Appendix 3.9 – Determination of Surface Characteristics Parameters for AERMET

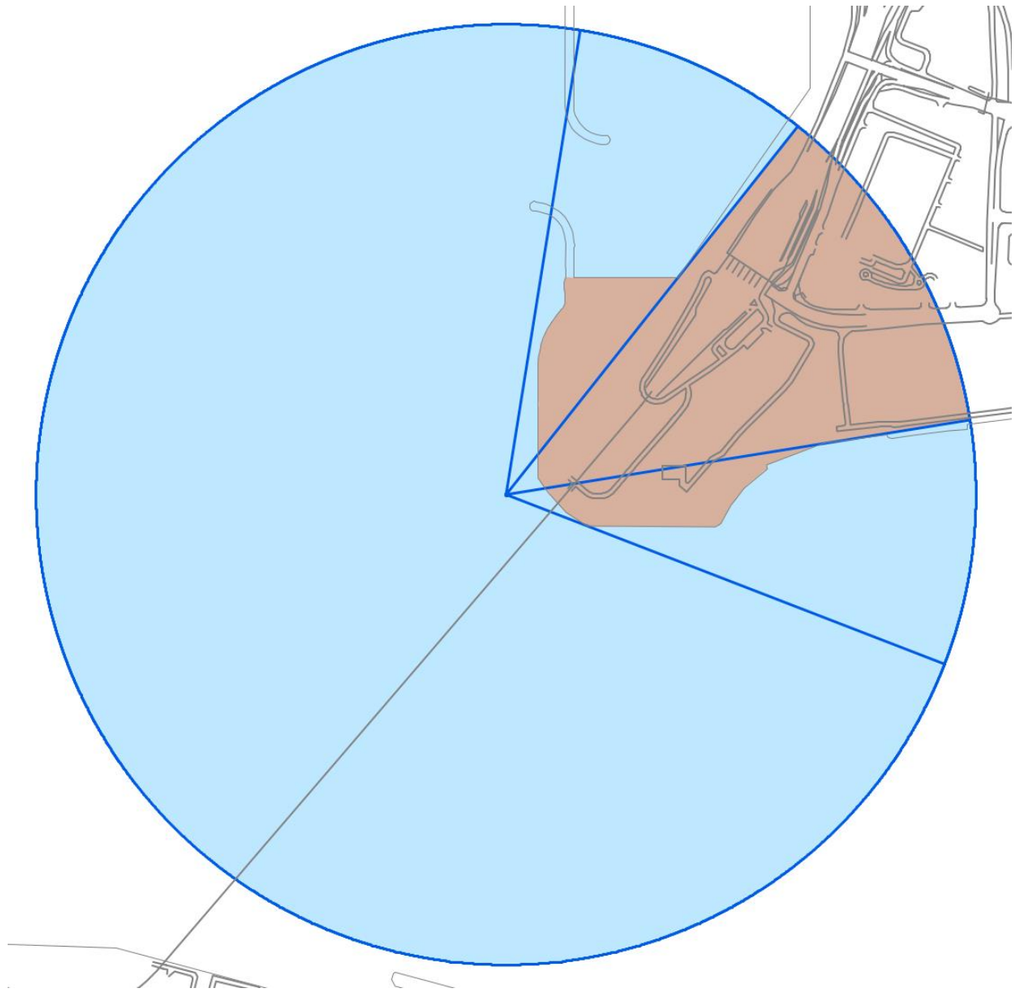
Appendix 3.9 Determination of Surface Characteristics Parameters

10km by 10km Region Centered on the Project Site

Legend

10km by 10km Region Centered on the Project Site

1km Boundary from Grid 3831



Legend

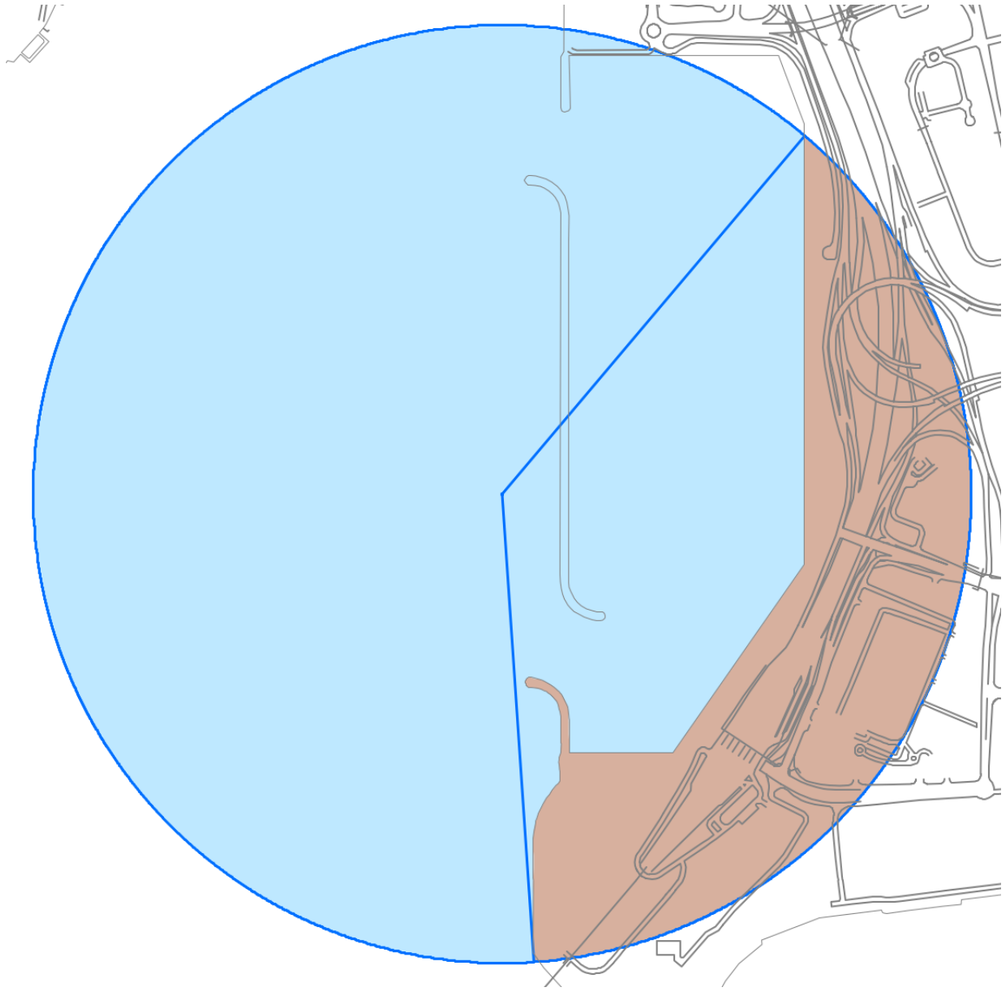
1km boundary from Grid 3831

Note:

Brown area is classified as urban area. Blue area is classified as water area. Green area is classified as grassland.

Appendix 3.9 Determination of Surface Characteristics Parameters

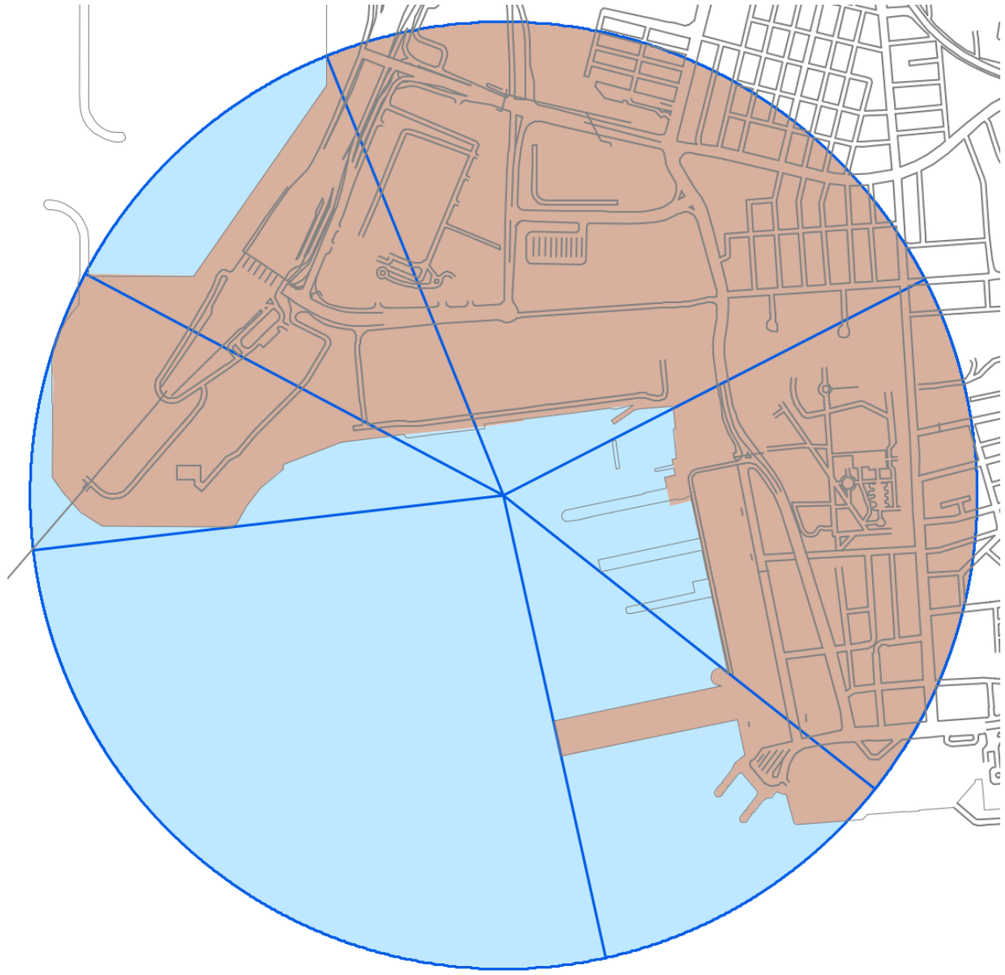
1km Boundary from Grid 3832



Legend

1km boundary from Grid 3832

1km Boundary from Grid 3931



Legend

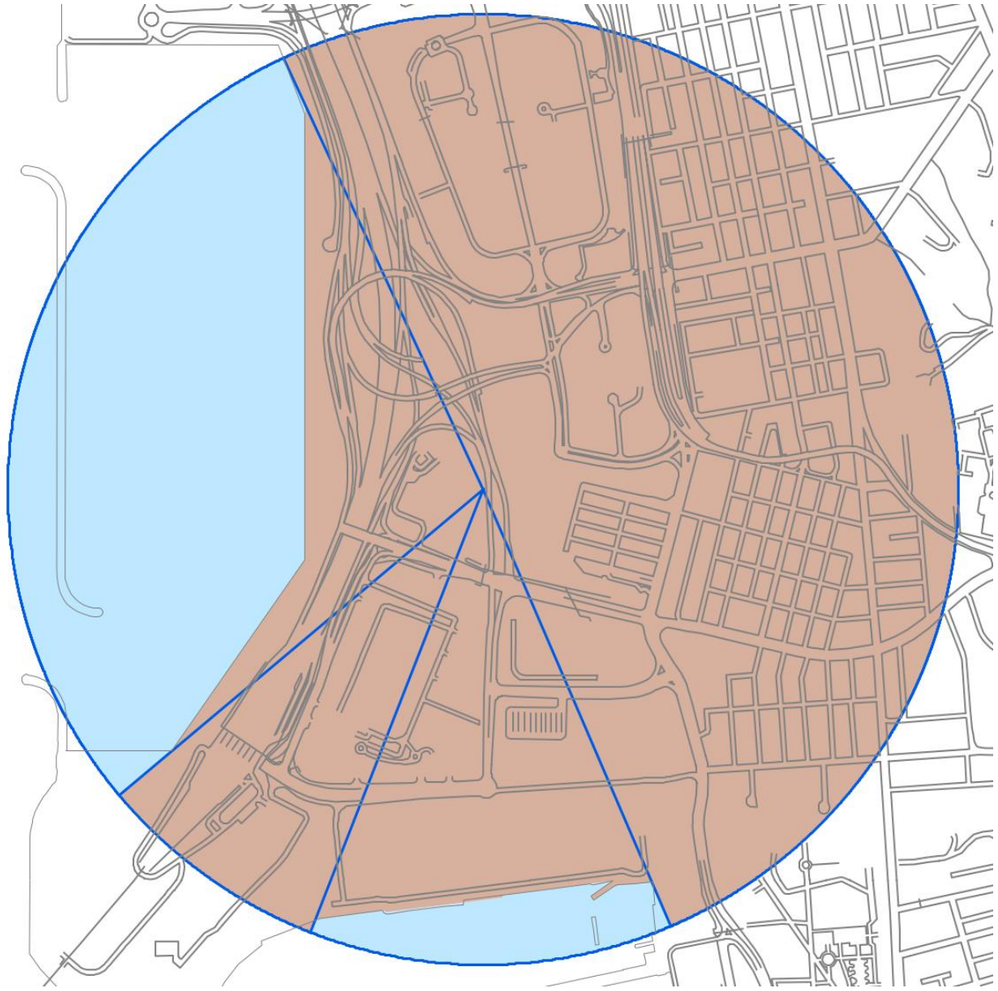
1km boundary from Grid 3931

Note:

Brown area is classified as urban area. Blue area is classified as water area.

Appendix 3.9 Determination of Surface Characteristics Parameters

1km Boundary from Grid 3932



Legend

1km boundary from Grid 3932

Note:

Brown area is classified as urban area. Blue area is classified as water area.

Appendix 3.9 Determination of Surface Characteristics Parameters

Summary of Default Albedo and Bowen Ratio from AERMET

Land Type	Season	Default Albedo from AERMET	Default Bowen Ratio from AERMET
Urban	Spring	0.14	1.00
	Summer	0.16	2.00
	Autumn	0.18	2.00
	Average	**0.16**	**1.67**
Grassland	Spring	0.18	0.40
	Summer	0.18	0.80
	Autumn	0.20	1.00
	Average	**0.19**	**0.73**
Water	Spring	0.12	0.10
	Summer	0.10	0.10
	Autumn	0.14	0.10
	Average	**0.12**	**0.10**

Summary of Surface Roughness(m) from AERMET

		Default Surface Roughness(m) from AERMET
Urban	Spring	1.0000
	Summer	1.0000
	Autumn	1.0000
	Average	**1.0000**
Grassland	Spring	0.0500
	Summer	0.1000
	Autumn	0.0100
	Average	**0.0533**
Water	Spring	0.0001
	Summer	0.0001
	Autumn	0.0001
	Average	**0.0001**

Summary of Surface Characteristics for the Study Area

Grid 3831

Sector (degrees in clockwise)	Land Use	Area (m^2)	Distance (m)	Weighting (Fraction/Distance)	Surface Roughness (m) [3,5]	Albedo [2,4,5]	Bowen Ratio [1,4,5]	Remark
110-10	Water	2250507.20	-	-	0.0001	0.15	0.55	Sea from southeast to north
10-40	Urban	50440.16	375	0.00053	0.0020			Urban development and Sea from north to northeast
	Water	205495.23	730	0.00110				
40-80	Urban	368321.00	655	0.00152	0.4736			Urban development and Sea from northeast to east
	Water	2730.93	55	0.00013				
80-110	Urban	47447.75	340	0.00053	0.0015			Urban development and Sea from east to southeast
	Water I	3365.42	80	0.00016				
	Water II	213420.80	740	0.00109				

Grid 3832

Sector (degrees in clockwise)	Land Use	Area (m^2)	Distance (m)	Weighting (Fraction/Distance)	Surface Roughness (m) [3,5]	Albedo [2,4,5]	Bowen Ratio [1,4,5]	Remark
175-40	Water	1958441.05	-	-	0.0001	0.15	0.55	Sea from south to northeast
40-175	Urban	642945.17	680	0.00080	0.0032			Urban development and Sea from northeast to south
	Water	545684.86	350	0.00131				

Appendix 3.9 Determination of Surface Characteristics Parameters

Grid 3931

Sector (degrees in clockwise)	Land Use	Area (m^2)	Distance (m)	Weighting (Fraction/Distance)	Surface Roughness (m) [3,5]	Albedo [2,4,5]	Bowen Ratio [1,4,5]	Remark
340-65	Urban	707488.63	630	0.00151	0.2236	0.15	0.55	Urban development and Sea from northwest to northeast
	Water	33807.04	155	0.00029				
65-130	Urban	466160.22	710	0.00115	0.0345			Urban development and Sea from northeast to southeast
	Water	105915.45	280	0.00066				
130-170	Urban	76819.55	725	0.00031	0.0005			Urban development and Sea from southeast to south
	Water I	96944.98	350	0.00081				
	Water II	169186.06	805	0.00061				
170-265	Water	835978.53	-	-	0.0001			Sea from south to west
265-300	Urban	216179.00	720	0.00100	0.0205			Urban development and Sea from west to northwest
	Water I	57632.40	305	0.00063				
	Water II	27938.31	920	0.00010				
300-340	Urban	247184.15	590	0.00119	0.0518			Urban development and Sea in northwest
	Water I	13398.05	135	0.00028				
	Water II	90217.49	910	0.00028				

Grid 3932

Sector (degrees in clockwise)	Land Use	Area (m^2)	Distance (m)	Weighting (Fraction/Distance)	Surface Roughness (m) [3,5]	Albedo [2,4,5]	Bowen Ratio [1,4,5]	Remark
335-155	Urban	1586455.71	-	-	1.0000	0.15	0.55	Urban development from northwest to southeast
155-200	Urban	305165.92	575	0.00147	0.3871			Urban development and Sea from southeast to southwest
	Water	56098.06	920	0.00017				
200-230	Urban	250256.64	-	-	1.0000			Urban development in southwest
230-335	Urban	234814.95	295	0.00090	0.0065			Urban development and Sea from southwest to northwest
	Water	654013.32	680	0.00108				

Notes:

1. With reference to AERMOD Implementation Guide, the determination of the Bowen ratio should be based on a simple unweighted geometric mean (i.e., no direction or distance dependency) for a representative domain, with a default domain defined by a 10km by 10km region centered on the measurement site.
2. With reference to AERMOD Implementation Guide, the determination of the albedo should be based on a simple unweighted arithmetic mean (i.e., no direction or distance dependency) for the same representative domain as defined for Bowen ratio, with a default domain defined by a 10km by 10km region centered on the measurement site.
3. Surface roughness length is based on an inverse-distance weighted geometric mean for an upwind distance of 1km relative to the concerned site.
4. Land use within 10km by 10km region centered on the measurement site included 48.26% urban (48262644.28 m^2), 17.22% grassland (17218658.78 m^2), and 34.52% water (34518696.93 m^2).
5. For the parameters including albedo, Bowen Ratio and surface roughness, the default value for "Winter" is excluded from calculating the representative values.