

APPENDIX 4.3 Determination of Surface Characteristics Parameter

Table A-1. Seasonal Values of Albedo for the NLCD92 21-Land Cover Classification System

Class Number	Class Name	Seasonal Albedo Values*				
		1	2	3	4	5
11	Open Water	0.1	0.1	0.1	0.1	0.1
21	Low Intensity Residential	0.16	0.16	0.18	0.45	0.16
22	High Intensity Residential	0.18	0.18	0.18	0.35	0.18
91	Woody Wetlands	0.14	0.14	0.14	0.3	0.14
23	Commercial/Industrial/Transportation (Not at Airport)	0.18	0.18	0.18	0.35	0.18
31	Bare Rock/Sand/Clay (Non-arid region)	0.2	0.2	0.2	0.6	0.2
51	Shrubland (Non-arid Region)	0.18	0.18	0.18	0.5	0.18
41	Deciduous forest	0.16	0.16	0.17	0.5	0.16
71	Grassland	0.18	0.18	0.2	0.6	0.18

Table A-2. Seasonal Values of Bowen Ratio for the NLCD92 21-Land Cover Classification System

Class Number	Class Name	Seasonal Bowen Ratio - Average*				
		1	2	3	4	5
11	Open Water	0.1	0.1	0.1	0.1	0.1
21	Low Intensity Residential	0.8	1	1	0.5	0.8
22	High Intensity Residential	1.5	1.5	1.5	0.5	1.5
91	Woody Wetlands	0.2	0.2	0.3	0.5	0.2
23	Commercial/Industrial/Transportation (Not at Airport)	1.5	1.5	1.5	0.5	1.5
31	Bare Rock/Sand/Clay (Non-arid region)	1.5	1.5	1.5	0.5	1.5
51	Shrubland (Non-arid Region)	1	1.5	1.5	0.5	1
41	Deciduous forest	0.3	1	1	0.5	0.7
71	Grassland	0.8	1	1	0.5	0.4

Table A-3. Seasonal Values of Surface Roughness (m) for the NLCD92 21-Land Cover Classification System

Class Number	Class Name	Seasonal Surface Roughness (m)*				
		1	2	3	4	5
11	Open Water	0.001	0.001	0.001	0.001	0.001
21	Low Intensity Residential	0.4	0.4	0.3	0.3	0.4
22	High Intensity Residential	1	1	1	1	1
91	Woody Wetlands	0.5	0.5	0.4	0.3	0.5
23	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.7
31	Bare Rock/Sand/Clay (Non-arid region)	0.05	0.05	0.05	0.05	0.05
51	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.15	0.3
41	Deciduous forest	1.3	1.3	0.6	0.5	1
71	Grassland	0.1	0.1	0.01	0.005	0.05

* Values are listed for the following seasonal categories: 1- Midsummer with lush vegetation; 2- Autumn with unharvested cropland; 3- Late autumn after frost and harvest; or winter with no snow; 4- Winter with continuous snow on ground; 5- Transitional spring with partial green coverage or short annuals

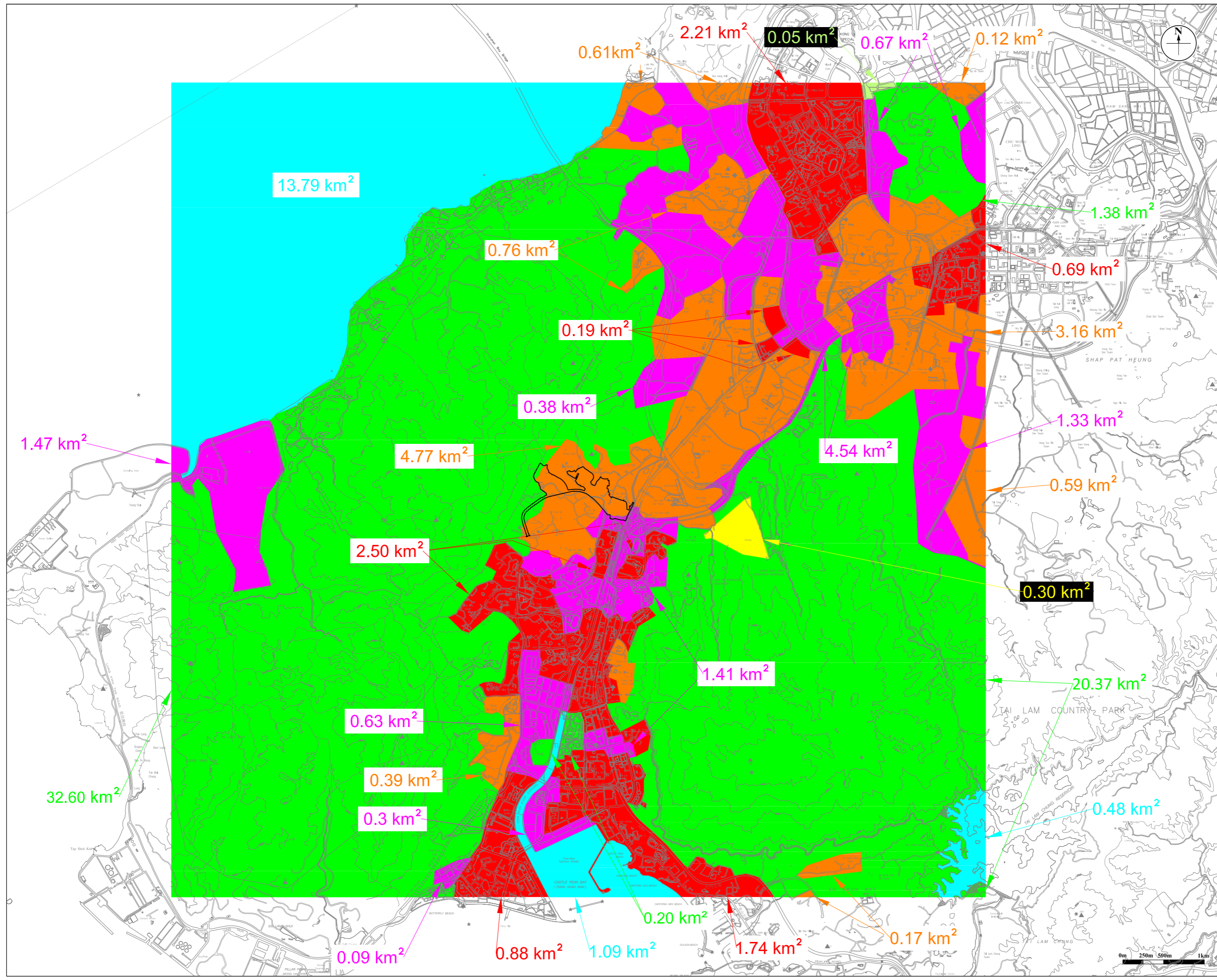
Project: San Hing Road and Hong Po Road EIA
Land Use Type as Extracted from LAKES = AERMOD

rows	Type	Season	Albedo Value	Bowen Ratio	Surface Roughness
1.	Open water	Winter	0.1	0.1	0.0010
		Spring	0.1	0.1	0.0010
		Summer	0.1	0.1	0.0010
		Autumn	0.1	0.1	0.0010
2.	Low Intensity Residential	Winter	0.18	1	0.3000
		Spring	0.16	0.8	0.4000
		Summer	0.16	0.8	0.4000
		Autumn	0.16	1	0.4000
3.	High Intensity Residential	Winter	0.18	1.5	1.0000
		Spring	0.18	1.5	1.0000
		Summer	0.18	1.5	1.0000
		Autumn	0.18	1.5	1.0000
4.	Woody Wetland	Winter	0.14	0.3	0.4000
		Spring	0.14	0.2	0.5000
		Summer	0.14	0.2	0.5000
		Autumn	0.14	0.2	0.5000
5.	Commercial/Industrial/Transportation (Not at Airport)	Winter	0.18	1.5	0.7000
		Spring	0.18	1.5	0.7000
		Summer	0.18	1.5	0.7000
		Autumn	0.18	1.5	0.7000
6.	Bare Rock/Sand/Clay (Non-arid region)	Winter	0.2	1.5	0.0500
		Spring	0.2	1.5	0.0500
		Summer	0.2	1.5	0.0500
		Autumn	0.2	1.5	0.0500
7.	Shurbland (Non-arid Region)	Winter	0.18	1.5	0.3000
		Spring	0.18	1	0.3000
		Summer	0.18	1	0.3000
		Autumn	0.18	1.5	0.3000
8.	Deciduous forest	Winter	0.17	1	0.6000
		Spring	0.16	0.7	1.0000
		Summer	0.16	0.3	1.3000
		Autumn	0.16	1	1.3000
9.	Grassland	Winter	0.2	1	0.0100
		Spring	0.18	0.4	0.0500
		Summer	0.18	0.8	0.1000
		Autumn	0.18	1	0.1000

Reference:

1. Tables A-1, A-2, A-3 from AERSURFACE User's Guide, USEPA, revised on 16 Jan 2013

- LEGEND:
- PROPOSED DEVELOPMENT AREA BOUNDARY
 - SHRUBLAND (NON-ARID REGION)
 - LOW INTENSITY RESIDENTIAL
 - COMMERCIAL/INDUSTRIAL/TRANSPORTATION (NOT AT AIRPORT)
 - HIGH INTENSITY RESIDENTIAL
 - BAREROCK/SAND/CLAY/ (NON-ARID REGION)
 - GRASSLAND
 - OPENWATER



Revision	Date		Description		Initial	
	Designed	Checked	Drawn	Checked	Initial	Checked
					KL	KY
Date			05/20	05/20		

Approved

Project title
 AGREEMENT NO. CE68/2017 (CE)
 SITE FORMATION AND
 INFRASTRUCTURAL WORKS FOR THE
 DEVELOPMENT AT SAN HING ROAD
 AND HONG PO ROAD, TUEN MUN -
 FEASIBILITY STUDY

Drawing title
 LANDUSE PARAMETERS (ALBEDO VALUE,
 BOWEN RATIO) DERIVATION BY 10KM X 10KM REGION

Drawing No. _____ Scale _____

土木工程拓展署
CEDD Civil Engineering and
 Development Department


 BLACK & VEATCH HONG KONG LIMITED
 博威工程顧問有限公司

Determination of Albedo Value and Bowen Ratio by 10km x 10km Region

Land Type	Albedo Value (A)				Bowen Ratio (B)				Occupied Area (km ²)	Frac of Area (Frac)	A x Frac				B^Frac			
	Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn			Winter	Spring	Summer	Autumn	Winter	Spring	Summer	Autumn
Open water	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	15.36	0.15	0.0154	0.0154	0.0154	0.0154	0.7021	0.7021	0.7021	0.7021
Low Intensity Residential	0.18	0.16	0.16	0.16	1	0.8	0.8	1	10.28	0.10	0.0185	0.0164	0.0164	0.0164	1.0000	0.9773	0.9773	1.0000
High Intensity Residential	0.18	0.18	0.18	0.18	1.5	1.5	1.5	1.5	8.65	0.09	0.0156	0.0156	0.0156	0.0156	1.0357	1.0357	1.0357	1.0357
Woody Wetland	0.14	0.14	0.14	0.14	0.3	0.2	0.2	0.2	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Commercial/Industrial/Transportation (Not at Airport)	0.18	0.18	0.18	0.18	1.5	1.5	1.5	1.5	10.81	0.11	0.0195	0.0195	0.0195	0.0195	1.0448	1.0448	1.0448	1.0448
Bare Rock/Sand/Clay (Non-arid region)	0.2	0.2	0.2	0.2	1.5	1.5	1.5	1.5	0.31	0.00	0.0006	0.0006	0.0006	0.0006	1.0012	1.0012	1.0012	1.0012
Shurbland (Non-arid Region)	0.18	0.18	0.18	0.18	1.5	1	1	1.5	54.54	0.55	0.0982	0.0982	0.0982	0.0982	1.2475	1.0000	1.0000	1.2475
Deciduous forest	0.17	0.16	0.16	0.16	1	0.7	0.3	1	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Grassland	0.2	0.18	0.18	0.18	1	0.4	0.8	1	0.05	0.00	0.0001	0.0001	0.0001	0.0001	1.0000	0.9995	0.9999	1.0000
								Sum	100.00	1								

Overall Value of Area of Concern

Season	Winter	Spring	Summer	Autumn
Albedo value	0.1678	0.1657	0.1657	0.1657
Bowen ratio	0.9489	0.7430	0.7433	0.9489



- LEGEND:
- SHRUBLAND (NON-ARID REGION)
 - LOW INTENSITY RESIDENTIAL
 - COMMERCIAL/INDUSTRIAL/TRANSPORTATION (NOT AT AIRPORT)
 - HIGH INTENSITY RESIDENTIAL

Grid 19,42

Revision	Date		Description		Initial	
	Designed	Checked	Drawn	Checked	KL	KY
Initial						
Date			05/20			05/20

Approved

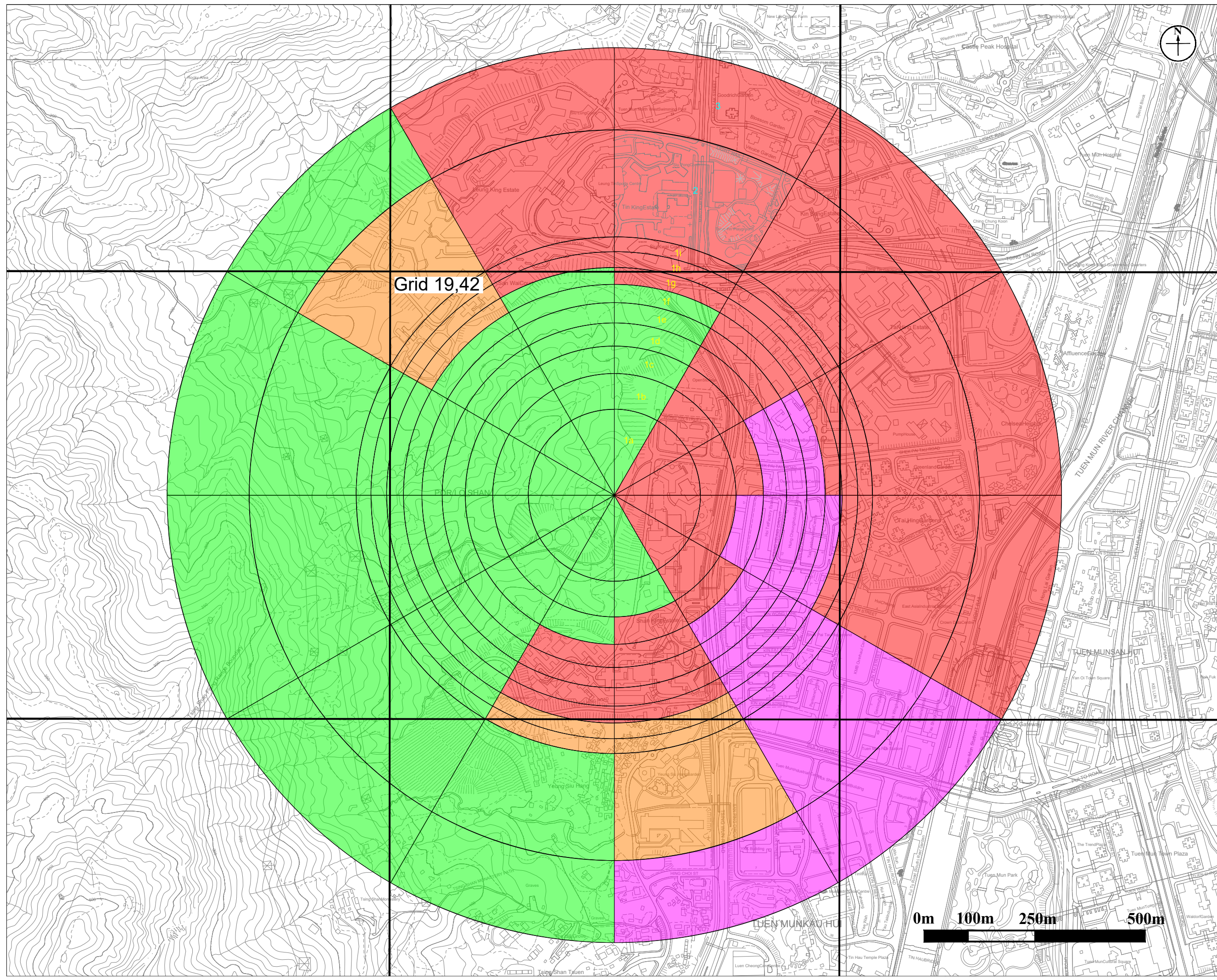
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Drawing title
 DETERMINATION OF SURFACE CHARACTERISTICS
 PARAMETERS FOR AERMET (GRID 19,42)

Drawing No. _____ Scale _____

土木工程拓展署
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 Development Department


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Grid (19,42)

Sector	Area of Concern	Season	Albedo Value	Bowen Ratio	Surface Roughness
1.	0° - 30° (clockwise from N)	Winter	0.1678	0.94893	0.58473
		Spring	0.1657	0.74305	0.58473
		Summer	0.1657	0.74332	0.58473
		Autumn	0.1657	0.94893	0.58473
2.	30° - 60° (clockwise from N)	Winter	0.1678	0.94893	1
		Spring	0.1657	0.74305	1
		Summer	0.1657	0.74332	1
		Autumn	0.1657	0.94893	1
3.	60° - 90° (clockwise from N)	Winter	0.1678	0.94893	0.94967
		Spring	0.1657	0.74305	0.94967
		Summer	0.1657	0.74332	0.94967
		Autumn	0.1657	0.94893	0.94967
4.	90° - 120° (clockwise from N)	Winter	0.1678	0.94893	0.91517
		Spring	0.1657	0.74305	0.91517
		Summer	0.1657	0.74332	0.91517
		Autumn	0.1657	0.94893	0.91517
5.	120° - 150° (clockwise from N)	Winter	0.1678	0.94893	0.77931
		Spring	0.1657	0.74305	0.77931
		Summer	0.1657	0.74332	0.77931
		Autumn	0.1657	0.94893	0.77931
6.	150° - 180° (clockwise from N)	Winter	0.1678	0.94893	0.44721
		Spring	0.1657	0.74305	0.49627
		Summer	0.1657	0.74332	0.49627
		Autumn	0.1657	0.94893	0.49627
7.	180° - 210° (clockwise from N)	Winter	0.1678	0.94893	0.37458
		Spring	0.1657	0.74305	0.38236
		Summer	0.1657	0.74332	0.38236
		Autumn	0.1657	0.94893	0.38236
8.	210° - 240° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
9.	240° - 270° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
10.	270° - 300° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
11.	300° - 330° (clockwise from N)	Winter	0.1678	0.94893	0.46381
		Spring	0.1657	0.74305	0.46381
		Summer	0.1657	0.74332	0.46381
		Autumn	0.1657	0.94893	0.46381
12.	330° - 360° (clockwise from N)	Winter	0.1678	0.94893	0.5575
		Spring	0.1657	0.74305	0.5575
		Summer	0.1657	0.74332	0.5575
		Autumn	0.1657	0.94893	0.5575

Notes:

1. The determination of the surface roughness length should be based on an inverse-distance weighted geometric mean for a default upwind distance of 1 kilometer relative to the measurement site. Surface roughness length may be varied by sector to account for variations in land cover near the measurement site; however, the sector widths should be no smaller than 30 degrees.
2. The determination of the Albedo and Bowen ratio should be based on an applicable land fraction to weight each value.
3. Seasonal average of these parameters were adopted except the parameter in winter season (4 - Winter with continuous snow on ground).
4. Option of seasonal average in AERMET is adopted to define the land surface characteristics over the year.

Determination of Surface Roughness in Each Sector (Grid 19,42)

Sector 1 (0° - 30°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		0.5847	0.5847	0.5847	0.5847								

Sector 2 (30° - 60°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		1.0000	1.0000	1.0000	1.0000								

Sector 3 (60° - 90°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		0.9497	0.9497	0.9497	0.9497								

Determination of Surface Roughness in Each Sector (Grid 19,42)

Sector 4 (90° - 120°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3074	0.1205	0.9579	0.9579	0.9579	0.9579
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4979	0.0744	0.9738	0.9738	0.9738	0.9738
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		0.9152	0.9152	0.9152	0.9152								

Sector 5 (120° - 150°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4979	0.0744	0.9738	0.9738	0.9738	0.9738
1h	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5349	0.0692	0.9756	0.9756	0.9756	0.9756
1i	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5695	0.0650	0.9771	0.9771	0.9771	0.9771
2	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.7077	0.4710	0.8454	0.8454	0.8454	0.8454
3	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.9224	0.3614	0.8791	0.8791	0.8791	0.8791
Inverse distance geometric mean =		0.7793	0.7793	0.7793	0.7793								

Sector 6 (150° - 180°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.7077	0.4710	0.5672	0.6495	0.6495	0.6495
3	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.9224	0.3614	0.8791	0.8791	0.8791	0.8791
Inverse distance geometric mean =		0.4472	0.4963	0.4963	0.4963								

Determination of Surface Roughness in Each Sector (Grid 19,42)

Sector 7 (180° - 210°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km ²)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3746	0.3824	0.3824	0.3824								

Sector 8 (210° - 240°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km ²)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Sector 9 (240° - 270°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km ²)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Determination of Surface Roughness in Each Sector (Grid 19,42)

Sector 10 (270° - 300°) (clockwise from N)






Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

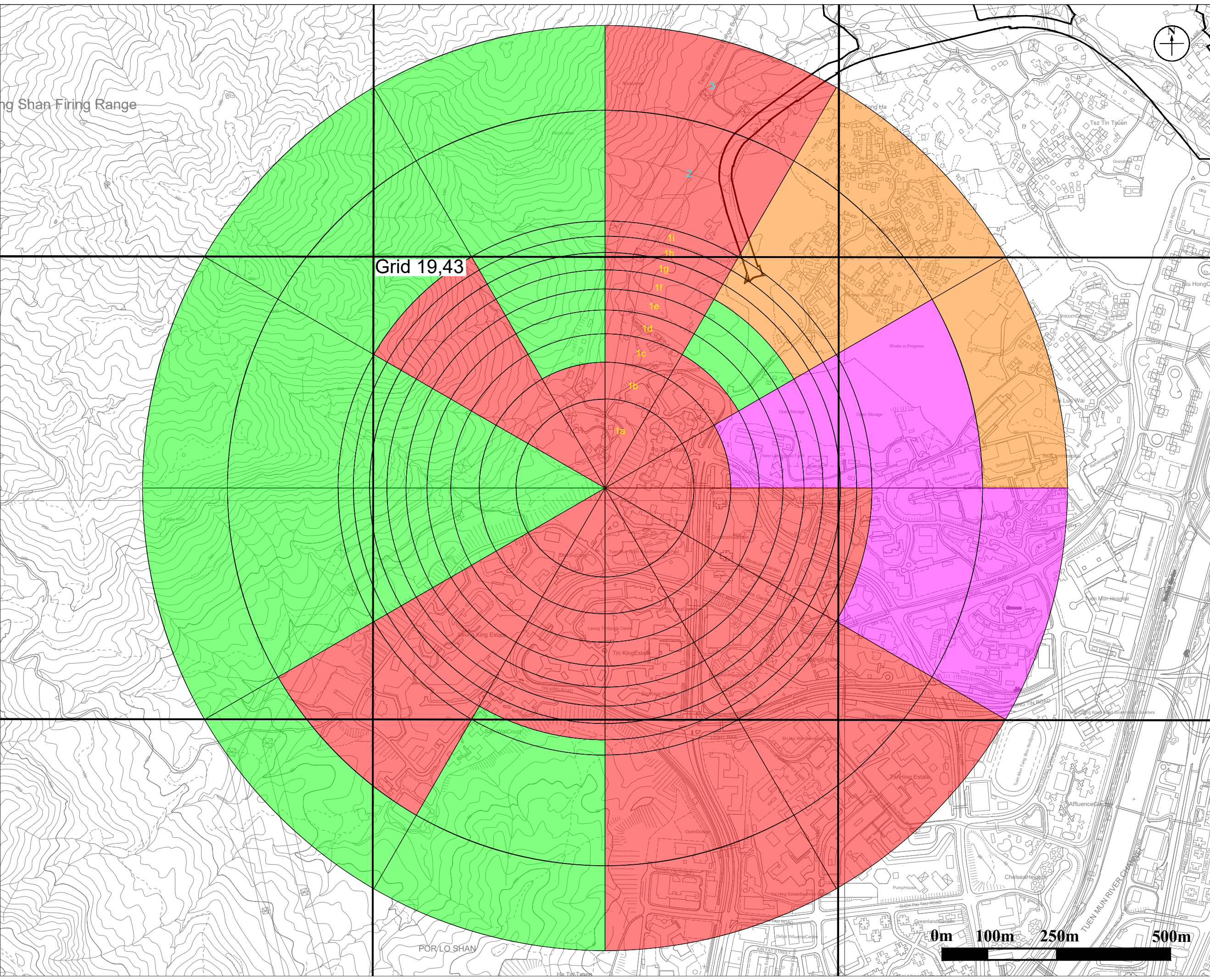
Sector 11 (300° - 330°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.4638	0.4638	0.4638	0.4638								

Sector 12 (330° - 360°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		0.5575	0.5575	0.5575	0.5575								

- LEGEND:
-  SITE BOUNDARY
 -  SHRUBLAND (NON-ARID REGION)
 -  LOW INTENSITY RESIDENTIAL
 -  COMMERCIAL/INDUSTRIAL/TRANSPORTATION (NOT AT AIRPORT)
 -  HIGH INTENSITY RESIDENTIAL



Revision	Date	Description			Initial
		Designed	Checked	Drawn	
Initial				KL	KY
Date				05/20	05/20

Approved

Project title
 AGREEMENT NO. CE68/2017 (CE)
 SITE FORMATION AND
 INFRASTRUCTURAL WORKS FOR THE
 DEVELOPMENT AT SAN HING ROAD
 AND HONG PO ROAD, TUEN MUN -
 FEASIBILITY STUDY

Drawing title
 DETERMINATION OF SURFACE CHARACTERISTICS
 PARAMETERS FOR AERMET (GRID 19,43)

Drawing No. _____ Scale _____

 土木工程拓展署
 Civil Engineering and
 Development Department


 BLACK & VEATCH HONG KONG LIMITED
 博威工程顧問有限公司

Grid (19,43)

Sector	Area of Concern	Season	Albedo Value	Bowen Ratio	Surface Roughness
1.	0° - 30° (clockwise from N)	Winter	0.1678	0.94893	0.43098
		Spring	0.1657	0.74305	0.43098
		Summer	0.1657	0.74332	0.43098
		Autumn	0.1657	0.94893	0.43098
2.	30° - 60° (clockwise from N)	Winter	0.1678	0.94893	0.43098
		Spring	0.1657	0.74305	0.50549
		Summer	0.1657	0.74332	0.50549
		Autumn	0.1657	0.94893	0.50549
3.	60° - 90° (clockwise from N)	Winter	0.1678	0.94893	0.64709
		Spring	0.1657	0.74305	0.68392
		Summer	0.1657	0.74332	0.68392
		Autumn	0.1657	0.94893	0.68392
4.	90° - 120° (clockwise from N)	Winter	0.1678	0.94893	0.85378
		Spring	0.1657	0.74305	0.85378
		Summer	0.1657	0.74332	0.85378
		Autumn	0.1657	0.94893	0.85378
5.	120° - 150° (clockwise from N)	Winter	0.1678	0.94893	1
		Spring	0.1657	0.74305	1
		Summer	0.1657	0.74332	1
		Autumn	0.1657	0.94893	1
6.	150° - 180° (clockwise from N)	Winter	0.1678	0.94893	1
		Spring	0.1657	0.74305	1
		Summer	0.1657	0.74332	1
		Autumn	0.1657	0.94893	1
7.	180° - 210° (clockwise from N)	Winter	0.1678	0.94893	0.56254
		Spring	0.1657	0.74305	0.56254
		Summer	0.1657	0.74332	0.56254
		Autumn	0.1657	0.94893	0.56254
8.	210° - 240° (clockwise from N)	Winter	0.1678	0.94893	0.7932
		Spring	0.1657	0.74305	0.7932
		Summer	0.1657	0.74332	0.7932
		Autumn	0.1657	0.94893	0.7932
9.	240° - 270° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
10.	270° - 300° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
11.	300° - 330° (clockwise from N)	Winter	0.1678	0.94893	0.58648
		Spring	0.1657	0.74305	0.58648
		Summer	0.1657	0.74332	0.58648
		Autumn	0.1657	0.94893	0.58648
12.	330° - 360° (clockwise from N)	Winter	0.1678	0.94893	0.39895
		Spring	0.1657	0.74305	0.39895
		Summer	0.1657	0.74332	0.39895
		Autumn	0.1657	0.94893	0.39895

Notes:

1. The determination of the surface roughness length should be based on an inverse-distance weighted geometric mean for a default upwind distance of 1 kilometer relative to the measurement site. Surface roughness length may be varied by sector to account for variations in land cover near the measurement site; however, the sector widths should be no smaller than 30 degrees.
2. The determination of the Albedo and Bowen ratio should be based on an applicable land fraction to weight each value.
3. Seasonal average of these parameters were adopted except the parameter in winter season (4 - Winter with continuous snow on ground).
4. Option of seasonal average in AERMET is adopted to define the land surface characteristics over the year.

Determination of Surface Roughness in Each Sector (Grid 19,43)

Sector 1 (0° - 30°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.4310	0.4310	0.4310	0.4310								

Sector 2 (30° - 60°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.7077	0.4710	0.5672	0.6495	0.6495	0.6495
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.4310	0.5055	0.5055	0.5055								

Sector 3 (60° - 90°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3074	0.1205	0.9579	0.9579	0.9579	0.9579
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4979	0.0744	0.9738	0.9738	0.9738	0.9738
1h	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5349	0.0692	0.9756	0.9756	0.9756	0.9756
1i	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5695	0.0650	0.9771	0.9771	0.9771	0.9771
2	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.7077	0.4710	0.8454	0.8454	0.8454	0.8454
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.6471	0.6839	0.6839	0.6839								

Determination of Surface Roughness in Each Sector (Grid 19,43)

Sector 4 (90° - 120°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.7077	0.4710	0.8454	0.8454	0.8454	0.8454
3	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.9224	0.3614	0.8791	0.8791	0.8791	0.8791
Inverse distance geometric mean =		0.8538	0.8538	0.8538	0.8538								

Sector 5 (120° - 150°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		1.0000	1.0000	1.0000	1.0000								

Sector 6 (150° - 180°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		1.0000	1.0000	1.0000	1.0000								

Determination of Surface Roughness in Each Sector (Grid 19,43)

Sector 7 (180° - 210°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.5625	0.5625	0.5625	0.5625								

Sector 8 (210° - 240°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.7932	0.7932	0.7932	0.7932								

Sector 9 (240° - 270°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Determination of Surface Roughness in Each Sector (Grid 19,43)

Sector 10 (270° - 300°) (clockwise from N)

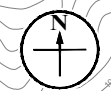
Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Sector 11 (300° - 330°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.5865	0.5865	0.5865	0.5865								

Sector 12 (330° - 360°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3989	0.3989	0.3989	0.3989								



- LEGEND:**
- SITE BOUNDARY
 - SHRUBLAND (NON-ARID REGION)
 - LOW INTENSITY RESIDENTIAL
 - HIGH INTENSITY RESIDENTIAL

Grid 19,44

Ksing Shan Firing Range

Revision	Date		Description		Initial	
	Designed	Checked	Drawn	Checked	KL	KY
Initial					KL	KY
Date					05/20	05/20
Approved						

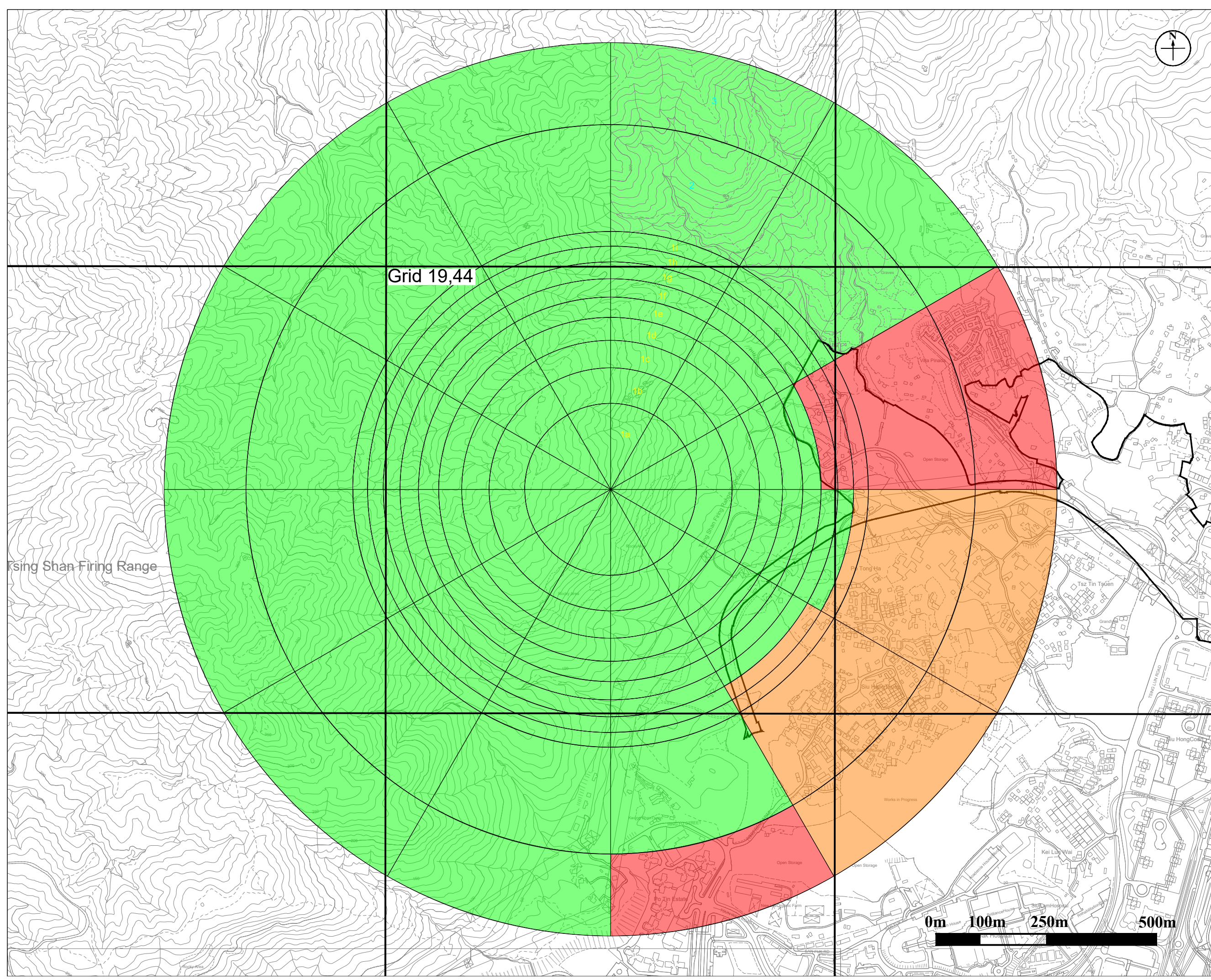
Project title
 AGREEMENT NO. CE68/2017 (CE)
 SITE FORMATION AND
 INFRASTRUCTURAL WORKS FOR THE
 DEVELOPMENT AT SAN HING ROAD
 AND HONG PO ROAD, TUEN MUN -
 FEASIBILITY STUDY

Drawing title
 DETERMINATION OF SURFACE CHARACTERISTICS
 PARAMETERS FOR AERMET (GRID 19,44)

Drawing No. _____ Scale _____

土木工程拓展署
CEDD Civil Engineering and
 Development Department


 BLACK & VEATCH HONG KONG LIMITED
 博威工程顧問有限公司



Grid (19,44)

Sector	Area of Concern	Season	Albedo Value	Bowen Ratio	Surface Roughness
1.	0° - 30° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
2.	30° - 60° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
3.	60° - 90° (clockwise from N)	Winter	0.1678	0.94893	0.58473
		Spring	0.1657	0.74305	0.58473
		Summer	0.1657	0.74332	0.58473
		Autumn	0.1657	0.94893	0.58473
4.	90° - 120° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.34421
		Summer	0.1657	0.74332	0.34421
		Autumn	0.1657	0.94893	0.34421
5.	120° - 150° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.34788
		Summer	0.1657	0.74332	0.34788
		Autumn	0.1657	0.94893	0.34788
6.	150° - 180° (clockwise from N)	Winter	0.1678	0.94893	0.37821
		Spring	0.1657	0.74305	0.37821
		Summer	0.1657	0.74332	0.37821
		Autumn	0.1657	0.94893	0.37821
7.	180° - 210° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
8.	210° - 240° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
9.	240° - 270° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
10.	270° - 300° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
11.	300° - 330° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
12.	330° - 360° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3

Notes:

1. The determination of the surface roughness length should be based on an inverse-distance weighted geometric mean for a default upwind distance of 1 kilometer relative to the measurement site. Surface roughness length may be varied by sector to account for variations in land cover near the measurement site; however, the sector widths should be no smaller than 30 degrees.
2. The determination of the Albedo and Bowen ratio should be based on an applicable land fraction to weight each value.
3. Seasonal average of these parameters were adopted except the parameter in winter season (4 - Winter with continuous snow on ground).
4. Option of seasonal average in AERMET is adopted to define the land surface characteristics over the year.

Determination of Surface Roughness in Each Sector (Grid 19,44)

Sector 1 (0° - 30°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Sector 2 (30° - 60°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Sector 3 (60° - 90°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		0.5847	0.5847	0.5847	0.5847								

Determination of Surface Roughness in Each Sector (Grid 19,44)

Sector 4 (90° - 120°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.7077	0.4710	0.5672	0.6495	0.6495	0.6495
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.3000	0.3442	0.3442	0.3442								

Sector 5 (120° - 150°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.7077	0.4710	0.5672	0.6495	0.6495	0.6495
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.3000	0.3479	0.3479	0.3479								

Sector 6 (150° - 180°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		0.3782	0.3782	0.3782	0.3782								

Determination of Surface Roughness in Each Sector (Grid 19,44)

Sector 7 (180° - 210°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Sector 8 (210° - 240°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Sector 9 (240° - 270°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Determination of Surface Roughness in Each Sector (Grid 19,44)

Sector 10 (270° - 300°) (clockwise from N)




Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Sector 11 (300° - 330°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Sector 12 (330° - 360°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

- LEGEND:
-  SITE BOUNDARY
 -  SHRUBLAND (NON-ARID REGION)
 -  HIGH INTENSITY RESIDENTIAL



Grid 19,45

Revision	Date		Description		Initial	
	Designed	Checked	Drawn	Checked	KL	KY
Initial					KL	KY
Date					05/20	05/20
Approved						

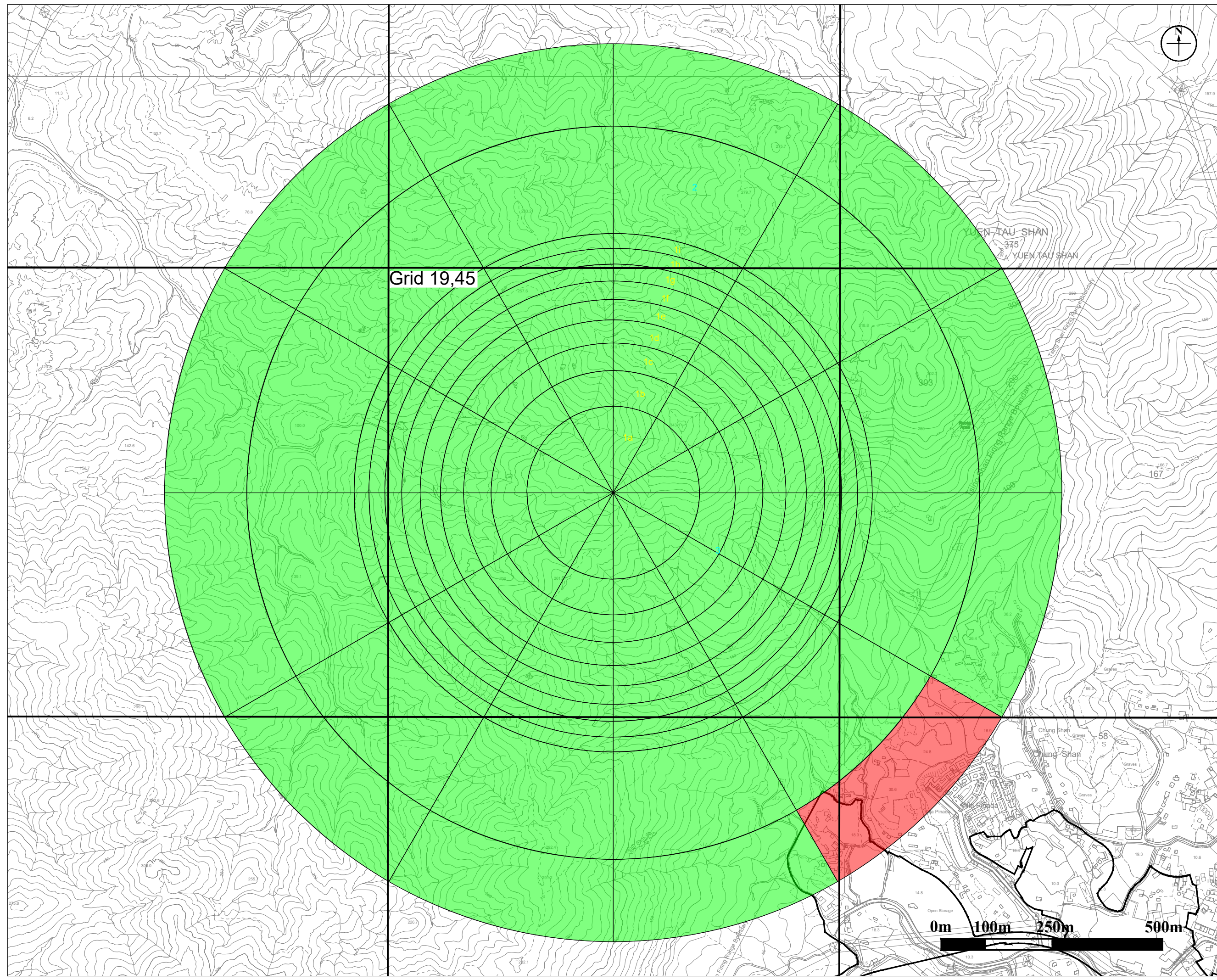
Project title
 AGREEMENT NO. CE68/2017 (CE)
 SITE FORMATION AND
 INFRASTRUCTURAL WORKS FOR THE
 DEVELOPMENT AT SAN HING ROAD
 AND HONG PO ROAD, TUEN MUN -
 FEASIBILITY STUDY

Drawing title
 DETERMINATION OF SURFACE CHARACTERISTICS
 PARAMETERS FOR AERMET (GRID 19,45)

Drawing No. _____ Scale _____

 土木工程拓展署
 Civil Engineering and
 Development Department


 BLACK & VEATCH HONG KONG LIMITED
 博威工程顧問有限公司



Grid (19,45)

Sector	Area of Concern	Season	Albedo Value	Bowen Ratio	Surface Roughness
1.	0° - 30° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
2.	30° - 60° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
3.	60° - 90° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
4.	90° - 120° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
5.	120° - 150° (clockwise from N)	Winter	0.1678	0.94893	0.37821
		Spring	0.1657	0.74305	0.37821
		Summer	0.1657	0.74332	0.37821
		Autumn	0.1657	0.94893	0.37821
6.	150° - 180° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
7.	180° - 210° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
8.	210° - 240° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
9.	240° - 270° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
10.	270° - 300° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
11.	300° - 330° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
12.	330° - 360° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3

Notes:

1. The determination of the surface roughness length should be based on an inverse-distance weighted geometric mean for a default upwind distance of 1 kilometer relative to the measurement site. Surface roughness length may be varied by sector to account for variations in land cover near the measurement site; however, the sector widths should be no smaller than 30 degrees.
2. The determination of the Albedo and Bowen ratio should be based on an applicable land fraction to weight each value.
3. Seasonal average of these parameters were adopted except the parameter in winter season (4 - Winter with continuous snow on ground).
4. Option of seasonal average in AERMET is adopted to define the land surface characteristics over the year.

Determination of Surface Roughness in Each Sector (Grid 19,45)

Sector 1 (0° - 30°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Sector 2 (30° - 60°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Sector 3 (60° - 90°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Determination of Surface Roughness in Each Sector (Grid 19,45)

Sector 4 (90° - 120°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Sector 5 (120° - 150°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		0.3782	0.3782	0.3782	0.3782								

Sector 6 (150° - 180°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Determination of Surface Roughness in Each Sector (Grid 19,45)

Sector 7 (180° - 210°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Sector 8 (210° - 240°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Sector 9 (240° - 270°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Determination of Surface Roughness in Each Sector (Grid 19,45)

Sector 10 (270° - 300°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km ²)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Sector 11 (300° - 330°) (clockwise from N)

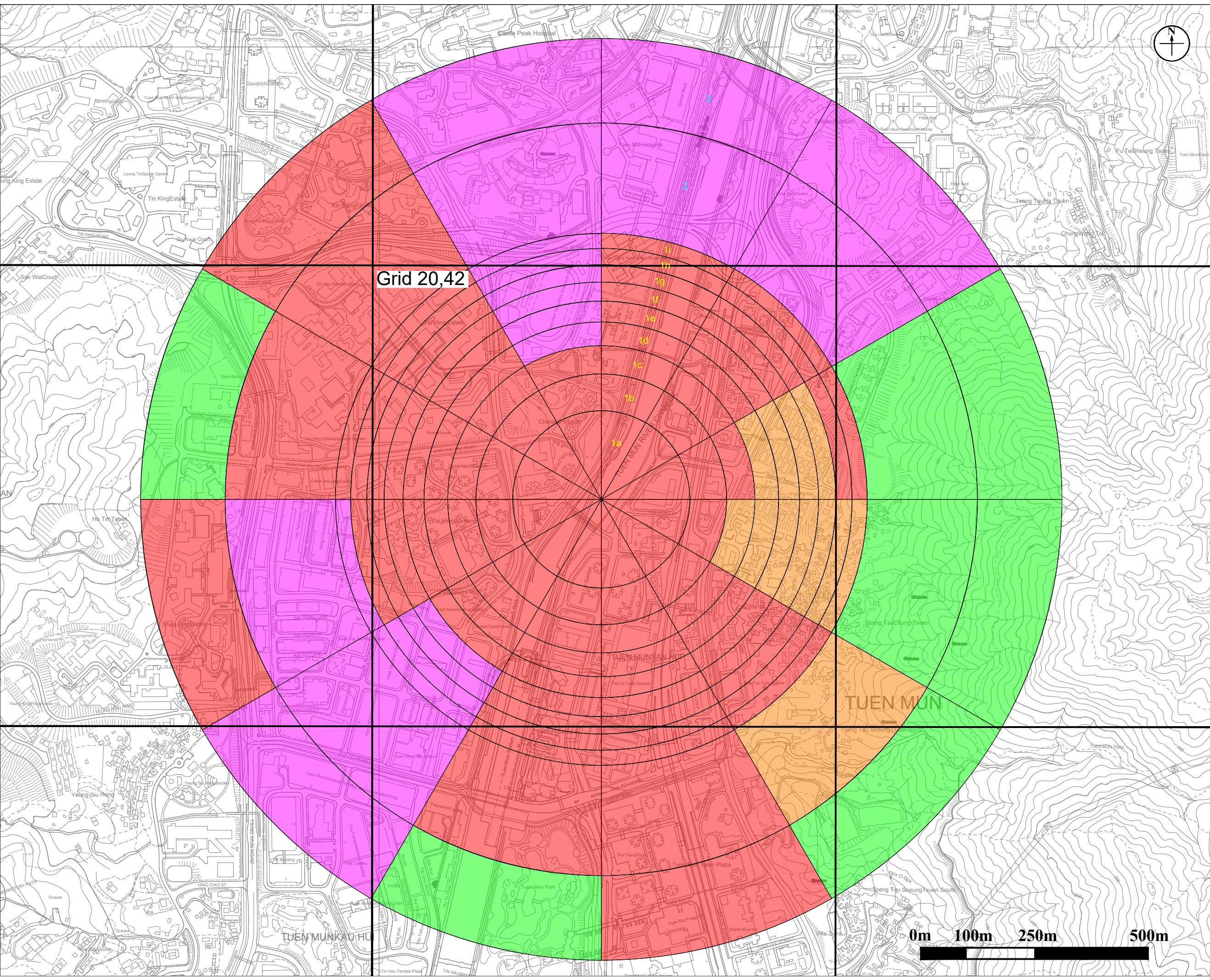
Fraction Index	Land Type	Surface Roughness (Z)				Area (km ²)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Sector 12 (330° - 360°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km ²)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								



- LEGEND:
- SHRUBLAND (NON-ARID REGION)
 - LOW INTENSITY RESIDENTIAL
 - COMMERCIAL/INDUSTRIAL/TRANSPORTATION (NOT AT AIRPORT)
 - HIGH INTENSITY RESIDENTIAL



Revision	Date		Description		Initial	
	Designed	Checked	Drawn	Checked	Initial	Checked
Initial					KL	KY
Date					05/20	05/20

Approved

Project title
 AGREEMENT NO. CE68/2017 (CE)
 SITE FORMATION AND
 INFRASTRUCTURAL WORKS FOR THE
 DEVELOPMENT AT SAN HING ROAD
 AND HONG PO ROAD, TUEN MUN -
 FEASIBILITY STUDY

Drawing title
 DETERMINATION OF SURFACE CHARACTERISTICS
 PARAMETERS FOR AERMET (GRID 20,42)

Drawing No. _____ Scale _____

土木工程拓展署
CEDD Civil Engineering and
 Development Department


 BLACK & VEATCH HONG KONG LIMITED
 博威工程顧問有限公司



Grid (20,42)

Sector	Area of Concern	Season	Albedo Value	Bowen Ratio	Surface Roughness
1.	0° - 30° (clockwise from N)	Winter	0.1678	0.94893	0.85378
		Spring	0.1657	0.74305	0.85378
		Summer	0.1657	0.74332	0.85378
		Autumn	0.1657	0.94893	0.85378
2.	30° - 60° (clockwise from N)	Winter	0.1678	0.94893	0.85378
		Spring	0.1657	0.74305	0.85378
		Summer	0.1657	0.74332	0.85378
		Autumn	0.1657	0.94893	0.85378
3.	60° - 90° (clockwise from N)	Winter	0.1678	0.94893	0.46972
		Spring	0.1657	0.74305	0.49531
		Summer	0.1657	0.74332	0.49531
		Autumn	0.1657	0.94893	0.49531
4.	90° - 120° (clockwise from N)	Winter	0.1678	0.94893	0.39895
		Spring	0.1657	0.74305	0.43742
		Summer	0.1657	0.74332	0.43742
		Autumn	0.1657	0.94893	0.43742
5.	120° - 150° (clockwise from N)	Winter	0.1678	0.94893	0.58648
		Spring	0.1657	0.74305	0.63036
		Summer	0.1657	0.74332	0.63036
		Autumn	0.1657	0.94893	0.63036
6.	150° - 180° (clockwise from N)	Winter	0.1678	0.94893	1
		Spring	0.1657	0.74305	1
		Summer	0.1657	0.74332	1
		Autumn	0.1657	0.94893	1
7.	180° - 210° (clockwise from N)	Winter	0.1678	0.94893	0.7932
		Spring	0.1657	0.74305	0.7932
		Summer	0.1657	0.74332	0.7932
		Autumn	0.1657	0.94893	0.7932
8.	210° - 240° (clockwise from N)	Winter	0.1678	0.94893	0.8081
		Spring	0.1657	0.74305	0.8081
		Summer	0.1657	0.74332	0.8081
		Autumn	0.1657	0.94893	0.8081
9.	240° - 270° (clockwise from N)	Winter	0.1678	0.94893	0.90321
		Spring	0.1657	0.74305	0.90321
		Summer	0.1657	0.74332	0.90321
		Autumn	0.1657	0.94893	0.90321
10.	270° - 300° (clockwise from N)	Winter	0.1678	0.94893	0.7932
		Spring	0.1657	0.74305	0.7932
		Summer	0.1657	0.74332	0.7932
		Autumn	0.1657	0.94893	0.7932
11.	300° - 330° (clockwise from N)	Winter	0.1678	0.94893	1
		Spring	0.1657	0.74305	1
		Summer	0.1657	0.74332	1
		Autumn	0.1657	0.94893	1
12.	330° - 360° (clockwise from N)	Winter	0.1678	0.94893	0.77931
		Spring	0.1657	0.74305	0.77931
		Summer	0.1657	0.74332	0.77931
		Autumn	0.1657	0.94893	0.77931

Notes:

1. The determination of the surface roughness length should be based on an inverse-distance weighted geometric mean for a default upwind distance of 1 kilometer relative to the measurement site. Surface roughness length may be varied by sector to account for variations in land cover near the measurement site; however, the sector widths should be no smaller than 30 degrees.
2. The determination of the Albedo and Bowen ratio should be based on an applicable land fraction to weight each value.
3. Seasonal average of these parameters were adopted except the parameter in winter season (4 - Winter with continuous snow on ground).
4. Option of seasonal average in AERMET is adopted to define the land surface characteristics over the year.

Determination of Surface Roughness in Each Sector (Grid 20,42)

Sector 1 (0° - 30°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.7077	0.4710	0.8454	0.8454	0.8454	0.8454
3	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.9224	0.3614	0.8791	0.8791	0.8791	0.8791
Inverse distance geometric mean =		0.8538	0.8538	0.8538	0.8538								

Sector 2 (30° - 60°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.7077	0.4710	0.8454	0.8454	0.8454	0.8454
3	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.9224	0.3614	0.8791	0.8791	0.8791	0.8791
Inverse distance geometric mean =		0.8538	0.8538	0.8538	0.8538								

Sector 3 (60° - 90°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.4697	0.4953	0.4953	0.4953								

Determination of Surface Roughness in Each Sector (Grid 20,42)

Sector 4 (90° - 120°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3989	0.4374	0.4374	0.4374								

Sector 5 (120° - 150°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.7077	0.4710	0.5672	0.6495	0.6495	0.6495
3	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.5865	0.6304	0.6304	0.6304								

Sector 6 (150° - 180°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		1.0000	1.0000	1.0000	1.0000								

Determination of Surface Roughness in Each Sector (Grid 20,42)

Sector 7 (180° - 210°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.7932	0.7932	0.7932	0.7932								

Sector 8 (210° - 240°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4979	0.0744	0.9738	0.9738	0.9738	0.9738
1h	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5349	0.0692	0.9756	0.9756	0.9756	0.9756
1i	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5695	0.0650	0.9771	0.9771	0.9771	0.9771
2	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.7077	0.4710	0.8454	0.8454	0.8454	0.8454
3	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.9224	0.3614	0.8791	0.8791	0.8791	0.8791
Inverse distance geometric mean =		0.8081	0.8081	0.8081	0.8081								

Sector 9 (240° - 270°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5695	0.0650	0.9771	0.9771	0.9771	0.9771
2	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.7077	0.4710	0.8454	0.8454	0.8454	0.8454
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		0.9032	0.9032	0.9032	0.9032								

Determination of Surface Roughness in Each Sector (Grid 20,42)

Sector 10 (270° - 300°) (clockwise from N)






Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.7932	0.7932	0.7932	0.7932								

Sector 11 (300° - 330°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		1.0000	1.0000	1.0000	1.0000								

Sector 12 (330° - 360°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4979	0.0744	0.9738	0.9738	0.9738	0.9738
1h	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5349	0.0692	0.9756	0.9756	0.9756	0.9756
1i	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5695	0.0650	0.9771	0.9771	0.9771	0.9771
2	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.7077	0.4710	0.8454	0.8454	0.8454	0.8454
3	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.9224	0.3614	0.8791	0.8791	0.8791	0.8791
Inverse distance geometric mean =		0.7793	0.7793	0.7793	0.7793								

- LEGEND:**
-  SITE BOUNDARY
 -  SHRUBLAND (NON-ARID REGION)
 -  LOW INTENSITY RESIDENTIAL
 -  COMMERCIAL/INDUSTRIAL/TRANSPORTATION (NOT AT AIRPORT)
 -  HIGH INTENSITY RESIDENTIAL



Grid 20,43

Revision	Date	Description			Initial
		Designed	Checked	Drawn	
Initial				KL	KY
Date				05/20	05/20

Approved

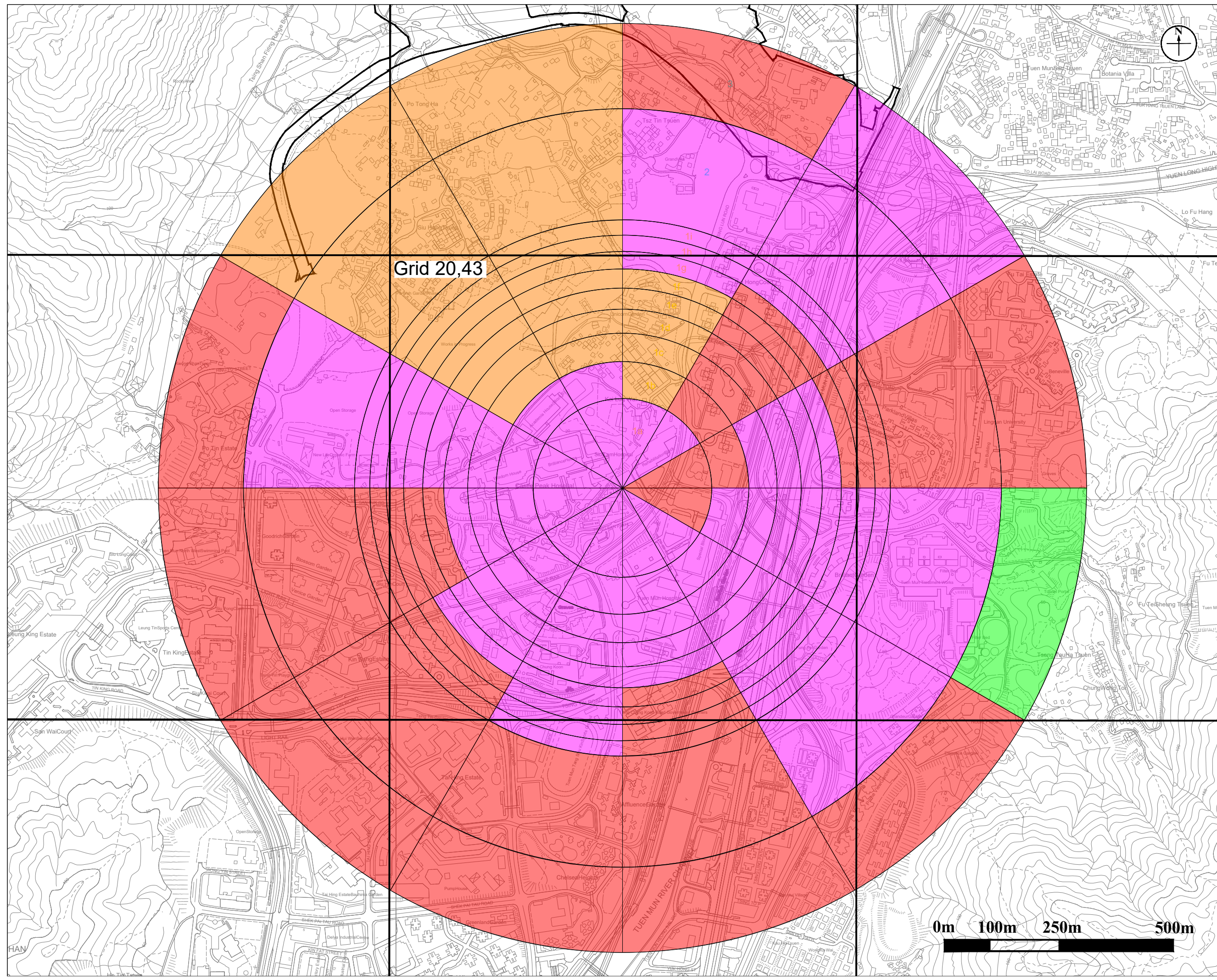
Project title
 AGREEMENT NO. CE68/2017 (CE)
 SITE FORMATION AND
 INFRASTRUCTURAL WORKS FOR THE
 DEVELOPMENT AT SAN HING ROAD
 AND HONG PO ROAD, TUEN MUN -
 FEASIBILITY STUDY

Drawing title
 DETERMINATION OF SURFACE CHARACTERISTICS
 PARAMETERS FOR AERMET (GRID 20,43)

Drawing No. _____ Scale _____

 土木工程拓展署
 Civil Engineering and
 Development Department


 BLACK & VEATCH HONG KONG LIMITED
 博威工程顧問有限公司



Grid (20,43)

Sector	Area of Concern	Season	Albedo Value	Bowen Ratio	Surface Roughness
1.	0° - 30° (clockwise from N)	Winter	0.1678	0.94893	0.58514
		Spring	0.1657	0.74305	0.63651
		Summer	0.1657	0.74332	0.63651
		Autumn	0.1657	0.94893	0.63651
2.	30° - 60° (clockwise from N)	Winter	0.1678	0.94893	0.78804
		Spring	0.1657	0.74305	0.78804
		Summer	0.1657	0.74332	0.78804
		Autumn	0.1657	0.94893	0.78804
3.	60° - 90° (clockwise from N)	Winter	0.1678	0.94893	0.92819
		Spring	0.1657	0.74305	0.92819
		Summer	0.1657	0.74332	0.92819
		Autumn	0.1657	0.94893	0.92819
4.	90° - 120° (clockwise from N)	Winter	0.1678	0.94893	0.62807
		Spring	0.1657	0.74305	0.62807
		Summer	0.1657	0.74332	0.62807
		Autumn	0.1657	0.94893	0.62807
5.	120° - 150° (clockwise from N)	Winter	0.1678	0.94893	0.74973
		Spring	0.1657	0.74305	0.74973
		Summer	0.1657	0.74332	0.74973
		Autumn	0.1657	0.94893	0.74973
6.	150° - 180° (clockwise from N)	Winter	0.1678	0.94893	0.86623
		Spring	0.1657	0.74305	0.86623
		Summer	0.1657	0.74332	0.86623
		Autumn	0.1657	0.94893	0.86623
7.	180° - 210° (clockwise from N)	Winter	0.1678	0.94893	0.81988
		Spring	0.1657	0.74305	0.81988
		Summer	0.1657	0.74332	0.81988
		Autumn	0.1657	0.94893	0.81988
8.	210° - 240° (clockwise from N)	Winter	0.1678	0.94893	0.85302
		Spring	0.1657	0.74305	0.85302
		Summer	0.1657	0.74332	0.85302
		Autumn	0.1657	0.94893	0.85302
9.	240° - 270° (clockwise from N)	Winter	0.1678	0.94893	0.88108
		Spring	0.1657	0.74305	0.88108
		Summer	0.1657	0.74332	0.88108
		Autumn	0.1657	0.94893	0.88108
10.	270° - 300° (clockwise from N)	Winter	0.1678	0.94893	0.74973
		Spring	0.1657	0.74305	0.74973
		Summer	0.1657	0.74332	0.74973
		Autumn	0.1657	0.94893	0.74973
11.	300° - 330° (clockwise from N)	Winter	0.1678	0.94893	0.36664
		Spring	0.1657	0.74305	0.45667
		Summer	0.1657	0.74332	0.45667
		Autumn	0.1657	0.94893	0.45667
12.	330° - 360° (clockwise from N)	Winter	0.1678	0.94893	0.36664
		Spring	0.1657	0.74305	0.45667
		Summer	0.1657	0.74332	0.45667
		Autumn	0.1657	0.94893	0.45667

Notes:

1. The determination of the surface roughness length should be based on an inverse-distance weighted geometric mean for a default upwind distance of 1 kilometer relative to the measurement site. Surface roughness length may be varied by sector to account for variations in land cover near the measurement site; however, the sector widths should be no smaller than 30 degrees.
2. The determination of the Albedo and Bowen ratio should be based on an applicable land fraction to weight each value.
3. Seasonal average of these parameters were adopted except the parameter in winter season (4 - Winter with continuous snow on ground).
4. Option of seasonal average in AERMET is adopted to define the land surface characteristics over the year.

Determination of Surface Roughness in Each Sector (Grid 20,43)

Sector 1 (0° - 30°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.1288	0.2876	0.9025	0.9025	0.9025	0.9025
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4979	0.0744	0.9738	0.9738	0.9738	0.9738
1h	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5349	0.0692	0.9756	0.9756	0.9756	0.9756
1i	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5695	0.0650	0.9771	0.9771	0.9771	0.9771
2	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.7077	0.4710	0.8454	0.8454	0.8454	0.8454
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		0.5851	0.6365	0.6365	0.6365								

Sector 2 (30° - 60°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.1288	0.2876	0.9025	0.9025	0.9025	0.9025
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5349	0.0692	0.9756	0.9756	0.9756	0.9756
1i	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5695	0.0650	0.9771	0.9771	0.9771	0.9771
2	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.7077	0.4710	0.8454	0.8454	0.8454	0.8454
3	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.9224	0.3614	0.8791	0.8791	0.8791	0.8791
Inverse distance geometric mean =		0.7880	0.7880	0.7880	0.7880								

Sector 3 (60° - 90°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3074	0.1205	0.9579	0.9579	0.9579	0.9579
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		0.9282	0.9282	0.9282	0.9282								

Determination of Surface Roughness in Each Sector (Grid 20,43)

Sector 4 (90° - 120°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.2359	0.1570	0.9455	0.9455	0.9455	0.9455
1c	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3074	0.1205	0.9579	0.9579	0.9579	0.9579
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4979	0.0744	0.9738	0.9738	0.9738	0.9738
1h	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5349	0.0692	0.9756	0.9756	0.9756	0.9756
1i	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5695	0.0650	0.9771	0.9771	0.9771	0.9771
2	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.7077	0.4710	0.8454	0.8454	0.8454	0.8454
3	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.6281	0.6281	0.6281	0.6281								

Sector 5 (120° - 150°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.1288	0.2876	0.9025	0.9025	0.9025	0.9025
1b	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.2359	0.1570	0.9455	0.9455	0.9455	0.9455
1c	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3074	0.1205	0.9579	0.9579	0.9579	0.9579
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4979	0.0744	0.9738	0.9738	0.9738	0.9738
1h	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5349	0.0692	0.9756	0.9756	0.9756	0.9756
1i	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5695	0.0650	0.9771	0.9771	0.9771	0.9771
2	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.7077	0.4710	0.8454	0.8454	0.8454	0.8454
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		0.7497	0.7497	0.7497	0.7497								

Sector 6 (150° - 180°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.1288	0.2876	0.9025	0.9025	0.9025	0.9025
1b	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.2359	0.1570	0.9455	0.9455	0.9455	0.9455
1c	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3074	0.1205	0.9579	0.9579	0.9579	0.9579
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		0.8662	0.8662	0.8662	0.8662								

Determination of Surface Roughness in Each Sector (Grid 20,43)

Sector 7 (180° - 210°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.1288	0.2876	0.9025	0.9025	0.9025	0.9025
1b	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.2359	0.1570	0.9455	0.9455	0.9455	0.9455
1c	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3074	0.1205	0.9579	0.9579	0.9579	0.9579
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4979	0.0744	0.9738	0.9738	0.9738	0.9738
1h	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5349	0.0692	0.9756	0.9756	0.9756	0.9756
1i	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5695	0.0650	0.9771	0.9771	0.9771	0.9771
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		0.8199	0.8199	0.8199	0.8199								

Sector 8 (210° - 240°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.1288	0.2876	0.9025	0.9025	0.9025	0.9025
1b	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.2359	0.1570	0.9455	0.9455	0.9455	0.9455
1c	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3074	0.1205	0.9579	0.9579	0.9579	0.9579
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		0.8530	0.8530	0.8530	0.8530								

Sector 9 (240° - 270°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.1288	0.2876	0.9025	0.9025	0.9025	0.9025
1b	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.2359	0.1570	0.9455	0.9455	0.9455	0.9455
1c	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3074	0.1205	0.9579	0.9579	0.9579	0.9579
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		0.8811	0.8811	0.8811	0.8811								

Determination of Surface Roughness in Each Sector (Grid 20,43)

Sector 10 (270° - 300°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km ²)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.1288	0.2876	0.9025	0.9025	0.9025	0.9025
1b	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.2359	0.1570	0.9455	0.9455	0.9455	0.9455
1c	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3074	0.1205	0.9579	0.9579	0.9579	0.9579
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4979	0.0744	0.9738	0.9738	0.9738	0.9738
1h	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5349	0.0692	0.9756	0.9756	0.9756	0.9756
1i	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5695	0.0650	0.9771	0.9771	0.9771	0.9771
2	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.7077	0.4710	0.8454	0.8454	0.8454	0.8454
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		0.7497	0.7497	0.7497	0.7497								

Sector 11 (300° - 330°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km ²)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.1288	0.2876	0.9025	0.9025	0.9025	0.9025
1b	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.2359	0.1570	0.9455	0.9455	0.9455	0.9455
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.7077	0.4710	0.5672	0.6495	0.6495	0.6495
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.3666	0.4567	0.4567	0.4567								

Sector 12 (330° - 360°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km ²)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.1288	0.2876	0.9025	0.9025	0.9025	0.9025
1b	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.2359	0.1570	0.9455	0.9455	0.9455	0.9455
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.7077	0.4710	0.5672	0.6495	0.6495	0.6495
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.3666	0.4567	0.4567	0.4567								

- LEGEND:
- SITE BOUNDARY
 - SHRUBLAND (NON-ARID REGION)
 - LOW INTENSITY RESIDENTIAL
 - COMMERCIAL/INDUSTRIAL/TRANSPORTATION (NOT AT AIRPORT)
 - HIGH INTENSITY RESIDENTIAL



Grid 20,44

Revision	Date		Description		Initial	
	Designed	Checked	Drawn	Checked	Initial	Checked
Initial					KL	KY
Date					05/20	05/20
Approved						

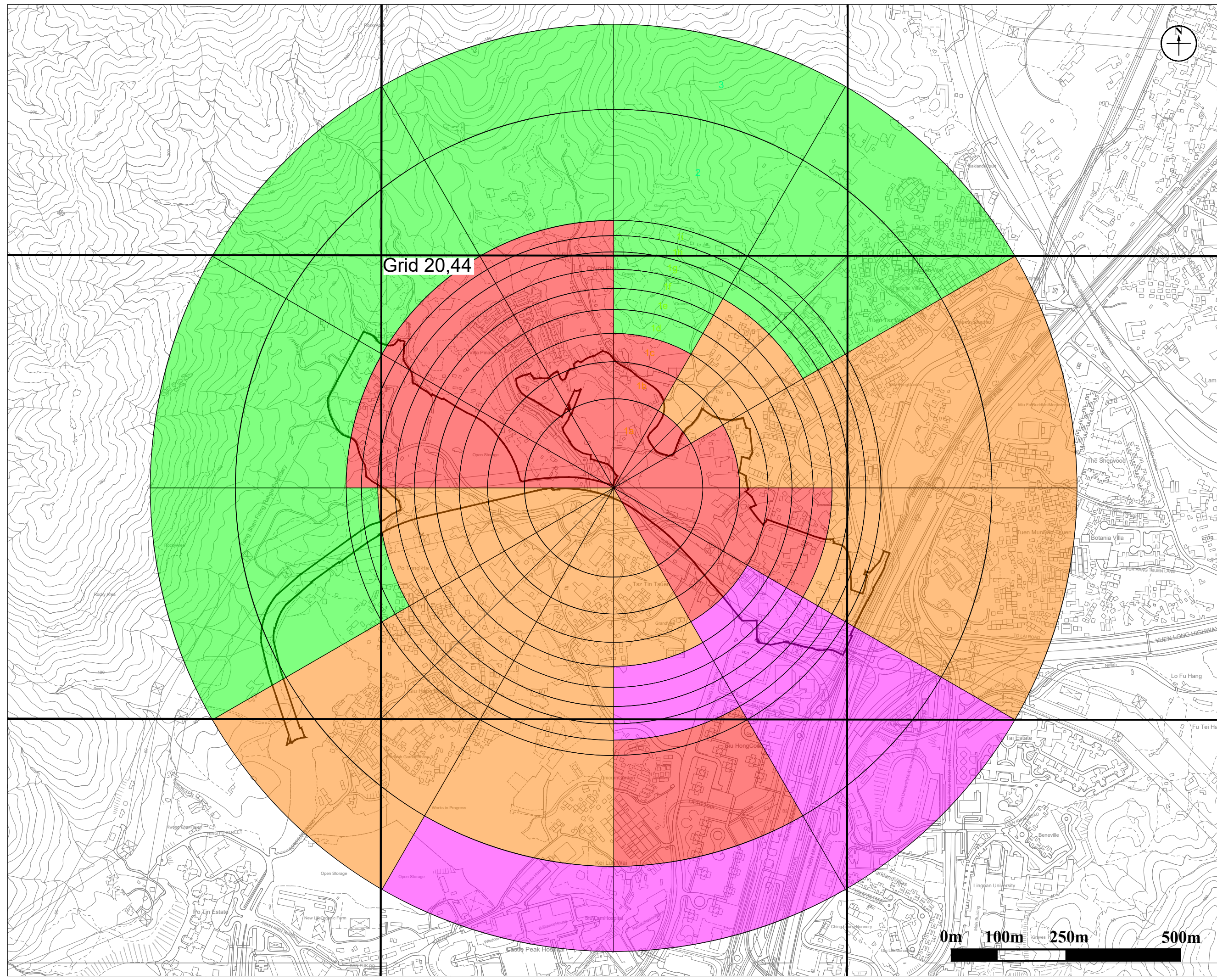
Project title
 AGREEMENT NO. CE68/2017 (CE)
 SITE FORMATION AND
 INFRASTRUCTURAL WORKS FOR THE
 DEVELOPMENT AT SAN HING ROAD
 AND HONG PO ROAD, TUEN MUN -
 FEASIBILITY STUDY

Drawing title
 DETERMINATION OF SURFACE CHARACTERISTICS
 PARAMETERS FOR AERMET (GRID 20,44)

Drawing No. _____ Scale _____

土木工程拓展署
CEDD Civil Engineering and
 Development Department


 BLACK & VEATCH HONG KONG LIMITED
 博威工程顧問有限公司



Grid (20,44)

Sector	Area of Concern	Season	Albedo Value	Bowen Ratio	Surface Roughness
1.	0° - 30° (clockwise from N)	Winter	0.1678	0.94893	0.43098
		Spring	0.1657	0.74305	0.43098
		Summer	0.1657	0.74332	0.43098
		Autumn	0.1657	0.94893	0.43098
2.	30° - 60° (clockwise from N)	Winter	0.1678	0.94893	0.36074
		Spring	0.1657	0.74305	0.39242
		Summer	0.1657	0.74332	0.39242
		Autumn	0.1657	0.94893	0.39242
3.	60° - 90° (clockwise from N)	Winter	0.1678	0.94893	0.39895
		Spring	0.1657	0.74305	0.4969
		Summer	0.1657	0.74332	0.4969
		Autumn	0.1657	0.94893	0.4969
4.	90° - 120° (clockwise from N)	Winter	0.1678	0.94893	0.51305
		Spring	0.1657	0.74305	0.60175
		Summer	0.1657	0.74332	0.60175
		Autumn	0.1657	0.94893	0.60175
5.	120° - 150° (clockwise from N)	Winter	0.1678	0.94893	0.77931
		Spring	0.1657	0.74305	0.77931
		Summer	0.1657	0.74332	0.77931
		Autumn	0.1657	0.94893	0.77931
6.	150° - 180° (clockwise from N)	Winter	0.1678	0.94893	0.5737
		Spring	0.1657	0.74305	0.63538
		Summer	0.1657	0.74332	0.63538
		Autumn	0.1657	0.94893	0.63538
7.	180° - 210° (clockwise from N)	Winter	0.1678	0.94893	0.35313
		Spring	0.1657	0.74305	0.44548
		Summer	0.1657	0.74332	0.44548
		Autumn	0.1657	0.94893	0.44548
8.	210° - 240° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.4
		Summer	0.1657	0.74332	0.4
		Autumn	0.1657	0.94893	0.4
9.	240° - 270° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.34495
		Summer	0.1657	0.74332	0.34495
		Autumn	0.1657	0.94893	0.34495
10.	270° - 300° (clockwise from N)	Winter	0.1678	0.94893	0.58648
		Spring	0.1657	0.74305	0.58648
		Summer	0.1657	0.74332	0.58648
		Autumn	0.1657	0.94893	0.58648
11.	300° - 330° (clockwise from N)	Winter	0.1678	0.94893	0.58648
		Spring	0.1657	0.74305	0.58648
		Summer	0.1657	0.74332	0.58648
		Autumn	0.1657	0.94893	0.58648
12.	330° - 360° (clockwise from N)	Winter	0.1678	0.94893	0.58648
		Spring	0.1657	0.74305	0.58648
		Summer	0.1657	0.74332	0.58648
		Autumn	0.1657	0.94893	0.58648

Notes:

1. The determination of the surface roughness length should be based on an inverse-distance weighted geometric mean for a default upwind distance of 1 kilometer relative to the measurement site. Surface roughness length may be varied by sector to account for variations in land cover near the measurement site; however, the sector widths should be no smaller than 30 degrees.
2. The determination of the Albedo and Bowen ratio should be based on an applicable land fraction to weight each value.
3. Seasonal average of these parameters were adopted except the parameter in winter season (4 - Winter with continuous snow on ground).
4. Option of seasonal average in AERMET is adopted to define the land surface characteristics over the year.

Determination of Surface Roughness in Each Sector (Grid 20,44)

Sector 1 (0° - 30°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.4310	0.4310	0.4310	0.4310								

Sector 2 (30° - 60°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3607	0.3924	0.3924	0.3924								

Sector 3 (60° - 90°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.7077	0.4710	0.5672	0.6495	0.6495	0.6495
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.3989	0.4969	0.4969	0.4969								

Determination of Surface Roughness in Each Sector (Grid 20,44)

Sector 4 (90° - 120°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.7077	0.4710	0.5672	0.6495	0.6495	0.6495
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.5131	0.6018	0.6018	0.6018								

Sector 5 (120° - 150°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4979	0.0744	0.9738	0.9738	0.9738	0.9738
1h	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5349	0.0692	0.9756	0.9756	0.9756	0.9756
1i	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5695	0.0650	0.9771	0.9771	0.9771	0.9771
2	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.7077	0.4710	0.8454	0.8454	0.8454	0.8454
3	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.9224	0.3614	0.8791	0.8791	0.8791	0.8791
Inverse distance geometric mean =		0.7793	0.7793	0.7793	0.7793								

Sector 6 (150° - 180°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.1288	0.2876	0.7073	0.7683	0.7683	0.7683
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4979	0.0744	0.9738	0.9738	0.9738	0.9738
1h	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5349	0.0692	0.9756	0.9756	0.9756	0.9756
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.9224	0.3614	0.8791	0.8791	0.8791	0.8791
Inverse distance geometric mean =		0.5737	0.6354	0.6354	0.6354								

Determination of Surface Roughness in Each Sector (Grid 20,44)

Sector 7 (180° - 210°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.1288	0.2876	0.7073	0.7683	0.7683	0.7683
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.7077	0.4710	0.5672	0.6495	0.6495	0.6495
3	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.9224	0.3614	0.8791	0.8791	0.8791	0.8791
Inverse distance geometric mean =		0.3531	0.4455	0.4455	0.4455								

Sector 8 (210° - 240°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.1288	0.2876	0.7073	0.7683	0.7683	0.7683
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.7077	0.4710	0.5672	0.6495	0.6495	0.6495
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.3000	0.4000	0.4000	0.4000								

Sector 9 (240° - 270°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.1288	0.2876	0.7073	0.7683	0.7683	0.7683
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3449	0.3449	0.3449								

Determination of Surface Roughness in Each Sector (Grid 20,44)

Sector 10 (270° - 300°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.5865	0.5865	0.5865	0.5865								

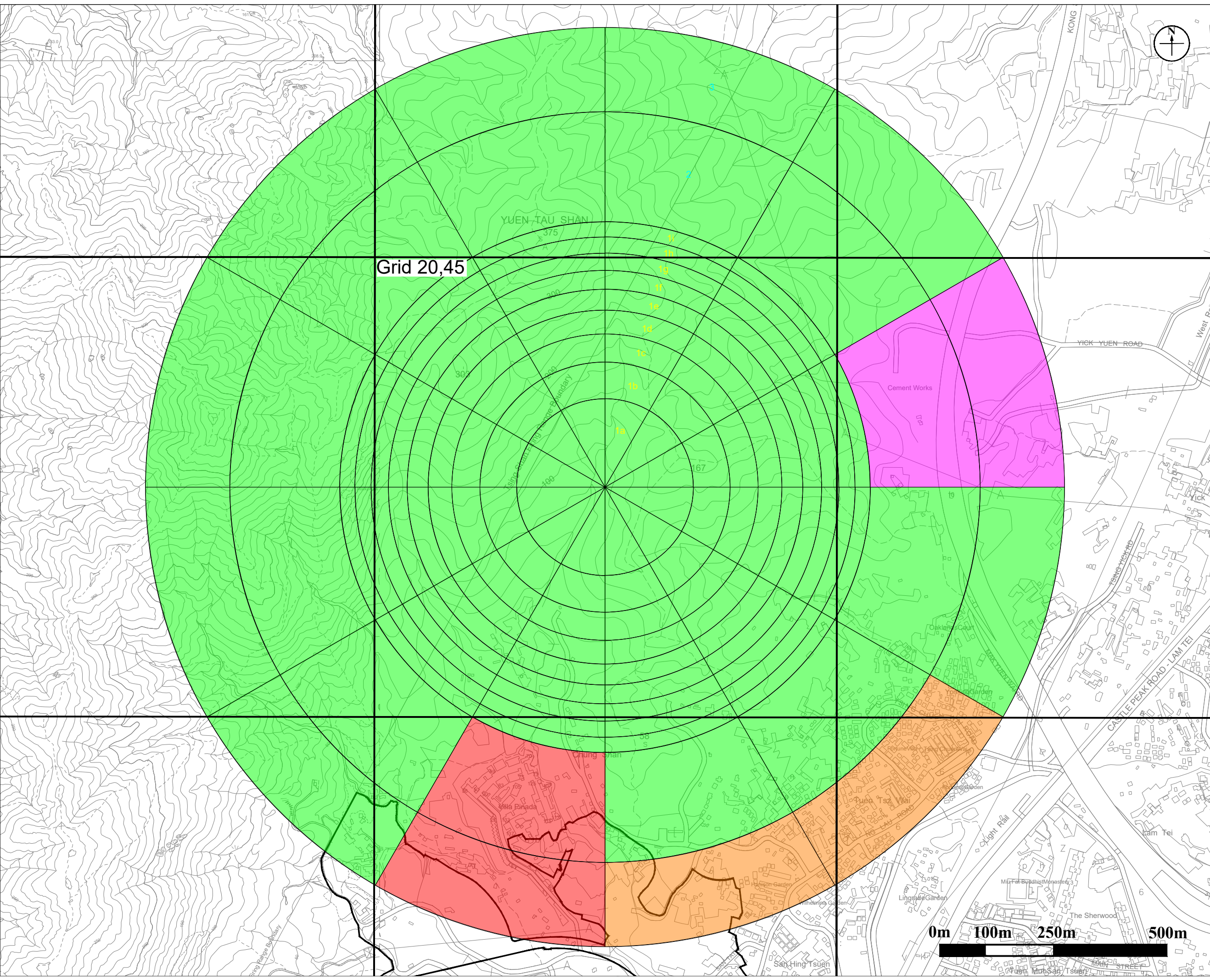
Sector 11 (300° - 330°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.5865	0.5865	0.5865	0.5865								

Sector 12 (330° - 360°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	High Intensity Residential	1	1	1	1	0.01	0.0370	0.1288	0.2876	1.0000	1.0000	1.0000	1.0000
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.5865	0.5865	0.5865	0.5865								

- LEGEND:
- SITE BOUNDARY
 - SHRUBLAND (NON-ARID REGION)
 - LOW INTENSITY RESIDENTIAL
 - COMMERCIAL/INDUSTRIAL/TRANSPORTATION (NOT AT AIRPORT)
 - HIGH INTENSITY RESIDENTIAL



Revision	Date	Description			Initial
		Designed	Checked	Drawn	
Initial				KL	KY
Date				05/20	05/20

Approved

Project title
 AGREEMENT NO. CE68/2017 (CE)
 SITE FORMATION AND
 INFRASTRUCTURAL WORKS FOR THE
 DEVELOPMENT AT SAN HING ROAD
 AND HONG PO ROAD, TUEN MUN -
 FEASIBILITY STUDY

Drawing title
 DETERMINATION OF SURFACE CHARACTERISTICS
 PARAMETERS FOR AERMET (GRID 20,45)

Drawing No. _____ Scale _____



Grid (20,45)

Sector	Area of Concern	Season	Albedo Value	Bowen Ratio	Surface Roughness
1.	0° - 30° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
2.	30° - 60° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
3.	60° - 90° (clockwise from N)	Winter	0.1678	0.94893	0.43673
		Spring	0.1657	0.74305	0.43673
		Summer	0.1657	0.74332	0.43673
		Autumn	0.1657	0.94893	0.43673
4.	90° - 120° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
5.	120° - 150° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.31708
		Summer	0.1657	0.74332	0.31708
		Autumn	0.1657	0.94893	0.31708
6.	150° - 180° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.31708
		Summer	0.1657	0.74332	0.31708
		Autumn	0.1657	0.94893	0.31708
7.	180° - 210° (clockwise from N)	Winter	0.1678	0.94893	0.60855
		Spring	0.1657	0.74305	0.66357
		Summer	0.1657	0.74332	0.66357
		Autumn	0.1657	0.94893	0.66357
8.	210° - 240° (clockwise from N)	Winter	0.1678	0.94893	0.51152
		Spring	0.1657	0.74305	0.51152
		Summer	0.1657	0.74332	0.51152
		Autumn	0.1657	0.94893	0.51152
9.	240° - 270° (clockwise from N)	Winter	0.1678	0.94893	0.40574
		Spring	0.1657	0.74305	0.50333
		Summer	0.1657	0.74332	0.50333
		Autumn	0.1657	0.94893	0.50333
10.	270° - 300° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
11.	300° - 330° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
12.	330° - 360° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3

Notes:

1. The determination of the surface roughness length should be based on an inverse-distance weighted geometric mean for a default upwind distance of 1 kilometer relative to the measurement site. Surface roughness length may be varied by sector to account for variations in land cover near the measurement site; however, the sector widths should be no smaller than 30 degrees.
2. The determination of the Albedo and Bowen ratio should be based on an applicable land fraction to weight each value.
3. Seasonal average of these parameters were adopted except the parameter in winter season (4 - Winter with continuous snow on ground).
4. Option of seasonal average in AERMET is adopted to define the land surface characteristics over the year.

Determination of Surface Roughness in Each Sector (Grid 20,45)

Sector 1 (0° - 30°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Sector 2 (30° - 60°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Sector 3 (60° - 90°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.7077	0.4710	0.8454	0.8454	0.8454	0.8454
3	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.9224	0.3614	0.8791	0.8791	0.8791	0.8791
Inverse distance geometric mean =		0.4367	0.4367	0.4367	0.4367								

Determination of Surface Roughness in Each Sector (Grid 20,45)

Sector 4 (90° - 120°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Sector 5 (120° - 150°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.3000	0.3171	0.3171	0.3171								

Sector 6 (150° - 180°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.3000	0.3171	0.3171	0.3171								

Determination of Surface Roughness in Each Sector (Grid 20,45)

Sector 7 (180° - 210°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.1288	0.2876	0.7073	0.7683	0.7683	0.7683
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4979	0.0744	0.9738	0.9738	0.9738	0.9738
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.9224	0.3614	0.8791	0.8791	0.8791	0.8791
Inverse distance geometric mean =		0.6085	0.6636	0.6636	0.6636								

Sector 8 (210° - 240°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		0.5115	0.5115	0.5115	0.5115								

Sector 9 (240° - 270°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.1288	0.2876	0.7073	0.7683	0.7683	0.7683
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.4057	0.5033	0.5033	0.5033								

Determination of Surface Roughness in Each Sector (Grid 20,45)

Sector 10 (270° - 300°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Sector 11 (300° - 330°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Sector 12 (330° - 360°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

- LEGEND:
- SITE BOUNDARY
 - SHRUBLAND (NON-ARID REGION)
 - LOW INTENSITY RESIDENTIAL
 - COMMERCIAL/INDUSTRIAL/TRANSPORTATION (NOT AT AIRPORT)
 - HIGH INTENSITY RESIDENTIAL
 - BAREROCK/SAND/CLAY (NON-ARID REGION)



Grid 21,43

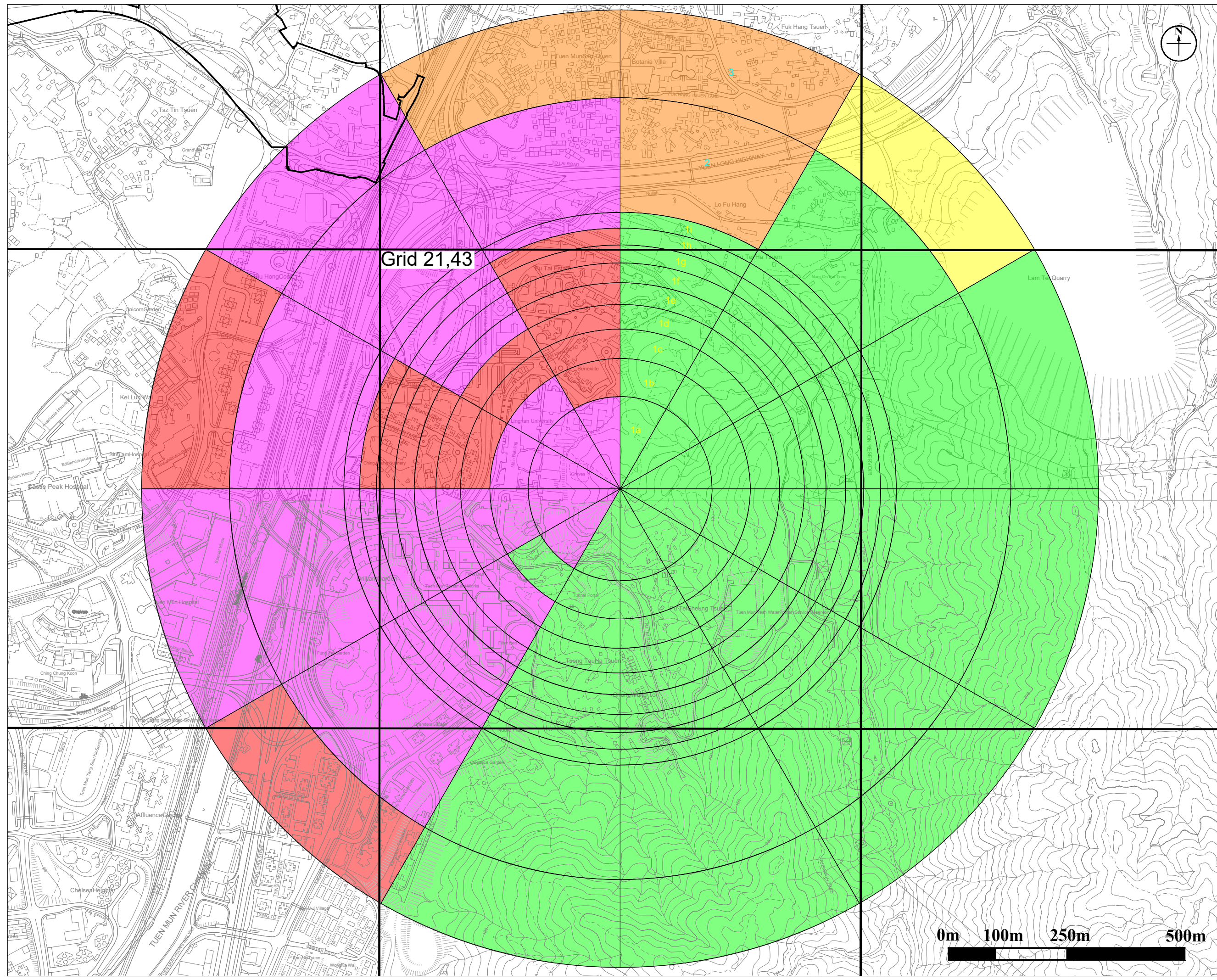
Revision	Date		Description		Initial	
	Designed	Checked	Drawn	Checked	KL	KY
Initial					KL	KY
Date					05/20	05/20

Approved

Project title
 AGREEMENT NO. CE68/2017 (CE)
 SITE FORMATION AND
 INFRASTRUCTURAL WORKS FOR THE
 DEVELOPMENT AT SAN HING ROAD
 AND HONG PO ROAD, TUEN MUN -
 FEASIBILITY STUDY

Drawing title
 DETERMINATION OF SURFACE CHARACTERISTICS
 PARAMETERS FOR AERMET (GRID 21,43)

Drawing No. _____ Scale _____



Grid (21,43)

Sector	Area of Concern	Season	Albedo Value	Bowen Ratio	Surface Roughness
1.	0° - 30° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3408
		Summer	0.1657	0.74332	0.3408
		Autumn	0.1657	0.94893	0.3408
2.	30° - 60° (clockwise from N)	Winter	0.1678	0.94893	0.21251
		Spring	0.1657	0.74305	0.21251
		Summer	0.1657	0.74332	0.21251
		Autumn	0.1657	0.94893	0.21251
3.	60° - 90° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
4.	90° - 120° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
5.	120° - 150° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
6.	150° - 180° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
7.	180° - 210° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
8.	210° - 240° (clockwise from N)	Winter	0.1678	0.94893	0.69846
		Spring	0.1657	0.74305	0.69846
		Summer	0.1657	0.74332	0.69846
		Autumn	0.1657	0.94893	0.69846
9.	240° - 270° (clockwise from N)	Winter	0.1678	0.94893	0.7
		Spring	0.1657	0.74305	0.7
		Summer	0.1657	0.74332	0.7
		Autumn	0.1657	0.94893	0.7
10.	270° - 300° (clockwise from N)	Winter	0.1678	0.94893	0.83007
		Spring	0.1657	0.74305	0.83007
		Summer	0.1657	0.74332	0.83007
		Autumn	0.1657	0.94893	0.83007
11.	300° - 330° (clockwise from N)	Winter	0.1678	0.94893	0.73015
		Spring	0.1657	0.74305	0.73015
		Summer	0.1657	0.74332	0.73015
		Autumn	0.1657	0.94893	0.73015
12.	330° - 360° (clockwise from N)	Winter	0.1678	0.94893	0.67834
		Spring	0.1657	0.74305	0.71696
		Summer	0.1657	0.74332	0.71696
		Autumn	0.1657	0.94893	0.71696

Notes:

1. The determination of the surface roughness length should be based on an inverse-distance weighted geometric mean for a default upwind distance of 1 kilometer relative to the measurement site. Surface roughness length may be varied by sector to account for variations in land cover near the measurement site; however, the sector widths should be no smaller than 30 degrees.
2. The determination of the Albedo and Bowen ratio should be based on an applicable land fraction to weight each value.
3. Seasonal average of these parameters were adopted except the parameter in winter season (4 - Winter with continuous snow on ground).
4. Option of seasonal average in AERMET is adopted to define the land surface characteristics over the year.

Determination of Surface Roughness in Each Sector (Grid 21,43)

Sector 1 (0° - 30°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.7077	0.4710	0.5672	0.6495	0.6495	0.6495
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.3000	0.3408	0.3408	0.3408								

Sector 2 (30° - 60°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Bare Rock/Sand/Clay (Non-arid region)	0.05	0.05	0.05	0.05	0.09	0.3333	0.9224	0.3614	0.3387	0.3387	0.3387	0.3387
Inverse distance geometric mean =		0.2125	0.2125	0.2125	0.2125								

Sector 3 (60° - 90°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Determination of Surface Roughness in Each Sector (Grid 21,43)

Sector 4 (90° - 120°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Sector 5 (120° - 150°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Sector 6 (150° - 180°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Determination of Surface Roughness in Each Sector (Grid 21,43)

Sector 7 (180° - 210°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km ²)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Sector 8 (210° - 240°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km ²)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.1288	0.2876	0.9025	0.9025	0.9025	0.9025
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3074	0.1205	0.9579	0.9579	0.9579	0.9579
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4979	0.0744	0.9738	0.9738	0.9738	0.9738
1h	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5349	0.0692	0.9756	0.9756	0.9756	0.9756
1i	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5695	0.0650	0.9771	0.9771	0.9771	0.9771
2	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.7077	0.4710	0.8454	0.8454	0.8454	0.8454
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		0.6985	0.6985	0.6985	0.6985								

Sector 9 (240° - 270°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km ²)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.1288	0.2876	0.9025	0.9025	0.9025	0.9025
1b	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.2359	0.1570	0.9455	0.9455	0.9455	0.9455
1c	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3074	0.1205	0.9579	0.9579	0.9579	0.9579
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4979	0.0744	0.9738	0.9738	0.9738	0.9738
1h	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5349	0.0692	0.9756	0.9756	0.9756	0.9756
1i	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5695	0.0650	0.9771	0.9771	0.9771	0.9771
2	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.7077	0.4710	0.8454	0.8454	0.8454	0.8454
3	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.9224	0.3614	0.8791	0.8791	0.8791	0.8791
Inverse distance geometric mean =		0.7000	0.7000	0.7000	0.7000								

Determination of Surface Roughness in Each Sector (Grid 21,43)

Sector 10 (270° - 300°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.1288	0.2876	0.9025	0.9025	0.9025	0.9025
1b	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.2359	0.1570	0.9455	0.9455	0.9455	0.9455
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5695	0.0650	0.9771	0.9771	0.9771	0.9771
2	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.7077	0.4710	0.8454	0.8454	0.8454	0.8454
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		0.8301	0.8301	0.8301	0.8301								

Sector 11 (300° - 330°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.1288	0.2876	0.9025	0.9025	0.9025	0.9025
1b	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.2359	0.1570	0.9455	0.9455	0.9455	0.9455
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4979	0.0744	0.9738	0.9738	0.9738	0.9738
1h	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5349	0.0692	0.9756	0.9756	0.9756	0.9756
1i	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5695	0.0650	0.9771	0.9771	0.9771	0.9771
2	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.7077	0.4710	0.8454	0.8454	0.8454	0.8454
3	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.9224	0.3614	0.8791	0.8791	0.8791	0.8791
Inverse distance geometric mean =		0.7301	0.7301	0.7301	0.7301								

Sector 12 (330° - 360°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.1288	0.2876	0.9025	0.9025	0.9025	0.9025
1b	High Intensity Residential	1	1	1	1	0.01	0.0370	0.2359	0.1570	1.0000	1.0000	1.0000	1.0000
1c	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3074	0.1205	1.0000	1.0000	1.0000	1.0000
1d	High Intensity Residential	1	1	1	1	0.01	0.0370	0.3647	0.1016	1.0000	1.0000	1.0000	1.0000
1e	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4139	0.0895	1.0000	1.0000	1.0000	1.0000
1f	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4579	0.0809	1.0000	1.0000	1.0000	1.0000
1g	High Intensity Residential	1	1	1	1	0.01	0.0370	0.4979	0.0744	1.0000	1.0000	1.0000	1.0000
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5695	0.0650	0.9771	0.9771	0.9771	0.9771
2	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.7077	0.4710	0.8454	0.8454	0.8454	0.8454
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.6783	0.7170	0.7170	0.7170								

- LEGEND:**
- SITE BOUNDARY
 - SHRUBLAND (NON-ARID REGION)
 - LOW INTENSITY RESIDENTIAL
 - COMMERCIAL/INDUSTRIAL/TRANSPORTATION (NOT AT AIRPORT)
 - HIGH INTENSITY RESIDENTIAL
 - BAREROCK/SAND/CLAY (NON-ARID REGION)



Grid (21,44)

Revision	Date		Description		Initial	
	Designed	Checked	Drawn	Checked	KL	KY
Initial					KL	KY
Date			05/20			05/20
Approved						

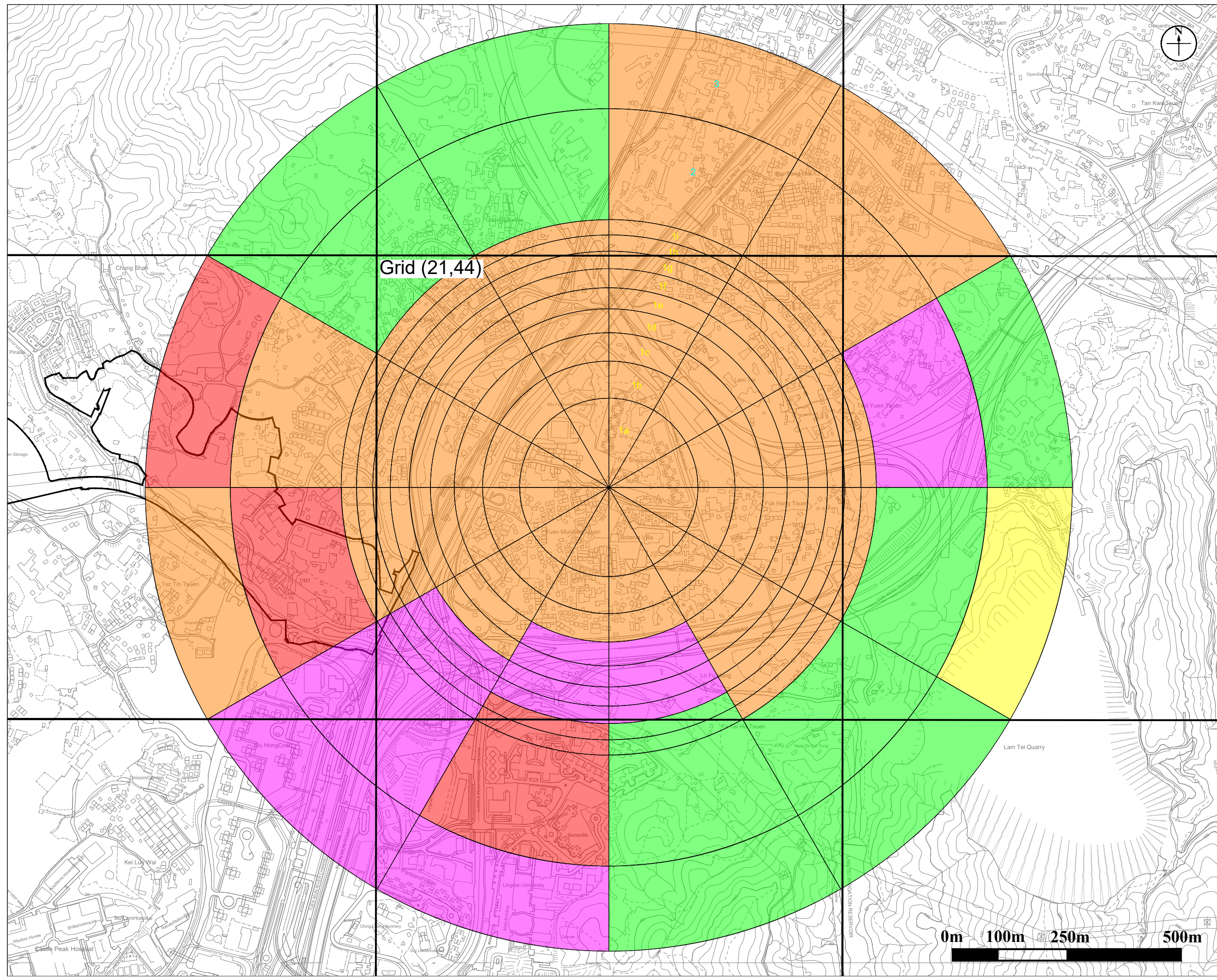
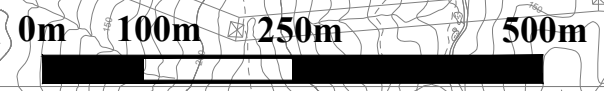
Project title
 AGREEMENT NO. CE68/2017 (CE)
 SITE FORMATION AND
 INFRASTRUCTURAL WORKS FOR THE
 DEVELOPMENT AT SAN HING ROAD
 AND HONG PO ROAD, TUEN MUN -
 FEASIBILITY STUDY

Drawing title
 DETERMINATION OF SURFACE CHARACTERISTICS
 PARAMETERS FOR AERMET (GRID 21,44)

Drawing No. _____ Scale _____

土木工程拓展署
CEDD Civil Engineering and
 Development Department


 BLACK & VEATCH HONG KONG LIMITED
 博威工程顧問有限公司



Grid (21,44)

Sector	Area of Concern	Season	Albedo Value	Bowen Ratio	Surface Roughness
1.	0° - 30° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.4
		Summer	0.1657	0.74332	0.4
		Autumn	0.1657	0.94893	0.4
2.	30° - 60° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.4
		Summer	0.1657	0.74332	0.4
		Autumn	0.1657	0.94893	0.4
3.	60° - 90° (clockwise from N)	Winter	0.1678	0.94893	0.37102
		Spring	0.1657	0.74305	0.43548
		Summer	0.1657	0.74332	0.43548
		Autumn	0.1657	0.94893	0.43548
4.	90° - 120° (clockwise from N)	Winter	0.1678	0.94893	0.21251
		Spring	0.1657	0.74305	0.24943
		Summer	0.1657	0.74332	0.24943
		Autumn	0.1657	0.94893	0.24943
5.	120° - 150° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.35212
		Summer	0.1657	0.74332	0.35212
		Autumn	0.1657	0.94893	0.35212
6.	150° - 180° (clockwise from N)	Winter	0.1678	0.94893	0.35073
		Spring	0.1657	0.74305	0.38245
		Summer	0.1657	0.74332	0.38245
		Autumn	0.1657	0.94893	0.38245
7.	180° - 210° (clockwise from N)	Winter	0.1678	0.94893	0.60855
		Spring	0.1657	0.74305	0.66357
		Summer	0.1657	0.74332	0.66357
		Autumn	0.1657	0.94893	0.66357
8.	210° - 240° (clockwise from N)	Winter	0.1678	0.94893	0.49767
		Spring	0.1657	0.74305	0.55879
		Summer	0.1657	0.74332	0.55879
		Autumn	0.1657	0.94893	0.55879
9.	240° - 270° (clockwise from N)	Winter	0.1678	0.94893	0.40574
		Spring	0.1657	0.74305	0.50333
		Summer	0.1657	0.74332	0.50333
		Autumn	0.1657	0.94893	0.50333
10.	270° - 300° (clockwise from N)	Winter	0.1678	0.94893	0.37821
		Spring	0.1657	0.74305	0.47713
		Summer	0.1657	0.74332	0.47713
		Autumn	0.1657	0.94893	0.47713
11.	300° - 330° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.35212
		Summer	0.1657	0.74332	0.35212
		Autumn	0.1657	0.94893	0.35212
12.	330° - 360° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.35212
		Summer	0.1657	0.74332	0.35212
		Autumn	0.1657	0.94893	0.35212

Notes:

1. The determination of the surface roughness length should be based on an inverse-distance weighted geometric mean for a default upwind distance of 1 kilometer relative to the measurement site. Surface roughness length may be varied by sector to account for variations in land cover near the measurement site; however, the sector widths should be no smaller than 30 degrees.
2. The determination of the Albedo and Bowen ratio should be based on an applicable land fraction to weight each value.
3. Seasonal average of these parameters were adopted except the parameter in winter season (4 - Winter with continuous snow on ground).
4. Option of seasonal average in AERMET is adopted to define the land surface characteristics over the year.

Determination of Surface Roughness in Each Sector (Grid 21,44)

Sector 1 (0° - 30°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.1288	0.2876	0.7073	0.7683	0.7683	0.7683
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.7077	0.4710	0.5672	0.6495	0.6495	0.6495
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.3000	0.4000	0.4000	0.4000								

Sector 2 (30° - 60°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.1288	0.2876	0.7073	0.7683	0.7683	0.7683
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.7077	0.4710	0.5672	0.6495	0.6495	0.6495
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.3000	0.4000	0.4000	0.4000								

Sector 3 (60° - 90°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.1288	0.2876	0.7073	0.7683	0.7683	0.7683
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.7077	0.4710	0.8454	0.8454	0.8454	0.8454
3	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3710	0.4355	0.4355	0.4355								

Determination of Surface Roughness in Each Sector (Grid 21,44)

Sector 4 (90° - 120°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.1288	0.2876	0.7073	0.7683	0.7683	0.7683
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Bare Rock/Sand/Clay (Non-arid region)	0.05	0.05	0.05	0.05	0.09	0.3333	0.9224	0.3614	0.3387	0.3387	0.3387	0.3387
Inverse distance geometric mean =		0.2125	0.2494	0.2494	0.2494								

Sector 5 (120° - 150°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.1288	0.2876	0.7073	0.7683	0.7683	0.7683
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3521	0.3521	0.3521								

Sector 6 (150° - 180°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.1288	0.2876	0.7073	0.7683	0.7683	0.7683
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4979	0.0744	0.9738	0.9738	0.9738	0.9738
1h	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3507	0.3824	0.3824	0.3824								

Determination of Surface Roughness in Each Sector (Grid 21,44)

Sector 7 (180° - 210°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.1288	0.2876	0.7073	0.7683	0.7683	0.7683
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4979	0.0744	0.9738	0.9738	0.9738	0.9738
1h	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5349	0.0692	1.0000	1.0000	1.0000	1.0000
1i	High Intensity Residential	1	1	1	1	0.01	0.0370	0.5695	0.0650	1.0000	1.0000	1.0000	1.0000
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.9224	0.3614	0.8791	0.8791	0.8791	0.8791
Inverse distance geometric mean =		0.6085	0.6636	0.6636	0.6636								

Sector 8 (210° - 240°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.1288	0.2876	0.7073	0.7683	0.7683	0.7683
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4979	0.0744	0.9738	0.9738	0.9738	0.9738
1h	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5349	0.0692	0.9756	0.9756	0.9756	0.9756
1i	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5695	0.0650	0.9771	0.9771	0.9771	0.9771
2	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.7077	0.4710	0.8454	0.8454	0.8454	0.8454
3	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.09	0.3333	0.9224	0.3614	0.8791	0.8791	0.8791	0.8791
Inverse distance geometric mean =		0.4977	0.5588	0.5588	0.5588								

Sector 9 (240° - 270°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.1288	0.2876	0.7073	0.7683	0.7683	0.7683
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	High Intensity Residential	1	1	1	1	0.09	0.3333	0.7077	0.4710	1.0000	1.0000	1.0000	1.0000
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.4057	0.5033	0.5033	0.5033								

Determination of Surface Roughness in Each Sector (Grid 21,44)

Sector 10 (270° - 300°) (clockwise from N)






Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.1288	0.2876	0.7073	0.7683	0.7683	0.7683
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.7077	0.4710	0.5672	0.6495	0.6495	0.6495
3	High Intensity Residential	1	1	1	1	0.09	0.3333	0.9224	0.3614	1.0000	1.0000	1.0000	1.0000
Inverse distance geometric mean =		0.3782	0.4771	0.4771	0.4771								

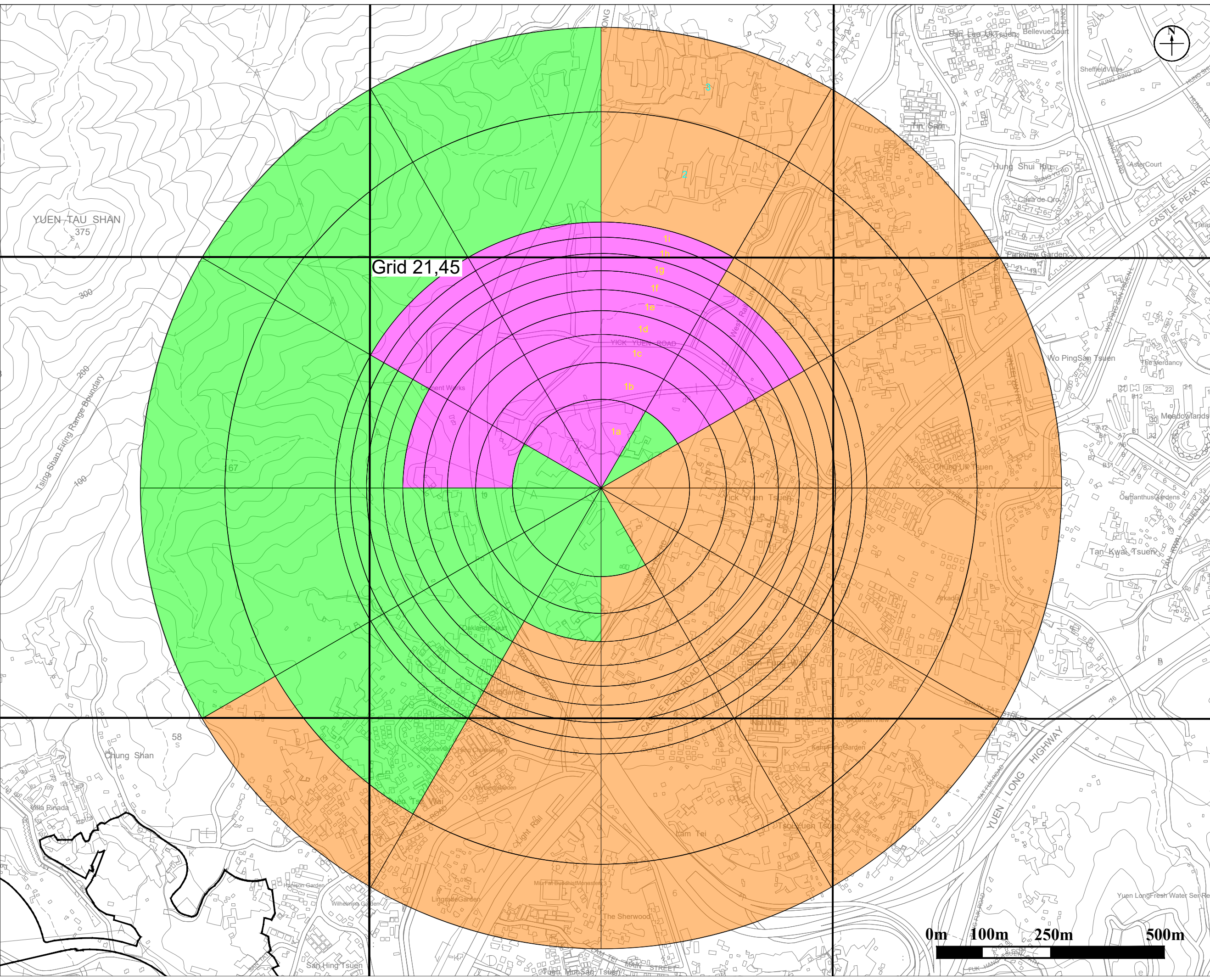
Sector 11 (300° - 330°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.1288	0.2876	0.7073	0.7683	0.7683	0.7683
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3521	0.3521	0.3521								

Sector 12 (330° - 360°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.1288	0.2876	0.7073	0.7683	0.7683	0.7683
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3521	0.3521	0.3521								

- LEGEND:**
-  SITE BOUNDARY
 -  SHRUBLAND (NON-ARID REGION)
 -  LOW INTENSITY RESIDENTIAL
 -  COMMERCIAL/INDUSTRIAL/TRANSPORTATION (NOT AT AIRPORT)
 -  HIGH INTENSITY RESIDENTIAL



Revision	Date		Description		Initial	
	Designed	Checked	Drawn	Checked	KL	KY
Initial						
Date			05/20			05/20

Approved

Project title
 AGREEMENT NO. CE68/2017 (CE)
 SITE FORMATION AND
 INFRASTRUCTURAL WORKS FOR THE
 DEVELOPMENT AT SAN HING ROAD
 AND HONG PO ROAD, TUEN MUN -
 FEASIBILITY STUDY

Drawing title
 DETERMINATION OF SURFACE CHARACTERISTICS
 PARAMETERS FOR AERMET (GRID 21,45)

Drawing No. _____ Scale _____



Grid (21,45)

Sector	Area of Concern	Season	Albedo Value	Bowen Ratio	Surface Roughness
1.	0° - 30° (clockwise from N)	Winter	0.1678	0.94893	0.48085
		Spring	0.1657	0.74305	0.54624
		Summer	0.1657	0.74332	0.54624
		Autumn	0.1657	0.94893	0.54624
2.	30° - 60° (clockwise from N)	Winter	0.1678	0.94893	0.38439
		Spring	0.1657	0.74305	0.45084
		Summer	0.1657	0.74332	0.45084
		Autumn	0.1657	0.94893	0.45084
3.	60° - 90° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.4
		Summer	0.1657	0.74332	0.4
		Autumn	0.1657	0.94893	0.4
4.	90° - 120° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.4
		Summer	0.1657	0.74332	0.4
		Autumn	0.1657	0.94893	0.4
5.	120° - 150° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.4
		Summer	0.1657	0.74332	0.4
		Autumn	0.1657	0.94893	0.4
6.	150° - 180° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.38276
		Summer	0.1657	0.74332	0.38276
		Autumn	0.1657	0.94893	0.38276
7.	180° - 210° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.36683
		Summer	0.1657	0.74332	0.36683
		Autumn	0.1657	0.94893	0.36683
8.	210° - 240° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.31708
		Summer	0.1657	0.74332	0.31708
		Autumn	0.1657	0.94893	0.31708
9.	240° - 270° (clockwise from N)	Winter	0.1678	0.94893	0.3
		Spring	0.1657	0.74305	0.3
		Summer	0.1657	0.74332	0.3
		Autumn	0.1657	0.94893	0.3
10.	270° - 300° (clockwise from N)	Winter	0.1678	0.94893	0.37061
		Spring	0.1657	0.74305	0.37061
		Summer	0.1657	0.74332	0.37061
		Autumn	0.1657	0.94893	0.37061
11.	300° - 330° (clockwise from N)	Winter	0.1678	0.94893	0.48085
		Spring	0.1657	0.74305	0.48085
		Summer	0.1657	0.74332	0.48085
		Autumn	0.1657	0.94893	0.48085
12.	330° - 360° (clockwise from N)	Winter	0.1678	0.94893	0.48085
		Spring	0.1657	0.74305	0.48085
		Summer	0.1657	0.74332	0.48085
		Autumn	0.1657	0.94893	0.48085

Notes:

1. The determination of the surface roughness length should be based on an inverse-distance weighted geometric mean for a default upwind distance of 1 kilometer relative to the measurement site. Surface roughness length may be varied by sector to account for variations in land cover near the measurement site; however, the sector widths should be no smaller than 30 degrees.
2. The determination of the Albedo and Bowen ratio should be based on an applicable land fraction to weight each value.
3. Seasonal average of these parameters were adopted except the parameter in winter season (4 - Winter with continuous snow on ground).
4. Option of seasonal average in AERMET is adopted to define the land surface characteristics over the year.

Determination of Surface Roughness in Each Sector (Grid 21,45)

Sector 1 (0° - 30°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.1288	0.2876	0.9025	0.9025	0.9025	0.9025
1b	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.2359	0.1570	0.9455	0.9455	0.9455	0.9455
1c	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3074	0.1205	0.9579	0.9579	0.9579	0.9579
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4979	0.0744	0.9738	0.9738	0.9738	0.9738
1h	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5349	0.0692	0.9756	0.9756	0.9756	0.9756
1i	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5695	0.0650	0.9771	0.9771	0.9771	0.9771
2	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.7077	0.4710	0.5672	0.6495	0.6495	0.6495
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.4808	0.5462	0.5462	0.5462								

Sector 2 (30° - 60°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.2359	0.1570	0.9455	0.9455	0.9455	0.9455
1c	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3074	0.1205	0.9579	0.9579	0.9579	0.9579
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.7077	0.4710	0.5672	0.6495	0.6495	0.6495
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.3844	0.4508	0.4508	0.4508								

Sector 3 (60° - 90°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.1288	0.2876	0.7073	0.7683	0.7683	0.7683
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.7077	0.4710	0.5672	0.6495	0.6495	0.6495
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.3000	0.4000	0.4000	0.4000								

Determination of Surface Roughness in Each Sector (Grid 21,45)

Sector 4 (90° - 120°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.1288	0.2876	0.7073	0.7683	0.7683	0.7683
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.7077	0.4710	0.5672	0.6495	0.6495	0.6495
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.3000	0.4000	0.4000	0.4000								

Sector 5 (120° - 150°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.1288	0.2876	0.7073	0.7683	0.7683	0.7683
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.7077	0.4710	0.5672	0.6495	0.6495	0.6495
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.3000	0.4000	0.4000	0.4000								

Sector 6 (150° - 180°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shrubland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.2359	0.1570	0.8278	0.8660	0.8660	0.8660
1c	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3074	0.1205	0.8650	0.8955	0.8955	0.8955
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.7077	0.4710	0.5672	0.6495	0.6495	0.6495
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.3000	0.3828	0.3828	0.3828								

Determination of Surface Roughness in Each Sector (Grid 21,45)

Sector 7 (180° - 210°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km ²)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.3647	0.1016	0.8849	0.9111	0.9111	0.9111
1e	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4139	0.0895	0.8979	0.9213	0.9213	0.9213
1f	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4579	0.0809	0.9072	0.9286	0.9286	0.9286
1g	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.4979	0.0744	0.9143	0.9341	0.9341	0.9341
1h	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5349	0.0692	0.9200	0.9385	0.9385	0.9385
1i	Low Intensity Residential	0.3	0.4	0.4	0.4	0.01	0.0370	0.5695	0.0650	0.9247	0.9422	0.9422	0.9422
2	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.7077	0.4710	0.5672	0.6495	0.6495	0.6495
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.3000	0.3668	0.3668	0.3668								

Sector 8 (210° - 240°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km ²)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Low Intensity Residential	0.3	0.4	0.4	0.4	0.09	0.3333	0.9224	0.3614	0.6472	0.7181	0.7181	0.7181
Inverse distance geometric mean =		0.3000	0.3171	0.3171	0.3171								

Sector 9 (240° - 270°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km ²)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.2359	0.1570	0.8278	0.8278	0.8278	0.8278
1c	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3074	0.1205	0.8650	0.8650	0.8650	0.8650
1d	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.3647	0.1016	0.8849	0.8849	0.8849	0.8849
1e	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4139	0.0895	0.8979	0.8979	0.8979	0.8979
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3000	0.3000	0.3000	0.3000								

Determination of Surface Roughness in Each Sector (Grid 21,45)

Sector 10 (270° - 300°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.1288	0.2876	0.7073	0.7073	0.7073	0.7073
1b	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.2359	0.1570	0.9455	0.9455	0.9455	0.9455
1c	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3074	0.1205	0.9579	0.9579	0.9579	0.9579
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4579	0.0809	0.9072	0.9072	0.9072	0.9072
1g	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.4979	0.0744	0.9143	0.9143	0.9143	0.9143
1h	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5349	0.0692	0.9200	0.9200	0.9200	0.9200
1i	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.01	0.0370	0.5695	0.0650	0.9247	0.9247	0.9247	0.9247
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.3706	0.3706	0.3706	0.3706								

Sector 11 (300° - 330°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.1288	0.2876	0.9025	0.9025	0.9025	0.9025
1b	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.2359	0.1570	0.9455	0.9455	0.9455	0.9455
1c	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3074	0.1205	0.9579	0.9579	0.9579	0.9579
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4979	0.0744	0.9738	0.9738	0.9738	0.9738
1h	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5349	0.0692	0.9756	0.9756	0.9756	0.9756
1i	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5695	0.0650	0.9771	0.9771	0.9771	0.9771
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.4808	0.4808	0.4808	0.4808								

Sector 12 (330° - 360°) (clockwise from N)

Fraction Index	Land Type	Surface Roughness (Z)				Area (km2)	Frac of Area (Frac)	Distance from centre (km) (Dist)	Weighting (Frac/Dist)	Z^(Frac/Dist)			
		Winter	Spring	Summer	Autumn					Winter	Spring	Summer	Autumn
1a	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.1288	0.2876	0.9025	0.9025	0.9025	0.9025
1b	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.2359	0.1570	0.9455	0.9455	0.9455	0.9455
1c	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3074	0.1205	0.9579	0.9579	0.9579	0.9579
1d	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.3647	0.1016	0.9644	0.9644	0.9644	0.9644
1e	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4139	0.0895	0.9686	0.9686	0.9686	0.9686
1f	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4579	0.0809	0.9716	0.9716	0.9716	0.9716
1g	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.4979	0.0744	0.9738	0.9738	0.9738	0.9738
1h	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5349	0.0692	0.9756	0.9756	0.9756	0.9756
1i	Commercial/Industrial/Transportation (Not at Airport)	0.7	0.7	0.7	0.7	0.01	0.0370	0.5695	0.0650	0.9771	0.9771	0.9771	0.9771
2	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.7077	0.4710	0.5672	0.5672	0.5672	0.5672
3	Shurbland (Non-arid Region)	0.3	0.3	0.3	0.3	0.09	0.3333	0.9224	0.3614	0.6472	0.6472	0.6472	0.6472
Inverse distance geometric mean =		0.4808	0.4808	0.4808	0.4808								