

Table of Contents

ACRONYMS, ABBREVIATIONS, DEFINITIONS

GLOSSARY

EXECUTIVE SUMMARY

1.0	INTRODUCTION	1
1.1	THE PROPONENT	1
1.2	PURPOSE FOR THE ENVIRONMENTAL ASSESSMENT	1
1.3	SITE HISTORY AND BACKGROUND	2
1.4	OVERVIEW OF CURRENT OPERATIONS.....	3
1.5	RATIONALE FOR THE PROPOSED UNDERTAKING	6
2.0	OVERVIEW OF THE EA PROCESS	11
2.1	ENVIRONMENTAL ASSESSMENT (EA) PROCESS.....	11
2.2	OVERVIEW OF RIDGE LANDFILL EA REPORT	14
2.3	TECHNICAL WORK COMPLETED.....	15
2.3.1	<i>Socio-Economic Interviews</i>	15
2.3.2	<i>Waste Diversion and Recycling Survey</i>	15
3.0	DESCRIPTION OF THE ENVIRONMENT POTENTIALLY AFFECTED	19
3.1	STUDY AREAS	19
3.1.1	<i>On-Site</i>	19
3.1.2	<i>Off-Site</i>	19
3.1.3	<i>Haul Route</i>	20
3.1.4	<i>The Broader Community</i>	20
3.2	DESCRIPTION OF THE ENVIRONMENT (BASELINE)	25
3.2.1	<i>Natural Environment – Biological</i>	25
3.2.1.1	Designated Natural Areas	29
3.2.1.2	Terrestrial	29
3.2.1.3	Breeding Birds.....	30
3.2.1.4	Botanical.....	32
3.2.1.5	Species at Risk (SAR).....	37
3.2.1.6	Aquatic	38
3.2.1.7	Turtle Habitat/Basking Surveys	40
3.2.1.8	Incidental Wildlife	40
3.2.2	<i>Natural Environment - Hydrogeological</i>	41
3.2.2.1	Geology	41
3.2.2.2	Overburden.....	42
3.2.2.3	Surficial Soil and Topography.....	42
3.2.2.4	Hydrogeology.....	45
3.2.3	<i>Natural Environment - Surface Water</i>	57
3.2.3.1	Drainage	58
3.2.3.2	Flow Characteristics	59
3.2.3.3	Baseflow	64
3.2.3.4	Flood Conditions	64

3.2.3.5	Drainage Characteristics	65
3.2.3.6	Stormwater Management Ponds and Flood Control Facility.....	65
3.2.3.7	Historical Streamflow Monitoring	65
3.2.3.8	Surface Water – Current Quality Monitoring Program	66
3.2.3.9	Benthic Community Inventory	75
3.2.4	<i>Natural Environment - Atmospheric</i>	75
3.2.4.1	Air Quality and Odour Criteria.....	76
3.2.4.2	Background Air Quality.....	78
3.2.4.3	Existing Conditions Source Identification.....	79
3.2.4.4	Emission Rate Estimates	81
3.2.4.5	Dispersion Modelling.....	82
3.2.4.6	Predicted Air Quality	87
3.2.4.7	Haul Route.....	91
3.2.4.8	Atmospheric Results.....	98
3.2.5	<i>Natural Environment - Climate Change</i>	99
3.2.5.1	Estimation of Greenhouse Gas Emissions from Existing Site Conditions.....	99
3.2.5.2	Projected Future Climatic Conditions	101
3.2.5.3	Potential Climate Change Interactions	102
3.2.6	<i>Socio-Economic Environment - Social</i>	104
3.2.6.1	Demographic, Social, and Cultural Characteristics	104
3.2.6.2	Outdoor Recreational Opportunities	106
3.2.6.3	Indigenous Communities and Organizations.....	106
3.2.6.4	Summary of Public Complaints and Responses.....	107
3.2.7	<i>Socio-Economic Environment - Economic</i>	110
3.2.7.1	Economic Characteristics of the Municipality of Chatham-Kent and Blenheim.....	110
3.2.7.2	Economic Activities within the Study Areas	111
3.2.7.3	Waste Connections and the Ridge Landfill’s Contribution to the Regional Economy of Chatham-Kent	112
3.2.8	<i>Socio-Economic Environment - Atmospheric</i>	115
3.2.8.1	Odour and Dust.....	115
3.2.8.2	Blowing Litter.....	115
3.2.9	<i>Socio-Economic Environment - Noise</i>	121
3.2.9.1	Landfill On-Site and Study Area.....	121
3.2.9.2	Haul Route Noise.....	127
3.2.10	<i>Socio-Economic Environment - Visual</i>	131
3.2.11	<i>Socio-Economic Environment - Agricultural</i>	141
3.2.11.1	On-Site Soils, Capability and Drainage	141
3.2.11.2	On-Site Crop Production and Farm Infrastructure.....	141
3.2.11.3	Off-Site Soils, Capability and Drainage.....	142
3.2.11.4	Off-Site Crop Production and Farm Infrastructure	145
3.2.11.5	Haul Route Study Area.....	145
3.2.12	<i>Cultural Environment - Archaeology</i>	146
3.2.12.1	Stage 1 Archaeological Assessment.....	146
3.2.12.2	Stage 2 Archaeological Assessment.....	147
3.2.12.3	Stage 3 Archaeological Assessment.....	148
3.2.13	<i>Cultural Environment – Cultural Heritage</i>	151
3.2.13.1	Stage 1 Cultural Heritage Assessment	151
3.2.13.2	Stage 2 Cultural Heritage Assessment	151
3.2.14	<i>Built Environment - Bird Hazards to Aviation Safety</i>	152
3.2.14.1	Aviation Safety.....	157

3.2.15	<i>Built Environment - Land Use</i>	157
3.2.16	<i>Built Environment -Transportation</i>	159
3.2.16.1	Regional Context	159
3.2.16.2	On-Site.....	160
3.2.16.3	Haul Route	160
3.2.16.4	Traffic Operations and Collision History	162
3.2.17	<i>Built Environment - Design and Operations</i>	164
3.2.17.1	Site Features	164
3.2.17.2	Stockpiles.....	167
3.2.17.3	Screening Berms.....	167
3.2.17.4	Leachate Management.....	167
3.2.17.5	Landfill Gas Management.....	167
3.2.17.6	Other Features.....	167
4.0	CONSIDERATION OF THE ALTERNATIVE METHODS	169
4.1	ALTERNATIVE METHODS FOR SITE DEVELOPMENT.....	171
4.1.1	<i>Description of Site Development Alternatives</i>	176
4.1.1.1	Site Development - Alternative 1	178
4.1.1.2	Site Development - Alternative 2	183
4.1.1.3	Site Development - Alternative 3	189
4.1.2	<i>Potential Net Effects of Landfill Site Development Alternatives</i>	195
4.1.2.1	Natural Environment – Biological (Terrestrial)	195
4.1.2.2	Natural Environment – Biological (Aquatic)	207
4.1.2.3	Natural Environment - Hydrogeological.....	213
4.1.2.4	Natural Environment - Surface Water	220
4.1.2.5	Natural Environment - Air Quality	229
4.1.2.6	Natural Environment - Climate Change	244
4.1.2.7	Socio-Economic Environment - Social.....	250
4.1.2.8	Socio-Economic Environment - Economic.....	267
4.1.2.9	Cultural Environment – Cultural Heritage and Archaeological	276
4.1.2.10	Built Environment – Land Use, Transportation, Bird Hazards and Aviation Safety, Design and Operations 279	
4.1.3	<i>Comparative Evaluation of Site Development Alternatives</i>	286
4.1.3.1	Site Development Alternative Conclusion.....	289
4.2	ALTERNATIVE METHODS OF LANDFILL GAS MANAGEMENT	295
4.2.1	<i>Quality of Landfill Gas</i>	297
4.2.2	<i>Gas Utilization</i>	297
4.2.3	<i>Description of Landfill Gas Management Alternatives</i>	298
4.2.4	<i>Detailed Evaluation of RNG and Electricity Generation</i>	303
4.2.5	<i>Potential Net Effects of Landfill Gas Management Alternatives</i>	307
4.2.5.1	Natural Environment – Physical – Atmospheric and Climate Change	307
4.2.5.2	Socio-Economic Environment - Social.....	314
4.2.5.3	Socio-Economic Environment - Economic.....	319
4.2.5.4	Cultural Environment	323
4.2.5.5	Built Environment	325
4.2.6	<i>Comparative Evaluation of Landfill Gas Management Alternatives</i>	327
4.2.6.1	Landfill Gas Alternatives Conclusion.....	328
4.3	ALTERNATIVE METHODS OF LEACHATE TREATMENT	333
4.3.1	<i>Development of Leachate Treatment Alternatives</i>	333

4.3.2	<i>Description of Leachate Treatment Alternatives</i>	337
4.3.2.1	On-site Leachate Pre-treatment Conceptualized Design	341
4.3.2.2	On-site Full Treatment.....	342
4.3.3	<i>Potential Net Effects of Leachate Treatment Alternatives</i>	344
4.3.3.1	Natural Environment – Aquatic.....	344
4.3.3.2	Natural Environment – Groundwater and Surface Water.....	350
4.3.3.3	Natural Environment – Atmospheric and Climate Change.....	355
4.3.3.4	Socio-Economic Environment - Social.....	359
4.3.3.5	Socio-Economic Environment - Economic.....	366
4.3.3.6	Cultural Environment	369
4.3.3.7	Built Environment	371
4.3.4	<i>Comparative Evaluation of Leachate Treatment Alternatives</i>	375
4.3.4.1	Leachate Treatment Alternatives Conclusion.....	377
4.4	ALTERNATIVE METHODS EVALUATION SUBSEQUENT REVIEW	381
5.0	DESCRIPTION OF THE PREFERRED ALTERNATIVE	383
5.1	PROPOSED ENGINEERING DESIGN OF PREFERRED ALTERNATIVE	383
5.1.1	<i>Landfill Gas</i>	387
5.1.2	<i>Leachate Management</i>	387
5.2	WASTE QUANTITIES AND CHARACTERISTICS	388
5.3	PROPOSED EXPANDED FILL AREA DESIGN	390
5.4	SITE FEATURES.....	391
5.4.1	<i>Site Access and Roads</i>	391
5.4.2	<i>Leachate and Landfill Gas Management</i>	392
5.4.3	<i>Surface Water Management</i>	392
5.4.4	<i>Soil Management, Berms and Buffers</i>	393
5.4.5	<i>Woodlots</i>	394
5.4.6	<i>Ancillary Works</i>	394
5.5	SURFACE WATER MANAGEMENT PLAN	394
5.6	LEACHATE MANAGEMENT SYSTEM.....	395
5.7	LANDFILL GAS MANAGEMENT SYSTEM.....	398
5.8	COMPLIANCE WITH ENGINEERED FACILITIES GUIDELINE AND LANDFILL STANDARDS	401
5.9	CLIMATE CHANGE CONSIDERATIONS.....	402
5.10	CANADA-ONTARIO LAKE ERIE ACTION PLAN.....	403
5.11	LANDFILL DEVELOPMENT (PHASING)	403
5.12	LANDFILL OPERATIONS.....	404
5.13	SITE CONTROL AND MAINTENANCE	405
5.14	MONITORING AND REPORTING	405
5.15	SITE CLOSURE	405
5.16	POST-CLOSURE	406
5.17	COMPARISON OF THE PREFERRED ALTERNATIVE TO THE “DO NOTHING” ALTERNATIVE	407
6.0	IMPACT ASSESSMENT OF THE PREFERRED ALTERNATIVE	415
6.1	NATURAL ENVIRONMENT - BIOLOGICAL	416
6.1.1	<i>Potential Biological Effects</i>	419
6.1.1.1	Endangered or Threatened Species.....	419
6.1.1.2	Medicinal or Culturally Sensitive Species of Importance to Indigenous Communities and Organizations	419
6.1.1.3	Terrestrial Systems.....	420
6.1.1.4	Aquatic	420

6.1.2	<i>Proposed Biological Mitigation</i>	421
6.1.3	<i>Net Effects - Biological</i>	427
6.2	NATURAL ENVIRONMENT – HYDROGEOLOGICAL.....	431
6.2.1	<i>Potential Hydrogeological Effects</i>	432
6.2.1.1	Groundwater Quality.....	432
6.2.1.2	Contaminating Lifespan.....	434
6.2.1.3	Groundwater Quantity.....	434
6.2.1.4	Water Supply Wells.....	434
6.2.2	<i>Proposed Hydrogeological Mitigation</i>	435
6.2.3	<i>Net Effects - Hydrogeological</i>	435
6.3	NATURAL ENVIRONMENT - SURFACE WATER.....	439
6.3.1	<i>Potential Surface Water Effects</i>	440
6.3.1.1	Surface Water Quantity.....	441
6.3.1.2	Surface Water Quantity.....	443
6.3.2	<i>Proposed Surface Water Mitigation</i>	450
6.3.3	<i>Net Effects – Surface Water</i>	453
6.4	NATURAL ENVIRONMENT - ATMOSPHERIC.....	457
6.4.1	<i>On-Site Atmospheric Effects</i>	458
6.4.1.1	Preferred Alternative Scenario 1 Source Identification.....	459
6.4.1.2	Preferred Alternative Scenario 2 Source Identification.....	463
6.4.1.3	Preferred Alternative Scenario 3 Source Identification.....	463
6.4.1.4	Source Configuration.....	469
6.4.1.5	Emission Rates.....	469
6.4.1.6	Dispersion Modelling.....	472
6.4.1.7	Predicted Air Quality.....	477
6.4.1.8	Results.....	493
6.4.2	<i>Haul Route Atmospheric Effects</i>	493
6.4.2.1	Scope of Assessment.....	493
6.4.2.2	Study Area and Receptor Locations.....	494
6.4.2.3	Results.....	501
6.4.3	<i>Proposed Mitigation – Atmospheric</i>	501
6.4.4	<i>Net Effects Atmospheric</i>	502
6.5	NATURAL ENVIRONMENT – CLIMATE CHANGE.....	505
6.5.1	<i>Potential Climate Change Effects</i>	505
6.5.1.1	GHG Emission Potential.....	505
6.5.2	<i>Proposed Climate Change Mitigation</i>	506
6.5.3	<i>Net Effects – Climate Change</i>	506
6.6	SOCIO-ECONOMIC ENVIRONMENT - SOCIAL.....	509
6.6.1	<i>Potential Social Effects</i>	511
6.6.1.1	Displacement.....	511
6.6.1.2	Odour and Dust.....	511
6.6.1.3	Litter.....	512
6.6.1.4	Noise.....	513
6.6.1.5	Visual.....	521
6.6.1.6	Dust and Noise Along the Haul Route.....	527
6.6.1.7	Impacts to Indigenous Communities and Organizations.....	529
6.6.2	<i>Proposed Social Mitigation</i>	529
6.6.3	<i>Net Effects – Social</i>	530
6.7	SOCIO-ECONOMIC ENVIRONMENT - ECONOMIC.....	535

6.7.1	<i>Potential Economic Effects</i>	536
6.7.1.1	Local Economy.....	536
6.7.1.2	Property Values.....	536
6.7.1.3	Costs.....	536
6.7.2	<i>Proposed Economic Mitigation</i>	536
6.7.3	<i>Net Effects - Economics</i>	537
6.8	SOCIO-ECONOMIC ENVIRONMENT – AGRICULTURAL	541
6.8.1	<i>Potential Agricultural Effects</i>	542
6.8.1.1	Agricultural Lands.....	542
6.8.1.2	Infrastructure.....	543
6.8.1.3	Farm Operations Along Haul Route.....	543
6.8.1.4	Employment.....	543
6.8.2	<i>Proposed Agricultural Mitigation</i>	544
6.8.3	<i>Net Effects - Agricultural</i>	544
6.9	CULTURAL ENVIRONMENT – CULTURAL HERITAGE	547
6.9.1	<i>Potential Cultural Heritage Effects</i>	547
6.9.1.1	8765 and 8779 Allison Line	547
6.9.1.2	20323 Charing Cross Road	548
6.9.2	<i>Proposed Cultural Heritage Mitigation</i>	548
6.9.3	<i>Net Effects – Cultural Heritage</i>	548
6.10	CULTURAL ENVIRONMENT – ARCHAEOLOGICAL	553
6.10.1	<i>Potential Archaeological Effects</i>	553
6.10.2	<i>Proposed Archaeological Mitigation</i>	553
6.10.3	<i>Net Effects – Archaeological</i>	554
6.11	BUILT ENVIRONMENT – LAND USE	557
6.11.1	<i>Potential Land Use Effects</i>	557
6.11.1.1	Land Use Designations.....	557
6.11.1.2	Approvals and Permits.....	558
6.11.2	<i>Proposed Land Use Mitigation</i>	558
6.11.3	<i>Net Effects – Land Use</i>	558
6.12	BUILT ENVIRONMENT – TRANSPORTATION	565
6.12.1	<i>Potential Transportation Effects</i>	565
6.12.2	<i>Proposed Transportation Mitigation</i>	569
6.12.3	<i>Net Effects – Transportation</i>	569
6.13	BUILT ENVIRONMENT – BIRD HAZARDS TO AVIATION SAFETY	573
6.13.1	<i>Potential Bird Hazards to Aviation Safety Effects</i>	573
6.13.2	<i>Proposed Bird Hazards to Aviation Safety Mitigation</i>	574
6.13.3	<i>Net Effects – Bird Hazards to Aviation Safety</i>	574
6.14	BUILT ENVIRONMENT – DESIGN AND OPERATIONS.....	577
6.14.1	<i>Potential Design and Operations Effects</i>	578
6.14.1.1	Climate Change Resilience	578
6.14.1.2	Leachate Collection System	579
6.14.1.3	Landfill Gas Management	579
6.14.2	<i>Proposed Design and Operations Mitigation</i>	580
6.14.3	<i>Net Effects – Design and Operations</i>	581
6.15	CUMULATIVE EFFECTS.....	585
6.15.1	<i>Other Existing or Proposed Projects/Activities and Potential Effects</i>	586
6.15.2	<i>Potential Cumulative Effects and Proposed Mitigation</i>	587

7.0	MONITORING, REPORTING AND COMMITMENTS	595
7.1	ENVIRONMENTAL EFFECTS MONITORING	595
7.1.1	<i>Biology</i>	595
7.1.1.1	General (applicable to multiple areas).....	595
7.1.1.2	Endangered and Threatened Species (Provincial)	596
7.1.1.3	Medicinal or Culturally Sensitive Species of Importance to Indigenous Communities and Organizations	596
7.1.1.4	Wildlife and Wildlife Habitat (Non-SAR)	596
7.1.1.5	Trees and Vegetation	596
7.1.1.6	Wetlands	597
7.1.1.7	Stormwater Management Ponds	597
7.1.2	<i>Groundwater</i>	597
7.1.2.1	On-Site Groundwater Monitoring	598
7.1.2.2	Private Groundwater Well Monitoring	601
7.1.3	<i>Surface Water</i>	605
7.1.4	<i>Air and Odour</i>	607
7.1.5	<i>Leachate Collection System</i>	607
7.1.6	<i>Landfill Gas</i>	609
7.2	COMPLAINTS	609
7.3	ANNUAL REPORTS	610
7.4	RIDGE LANDFILL LIAISON COMMITTEE.....	612
7.5	ENVIRONMENTAL MANAGEMENT	612
7.6	CONTINGENCY MEASURES	613
7.6.1	<i>Groundwater</i>	613
7.6.1.1	Tier 1 – Investigation	613
7.6.1.2	Tier 2 – Design, Approval and Implementation	614
7.6.2	<i>Surface Water</i>	615
7.6.3	<i>Archaeology and Heritage Resources</i>	616
7.6.4	<i>Transportation</i>	616
7.6.5	<i>Leachate Management</i>	616
7.6.6	<i>Landfill Gas Management</i>	616
7.6.7	<i>Old Landfill Seep Remediation Trigger Criteria and Contingency Plan</i>	616
7.7	COMMITMENTS	617
8.0	CONSULTATION.....	633
8.1	EA CONSULTATION OBJECTIVES	633
8.2	OVERVIEW OF EA CONSULTATION PROCESS	635
8.3	PRINCIPLE GROUPS CONSULTED	636
8.3.1	<i>Landfill Expansion Letters of Support</i>	637
8.4	SUMMARY OF KEY ISSUES AND CONCERNS RAISED	638
8.5	OVERVIEW OF COMMUNICATION ACTIVITIES	642
8.5.1	<i>Mandatory Notices and Other Notifications</i>	642
8.5.2	<i>Landfill Website</i>	644
8.5.3	<i>Community Newsletters and Operational Updates</i>	645
8.5.4	<i>Media Relations</i>	646
8.6	OVERVIEW OF PUBLIC CONSULTATION ACTIVITIES.....	647
8.6.1	<i>Evaluation Criteria Workshop</i>	648
8.6.2	<i>Open Houses</i>	649
8.6.3	<i>Stakeholder Meetings</i>	652

8.6.3.1	Residents and Businesses	652
8.6.3.2	Ridge Landfill Liaison Committee	652
8.6.4	<i>Summary of Public Consultation Feedback Received</i>	653
8.7	OVERVIEW OF INDIGENOUS COMMUNITIES AND ORGANIZATIONS CONSULTATION ACTIVITIES	655
8.7.1	<i>Aamjiwnaang First Nation</i>	658
8.7.2	<i>Caldwell First Nation</i>	658
8.7.3	<i>Chippewas of the Thames First Nation</i>	659
8.7.4	<i>Oneida Nation of the Thames</i>	660
8.7.5	<i>Walpole Island First Nation</i>	662
8.8	OVERVIEW OF AGENCY CONSULTATION ACTIVITIES	668
8.8.1	<i>Ministry of the Environment, Conservation and Parks (MECP)</i>	668
8.8.2	<i>Ministry of Natural Resources and Forestry (MNRF) / MECP</i>	677
8.8.3	<i>Ministry of Transportation (MTO)</i>	678
8.8.4	<i>Transport Canada</i>	679
8.8.5	<i>Department of Fisheries and Oceans</i>	679
8.8.6	<i>Municipality of Chatham-Kent</i>	679
8.8.6.1	Leachate Management.....	681
8.8.6.2	Traffic	682
8.8.6.3	Planning Application.....	682
8.8.6.4	Drainage Act	682
8.8.6.5	Diversion.....	683
8.8.7	<i>Chatham-Kent Municipal Airport</i>	683
8.8.8	<i>Lower Thames Valley Conservation Authority</i>	684
8.9	REVIEW OF THE DRAFT ENVIRONMENTAL ASSESSMENT	685
8.9.1	<i>Notification</i>	685
8.9.2	<i>Viewing Locations</i>	685
8.9.3	<i>Comments on Draft EA</i>	686
8.9.3.1	Ministry of the Environment, Conservation and Parks	686
8.9.3.2	Walpole Island First Nation.....	687
9.0	WASTE DIVERSION	689
9.1	BACKGROUND	689
9.2	ASSESSMENT OF DIVERSION OPPORTUNITIES	691
9.2.1	<i>Diversion Options Considered</i>	692
9.2.1.1	At-Ridge Options	692
9.2.1.2	At-Source and Elsewhere in the System	693
9.2.2	<i>Results of Evaluation of Diversion Options</i>	695
10.0	OTHER APPROVALS	699
10.1	MUNICIPALITY OF CHATHAM-KENT	699
10.1.1	<i>Municipal Drainage Act</i>	699
10.1.2	<i>Municipality of Chatham-Kent Official Plan</i>	699
10.1.3	<i>Zoning By-Law</i>	699
10.1.4	<i>Site Plan Control Agreement</i>	700
10.2	ENVIRONMENTAL COMPLIANCE APPROVAL AMENDMENT	700
10.2.1	<i>Permit to Temporarily Remove Eastern Meadowlark Habitat (if needed)</i>	701
10.3	SUMMARY OF SURFACE WATER PERMIT AND APPROVAL REQUIREMENTS	701

FIGURES

FIGURE 1-1: LOCATION OF RIDGE LANDFILL	2
FIGURE 1-2: HISTORY OF THE RIDGE LANDFILL	3
FIGURE 1-3: RIDGE LANDFILL WASTE TYPES RECEIVED.....	4
FIGURE 1-4: EXISTING LAYOUT OF THE RIDGE LANDFILL	5
FIGURE 2-1: OVERVIEW OF THE EA PROCESS.....	11
FIGURE 3-1: STUDY AREAS	21
FIGURE 3-2: BIOLOGICAL-SIGNIFICANT NATURAL FEATURES.....	27
FIGURE 3-3: BIOLOGICAL - SUM OF BAT PASSES - SOUTHEAST WOODLOT	38
FIGURE 3-4: HOWARD DRAIN LOOKING DOWNSTREAM	39
FIGURE 3-5: DUKE DRAIN LOOKING DOWNSTREAM	39
FIGURE 3-6: GLACIAL LAKES	41
FIGURE 3-7: HYDROGEOLOGICAL - QUATERNARY GEOLOGY.....	43
FIGURE 3-8: HYDROGEOLOGICAL - SURFICIAL GEOLOGY.....	47
FIGURE 3-9: HYDROGEOLOGICAL - CONCEPTUAL HYDROGEOLOGY LAYERS	49
FIGURE 3-10: HYDROGEOLOGICAL - ON-SITE GROUNDWATER MONITORING WELL LOCATIONS	53
FIGURE 3-11: HYDROGEOLOGICAL - PRIVATE RESIDENTIAL GROUNDWATER MONITORING WELLS	55
FIGURE 3-12: SURFACE WATER - CLIMATE NORMALS (CHATHAM WWTP)	58
FIGURE 3-13: SURFACE WATER - HOWARD DRAIN SUBWATERSHED (BASELINE)	61
FIGURE 3-14: SURFACE WATER - OBSERVED VS MODELLED FLOWS AT FLOOD CONTROL FACILITY OUTLET (FLOW NODE 1)	63
FIGURE 3-15: SURFACE WATER - WATER LEVEL TRACE - HOWARD DRAIN DOWNSTREAM OF FLOOD CONTROL FACILITY	66
FIGURE 3-16: SURFACE WATER SAMPLING/MONITORING LOCATIONS	71
FIGURE 3-17 SURFACE WATER - EXISTING LAND USES	73
FIGURE 3-18: ATMOSPHERIC ENVIRONMENTAL EFFECTS DISCRETE RECEPTORS	85
FIGURE 3-19: ATMOSPHERIC -HAUL ROUTE LOCATION.....	93
FIGURE 3-20: ATMOSPHERIC 2018 PEAK HOURLY TRAFFIC VOLUMES.....	95
FIGURE 3-21: SOCIO-ECONOMIC - EXISTING RESIDENCES, BUSINESSES AND INSTITUTIONS IN THE SOCIO- ECONOMIC STUDY AREA.....	119
FIGURE 3-22: NOISE - TYPICAL DECIBEL SOUND LEVELS	123
FIGURE 3-23: NOISE - BASELINE AT RECEPTORS.....	125
FIGURE 3-24: HAUL ROUTE NOISE RECEPTORS	129
FIGURE 3-25: PHOTO LOCATIONS FOR VISUAL SIMULATIONS.....	135

FIGURE 3-26: VISIBILITY ANALYSIS - EXISTING CONDITIONS 139

FIGURE 3-27: AGRICULTURAL LAND USE 143

FIGURE 3-28: ARCHAEOLOGICAL SITES REQUIRING STAGE 3..... 149

FIGURE 3-29: BIRD HAZARDS TO AVIATION SAFETY - CHATHAM-KENT MUNICIPAL AIRPORT AND REGISTERED ZONING..... 154

FIGURE 3-30: BIRD HAZARDS TO AVIATION SAFETY - FLIGHTLINES AND NIGHT ROOST SITES 2016-2017 156

FIGURE 3-31: TRANSPORTATION - EXISTING LANE CONFIGURATIONS..... 159

FIGURE 3-32: TRANSPORTATION - RIDGE LANDFILL HAUL ROUTE 161

FIGURE 3-33: TRANSPORTATION - EXISTING (2019) TRAFFIC VOLUMES 163

FIGURE 3-34: EXISTING SITE CONDITIONS 165

FIGURE 4-1: EXISTING SITE FEATURES 173

FIGURE 4-2: SITE DEVELOPMENT ALTERNATIVE 1 PLAN..... 179

FIGURE 4-3: SITE DEVELOPMENT ALTERNATIVE 1 CROSS-SECTION 181

FIGURE 4-4: SITE DEVELOPMENT ALTERNATIVE 2 PLAN..... 185

FIGURE 4-5: SITE DEVELOPMENT ALTERNATIVE 2 CROSS-SECTION 187

FIGURE 4-6: SITE DEVELOPMENT ALTERNATIVE 3 PLAN..... 191

FIGURE 4-7: SITE DEVELOPMENT ALTERNATIVE 3 CROSS SECTION..... 193

FIGURE 4-8: HOWARD DRAIN SUBWATERSHED CATCHMENT PLAN (POST-LANDFILL EXPANSION)..... 211

FIGURE 4-9: DEPICTION OF TRAVEL TIME TO BEDROCK 215

FIGURE 4-10: NOISE RECEPTORS CLOSEST TO THE RIDGE LANDFILL 255

FIGURE 4-11: LANDFILL GAS GENERATION 297

FIGURE 4-12: RENEWABLE ENERGY COST MODEL RESULTS 305

FIGURE 4-13: ELECTRICITY GENERATION COST MODEL RESULTS..... 306

FIGURE 4-14: PUC LETTER 336

FIGURE 4-15: POTENTIAL LEACHATE MANAGEMENT AND TREATMENT AREAS 345

FIGURE 5-1: PREFERRED ALTERNATIVE..... 385

FIGURE 5-2: TYPES OF WASTE RECEIVED AT THE RIDGE LANDFILL..... 389

FIGURE 5-3: LANDFILL GAS GENERATION RESULTS 399

FIGURE 5-4: PROPOSED EXPANSION PHASING PLAN..... 413

FIGURE 6-1: AVERAGE DAILY AIR TEMPERATURE VS. WATER TEMPERATURE IN HOWARD DRAIN (2016) 441

FIGURE 6-2: HYDROGRAPH - NODE 1, 250-YEAR, 24-HOUR (YEAR 2050) - SITE OUTLET 443

FIGURE 6-3: COMPARISON OF BASELINE AND POST-LANDFILL HYDROGRAPHS AT HOWARD DRAIN WATERSHED OUTLET AT FLOW NODE 1 (MARCH – JUNE 2017) 446

FIGURE 6-4: HYDROGRAPH FOR 250-YEAR, 24 HOUR SCS TYPE II (2050) AT NODE 2 – LANDFILL SITE OUTLET 447

FIGURE 6-5: ATMOSPHERIC - PREFERRED ALTERNATIVE SCENARIO 1 - SITE LAYOUT AND SOURCE CONFIGURATION.....	461
FIGURE 6-6: ATMOSPHERIC - PREFERRED ALTERNATIVE SCENARIO 2 - SITE LAYOUT AND SOURCE CONFIGURATION.....	465
FIGURE 6-7: ATMOSPHERIC - PREFERRED ALTERNATIVE SCENARIO 3 - SITE LAYOUT AND SOURCE CONFIGURATION.....	467
FIGURE 6-8: ATMOSPHERIC - ENVIRONMENTAL EFFECTS DISCRETE RECEPTORS	475
FIGURE 6-9: ATMOSPHERIC - HAUL ROUTE RECEPTORS.....	495
FIGURE 6-10: 2018 PEAK HOURLY TRAFFIC VOLUMES	498
FIGURE 6-11: ACOUSTIC MODELLING RESULTS - PHASE I (YEAR 1-2 OF OPERATION AND AREA 'B' ACTIVE)	515
FIGURE 6-12: ACOUSTIC MODELLING RESULTS - PHASE II (YEAR 8 OF OPERATION AND AREA 'B' ACTIVE)	517
FIGURE 6-13: ACOUSTIC MODELLING RESULTS - PHASE III (YEAR 18 OF OPERATION AND CELL A5 ACTIVE).....	519
FIGURE 6-14: PHOTO LOCATIONS FOR VISUAL SIMULATIONS.....	523
FIGURE 6-15: VISIBILITY ANALYSIS - FUTURE CONDITIONS.....	525
FIGURE 6-16: ARCHAEOLOGICAL & CULTURAL HERITAGE FEATURES.....	551
FIGURE 6-17: PROPOSED OFFICIAL PLAN LAND USE DESIGNATIONS	561
FIGURE 6-18: PROPOSED ZONING BY-LAW DESIGNATIONS.....	563
FIGURE 6-19: FUTURE (2041) TRAFFIC VOLUMES	568
FIGURE 7-1: ON-SITE GROUNDWATER MONITORING WELLS	603
FIGURE 8-1: GUIDING PRINCIPLES FOR EA CONSULTATION.....	634
FIGURE 8-2: EA KEY MILESTONES AND ASSOCIATED CONSULTATION ACTIVITIES	636
FIGURE 8-3: STAKEHOLDER GROUPS CONSULTED	637
FIGURE 8-4: SCREEN CAPTURE OF THE RIDGE LANDFILL WEBSITE.....	645
FIGURE 8-5: SCREEN CAPTURE OF "THE RIDGE".....	646
 TABLES	
TABLE 2-1: EA ACT, SECTION 6.1 REQUIREMENTS.....	12
TABLE 2-2: TECHNICAL WORK COMPLETED	16
TABLE 3-1: SUMMARY - OFF-SITE AREAS	23
TABLE 3-2: BIOLOGICAL- FIELD INVESTIGATION SURVEY DATES.....	25
TABLE 3-3: BIOLOGICAL - BIRD SPECIES OBSERVED DURING 2015 AND 2017	31
TABLE 3-4: BIOLOGICAL - BOTANICAL SPECIES OBSERVED DURING 2015, 2016 AND 2017.....	33
TABLE 3-5: BIOLOGICAL - AMPHIBIAN SPECIES OBSERVED DURING 2015, 2016 AND 2017	37
TABLE 3-6: BIOLOGICAL - INCIDENTAL WILDLIFE OBSERVATIONS.....	40
TABLE 3-7: HYDROGEOLOGICAL - GROUNDWATER MONITORING PROGRAM - OLD LANDFILL.....	50

TABLE 3-8: HYDROGEOLOGICAL- SUMMARY OF GROUNDWATER MONITORING PROGRAM-CURRENT WEST AND SOUTH LANDFILL AREAS	50
TABLE 3-9: SURFACE WATER - SUMMARY OF HEC-HMS HYDROLOGIC MODEL RESULTS - BASELINE CONDITIONS...	64
TABLE 3-10: SURFACE WATER - STREAMFLOW MONITORING STATION LOCATIONS.....	66
TABLE 3-11: SURFACE WATER - SUMMARY OF SW QUALITY MONITORING RESULTS.....	68
TABLE 3-12: ONTARIO AND CANADA-WIDE STANDARDS AND CRITERIA USED IN THE EA	76
TABLE 3-13: SOURCE AND CONTAMINANTS IDENTIFICATION TABLE - EXISTING CONDITIONS	80
TABLE 3-14: ATMOSPHERIC EXISTING CONDITIONS RESULTING CUMULATIVE AIR QUALITY	88
TABLE 3-15: ATMOSPHERIC COMPLIANCE ASSESSMENT EXISTING CONDITIONS EMISSION SUMMARY TABLE.....	90
TABLE 3-16: ATMOSPHERIC IMPACT FROM WASTE HAUL TRUCKS.....	97
TABLE 3-17: ATMOSPHERIC CUMULATIVE IMPACT (PROJECT AND BACKGROUND) FROM WASTE HAUL TRUCKS....	98
TABLE 3-18: CLIMATE CHANGE ANNUAL AVERAGE GHG EMISSIONS - EXISTING CONDITIONS SITE.....	100
TABLE 3-19: CLIMATE CHANGE 2018 GHG EMISSIONS IN CO ₂ E	101
TABLE 3-20: CLIMATE CHANGE SUMMARY OF CURRENT AND FUTURE CLIMATE.....	101
TABLE 3-21: CLIMATE CHANGE SUMMARY OF CLIMATE INTERACTIONS.....	103
TABLE 3-22: BLOWING LITTER IMPACT ZONE CRITERIA.....	117
TABLE 3-23: NOISE -LANDFILL EQUIPMENT SOUND POWER LEVEL.....	122
TABLE 3-24: BIRD HAZARDS-SPECIES AND MAXIMUM NUMBERS OF GULLS RECORDED AT RIDGE LANDFILL	153
TABLE 3-25: BIRD HAZARDS - MAXIMUM NUMBER OF NON-GULL SPECIES RECORDED AT RIDGE LANDFILL	155
TABLE 3-26: TRANSPORTATION - SYNCHRO CAPACITY ANALYSIS SUMMARY - EXISTING (2019).....	161
TABLE 4-1: RIDGE LANDFILL CAPACITY CALCULATIONS	177
TABLE 4-2: SUMMARY OF HEC-HMS MODEL RESULTS – BASELINE CONDITION	224
TABLE 4-3: SUMMARY OF HEC-HMS MODEL RESULTS – ALTERNATIVE 1.....	226
TABLE 4-4: SUMMARY OF HEC-HMS MODEL RESULTS – ALTERNATIVE 2.....	227
TABLE 4-5: SUMMARY OF HEC-HMS MODEL RESULTS – ALTERNATIVE 3.....	228
TABLE 4-6: ONTARIO AND CANADA-WIDE STANDARDS AND CRITERIA.....	232
TABLE 4-7: BACKGROUND AIR QUALITY	234
TABLE 4-8: EFFECTS MAGNITUDE LEVELS FOR AIR QUALITY.....	237
TABLE 4-9: SIGNIFICANCE OF CUMULATIVE AIR QUALITY IMPACT	238
TABLE 4-10: ALTERNATIVE METHODS SUMMARY.....	240
TABLE 4-11: POTENTIAL CHANGE FROM BASELINE NOISE LEVEL FROM LANDFILL OPERATIONS	257
TABLE 4-12: POTENTIAL FOR ODOUR IMPACT	259
TABLE 4-13: OVERVIEW OF COMPARATIVE EVALUATION RATING - SITE DEVELOPMENT	291
TABLE 4-14: COMPARATIVE EVALUATION OVERALL RANKING OF LANDFILL GAS ALTERNATIVES.....	331

TABLE 4-15: LIMITS FOR SANITARY AND COMBINED SEWERS	341
TABLE 4-16: OVERVIEW OF COMPARATIVE EVALUATION RANKING OF LEACHATE TREATMENT ALTERNATIVES.....	379
TABLE 5-1: SOIL BALANCE	391
TABLE 5-2: PREFERRED ALTERNATIVE COMPARED TO THE “DO NOTHING” ALTERNATIVE	408
TABLE 6-1: BIOLOGICAL IMPACT ASSESSMENT CRITERIA	416
TABLE 6-2: PROPOSED BIOLOGICAL MITIGATION	421
TABLE 6-3: SUMMARY OF BIOLOGICAL POTENTIAL EFFECTS	429
TABLE 6-4: HYDROGEOLOGICAL IMPACT ASSESSMENT CRITERIA	431
TABLE 6-5: PREDICTED MAXIMUM CONCENTRATIONS	433
TABLE 6-6: SUMMARY OF HYDROGEOLOGICAL POTENTIAL EFFECTS.....	437
TABLE 6-7: SURFACE WATER CRITERIA	439
TABLE 6-8: SURFACE WATER - SUMMARY OF 100-YEAR FLOW SCENARIO	448
TABLE 6-9: SURFACE WATER - SUMMARY - 250-YEAR FLOW SCENARIO	449
TABLE 6-10: SURFACE WATER MITIGATION MEASURES	451
TABLE 6-11: SUMMARY OF SURFACE WATER POTENTIAL EFFECTS.....	455
TABLE 6-12: ATMOSPHERIC IMPACT ASSESSMENT CRITERIA	457
TABLE 6-13: PREFERRED ALTERNATIVE SCENARIO 1 RESULTING CUMULATIVE AIR QUALITY	478
TABLE 6-14: PREFERRED ALTERNATIVE SCENARIO 2 RESULTING CUMULATIVE AIR QUALITY	480
TABLE 6-15: PREFERRED ALTERNATIVE SCENARIO 3 RESULTING CUMULATIVE AIR QUALITY	482
TABLE 6-16: PREFERRED ALTERNATIVE SCENARIO 3 NO ₂ 1- HR AVERAGE COMPARISON TO 2025 CAAQS.....	484
TABLE 6-17: RECEPTORS ABOVE CRITERIA NO ₂ 1- HR AVERAGE COMPARISON TO 2025 CAAQS	485
TABLE 6-18: COMPARISON OF THE PREDICTED CUMULATIVE AIR QUALITY.....	486
TABLE 6-19: COMPLIANCE ASSESSMENT SCENARIO 1 EMISSION SUMMARY TABLE.....	488
TABLE 6-20: COMPLIANCE ASSESSMENT SCENARIO 2 EMISSION SUMMARY TABLE.....	489
TABLE 6-21: COMPLIANCE ASSESSMENT SCENARIO 3 EMISSION SUMMARY TABLE.....	490
TABLE 6-22: COMPARISON OF PREDICTED COMPLIANCE AIR QUALITY CONCENTRATIONS.....	492
TABLE 6-23: PEAK HOUR TRAFFIC VOLUMES AND HEAVY DUTY VEHICLE PERCENTAGE	500
TABLE 6-24: SUMMARY OF ATMOSPHERIC POTENTIAL EFFECTS	503
TABLE 6-25: CLIMATE CHANGE IMPACT ASSESSMENT CRITERIA	505
TABLE 6-26: SUMMARY OF CLIMATE CHANGE POTENTIAL EFFECTS	507
TABLE 6-27: SOCIAL IMPACT ASSESSMENT CRITERIA	509
TABLE 6-28: SOUND LEVELS PREDICTED FOR 2041 SITE OPERATION AND SITE CLOSURE SCENARIOS.....	527
TABLE 6-29: SUMMARY OF POTENTIAL SOCIAL EFFECTS.....	531

TABLE 6-30: ECONOMIC IMPACT ASSESSMENT CRITERIA.....	535
TABLE 6-31: SUMMARY OF ECONOMIC POTENTIAL EFFECTS	539
TABLE 6-32: AGRICULTURAL IMPACT ASSESSMENT CRITERIA	541
TABLE 6-33: SUMMARY OF POTENTIAL AGRICULTURAL EFFECTS	545
TABLE 6-34: CULTURAL HERITAGE IMPACT ASSESSMENT CRITERIA.....	547
TABLE 6-35: SUMMARY OF CULTURAL HERITAGE POTENTIAL EFFECTS	549
TABLE 6-36: ARCHAEOLOGICAL IMPACT ASSESSMENT CRITERIA.....	553
TABLE 6-37: SUMMARY OF ARCHAEOLOGICAL POTENTIAL EFFECTS	555
TABLE 6-38: LAND USE IMPACT ASSESSMENT CRITERIA.....	557
TABLE 6-39: SUMMARY OF LAND USE POTENTIAL EFFECTS	559
TABLE 6-40: TRANSPORTATION IMPACT ASSESSMENT CRITERIA.....	565
TABLE 6-41: ATR DATA SUMMARY	566
TABLE 6-42: SUMMARY - FORECASTED CONDITIONS (2041)	567
TABLE 6-43: SUMMARY OF TRANSPORTATION POTENTIAL EFFECTS	571
TABLE 6-44: BIRD HAZARDS TO AVIATION SAFETY IMPACT ASSESSMENT CRITERIA.....	573
TABLE 6-45: SUMMARY OF BIRD HAZARDS TO AVIATION SAFETY POTENTIAL EFFECTS.....	575
TABLE 6-46: DESIGN AND OPERATIONS IMPACT ASSESSMENT CRITERIA.....	577
TABLE 6-47: SUMMARY OF DESIGN AND OPERATION POTENTIAL EFFECTS	583
TABLE 6-48: POTENTIAL CUMULATIVE EFFECTS.....	589
TABLE 7-1: GROUNDWATER MONITORING PROGRAM - OLD LANDFILL.....	599
TABLE 7-2: SUMMARY OF GROUNDWATER MONITORING PROGRAM – WEST LANDFILL/AREA A AND SOUTH LANDFILL/AREA B	599
TABLE 7-3: TARGET PARAMETER LIST	600
TABLE 7-4: SURFACE WATER SAMPLING.....	606
TABLE 7-5: SURFACE WATER MONITORING TARGET PARAMETER LIST.....	606
TABLE 7-6: LEACHATE COLLECTION SYSTEM MONITORING PROGRAM.....	608
TABLE 7-7: COMMITMENTS	619
TABLE 8-1: SUMMARY OF KEY ISSUES AND CONCERNS RAISED.....	638
TABLE 8-2: EA NOTIFICATION DETAILS.....	643
TABLE-8-3: MEDIA NEWS STORIES.....	647
TABLE 8-4: OVERVIEW OF EVALUATION CRITERIA WORKSHOP ACTIVITIES.....	649
TABLE 8-5: OVERVIEW OF EA OPEN HOUSE.....	651
TABLE 8-6: SUMMARY OF KEY ISSUES AND CONCERNS.....	654
TABLE 8-7: EA NOTIFICATIONS FOR INDIGENOUS COMMUNITIES AND ORGANIZATIONS	657

TABLE 8-8: OVERVIEW OF MEETINGS BETWEEN WIFN AND WASTE CONNECTIONS	663
TABLE 8-9: OVERVIEW OF MEMOS RECEIVED FROM NEEGAN BURNSIDE ON BEHALF OF WIFN.....	664
TABLE 8-10: OVERVIEW OF CONFERENCE CALLS AND MEETINGS BETWEEN THE MECP AND THE EA TEAM	669
TABLE 8-11: OVERVIEW OF MEMOS RECEIVED FROM MECP.....	672
TABLE 8-12: OVERVIEW OF CONFERENCE CALLS BETWEEN THE MNRF AND THE EA TEAM.....	678
TABLE 8-13: OVERVIEW OF MEETINGS BETWEEN THE MUNICIPALITY OF CHATHAM-KENT AND WASTE CONNECTIONS	680
TABLE 8-14: OVERVIEW OF MEETINGS BETWEEN THE CHATHAM-KENT MUNICIPAL AIRPORT AND WASTE CONNECTIONS	684
TABLE 9-1: SUMMARY OF DIVERSION OPTIONS EVALUATION.....	696
TABLE 10-1: SUMMARY OF PERMITS AND APPROVALS.....	702

APPENDICES

- A Approved Amended Terms of Reference and Associated Work Plans
- B EA Record of Consultation
- C Commitments Tables
- D Discipline Impact Assessments:
 - D1 – Agricultural Impact Assessment
 - D2A – Heritage Impact Assessment
 - D2B – Archaeological Impact Assessment
 - D3A – Atmospheric Impact Assessment
 - D3B – Climate Change Impact Assessment
 - D4 – Assessment of Potential Bird Hazards to Aircraft Safety
 - D5 – Biological Impact Assessment
 - D6 – Design and Operations Report
 - D7 – Hydrogeological Impact Assessment
 - D8 – Landfill Site and Haul Route Noise Impact Assessment
 - D9 – Socio-Economic Impact Assessment
 - D10 – Surface Water Impact Assessment
 - D11 – Transportation Impact Assessment
 - D12 – Visual Impact Assessment
- E Diversion Options
- F Other Supporting Documents
 - F1 – Revised Need Memo
 - F2 – Landfill Mining Report