

Appendix 3N1 - Detail Parameters Input into the AERMET

Table 1 - Albedo Ratio

Seasonal Value #	Albedo					Arithmetic Mean (Average)
	1*	2*	3*	5*		
Open Water (11)		0.1	0.1	0.1	0.1	0.100
Deciduous Forest (41)		0.16	0.16	0.17	0.16	0.163
Low Intensity Residential (21)		0.16	0.16	0.18	0.16	0.165
High Intensity Residential (22)		0.18	0.18	0.18	0.18	0.180
Commercial/ Industrial/ Transportation (23)		0.18	0.18	0.18	0.18	0.180
Quarries (32)		0.2	0.2	0.2	0.2	0.200

Table 2 - Bowen Ratio

Seasonal Value #@	Bowen Ratio					Arithmetic Mean (Average)
	1*	2*	3*	5*		
Open Water (11)		0.1	0.1	0.1	0.1	0.10
Deciduous Forest (41)		0.3	1	1	0.7	0.75
Low Intensity Residential (21)		0.8	1	1	0.8	0.90
High Intensity Residential (22)		1.5	1.5	1.5	1.5	1.50
Commercial/ Industrial/ Transportation (23)		1.5	1.5	1.5	1.5	1.50
Quarries (32)		1.5	1.5	1.5	1.5	1.50

Table 3 - Surface Roughness Length

	Surface Roughness Length					Arithmetic Mean (Average) (m)	Remarks
	1*	2*	3*	5*			
Open Water (11)		0.001	0.001	0.001	0.001	0.0010	--
Deciduous Forest (41)	--	--	--	--	--	0.6000	Assume tree is 6m height in PATH grid.
Low Intensity Residential (21)		0.4	0.4	0.3	0.4	0.3750	--
High Intensity Residential (22)		1	1	1	1	1.0000	--
Commercial/ Industrial/ Transportation (23)		0.7	0.7	0.7	0.7	0.7000	Not at Airport
Quarries (32)		0.3	0.3	0.3	0.3	0.3000	--

Note:

#: Default values are extracted from USEPA "AERSURFACE User's Guide (EPA-454/B-08-001 January 2008 (Revised on 01/16/2013). Class number as indicated in bracket () are extracted from the "AERSURFACE User's Guide".

*: Midsummer with lush vegetation (Jun, Jul, Aug), 2 - Autumn with unharvested cropland, 3 - Late autumn after frost and harvest, or winter with no snow, and 5 - Transitional spring with partial green coverage or short annuals.

@: Seasonal Bowen Ratio - average is adopted.

- Default seasonal category no. 4 (winter with continuous snow on ground) is ignored as it is not applicable in Hong Kong weather condition.

Table 4 - Calculation of project specific's surface roughness for mixture of land uses

Grid	Sector (degree, from north)	Land Use Type #	Col. 1 Area (m ²)	Col. 2 Area Fraction (%)	Col.3 Distance between centre of PATH grid and centre point of land use (m)	Col. 4 Weighting = Col. 2 / Col. 3	Col. 5 Surface Roughness Length (m) (Refer to Table 3)	Col. 6 Inverse-Distance Weighted Geometric Mean (m)
Mixture of Land Use 1 (Grid 43,33)	313-135	Commercial/ Industrial/ Transportation (23)	1250538.897	0.79	509	0.001560724	0.7	0.0878
Mixture of Land Use 1 (Grid 43,33)	313-135	Open Water (11)	323637.046	0.21	284	0.0007239	0.001	
Mixture of Land Use 2 (Grid 43,33)	135-269	Commercial/ Industrial/ Transportation (23)	286305.773	0.24	450	0.0005409	0.7	0.0073
Mixture of Land Use 2 (Grid 43,33)	135-269	Open Water (11)	890036.172	0.76	609	0.0012424	0.001	
Mixture of Land Use 3 (Grid 43,33)	269-313	Commercial/ Industrial/ Transportation (23)	229088.448	0.59	588	0.0009986	0.7	0.0952
Mixture of Land Use 3 (Grid 43,33)	269-313	Open Water (11)	134880.144	0.35	730	0.0004736	0.001	
Mixture of Land Use 3 (Grid 43,33)	269-313	High Intensity Residential (22)	26174.783	0.07	958	0.0000700	1	0.9191
Mixture of Land Use 1 (Grid 44,33)	4-113	Commercial/ Industrial/ Transportation (23)	125265.853	0.13	310	0.00043095	0.7	
Mixture of Land Use 1 (Grid 44,33)	4-113	High Intensity Residential (22)	812392.174	0.87	623	0.001390699	1	0.0330
Mixture of Land Use 2 (Grid 44,33)	113-229	Commercial/ Industrial/ Transportation (23)	338064.412	0.41	575	0.000714955	0.7	
Mixture of Land Use 2 (Grid 44,33)	113-229	Open Water (11)	389185.713	0.47	641	0.000738322	0.001	0.1130
Mixture of Land Use 2 (Grid 44,33)	113-229	Commercial/ Industrial/ Transportation (23)	95092.489	0.12	893	0.000129492	0.7	
Mixture of Land Use 3 (Grid 44,33)	229-270	Commercial/ Industrial/ Transportation (23)	162946.934	0.29	346	0.000841088	0.7	0.5667
Mixture of Land Use 3 (Grid 44,33)	229-270	Open Water (11)	163895.500	0.29	634	0.000461688	0.001	
Mixture of Land Use 3 (Grid 44,33)	229-270	Commercial/ Industrial/ Transportation (23)	211717.483	0.38	826	0.000457771	0.7	0.0077
Mixture of Land Use 3 (Grid 44,33)	229-270	Open Water (11)	21363.648	0.04	970	3.93346E-05	0.001	
Mixture of Land Use 4 (Grid 44,33)	270-4	Open Water (11)	39808.878	0.05	897	5.37331E-05	0.001	0.0010
Mixture of Land Use 4 (Grid 44,33)	270-4	Commercial/ Industrial/ Transportation (23)	786125.011	0.95	590	0.001613223	0.7	
Mixture of Land Use 1 (Grid 43,32)	341-107	Open Water (11)	411311.614	0.38	310	0.0012202	0.001	0.0010
Mixture of Land Use 1 (Grid 43,32)	341-107	Commercial/ Industrial/ Transportation (23)	411193.060	0.38	588	0.0006431	0.7	
Mixture of Land Use 1 (Grid 43,32)	341-107	Open Water (11)	232968.093	0.21	817	0.0002622	0.001	0.0010
Mixture of Land Use 1 (Grid 43,32)	341-107	Commercial/ Industrial/ Transportation (23)	31938.410	0.03	973	0.0000302	0.7	
Mixture of Land Use 2 (Grid 43,32)	107-265	Open Water (11)	286305.7727	1.00	471	0.0021231	0.001	0.0010
Mixture of Land Use 3 (Grid 43,32)	265-341	Open Water (11)	661202.3145	1.00	619	0.0016133	0.001	
Mixture of Land Use 3 (Grid 43,32)	265-341	High Intensity Residential (22)	904.4532	0.00	994	0.0000014	1	0.0114
Mixture of Land Use 1 (Grid 44,32)	315-105	Commercial/ Industrial/ Transportation (23)	44946.332	0.03	306	0.0001123	0.7	
Mixture of Land Use 1 (Grid 44,32)	315-105	Open Water (11)	630150.692	0.48	343	0.0014051	0.001	0.00155
Mixture of Land Use 1 (Grid 44,32)	315-105	Commercial/ Industrial/ Transportation (23)	612746.653	0.47	667	0.0007026	0.7	
Mixture of Land Use 1 (Grid 44,32)	315-105	High Intensity Residential (22)	19687.609	0.02	970	0.0000155	1	0.0119
Mixture of Land Use 2 (Grid 44,32)	105-315	Commercial/ Industrial/ Transportation (23)	404789.057	0.22	205	0.0010771	0.7	
Mixture of Land Use 2 (Grid 44,32)	105-315	Open Water (11)	1428472.084	0.78	439	0.0017749	0.001	

Note:

#: Class number as indicated in bracket () are extracted from the "AERSURFACE User's Guide".

Table 5 - Calculation of % of land use within 10km x 10km area

Grid No.	Land Use Type #	Total Area (m ²)	% of Total Area
43,33	Open Water (11)	18653149.93	0.186301357
43,33	Deciduous Forest (41)	31251143.51	0.312125859
43,33	Low Intensity Residential (21)	1748236.864	0.017460799
43,33	High Intensity Residential (22)	39011172.43	0.389630405
43,33	Commercial/ Industrial/ Transportation (23)	8200881.386	0.081907632
43,33	Quarries (32)	1258948.1	0.012573948
44,33	Open Water (11)	20018622.12	0.200354406
44,33	Deciduous Forest (41)	31755600.47	0.317822796
44,33	Low Intensity Residential (21)	2998839.877	0.030013593
44,33	High Intensity Residential (22)	36833353.29	0.368642985
44,33	Commercial/ Industrial/ Transportation (23)	7050692.688	0.070566163
44,33	Quarries (32)	1258948.1	0.012600058
43,32	Open Water (11)	19020458.08	0.189487849
43,32	Deciduous Forest (41)	28895031.41	0.287861487
43,32	Low Intensity Residential (21)	1324013.23	0.013190241
43,32	High Intensity Residential (22)	41682252.37	0.415251846
43,32	Commercial/ Industrial/ Transportation (23)	8197543.726	0.081666536
43,32	Quarries (32)	1258948.1	0.012542041
44,32	Open Water (11)	20868477.3	0.207947494
44,32	Deciduous Forest (41)	28827851.62	0.287260034
44,32	Low Intensity Residential (21)	2780452.993	0.027706297
44,32	High Intensity Residential (22)	39568128.03	0.394283346
44,32	Commercial/ Industrial/ Transportation (23)	7050692.688	0.070257827
44,32	Quarries (32)	1258948.1	0.012545003

Note:

#: Class number as indicated in bracket () are extracted from the "AERSURFACE User's Guide".

Table 6 - Calculation of Albedo and Bowen Ratio

Grid No.	Land Use Type #	Default Albedo Ratio value from AERMET (Refer to Table 1)	Default Albedo x % of Total Area (Refer to Table 5)	Area-weighted Albedo Ratio (m)	Default Bowen Ratio value from AERMET (Refer to Table 2)	Default Bowen ^ % of Total Area (Refer to Table 5)	Area-weighted Geometric mean _Bowen Ratio (m)
43,33	Open Water (11)	0.100	0.018630136	0.1596	0.100	0.65118	0.7230
43,33	Deciduous Forest (41)	0.163	0.050720452		0.750	0.91412	
43,33	Low Intensity Residential (21)	0.165	0.002881032		0.900	0.99816	
43,33	High Intensity Residential (22)	0.180	0.070133473		1.500	1.17114	
43,33	Commercial/ Industrial/ Transportation (23)	0.180	0.014743374		1.500	1.03377	
43,33	Quarries (32)	0.200	0.00251479		1.500	1.00511	
44,33	Open Water (11)	0.100	0.020035441	0.1582	0.100	0.63044	0.6888
44,33	Deciduous Forest (41)	0.163	0.051646204		0.750	0.91262	
44,33	Low Intensity Residential (21)	0.165	0.004952243		0.900	0.99684	
44,33	High Intensity Residential (22)	0.180	0.066355737		1.500	1.16122	
44,33	Commercial/ Industrial/ Transportation (23)	0.180	0.012701909		1.500	1.02903	
44,33	Quarries (32)	0.200	0.002520012		1.500	1.00512	
43,32	Open Water (11)	0.100	0.018948785	0.1599	0.100	0.64642	0.7306
43,32	Deciduous Forest (41)	0.163	0.046777492		0.750	0.92052	
43,32	Low Intensity Residential (21)	0.165	0.00217639		0.900	0.99861	
43,32	High Intensity Residential (22)	0.180	0.074745332		1.500	1.18337	
43,32	Commercial/ Industrial/ Transportation (23)	0.180	0.014699977		1.500	1.03367	
43,32	Quarries (32)	0.200	0.002508408		1.500	1.00510	
44,32	Open Water (11)	0.100	0.020794749	0.1582	0.100	0.61952	0.6901
44,32	Deciduous Forest (41)	0.163	0.046679755		0.750	0.92068	
44,32	Low Intensity Residential (21)	0.165	0.004571539		0.900	0.99709	
44,32	High Intensity Residential (22)	0.180	0.070971002		1.500	1.17336	
44,32	Commercial/ Industrial/ Transportation (23)	0.180	0.012646409		1.500	1.02890	
44,32	Quarries (32)	0.200	0.002509001		1.500	1.00510	

Note:

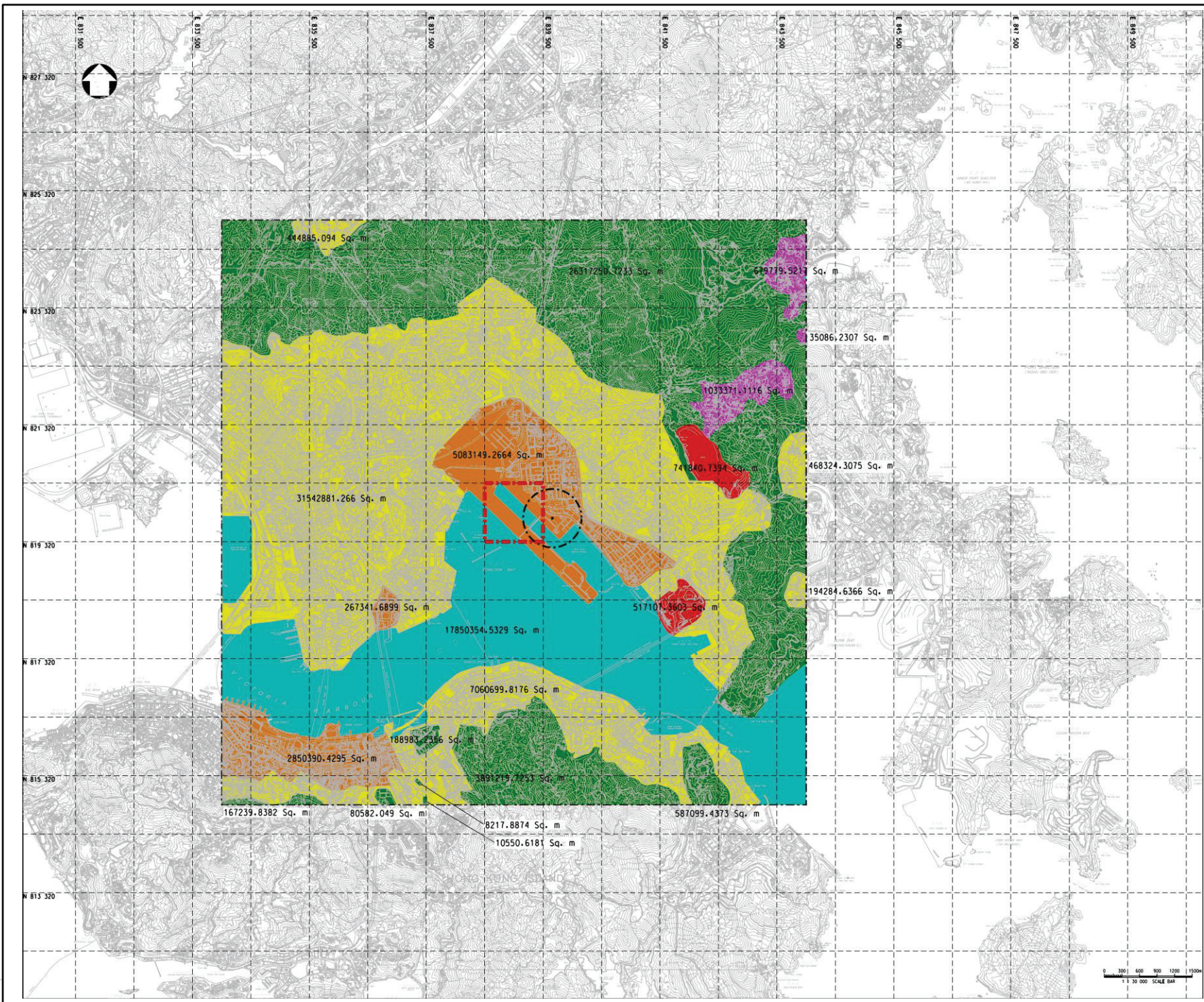
#: Class number as indicated in bracket () are extracted from the "AERSURFACE User's Guide".

Table 7 - Input into AERMET

Grid No.	Sector (degree, from north)	Land Use Type #	Albedo Ratio (Refer to Table 6)	Bowen Ratio (Refer to Table 6)	Surface Roughness (m) (Refer to Table 3)	Surface Roughness (m) (Refer to Table 4)	Remarks
43,33	313-135	Mixture of Land Use 1 (Grid 43,33)	0.1596	0.7230	--	0.0878	Mixture of Commercial/ Industrial/ Transportation and Open water
43,33	135-269	Mixture of Land Use 2 (Grid 43,33)			--	0.0073	Mixture of Commercial/ Industrial/ Transportation and Open water
43,33	269-313	Mixture of Land Use 3 (Grid 43,33)			--	0.0952	Mixture of Commercial/ Industrial/ Transportation, High Intensity Residential and Open water
44,33	4-113	Mixture of Land Use 1 (Grid 44,33)	0.1582	0.6888	--	0.9191	Mixture of Commercial/ Industrial/ Transportation and High Intensity Residential
44,33	113-229	Mixture of Land Use 2 (Grid 44,33)			--	0.0330	Mixture of Commercial/ Industrial/ Transportation and Open water
44,33	229-270	Mixture of Land Use 3 (Grid 44,33)			--	0.1130	Mixture of Commercial/ Industrial/ Transportation and Open water
44,33	270-4	Mixture of Land Use 4 (Grid 44,33)			--	0.5667	Mixture of Commercial/ Industrial/ Transportation and Open water
43,32	341-107	Mixture of Land Use 1 (Grid 43,32)	0.1599	0.7306	--	0.0077	Mixture of Commercial/ Industrial/ Transportation and Open water
43,32	107-265	Mixture of Land Use 2 (Grid 43,32)			--	0.0010	Open water
43,32	265-341	Mixture of Land Use 3 (Grid 43,32)			--	0.0010	Mixture of High Intensity Residential and Open water
44,32	315-105	Mixture of Land Use 1 (Grid 44,32)	0.1582	0.6901	--	0.0114	Mixture of Commercial/ Industrial/ Transportation and Open water
44,32	105-315	Mixture of Land Use 2 (Grid 44,32)			--	0.0119	Mixture of Commercial/ Industrial/ Transportation and Open water

Note:

#: Class number as indicated in bracket () are extracted from the "AERSURFACE User's Guide".



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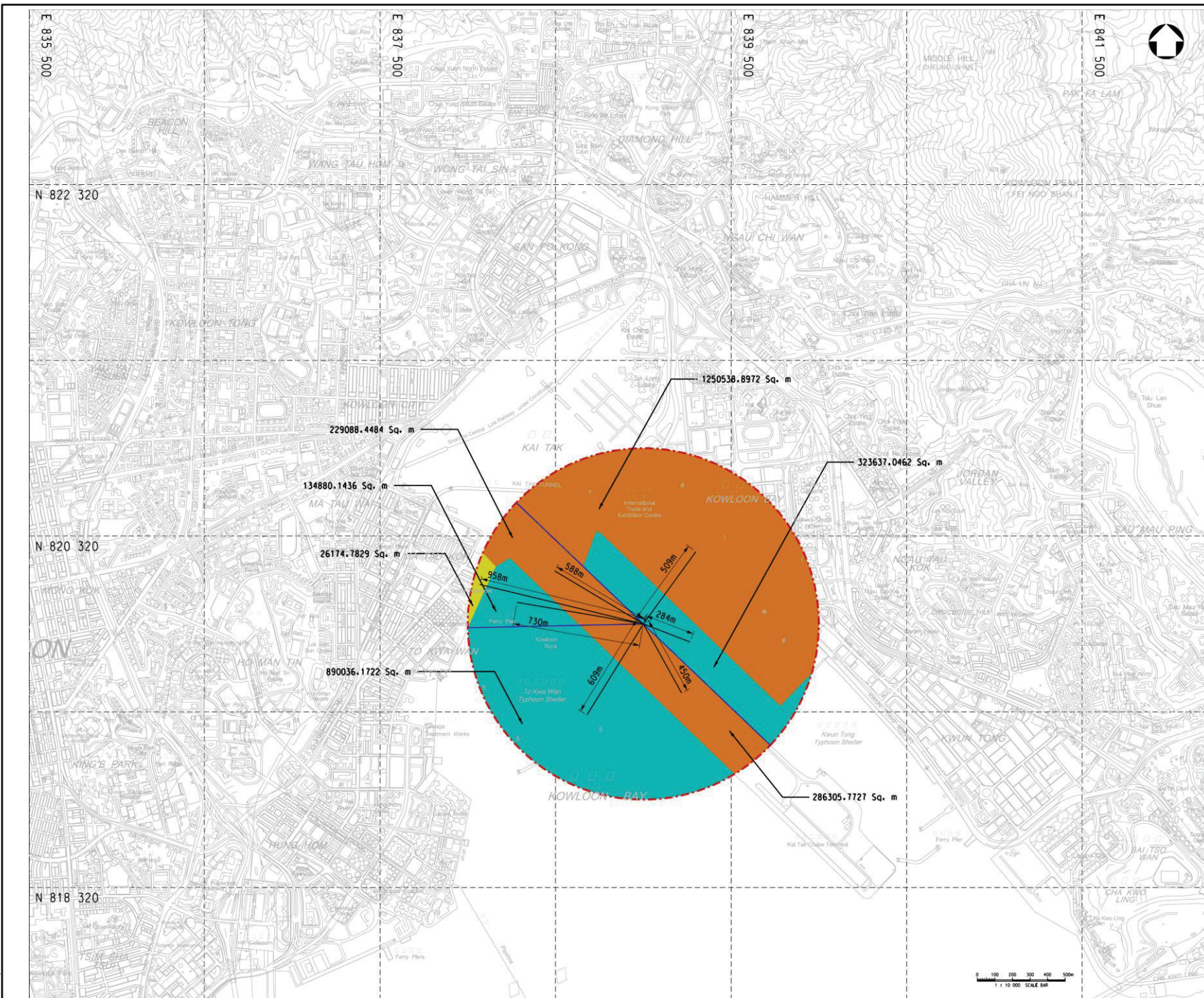
A ROOFTOP HELIPAD AT THE
NEW ACUTE HOSPITAL AT
KAI TAK DEVELOPMENT AREA

Site

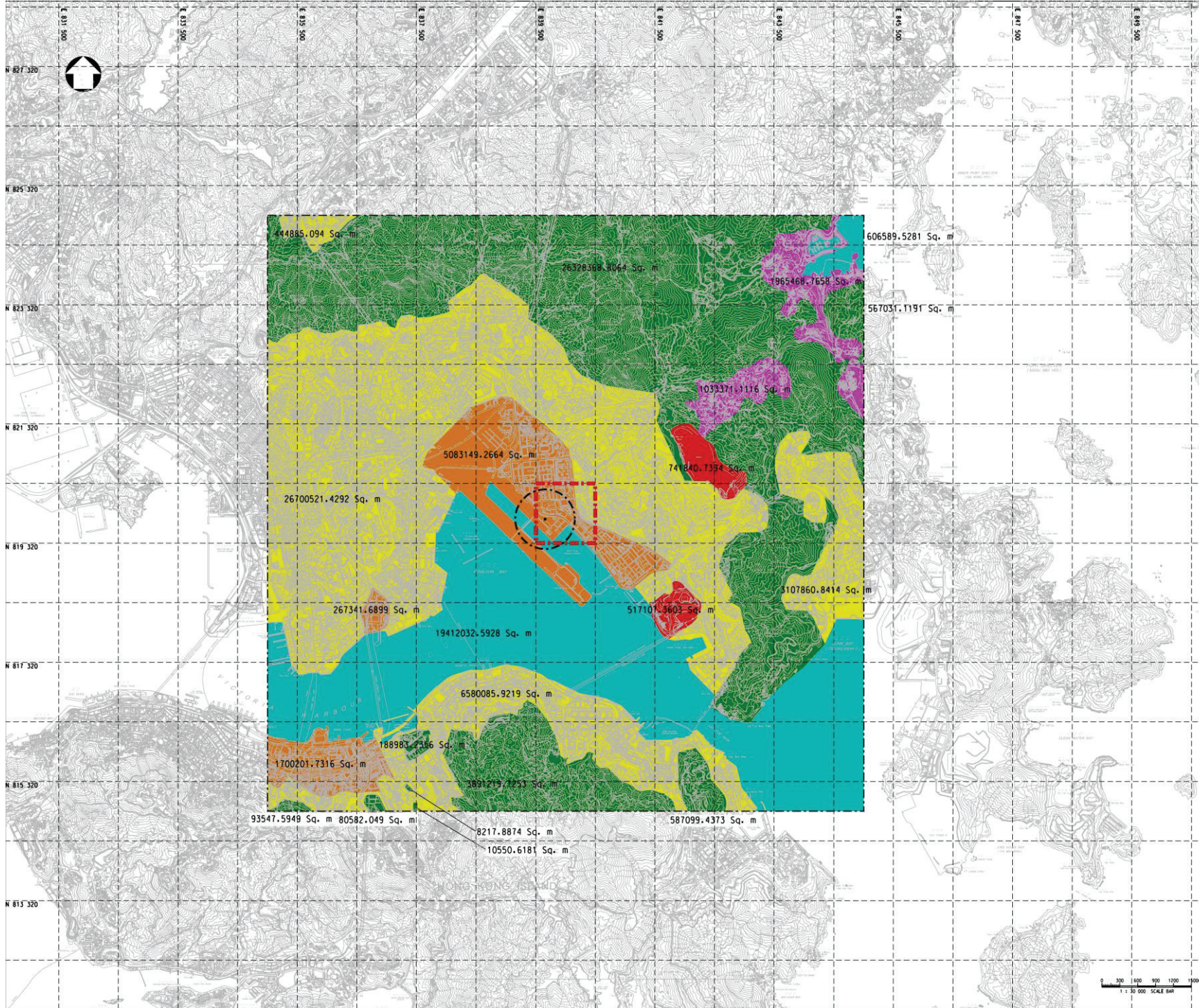
Land use within 10km x
10km from centre point
of PATH Grid (43,33)

Drawn	Checked	Approved
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Appendix 3N



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<p>Project</p> <p>A ROOFTOP HELPAD AT THE NEW ACUTE HOSPITAL AT KAI TAK DEVELOPMENT AREA</p>													
<p>Study</p> <p>Sectors within 1km diameter from PATH Grid (43,33)</p>													
<table border="1"> <thead> <tr> <th>Drawn</th> <th>Checked</th> <th>Approved</th> </tr> </thead> <tbody> <tr> <td>Not to Scale</td> <td>CAD File Name</td> <td>Print Issued</td> </tr> <tr> <td colspan="2">Drawing No.</td> <td>Rev</td> </tr> </tbody> </table>		Drawn	Checked	Approved	Not to Scale	CAD File Name	Print Issued	Drawing No.		Rev			
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- 500m FROM PROPOSED HELIPAD
- PATH GRID
- OPEN WATER
- COMMERCIAL/ INDUSTRIAL/ TRANSPORTATION
- HIGH INTENSITY RESIDENTIAL
- DECIDUOUS FOREST
- LOW INTENSITY RESIDENTIAL
- QUARRIES

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**A ROOFTOP HELIPAD AT THE
NEW ACUTE HOSPITAL AT
KAI TAK DEVELOPMENT AREA**

Site

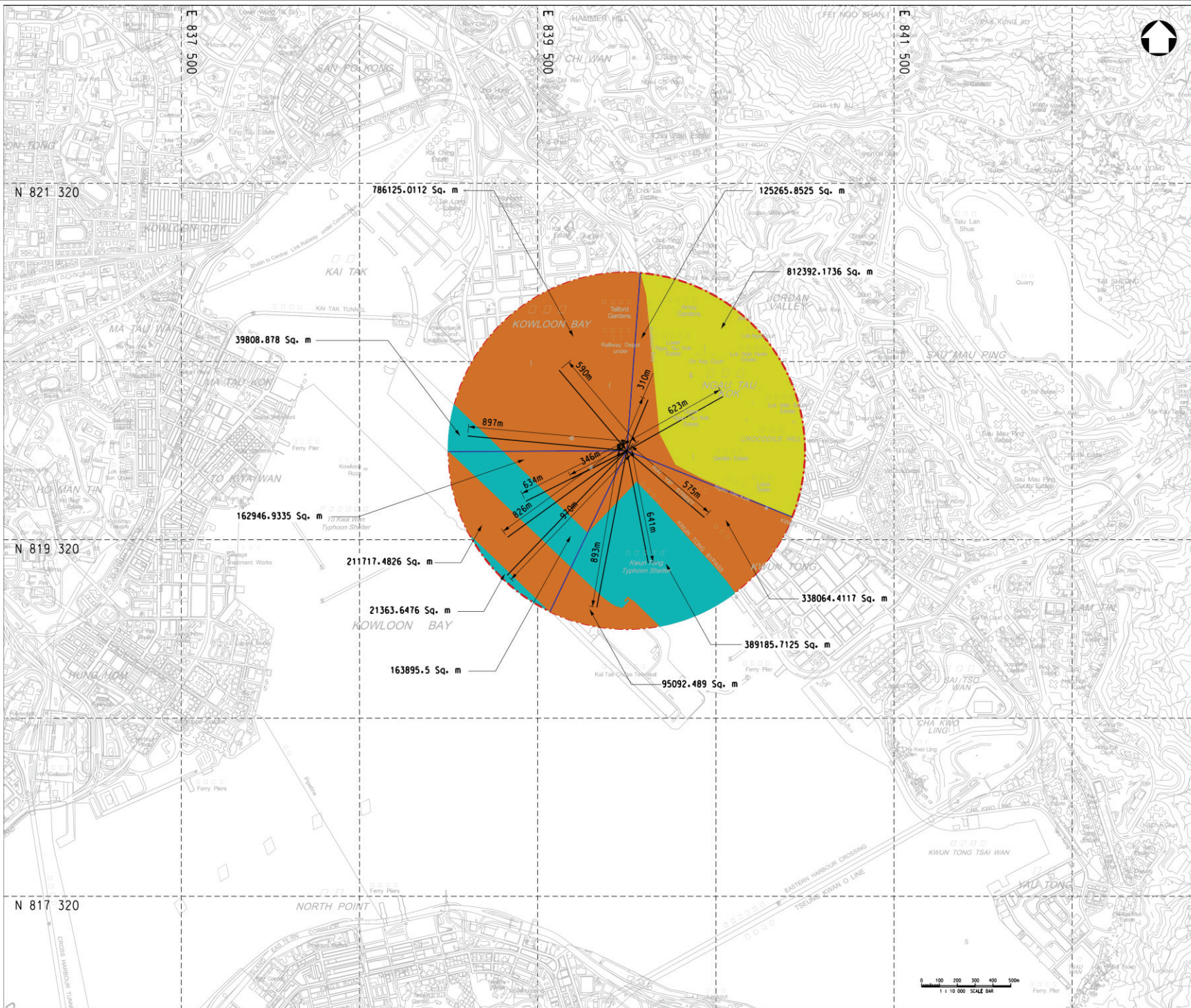
Land use within 10km x
10km from centre point
of PATH Grid (44,33)

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A ROOFTOP HELIPAD AT THE
NEW ACUTE HOSPITAL AT
KAI TAK DEVELOPMENT AREA

Site

Sectors within 1km
diameter from
PATH Grid (44,33)

Check

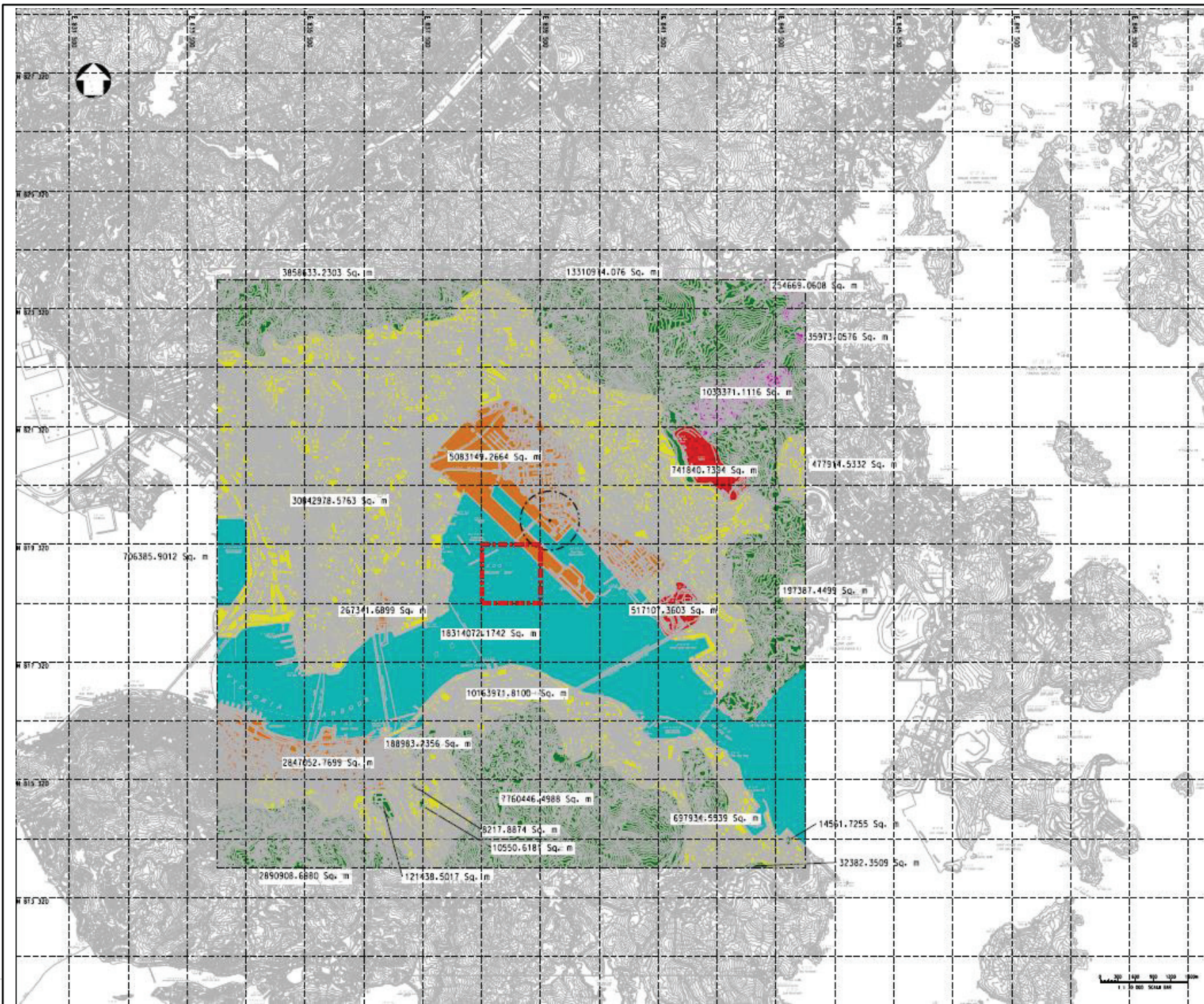
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Appendix 3N



- 500m FROM PROPOSED ALIGNMENT
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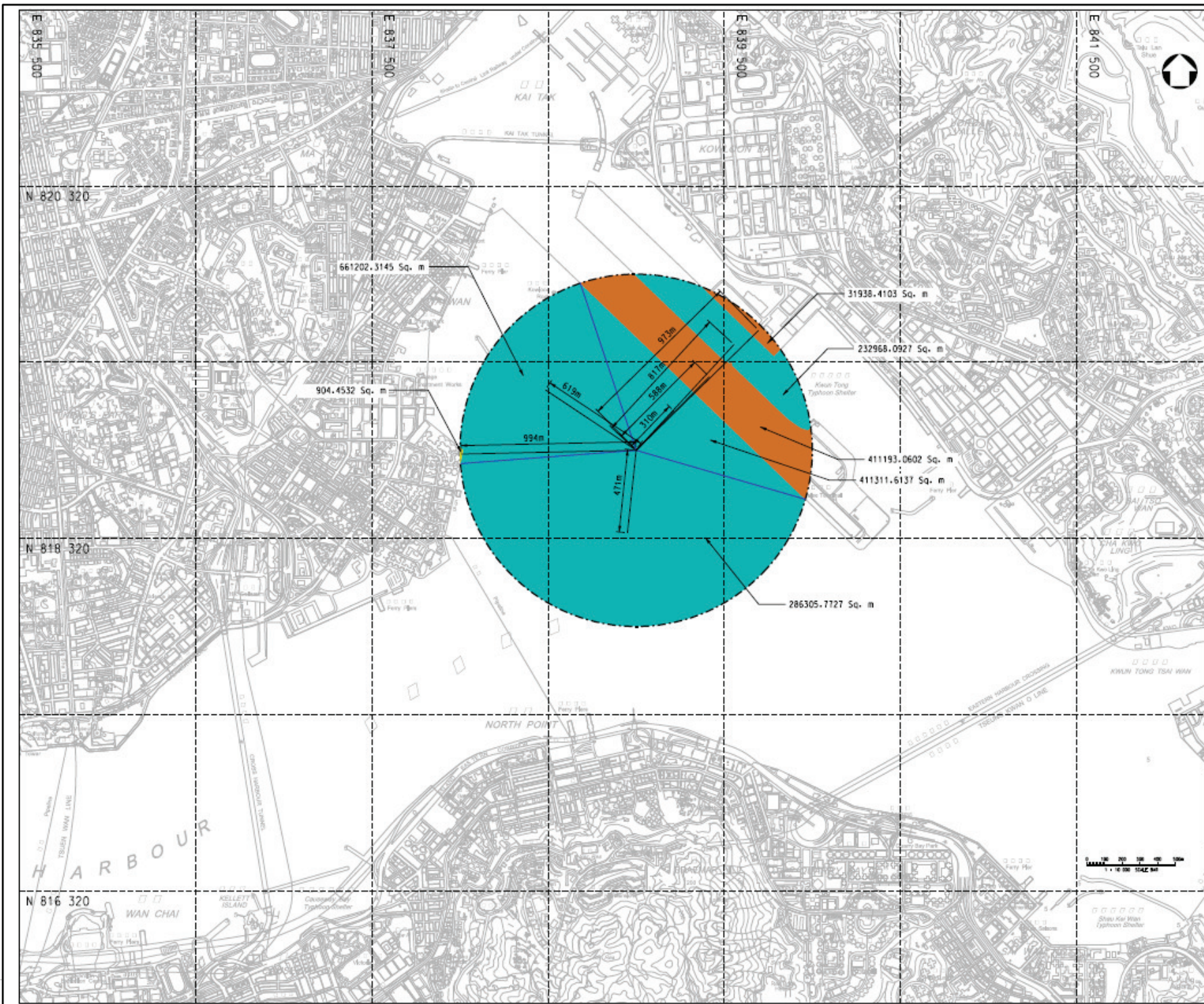
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Land use within 10km x
10km from centre point
of PATH Grid (43,32)

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OPEN WATER		COMMERCIAL/ INDUSTRIAL/ TRANSPORTATION		HIGH INTENSITY RESIDENT	
1 km BOUNDARY		SECTOR			


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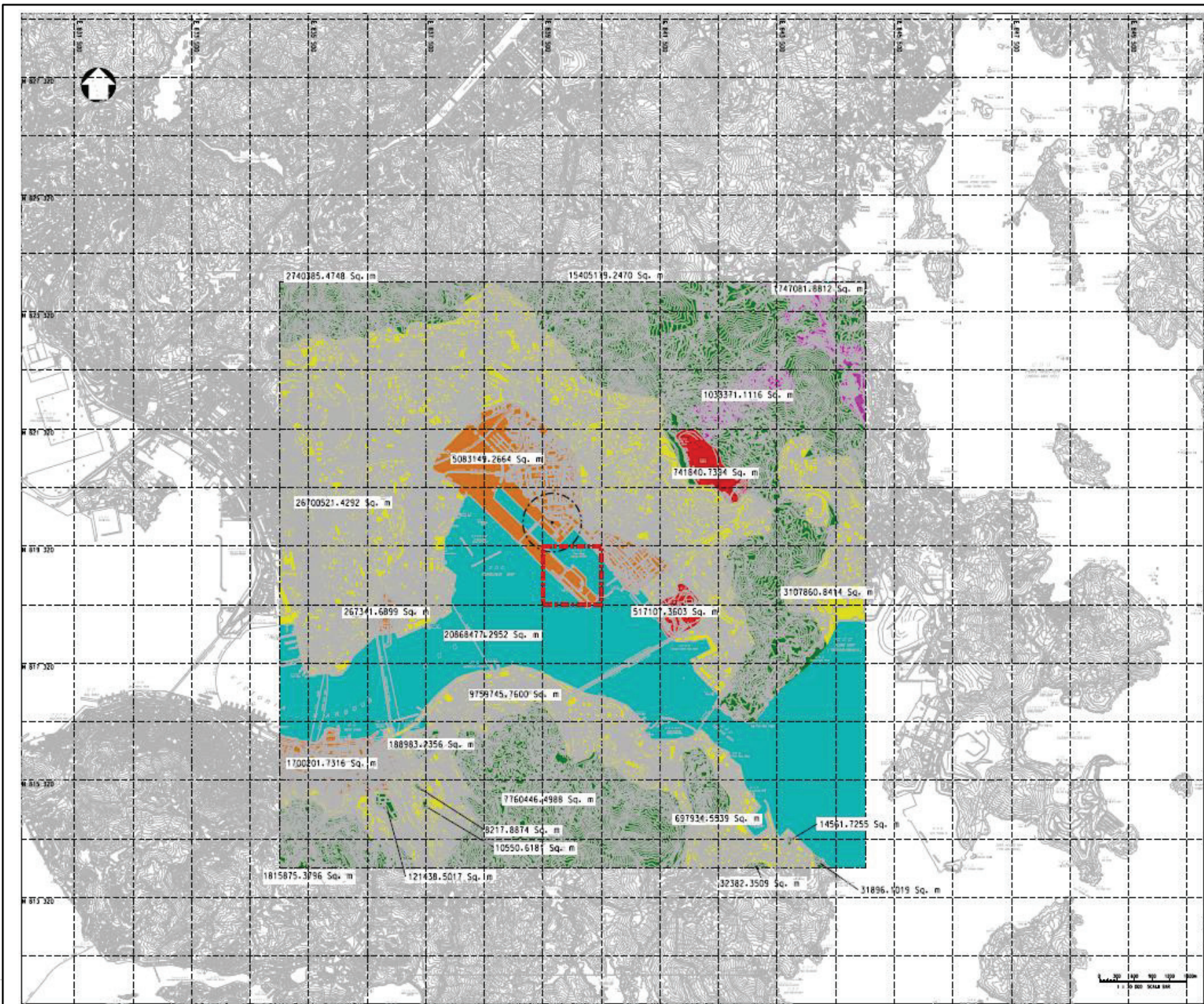
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Sectors within 1km
diameter from PATH Grid
(43,32)

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- 500m FROM PROPOSED ALIGNMENT
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Land use within 10km x
10km from centre point of
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<p>Project</p> <p>A ROOFTOP HELIPAD AT NEW ACUTE HOSPITAL AT KAI TAK DEVELOPMENT AREA</p>											
<p>Site</p> <p>Land use within 10km x 10km from centre point of PATH Grid (44,32)</p>											
<p>Drawn</p> <table border="1"> <tr> <td> </td> <td>Checked</td> <td>Approved</td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>							Checked	Approved			
	Checked	Approved									
<p>Scale</p> <p>Not to Scale CAD File Name Plot Issued</p>											
<p>Drawing No. Date</p>											
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