

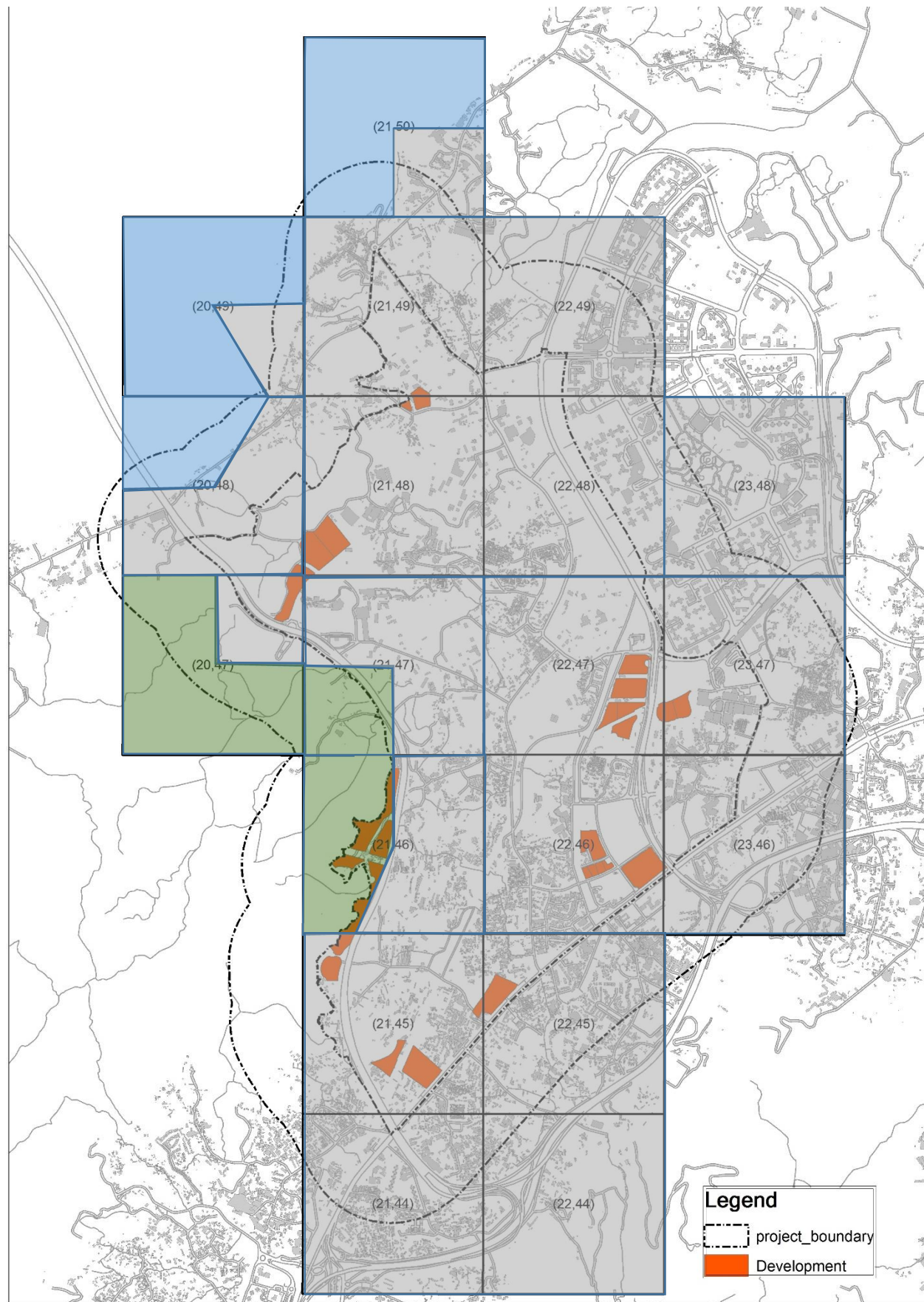
***Appendix 3.17***

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***Determination of Surface Characteristics Parameters***



### Appendix 3.17 Determination of Surface Characteristics Parameters



**Summary of Surface Characteristics for Scenario Year 2024 – 2030  
(Construction and Operation Phases)**

Grid	Sector	Land Use	Albedo	Bowen Ratio	Surface Roughness (m)	Remark
20, 47	0 - 90	Urban	0.2075	1.6250	<u>3.7000</u>	Planned high-rise buildings for port back-up storage and workshop use and hilly terrain exist in the northeast.
	90 - 360	Forest	0.1775	0.8250	1.3000	Trees on the hill in the northwest and southern area.
20, 48	30 - 270	Urban	0.2075	1.6250	<u>3.7000</u>	Hilly terrain in the area. Planned high-rise buildings for port back-up storage and workshop use exist in the southeast. Thus surface roughness of 370 cm is assumed.
	270 - 30	Water	0.1400	0.4500	0.0001	Sea in the northwest.
20, 49	90 - 150	Urban	0.2075	1.6250	1.0000	Village, low-rise buildings in the southeast
	150 - 90	Water	0.1400	0.4500	0.0001	Sea for the rest of the area.
21, 44	0 - 360	Urban	0.2075	1.6250	1.0000	Abundant village, low-rise buildings in the area
21, 45	0 - 360	Urban	0.2075	1.6250	1.0000	Abundant village, brownfield operation in the area
21, 46	0 - 200	Urban	0.2075	1.6250	1.0000	Abundant village, low-rise buildings, open storage in the area.
	200 - 360	Forest	0.1775	0.8250	1.3000	Trees on the hill in the west.
21, 47	180 - 270	Forest	0.1775	0.8250	1.3000	Trees on the hill in the southwest.
	270 - 180	Urban	0.2075	1.6250	1.0000	Abundant open storage and brownfield operation in the area
21, 48	0 - 360	Urban	0.2075	1.6250	<u>3.7000</u>	Densely packed brownfield operations exist in the area. Planned high-rise buildings for port back-up storage and workshop use exist in southwest. Hilly slope locates in the northwest. Thus surface roughness of 370 cm is assumed.
21, 49	0 - 360	Urban	0.2075	1.6250	1.0000	Densely packed brownfield operations exist in the area. Planned low-rise residential buildings locates in the south.
21, 50	90 - 180	Urban	0.2075	1.6250	1.0000	Abundant village, low-rise buildings exist in the southeast.
	180 - 90	Water	0.1400	0.4500	0.0001	Sea for the rest of the area.
22, 44	0 - 360	Urban	0.2075	1.6250	1.0000	Village and low-rise buildings are in the north and west and hilly terrain in the south and east. Thus surface roughness of 100 cm is assumed.
22, 45	0 - 360	Urban	0.2075	1.6250	1.0000	Abundant village, low-rise residential buildings exist in the area with a hill in the east and south. Thus surface roughness of 100 cm is assumed.
22, 46	0 - 360	Urban	0.2075	1.6250	<u>3.7000</u>	The area is developed with high-rise residential buildings.
22, 47	0 - 360	Urban	0.2075	1.6250	1.0000	Village, low-rise buildings, open storage as majority, but a few planned high-rise residential buildings in the east.
22, 48	0 - 360	Urban	0.2075	1.6250	1.0000	Abundant village, low-rise buildings, open storage exist in the area while existing high-rise residential buildings are in the east. Thus surface roughness of 100 cm is assumed.
22, 49	0 - 360	Urban	0.2075	1.6250	<u>3.7000</u>	Existing high-rise residential buildings are in the east side while hilly terrain in the west. Thus surface roughness of 370 cm is assumed.
23, 46	0 - 360	Urban	0.2075	1.6250	1.0000	Abundant village, low-rise buildings, open storage exist in the area.
23, 47	0 - 360	Urban	0.2075	1.6250	<u>3.7000</u>	The area is surrounded by existing high-rise residential buildings in north and east and planned high-rise commercial buildings on west and southwest. Thus surface roughness of 370 cm is assumed.
23, 48	0 - 360	Urban	0.2075	1.6250	<u>3.7000</u>	Existing developed area with high-rise residential buildings.

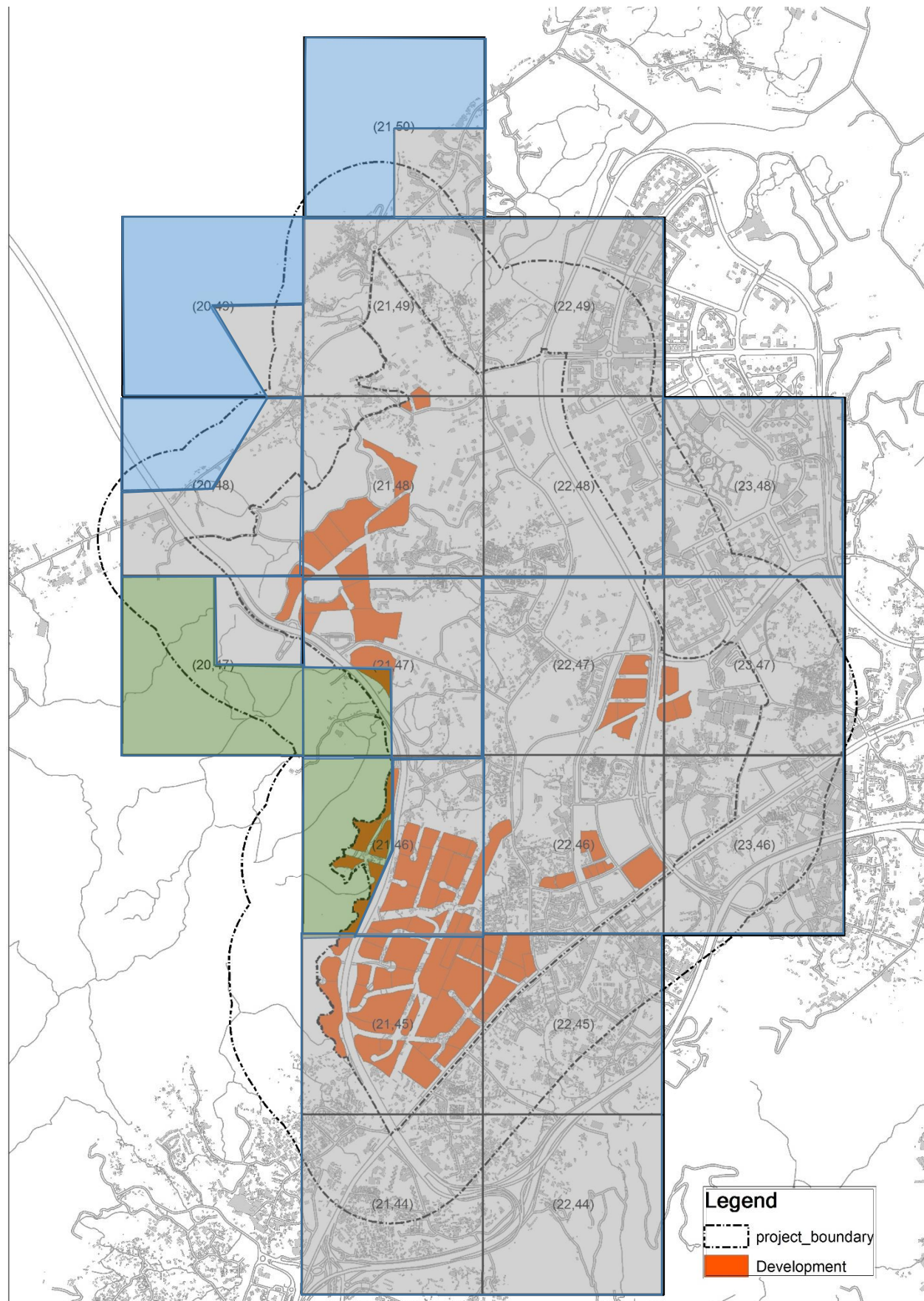
Note:

Grey area is classified as urban area. Blue area is classified as water area. Green area is classified as coniferous forest area.

Albedo, Bowen Ratio and Surface Roughness are generally suggested by AERMET by default.

Underlined figure indicates modification due to the status of the site. Please see remarks.

### Appendix 3.17 Determination of Surface Characteristics Parameters



**Summary of Surface Characteristics for Scenario Year 2031 – 2039 (Construction Phase)**

Grid	Sector	Land Use	Albedo	Bowen Ratio	Surface Roughness (m)	Remark
20, 47	0 - 90	Urban	0.2075	1.6250	<u>3.7000</u>	Planned high-rise buildings for port back-up storage and workshop use and hilly terrain exist in the northeast.
	90 - 360	Forest	0.1775	0.8250	1.3000	Trees on the hill in the northwest and southern area.
20, 48	30 - 270	Urban	0.2075	1.6250	<u>3.7000</u>	Hilly terrain in the area. Planned high-rise buildings for port back-up storage and workshop use exist in the southeast. Thus surface roughness of 370 cm is assumed.
	270 - 30	Water	0.1400	0.4500	0.0001	Sea in the northwest.
20, 49	90 - 150	Urban	0.2075	1.6250	1.0000	Village, low-rise buildings in the southeast
	150 - 90	Water	0.1400	0.4500	0.0001	Sea for the rest of the area.
21, 44	0 - 360	Urban	0.2075	1.6250	1.0000	Abundant village, low-rise buildings in the area
21, 45	0 - 360	Urban	0.2075	1.6250	<u>3.7000</u>	The area is fully developed with high-rise residential and commercial buildings
21, 46	0 - 200	Urban	0.2075	1.6250	<u>3.7000</u>	The area is fully developed with high-rise residential, industrial and commercial buildings.
	200 - 360	Forest	0.1775	0.8250	1.3000	Trees on the hill in the west.
21, 47	180 - 270	Forest	0.1775	0.8250	1.3000	Trees on the hill in the southwest.
	270 - 180	Urban	0.2075	1.6250	1.0000	Abundant open storage and brownfield operation in the area in the east and planned high-rise buildings for port backup and logistics uses in the northwest.
21, 48	0 - 360	Urban	0.2075	1.6250	<u>3.7000</u>	More planned high-rise buildings for port back-up storage and workshop use exist in southwest. Hilly slope locates in the northwest. Thus surface roughness of 370 cm is assumed.
21, 49	0 - 360	Urban	0.2075	1.6250	<u>3.7000</u>	Inline with Grid (21, 48) because residential site 3-18 and 3-19 fall into two grids.
21, 50	90 - 180	Urban	0.2075	1.6250	1.0000	Abundant village, low-rise buildings exist in the southeast.
	180 - 90	Water	0.1400	0.4500	0.0001	Sea for the rest of the area.
22, 44	0 - 360	Urban	0.2075	1.6250	1.0000	Village and low-rise buildings are in the north and west and hilly terrain in the south and east. Thus surface roughness of 100 cm is assumed.
22, 45	0 - 360	Urban	0.2075	1.6250	<u>3.7000</u>	The area is surrounded by planned high-rise buildings in the north and west and a hill in the east and south. Thus surface roughness of 370 cm is assumed.
22, 46	0 - 360	Urban	0.2075	1.6250	<u>3.7000</u>	The area is developed with high-rise residential buildings.
22, 47	0 - 360	Urban	0.2075	1.6250	1.0000	Village, low-rise buildings, open storage as majority, but a few planned high-rise residential buildings in the east.
22, 48	0 - 360	Urban	0.2075	1.6250	1.0000	Abundant village, low-rise buildings, open storage exist in the area while existing high-rise residential buildings are in the east. Thus surface roughness of 100 cm is assumed.
22, 49	0 - 360	Urban	0.2075	1.6250	<u>3.7000</u>	Existing high-rise residential buildings are in the east side while hilly terrain in the west. Thus surface roughness of 370 cm is assumed.
23, 46	0 - 360	Urban	0.2075	1.6250	1.0000	Abundant village, low-rise buildings, open storage exist in the area.
23, 47	0 - 360	Urban	0.2075	1.6250	<u>3.7000</u>	The area is surrounded by existing high-rise residential buildings in north and east and planned high-rise commercial buildings on west and southwest. Thus surface roughness of 370 cm is assumed.
23, 48	0 - 360	Urban	0.2075	1.6250	<u>3.7000</u>	Existing developed area with high-rise residential buildings.

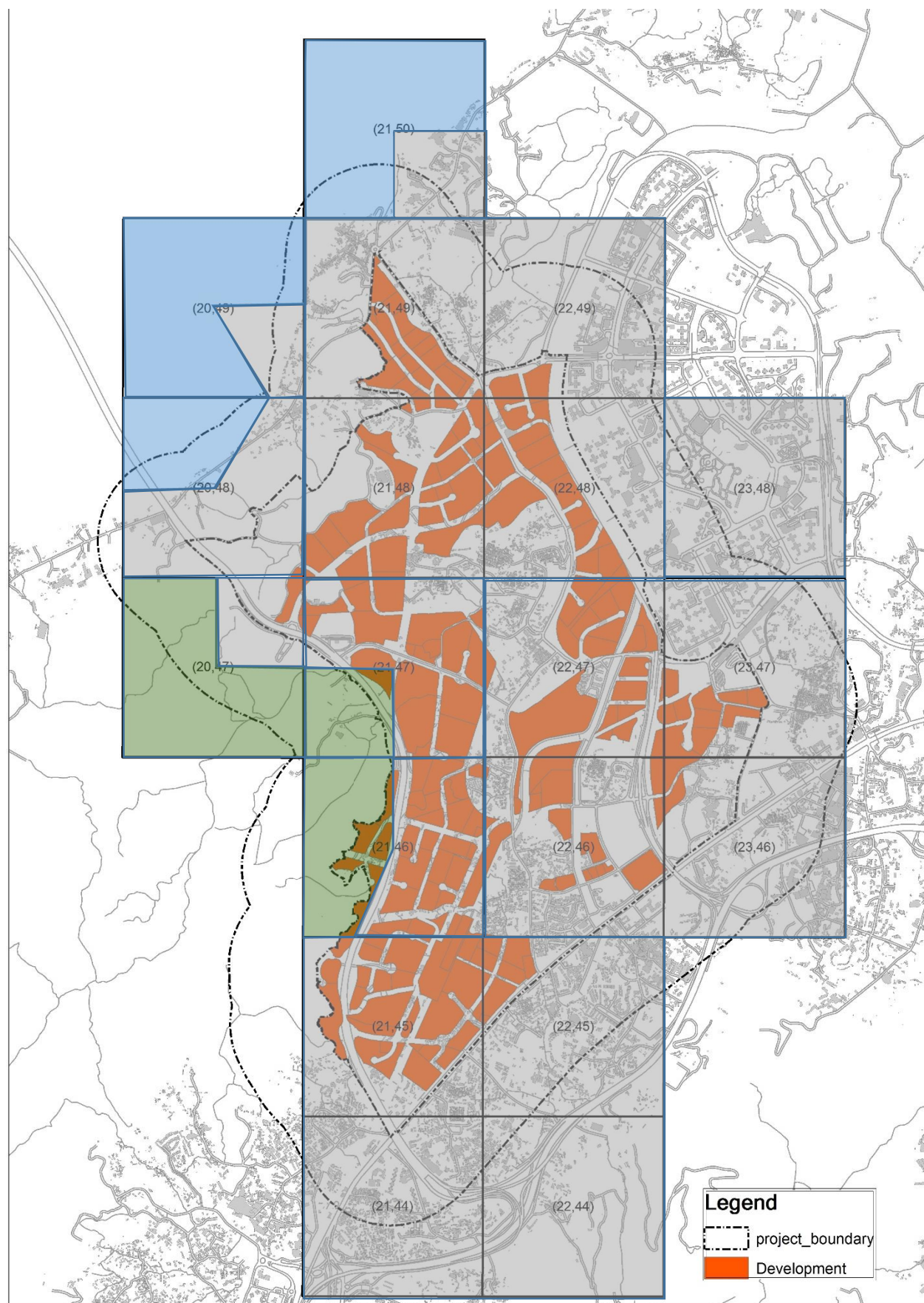
Note:

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Albedo, Bowen Ratio and Surface Roughness are generally suggested by AERMET by default.

Underlined figure indicates modification due to the status of the site. Please see remarks.

## Appendix 3.17 Determination of Surface Characteristics Parameters



### Summary of Surface Characteristics for Scenario Year 2031 – 2039 (Operation Phase)

Grid	Sector	Land Use	Albedo	Bowen Ratio	Surface Roughness (m)	Remark
20, 47	0 - 90	Urban	0.2075	1.6250	<u>3.7000</u>	Planned high-rise buildings for port back-up storage and workshop use and hilly terrain exist in the northeast.
	90 - 360	Forest	0.1775	0.8250	1.3000	Trees on the hill in the northwest and southern area.
20, 48	30 - 270	Urban	0.2075	1.6250	<u>3.7000</u>	Hilly terrain in the area. Planned high-rise buildings for port back-up storage and workshop use exist in the southeast. Thus surface roughness of 370 cm is assumed.
	270 - 30	Water	0.1400	0.4500	0.0001	Sea in the northwest.
20, 49	90 - 150	Urban	0.2075	1.6250	1.0000	Village, low-rise buildings in the southeast
	150 - 90	Water	0.1400	0.4500	0.0001	Sea for the rest of the area.
21, 44	0 - 360	Urban	0.2075	1.6250	1.0000	Abundant village, low-rise buildings in the area
21, 45	0 - 360	Urban	0.2075	1.6250	<u>3.7000</u>	The area is fully developed with high-rise residential and commercial buildings
21, 46	0 - 200	Urban	0.2075	1.6250	<u>3.7000</u>	The area is fully developed with high-rise residential, industrial and commercial buildings.
	200 - 360	Forest	0.1775	0.8250	1.3000	Trees on the hill in the west.
21, 47	180 - 270	Forest	0.1775	0.8250	1.3000	Trees on the hill in the southwest.
	270 - 180	Urban	0.2075	1.6250	<u>3.7000</u>	The area is fully developed with high-rise buildings for port backup and logistics uses.
21, 48	0 - 360	Urban	0.2075	1.6250	<u>3.7000</u>	The area is fully developed with high-rise buildings for various use.
21, 49	0 - 360	Urban	0.2075	1.6250	<u>3.7000</u>	The area is fully developed with high-rise residential buildings.
21, 50	90 - 180	Urban	0.2075	1.6250	1.0000	Abundant village, low-rise buildings exist in the southeast.
	180 - 90	Water	0.1400	0.4500	0.0001	Sea for the rest of the area.
22, 44	0 - 360	Urban	0.2075	1.6250	1.0000	Village and low-rise buildings are in the north and west and hilly terrain in the south and east. Thus surface roughness of 100 cm is assumed.
22, 45	0 - 360	Urban	0.2075	1.6250	<u>3.7000</u>	The area is surrounded by planned high-rise buildings in the north and west and a hill in the east and south. Thus surface roughness of 370 cm is assumed.
22, 46	0 - 360	Urban	0.2075	1.6250	<u>3.7000</u>	The area is developed with high-rise residential buildings.
22, 47	0 - 360	Urban	0.2075	1.6250	<u>3.7000</u>	The area becomes fully developed with high-rise residential buildings.
22, 48	0 - 360	Urban	0.2075	1.6250	<u>3.7000</u>	The area becomes fully developed with high-rise residential buildings.
22, 49	0 - 360	Urban	0.2075	1.6250	<u>3.7000</u>	Existing high-rise residential buildings are in the east side while hilly terrain in the west. The southwest area is developed with high-rise residential buildings. Thus surface roughness of 370 cm is assumed.
23, 46	0 - 360	Urban	0.2075	1.6250	1.0000	Abundant village, low-rise buildings, open storage exist in the area.
23, 47	0 - 360	Urban	0.2075	1.6250	<u>3.7000</u>	The area consists of existing high-rise residential buildings in north and east and fully development with high-rise buildings in west and southwest.
23, 48	0 - 360	Urban	0.2075	1.6250	<u>3.7000</u>	Existing developed area with high-rise residential buildings.

Note:

Grey area is classified as urban area. Blue area is classified as water area. Green area is classified as coniferous forest area. Albedo, Bowen Ratio and Surface Roughness are generally suggested by AERMET by default. Underlined figure indicates modification due to the status of the site. Please see remarks.