

# TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY</b>	<b>3</b>
<b>1.0 INTRODUCTION AND POLICY FRAMEWORK</b>	<b>9</b>
1.1 Policy Context	10
1.2 Purpose of Report	11
<b>2.0 BIRDS IN MARKHAM</b>	<b>13</b>
2.1 Migrant Birds	13
2.2 Resident Birds	14
2.3 Breeding Birds	14
2.4 Markham's Greenway System	14
<b>3.0 BIRD-WINDOW COLLISIONS</b>	<b>18</b>
3.1 Bird-Window Collisions in Markham	18
3.2 Markham Development Structure	18
3.3 Factors: Glass and Other Reflective Surfaces	19
Reflectivity	19
Transparency	19
Black Hole/Passage Effect	19
Overall Design	20
Types of Glass	20
Building Size	20
Orientation	20
Proximity to Natural Features	21
Siting	21

Design Traps	22
Reflected Vegetation	22
Green Roofs, Gardens and Walls	22
3.4 Factor: Lighting	23
Fatal Light Attraction	23
Beacon Effect and Urban Glow	23
3.5 Factor: Building Height and High Risk Bird-Window Collision Areas	23
Nighttime Migration Path Threat	24
Seasonal Migratory Threat/Bad Weather Threat	24
<b>4.0 TREATMENTS</b>	<b>26</b>
4.1 Application of Treatments	26
16m Zone of Protection	26
2m <sup>2</sup> rule	28
15% rule	28
4.2 Primary Treatments	29
Integral/Applied Coverings - Stripes	30
Integral/Applied Coverings - Dots	31
Integral/Applied External Coverings - Netting	32
Frit and Etched Patterns	33
4.3 Secondary Treatments	34
Internal Blinds and Shades	35
Louvers and External Coverings	36
Closely-Spaced Mullions	37
Tinting	38

Angling	39
UV Patterned Glass (Experimental)	40
Landscape Design	41
4.4 Lighting Treatments	42
Mitigate Interior and Exterior Lighting	43
<b>5.0 IMPLEMENTATION &amp; RECOMMENDATIONS</b>	<b>45</b>
5.1 Endorse Bird Friendly Guidelines	45
5.2 Site Plan Approval Process	45
5.3 Voluntary Monitoring Program	46
5.4 Retrofit and Audit of Existing Buildings	46
5.5 Education and Outreach/Lights Out Program	46
<b>GLOSSARY</b>	<b>50</b>
<b>APPENDICES</b>	<b>56</b>
A: Applicable Legislation	56
B: Best Practices Summary	60
C: Markham Retrofit Projects	74
D: Existing Conditions Summary	76
E: Bird Identification	86
<b>REFERENCES</b>	<b>94</b>