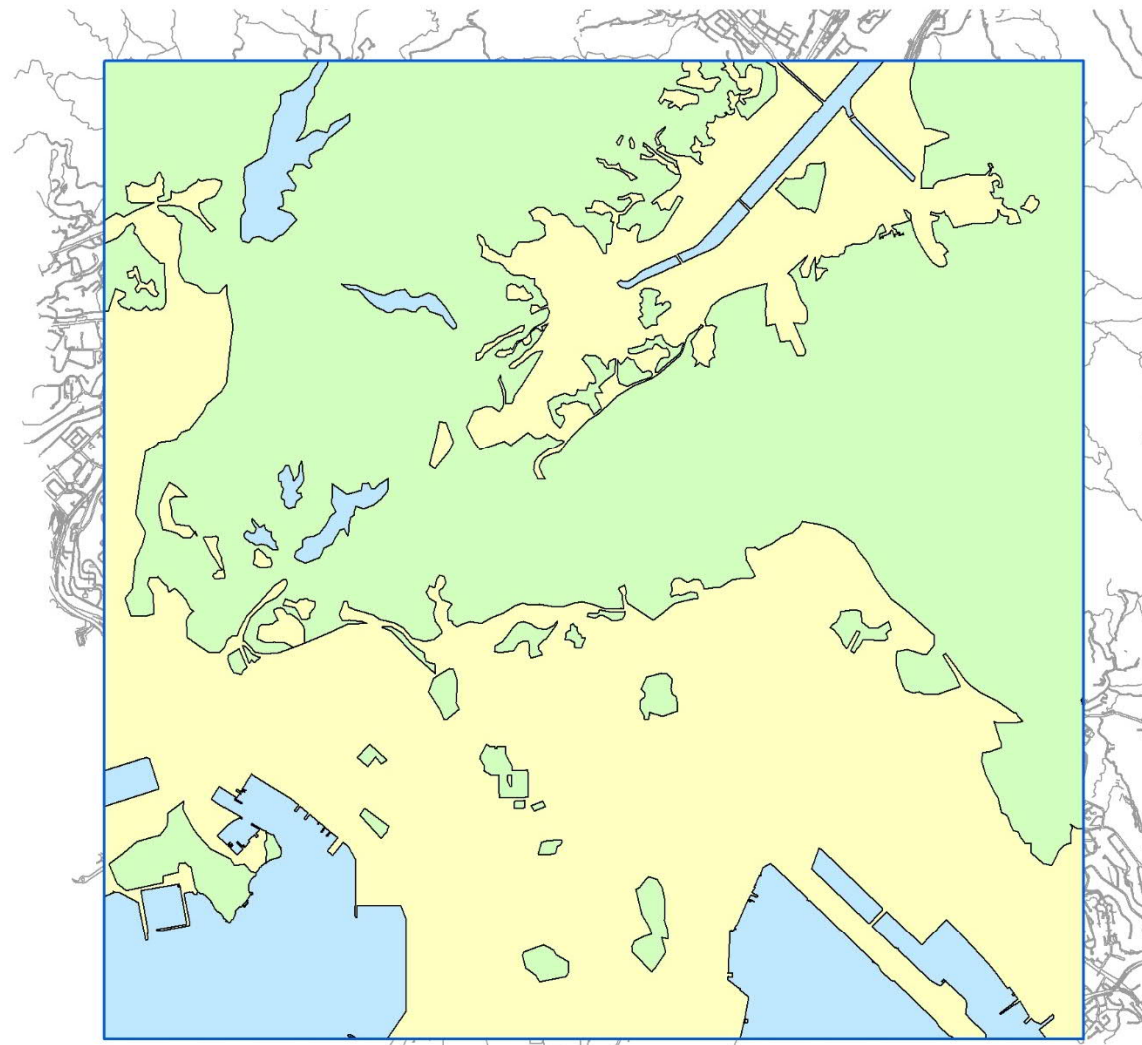






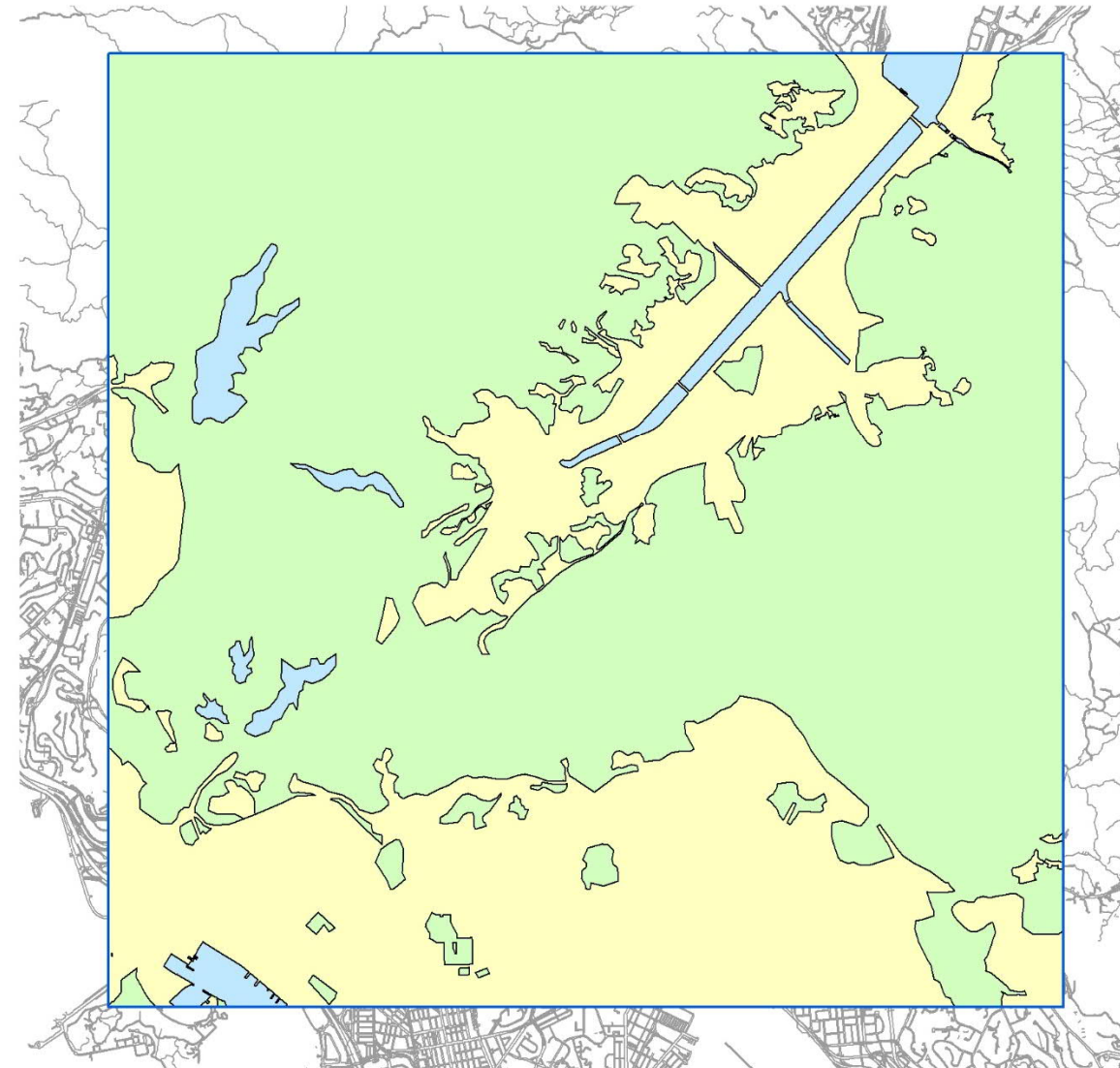
10km by 10km Region Centered for Kowloon Side







Legend

-  10km by 10km Region Centered on Kowloon Side
-  Grass
-  Urban
-  Water

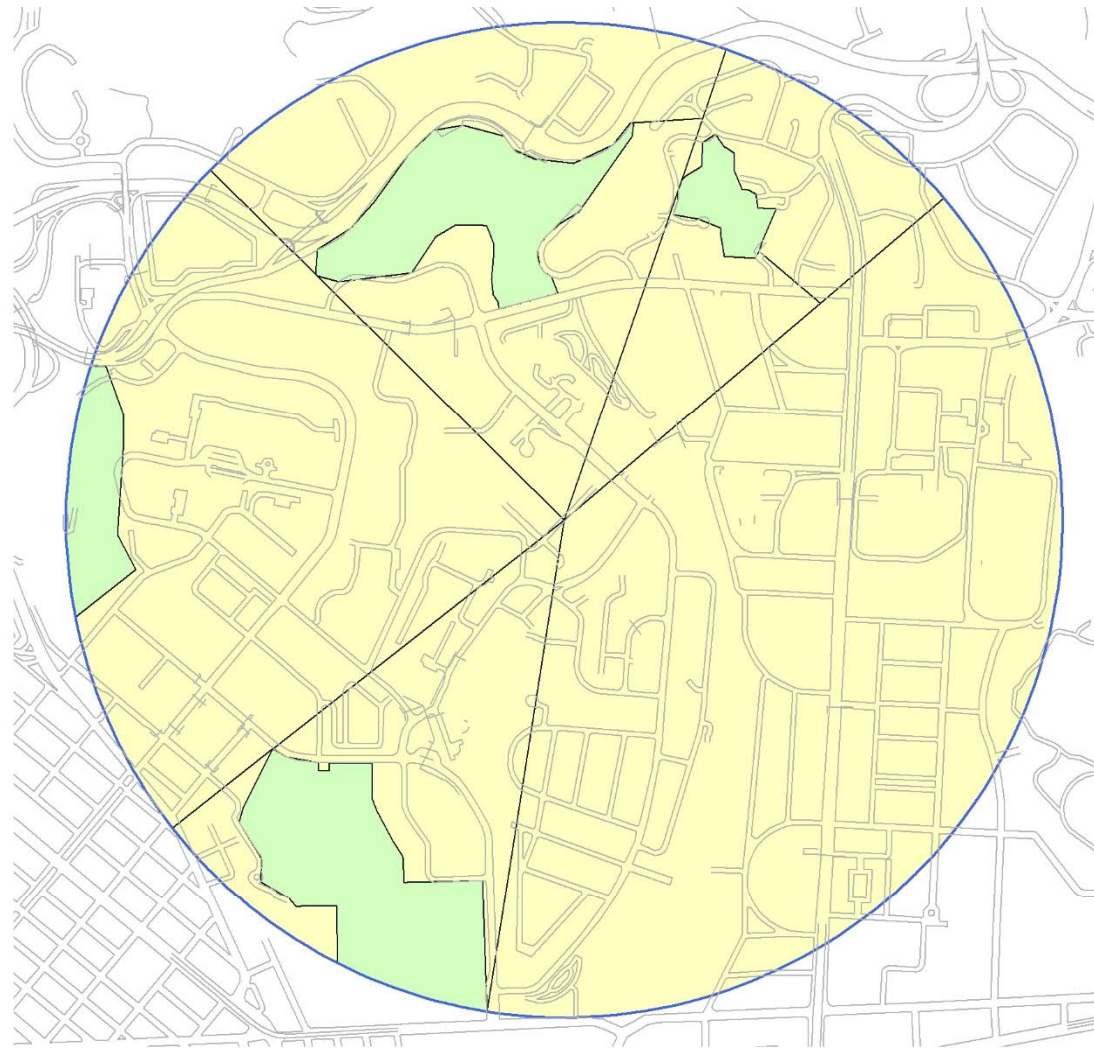
10km by 10km Region Centered for Sha Tin Side






Legend

-  10km by 10km Region Centered on Sha Tin Side
-  Grass
-  Urban
-  Water

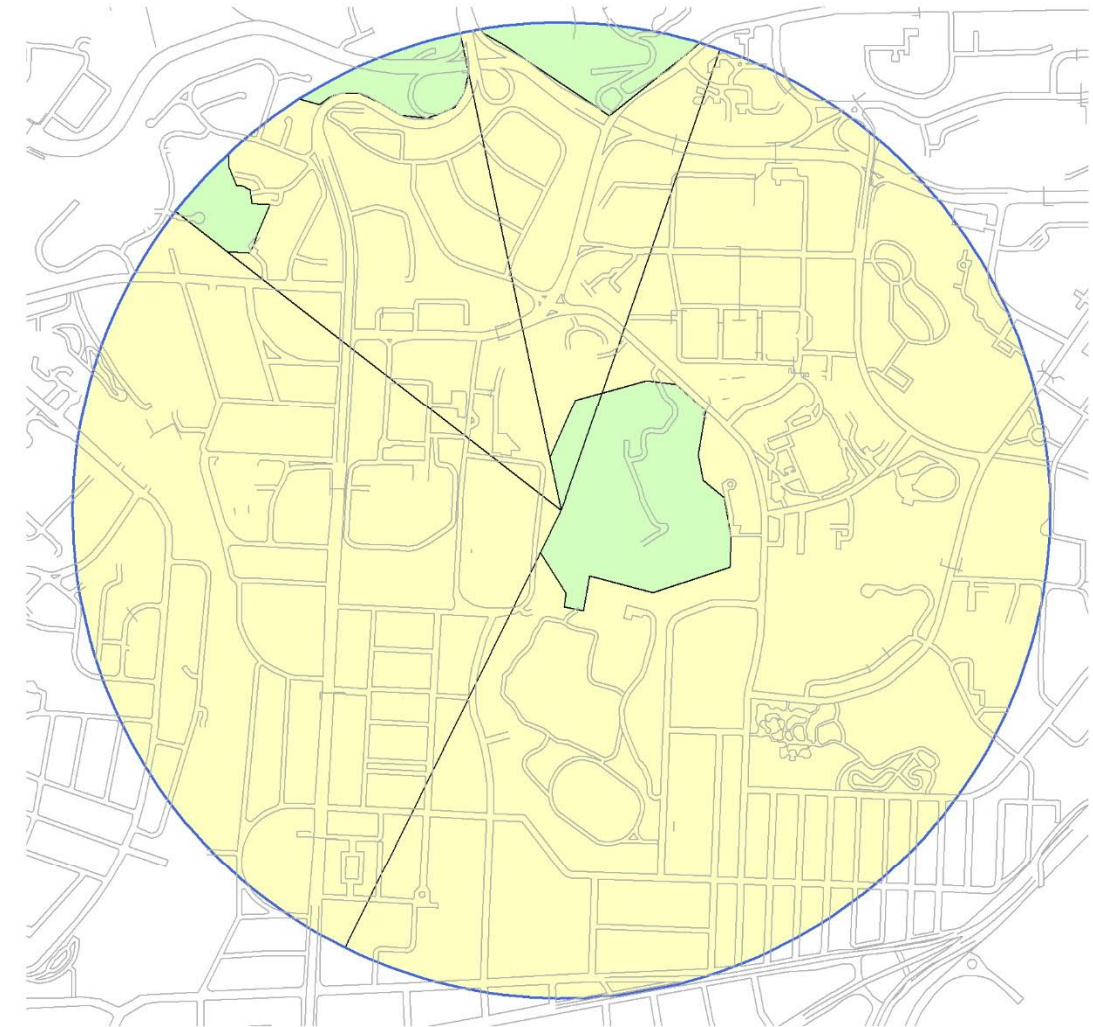
Grid 4035






Legend

-  1km Boundary from Grid 4035
-  Grass
-  Urban

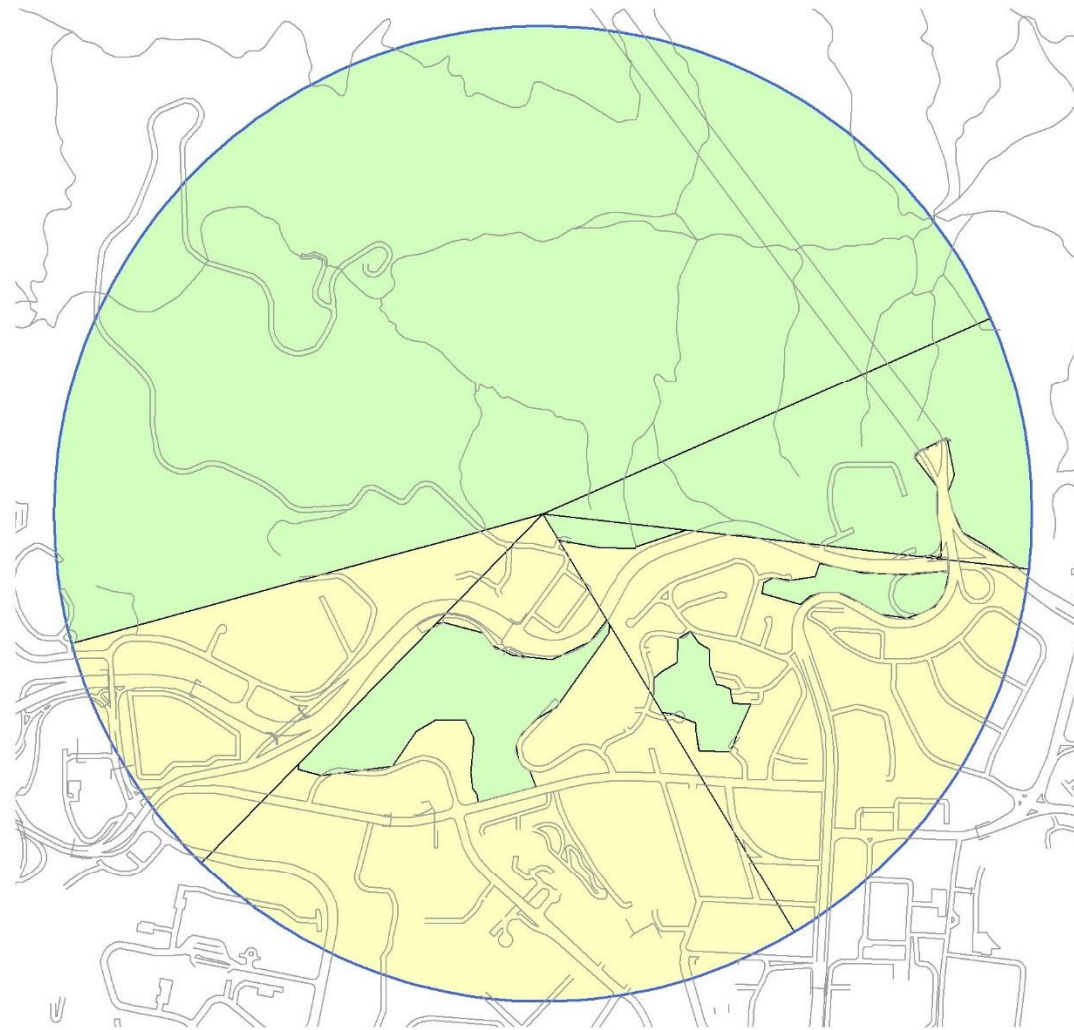
Grid 4135






Legend

-  1km Boundary from Grid 4135
-  Grass
-  Urban

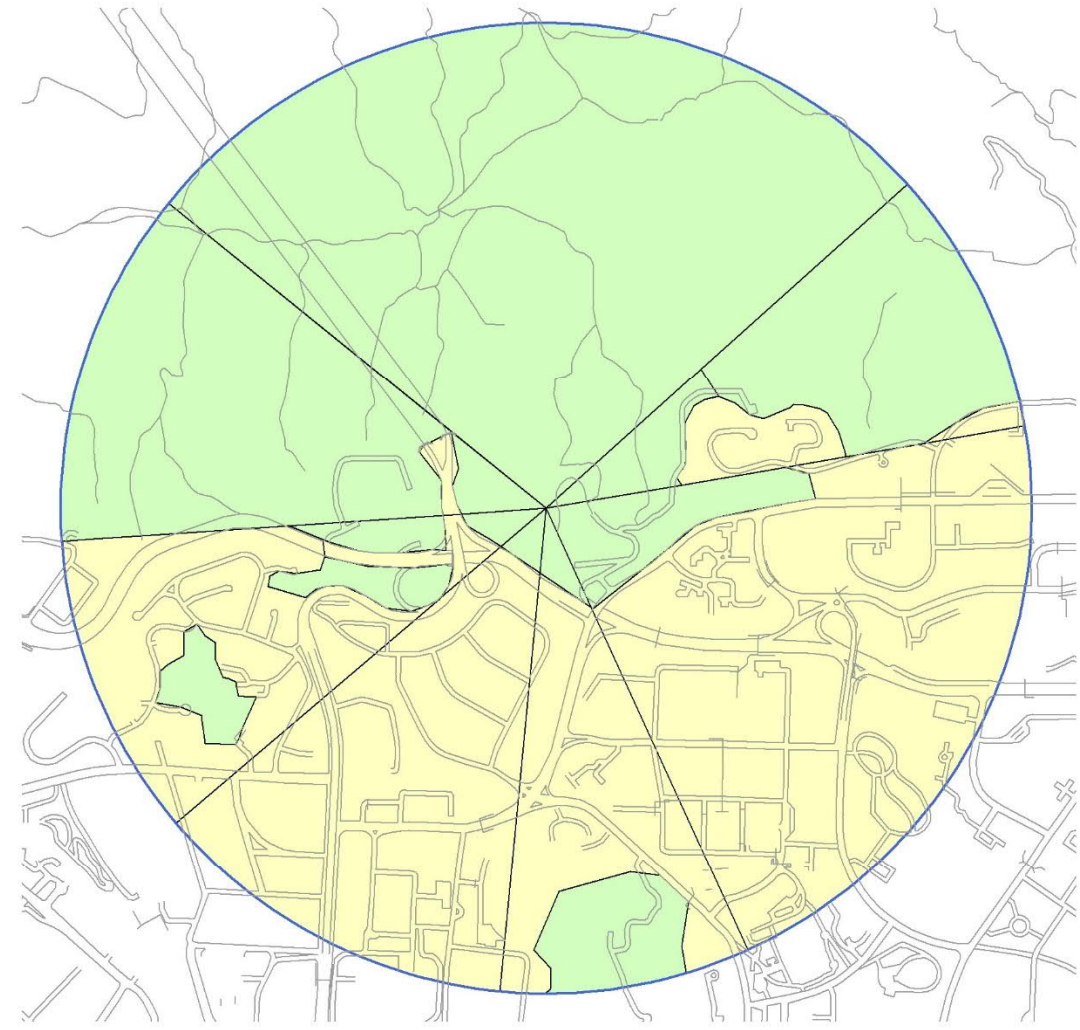
Grid 4036






Legend

-  1km Boundary from Grid 4036
-  Grass
-  Urban

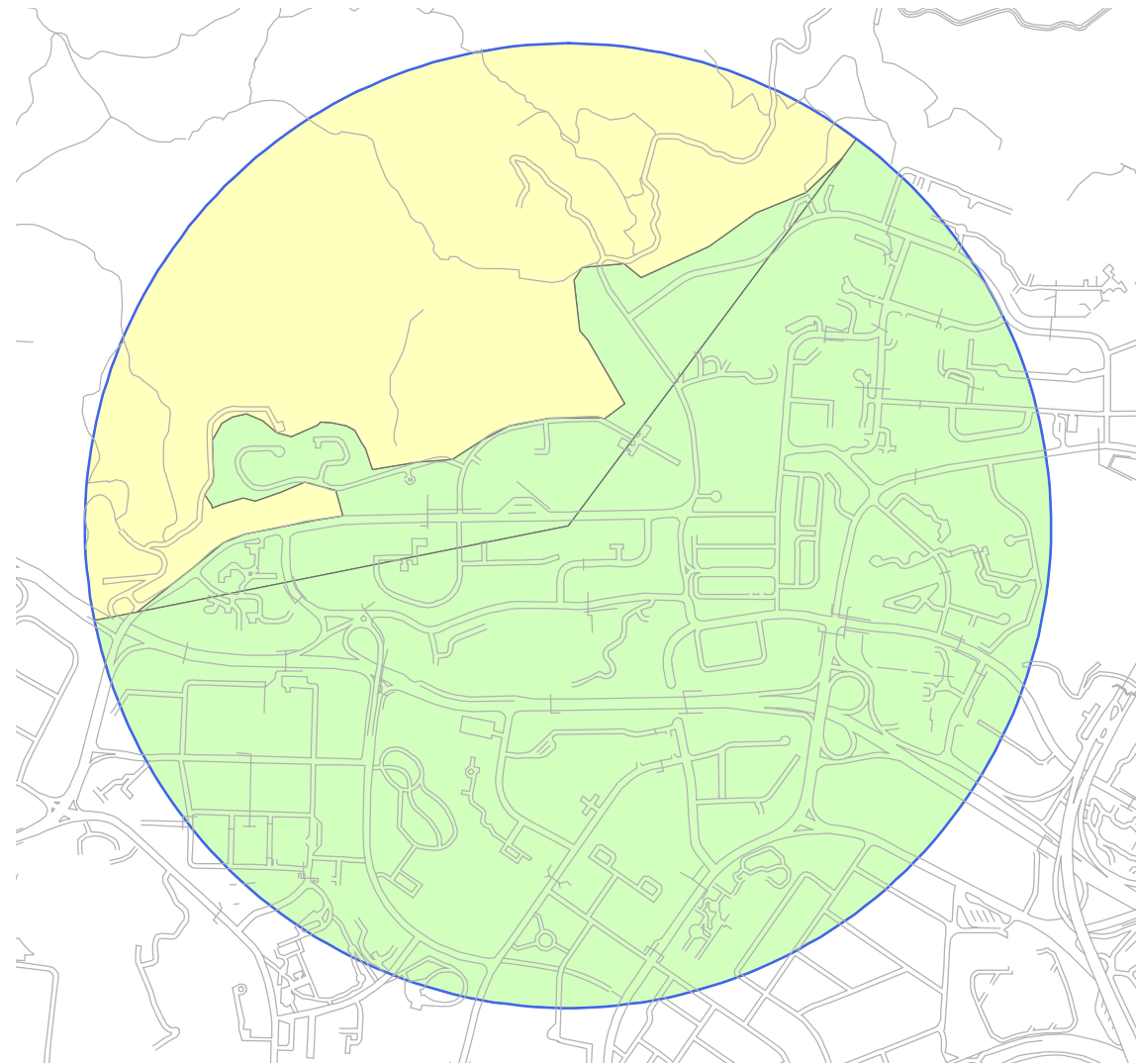
Grid 4136






Legend

-  1km Boundary from Grid 4136
-  Grass
-  Urban

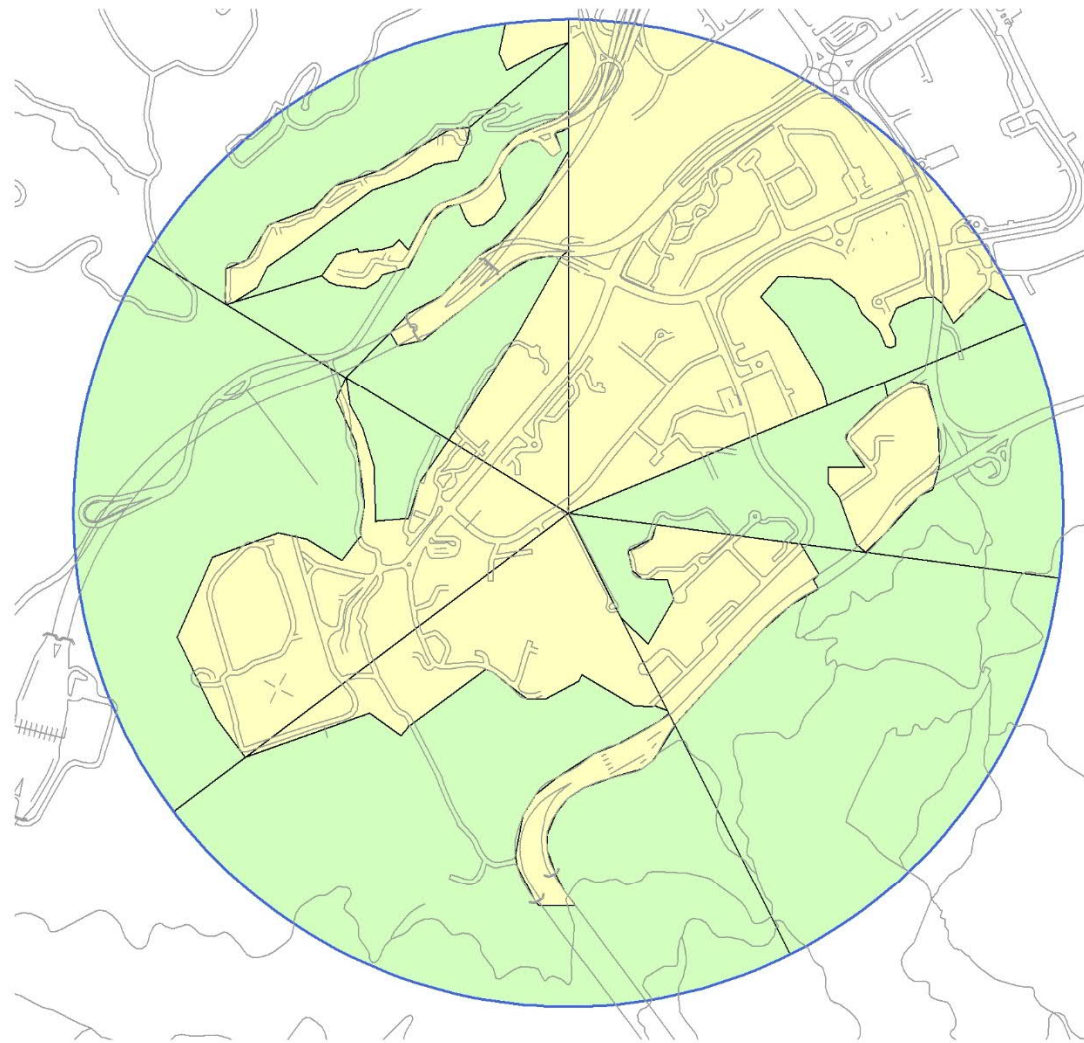
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

Legend

-  1km Boundary from Grid 4236
-  Grass
-  Urban

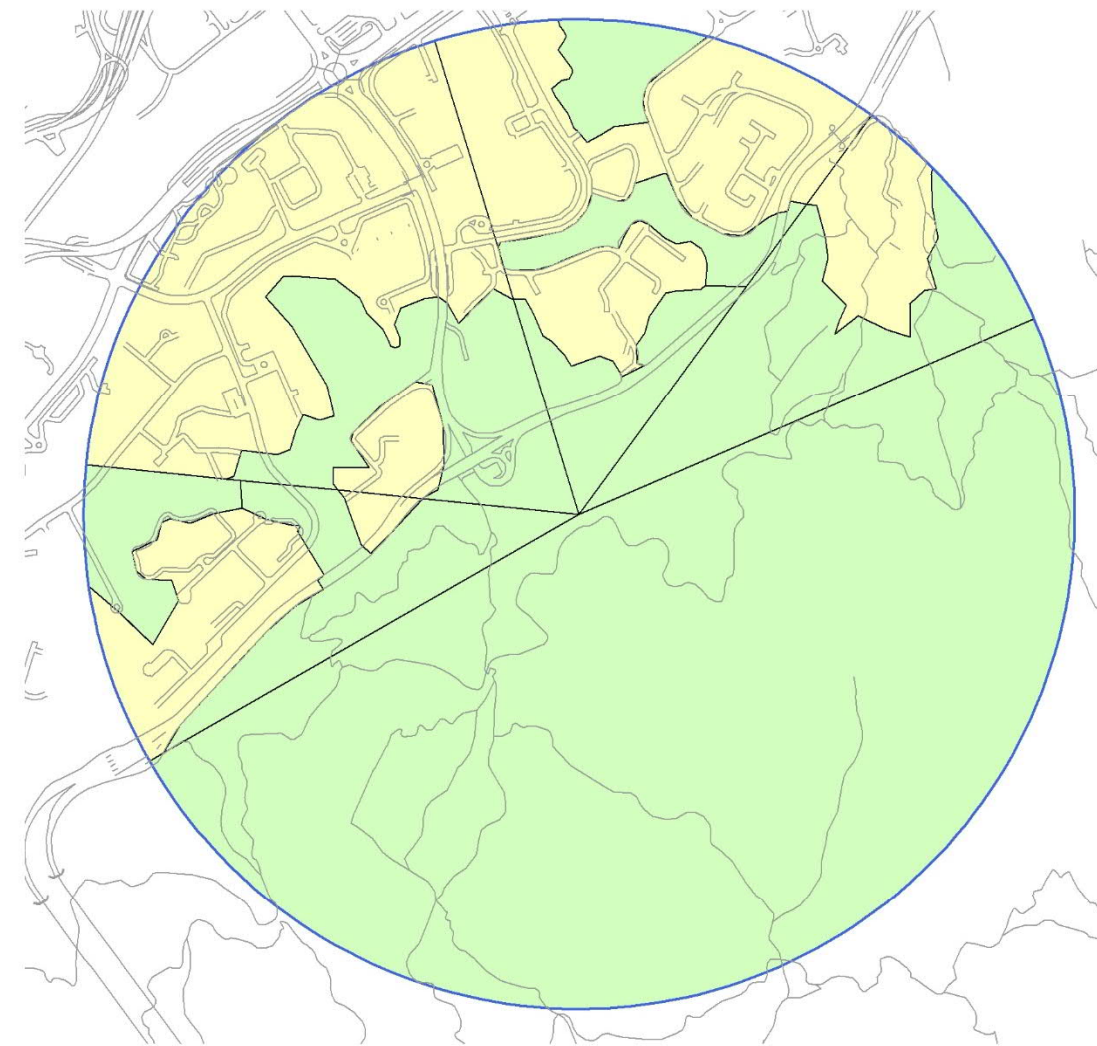
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

Legend

-  1km Boundary from Grid 4038
-  Grass
-  Urban

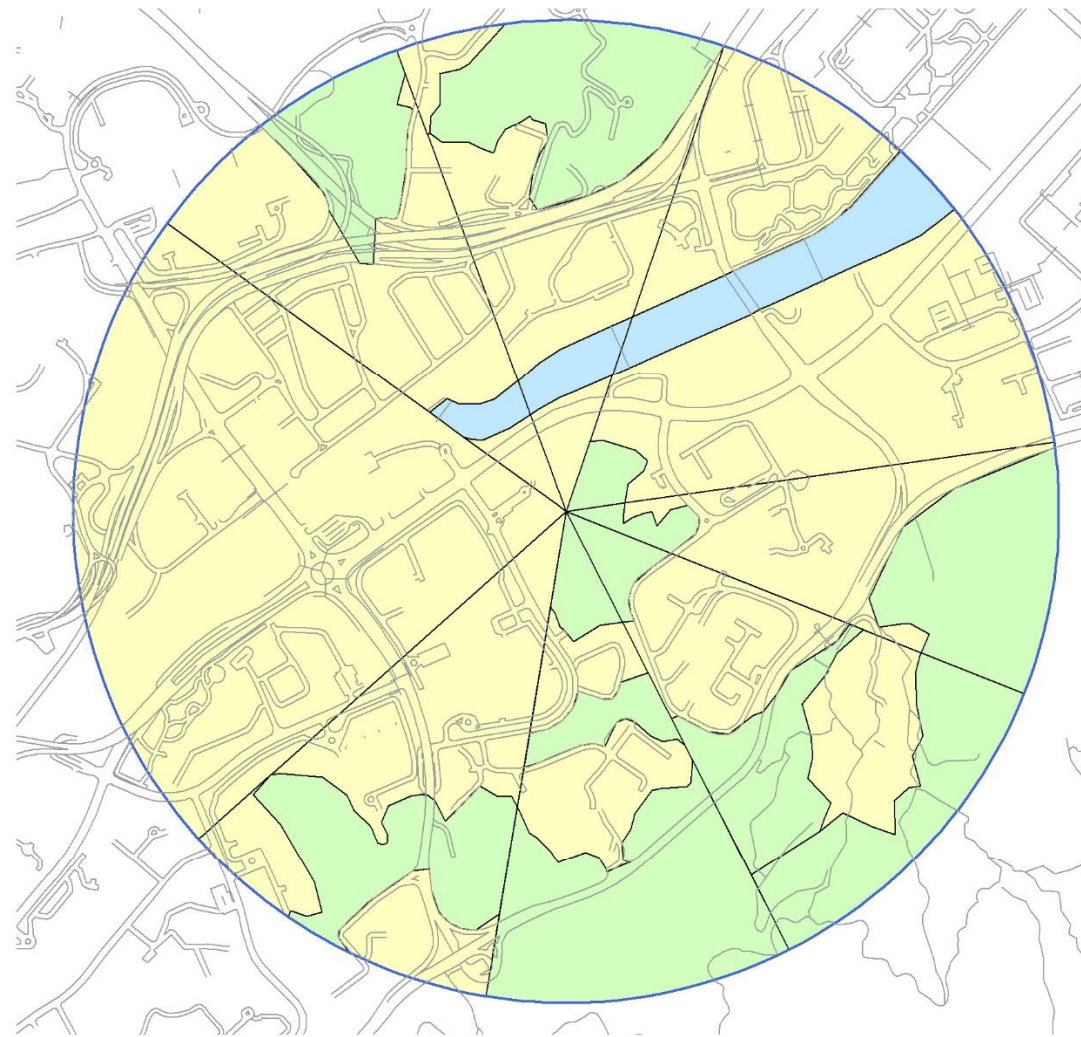
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


Legend

-  1km Boundary from Grid 4138
-  Grass
-  Urban

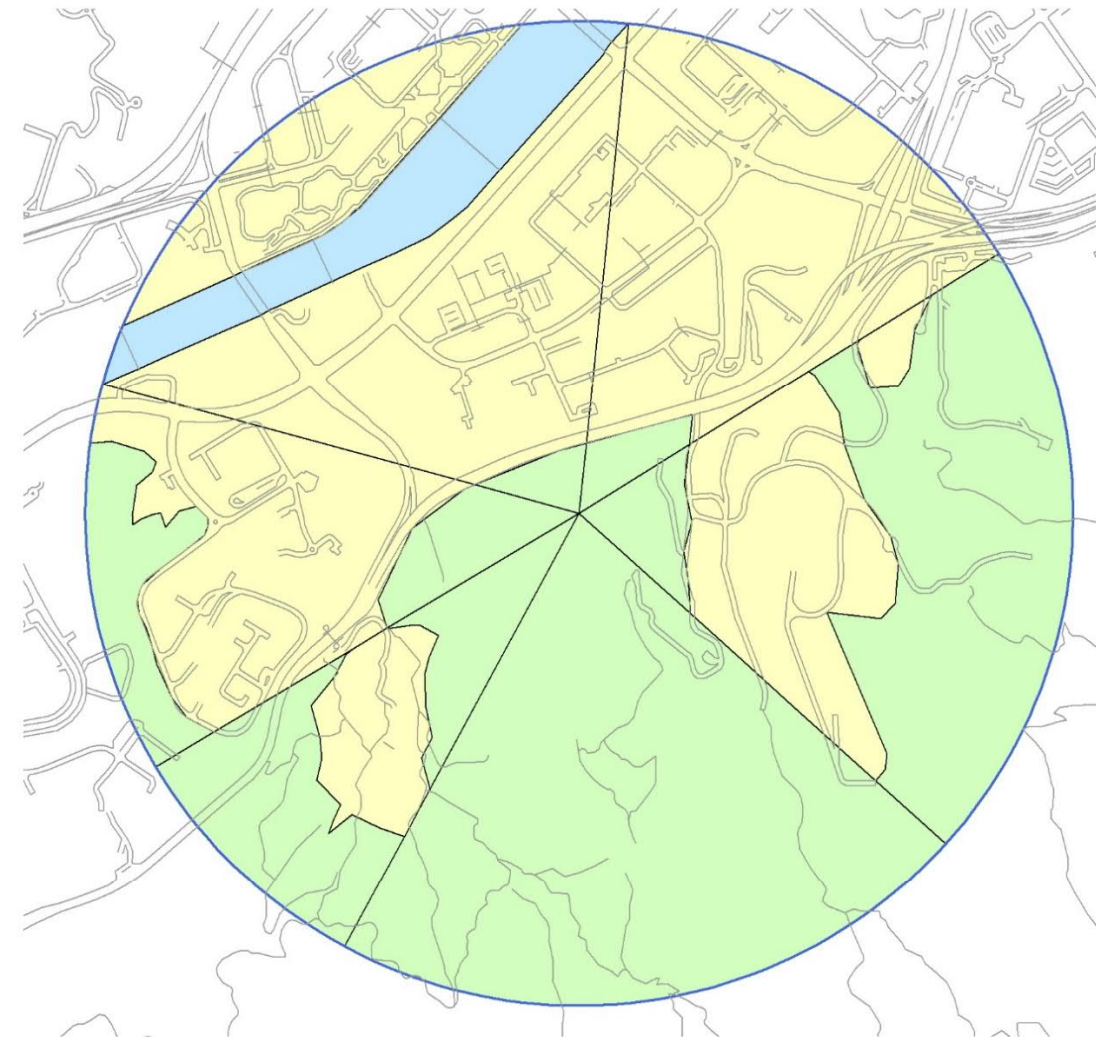
Grid 4139







Legend

-  1km Boundary from Grid 4139
-  Grass
-  Urban
-  Water

Grid 4239



Legend

-  1km Boundary from Grid 4239
-  Grass
-  Urban
-  Water

Appendix 3.9 Determination of Surface Characteristics

Summary of Default Albedo, Bowen Ratio and Surface Roughness from AERMET

Land Type	Season	Default Albedo from AERMET	Default Bowen Ratio from AERMET	Default Surface Roughness(m) from AERMET
Urban	Spring	0.14	1.00	1.0000
	Summer	0.16	2.00	1.0000
	Autumn	0.18	2.00	1.0000
	Average	0.16	1.67	1.0000
Grassland	Spring	0.18	0.40	0.0500
	Summer	0.18	0.80	0.1000
	Autumn	0.20	1.00	0.0100
	Average	0.19	0.73	0.0533
Water	Spring	0.12	0.10	0.0001
	Summer	0.10	0.10	0.0001
	Autumn	0.14	0.10	0.0001
	Average	0.12	0.10	0.0001

Summary of Surface Characteristics for the Study Area

Kowloon Side

Grid 4035

Sector (degrees in Clockwise)	Land Use	area (m2)	Distance (m)	Weighting (area Fraction/Distance)	Albedo ^{2,4,5}	Bowen Ratio _{1,4,5}	Surface Roughness ³	Remarks
19-50	Urban	116089.48	433.97	0.001000	0.17	0.84	0.7976	Residential Area
	Grass	24864.70	715.47	0.000130				Vegetated Terrain
	Urban	126679.73	854.92	0.000554				Residential area and Hong Kong Baptist University area
50-189	Urban	1215488.46	-				1.00000	Low-rise residential, GIC and university area
189-232	Urban	200464.77	481.07	0.001112			0.4613	Residential Area
	Grass	135997.45	828.56	0.000438				Vegetated Terrain and Tai Hang Tung Recreation Ground
	Urban	38344.25	933.74	0.000110				Residential Area
232-315	Urban	676626.71	587.43	0.001594			0.8871	Housing Estates, including Shek Kip Mei Estate and Nam Shan Estate
	Grass	46188.41	941.60	0.000068				Vegetated Terrain
315-19	Urban	226057.69	414.88	0.000972			0.6113	The City University of Hong Kong, shopping arcade
	Grass	107309.55	652.83	0.000293	Vegetated Terrain			
	Urban	227065.80	841.57	0.000481	Residential Area			

Appendix 3.9 Determination of Surface Characteristics

Grid 4135

Sector (degrees in Clockwise)	Land Use	area (m2)	Distance (m)	Weighting (area Fraction/Distance)	Albedo ^{2,4,5}	Bowen Ratio _{1,4,5}	Surface Roughness ³	Remarks
19-206	Grass	119881.81	162.37	0.000452	0.17	0.84	0.6025	Vegetated Park Area
	Urban	1514093.59	428.41	0.002163				Low-rise residential buildings and university area
206-308	Urban	886524.41	-	-			1.00000	Low-rise residential, GIC area
308-348	Urban	299651.77	609.88	0.001400			0.7446	Residential and Hong Kong Baptist University area
	Grass	19799.01	924.45	0.000061			Vegetated Terrain	
	Grass	31469.72	938.36	0.000096			Vegetated Terrain	
348-19	Grass	10109.15	139.67	0.000268			0.4691	Vegetated Park Area
	Urban	215568.09	627.02	0.001274				Residential and Hong Kong Baptist University area
	Grass	44079.48	932.15	0.000175				Vegetated Terrain

Grid 4036

Sector (degrees in Clockwise)	Land Use	area (m2)	Distance (m)	Weighting (area Fraction/Distance)	Albedo ^{2,4,6}	Bowen Ratio _{1,4,6}	Surface Roughness ³	Remarks
67-97	Grass	249076.89	649.29	0.001457	0.17	0.84	0.0603	Vegetated Lion Rock area
	Urban	14131.98	838.67	0.000064				Lion Rock Tunnel Portal Area
97-149	Grass	11602.86	133.61	0.000189			0.5213	Vegetated Lion Rock area
	Grass	24558.51	493.65	0.000108			Vegetated Terrain	
	Urban	399685.30	669.02	0.001301			Residential area and Baptist University area	
	Grass	23197.03	680.97	0.000074			Vegetated Terrain	
149-224	Urban	53653.21	178.29	0.000458			0.5797	Consists of low-rise residential buildings
	Grass	100152.91	433.77	0.000352				Vegetated Beacon Hill area
	Urban	502863.42	708.55	0.001081				Residential Area
224-254	Urban	264063.58	-	-			1.00000	Residential Area
254-67	Grass	1498187.87	-	-	0.05330	Vegetated Lion Rock Country Park area		

Appendix 3.9 Determination of Surface Characteristics

Grid 4136

Sector (degrees in Clockwise)	Land Use	Area (m2)	Distance (m)	Weighting (area Fraction/Distance)	Albedo ^{2,4,6}	Bowen Ratio _{1,4,6}	Surface Roughness ³	Remarks
48-80	Grass	32953.28	234.20	0.000500	0.17	0.84	0.0956	Hilly, vegetated Lion Rock Hill area
	Urban	41438.20	451.03	0.000327				Area with high-rise residential building
	Grass	199395.08	763.24	0.000929				Hilly, vegetated Lion Rock Country Park area
	Urban	7557.89	921.34	0.000029				Area with high-rise residential building
80-155	Grass	62202.85	235.49	0.000403			0.5133	Vegetated Lion Rock Hill area
	Urban	593632.21	661.76	0.001368				Area with high-rise residential building
155-186	Grass	7489.26	115.34	0.000247			0.4189	Vegetated Lion Rock Hill area
	Urban	193136.29	606.54	0.001214				Residential and university area
	Grass	61749.71	889.07	0.000265				Vegetated Lok Fu Park
186-230	Grass	5670.91	78.96	0.000187			0.7243	Vegetated Lion Rock Hill area
	Urban	379280.46	652.64	0.001510				Low-rise residential buildings and university area
230-266	Grass	6902.64	98.72	0.000220			0.3398	Vegetated Lion Rock Hill area
	Urban	17134.59	257.72	0.000209				Contains section of Route 7 such as Lung Cheung Road
	Grass	16950.38	338.62	0.000157				Vegetated Beacon Hill area
	Grass	23197.03	338.62	0.000215				Vegetated Beacon Hill area
	Urban	229313.39	738.01	0.000976				Consists of low-rise residential buildings
	Grass	24922.23	796.11	0.000098				Vegetated Beacon Hill area
266-308	Grass	15219.25	133.03	0.000306			0.0612	Vegetated Lion Rock Hill area
	Urban	6996.48	224.69	0.000083				Roads including Lion Rock Tunnel Road
	Grass	351628.34	682.13	0.001379				Hilly, vegetated Lion Rock Country Park area
308-48	Grass	864406.56	-	-	0.05330	Hilly, vegetated Lion Rock Country Park area		

Grid 4236

Sector (degrees in Clockwise)	Land Use	area (m2)	Distance (m)	Weighting (area Fraction/Distance)	Albedo ^{2,4,6}	Bowen Ratio _{1,4,6}	Surface Roughness ³	Remarks
37-259	Urban	1936893.82	321.30	0.021427	0.17	0.84	1.0000	Area with high-rise residential building
259-37	Grass	917122.29	600.40	0.002329			0.1846	Hilly, vegetated Lion Rock Country Park area
	Urban	287161.53	255.70	0.001712			Area with high-rise residential building	

Appendix 3.9 Determination of Surface Characteristics

Sha Tin Side

Grid 4038

Sector (degrees in Clockwise)	Land Use	Area (m2)	Distance (m)	Weighting (area Fraction/Distance)	Albedo ^{2,5,6}	Bowen Ratio _{1,5,6}	Surface Roughness ³	Remarks
1-67	Urban	522521.55	627.29	0.001418	0.18	0.90	0.7527	Area mixed with high-rise residential estates & low-rise village house development
	Grass	64810.57	725.27	0.000152				Vegetated, hilly terrain
67-98	Grass	90576.28	389.38	0.000883			0.0843	Vegetated, hilly terrain
	Urban	46226.16	655.54	0.000268				area with high-rise residential buildings
	Grass	126618.67	853.25	0.000563				Consists part of Lion Rock Country Park area
98-153	Grass	24873.08	163.64	0.000312			0.1165	Vegetated, hilly terrain
	Urban	83563.51	345.24	0.000497				High-rise residential area
	Grass	378592.64	737.39	0.001054				Hilly, vegetated Lion Rock Country Park area
153-233	Urban	136823.30	298.00	0.000662			0.1742	area mixed with high-rise residential estates & low-rise village house development
	Urban	29804.12	593.93	0.000072				Part of Lion Rock Tunnel Road and Lion Rock Tunnel Toll Plaza
	Grass	527181.84	701.45	0.001083				Hilly, vegetated Lion Rock Country Park area
233-301	Grass	27828.29	373.17	0.000125			0.2003	Vegetated, hilly terrain
	Urban	212887.47	472.26	0.000753				Developed area with GICs and residential buildings
	Grass	357731.51	756.58	0.000790				Vegetated, hilly terrain
301-1	Urban	64496.08	241.83	0.000522			0.18751	GICs including Hin Tin Playground
	Grass	60483.32	399.00	0.000297				Vegetated, hilly terrain
	Urban	30890.60	531.99	0.000114				Part of Tsing Sha Highway and entrance to Eagle Nest Tunnel
	Grass	79414.00	592.35	0.000262				Vegetated, hilly terrain
	Urban	23998.64	652.96	0.000072				Low-rise Villas
	Grass	63930.51	728.66	0.000172				Vegetated, hilly terrain
	Urban	28690.76	774.01	0.000073	Low-rise Villas			
	Grass	149833.91	881.29	0.000333	Vegetated, hilly terrain			
	Urban	9400.37	962.57	0.000019	Low-rise villas			

Appendix 3.9 Determination of Surface Characteristics

Grid 4138

Sector (degrees in Clockwise)	Land Use	Area (m2)	Distance (m)	Weighting (area Fraction/Distance)	Albedo ^{2,5,6}	Bowen Ratio _{1,5,6}	Surface Roughness ³	Remarks
36-67	Grass	188915.34	589.11	0.001208	0.18	0.90	0.1021	Vegetated, hilly terrain
	Urban	76450.84	836.51	0.000344				Low-rise Sha Tin Tau New Village
67-240	Grass	1514270.80	-	-			0.05330	Hilly, vegetated Lion Rock Country Park area
240-276	Urban	10765.46	408.19	0.000085			0.1456	Worldwide Gardens Recreation Club
	Grass	125005.74	459.47	0.000876				Consists part of Lion Rock Country Park area
	Urban	117529.67	786.28	0.000481				High-rise residential area
	Grass	57348.68	882.94	0.000209				Vegetated, hilly terrain
276-343	Urban	35460.70	387.81	0.000156			0.2921	High-rise residential area
	Grass	170429.22	395.85	0.000733				Vegetated, hilly terrain
	Urban	381585.52	757.75	0.000857				Developed area with both village houses and high-rise residential buildings
343-36	Grass	75405.27	279.47	0.000582			0.2464	Consists part of Lion Rock Country Park area
	Urban	65268.22	450.09	0.000313				Low-rise Kak Tin Village
	Grass	48628.69	586.73	0.000179				Vegetated terrain
	Urban	229883.12	781.49	0.000635				High-rise residential area
	Grass	44212.31	900.47	0.000106				Vegetated terrain

Appendix 3.9 Determination of Surface Characteristics

Grid 4139

Sector (degrees in Clockwise)	Land Use	Area (m2)	Distance (m)	Weighting (area Fraction/Distance)	Albedo ^{2,5,6}	Bowen Ratio _{1,5,6}	Surface Roughness ³	Remarks										
19-82	Grass	14701.93	108.00	0.000247	0.18	0.90	0.2236	Vegetated terrain										
	Urban	318933.94	616.94	0.000937				Developed area with residential buildings and GICs										
	Water	75507.74	685.13	0.000200				Consists part of Shing Mun River										
	Urban	142629.56	788.52	0.000328				Developed area with GICs, commercial and residential buildings										
82-112	Grass	12769.71	166.30	0.000295			0.18	0.90	0.2440	Vegetated terrain								
	Urban	125059.41	524.87	0.000916						Both high-rise residential and low-rise village house developments								
	Grass	122305.67	848.69	0.000554						Hilly, vegetated Lion Rock Country Park area								
112-153	Grass	17188.59	143.39	0.000332					0.18	0.90	0.2247	Vegetated terrain						
	Urban	96803.72	408.94	0.000656								High-rise residential estates						
	Grass	70983.53	647.38	0.000304								Hilly, vegetated terrain						
	Urban	72206.79	753.21	0.000266								Low-rise Sha Tin Tau New Village						
	Grass	103572.80	896.74	0.000320								Hilly, vegetated terrain						
153-189	Grass	18751.30	160.84	0.000368							0.18	0.90	0.1442	Vegetated terrain				
	Urban	30542.35	322.57	0.000299										High-rise residential buildings				
	Grass	25021.72	431.99	0.000183										Vegetated terrain				
	Urban	61845.56	574.37	0.000340										Low-rise Kak Tin Village				
	Grass	180289.90	822.57	0.000693										Consists part of Lion Rock Country Park area				
189-228	Urban	159698.92	455.75	0.001033									0.18	0.90	0.5042	High-rise residential buildings		
	Grass	102286.87	773.47	0.000390												Vegetated terrain		
	Urban	45788.57	917.53	0.000147												High-rise residential buildings		
	Urban	31385.56	934.57	0.000099												High-rise residential buildings		
228-306	Urban	678455.73	-	-											0.18	0.90	1.00000	Area mixed with high-rise residential estates & low-rise village house development
306-339	Urban	13426.58	140.42	0.000323													0.2775	Developed area with Sha Tin Che Kung Temple and Che Kung Miu Road
	Water	12446.19	256.87	0.000164														Consists part of Shing Mun River
	Urban	199987.99	648.30	0.001043														Area mixed with high-rise residential estates & low-rise village house development
	Grass	69908.87	860.98	0.000275														Vegetated terrain
339-19	Urban	19721.49	160.06	0.000364													0.1766	Developed area with Temples and Che Kung Miu Road
	Water	19617.13	294.65	0.000197														Consists part of Shing Mun River
	Urban	145108.08	561.84	0.000763	Developed area with schools, churches and low-rise villas													
	Grass	137055.47	842.09	0.000481	Hilly, vegetated terrain													
	Urban	17158.16	945.76	0.000054	Low-rise villas													

Appendix 3.9 Determination of Surface Characteristics

Grid 4239

Sector (degrees in Clockwise)	Land Use	Area (m2)	Distance (m)	Weighting (area Fraction/Distance)	Albedo ^{2,5,6}	Bowen Ratio _{1,5,6}	Surface Roughness ³	Remarks
6-58	Grass	21340.67	153.08	0.000305	0.18	0.90	0.5967	Vegetated terrain
	Urban	435532.48	667.82	0.001427				Developed area with high-rise residential estates & low-rise Sha Tin Wai New Village
58-132	Grass	36742.07	147.88	0.000385			0.1743	Vegetated terrain
	Urban	211761.49	434.90	0.000754				High-rise Shui Chuen O Estate
	Urban	13486.22	714.57	0.000029				GICs including Sha Tin Plant Quarantine Station
	Grass	383804.85	771.79	0.000770				Hilly, vegetated terrain
132-208	Grass	665444.75	-	-			0.05330	Hilly, vegetated Lion Rock Country Park area
208-239	Grass	60472.39	325.89	0.000693			0.1205	Hilly, vegetated Lion Rock Country Park area
	Urban	77933.41	599.26	0.000486				Low-rise Sha Tin Tau New Village
	Grass	129218.17	850.85	0.000567				Hilly, vegetated terrain
239-285	Grass	50119.15	244.96	0.000508			0.3021	Hilly, vegetated Lion Rock Country Park area
	Urban	273328.64	646.69	0.001049				Developed area with high-rise residential estates & low-rise Lei Uk Tsuen
	Grass	79420.86	913.15	0.000216				Vegetated terrain
285-6	Grass	16162.24	95.32	0.000241			0.1798	Vegetated terrain
	Urban	388703.20	478.43	0.001156	Developed area with high-rise residential buildings			
	Water	148554.76	753.69	0.000281	Consists part of Shing Mun River			
	Urban	149151.59	884.20	0.000240	Developed area with GICs, commercial and residential buildings			

Note:

1. Reference to AERMOD Implementation Guide, the determination of the Bowen ratio should be based on a simple unweighted geometric mean (i.e., no direction or distance dependency) for a representative domain, with a default domain defined by a 10km by 10km region centered on the measurement site.
2. Reference to AERMOD Implementation Guide, the determination of the albedo should be based on a simple unweighted arithmetic mean (i.e., no direction or distance dependency) for the same representative domain as defined for Bowen ratio, with a default domain defined by a 10km by 10km region centered on the measurement site.
3. Surface roughness length is based on an inverse-distance weighted geometric mean for an upwind distance of 1km relative to the concerned site.
4. Land use within 10km by 10km region centered for Kowloon Side included 42.22% urban (42222962m²), 47.23% Grassland (47230922m²), and 10.55% water (10546115m²).
5. Land use within 10km by 10km region centered for Sha Tin Side included 42.22% urban (32713718.10m²), 47.23% Grassland (64261972.m²), and 10.55% water (3024309m²).
6. For the parameters including albedo, Bowen Ratio and surface roughness, the default value for "Winter" is excluded from calculating the representative values.