ for the position of Director, Cities up to 500,000
 - b. _____ for the appointment to a Committee
2. In accordance with Council Policy GP-C-23 Council Compensation and Benefits, up to \$1,000 per candidate will be provided to cover election related expenses for Director positions.



Report Details

Background:

The Alberta Urban Municipalities Association was founded in 1905 and represents Alberta's 272 urban municipalities including cities, towns, villages, summer villages, and specialized municipalities, as well as Associate and Affiliate members.

Our goal is to develop a strong partnership between all three levels of government through a shared vision with long term planning that would facilitate social and economic growth, a strategic and stable funding matrix for capital projects, vital emergency and social services as well as implementation and coordination in the delivery of these services to ensure the sustainability of the Alberta Advantage.

Discussion:

AUMA has a board of directors and a variety of committees and The City of Red Deer has a solid tradition of participating on both the Board and committees. Committees of the AUMA include:

- Audit & Finance
- Elected Officials Professional Development
- Infrastructure & Energy
- Investment Advisory
- Municipal Governance
- Safe & Healthy Communities
- Small Communities
- Sustainability & Environment

The 2018 convention will be held here in Red Deer. Our ongoing participation in the AUMA will help us to ready ourselves to host this convention.

While the AUMA does not require endorsement of the whole of Council for a member to stand for appointment, we believe it is appropriate to have Council's support.

DATE: August 31, 2016
TO: Samantha Rodwell, Deputy City Clerk
FROM: Frieda McDougall, Legislative Services Manager
SUBJECT: Council Representation on the Alberta Urban Municipalities Association (AUMA)

Reference Report:

Legislative Services, dated August 12, 2016

Resolution:

At the Monday, August 29, 2016 Regular Council Meeting, Council passed the following Resolutions:

Resolved that Council of The City of Red Deer having considered the report from Legislative Services department, dated August 12, 2016 re: Council Representation on the Alberta Urban Municipalities Association (AUMA), hereby agrees to

1. Endorse the nomination of:
 - a. Councillor Buck Buchanan for the position of Director, Cities up to 500,000
 - b. Councillor Dianne Wyntjes for the appointment to a Committee
 - c. Councillor Lawrence Lee for the appointment to a Committee
2. Vary Council Policy GP-C-2.3 Council Compensation and Benefits by reducing the amount for election expenses from \$1,000 to \$500, and provides up to \$500 to cover election related expenses for Director positions.

Report back to Council: No



Frieda McDougall
Manager

- c. Legislative Services Client Services Support
Corporate Meeting Coordinator
Corporate Meeting Support
Policy Analyst



July 8, 2016

Approval of Council Meeting Dates for 2017

Legislative Services

Report Summary & Recommendation:

That Council pass a resolution to adopt the 2017 Schedule of Council Meeting dates as attached.

Note that Operating Budget meeting dates as previously adopted are included for Council to adopt start times for those meetings.

City Manager Comments:

I recommend following the pattern of previous years as set out.

Craig Curtis
City Manager

Proposed Resolution

Resolved that Council of The City of Red Deer having considered the report from Legislative Services dated May 30, 2016 hereby approves the Council meeting dates for 2017 as follows:

Council Meeting Dates

Monday	January 9, 2017	Regular Council Meeting	2:30 P.M.
Tuesday	January 10, 2017	Operating Budget Meeting	1:00 – 5:00 P.M.
Wednesday	January 11, 2017	Operating Budget Meeting	1:00 – 5:00 P.M.
Thursday	January 12, 2017	Operating Budget Meeting	1:00 – 5:00 P.M.
Friday	January 13, 2017	Operating Budget Meeting	1:00 – 5:00 P.M.
Monday	January 16, 2017	Operating Budget Meeting	1:00 – 5:00 P.M.
Tuesday	January 17, 2017	Operating Budget Meeting	1:00 – 5:00 P.M.
Wednesday	January 18, 2017	Operating Budget Meeting	1:00 – 5:00 P.M.



Thursday	January 19, 2017	Operating Budget Meeting	1:00 – 5:00 P.M.
Friday	January 20, 2017	Operating Budget Meeting	1:00 – 5:00 P.M.
Monday	January 23, 2017	Regular Council Meeting	2:30 P.M.
Monday	February 6, 2017	Regular Council Meeting	2:30 P.M.
Tuesday	February 21, 2017	Regular Council Meeting	2:30 P.M.
Monday	March 6, 2017	Regular Council Meeting	2:30 P.M.
Monday	March 20, 2017	Regular Council Meeting	2:30 P.M.
Monday	April 3, 2017	Regular Council Meeting	2:30 P.M.
Tuesday	April 18, 2017	Regular Council Meeting	2:30 P.M.
Monday	May 1, 2017	Regular Council Meeting	2:30 P.M.
Monday	May 15, 2017	Regular Council Meeting	2:30 P.M.
Monday	May 29, 2017	Regular Council Meeting	2:30 P.M.
Monday	June 12, 2017	Regular Council Meeting	2:30 P.M.
Monday	June 26, 2017	Regular Council Meeting	2:30 P.M.
Monday	July 10, 2017	Regular Council Meeting	2:30 P.M.
Monday	July 24, 2017	Regular Council Meeting	2:30 P.M.
Monday	August 21, 2017	Regular Council Meeting	2:30 P.M.
Tuesday	August 22, 2016	Mid-Year Budget Review	9:00 A.M.
Tuesday	September 5, 2017	Regular Council Meeting	2:30 P.M.
Monday	September 18, 2017	Regular Council Meeting	2:30 P.M.
Monday	October 2, 2017	Regular Council Meeting	2:30 P.M.
Monday	October 23, 2017	Swearing in Ceremony	4:30 P.M.
Monday	October 30, 2017	Organizational Meeting & Regular Council Meeting	2:30 P.M.
Tuesday	November 14, 2017	Regular Council Meeting	2:30 P.M.
Monday	November 27, 2017	Regular Council Meeting	2:30 P.M.
Monday	December 11, 2017	Regular Council Meeting	2:30 P.M.



Report Details

Background:

Each year Council sets the dates of the Council meeting, including budget meetings, for the upcoming year. Consideration in the proposed scheduling is given to some of the consistent events Council members attend, as follows:

2017 FCM Sustainable Communities Conference: February 7-9, 2017 (Tentative)

2017 FCM Convention: June 1 – June 4, 2017: Ottawa, ON

2017 AUMA Convention: November 22 – November 24, 2017: Calgary, AB

Discussion:

A list of the Council meeting dates for 2017 is summarized and includes the Operating Budget dates as set previously by Council resolution.

Not reflected in the schedule as drafted is the consideration of a Council break between Nomination Day and the Election. If Council wishes to exercise this option, the Council Meetings of September 18, 2017 and October 10, 2017 would be cancelled.

Council Meeting Dates

Monday	January 9, 2017	Regular Council Meeting	2:30 P.M.
Tuesday	January 10, 2017	Operating Budget Meeting	1:00 – 5:00 P.M.
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Monday	May 1, 2017	Regular Council Meeting	2:30 P.M.
Monday	May 15, 2017	Regular Council Meeting	2:30 P.M.
Monday	May 29, 2017	Regular Council Meeting	2:30 P.M.
Monday	June 12, 2017	Regular Council Meeting	2:30 P.M.
Monday	June 26, 2017	Regular Council Meeting	2:30 P.M.
Monday	July 10, 2017	Regular Council Meeting	2:30 P.M.
Monday	July 24, 2017	Regular Council Meeting	2:30 P.M.
Monday	August 21, 2017	Regular Council Meeting	2:30 P.M.
Tuesday	August 22, 2016	Mid-Year Budget Review	9:00 A.M.
Tuesday	September 5, 2017	Regular Council Meeting	2:30 P.M.
Monday	September 18, 2017	Regular Council Meeting	2:30 P.M.
Monday	October 2, 2017	Regular Council Meeting	2:30 P.M.
Monday	October 23, 2017	Swearing in Ceremony	4:30 P.M.
Monday	October 30, 2017	Organizational Meeting & Regular Council Meeting	2:30 P.M.
Tuesday	November 14, 2017	Regular Council Meeting	2:30 P.M.
Monday	November 27, 2017	Regular Council Meeting	2:30 P.M.
Monday	December 11, 2017	Regular Council Meeting	2:30 P.M.

January

DM-Councillor Lee

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1 New Year's Day	2 In-Lieu New Year's Day	3	4	5	6	7
8	9 C	10 Operating Budget	11	12	13	14
15	16 Operating Budget	17	18	19	20	21
22	23 C	24	25	26	27	28
29	30	31				

February

DM - Councillor Mulder

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6 C	7 FCM Sustainable Communities Conference (Tentative)	8	9	10	11
12	13	14	15	16	17	18
19	20 Family Day	21 C	22	23	24	15
26	27	28				

March

DM - Councillor Wong

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3 Employees Recognition Awards	4
5	6 C	7	8	9	10	11
12	13	14	15	16	17	18
19	20 C	21	22	23	24	25
26	27	28	29	30	31	

April

DM - Councillor Wyntjes

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2	3 C	4	5	6	7	8
9	10	11	12	13	14 Good Friday	15
16	17 Easter Monday	18 C	19	20	21	22
23	24	25	26	27	28	29
30						

May

DM - Councillor Buchanan

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1 C	2	3	4	5	6
7	8	9	10	11	12	13
14	15 C	16	17	18	19	20
21	22 Victoria Day	23	24	25	26	27
28	29 C	30	31			

June

DM - Councillor Handley

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1 FCM Conference Ottawa, ON	2	3
4 FCM Conference Ottawa, ON	5	6	7	8 Mayor's Recognition Award	9	10
11	12 C	13	14	15	16	17
18	19	20	21	22	23	24
25	26 C	27	28 Mayor's Garden Party	29	30	

July

DM - Councillor Harris

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1 Canada Day
2	3 In-Lieu of Canada Day	4	5	6	7	8
9	10 C	11	12	13	14	15
16	17	18	19	20	21	22
23	24 C	25	26	27	28	29
30	31					

August

DM - Councillor Johnston

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7 Heritage Day	8	9	10	11	12
13	14	15	16	17	18	19
20	21 C	22 Mid Year Budget	23	24	25	26
27	28	29	30	31		

September

DM - Councillor Lee

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4 Labour Day	5 C	6	7	8	9
10	11	12	13	14	15	16
17	18 C	19	20	21	22	23
24	25	26	27	28	29	30

October

DM - Councillor Mulder

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2 C	3	4	5	6	7
8	9 Thanksgiving Day	10	11	12	13	14
15	16 Election	17	18	19	20	21
22	23 Swearing In Ceremony	24	25	26	27	28
29	30 C	31				

November

DM - Councillor Wong

Sun	Mon	Tue	Wed	Thu	Fri	Sat
DST			1	2	3	4
5	6	7	8	9	10	11 Remembrance Day
12	13 In-Lieu Remembrance Day	14 C	15	16	17	18
19	20	21	22	23 AUMA Conference Calgary, AB	24	26
26	27 C	28 Capital Budget Placeholder	29	30		

December

DM - Councillor Wyntjes

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11 C	12	13	14	15	16
17	18	19	20	21	22	23
24	25 Christmas Day	26 Boxing Day	27	28	29	30
30						

DATE: August 31, 2016

TO: Samantha Rodwell, Deputy City Clerk

FROM: Frieda McDougall, Legislative Services Manager

SUBJECT: Approval of Council Meeting Dates for 2017

Reference Report:

Legislative Services, dated July 8, 2016

Resolution:

At the Monday, August 29, 2016 Regular Council Meeting, Council passed the following Resolution:

Resolved that Council of The City of Red Deer having considered the report from Legislative Services dated May 30, 2016 re: Approval of Council Meeting Dates for 2017 hereby approves the Council meeting dates for 2017 as follows:

Council Meeting Dates

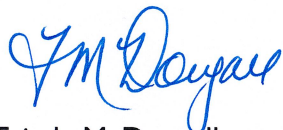
Monday	January 9, 2017	Regular Council Meeting	2:30 P.M.
Tuesday	January 10, 2017	Operating Budget Meeting	1:00 – 5:00 P.M.
Wednesday	January 11, 2017	Operating Budget Meeting	1:00 – 5:00 P.M.
Thursday	January 12, 2017	Operating Budget Meeting	1:00 – 5:00 P.M.
Friday	January 13, 2017	Operating Budget Meeting	1:00 – 5:00 P.M.
Monday	January 16, 2017	Operating Budget Meeting	1:00 – 5:00 P.M.
Tuesday	January 17, 2017	Operating Budget Meeting	1:00 – 5:00 P.M.
Wednesday	January 18, 2017	Operating Budget Meeting	1:00 – 5:00 P.M.
Thursday	January 19, 2017	Operating Budget Meeting	1:00 – 5:00 P.M.
Friday	January 20, 2017	Operating Budget Meeting	1:00 – 5:00 P.M.
Monday	January 23, 2017	Regular Council Meeting	2:30 P.M.
Monday	February 6, 2017	Regular Council Meeting	2:30 P.M.
Tuesday	February 21, 2017	Regular Council Meeting	2:30 P.M.
Monday	March 6, 2017	Regular Council Meeting	2:30 P.M.
Monday	March 20, 2017	Regular Council Meeting	2:30 P.M.
Monday	April 3, 2017	Regular Council Meeting	2:30 P.M.
Tuesday	April 18, 2017	Regular Council Meeting	2:30 P.M.
Monday	May 1, 2017	Regular Council Meeting	2:30 P.M.
Monday	May 15, 2017	Regular Council Meeting	2:30 P.M.
Monday	May 29, 2017	Regular Council Meeting	2:30 P.M.
Monday	June 12, 2017	Regular Council Meeting	2:30 P.M.
Monday	June 26, 2017	Regular Council Meeting	2:30 P.M.

Monday	July 10, 2017	Regular Council Meeting	2:30 P.M.
Monday	July 24, 2017	Regular Council Meeting	2:30 P.M.
Monday	August 21, 2017	Regular Council Meeting	2:30 P.M.
Tuesday	August 22, 2016	Mid-Year Budget Review	9:00 A.M.
Tuesday	September 5, 2017	Regular Council Meeting	2:30 P.M.
Monday	September 18, 2017	Regular Council Meeting	2:30 P.M.
Monday	October 2, 2017	Regular Council Meeting	2:30 P.M.
Monday	October 23, 2017	Swearing in Ceremony	4:30 P.M.
Monday	October 30, 2017	Organizational Meeting & Regular Council Meeting	2:30 P.M.
Tuesday	November 14, 2017	Regular Council Meeting	2:30 P.M.
Monday	November 27, 2017	Regular Council Meeting	2:30 P.M.
Monday	December 11, 2017	Regular Council Meeting	2:30 P.M.

Report back to Council: No.

Comments/Further Action:

The Legislative Services office will now proceed with updating calendars in accordance with this resolution.



Frieda McDougall
Manager

c. Corporate Meeting Support



August 17, 2016

Police and Emergency Services Dispatch Request to Table

Legislative Services

Report Summary & Recommendation:

Following is a resolution passed at the June 20, 2016 Regular Meeting of City Council:

Resolved that Council of The City of Red Deer having considered the report from Legislative Services, dated June 9, 2016 re: Police and Emergency Services Dispatch Request to Table, hereby agrees to table consideration of this item up to the August 29, 2016 Council meeting to allow Administration more time to prepare the report.

Recommendation:

That Council consider tabling this item up to 4 weeks to the September 26, 2016 Council meeting to allow Administration more time to prepare the report.

City Manager Comments:

I support the recommendation of Administration.

Craig Curtis
City Manager

Proposed Resolution:

Resolved that Council of The City of Red Deer, having considered the report from Legislative Services, dated August 17, 2016 re: Police and Emergency Services Dispatch Request to Table, hereby agrees to table consideration of this item to the September 26, 2016 Council meeting to allow for additional time to prepare the report.

DATE: August 31, 2016
TO: Sarah Cockerill, Director of Community Services
FROM: Frieda McDougall, Legislative Services Manager
SUBJECT: Police and Emergency Services Dispatch: Request to Table

Reference Report:

Legislative Services, dated August 17, 2016

Resolution:

At the Monday, August 29, 2016 Regular Council Meeting, Council passed the following Resolution:

Resolved that Council of The City of Red Deer, having considered the report from Legislative Services, dated August 17, 2016 re: Police and Emergency Services Dispatch Request to Table, hereby agrees to table consideration of this item to the September 26, 2016 Council meeting to allow for additional time to prepare the report.

Report back to Council: Yes.



Frieda McDougall
Manager

- c. Director of Development Services
Corporate Meeting Administrator



August 16, 2016

Proposed Amendment of the Land Use Bylaw Bylaw 3357 / F - 2016

Planning Department

Report Summary & Recommendation:

An application has been submitted to amend the Land Use Bylaw (LUB) for a site exception to allow a secondary suite as a discretionary use on a lot that is designated R1N - Residential (Narrow Lot) District.

The Planning Department recommends Council give First Reading to proposed Bylaw 3357 / F - 2016 to amend the Land Use Bylaw.

City Manager Comments:

I believe this proposal would set a difficult precedent and altar the criteria for the development of secondary suites. I do not support this as a “spot zoning”.

If first reading is passed, a public Hearing would then be advertised for two consecutive weeks to be held on Monday, September 26, 2016 at 6:00 p.m. during Council's regular meeting.

Craig Curtis
City Manager

Proposed Resolution

That Council consider first reading of Land Use Bylaw 3357/F-2016 at this time.



Report Details

Background:

Secondary suites are neither a permitted nor a discretionary use in the RIN - Residential (Narrow Lot) District. The subject site, although designated RIN, exceeds the minimum lot frontage, lot depth and lot area standards of the RI - Residential (Low Density) District where secondary suites are allowed; therefore it may be reasonable to allow site exception for the development of a secondary suite on this parcel.

Discussion:

Statutory Plans & Planning Tools

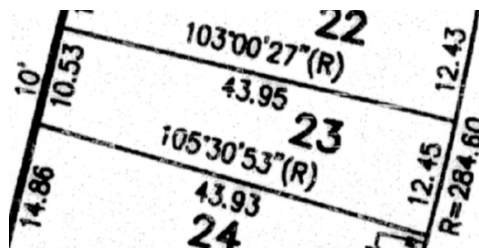
The Lancaster / Vanier East Neighbourhood Area Structure Plan does not specifically address the issue of secondary suites in RIN lots.

The Municipal Development Plan (section 10) contains policies that support the creation of affordable housing, a mix of housing types, and the efficient use of land.

The proposal is consistent with the principles and standards of the Neighbourhood Planning and Design Standards that support affordable housing opportunities through the provision of a variety of housing types including secondary suites (Standard 6.4).

Land Use Bylaw

Secondary suites are neither a permitted nor a discretionary use in the RIN - (Residential (Narrow Lot) District. The subject RIN parcel in the Vanier East neighbourhood contains a detached dwelling. The following sketch and table shows the dimensions of the subject site (Lot 23) and how they compare to both the RI and RIN minimum standards.





	RI Standard	R1N Standard	Subject Lot
Minimum Frontage	12.0 m	10.5 m	12.45 m
Minimum Lot Width at Rear of Lot	N/A	9.2 m	10.53 m
Minimum Lot Depth	30.0 m	36.6 m	43.93 m
Minimum Lot Area	360 m ²	385 m ²	504.6 m ²

The subject lot not only exceeds the minimum R1N district standards, it also exceeds the RI district standards, especially in minimum lot area (it is 40.2% larger than the RI minimum size requirement). If the subject lot was located within an RI district the development of a secondary suite would be possible.

Parking

Parking is generally raised as a concern when considering secondary suites. All secondary suite parking requirements must be provided off-street. The availability of on-street parking in RI areas is impacted by the majority of dwellings having double wide driveways and parking pads. These curb cuts reduce the amount of on-street parking that is possible, particularly when the resulting spaces between driveways is not wide enough to accommodate a full parallel parking stall.

In contrast, the R1N district does not allow front driveways and parking pads; all off-street parking must be accessed via the rear lane resulting in the majority of an R1N street being available for on-street parking. In Figure I the twenty houses facing north onto Landry Bend are designated RI and because of all the driveways there are only about eleven usable on-street parallel parking stalls available, a ratio of roughly 0.5 stalls per house. In comparison, the 26 R1N houses facing south onto Lancaster Drive are not permitted to have front driveways, leaving the entire length of the street available for on-street parking.



Figure I: RI and R1N area in Lancaster East (Lonsdale).



Since RIN lots must be at least 10.5 m wide and a parallel parking stall is approximately 9.3 m long, there should be at least one on-street stall per house, twice the ratio of on-street stalls compared to the R1 street. Accordingly, in RIN areas secondary suites with adequate off-street parking should have a negligible impact on on-street parking.

Consultation/Dialogue

The proposal was circulated to 78 landowners within 100 metres of the subject lot. Two letters from landowners were received and one letter from the Red Deer chapter of the Urban Development Institute (UDI):

- One landowner was supportive of the proposed amendment.
- Melcor Developments Ltd., the developer of Lancaster Vanier East, still owns several lots in the area and has indicated that they do not support the proposed amendment as it would alter the single family character of Village Crescent. Melcor believes the addition of a secondary suite has the potential to create a problem with parking and would have a significant impact on the rear yard of this home. Administration suggests that allowing for a secondary suite in this RIN site would have a similar impact on the single family character of the area as allowing a secondary suite in an R1 area.
- Although the Red Deer chapter of the Urban Development Institute is not an area landowner, it did provide a letter of support for the proposed amendment. UDI indicated that secondary suites enhance affordability and therefore accessibility of housing for a broader range of society.

Analysis:

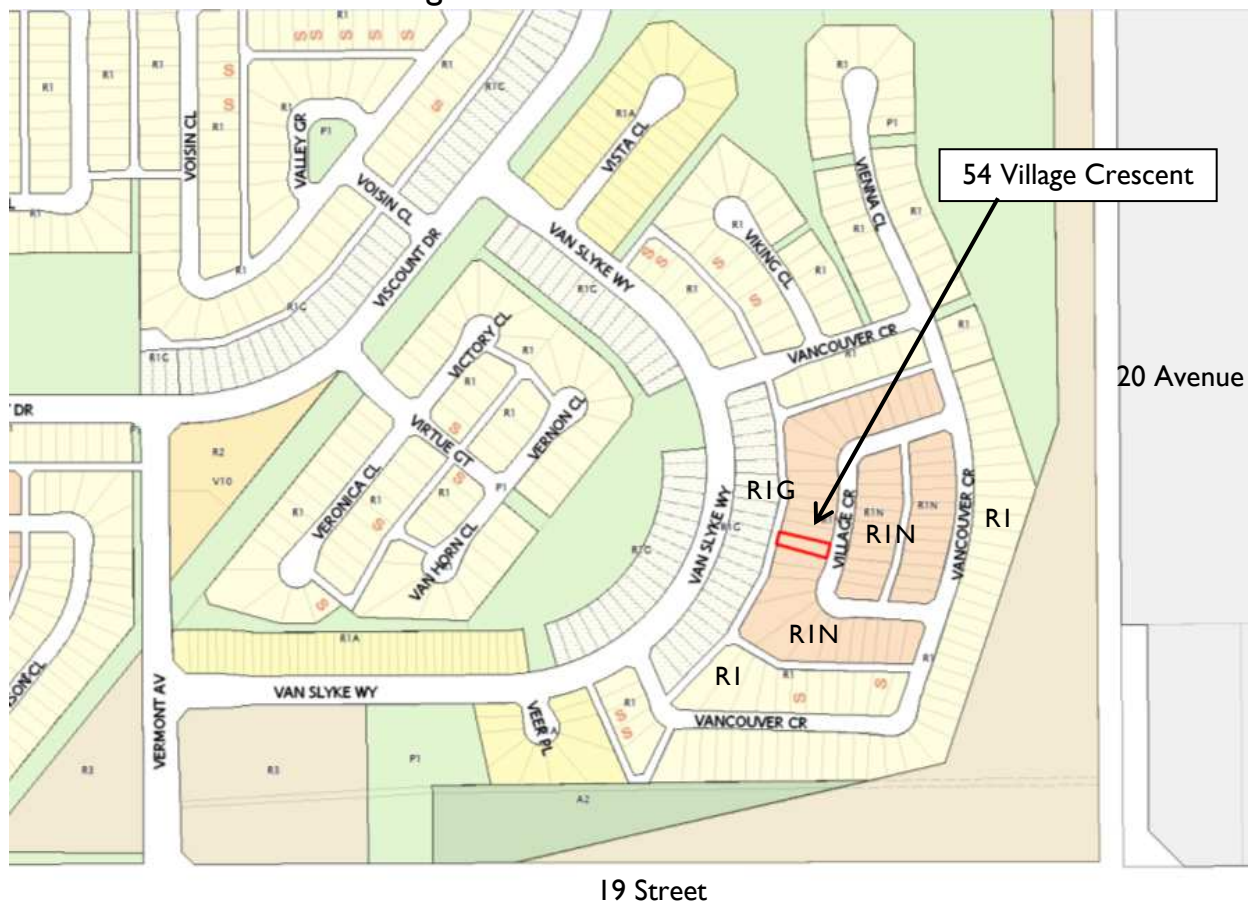
The proposed LUB amendment for a site exception is supported from a land use planning perspective for the following reasons:

1. Although not all RIN lots may be suitable for the development of a secondary suite, the subject parcel is sufficiently large to accommodate the necessary off-street parking required for a secondary suite. Both the frontage and size of this RIN lot exceed the R1 standards; if this same lot was located in an R1 district it would meet the requirements for a secondary suite, including the provision of off-street parking.
2. Potential impacts on on-street parking are likely to be minimal as adequate off-street parking can be provided on the subject lot (addressed at the DP stage) and on-street parking is not as encumbered as in typical R1 areas.
3. The proposal is consistent with MDP objectives and policies that promote the creation of affordable housing, a mix of housing types, and the efficient use of land.



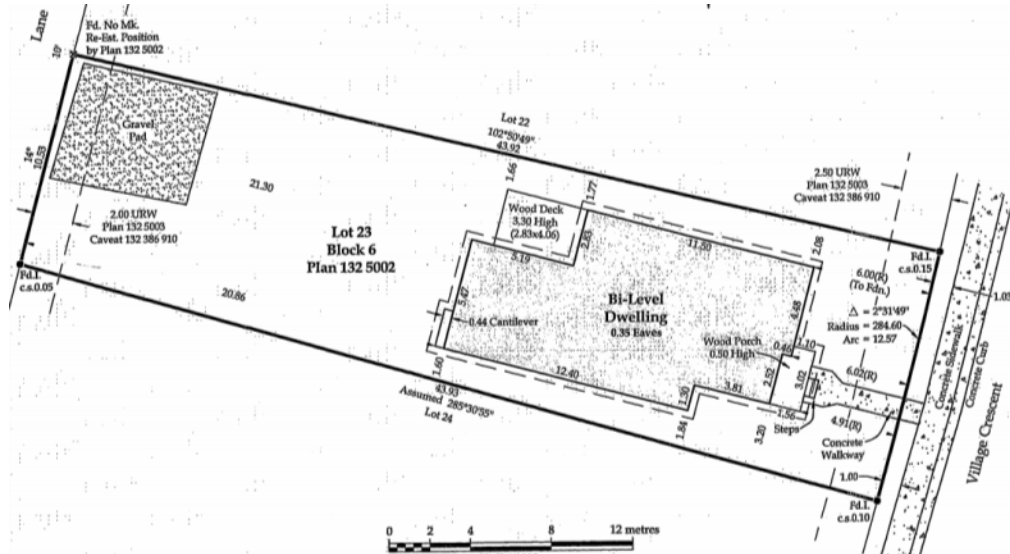
4. The proposal is consistent with the principles and standards of the Neighbourhood Planning and Design Standards that support affordable housing opportunities through the provision of a variety of housing types including secondary suites (Standard 6.4).
5. The proposal appears to meet the development criteria for secondary suites in section 4.7(9) of the Land Use Bylaw.
6. Specific development related concerns with a proposed secondary suite can be addressed by the development authority through applicable conditions at the development permit stage.

Neighbourhood Context





Excerpt from Real Property Report



BYLAW NO. 3357 / F – 2016

Being a Bylaw to amend Bylaw No. 3357/2006, the Land Use Bylaw of The City of Red Deer as described herein.

COUNCIL OF THE CITY OF RED DEER, ALBERTA, ENACTS AS FOLLOWS:

Bylaw No. 3357/2006 is hereby amended as follows:

1. Section 8.22.1(e) is amended to add the following:

(ix) Secondary Suite on:

(1) Lot 23, Block 5, Plan 132 5002 (54 Village Crescent)

2. The “Land Use District Map R10” contained in “Schedule A” of the Land Use Bylaw is hereby amended in accordance with the Land Use District Map 3 / 2016 attached hereto and forming part of the bylaw.

READ A FIRST TIME IN OPEN COUNCIL this day of 2016.

READ A SECOND TIME IN OPEN COUNCIL this day of 2016.

READ A THIRD TIME IN OPEN COUNCIL this day of 2016.

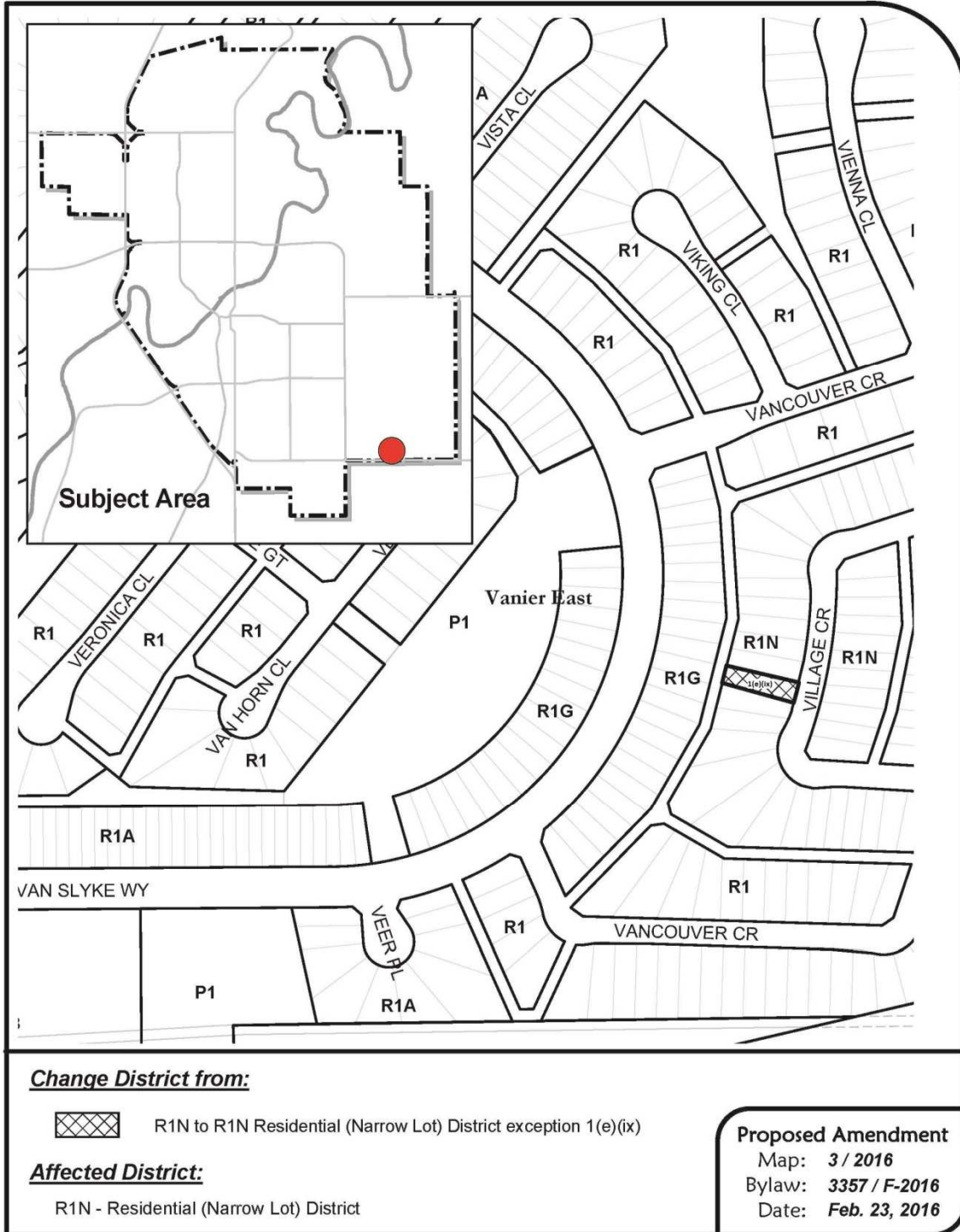
AND SIGNED BY THE MAYOR AND CITY CLERK this day of 2016.

MAYOR

CITY CLERK

Schedule "A"

THE CITY OF Red Deer *Proposed Amendment to Land Use Bylaw 3357/2006*



Orlando Toews

From: Guy Pelletier <gpelletier@melcor.ca>
Sent: March 14, 2016 4:46 PM
To: Orlando Toews
Cc: Gregg Broks; Tyler Hansen
Subject: Site Exception Request - #54 Village Crescent

Follow Up Flag: Follow up
Flag Status: Flagged

Good Afternoon Orlando,

We are in receipt of your letter dated February 23rd regarding the above noted application.

Melcor Developments is the land developer that developed the community of Vanier Woods East where Village Crescent is located. We continue to own several lots in this area.

Melcor does not support the approval of a site exception to permit a secondary suite to be included as a discretionary use on the lot located at #54 Village Crescent. R1N lots are by definition narrow. The addition of secondary suite lot on a narrow lot has the potential to create a problem with parking. The addition of another one or two off street parking stalls may address the technical need for parking but it would have a significant impact on the rear yard of this home. These types of lots are not conducive to accommodating secondary suites.

Village Crescent is a single family neighbourhood and the addition of secondary suites has the potential to alter that character.

Thank you for the opportunity to provide our input.

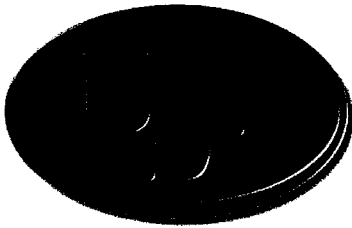
Guy Pelletier
Vice President, Red Deer Region
d| 403.343.0817 e| gpelletier@melcor.ca
a| 502, 4901 – 48th Street
Red Deer, AB T4N 6M4
w| Melcor.ca

MELCOR DEVELOPMENTS LTD.

MELCOR
LIVE. WORK. SHOP. PLAY.

[This message has been scanned for security content threats and viruses.]

[The City of Red Deer I.T. Services asks that you consider the environment before printing this e-mail.]



URBAN DEVELOPMENT INSTITUTE ALBERTA
One vision; one voice

REGARDING: PROPOSED BYLAW 3357/F-2016
DATE: MARCH 14, 2016
TO: ORLANDO TOEWS, SENIOR PLANNER
FROM: STEVE BONTJE, UDI RED DEER CHAPTER CHAIR

Thank you for the opportunity to review the Proposed Bylaw regarding Secondary Suite options.

Housing affordability remains a key concern for UDI-Red Deer. Recent economic challenges have again highlighted the importance of ensuring there are affordable housing options for citizens of Central Alberta. We must work together to leverage all available resources, including ensuring that policy enables the creation and sustainability of affordable housing options.

Proposed Bylaw 3357/F-2016, expanding the areas where secondary suites are permitted, will increase the availability of affordable housing options in Central Alberta. As secondary suites enable the primary resident the ability to both offset the cost of their housing as well as provide an additional unit of affordable housing in Red Deer, increasing accessibility should be a key part of the City of Red Deer's housing affordability strategy.

UDI-Red Deer supports Proposed Bylaw 3357/F-2016 and encourages The City of Red Deer to consider this change.

Steve Bontje, UDI Red Deer Chapter Chair

Alan Forman, UDI Red Deer Vice Chair

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Name (Please Print): Robert Stefaniszyn For COSMOS Group of CompaniesMailing Address: #17428-49 ave Postal Code: T4P 1M2Phone #403-343-0715 ext 261 E-mail Address: robert.stefaniszyn@cosmosreddeer.org

Comments re: Proposed Bylaw 3357/F-2016: A Proposed Land Use Bylaw Amendment for a Site Exception to list "secondary suite" as a discretionary use at 54 Village Crescent [zoned R1N Residential (Narrow Lot) District]

Approved, no issues.

Robert Stefaniszyn
Director of Operations

P: 403-343-0715 ext. 261
F: 403-347-6969
C: 403-358-1454
E: robert.stefaniszyn@cosmosreddeer.org
www.cosmosreddeer.ca

#1, 7428 - 49 Avenue, Red Deer, AB T4P 1M2

Thank you.

DATE: August 31, 2016
TO: Orlando Toews, Senior Planner
FROM: Frieda McDougall, Legislative Services Manager
SUBJECT: Proposed Amendment of the Land Use Bylaw 3357/F-2016

Reference Report:

Planning Department, dated August 16, 2016

Bylaw Reading:

At the Monday, August 29, 2016 Regular Council Meeting, Council defeated first reading of the Bylaw 3357/F-2016 (a Land Use Bylaw Amendment for a site exception to allow a secondary suite as a discretionary use on a lot that is designated R1N - Residential (Narrow Lot) District) be read a first time.).

Report back to Council: No.



Frieda McDougall
Manager

- c. Director of Planning Services
Manager of Planning Services
Corporate Meeting Administrator



August 11, 2016

Pines:

Disposition of Municipal Reserve / Land Use Bylaw 3357 / V - 2016 (Redesignation of Part of Lot R10, Block 14, Plan 782 2386)

Planning Department

Report Summary & Recommendation:

The proposal is to dispose of a portion of municipal reserve (MR), specifically ± 73 m² of Lot R10, Block 14, Plan 782 2386, located behind 32 Payne Close in the Pines neighbourhood and redesignate it from *PI – Parks and Recreation District* to *R1 – Residential (Low Density) District*. This will facilitate the sale of the land at fair market value to the owner of 32 Payne Close to address the encroachment of the owner's development onto Lot R10.

Planning staff recommends Council support both the disposition of municipal reserve and the LUB amendment Bylaw 3357 / V -2016.

City Manager Comments:

I support the recommendation of Administration. Given the implausibility of returning this space to public park space, it is recognized that this sale will help to purchase public park space elsewhere in the future.

Craig Curtis
City Manager

Proposed Resolution

Resolved that Council of The City of Red Deer having considered the report from the Planning Department, dated August 11, 2016 re: Pines Disposition of Municipal Reserve and Land Use Bylaw 3357/V-2016 Redesignation of Part of Lot R10, Block 14, Plan 782 2386, hereby agrees that the following resolution be considered at the Council Meeting of September 26, 2016:

“Resolved that Council of The City of Red Deer having considered the report from the Planning Department, dated August 11, 2016 re: Pines Disposition of Municipal Reserve and Land Use Bylaw 3357/V-2016 Redesignation of Part of Lot R10, Block 14, Plan 782 2386, hereby agrees to the Disposal of Municipal Reserve Lands described as:

“All that portion of Lot R10, Block 14, Plan 782 2386 “



Report Details

Background:

Although it is not desirable for private development to encroach onto public lands it does happen from time to time. Addressing an encroachment should take into consideration the nature and scale of the encroachment and its potential impact on the community. In this case the scale is relatively small, i.e. a ± 73 m² fenced concrete patio area around a swimming pool. The encroachment has occurred for more than ten years and is located in a secluded municipal reserve area that runs behind and between R1 lots in the Pines neighbourhood. There is no public trail running through this MR parcel.

The landowner wishes to purchase the encroaching area and has entered into a purchase agreement with the City subject to Council Policy re Land Acquisition & Sales, Executive Limitation EL-D-2.1.

Discussion:

Encroachments onto public lands are not desirable; however, in this case the encroachment has existed for many years and involves a relatively small area of land. Disposing of and selling the MR to the landowner at fair market value is a pragmatic way of addressing this issue with minimal impact on the larger MR area. Alternatively, the City could direct the landowner to remove all encroachments, including the fence, shed, and concrete patio.

Analysis:

If Council supports the disposal of the portion of municipal reserve, the subject land is required to be redesignated from P1 to R1, subdivided out of the larger parent MR parcel and consolidated with the title of 32 Payne Close.

If this portion of MR is disposed of and sold to the owner of 32 Payne Close it would be sold at fair market value. Proceeds of the land sale must be deposited in the public reserve fund which can only be used to purchase other lands that are then dedicated as municipal reserve. The subject land would also be required to be consolidated with the 32 Payne Close parcel resulting in one title. In addition to paying fair market value for the land, the owner of 32 Payne would be responsible for all costs associated with disposal, subdivision, consolidation, etc.

There was no objection to the proposal from relevant city departments, however, Engineering Services indicated that a water line exists in the MR parcel and that further encroachments would impact access and costs of water line repairs or replacement.

The proposed disposition of MR, redesignation, subdivision, sale and consolidation was referred to 23 landowners within 100 metres of 32 Payne Close. Four landowners provided



written comments. Three landowners did not object and one landowner objected stating that this would set a dangerous precedent and was unfair to landowners who have built within their property lines. Administration notes that Council is not bound by precedent; situations can be addressed on a case by case basis. Encroachments onto public lands are not desirable; however, in this case the encroachment has existed for many years and involves a relevantly small area of land. Disposing of and selling the MR to the landowner is a pragmatic way of addressing this issue. Alternatively, the City could direct the landowner to remove all encroachments, including the fence, shed, and concrete patio.

Planning staff recommends that Council:

- support the proposed disposition $\pm 73 \text{ m}^2$ of municipal reserve within Lot R10, Block 14, Plan 782 2386, and
- give First Reading to Bylaw 3357/V-2016 to redesignate the subject area from *PI – Parks and Recreation District* to *R1 – Residential (Low Density) District*.

As per Section 674 of the Act, disposal of MR land requires Council to hold a public hearing prior to considering a resolution to dispose of the MR land. In addition to the usual notification for a public hearing required in section 606 of the Act, notices containing relevant information will be posted on or near the subject MR parcel. If Council gives First Reading to Bylaw 3357/V-2016, it is recommended that Council hold the public hearings for both the MR disposal and proposed Bylaw 3357/V-2016 concurrently on the same day.

BYLAW NO. 3357 / V – 2016

Being a Bylaw to amend Bylaw No. 3357/2006, the Land Use Bylaw of The City of Red Deer as described herein.

COUNCIL OF THE CITY OF RED DEER, ALBERTA, ENACTS AS FOLLOWS:

Bylaw No. 3357/2006 is hereby amended as follows:

1. The land shown in the sketch attached as Schedule A to this Bylaw is redesignated from P1 – Parks and Recreation District to R1 – Residential (Low Density) District.
2. The “Land Use District Map M18” contained in “Schedule A” of the Land Use Bylaw is hereby amended in accordance with the Land Use District Map 19 / 2016 attached hereto and forming part of the bylaw.

READ A FIRST TIME IN OPEN COUNCIL this day of 2016.

READ A SECOND TIME IN OPEN COUNCIL this day of 2016.

READ A THIRD TIME IN OPEN COUNCIL this day of 2016.

AND SIGNED BY THE MAYOR AND CITY CLERK this day of 2016.

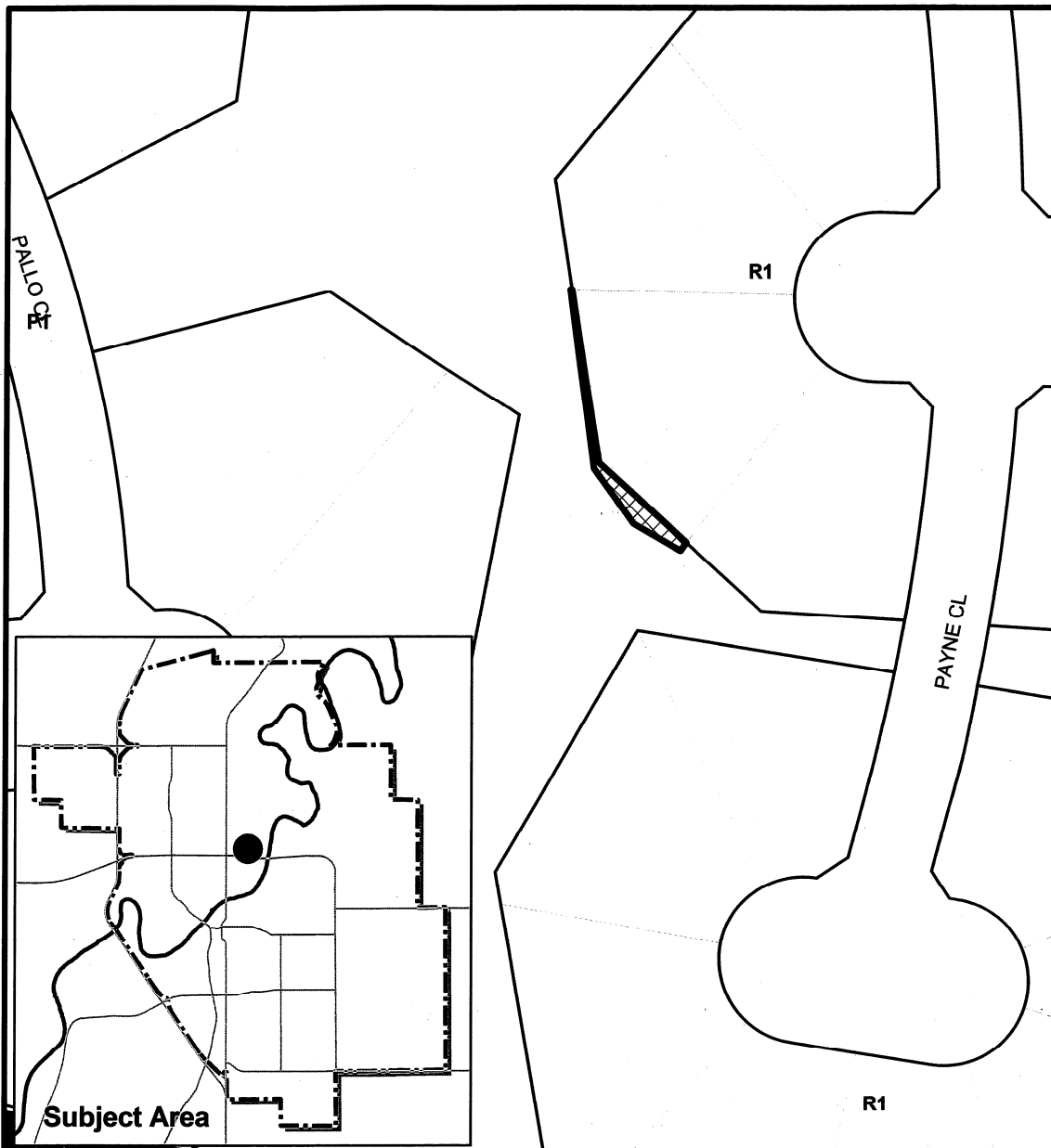
MAYOR

CITY CLERK

Schedule "A"



Proposed Amendment to Land Use Bylaw 3357/2006



Change District from:



P1 to R1 - Residential (Low Density) District

Affected District:

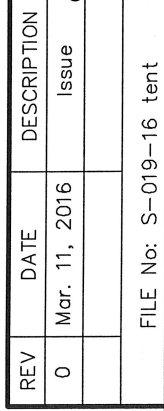
P1 - Parks and Recreation District

Proposed Amendment

Map: **19/ 2016**

Bylaw: **3357 / V-2016**

Date: **July 22, 2016**



Orlando Toews

From: tina catherall <
Sent: July 19, 2016 7:10 PM
To: Orlando Toews
Subject: Bylaw 3357/V-2016

Orlando Toews,
Senior Planner
City of Red Deer Planning Department

Re:- Requested comments regarding disposal of land next to 32 Payne Close Red Deer

That the City of Red Deer even considers setting a PRECEDENT of this nature is appalling and frankly, very worrisome!

Grossly unfair to all property owners that have built within their Lot boundaries and have obtained the proper permits.

Grossly unfair to all property owners that have purchased their homes with the, not unfair expectation, that the P.I. designation would remain exactly that!

The P.I. designations enhance and beautify this area for the enjoyment of all. To encroach upon and remove part of this is blatantly wrong in so many ways.

The mature trees and green areas also increase the property and resale values.

Absolutely and without a doubt a NO to this unbelievable proposal!

Malcolm and Christine Catherall

E-mail Address :

[This message has been scanned for security content threats and viruses.]

[The City of Red Deer I.T. Services asks that you consider the environment before printing this e-mail.]

Orlando Toews

From: Ratpack1 <
Sent: July 20, 2016 3:13 PM
To: Orlando Toews
Subject: Re: Proposed disposal of Municipal Reserve, rezoning, subdivision & consolidation - 32
Payne Close in Pines neighbourhood

Good Afternoon Orlando,
Neither Valerie nor myself have any objection to what the Vellner's are doing, re their consolidation proposal.
It does however beg the question....We as well abut against a municipal reserve area,.... If we fence a portion of it and
use it as our own for a number of years, can we too apply to purchase it and make it our own???

Thanks Orlando
Larry and Valerie Larratt

Orlando Toews

From: DOUG Dougdoug <
Sent: July 16, 2016 8:16 AM
To: Orlando Toews
Subject: Att. Orlando Toews Bylaw 3357/V-2016 32 Payne Close

I am pleased to see a process for our closes has been developed to help the owners resolve the frustrations of lot development going back 30 years.

I support the sale(s) of the 73 m2 or more of reserve land. The (MR) huge walking path will not be impacted by such a small land sale.

I have at least one other neighbour (about 120 meters) from this location with a similar problem. The frustration involved and caused perhaps by others many many years ago must be upsetting.

We deserve to give these owners the benefit of the possibilities of survey problems at the time of development due to the equipment used at that time and the very irregular shaped lots as well as the crooked reserve land involved which would make an (S) look like a straight line.

Truly,

Doug Brunner

July, 16th, 2016

[This message has been scanned for security content threats and viruses.]

[The City of Red Deer I.T. Services asks that you consider the environment before printing this e-mail.]



Bylaw 3357/V-2016

COMMENTS

Proposed disposal of ± 73 m² of MR, rezoning the disposed of land, and subdivision and consolidation of the subject land with 32 Payne Close.

Part of Lot R10, Block 14, Plan 782 2386, next to 32 Payne Close

Please provide your comments by 4:30 PM, July 20, 2016

Name (Please Print): Bill Graham

Mailing Address: _____ Postal Code: _____

Phone #: _____ E-mail Address: _____

Based on the circumstances, I support
disposing of and selling of this land
to the owner of 32 Payne Close.

A handwritten signature in dark ink, appearing to be 'Bill Graham', written on the first line of the signature area.

Thank you.

DATE: August 31, 2016

TO: Orlando Toews, Senior Planner

FROM: Frieda McDougall, Legislative Services Manager

SUBJECT: Disposition of Municipal Reserve Land Use Bylaw 3357/V-2016

Reference Report:

Planning Department, dated August 11, 2016

Resolution:

At the Monday, August 29, 2016 Regular Council Meeting, Council passed the following Resolution:

Resolved that Council Resolved that Council of The City of Red Deer having considered the report from the Planning Department, dated August 11, 2016 re: Pines Disposition of Municipal Reserve and Land Use Bylaw 3357/V-2016 Redesignation of Part of Lot R10, Block 14, Plan 782 2386, hereby agrees that the following resolution be considered at the Council Meeting of September 26, 2016:

“Resolved that Council of The City of Red Deer having considered the report from the Planning Department, dated August 11, 2016 re: Pines Disposition of Municipal Reserve and Land Use Bylaw 3357/V-2016 Redesignation of Part of Lot R10, Block 14, Plan 782 2386, hereby agrees to the Disposal of Municipal Reserve Lands described as:

“All that portion of Lot R10, Block 14, Plan 782 2386”

Bylaw Reading:

At the Monday, August 29, 2016 Regular Council Meeting, Council gave first reading to Bylaw 3357/V-2016 (a Land Use Bylaw Amendment to redesignate a +73m² portion of Lot R10, Block 14, Plan 782 2386 from P1 Parks and Recreation District to R1 Residential (Low Density) District).

Report back to Council: Yes.

Comments/Further Action:

This office will advertise for a Public Hearing to be held on Monday, September 26, 2016 at 6:00 p.m. for both Disposal of Municipal Reserves and the Land Use Bylaw during Council's regular meeting.



Frieda McDougall
Manager

- c. Director of Planning Services
Manager of Planning Services
Corporate Meeting Administrator



August 17, 2016

Notice of Motion – Secondary Suites

Legislative Services

Report Summary & Recommendation:

This Notice of Motion was submitted by Councillor Lawrence Lee at the Monday, July 18, 2016 Council meeting and was tabled at the Monday, August 16, 2016 Council Meeting.

City Manager Comments:

I support the recommendation of Administration.

Craig Curtis
City Manager

Proposed Resolution

Whereas secondary suites provided an alternative housing option particularly during the economic upswing when housing options were limited but are less required and desired now that a greater variety of housing options are routinely available; and

Whereas the principle of multi-neighbourhood design allows for flexible housing choices; and

Whereas secondary suites are allowed on a discretionary basis in single family homes located in a R1, R1A, R2, R3 and C1 residential districts and are permitted uses in some areas subject to location criteria; and

Whereas secondary suites are dwelling units that are located with a primary dwelling unit, where both units are registered under the same land title; and

Whereas currently 15% of the total number of detached dwelling units within a neighbourhood are permitted to have secondary suites, without limitations to the number on a specific street or area; and

Whereas this can result in clustering of secondary suites resulting in neighbourhood impacts in terms of density, noise, traffic, parking, etc.;

Now therefore be it resolved that the overall percentage of secondary suites within a given neighbourhood be reduced to 10% of the total number of detached dwelling units; and

Further be it resolved that the total of secondary suites on any street be limited to no more than 10% of the total number of detached dwelling units on that street.



Report Details

Background:

The following is the Notice of Motion as presented by Councillor Lawrence Lee at the Monday, July 18, 2016 meeting of Red Deer City Council.

Whereas secondary suites provided an alternative housing option particularly during the economic upswing when housing options were limited but are less required and desired now that a greater variety of housing options are routinely available; and

Whereas the principle of multi-neighbourhood design allows for flexible housing choices; and

Whereas secondary suites are allowed on a discretionary basis in single family homes located in a R1, R1A, R2, R3 and C1 residential districts and are permitted uses in some areas subject to location criteria; and

Whereas secondary suites are dwelling units that are located with a primary dwelling unit, where both units are registered under the same land title; and

Whereas currently 15% of the total number of detached dwelling units within a neighbourhood are permitted to have secondary suites, without limitations to the number on a specific street or area; and

Whereas this can result in clustering of secondary suites resulting in neighbourhood impacts in terms of density, noise, traffic, parking, etc.;

Now therefore be it resolved that the overall percentage of secondary suites within a given neighbourhood be reduced to 10% of the total number of detached dwelling units; and

Further be it resolved that the total of secondary suites on any street be limited to no more than 10% of the total number of detached dwelling units on that street.



August 19, 2016

Notice of Motion – Secondary Suites Comments from Inspections & Licensing Manager

Inspections and Licensing

Background:

In 2006, The City's Affordable Housing Strategy set out a number of recommendations regarding secondary suites, including changes to regulations, legalizing existing secondary suites and creating new secondary suites in established neighbourhoods. To that end, The City engaged a consultant to consult with the larger community and defined stakeholders concerning how secondary suites should be managed in the future.

Following the final report from the consultant, the Secondary Suites Steering Committee was formed, consisting of City staff. The committee worked through 2008/2009 to review the findings of the consultant and ultimately drafting a Land Use Bylaw amendment. At this time, section (9.5) of the bylaw amendment called for a 20% cap per neighbourhood. The rationale for providing a 20% cap was:

- Allowed for double the then 10% maximum number of suite lots that were allowed to be pre-identified in existing NASPs;
- Allowed established neighbourhoods, without a NASP, the opportunity to construct suites in up to 20% of the total detached dwelling units in a neighbourhood;
- Provided limit and balance to the allowable number of suites in a neighbourhood; and
- Allowed for a proactive, although limited, approach to the implementation of The City's Affordable Housing Strategy.

On November 14, 2009, Council gave first reading to Bylaw 3357/Z – 2009, as presented.

At the December 14, 2009 Regular meeting of Council, Council considered 2nd and 3rd reading of Land Use Bylaw 3357/Z-2009. The minutes show an amending resolution was proposed, reducing the neighbourhood cap from 20% to 10%. This motion was defeated. Following this, an additional amending resolution was introduced, reducing the neighbourhood cap from 20% to 15%. This motion was carried and the bylaw was adopted.

In 2010, the Secondary Suite Ad Hoc Committee was formed. The committee consisted of two members of Council, five citizens-at-large and 2 non-voting staff resource liaisons. The mandate of the committee was to "provide insight, advice and potential changes to administration on matters relating to the current land use bylaw and development permit application processes respective to secondary suites". Included in the terms of reference was direction that the evaluation report, prepared by administration and the committee, would include "assessment relative to the maximum 15% limitation cap".



In August 2010, resolutions came forward from the Ad Hoc Committee and MPC that suggested that secondary suite numbers, location and density could be addressed using a method involving defined circles or block designations. The idea was that the 15% limit allowed for secondary suites would be applied to the number of dwelling units located within a 100 m radius circle or in an end to end block location. This approach was deemed problematic by Administration for a number of reasons, which were included within the Secondary Suite Report, dated December 13, 2010.

In April, 2012 the Ad Hoc Committee was dissolved having fulfilled their mandate.

Discussion:

The 15% density limit for Secondary Suites is based on the total number of detached dwellings in the predetermined neighbourhood. The City's GIS system provides the tool for Administration to calculate and track the number of allowable suites, and the number of approved suites and their locations. This information is publically available on The City's website.

In established neighbourhoods, the density calculation is simple. The GIS system determines the number of detached dwellings in each predetermined neighbourhood, attributes a limit of the number of Secondary Suites, identifies the number of suites approved and the number of suites remaining.

In developing neighbourhoods, the density calculation is somewhat more complex, as the 15% is based on the number constructed detached dwellings. This is important because if undeveloped lots are accounted for within the 15%, there is a risk that Secondary Suites will be concentrated on the lots where dwellings are constructed, in the earlier phases of the neighbourhood build out.

The discussion around the 15% density limit has been reviewed several times in the past, due to concerns about the possibility of one street having a concentration of suites. Two options were explored in detail by the Ad Hoc Committee, MPC and Council, but deemed problematic to administer. These options included:

1. 15% within a 100m circle of a secondary suite application.

This calculation method would require each Development Permit for a Secondary Suite have its own circle, and some would inevitably overlap. In overlapping situations, one circle would impact the calculation of another circle (and so forth), which would become an administrative nightmare to calculate and implement.

2. 15% on a block with a "block" identified as two sides of a street plus lane behind the proposed suite.

This calculation method would require block boundaries to be predetermined, and curvilinear streets will make this difficult. The block outlines may also not account



for parks, schools, and other locations where existing housing is only located on one side of the street (which is perhaps one of the most preferred locations).

In Section 9.8 of the Land Use Bylaw, key planning considerations are outlined for the Development Authority to consider in making a decision on a secondary suites application. It is specifically noted at the beginning of this section that the list is not exhaustive. The three considerations listed are:

- 1) design and accessibility of the area surround the site;
- 2) density of the area surround the site; and
- 3) the availability of on street parking.

Under each of those planning considerations the Land Use Bylaw lists a few points as to what “by virtue of” could achieve those considerations. These are points of consideration and are not to be used as a checklist for approval. The Development Authority has the discretion to make a decision on an application based on these as well as any other planning considerations. This section provides more detailed guidance by listing some of the planning considerations than other parts of the Land Use Bylaw. Administration feels the current wording allows the Development Authority to make a decision based on issues raised in the Notice of Motion.

The Land Use Bylaw also has parking standards for secondary suites. These will be reviewed as part of the holistic review of the parking standards section of the Land Use Bylaw update project.

Analysis:

Section 9.8 of the Land Use Bylaw is not an exhaustive list of planning considerations for the Development Authority to consider in approving an application. It provides the flexibility for the Development Authority based on the context of the application location to attach additional planning considerations to their decision if they choose. The Parking standards will be reviewed in context of the entire parking standards section as part of the Land Use Bylaw update project. Administration does not recommend any further regulations, including a reduction in the 15% density limit within neighbourhoods, or a maximum density limit of 10% on a street.

Very few complaints are received by Administration related to legal Secondary Suites, and the complaints that are received are typically related to illegal developments or rental properties in general.

Further, any reduction in the existing density limits is contrary to corporate initiatives and plans, including the *Environmental Master Plan*, the *Social Policy Framework* and the *Design Charter*, which all encourage a variety of housing types, as well as higher density neighbourhoods and in-fill development.



To date, there are several neighbourhoods that have exceeded the recommended 10% density limit on neighbourhoods. Those neighbourhoods would be grandfathered and would remain non-conforming until such time that those existing Secondary Suite uses cease.

Finally, including a 10% density limit per street would be problematic for a number of reasons, identified above in the 'Discussion' as option 2.

SECONDARY SUITES AS OF FEBRUARY, 2010

ZoneName	# SFD	15% Allowed	# of Apps Pending	Total Approved	Total Remaining	% Per Zone
Anders Park	373	56		6	50	1.6
Anders Park East	449	67		2	65	0.4
Anders South	472	71		0	71	0.0
Aspen Ridge	388	58		1	57	0.3
Bower	454	68		5	63	1.1
Central Park	24	4		1	3	4.2
Clearview Meadows	527	79		8	71	1.5
Clearview Ridge	216	32		19	13	8.8
College Park	21	3		0	3	0.0
Davenport	465	70		5	65	1.1
Deer Park Estates	487	73		4	69	0.8
Deer Park Village	547	82		5	77	0.9
Devonshire	623	93		7	86	1.1
Downtown	160	24		10	14	6.3
Eastview	435	65		44	21	10.1
Eastview Estates	565	85		16	69	2.8
Fairview	250	37	1	8	29	2.8
Garden Heights	103	15	1	9	6	7.8
Glendale	153	23		5	18	3.3
Glendale Park Estates	511	77		29	48	5.7
Grandview	362	54		36	18	9.9
Highland Green	271	41		13	28	4.8
Highland Green Estates	286	43		7	36	2.4
Inglewood West	585	88		38	50	6.5
Ironstone	581	87		24	63	4.1
Johnstone Crossing	434	65		36	29	8.3
Johnstone Park	259	39		5	34	1.9
Kentwood East	260	39		2	37	0.8
Kentwood West	334	50		8	42	2.4
Kingsgate	327	49		4	45	1.2
Lancaster Green	497	75		7	68	1.4
Lancaster Meadows	341	51		0	51	0.0
Lonsdale	633	95		9	86	1.4
Michener Hill	256	38		36	2	14.1
Morrisroe	393	59		9	50	2.3
Morrisroe Extension	455	68		9	59	2.0
Mountview	600	90		33	57	5.5
Normandeau	532	80		20	60	3.8

Oriole Park	735	110		19	91	2.6
Oriole Park West	478	72		21	51	4.4
Parkvale	172	26		14	12	8.1
Pines	314	47		8	39	2.5
Riverside Meadows	329	49		41	8	12.5
Rosedale Estates	525	79		7	72	1.3
Rosedale Meadows	482	72		7	65	1.5
South Hill	81	12		12	0	14.8
Sunnybrook	387	58		9	49	2.3
Sunnybrook South	135	20	1	13	7	8.9
Timberlands	85	13		9	4	10.6
Timberstone	193	29		1	28	0.5
Vanier Woods	496	74		3	71	0.6
Vanier Woods East*	564	85		10	75	1.8
Waskasoo	139	21		10	11	7.2
West Park (west)	301	45		30	15	10.0
West Park (east)	200	30		35	-5	17.5
West Park (north)	115	17		0	17	0.0
West Park (south)	291	44		15	29	5.2
Westlake	592	89		19	70	3.2
Woodlea	196	29		18	11	9.2
Totals			3	781	2433	

* Vanier woods East numbers are as per the Estimated numbers in the NASP

SECONDARY SUITES AS OF AUGUST, 2016

ZoneName	# SFD	15% Allowed	# of Apps Pending	Total Approved	Total Remaining	Total % Per Zone
Anders Park	373	56		6	50	1.61%
Anders Park East	449	67		2	65	0.45%
Anders South	472	71		0	71	0.00%
Aspen Ridge	388	58		1	57	0.26%
Bower	454	68		5	63	1.10%
Central Park	24	4		1	3	4.17%
Clearview Meadows	527	79		9	70	1.71%
Clearview Ridge	359	32		1	31	0.28%
College Park	21	3		0	3	0.00%
Davenport	465	70		5	65	1.08%
Deer Park Estates	487	73		4	69	0.82%
Deer Park Village	546	82		6	76	1.10%
Devonshire	623	94		7	87	1.12%
Downtown	151	23	1	11	12	7.28%
Eastview	435	65		46	19	10.57%
Eastview Estates	565	85		20	65	3.54%
Fairview	214	33	1	10	23	4.67%
Garden Heights	105	16		9	7	8.57%
Glendale	154	24		8	16	5.19%
Glendale Park Estates	515	78		16	62	3.11%
Grandview	364	55		38	17	10.44%
Highland Green	271	41		14	27	5.17%
Highland Green Estates	285	43		9	34	3.16%
Inglewood West	585	88		40	48	6.84%
Ironstone	581	87		24	63	4.13%
Johnstone Crossing	438	66		38	28	8.68%
Johnstone Park	320	48		6	42	1.88%
Kentwood East	260	39		3	36	1.15%
Kentwood West	334	51		8	43	2.40%
Kingsgate	362	55		4	51	1.10%
Lancaster Green	497	75		10	65	2.01%
Lancaster Meadows	341	51		0	51	0.00%
Lonsdale	654	99		8	91	1.22%
Michener Hill	254	39		36	3	14.17%
Morrisroe	393	59		11	48	2.80%
Morrisroe Extension	454	69		11	58	2.42%
Mountview	600	90		37	53	6.17%
Normandeau	532	80		23	57	4.32%

Oriole Park	735	111		22	89	2.99%
Oriole Park West	480	72		23	49	4.79%
Parkvale	164	25		16	9	9.76%
Pines	314	48		11	37	3.50%
Riverside Meadows	327	50		41	9	12.54%
Rosedale Estates	525	79		6	73	1.14%
Rosedale Meadows	482	73		5	68	1.04%
South Hill	59	11		13	-2	22.03%
Sunnybrook	387	59		11	48	2.84%
Sunnybrook South	224	34		15	19	6.70%
Timberlands	346	52		20	32	5.78%
Timberstone	283	43		3	40	1.06%
Vanier Woods	496	75		6	69	1.21%
Vanier Woods East*	402	61		20	41	4.98%
Waskasoo	141	22		9	13	6.38%
West Park (west)	300	45		34	11	11.33%
West Park (east)	200	30		32	-2	16.00%
West Park (north)	115	17		0	17	0.00%
West Park (south)	291	44		17	27	5.84%
Westlake	638	96		25	71	3.92%
Woodlea	195	30		20	10	10.26%
Totals			2	836	2457	



DATE: January 14, 2015

TO: Municipal Planning Commission

FROM: Planning Department

RE: Secondary Suites Density Limits
For Information

At the November 26, 2014 MPC meeting, much discussion surrounded secondary suite densities in neighbourhoods. As a response, staff has prepared the following information package for MPC.

Report Summary

- December 2009 Council approved an amendment to the Land Use Bylaw that expanded secondary suites through the city in response to a recommendation in The Affordable Housing Strategy and updates to provincial fire, building and safety codes.
- Since 2009, the number of secondary suites in a neighbourhood has been limited to 15% of the number of detached dwellings in said neighbourhood.
- Concerns about suites being concentrated in one area or one street within a neighbourhood have been raised several times. After review Council retained the 15% of the number of detached dwellings in a neighbourhood as the way to distribute secondary suites throughout the city.

Background

Prior to 2001, secondary suites were limited to specific residential districts. Between 2001 and December 2009 secondary suites were only considered on pre-determined parcels identified in Neighbourhood Area Structure Plans (NASP), which limited the approval of secondary suites to newer neighbourhoods. The NASPs approved prior to 2009 capped the secondary suite density to 10% of detached dwellings in a neighbourhood.

The City of Red Deer's 2006 Affordable Housing Strategy identified a need for more housing choice and recommended The City's Land Use Bylaw (LUB) be amended to allow secondary suites throughout the community. The rationale for this recommendation was that secondary suites:

- Add additional dwelling units within existing housing stock;
- Add lost population back into older neighbourhoods;
- Are a sustainable form of development as they increase urban densities, utilize existing municipal infrastructure (streets, utilities, schools, etc.), help reduce land consumed by new residential developments; and
- They arguably offer a more affordable alternative form of housing for both the resident(s) of the secondary suite and the homeowner.

The Affordable Housing Strategy coupled with updates to provincial fire, building and safety codes pertaining to secondary suites, ignited Council's interest in expanding secondary suites throughout the city.

Since 2008 there has been much work done regarding how to best regulate secondary suites. The major players that provided guidance and direction for the secondary suite LUB regulations currently contained the City's LUB were:

Who was involved	What was their role
Council	Provided governance, considered suggestions and recommendations from the Secondary Suite Ad-hoc Review Committee, and adopted bylaws and policies pertaining to secondary suites.
Secondary Suite Ad-hoc Review Committee (December 2009 – April 2012)	<p>This committee monitored and guided the secondary suite application and decision making process that resulted from the December 2009 LUB amendment. The committee comprised of:</p> <ul style="list-style-type: none"> • Two members of Council (Councillor Lynne Mulder, and Councillor Tara Veer); • Five citizens at large [Heather Brandt, Lani Parr, Paul Jones, Ron Polutnik, and Dale Reid (resigned March 2011)]; • Two non-voting staff resource liaisons as identified by the Secondary Suites Ad-hoc Review Committee (Tony Lindhout and Jordan Furness). <p>A copy of an April 26, 2012 report that summarized the work done by the committee, along with the original terms of reference is included as Attachment 1.</p>
Municipal Planning Commission	Approval authority for many secondary suite applications and provided suggestions and recommendations to the Secondary Suite Ad-hoc Review Committee.
Western Management Consultants (2008)	Prepared the Secondary Suites Project Report which contained recommended strategies specific to the regulation of secondary suites. This information was used to formulate the December 2009 LUB amendments. A copy of the report's executive summary is provided in Attachment 2.
Staff	Staff from a variety of departments were involved in all aspects of the secondary suite matter from drafting amending Bylaw 3357/Z-2009, administering the current regulations, and everything in between.
Public	Public consultation was sought throughout the entire process (e.g. open houses, surveys, public hearings, etc.), and continues to this day when applications are referred to adjacent landowners.

There have been some tweaks since the secondary suite amending bylaw (Bylaw 3357/Z-2009) was adopted in December 2009 but the essence remains.

Current Land Use Bylaw Regulations

Secondary suite development regulations are contained in section 4.7 (9) of the LUB; a copy of the section is attached for your information in Attachment 3. These regulations pertain to all secondary

suite applications submitted to the City and contain requirements such as site characteristic requirements, application circulation, identifies non-relevant matters that should not be considered when making a decision, and development regulations specific to the suite itself.

Secondary suites are not a listed use in all residential districts. Attachment 4 provides a table that identifies all the residential districts and whether secondary suites are a permitted or discretionary use, or allowed at all. Secondary suites are a use in one commercial district, the C1 Commercial (City Centre) District as a discretionary use.

There is an important distinction between permitted and discretionary uses. If a use is permitted and the application meets all the pertinent regulations in the LUB, then the Development Authority is obligated to issue a development permit. On the other hand, decisions on discretionary uses are based on the merits of each application and may be refused if there are planning reasons that warrant a refusal regardless of whether an application for a discretionary use meets all the pertinent regulations in the LUB.

How the 15% Secondary Suite Neighbourhood Density Limit was Determined

In reviewing the secondary suite files, it is apparent the density limit question has been scrutinized thoroughly and many approaches were researched to find one that best suits Red Deerians. When amending Bylaw 3357/Z-2009 was brought to Council for second and third reading, it proposed a 20% secondary suite density limit per neighbourhood. The 20% limit was proposed because:

- The 20% was double the 10% maximum number of secondary suite lots previously allowed to be pre-identified in NASPs;
- Allowed established neighbourhoods (with no NASP) to opportunity to construct secondary suites in up to 20% of the total detached dwellings in a neighbourhood;
- Provides limit and balance to the allowable number of secondary suites in a neighbourhood; and
- Allows for a proactive, although limited, approach to the implementation of The City's Affordable Housing Strategy.

At the December 14, 2009 Council meeting, a motion was passed to reduce the 20% density limit to 15%. Bylaw 3357/Z-2009, as amended, received third and final reading at this meeting. Copies of the 15% density motion and Bylaw 3357/Z-2009 as amended are included in Attachment 5.

Review of the 15% Secondary Suite Neighbourhood Density Limit

Striking a balance between offering housing choice and ensuring secondary suites do not dominate a particular area or street is not an easy task. The 15% density limit measured by neighbourhood has been reviewed several times due to concerns about the possibility of one street being inundated with secondary suites. The Secondary Suite Ad-hoc Committee, MPC and Council explored the following two options in depth; both options were not supported because they were deemed problematic to administer:

1. 15% within a 100 m circle of a secondary suite application. This calculation method would require each development permit for a secondary suite have its own circle, and some would inevitably overlap. In overlapping situations, one circle will impact the calculation of another circle (and so forth), which would become an administrative nightmare to calculate and implement.
2. 15% on a block with a "block" identified as 2 sides of a street plus lane behind proposed suite. This calculation method would require block boundaries to be predetermined, and curvilinear streets will make this difficult. The block outlines may not account for parks, schools, and other locations where existing housing is only located on one side of the street (which is perhaps one of the most preferred locations).

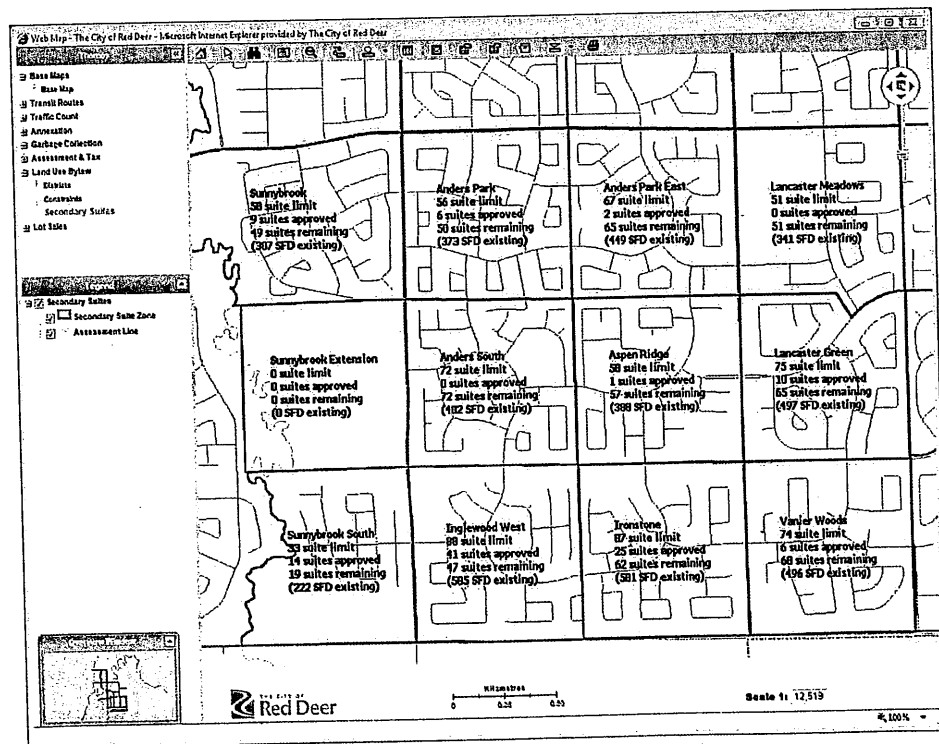
It was determined that neither of the two options explored would prevent multiple suites in a row. While there are other methods available to prevent multiple suites in a row (e.g. minimum distance separations), Council determined at their June 27, 2011 meeting that the specific evaluative criteria already contained in the LUB (established under Bylaw 33357/Z-2009 and follow up amendments under Bylaw 3357/B-2011) addressed the secondary suite density and separation matters sufficiently. A copy of the report to Council and the June 27, 2011 motion are included in Attachment 6.

How the 15% Density Limit is Calculated

The 15% density limit for secondary suites based on predetermined neighbourhoods are calculated by the total number of detached dwellings in said neighbourhood multiplied by 0.15. The density limit for secondary suites is directly related to the number of detached dwellings in a neighbourhood. Below is an example of two neighbourhoods with a significant difference in detached dwellings that illustrates how the 15% limit relates to the number of detached dwellings:

Garden Heights (102 detached dwellings)		Lonsdale (653 detached dwellings)	
Suite limit	15	Suite limit	98
Suites approved	9	Suites approved	8
Suites remaining	6	Suites remaining	90

In established neighbourhoods the calculation is simple. The City's GIS system has a layer that determines the number of detached dwellings in each predetermined neighbourhood, attributes a limit of the number of secondary suites, shows the number of suites approved and the number remaining. The Interactive City Map, which is publicly available from The City's website, is shown below. Users can zoom into each neighbourhood and parcels with a subscribed "s" indicate parcels where a secondary suite has been approved.



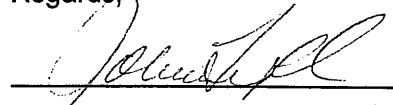
In developing neighbourhoods the calculation is done manually as the GIS system is based on "as-built" drawings, not actual registered lots. This is important because if unregistered lots are accounted

for in the 15% there runs a risk that secondary suites will be concentrated on the lots already registered. For example, phase 1 of a larger multi-lot residential development could bare the entire 15% of the secondary suites identified in a neighbourhood. Inspections & Licensing and GIS are working to standardize this practice.

Attachment 7 provides a map showing the various neighbourhoods, the respective suite limits and the number approved in each neighbourhood along with their location.

We hope this information is helpful to the MPC and welcome and questions or comments.

Regards,



JoJene Tejkl
Senior Planner

Attachments:

1. Summary Report – Secondary Suite Ad-hoc Committee Terms of Reference
2. Western Management Consultants Secondary Suites Project Report Executive Summary
3. Section 4.7(9) Secondary Suite Use Provisions and Development Regulations (LUB)
4. Land Use District Table
5. Bylaw 3357/Z-2009 as Amended
6. Secondary Suites – Council Resolution, December 13, 2010
7. Secondary Suite Map (December, 2014)



Attachment 1

PLANNING AND INSPECTIONS & LICENSING DEPARTMENTS

Date: April 26, 2012

To: Secondary Suite Regulation Ad Hoc Review Committee

From: Tony Lindhout, Senior Planner
Joyce Boon, Development & Licensing Supervisor

RE: Summary Report
Secondary Suite Ad Hoc Committee Terms of Reference

This report is prepared for the purpose of determining the fulfillment of the work undertaken by the Secondary Suites Regulation Ad Hoc Review Committee relative to the Committee's duties and responsibilities as outlined in their Terms of Reference (attached as Appendix A).

Background

City Council, on December 14, 2009, approved Land Use Bylaw amendment No. 3357/Z-2009 which added use provisions and development regulations into the Land Use Bylaw to expand the allowance of secondary suites into established and mature city residential neighbourhoods. While the amendment included location criteria for new secondary suites in developing neighbourhoods, the amendment was aimed primarily at the owners of existing illegal secondary suites allowing them to apply, by a set date, to legalize these suites and ensure that they comply with applicable Fire and Building Codes. Over the course of the following nine months, the City received an over whelming ±620 applications to legalize existing non-conforming secondary suites. In addition to these 620 applications, there were ±329 other secondary suites that are either legal conforming or known or deemed legal non-conforming. The owners of the legal non-conforming suites were sent letters by the City indicating that an inspection was required to ensure these suites conform to applicable safety codes.

The approved Secondary Suite Regulations capped the number of secondary suites allowed in any one neighbourhood to 15% of the total number of detached dwelling units located within an individual neighbourhood. City Council approved a Secondary Suite Zone Boundaries Map that divided the city along the lines of established neighbourhoods with the exception of the West Park neighbourhood which was divided into 4 sub zones each having its own 15% secondary suite limit. The exception to West Park was due to the large number of secondary suites in this neighbourhood in perspective of its proximity to Red Deer College.

City Council at the December 14, 2009 meeting also passed a resolution to establish a Secondary Suite Regulation Ad Hoc Review Committee (SS Ad Hoc Committee) for the purpose of monitoring and reporting back to Red Deer City Council on the implementation of the new Secondary Suite Regulations in the Land Use Bylaw. City Council in March 2010 approved the composition of the SS Ad Hoc Committee consisting of two members of Council, five citizens-at-large and two non-voting City staff liaisons (Inspections & Licensing and Planning Departments).

The mandate and purpose of the SS Ad Hoc Committee is to provide insight, advice and potential changes to administration on matters relating to the current land-use bylaw and development permit application processes respective to secondary suites. The SS Ad Hoc

Committee at its regular meetings (often monthly), reviewed all Municipal Planning Commission (MPC) and Subdivision Development Appeal Board (SDAB) minutes and decisions relative to secondary suites, received regular updates from Administration on emerging secondary suite issues, status of back logged secondary suite applications and entered into numerous discussions regarding public education and enforcement matters relative to secondary suites.

One of the Committee's major undertakings was to oversee the preparation of a secondary suites Evaluation Report to be submitted to City Council in the first quarter of 2011 relative to implementation of secondary suite Land Use Bylaw development regulations, development approval processes and impacts on neighbourhoods.

An Evaluation Report, which recommended several changes to the Secondary Suite Regulations (fine-tuning, more clarity) was completed by Administration in early 2011, endorsed by both the SS Ad Hoc Committee and the Municipal Planning Commission and was presented to City Council. The majority of the proposed changes were approved by City Council in May 2011 through Land Use Bylaw Amendment No. 3357/B-2011. Over the course of this evaluation process and in discussions with City Council regarding this Bylaw amendment, several significant matters arose:

1. A request by Administration to increase the 15% secondary suite density limit of the West Park East neighbourhood to accommodate processing of 11 outstanding applications for existing illegal suites. This change, in a separate Bylaw proposal, was not supported by the SS Ad Hoc Committee and ultimately the proposal was also denied by City Council due to significant community opposition heard at the public hearing.
2. Much discussion around enforcement issues such as illegal suites, safety inspections, occupancy permits, messy yards and noise. The following was noted/undertaken:
 - a) City enforcement is undertaken on a complaint basis.
 - b) Any complaints regarding secondary suites (illegal suites, messy yards, etc.) are directed to the Inspections & Licensing Department for follow-up and action; the City has now set up a centralized complaint line (supported by both the SS AD Hoc Committee and City Council) – a single telephone complaint line to direct citizens to the appropriate department/agency to obtain information and assistance.
 - c) Illegal suites, if verified by City staff, will be subject to a shut down process initiated under the Land Use Bylaw. It involves an initial request to sign a shut down agreement which if not signed, would then result in further action - a potential Order, fines/penalties and/or legal action.
 - d) The Community Standards Bylaw is used to enforce messy yard and noise complaints and compliance.
 - e) The need to pursue a Secondary Suite Licensing Bylaw.
3. City Council requested Administration to prepare a Secondary Suite Licensing Bylaw for the purpose of tracking and monitoring approved secondary suites. A draft Licensing Bylaw was prepared by Administration, supported by the SS Ad Hoc Committee and while given first reading by City Council, it was ultimately denied by Council following significant opposition at the public hearing from secondary suite owners. Issues raised included why were secondary suites being singled out for a

license but not other forms of rental property; how much landowner information needs to be posted at the site; and why should non-resident landowners need to appoint a local contact person/agent?

All of the ±620 secondary suite applications have now been processed with decisions issued. The current Secondary Suite Regulations (attached as Appendix B) including the ability of the Development Officer to approve straight forward secondary suite applications, enabled the backlog of applications to be dealt with in a more time efficient manner. A number of secondary suite approvals still require compliance with "conditions of approval" before an occupancy permit can be issued. The City continues to follow-up on these applications to ensure compliance with parking requirements and Safety Codes.

During 2011 as the backlog of secondary suite applications were quickly diminishing, the SS Ad Hoc Committee dedicated 3 workshop type meetings to determining what, if any, secondary suite matters are still outstanding that The City and/or the Committee may wish to pursue, or work on, in the future. Items raised included:

- Is there a line between rental units and secondary suites?
- Improved public relations strategy required including communication & education around allowance and processing of secondary suite applications, and enforcement processes.
- How can absentee landlords be made more responsible for their properties?
- Is there a need to develop a clearer process for those who oppose secondary suites?
- Are there still Land Use Bylaw gaps, such as:
 - change the 15% secondary suite neighbourhood cap;
 - allow secondary suites in detached garages; and
 - need for secondary suite density and concentration limits?
- From a safety perspective, should another round of applications for remaining illegal secondary suites be considered?
- Incentives to encourage development of more secondary suites?
- Can secondary suites be better integrated into our neighbourhoods?
- Is there a difference in the impact of secondary suites between established and new neighbourhoods?
- Information regarding approved secondary suite properties needs to be conveyed to The City's Revenue and Assessment Services for their records.

Secondary Suite Statistics (April 17, 2012)

The majority of the secondary suites referenced in the following charts resulted from the ±620 applications The City received following the December 2009 approval of the Land Use Bylaw amendment that opened the door for property owners to apply to legalize existing non-conforming (illegal) secondary suites. This initiative was significant in terms of the number of applications received and the over 2 years it took to process all of the applications. The Inspections & Licensing Department re-assigned a Customer Service Specialist to the

Secondary Suite Coordinator position to deal with the processing of the secondary suite applications. This position did not cost The City any increased funding and this position ends July 2012. The following statistical summary provides a realistic picture of the current secondary suite situation within the city.

Non-conforming secondary suite approvals		728
• approvals by Development Officer	65	
Deemed non-conforming secondary suites (includes 32 applications that were denied; rest identified through a complaint - no application made)		121
• removal agreements issued	81	
• removal agreements pending	40	
New secondary suite approvals (mostly new neighbourhoods)		100
Total known secondary suite locations		949
• confirmed removed secondary suites	35	
• inspections scheduled to see if suite exist	30	

Appeals to the Subdivision Development Appeal Board		67
• includes both denied applications and approved applications in which a condition(s) was appealed		
• 40 decisions over turned		

Development Permits Issued for non-conforming secondary suites	470
Legal non-conforming secondary suites not requiring a Development Permit – only required Alberta Fire Code upgrades	258
Total	728

Non-conforming secondary suite approvals - Occupancy Permits issued (all Development Permit conditions met)	622
Non-conforming secondary suite approvals – Occupancy Permits not yet issued – waiting for Development Permit conditions to be met	106
Total	728

15% neighbourhood limit for Secondary Suites	
• one neighbourhood has reached 15%	West Park East
• 3 neighbourhoods between 10-15%	South Hill Riverside Meadows Michener Hill
• all other neighbourhoods under 10%	

Note: all totals may not add up as some numbers are approximate and others have been rounded off

Summary/Analysis

The SS Ad Hoc Committee, through discussions at its regular meetings, has been effective and instrumental in monitoring and guiding the secondary suites application and decision making processes that resulted from the initial December 2009 Land Use Bylaw amendment allowing landowners of illegal secondary suites to apply to make these suites legal and conform with applicable Fire and Building Codes.

Bylaw changes proposed by Administration and vetted through the SS Ad Hoc Committee as part of the 2011 Evaluation Report and ultimately approved by Council, resulted in a better decision making process for the Development Authority and eliminated some of the frustration between decisions being issued by MPC and decisions issued by the SDAB on applications that were appealed. Changes included the addition of a Purpose Statement; a clear indication that the condition of a secondary suite property or the behavior of its occupants are not to be considered by the Development Authority, rather the Community Standards Bylaw; the addition of planning criteria; and an improved linkage between enforcement of development conditions to potential Bylaw offenses and penalties. These changes allow the Development Authority to better scrutinize secondary suite applications and issue more definitive decisions.

Although the Secondary Suite Licensing Bylaw was not approved by City Council, the Inspections & Licensing Department will continue to send out landowner letters and agreements to shut down known illegal secondary suites with legal action to be initiated if the suite remains, as well as deal with secondary suites on a complaint basis.

A number of the secondary suite matters identified at the SS Ad Hoc workshop sessions in 2011 (education strategies, enforcement, Bylaw gaps, etc.) will be monitored by Administration and appropriate action taken as required. Now that all of the existing non-conforming (illegal) secondary suite applications have been processed, Administration proposes to evaluate and assess the Land Use Bylaw's location criteria on future new secondary suite applications. Administration believes that what we have now (current Secondary Suite Regulations, application process, and enforcement) works well.

As the number of applications for new secondary suites is relatively low, Administration believes a two to three year time period is required to properly monitor and evaluate the impact and effectiveness of the secondary suite location criteria within city neighbourhoods, particularly emerging new neighbourhoods. At that time a summary report could be brought back to City Council outlining and addressing any Bylaw deficiencies or changes required.

Administration believes that the mandate of the Secondary Suites Regulation Ad Hoc Review Committee to monitor and provide insight, advice and potential changes to Administration on matters pertaining to the Secondary Suite Regulations and the Development Permit application processes has been fulfilled. The 2009 - 2011 Land Use Bylaw amendments allowed landowners to make existing non-conforming suites legal and safe and creates continued opportunity for new suites to be provided as a form of alternative/affordable housing.

Recommendation

That, with thanks, the Secondary Suites Regulation Ad Hoc Review Committee be disbanded.

Tony Lindhout

Tony Lindhout, RPP, MCIP
Senior Planner

J. Boon

Joyce Boon,
Development & Licensing Supervisor

Appendix A**Secondary Suites Regulation Ad-Hoc Review Committee****Terms of Reference**

1. The Secondary Suites Ad-Hoc Review Committee consists of:
 - a. Two members of Council.
 - b. Five Citizens-at-Large.
 - c. Two non-voting staff resource liaisons as identified by the Secondary Suites Ad-hoc Review Committee.
2. Secondary Suites Ad-Hoc Review Committee members are appointed or reappointed annually.
3. The mandate and purpose of the Secondary Suites Ad-Hoc Review Committee is to provide insight, advice and potential changes to administration on matters relating to the current land-use bylaw and development permit application processes respective to secondary suites. Further, the Committee will oversee the preparation of a secondary suites evaluation report to be submitted to City Council in the first quarter of 2011 relative to implementation of secondary suite land use bylaw development regulations, development approval processes and impacts on neighbourhoods.
4. The duties of the Secondary Suites Ad-Hoc Review Committee include, but are not limited to:
 - a. In consultation with administration, development of a secondary suites evaluation report template that may include but is not limited to relative data identified in Figure 1.
 - b. Review information and data supplied by administration relative to monitoring and evaluating the impacts of secondary suite regulations and legislation,
 - c. Review the draft evaluation report prepared by administration prior to submission to City Council for information;
 - d. Recommend if required, possible changes to the existing land-use bylaw and development permit application process relative to secondary suites based on evidence emerging from the monitoring and evaluation report;
 - e. Advise administration and Council on the interests and concerns of the public relative to current secondary suite land use bylaw regulations and the development permit application process;
 - f. Request additional technical expertise if required from City staff, administration or any outside resource.
5. Meeting agendas will be prepared jointly by the Chair and staff resource liaisons at least one week in advance of the meeting. A copy of the agenda and any relevant information packages will be distributed to members and support staff in advance of the meeting date.
6. The governance and operation of the Secondary Suites Ad-Hoc Review Committee shall be as outlined in The City's Committee Bylaw 3431/2009.

Figure 1

Data that may be included in the secondary suites evaluation report prepared by administration and the Secondary Suites Ad-hoc Review Committee for the consideration of Council:

Existing secondary suites:

- number of secondary suite development permit applications received for **existing** non-approved secondary suites:
 - how many applications were approved/refused/appealed,
 - types of upgrades required in order to comply with Safety Codes Act,
 - how many homeowners proceeded with upgrades, and
 - number of homes reverted back to single family dwelling status,
- status of known non-approved secondary suites list:
 - how many have not applied for a development permit to legalize use, and
 - how many have been reverted back to single family dwelling status, and
- number of non-conforming but not illegal secondary suites that registered and have been inspected.

New secondary suites:

- number of development permit applications received for **new** secondary suites,
- how many were “permitted” and “discretionary” use applications,
- number of “permitted” use secondary suite applications approved, and
- number of “discretionary” use secondary suite applications approved; refused; appealed.

All secondary suites:

- using the secondary suite boundary zone map, location and number of approved secondary suites including assessment relative to the maximum 15% limitation cap,
- land use districts in which secondary suite approvals are located,
- identification of any concentrations of approved secondary suites,
- effectiveness/analysis of tracking secondary suite approvals on City *Redgis* system, and public viewing on City Web Map,
- total number of site inspections undertaken by Inspections and Licensing staff and Emergency Services staff (includes multiple inspections on same site),
- evaluation of staff resources required to process secondary suite development permit applications,
- assessment of neighbourhood notification process, effectiveness, response rate,
- impacts of secondary suites (legal and illegal) on community (e.g. parking) and tracking types of issues identified by complaints or by any other means of assessment; resolution mechanisms,
- evaluation of Permit Fee Bylaw relative to fee structure for secondary suite applications, and
- orders/fines/penalties issued.

March 18, 2010

Appendix B**Current Secondary Suite Regulations from Land Use Bylaw**

City of Red Deer Land Use Bylaw 3357/2006

- (x) an accessory building may not be constructed or used for the sole purpose of a home occupation,
- (xi) a home occupation which is allowed as a permitted use shall not generate additional traffic subsequent to the date of approval.
- (k) Notwithstanding section 4.7 (8)(a) or any other provision of this Bylaw, the holder of a home occupation license (the "Licensee") may hold one retail sale or open house per year from the premises in which the home occupation is located, subject to the following conditions:
 - (i) the Licensee shall notify the Development Officer two weeks prior to the date of the proposed sale,
 - (ii) the sale may run for one day only,
 - (iii) admission to the sale shall be by invitation only and the sale may not be generally advertised, and
 - (iv) the retail sale of goods shall be restricted to products produced in the home, for which the licensee is a licensed home occupation.

(9) ¹Secondary Suite Use Provisions and Development Regulations**General Purpose**

- (9.1) The purpose of this section is to regulate Secondary Suites as defined by this Bylaw. Secondary Suites are intended to provide integrated residential uses secondary to primary Dwelling Units in residential neighbourhoods in order to:
- (a) create more supply and choice in the range of housing options;
 - (b) create Dwelling Units that meet applicable fire and building codes;
 - (c) create more affordable home ownership and rental accommodation; and
 - (d) provide opportunity for increasing neighbourhood populations and densities.

Use Provisions

- (9.2) Where a Secondary Suite is shown as a permitted use in the R1, R1A, and R2 Residential Districts, it is permitted only:

¹ 3357/Z-2009, 3357/S-2010, 3357/B-2011

City of Red Deer Land Use Bylaw 3357/2006

- (a) On a lot identified for a Secondary suite in a Neighbourhood Area Structure Plan adopted before January 1, 2010; or
- (b) On a lot located within a Neighbourhood Area Structure Plan adopted after January 1, 2010, provided that the lot has a lane, that the primary Dwelling Unit is not developed with a zero lot line and that the lot meets one of the following requirements:
 - (i) it is a corner lot; or
 - (ii) the lot is on a street containing residential development on only one side of the street; or
 - (iii) any portion of the front boundary of the lot is located directly across the street from a parcel in a (PS) Public Service District or from a Municipal Reserve parcel either of which is not less than 10.0 m wide; or
 - (iv) a side boundary of the lot abuts a Municipal Reserve parcel which is not less than 10.0 m wide; or
 - (v) a side or rear boundary of the lot abuts, or is within 10.0 m of the boundary of a parcel in a Commercial or Industrial District; or
 - (vi) a side boundary of the lot abuts a parcel in a R2 or R3 Residential District.
- (9.3) A Secondary Suite is a discretionary use in any R1, R1A, R2, R3 Residential and C1 Commercial District, except where it is a permitted use under section 9.2.
- (9.4) A Secondary Suite which exists as of December 14, 2009 in any residential district and which has not previously received development approval under this Bylaw or its predecessors, is considered a discretionary use provided that:
 - (a) The Secondary Suite complies with the Safety Codes Act; and
 - (b) The owner applies for a development permit in respect of the Secondary Suite prior to September 1, 2010.
- (9.5) Whether it is listed as a permitted or a discretionary use, a Secondary Suite may not be developed in any applicable Residential District if such development would increase the number of Secondary Suites in a neighbourhood beyond 15% of the total number of detached Dwelling

City of Red Deer Land Use Bylaw 3357/2006

Units in that neighbourhood. For the purpose of this section, the Secondary Suite Neighbourhood Zone boundaries shall be the boundaries as illustrated on Figure 3A.

- (9.6) Prior to consideration of an application for development of a discretionary use Secondary Suite, the Development Officer shall notify all landowners located within 100 m of the boundary of the site on which the proposed Secondary Suite is to be located.
- (9.7) Notwithstanding that a Secondary Suite may be listed as a permitted or discretionary use in a district, such use is a conditional use which is only allowed if the Secondary Suite meets the following requirements, which shall not be relaxed or varied by the Development Authority:
- (a) Except as allowed by section 9.4, a Secondary Suite may only be developed in a detached Dwelling Unit;
 - (b) Not more than one Secondary Suite is allowed in a Dwelling Unit;
 - (c) A Secondary Suite is not allowed in an Accessory Building; and
 - (d) A Secondary Suite and a Home Occupation (other than a permitted "office" use) are not allowed in the same detached Dwelling Unit.

Discretion of MPC

- (9.8) Before the Development Authority considers an application for a Secondary Suite, all landowners located within 100 m of the boundary of the site on which the proposed Secondary Suite is to be located must have been notified of the application.

In making its decision on discretionary use applications the Development Authority may give favorable consideration to a Secondary Suite application through evaluation of planning criteria including but not limited to the following:

- (a) Availability of on-street parking spaces by virtue of any of the following:
 - (i) corner lot locations,
 - (ii) residential development located on only one side of the street and where parking is permitted on the other side,

City of Red Deer Land Use Bylaw 3357/2006

- (iii) a side boundary of the lot abuts a Municipal Reserve parcel which is not less than 10.0 m wide,
 - (iv) any portion of the front boundary of the lot is located across the street from a parcel in a PS Public Service District or from a Municipal Reserve parcel either of which is not less than 10.0 m wide, and
 - (v) a side or rear boundary of the lot abuts, or is within 10.0 m of the boundary of a parcel in a Commercial or Industrial District.
- (b) Surrounding neighbourhood not overly dense by virtue of any of the following:
- (i) development consists largely of detached dwelling units,
 - (ii) development consists largely of minimum 12 m wide lots,
 - (iii) the number and location of lawful Secondary Suites, or
 - (iv) the number and location of area semi-detached and multiple family dwelling units.
- (c) Neighbourhood design and accessibility:
- (i) the lot is located on a street that has more than one entrance/exit,
 - (ii) the lot has access from a lane, or
 - (iii) the lot is located in close proximity to a neighbourhood park or open space area, a neighbourhood commercial site or, a community trail/pathway system.
- (9.9) In making its decision on a Secondary Suite, the Development Authority shall not consider the condition of the property or the behaviour of the occupants of the property, as these matters are enforced through the Community Standards Bylaw and other legislation.
- (9.9.1) ¹No person shall fail to comply with a development permit, or conditions forming part thereof, issued in relation to a secondary suite development.

¹ 3357/A-2012

City of Red Deer Land Use Bylaw 3357/2006

Development Regulations

(9.10) The Development Officer may issue decisions on discretionary use secondary suite applications if:

- (a) No neighbourhood objection has been received from the 100 m landowner consultation process; and
- (b) The application meets all requirements of the Land Use Bylaw and Secondary Suite Regulations.

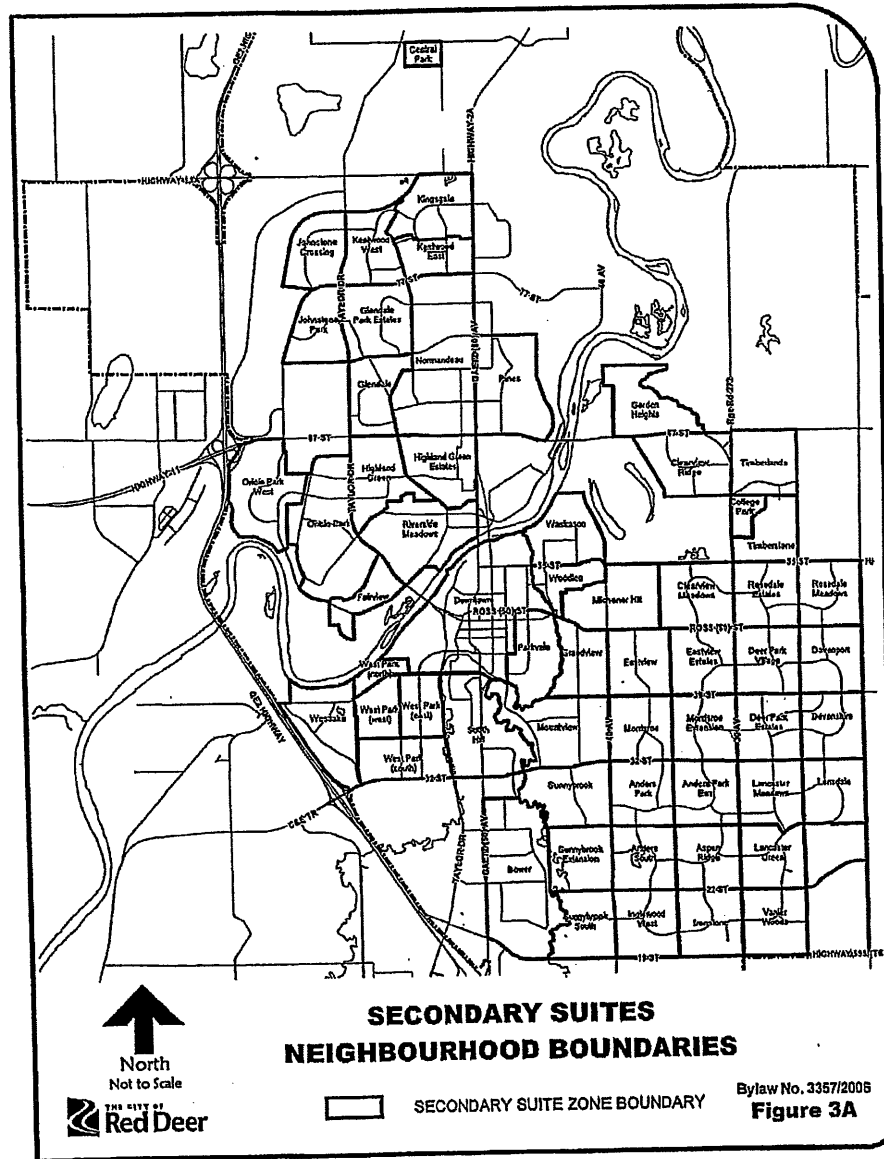
(9.11) The following regulations apply to all permitted and discretionary use Secondary Suites, unless varied by the Development Authority:

- (a) The Secondary Suite must have its own exterior building entrance, which shall not be located on a front building elevation facing a public street. Notwithstanding this, a single entry door providing access to an enclosed, shared landing area from which both the primary Dwelling Unit and the Secondary Suite take access, may be located on a front building elevation facing a public street.
- (b) The floor area of a Secondary Suite shall not exceed the total floor area used by the primary Dwelling Unit.
- (c) In addition to meeting the parking requirements for the primary Dwelling Unit as set out in section 3.1 and 3.2 of this Bylaw, a property which contains a Secondary Suite must also meet the following parking requirements:
 - (i) a property containing a Secondary Suite with two or fewer bedrooms shall provide one off-street parking space; a Secondary Suite with more than two bedrooms shall provide two off-street parking spaces; all parking spaces to be developed to a minimum gravel standard,
 - (ii) parking spaces for the Secondary Suite shall be available for the exclusive and unrestricted use of the occupant(s) of the Secondary Suite,
 - (iii) parking spaces for a Secondary Suite must be located in one of the following locations:
 - (1) in an attached or detached garage or on its driveway,

City of Red Deer Land Use Bylaw 3357/2006

- (2) in the rear yard, or
- (3) in the side yard to the rear of the front yard setback,
- (iv) locating Secondary Suite parking spaces in tandem with the parking pads required of the primary Dwelling Unit is not allowed however, if multiple parking spaces are required for the Secondary Suite, these can be arranged in a tandem parking configurations,
- (v) on lots where the parking space for a Secondary Suite is not to be provided in the location described in subsection (iii), the Development Authority may allow the parking space(s) to be located within the front yard setback provided that a minimum of 25% of the front yard setback remains landscaped, that the parking spaces for the Secondary Suite are not in tandem with the parking spaces for the primary Dwelling Unit and that the parking space is developed to the satisfaction of the Development Authority.”

City of Red Deer Land Use Bylaw 3357/2006



Attachment 2

i

EXECUTIVE SUMMARY

Background

Over the past few years, affordable housing has become a significant concern in The City of Red Deer. In response, the City's Affordable Housing Strategy (2006) sets out a number of strategic recommendations regarding secondary suites, including changes to secondary suite regulations, legalizing existing secondary suites, and creating new secondary suites in established neighborhoods. Earlier in 2002, The City of Red Deer implemented regulations by way of the *Land Use Bylaw* and *Neighbourhood Planning Guidelines and Standards* to allow for the identification of secondary suite locations within the Neighbourhood Area Structure Plans for new developing residential neighborhoods.

In January 2008, The City of Red Deer engaged Western Management Consultants to consult with the larger community and defined stakeholder groups to identify stakeholder observations, suggestions and input concerning how *secondary suites* should be managed in the future.

The project involved the following activities:

- Analyzing City regulations for designating secondary suites in new residential areas structure plans based on the City's experience with recently developed new neighborhoods, e.g., Inglewood West, Inglewood East, Johnstone Crossing, etc.;
- Consulting with citizens and other stakeholders to determine their level of support for secondary suites and to identify issues and concerns that need to be considered by The City in the legalization of secondary suites;
- Researching and providing recommendations around the legalization of non-conforming secondary suites in existing established neighborhoods;
- Analyzing, evaluating and proposing modifications to the City's Land Use Bylaw in order to implement the new Alberta Building Code and Alberta Fire Code standards for secondary suites; and
- Recommending strategies as to how secondary suites can be used as a means of increasing the City's supply of affordable housing units and residential densities.



W e s t e r n M a n a g e m e n t C o n s u l t a n t s

ii.

Secondary Suites Defined

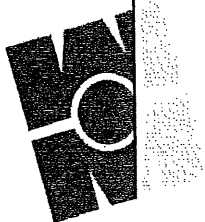
A secondary suite is generally defined as any self-contained dwelling unit that includes a kitchen, bathroom and sleeping accommodation contained within a principal dwelling.

Secondary suites were created to:

- Provide opportunities for landowners to create more choices in the range of affordable housing; and
- Provide opportunities in a manner which are compatible with other residential uses and which ensure a detached dwelling with a secondary suite retains the curb appearance, the level of activity and the primary functions of a detached dwelling (as opposed to a semi-detached dwelling).

The R2 and R3 zoning in the City's Land Use Bylaw allows secondary suites if they were legally in existence before April 5, 2004. The Land Use Bylaw does not currently permit creation of new secondary suites in neighbourhoods that were developed prior to the requirement for Area Structure Plans (ASP's).

The City's Assessment Department has identified 881 properties where the variation "basement suite" code has been used. This description however, does not determine if they are actually rented or still active. The City has over 80 files on non-compliant secondary suites which have been put 'on hold' in the possibility that the regulations may change as a result of this project. Knowledge of existing illegal secondary suites is usually gained by way of a complaint to the Inspections and Licensing Department. The owner of the secondary suite is then issued a letter indicating the suite may not be legal under the Land Use Bylaw. The secondary suite is inspected to determine whether it meets Alberta Building and Fire Code standards and the owner is required to make immediate changes to comply if necessary.



iii.

Leading Practice Review

Many Canadian cities are addressing the need for affordable housing options for their residents including creation of secondary suites. Secondary suite opportunities in 11 Canadian cities were researched through a search of information and documents available about each city on the Internet and through phone calls to the Planning Departments in several of the cities.

Stakeholder Consultation

Citizen and stakeholder input and feedback concerning secondary suites was secured through:

- A Web survey accessed by residents from The City of Red Deer website;
- Interviews with stakeholder groups;
- Two open house sessions; and
- Letters from community associations and residents.

Themes Identified through Stakeholder Consultation

- There is a high level of resident support for secondary suites in Red Deer.
- Parking was identified as the major issue related to secondary suites and residents indicated the City must address this issue.
- The City must exercise its responsibility to ensure secondary suites meet safety and fire code standards.
- The size and location of the secondary suite in relation to the primary dwelling should be regulated by the City.
- The owner of a primary dwelling unit in which a home-based business operates should be restricted from having a secondary suite.
- The prevalence of non-owner-occupied secondary suites in some (particularly older) neighbourhoods is perceived by some residents as one cause of increased crime and other negative social behaviors.



iv.

- There was mixed support for The City providing incentives to create secondary suites.

Recommendations

Based on the Leading Practice review of 11 other Canadian municipalities and the results of the consultation with Red Deer stakeholders, the following recommendations are proposed for secondary suites in The City of Red Deer.

Recommendation #1: That the following regulations for secondary suites be adopted and that the Land Use Bylaw be amended accordingly:

- a. Secondary suites are allowed only in single detached dwelling units, where listed as a permitted or discretionary use in the land use district;
- b. Secondary suites shall be constructed within the requirements of all applicable Safety Codes;
- c. Only one secondary suite may be permitted in a single detached dwelling unit;
- d. Minimum lot width shall be 12m;
- e. Minimum site area shall be 360m²;
- f. A secondary suite must be less than the total floor area of the principal dwelling unit;
- g. A secondary suite requires one off-street parking stall in addition to the two off-street stalls required for the principal dwelling. A garage is considered as off-street parking. Driveway parking may be considered if it does not restrict movement of vehicles in the garage; and
- h. Secondary suites are not permitted in a single detached house which contains a Home Occupation.

Recommendation #2: That secondary suites be identified as a "discretionary" use in all existing R1, R1A and R2 districts not currently subject to City of Red Deer Neighbourhood Planning Guidelines & Standards for a two year period commencing on October 1, 2008.



v.

Recommendation #3: That secondary suites be identified as a “permitted” use in all new area structure plan areas effective January 1, 2009.

Recommendation #4: That The City of Red Deer review resource requirements to implement and administer changes to the licensing and approval of existing illegal secondary suites and new secondary suites.

Recommendation #5: That the City engage in a robust public information campaign to encourage owners of existing secondary suites to obtain a permit for the secondary suite; to inform homeowners with secondary suites that they have a responsibility to ensure that the suite meets building and fire code standards, and to provide citizens with all the necessary information relating to building and safety code standards.

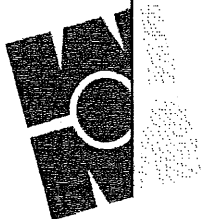
Recommendation #6: That Red Deer develop an Incentive Strategy to assist in the legalization of existing secondary suites and to encourage development of options for affordable housing through development of new secondary suites.

Recommendation #7: That the Westpark neighbourhood be given special consideration for an intervention strategy such as an Area Re-development Plan to deal with current density issues.

Conclusion

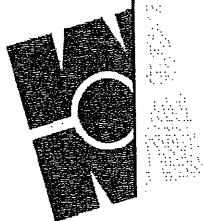
Based on stakeholder consultation and primary and secondary research undertaken during this project, there appears to be support for secondary suites in The City of Red Deer. The benefits to The City by legalizing existing and new secondary suites include but are not limited to the following:

- Stability in Housing Options – Secondary suites provide more reliable and somewhat stable rental supply for the community;
- Income Stream for Mortgage Qualification – Secondary suites that conform to municipal planning regulations may be recognized by lenders to qualify new homeowners for mortgages;



vi.

- Increase in Grant Monies from the Government – Tenants of secondary suites can be enumerated resulting in better census data which can positively influence per-capita based provincial grants allocations to The City;
- Infrastructure Planning – Increased certainty about the number of primary and secondary dwelling units provides the City with a better opportunity to plan infrastructure requirements; and
- Health and Safety – Legalizing secondary suites will provide better opportunity for ensuring minimum health and safety standards for tenants of secondary suites.



W e s t e r n M a n a g e m e n t C o n s u l t a n t s

Attachment 3

City of Red Deer Land Use Bylaw 3357/2006

- (ix) a home occupation may be accommodated in a private garage, provided however, that it does not prevent the continued use of the garage for the intended purpose of parking motor vehicles and that the parking requirements of any bylaw continue to be met,
 - (x) an accessory building may not be constructed or used for the sole purpose of a home occupation,
 - (xi) a home occupation which is allowed as a permitted use shall not generate additional traffic subsequent to the date of approval.
- (k) Notwithstanding section 4.7 (8)(a) or any other provision of this Bylaw, the holder of a home occupation license (the "Licensee") may hold one retail sale or open house per year from the premises in which the home occupation is located, subject to the following conditions:
- (i) the Licensee shall notify the Development Officer two weeks prior to the date of the proposed sale,
 - (ii) the sale may run for one day only,
 - (iii) admission to the sale shall be by invitation only and the sale may not be generally advertised, and
 - (iv) the retail sale of goods shall be restricted to products produced in the home, for which the licensee is a licensed home occupation.



9. ¹Secondary Suite Use Provisions and Development Regulations

General Purpose

- (9.1) The purpose of this section is to regulate Secondary Suites as defined by this Bylaw. Secondary Suites are intended to provide integrated residential uses secondary to primary Dwelling Units in residential neighbourhoods in order to:
- (a) create more supply and choice in the range of housing options;
 - (b) create Dwelling Units that meet applicable fire and building codes;
 - (c) create more affordable home ownership and rental accommodation; and
 - (d) provide opportunity for increasing neighbourhood populations and densities.

¹ 3357/Z-2009, 3357/S-2010, 3357/B-2011

City of Red Deer Land Use Bylaw 3357/2006

Use Provisions

(9.2) ¹Where a Secondary Suite is shown as a permitted use in the R1, R1A, R1C, R1WS, and R2 Residential Districts, it is permitted only:

- (a) On a lot identified for a Secondary suite in a Neighbourhood Area Structure Plan adopted before January 1, 2010; or
- (b) On a lot located within a Neighbourhood Area Structure Plan adopted after January 1, 2010, provided that the lot has a lane, that the primary Dwelling Unit is not developed with a zero lot line and that the lot meets one of the following requirements:
 - (i) it is a corner lot; or
 - (ii) the lot is on a street containing residential development on only one side of the street; or
 - (iii) any portion of the front boundary of the lot is located directly across the street from a parcel in a (PS) Public Service District or from a Municipal Reserve parcel either of which is not less than 10.0 m wide; or
 - (iv) a side boundary of the lot abuts a Municipal Reserve parcel which is not less than 10.0 m wide; or
 - (v) a side or rear boundary of the lot abuts, or is within 10.0 m of the boundary of a parcel in a Commercial or Industrial District; or
 - (vi) a side boundary of the lot abuts a parcel in a R2 or R3 Residential District.

(9.3) ²A Secondary Suite is a discretionary use in any R1, R1A, R1C, R1WS, R2, R3 Residential and C1 Commercial District, except where it is a permitted use under section 9.2.

(9.4) A Secondary Suite which exists as of December 14, 2009 in any residential district and which has not previously received development approval under this Bylaw or its predecessors, is considered a discretionary use provided that:

- (a) The Secondary Suite complies with the Safety Codes Act; and

¹3357/L-2013

²3357/L-2013

City of Red Deer Land Use Bylaw 3357/2006

- (b) The owner applies for a development permit in respect of the Secondary Suite prior to September 1, 2010.
- (9.5) Whether it is listed as a permitted or a discretionary use, a Secondary Suite may not be developed in any applicable Residential District if such development would increase the number of Secondary Suites in a neighbourhood beyond 15% of the total number of detached Dwelling Units in that neighbourhood. For the purpose of this section, the Secondary Suite Neighbourhood Zone boundaries shall be the boundaries as illustrated on Figure 3A.
- (9.6) Prior to consideration of an application for development of a discretionary use Secondary Suite, the Development Officer shall notify all landowners located within 100 m of the boundary of the site on which the proposed Secondary Suite is to be located.
- (9.7) Notwithstanding that a Secondary Suite may be listed as a permitted or discretionary use in a district, such use is a conditional use which is only allowed if the Secondary Suite meets the following requirements, which shall not be relaxed or varied by the Development Authority:
 - (a) Except as allowed by section 9.4, a Secondary Suite may only be developed in a detached Dwelling Unit;
 - (b) Not more than one Secondary Suite is allowed in a Dwelling Unit;
 - (c) A Secondary Suite is not allowed in an Accessory Building; and
 - (d) A Secondary Suite and a Home Occupation (other than a permitted "office" use) are not allowed in the same detached Dwelling Unit.

Discretion of MPC

- (9.8) Before the Development Authority considers an application for a Secondary Suite, all landowners located within 100 m of the boundary of the site on which the proposed Secondary Suite is to be located must have been notified of the application.

In making its decision on discretionary use applications the Development Authority may give favorable consideration to a Secondary Suite application through evaluation of planning criteria including but not limited to the following:

- (a) Availability of on-street parking spaces by virtue of any of the following:

City of Red Deer Land Use Bylaw 3357/2006

- (i) corner lot locations,
 - (ii) residential development located on only one side of the street and where parking is permitted on the other side,
 - (iii) a side boundary of the lot abuts a Municipal Reserve parcel which is not less than 10.0 m wide,
 - (iv) any portion of the front boundary of the lot is located across the street from a parcel in a PS Public Service District or from a Municipal Reserve parcel either of which is not less than 10.0 m wide, and
 - (v) a side or rear boundary of the lot abuts, or is within 10.0 m of the boundary of a parcel in a Commercial or Industrial District.
 - (b) Surrounding neighbourhood not overly dense by virtue of any of the following:
 - (i) development consists largely of detached dwelling units,
 - (ii) development consists largely of minimum 12 m wide lots,
 - (iii) the number and location of lawful Secondary Suites, or
 - (iv) the number and location of area semi-detached and multiple family dwelling units.
 - (c) Neighbourhood design and accessibility:
 - (i) the lot is located on a street that has more than one entrance/exit,
 - (ii) the lot has access from a lane, or
 - (iii) the lot is located in close proximity to a neighbourhood park or open space area, a neighbourhood commercial site or, a community trail/pathway system.
- (9.9) In making its decision on a Secondary Suite, the Development Authority shall not consider the condition of the property or the behaviour of the occupants of the property, as these matters are enforced through the Community Standards Bylaw and other legislation.

City of Red Deer Land Use Bylaw 3357/2006

- (9.9.1) ¹No person shall fail to comply with a development permit, or conditions forming part thereof, issued in relation to a secondary suite development.

Development Regulations

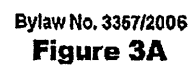
- (9.10) The Development Officer may issue decisions on discretionary use secondary suite applications if:
- (a) No neighbourhood objection has been received from the 100 m landowner consultation process; and
 - (b) The application meets all requirements of the Land Use Bylaw and Secondary Suite Regulations.
- (9.11) The following regulations apply to all permitted and discretionary use Secondary Suites, unless varied by the Development Authority:
- (a) The Secondary Suite must have its own exterior building entrance, which shall not be located on a front building elevation facing a public street. Notwithstanding this, a single entry door providing access to an enclosed, shared landing area from which both the primary Dwelling Unit and the Secondary Suite take access, may be located on a front building elevation facing a public street.
 - (b) The floor area of a Secondary Suite shall not exceed the total floor area used by the primary Dwelling Unit.
 - (c) In addition to meeting the parking requirements for the primary Dwelling Unit as set out in section 3.1 and 3.2 of this Bylaw, a property which contains a Secondary Suite must also meet the following parking requirements:
 - (i) a property containing a Secondary Suite with two or fewer bedrooms shall provide one off-street parking space; a Secondary Suite with more than two bedrooms shall provide two off-street parking spaces; all parking spaces to be developed to a minimum gravel standard,
 - (ii) parking spaces for the Secondary Suite shall be available for the exclusive and unrestricted use of the occupant(s) of the Secondary Suite,
 - (iii) parking spaces for a Secondary Suite must be located in one of the following locations:

¹ 3357/A-2012

City of Red Deer Land Use Bylaw 3357/2006

- (1) in an attached or detached garage or on its driveway,
- (2) in the rear yard, or
- (3) in the side yard to the rear of the front yard setback,
- (iv) locating Secondary Suite parking spaces in tandem with the parking pads required of the primary Dwelling Unit is not allowed however, if multiple parking spaces are required for the Secondary Suite, these can be arranged in a tandem parking configurations,
- (iv) on lots where the parking space for a Secondary Suite is not to be provided in the location described in subsection (iii), the Development Authority may allow the parking space(s) to be located within the front yard setback provided that a minimum of 25% of the front yard setback remains landscaped, that the parking spaces for the Secondary Suite are not in tandem with the parking spaces for the primary Dwelling Unit and that the parking space is developed to the satisfaction of the Development Authority.”
- (v) ¹a hard surfaced walkway shall be provided between any Secondary Suite parking space(s) and the primary dwelling unit in which the Secondary Suite is located.

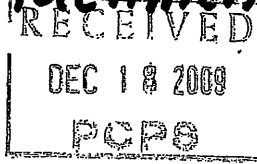
¹ 3357/E-2014



Attachment 4

Residential Land Use Districts	Permitted	Discretionary
R1 Residential (Lot Density)	Yes, subject to section 4.7(9)	Yes, subject to section 4.7(9)
R1C Residential (Carriage Home)	Yes, subject to section 4.1.1(3)(b) and 4.7(9)	Yes, subject to sections 4.1.1(3) and 4.7(9)
R1WS Residential (Wide/Shallow Lot)	No	Yes, subject to sections 4.1.2(2)(b) and 4.7(9)
R1A Residential (Semi-Detached Dwelling)	Yes, in detached dwelling unit, subject to section 4.7(9)	Yes, in a detached dwelling unit, subject to section 4.7(9) Yes, in a semi-detached dwelling unit but only in situations where they were in existence as of January 1, 2009, subject to 4.7(9). No new secondary suites allowed in semi-detached dwellings
R1N Residential (Narrow Lot)	No	Yes, but only suites that were in existence as of January 1, 2009. No new secondary suites allowed.
R1G Residential (Small Lot)	No	No
RLW Residential (Live-Work)	No	No
R2 Residential (Medium Density)	Yes, if legally in existence before April 5, 2004 Yes, in a detached dwelling unit, subject to section 4.9(7)	Yes, in a detached dwelling unit, subject to section 4.7(9)
R2T Residential (Town House)	No	No
R3 Residential (Multiple Family)	No	Yes, if legally in existence before April 5, 2004 Yes, in a detached dwelling unit, subject to section 4.7(9)
R4 Residential (Manufactured Home)	No	No
R1E Residential Estate	No	No

Commercial Land Use Districts	Permitted	Discretionary
C1 Commercial (City Centre) <i>no other commercial districts list "secondary suites" as a use</i>	No	Yes, in a detached dwelling unit, subject to 4.7(9)

**Attachment 5******REVISED - Council Decision – December 14, 2009****FILE COPY**

DATE: December 15, 2009

TO: Secondary Suites Steering Committee:
c/o Tony Lindhout, Parkland Community Planning Services

FROM: Elaine Vincent, Legislative & Administrative Services Manager

SUBJECT: Land Use Bylaw Amendment No. 3357/Z-2009 - Secondary Suites Regulations

Reference Report:

Legislative and Administrative Services Manager, dated December 7, 2009

Parkland Community Planning Services, Secondary Suites Steering Committee, dated December 7, 2009

Resolutions:

"Resolved that Council of the City of Red Deer having considered the report from Parkland Community Planning Services, dated December 7, 2009, Re: Land Use Bylaw Amendment 3357/Z-2009, Proposed Secondary Suite Regulations, hereby amends Land Use Bylaw Amendment 3357/Z-2009 by:

Deleting Section (9.4) (b) – "the owner applies for a development permit in respect of the Secondary Suite prior to January 1, 2012."

and replacing it with the revised Section (9.4) (b): "the owner applies for a development permit in respect of the Secondary Suite prior to July 1, 2010."**

MOTION CARRIED

"Resolved that Council of the City of Red Deer hereby agrees to reduce the Secondary Suite Cap from 20% to 15%". **

MOTION CARRIED

BYLAW NO. 3357/Z-2009

Being a Bylaw to amend Bylaw No. 3357/2006, the Land Use Bylaw of The City of Red Deer.

COUNCIL OF THE CITY OF RED DEER, ALBERTA, DULY ASSEMBLED, ENACTS AS FOLLOWS:

Definitions

- 1 Section 1.3 is amended by deleting the existing definitions of **Dwelling Unit** and **Secondary Suite** and replacement of them with the following new definitions:

"Dwelling Unit means a self contained building or a portion of a building usually containing cooking, eating, living, sleeping and sanitary facilities and used as a permanent residence by a household.

Secondary Suite means a self-contained Dwelling Unit that is located within a primary Dwelling Unit, where both Dwelling Units are registered under the same land title."

Districts

- 2 R1 Residential District (permitted uses) subsection 4.1 (1)(a)(vi) is deleted and replaced with the following new subsection:

"(vi) Secondary Suite, subject to section 4.7(9)"

- 3 R1 Residential District (discretionary uses) Subsection 4.1 (1)(b) is amended by adding the following new subsection:

"(x) Secondary Suite, subject to section 4.7(9)"

- 4 R1A Residential District (permitted uses) subsection 4.2 (1)(a) is amended by adding the following new subsection:

"(vii) Secondary Suite in a detached Dwelling Unit, subject to section 4.7(9)"

- 5 R1A Residential District (discretionary uses) subsection 4.2 (1)(b) is amended by adding the following new subsections:

"(ix) Secondary Suite in a detached Dwelling Unit, subject to section 4.7(9)

(x) Secondary Suite in existence in a semi-detached Dwelling Unit on January 1, 2009, subject to section 4.7(9)"

- 6 R1N Residential District (discretionary uses) subsection 4.3 (1)(b) is amended by adding the following new subsection:

"(vi) Secondary Suite in existence on January 1, 2009, subject to section 4.7(9)"

- 7 R2 Residential District (permitted uses) subsection 4.4 (1)(a) is amended by adding the following new subsection:

"(vii) Secondary Suite in a detached Dwelling Unit, subject to subsections 4.7 (9)"

- 8 R2 Residential District (discretionary uses) subsection 4.4(1)(b) is amended by adding the following new subsection:

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Page 2

"(xvi) Secondary Suite in a detached Dwelling Unit, subject to section 4.7(9)"

- 9 R3 Residential District (discretionary uses) subsection 4.5 (1)(b) is amended by adding the following new subsection:

"(xii) Secondary Suite in a detached Dwelling Unit, subject to section 4.7(9)"

- 10 C1 Commercial District (discretionary uses) subsection 5.1(1)(b) is amended by adding the following new subsection:

"(xxi) Secondary Suite in a detached Dwelling Unit, subject to section 4.7(9)"

Secondary Suite Regulations

- 11 Residential District Regulations subsection 4.7 (9) is deleted in its entirety and replaced with the following new subsection:

"(9) Secondary Suite Use Provisions and Development Regulations"

General Purpose

- (9.1) These regulations provide opportunity for landowners to create more choices in the range of housing options, in a manner which is compatible with other residential uses and which ensures that a primary Dwelling Unit with a Secondary Suite retains the curb appearance, the level of activity and the principal function of a residential dwelling.

Use Provisions

- (9.2) Where Secondary Suite is shown as a permitted use in the R1, R1A and R2 Residential Districts, it is permitted only:
- (a) on a lot identified for a Secondary suite in a Neighbourhood Area Structure Plan adopted before January 1, 2010; or
 - (b) on a lot located within a Neighbourhood Area Structure Plan adopted after January 1, 2010, provided that the lot has a lane, that the primary Dwelling Unit is not developed with a zero lot line and that the lot meets one of the following requirements:
 - (i) it is a corner lot; or
 - (ii) the lot is on a street containing residential development on only one side of the street; or
 - (iii) any portion of the front boundary of the lot is located directly across the street from a parcel in a (PS) Public Service District or from a Municipal Reserve parcel either of which is not less than 10.0 m wide; or
 - (iv) a side boundary of the lot abuts a Municipal Reserve parcel which is not less than 10.0 m wide; or

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- (v) a side or rear boundary of the lot abuts, or is within 10.0 m of the boundary of a parcel in a Commercial or Industrial District; or
 - (vi) a side boundary of the lot abuts a parcel in a R2 or R3 Residential District.
- (9.3) A Secondary Suite is a discretionary use in any R1, R1A, R2, R3 Residential and C1 Commercial District, except where it is a permitted use under section 9.2.
- (9.4) A Secondary Suite which exists as of January 1, 2009 in any residential district and which has not previously received development approval under this Bylaw or its predecessors, is considered a discretionary use provided that:
 - (a) the Secondary Suite complies with the Safety Codes Act; and
 - (b) the owner applies for a development permit in respect of the Secondary Suite prior to July 1, 2010.
- (9.5) Whether it is listed as a permitted or discretionary use, a Secondary Suite may not be developed in an R1, R1A, R2 or R3 Residential District if such development would increase the number of Secondary Suites in a neighbourhood beyond 15% of the total number of detached Dwelling Units in that neighbourhood. For the purpose of this section, the boundaries of a neighbourhood shall be those shown in the City's Redgis system on the City's Web page.
- (9.6) Prior to consideration of an application for development of a discretionary use Secondary Suite, the Development Officer shall notify all landowners located within 100 m of the boundary of the site on which the proposed Secondary Suite is to be located.
- (9.7) Notwithstanding that a Secondary Suite may be listed as a permitted or discretionary use in a district, such use is a conditional use which is only allowed if the Secondary Suite meets the following requirements, which shall not be relaxed or varied by the Development Authority:
 - (a) Except as allowed by section 9.4, a Secondary Suite may only be developed in a detached Dwelling Unit.
 - (b) Not more than one Secondary Suite is allowed in a detached Dwelling Unit.
 - (c) A Secondary Suite is not allowed in an Accessory Building.
 - (d) A Secondary Suite and a Home Occupation (other than a permitted "office" use) are not allowed in the same detached Dwelling Unit.

Bylaw No. 3357/Z-2009

Page 4

Discretion of MPC

- (9.8) Subject to section 9.7, the Municipal Planning Commission may approve as a discretionary use an application for a Secondary Suite in a detached Dwelling Unit in any district provided that the proposed suite would not unduly interfere with the amenities of the neighbourhood, or materially interfere with or affect the use, enjoyment or value of neighbouring sites and that all landowners located within 100 m of the boundary of the site on which the proposed Secondary Suite is to be located have been notified.

Development Regulations

- (9.9) The following regulations apply to all permitted and discretionary Secondary Suites, unless varied by the Municipal Planning Commission:

- (a) A Secondary Suite must have its own exterior building entrance, which shall not be located on a front building elevation facing a public street. Notwithstanding this, a single entry door providing access to an enclosed, shared landing area from which both the primary Dwelling Unit and the Secondary Suite take access, may be located on a front building elevation facing a public street.
- (b) The floor area of a Secondary Suite shall not exceed the total floor area used by the primary Dwelling Unit.
- (c) In addition to meeting the parking requirements for the primary Dwelling Unit as set out in section 3.1 and 3.2 of this Bylaw, a property which contains a Secondary Suite must also meet the following parking requirements:
 - (1) A property containing a Secondary Suite with two or fewer bedrooms shall provide one off-street parking pad; a Secondary Suite with more than two bedrooms shall provide two off-street parking pads; all parking pads to be developed to a minimum gravel standard.
 - (2) Parking pads for the Secondary Suite shall be available for the exclusive and unrestricted use of the occupant(s) of the Secondary Suite.
 - (3) Parking pads for a Secondary Suite must be located in one of the following locations:
 - (A) in an attached or detached garage,
 - (B) in the rear yard; or
 - (C) in the side yard to the rear of the front yard setback.
 - (4) Locating Secondary Suite parking pads in tandem with the parking pads required of the primary Dwelling Unit is not allowed. However, if multiple parking pads are required for the Secondary Suite, these can be arranged in a tandem parking configuration.

Bylaw No. 3357/Z-2009
Page 5

- (5) On lots where the parking pad for a Secondary Suite in the location described in subsection (3) cannot reasonably be provided, the Development Authority may allow the parking pad(s) to be located within the front yard setback provided that a minimum of 25% of the front yard setback remains landscaped, that the parking pads for the Secondary Suite are not in tandem with the parking pads for the primary Dwelling Unit and that the parking pad is developed to the satisfaction of the Development Authority."

Offences

12 New Section 9.2 (10) is added as follows:

- "(10) (a) If any Secondary Suite is occupied after January 1, 2012 without a valid occupancy permit, the owner of the building in which the Secondary Suite is located is guilty of an offence.
- (b) Where a violation ticket, summons or stop order has been issued for a breach of subsection (a) above, and the Secondary Suite continues to be occupied 30 days after the date that the violation ticket, summons or order has been issued, the owner of the building is guilty of a continuing offence and shall be liable upon conviction to a penalty of \$100 for each day after the 30 day period that the Secondary Suite continues to be occupied. This continuing offence penalty shall be in addition to any penalty imposed as a result of a conviction for a breach of Section 9.2 (10)(a)."

13 Schedule "C" Specified Penalties for Offences under the Land Use Bylaw is amended by adding the following:

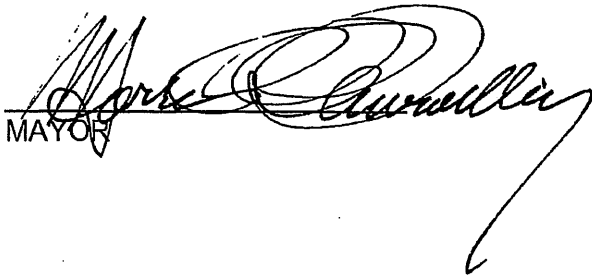
<u>Description of Offence</u>	<u>First Offence</u>	<u>Second Offence</u>	<u>Third or Continuing Subsequent Offences</u>
"Section 4.7 (9)			
Secondary Suite does not comply with conditions of permit	\$500.00	\$1,000.00	\$5,000.00
Secondary Suite does not comply with the regulations of this Bylaw	\$500.00	\$1,000.00	\$5,000.00
Section 9.2(10)(a)			
Secondary Suite occupied without valid permit	\$500.00	\$1,000.00	\$5,000.00"

READ A FIRST TIME IN OPEN COUNCIL this 16th day of November 2009.

READ A SECOND TIME IN OPEN COUNCIL this 14th day of December 2009.

READ A THIRD TIME IN OPEN COUNCIL this 14th day of December 2009.

AND SIGNED BY THE MAYOR AND CITY CLERK this 14th day of December 2009.



MAYOR



CITY CLERK

Attachment 6



DATE: June 15, 2011
TO: Craig Curtis, City Manager
FROM: Planning and Inspections & Licensing Departments
RE: Secondary Suites
 Council Resolution – December 13, 2010

Introduction

City Council at their meeting of December 13, 2010 passed the following resolution:

"Resolved that Council of the City of Red Deer having considered the report from the Planning Services and Inspections & Licensing departments dated December 3, 2010 Re: Secondary Suites Council Report, hereby directs that administration continue discussions with the Municipal Planning Commission and the Secondary Suites Ad Hoc Committee to explore whether options are required for the future consideration of Council regarding development of secondary suite density and proximity (separation), with a report to be brought back for Council's consideration prior to the end of June 2011.

Background

The Secondary Suites Ad Hoc Review Committee, the Municipal Planning Commission and Inspections & Licensing and Planning staff together recently coordinated a comprehensive review of the Secondary Suite Regulations within the Land Use Bylaw. The lack of Secondary Suite planning criteria and how to analyze potential neighbourhood impacts were concerns raised by Inspections & Licensing staff, the Municipal Planning Commission (MPC) and the Subdivision Development Appeal Board (SDAB) during the approval and appeal of Secondary Suite applications. Land Use Bylaw Amendment Bylaw 3357/B-2011, which passed on May 2, 2011:

- added objectives to the Secondary Suite purpose statement;
- added, for evaluation by the Development Authority, planning criteria that includes consideration of:
 - availability of on-street parking, and
 - density of surrounding developed neighbourhood by virtue of the number of existing detached dwelling units, parcel widths, location of approved Secondary Suites and locations of any multiple family developments;
- added consideration by the Development Authority, of neighbourhood design and accessibility principles in regard to:
 - type of street (street having more than one entrance/exit, cul-du-sac, crescent), lane access, and
 - proximity to any neighbourhood amenity (park, commercial conveniences, community trail);
- added allowance of Development Officer approvals if applications supported by neighbourhood and comply with LUB and Safety Codes Act; and
- references the Community Standards Bylaw with regard to enforcement of messy yards and tenant behavior issues.

Furthermore, Administrative changes have also been made by staff to MPC presentations and agenda content to streamline the decision making process resulting in more Secondary Suite applications being processed at MPC meetings. While the total number of Secondary Suite applications received was ±550 (since Dec/09), only ±175 currently remain to be processed. These are all discretionary use, existing Secondary Suite applications.

The neighbourhood notification notice was also amended to provide area residents more clarity around the Secondary Suite approval process and matters that may constitute as having legitimate neighbourhood impact.

Discussion

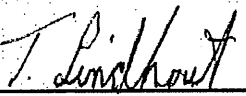
The Secondary Suite density and separation matters referenced in the December 14, 2010 Council resolution are generally being addressed through the recently approved Land Use Bylaw amendment. The new criteria in the LUB relates to various neighbourhood conditions such as the number of detached dwelling units, parcels that are at least 12 m wide, number and location of lawful Secondary Suites and the number and location of area multiple family developments are now being applied to the Secondary Suite applications. Other Secondary Suite considerations are the type of street it is located on (does street have more than one entrance/exit), does the site have access to a lane and the site's proximity to any neighbourhood park, open space, community trail or neighbourhood commercial site.

The matter of further Bylaw amendments regarding density and separation circumstances was discussed with the Secondary Suite Ad Hoc Review Committee at their May 26, 2011 meeting. The Ad Hoc Committee suggested that no additional land use bylaw changes are required at this time.

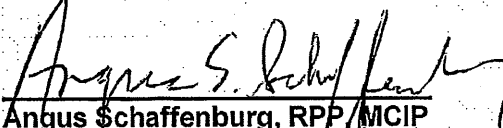
Staff (Planning and I&L) concludes that density and separation can be generally addressed through the recently adopted LUB provisions. However, staff and the Secondary Suites Ad Hoc Review Committee should monitor the impact of the recent Bylaw changes on the remaining ±175 Secondary Suite applications before contemplating any additional amendments. These applications will likely take another 4-5 months to process. In early 2012 staff will bring back an update of the secondary suites process including any areas for policy changes after discussion with the Secondary Suites Ad Hoc Review Committee and the Municipal Planning Commission.

Recommendation

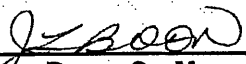
That Council agrees that no additional amendments should be considered at this time and that Administration bring back a report, if required, recommending changes to the secondary suites land use bylaw provisions in early 2012 after review by the Secondary Suites Ad Hoc Review Committee and the Municipal Planning Commission.



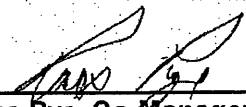
Tony Lindhout, RPP, MCIP
Senior Planner



Angus Schaffenburg, RPP/MCIP
Acting Planning Manager



Joyce Boon, Co-Manager
Inspections & Licensing



Russ Pye, Co-Manager
Inspections & Licensing

Monday, June 27, 2011 Council meeting

Secondary Suites – Density Report

Department: Planning Services

Moved by Councillor Tara Veer, seconded by Councillor Lynne Mulder

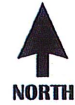
“Resolved that Council of The City of Red Deer having considered the report from the Planning and Inspection and Licensing Departments, dated June 15, 2011, re: Secondary Suites – Density Report, hereby agrees that no additional amendments should be considered at this time and that Administration bring back a report, if required, recommending changes to the Secondary Suites Land Use Bylaw provisions in early 2012, following a review by the Secondary Suites Ad Hoc Review Committee and the Municipal Planning Commission.”

IN FAVOUR: Mayor Morris Flewwelling, Councillor Buck Buchanan, Councillor Paul Harris, Councillor Cindy Jefferies, Councillor Lynne Mulder, Councillor Chris Stephan, Councillor Tara Veer, Councillor Frank Wong, Councillor Dianne Wyntjes

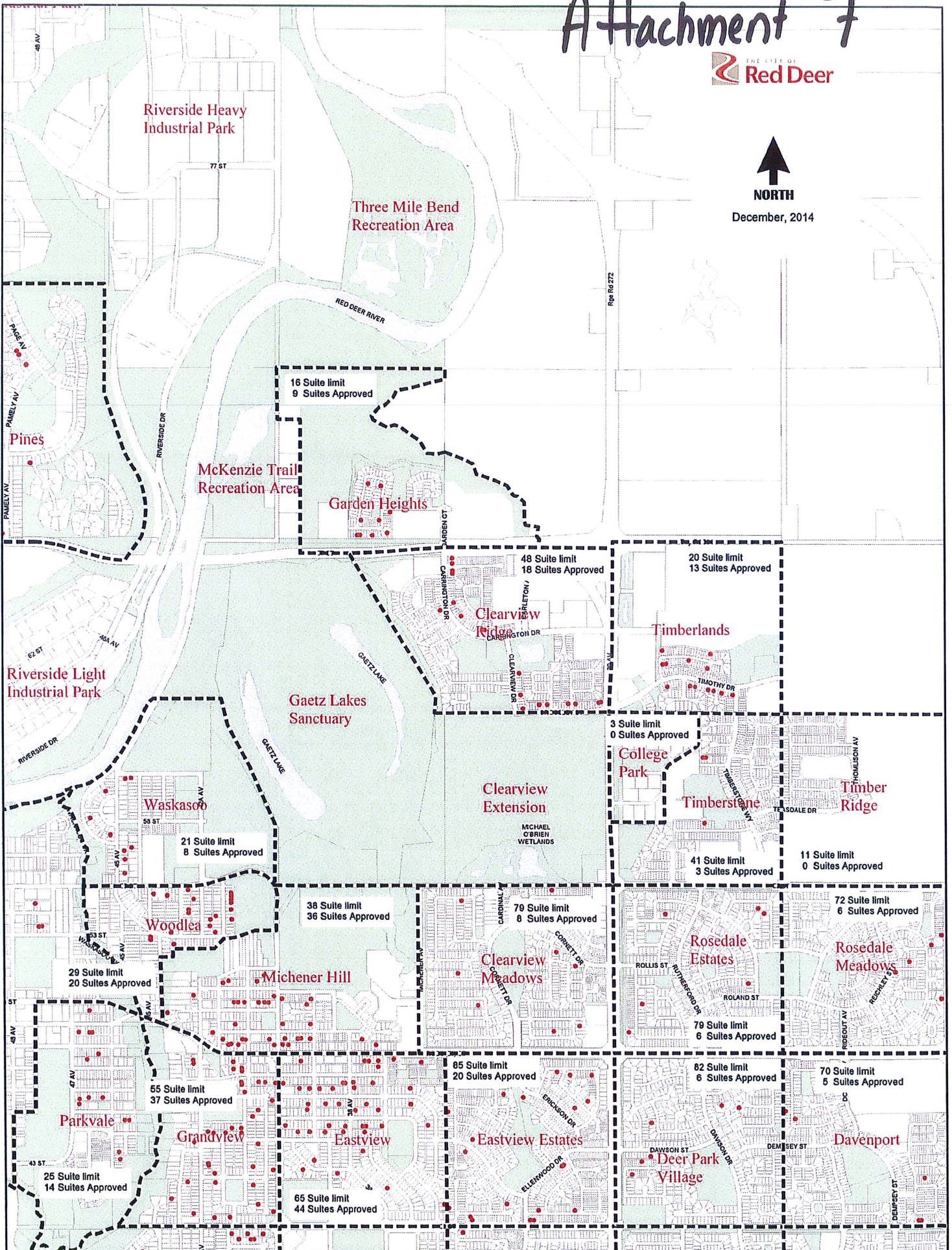
MOTION CARRIED

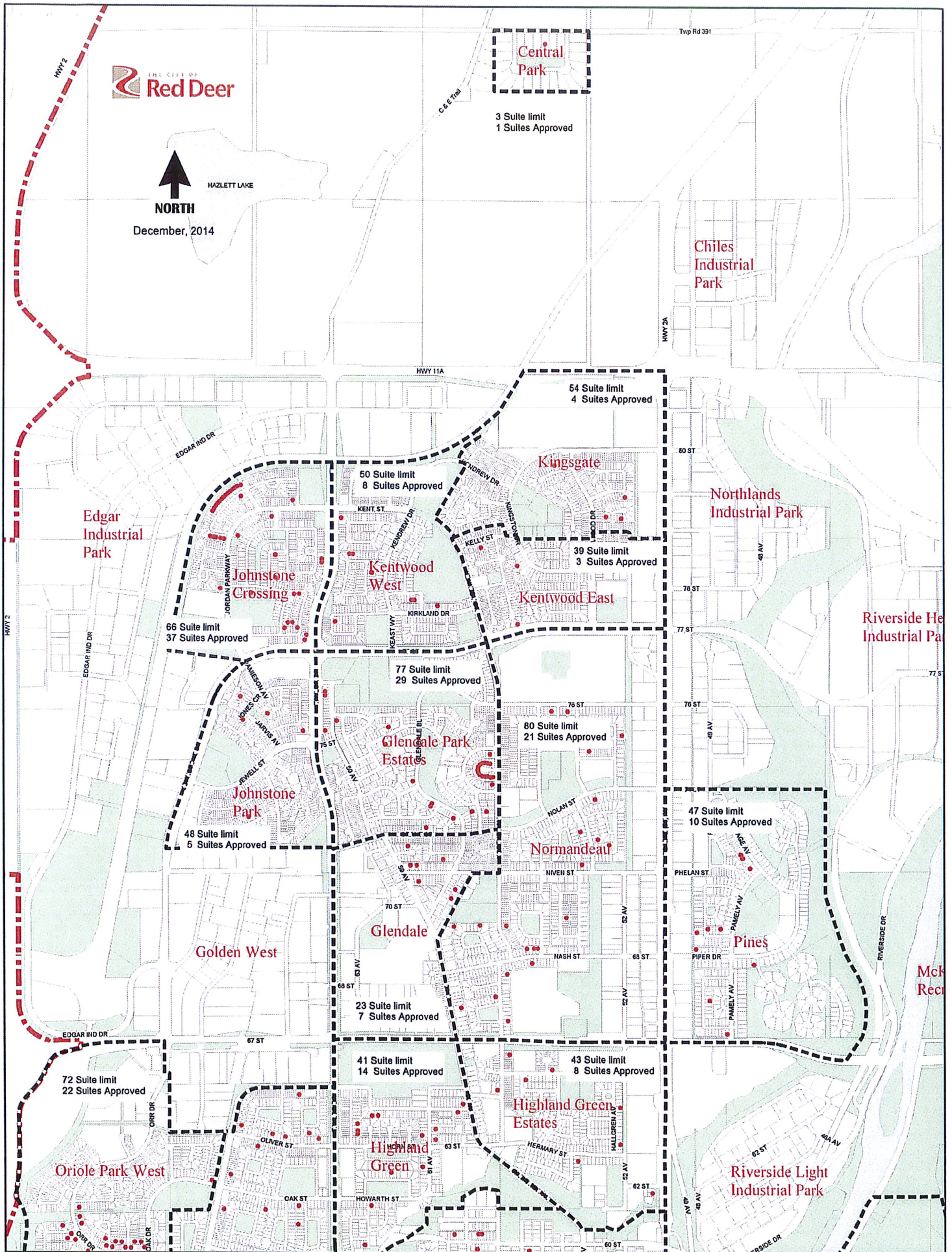
Council recessed at 4:55 p.m. and reconvened at 6:12 p.m.

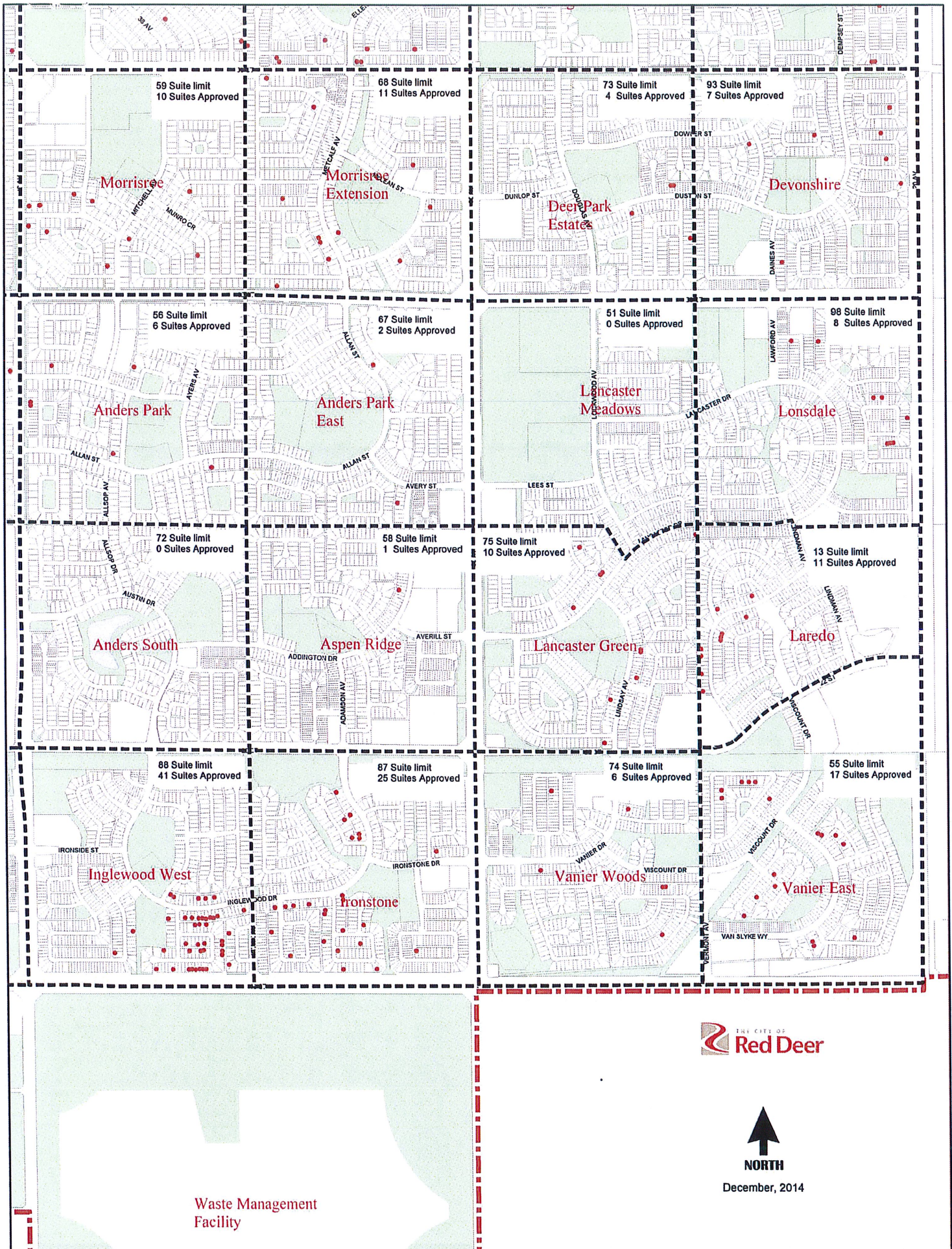
Attachment 7

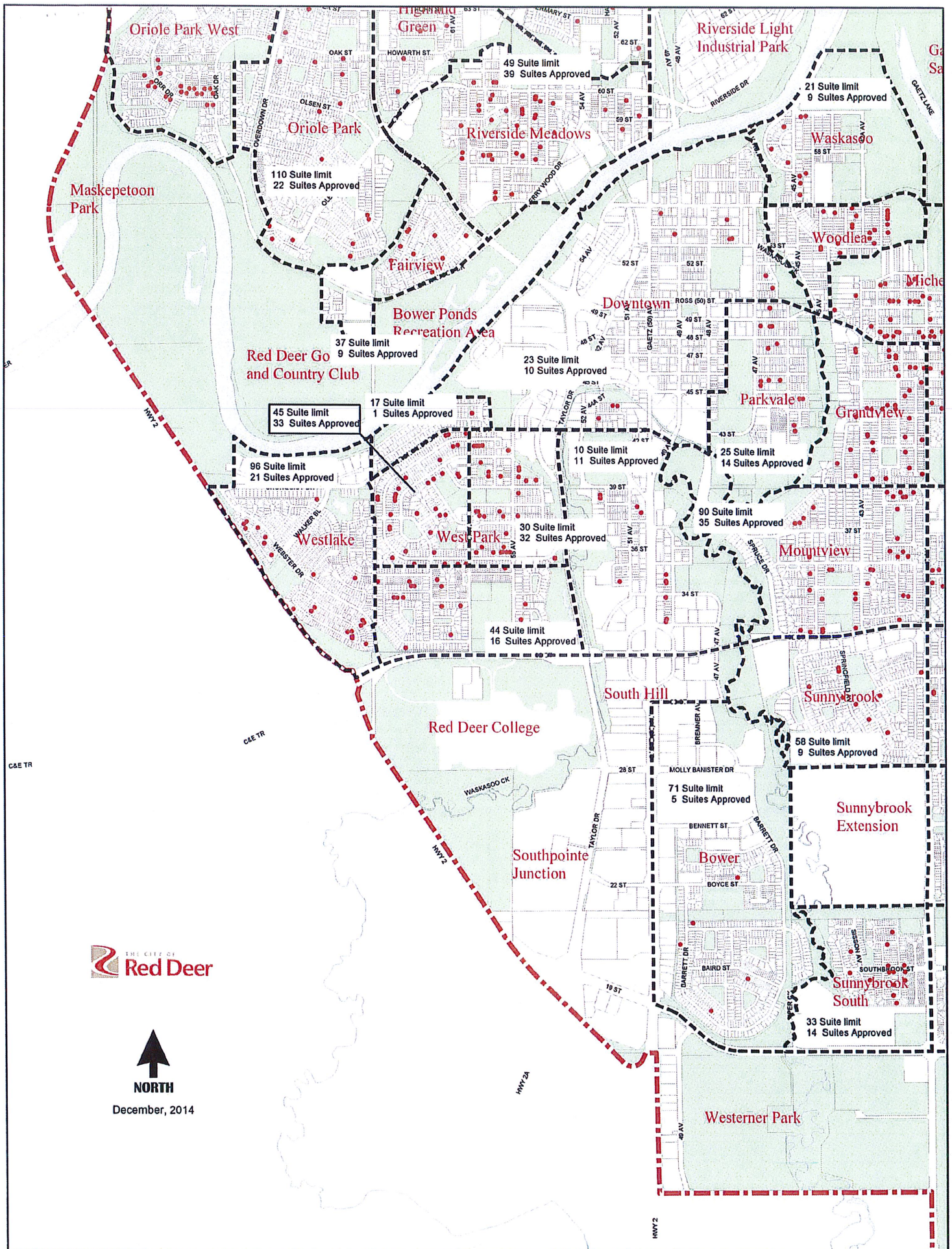


December, 2014









DATE: August 31, 2016
TO: Samantha Rodwell, Deputy City Clerk
FROM: Frieda McDougall, Legislative Services Manager
SUBJECT: Notice of Motion Submitted by Councillor Lawrence Lee Re:
Secondary Suites

Reference Report:

Legislative Services, dated August 17, 2016 and Inspections & Licensing, dated August 19, 2016

Resolution:

At the Monday, August 29, 2016 Regular Council Meeting, Council passed the following Resolution:

Resolved that Council of The City of Red Deer hereby agrees to table the Notice of Motion Submitted by Councillor Lee Re: Secondary Suites for up to 12 weeks in order for administration to undertake a review of the location criteria under which secondary suites are approved and further review the 15% standard in the context of the new neighbourhood guidelines and standards.

Report back to Council: Yes.



Frieda McDougall
Manager

- c. Director of Planning Services
Inspections & Licensing Manager
Corporate Meeting Administrator