



Delft University of Technology

## Port City Atlas: Mapping European Port City Territories From Understanding to Design

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PORT



BRS (%)

100



BRS

Liquid	141	●
Dry bulk	54	●
Container	211	●
Specialized	492	●
General	335	●
Cruise ship	20	●
Passenger		
Other	431	●

Vessels 1,684 ✕



BRS

Liquid bulk	2,547	●
Dry bulk	3,511	●
Containers	912	●
RoRo	937	●
Other	283	●

Cargo (t) 8,190 ✕



Passengers 0 ✕

CITY



BRS

Bristol, City of	
→ London	177
→ Birmingham	125

→ Capital national (km)	
→ Capital regional (km)	
Area (km²)	111
Built-up area (km²)	141
Density (per km²)	4,166
Population	461,329
Population structure (%)	<div><div>15</div><div>65</div><div>17.7</div><div>69.4</div><div>13.0</div></div>
Distribution built area (%)	<div><div>B</div><div>I</div><div>87</div><div>11</div><div>2</div></div>

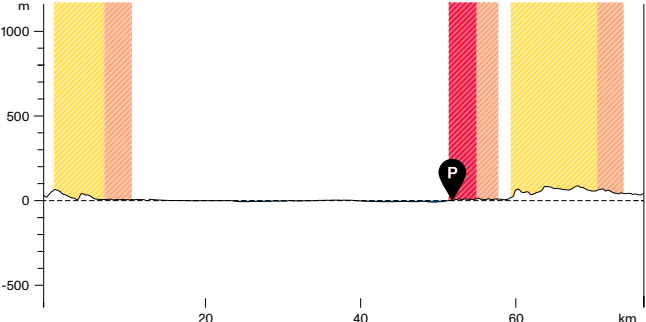
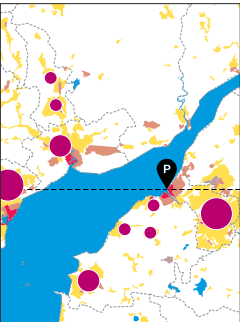
TERRITORY



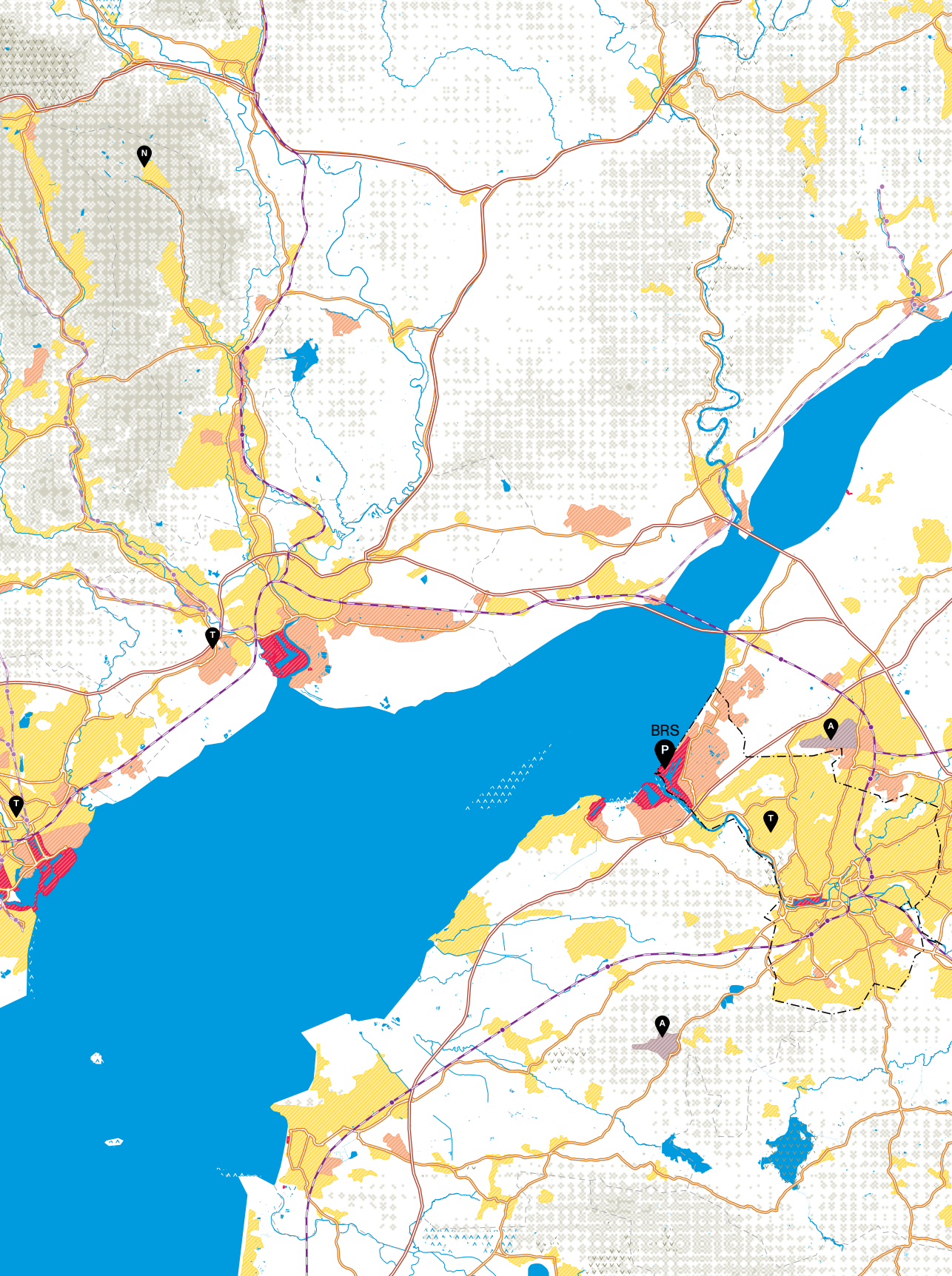
BRS

Bristol, City of	
Area (km²)	111
Density (per km²)	4,224
Population	467,099

Natura2000 (km²)	<div><div>M</div><div>I</div><div>1,006</div><div>2</div></div>
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SOU

PME

# Southampton, UK

## Portsmouth, UK



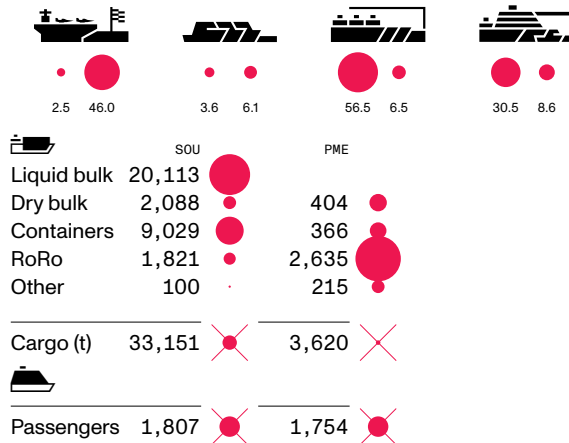
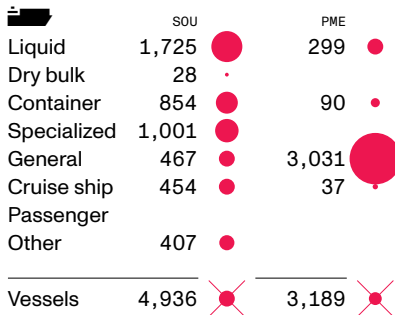
River Itchen



The Solent

## PORT

SOU/PME (%)



## CITY



Southampton

SOU



Portsmouth

PME

→ Capital national (km)

→ London

115

→ London

107

→ Capital regional (km)

Area (km<sup>2</sup>)

130

196

Built-up area (km<sup>2</sup>)

85

121

Density (per km<sup>2</sup>)

1,937

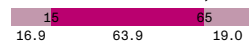
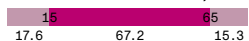
2,760

Population

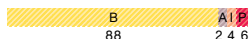
252,578

542,040

Population structure (%)



Distribution built area (%)



## TERRITORY



Southampton

SOU



Portsmouth

PME

Area (km<sup>2</sup>)

50

41

Density (per km<sup>2</sup>)

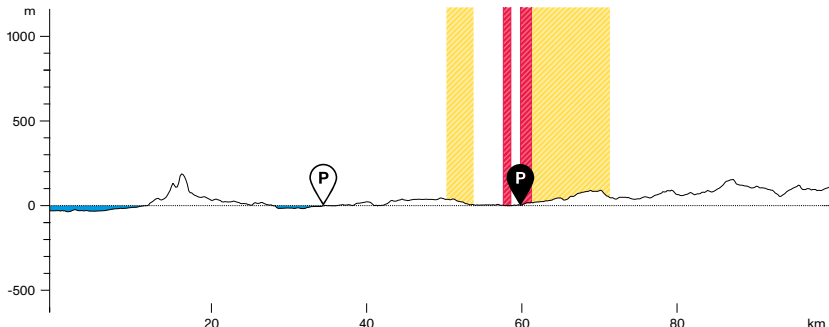
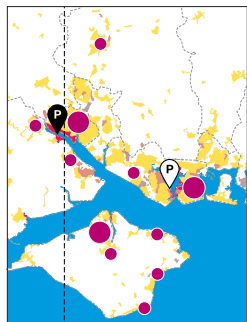
5,059

5,321

Population

254,361

216,023

Natura2000 (km<sup>2</sup>)




PORT




LEH (%)

100

	LEH
Liquid	1,657
Dry bulk	9
Container	2,129
Specialized	420
General	494
Cruise ship	131
Passenger	
Other	251

Vessels 5,091

	LEH
Liquid bulk	36,132
Dry bulk	1,225
Containers	21,932
RoRo	844
Other	40

Cargo (t) 60,173



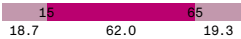

Passengers 172

CITY



LEH

City of Le Havre  
→ Paris 178

→ Capital national (km)	
→ Capital regional (km)	
Area (km²)	86
Built-up area (km²)	65
Density (per km²)	2,262
Population	195,042
Population structure (%)	
Distribution built area (%)	

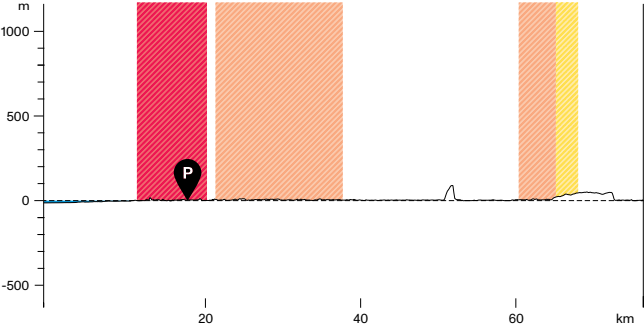
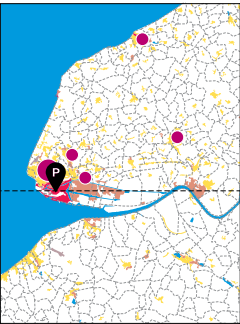
TERRITORY



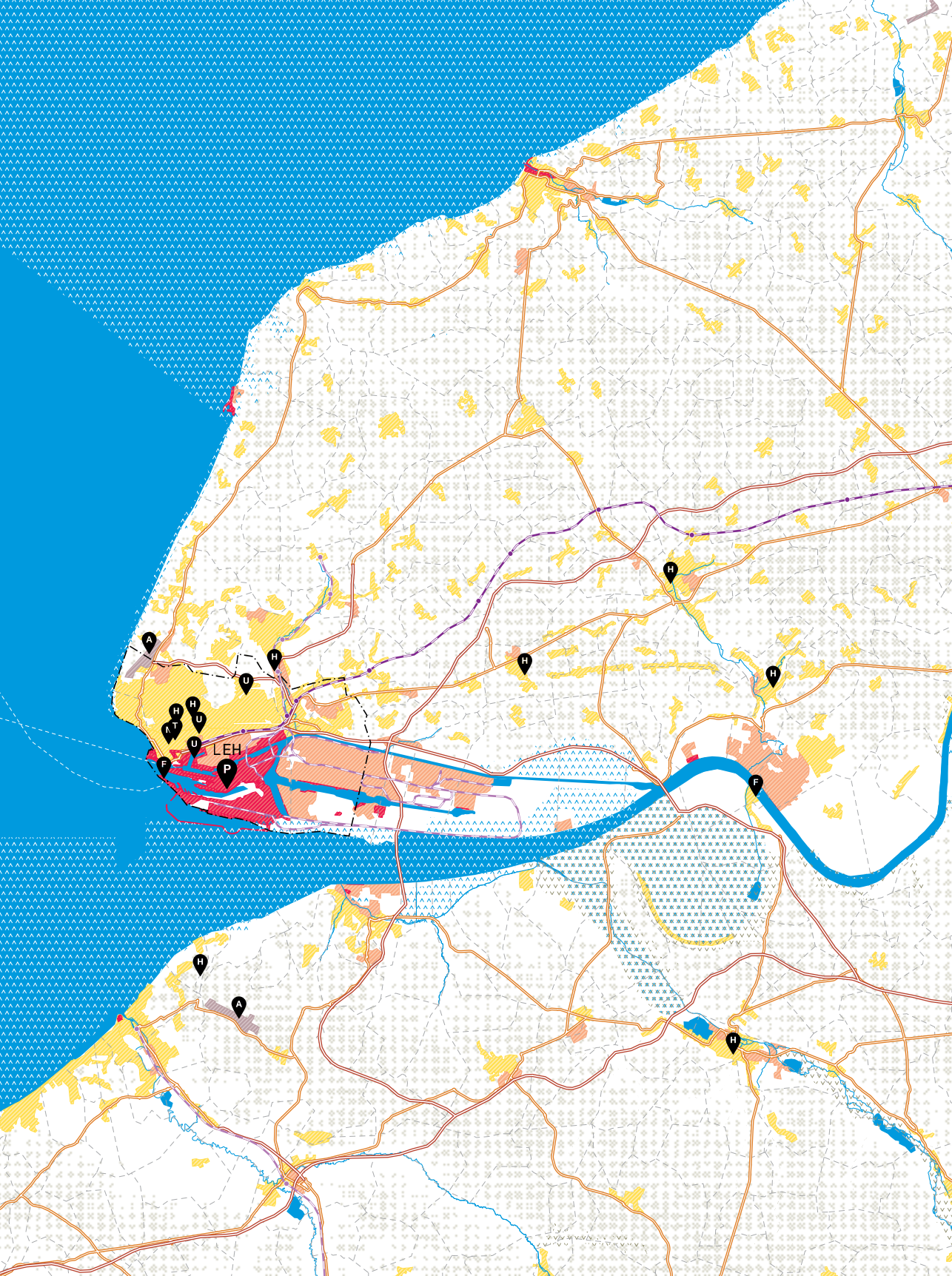
LEH

Seine-Maritime

Area (km²)	6,301
Density (per km²)	199
Population	1,254,436
Natura2000 (km²)	









PORT



NTE (%)

100



NTE

Liquid	865	
Dry bulk	679	
Container	250	
Specialized	208	
General	165	
Cruise ship	10	
Passenger		
Other	414	

Vessels 2,591



NTE

Liquid bulk	22,633	
Dry bulk	5,339	
Containers	1,404	
RoRo	465	
Other	314	

Cargo (t) 30,155



Passengers 0

CITY



NTE

City of Saint-Nazaire  
→ Paris 382

→ Capital national (km)

→ Capital regional (km)

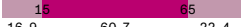
Area (km²) 48

Built-up area (km²) 31

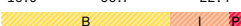
Density (per km²) 1,461

Population 69,993

Population structure (%)



Distribution built area (%)



TERRITORY



NTE

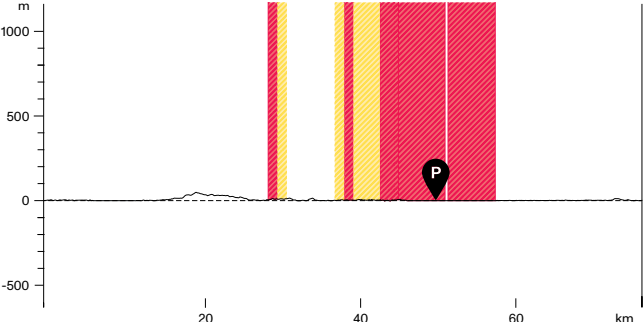
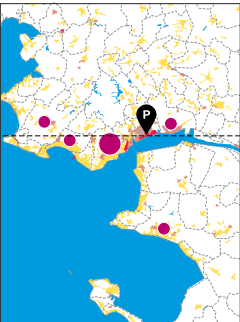
Loire-Atlantique

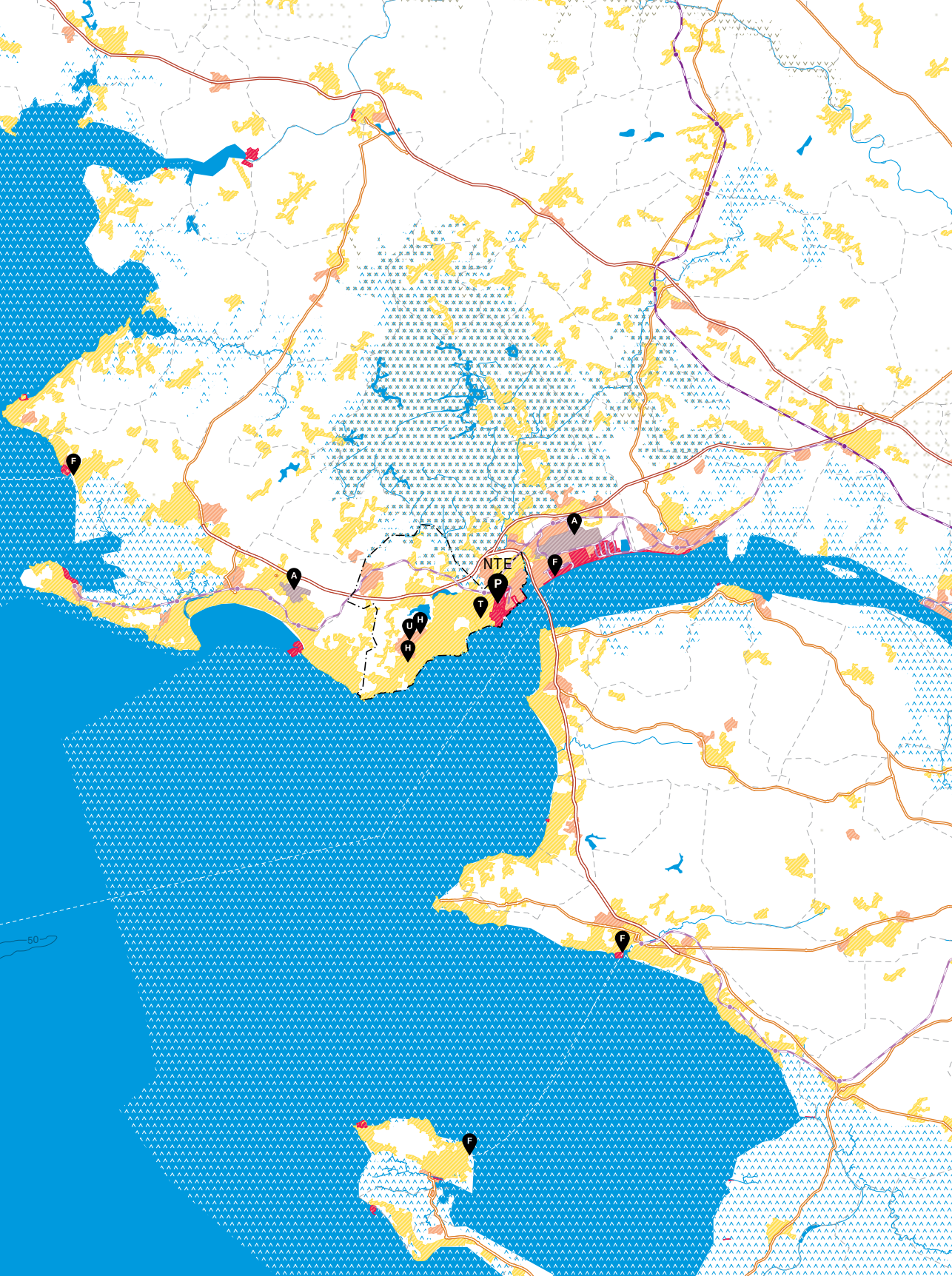
Area (km²) 6,876

Density (per km²) 208

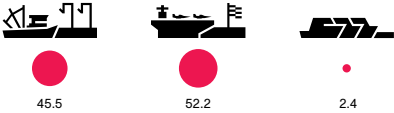
Population 1,427,913

Natura2000 (km²)





PORT



LRH (%)

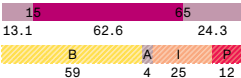
	LRH	
Liquid	219	
Dry bulk	108	
Container	24	
Specialized		
General	460	
Cruise ship		
Passenger		
Other	31	
Vessels	842	

	LRH	
Liquid bulk	3,174	
Dry bulk	5,802	
Containers	40	
RoRo		
Other	744	
Cargo (t)	9,763	
Passengers	0	

CITY

	LRH
City of La Rochelle	
→ Paris	400

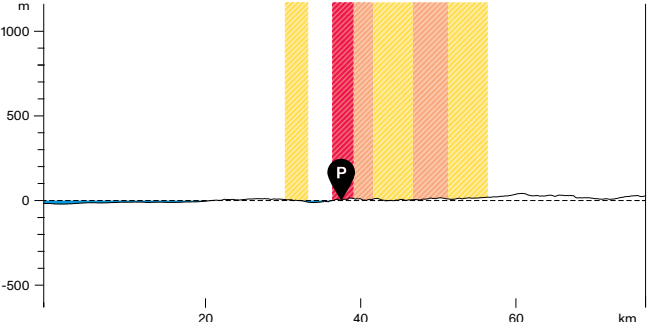
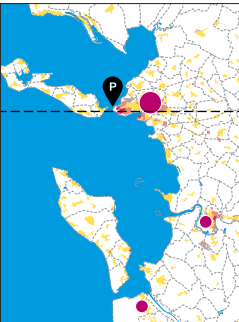
→ Capital national (km)	
→ Capital regional (km)	
Area (km²)	38
Built-up area (km²)	38
Density (per km²)	2,198
Population	82,783
Population structure (%)	
Distribution built area (%)	



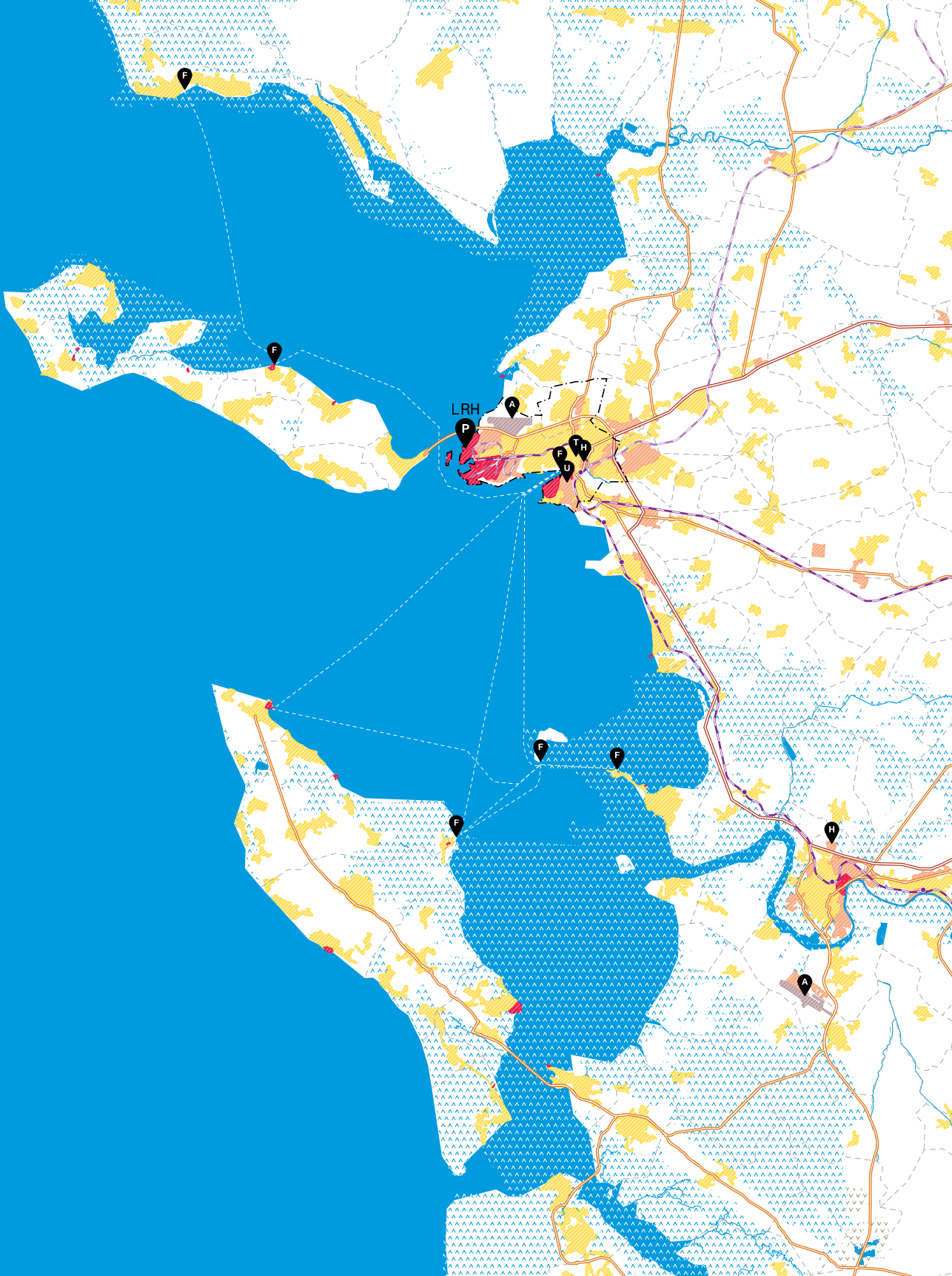
TERRITORY

	LRH
Charente-Maritime	

Area (km²)	6,877
Density (per km²)	94
Population	648,837
Natura2000 (km²)	














PORT









BOD (%)



100

	BOD	
Liquid	320	
Dry bulk	139	
Container	49	
Specialized		
General	205	
Cruise ship	50	
Passenger		
Other	9	

Vessels	767	
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	BOD	
Liquid bulk	4,727	
Dry bulk	1,444	
Containers	248	
RoRo		
Other	80	

Cargo (t)	6,499	
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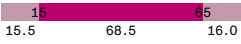

	Passengers	1	
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CITY



BOD


City of Bordeaux	
→ Paris	499

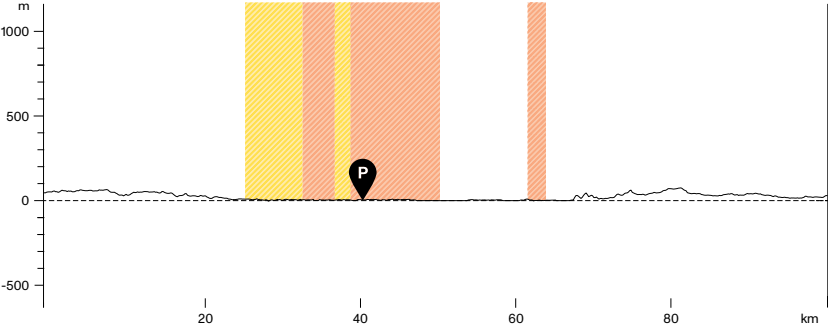
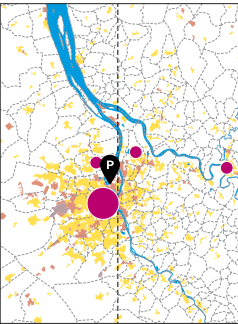
→ Capital national (km)	
→ Capital regional (km)	
Area (km²)	246
Built-up area (km²)	133
Density (per km²)	2,642
Population	650,138
Population structure (%)	
Distribution built area (%)	

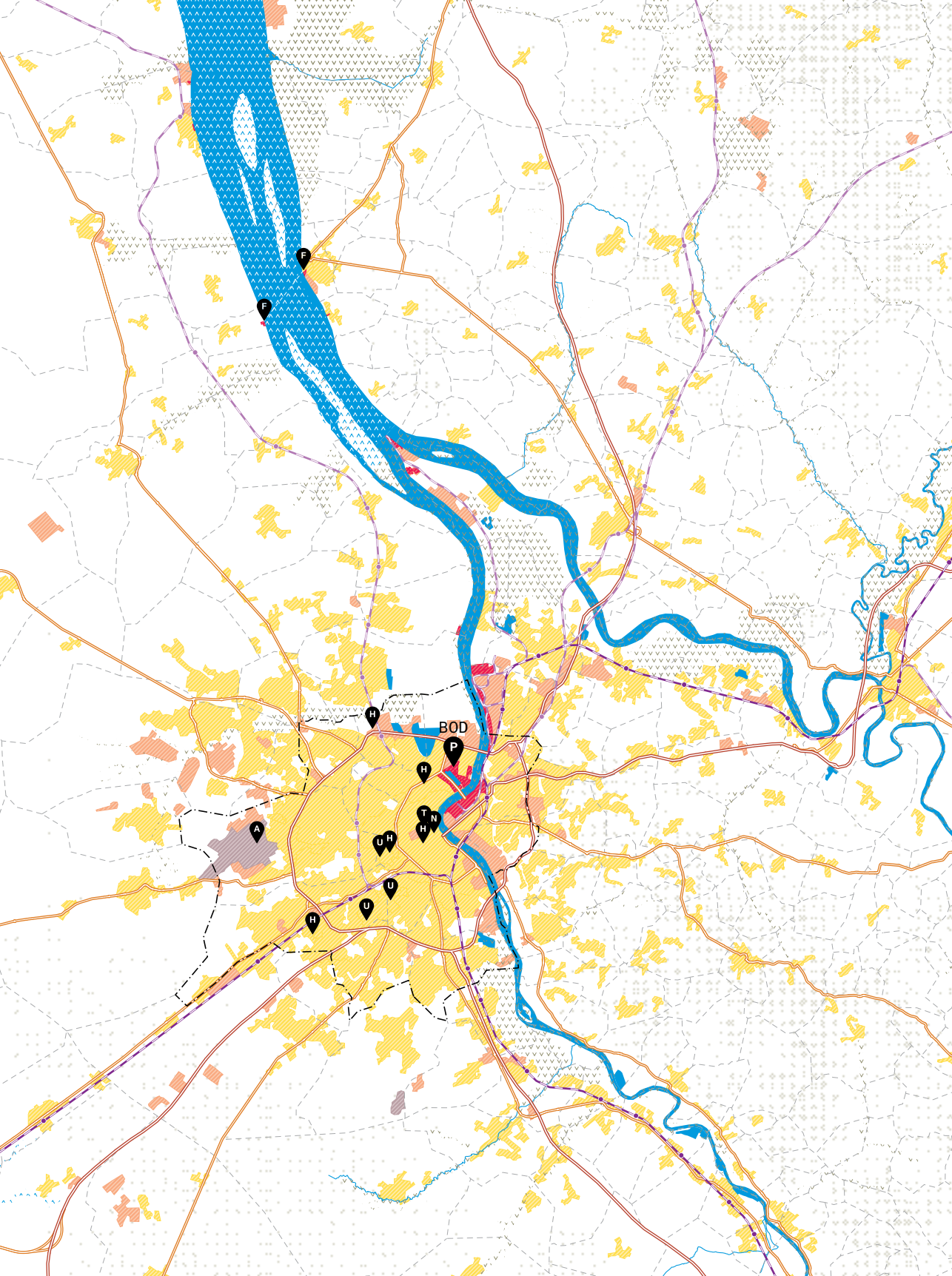
TERRITORY



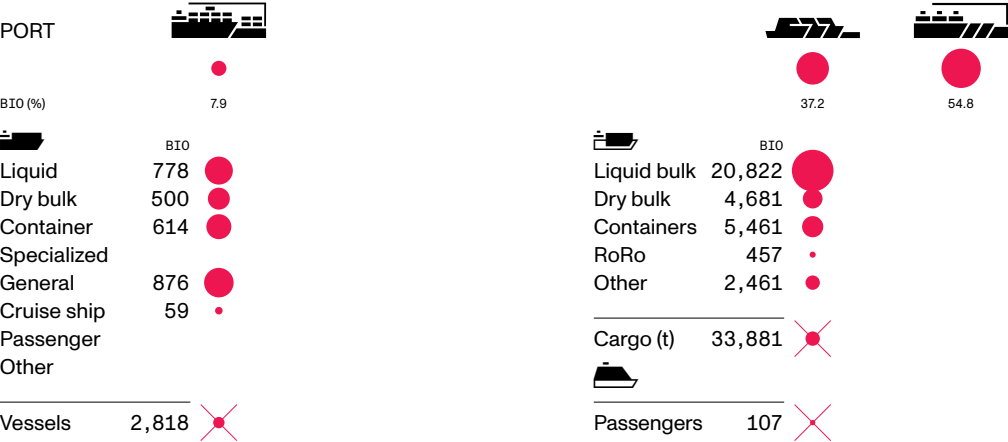
BOD

Gironde	
Area (km²)	10,084
Density (per km²)	161
Population	1,619,190
Natura2000 (km²)	

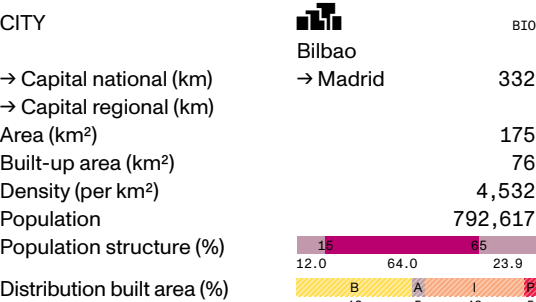




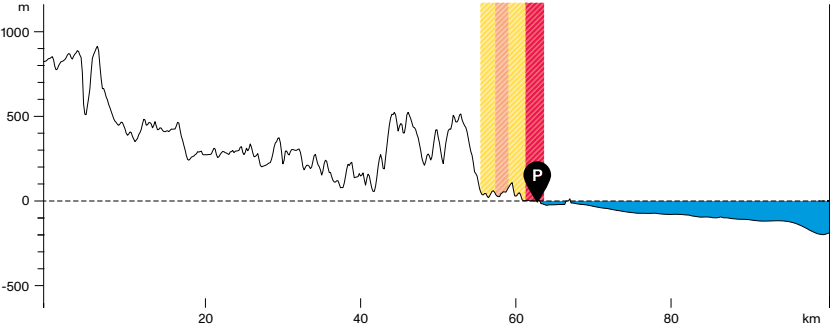
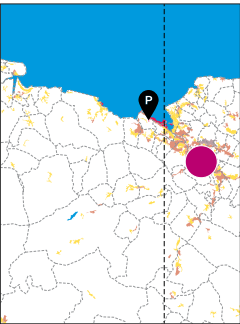
PORT



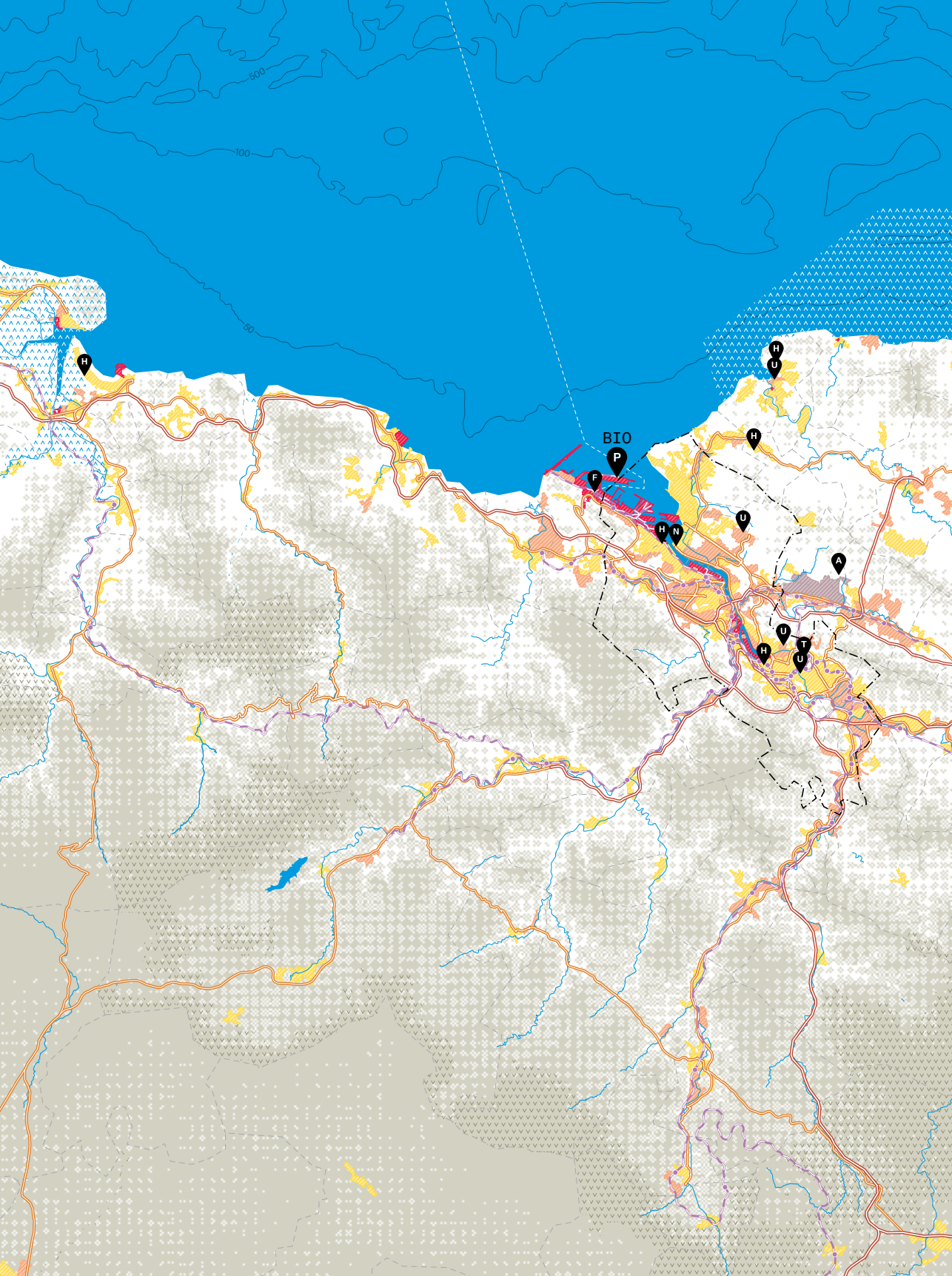
CITY



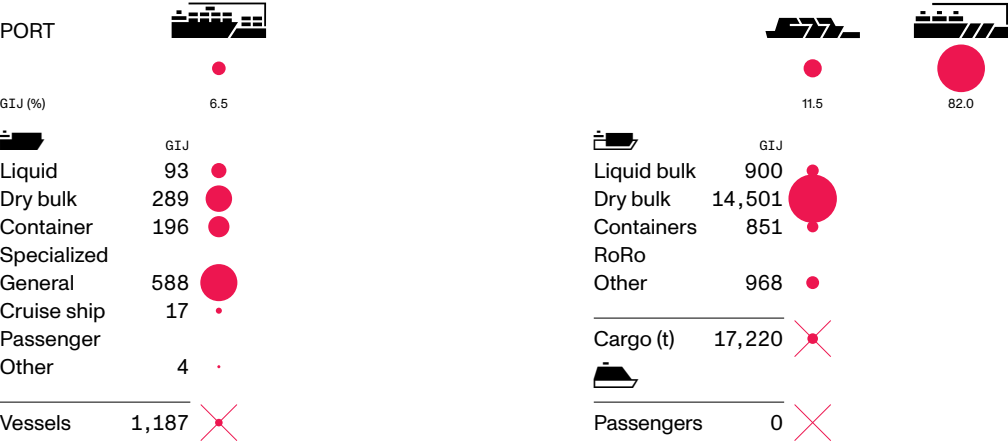
TERRITORY



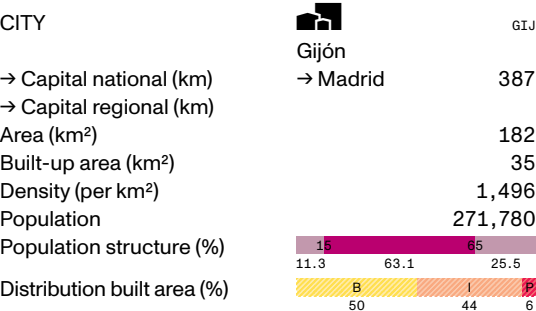




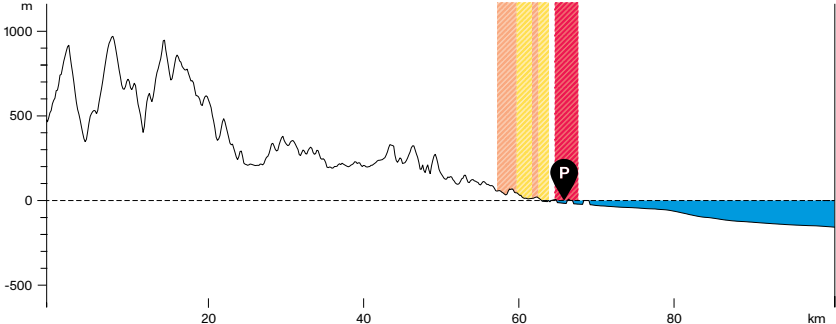
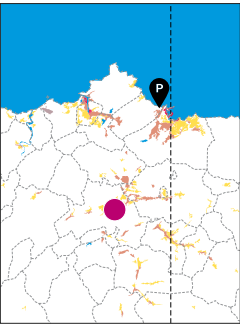
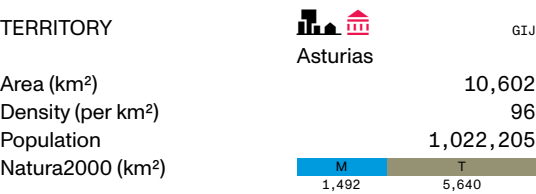
PORT

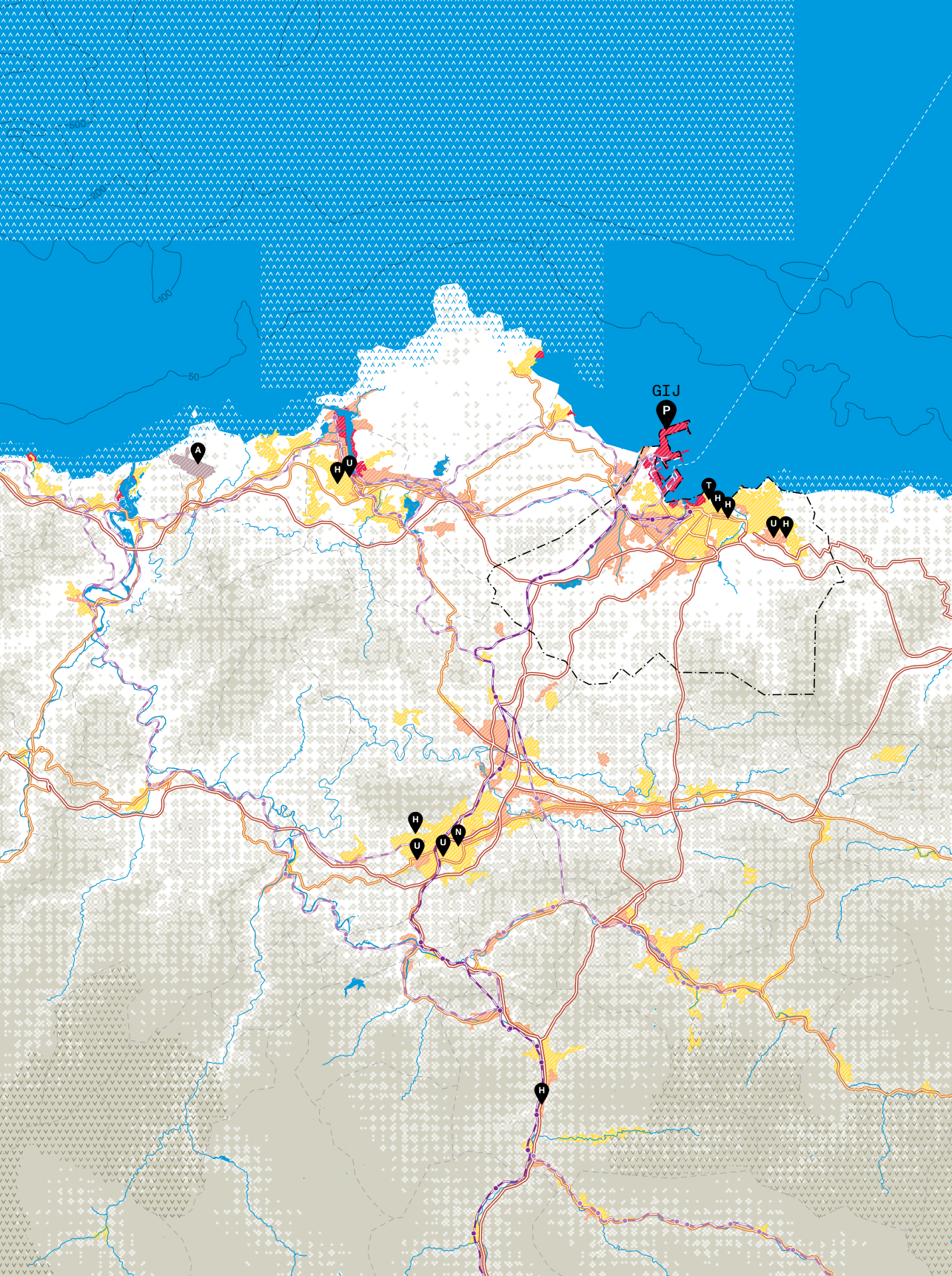


CITY



TERRITORY





LCG

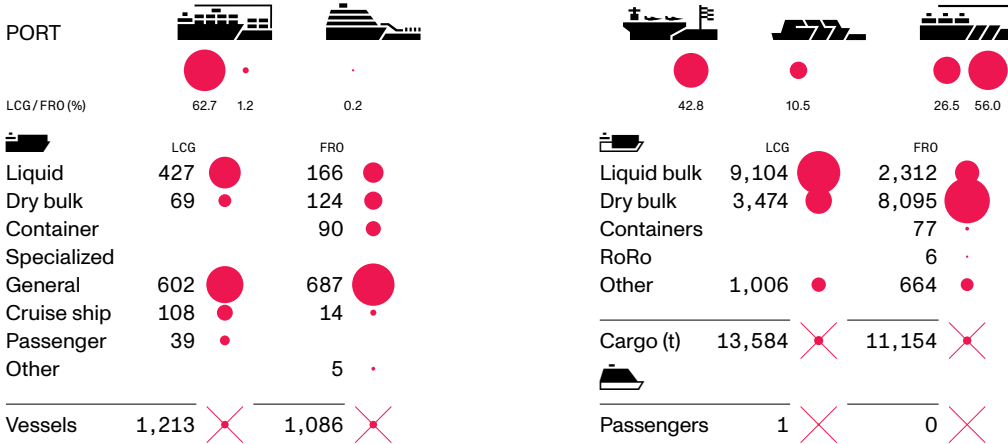
FRO

# La Coruña, ES Ferrol, ES

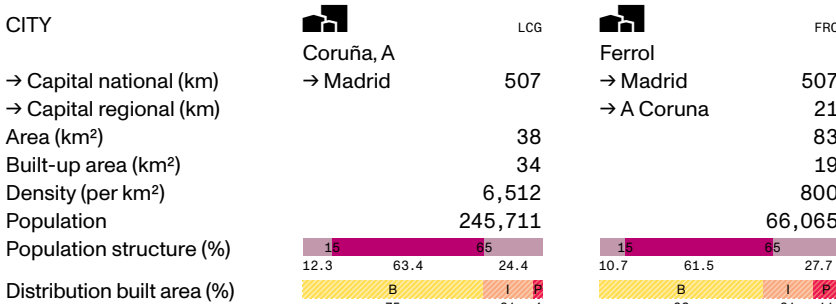
 Ria da Coruña

 Ria de Ferrol

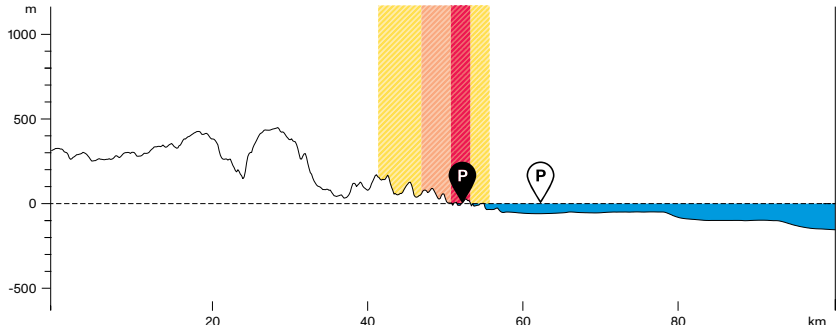
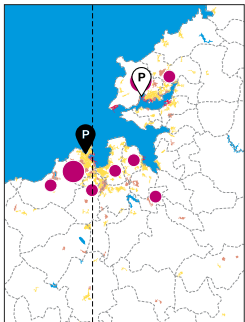
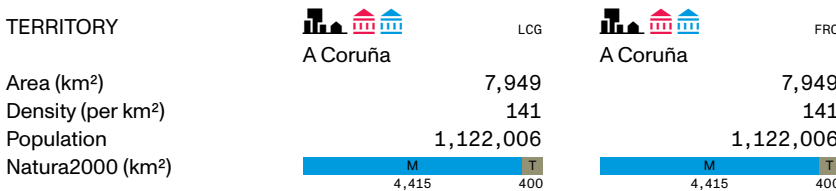
## PORT



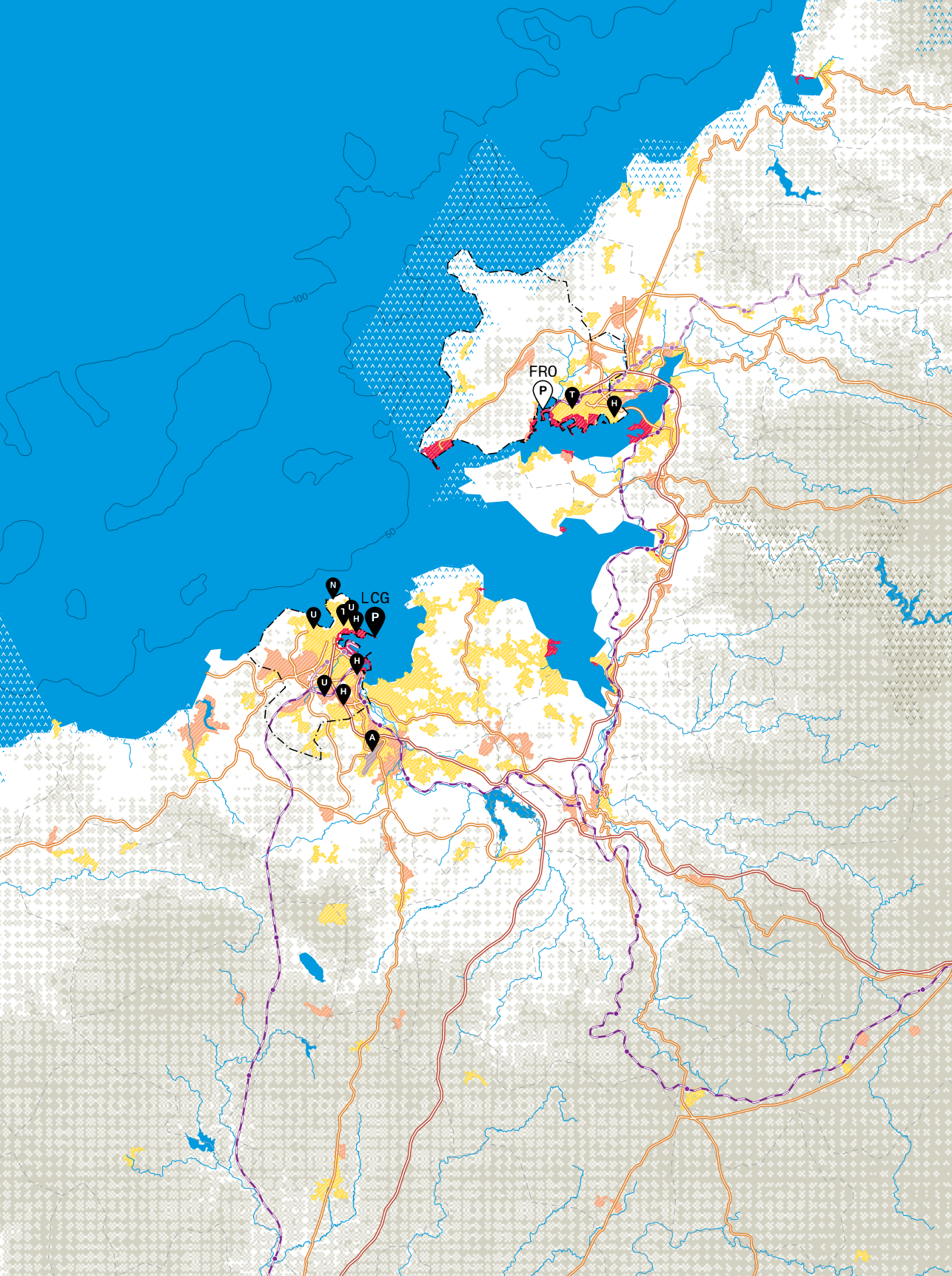
## CITY



## TERRITORY









PORT



LEI (%)

37.4



LEI

Liquid	373	
Dry bulk	87	
Container	1,124	
Specialized	17	
General	853	
Cruise ship	100	
Passenger		
Other		

Vessels 2,550



62.6



LEI

Liquid bulk	7,758	
Dry bulk	2,606	
Containers	5,481	
RoRo	1,047	
Other	1,032	

Cargo (t) 17,924



Passengers 1



CITY



LEI

Porto

275

→ Capital national (km)

→ Capital regional (km)

Area (km²)

479

Built-up area (km²)

255

Density (per km²)

1,986

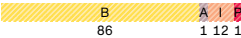
Population

951,805

Population structure (%)



Distribution built area (%)



TERRITORY



LEI

Metropolitana do Porto

Area (km²)

2,040

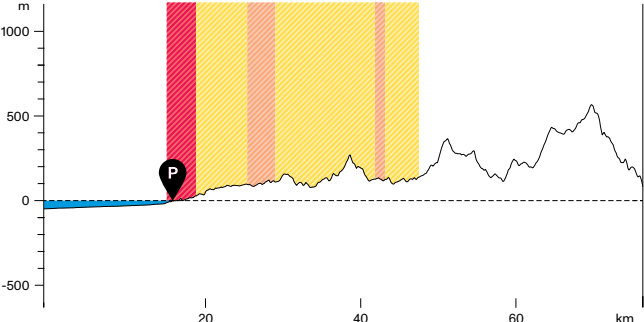
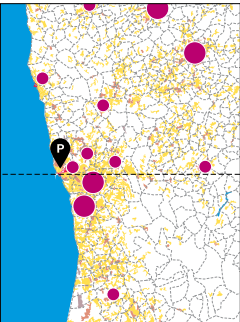
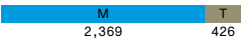
Density (per km²)

844

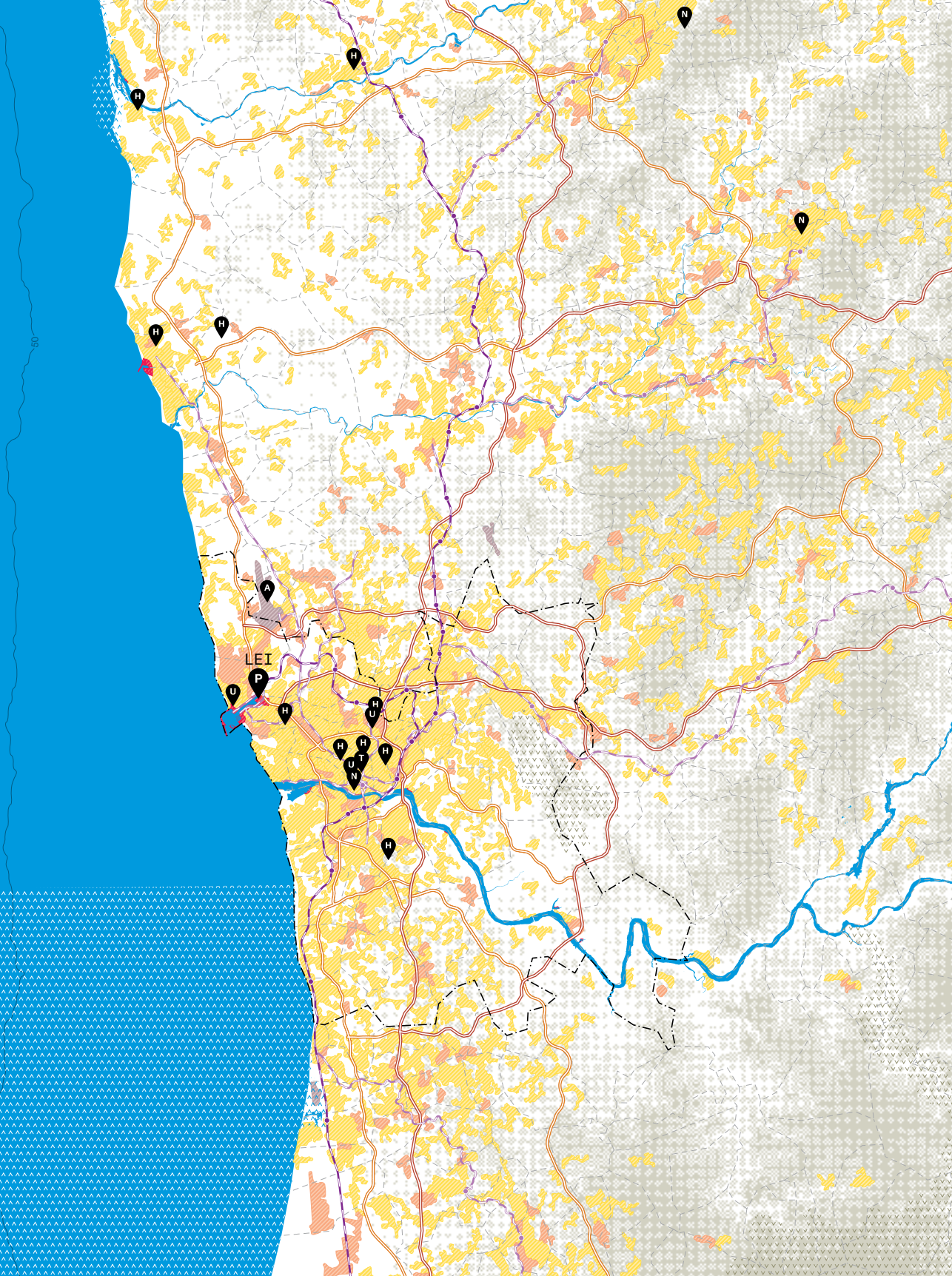
Population

1,722,374

Natura2000 (km²)







LIS

SET

# Lisboa, PT

## Setúbal, PT



Tagus River



Sado Estuary

PORT



LIS/SET (%)

5.2 29.1

1.5

5.1

2.8

2.5

81.4

6.6 65.8



LIS

SET

Liquid  
Dry bulk  
Container  
Specialized  
General  
Cruise ship  
Passenger  
Other

430  
240  
844  
18  
675  
317

159  
57  
300  
376  
562



LIS

SET

Liquid bulk  
Dry bulk  
Containers  
RoRo  
Other

1,661  
4,925  
3,710  
9  
160

367  
3,446  
1,136  
518  
1,268

Cargo (t) 10,465

6,735



Passengers 73

0

Vessels 2,523

1,461

CITY



Lisboa  
→ Lisboa

LIS



Setúbal  
→ Lisboa  
→ Porto

SET

→ Capital national (km)

0

31

→ Capital regional (km)

299

Area (km<sup>2</sup>)

637

170

Built-up area (km<sup>2</sup>)

368

49

Density (per km<sup>2</sup>)

2,921

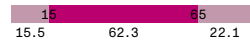
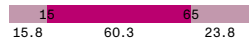
680

Population

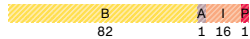
1,859,838

115,758

Population structure (%)



Distribution built area (%)



TERRITORY



LIS

Metropolitana de Lisboa



SET

Metropolitana de Lisboa

Area (km<sup>2</sup>)

2,853

2,853

Density (per km<sup>2</sup>)

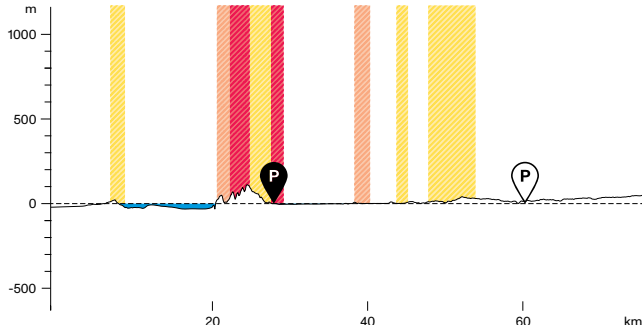
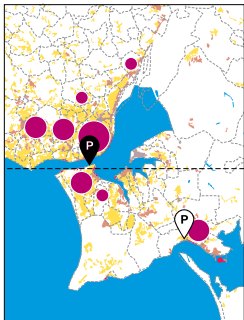
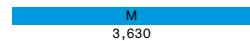
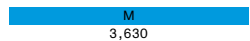
998

998

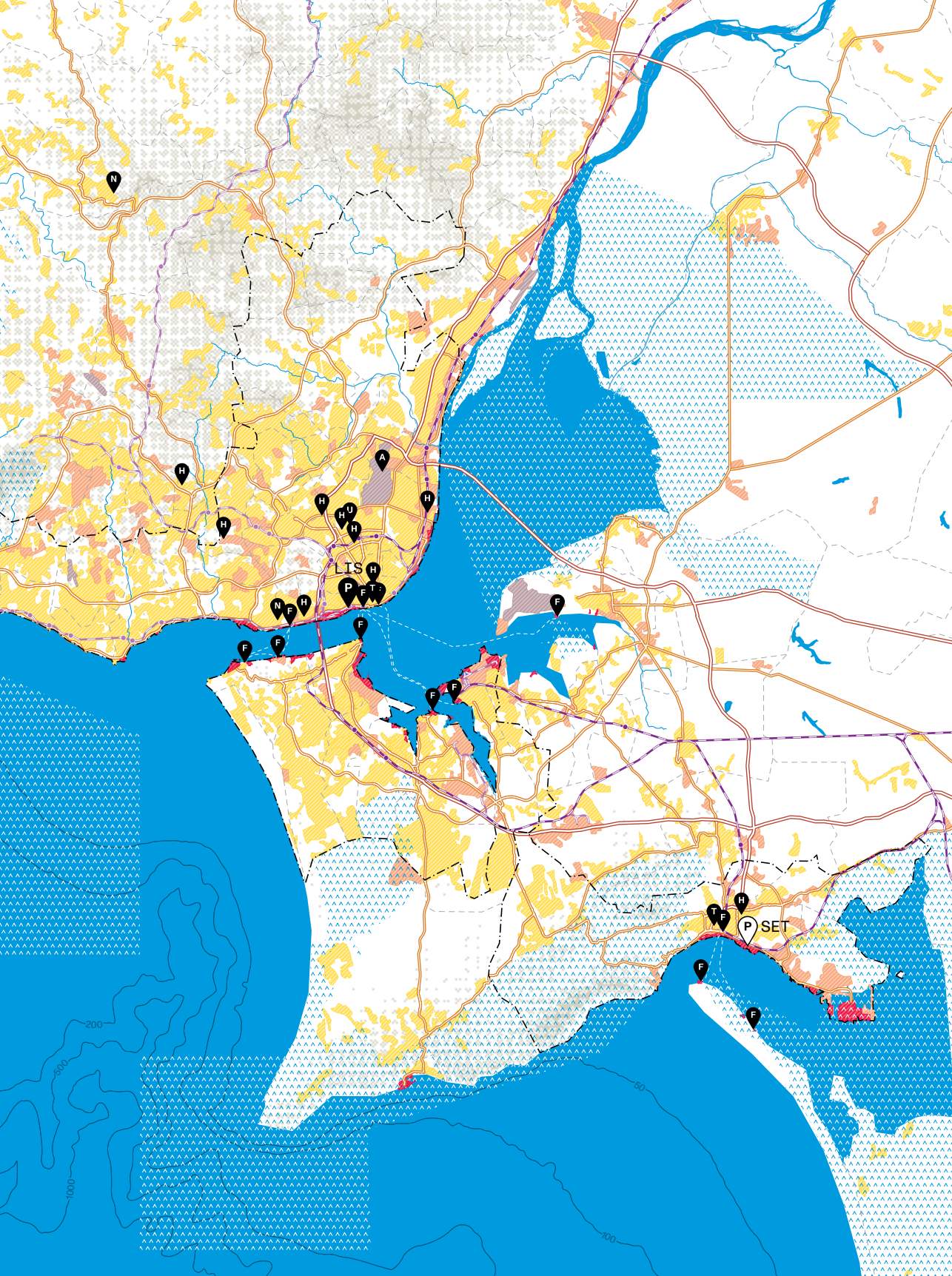
Population

2,846,332

2,846,332

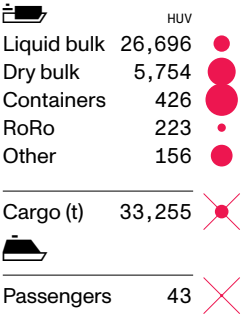
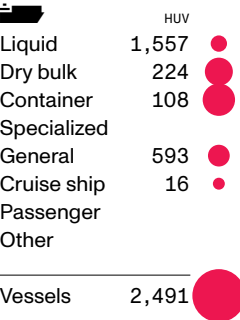
Natura2000 (km<sup>2</sup>)



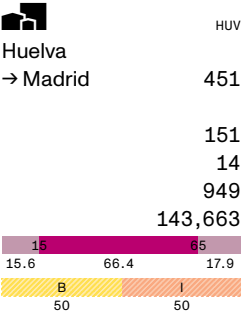


PORT

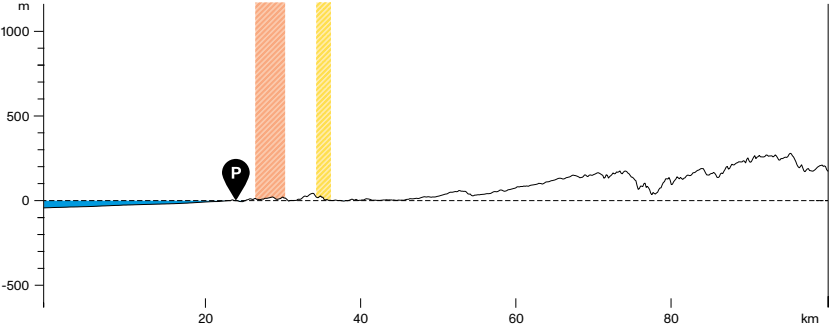
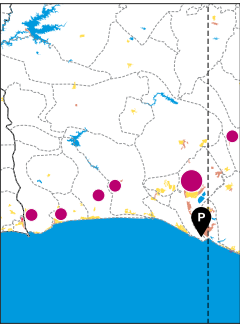
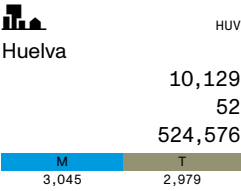
HUV (%)



CITY



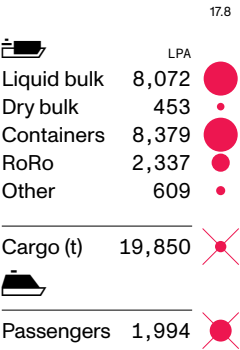
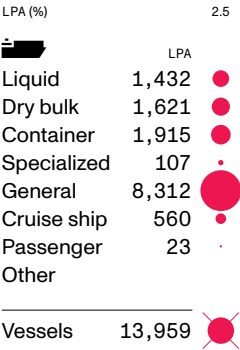
TERRITORY







PORT

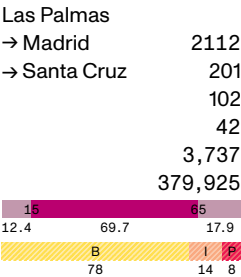


79.8

CITY



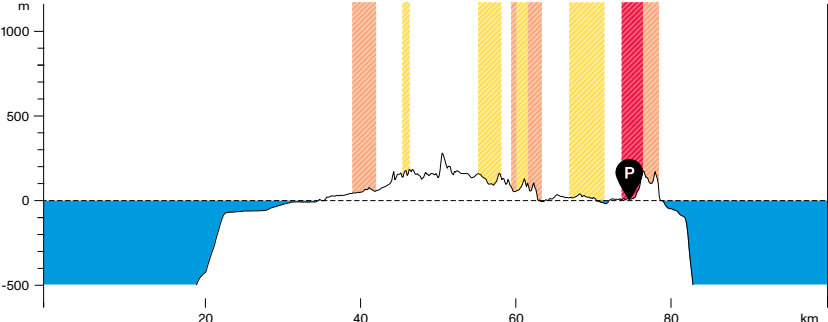
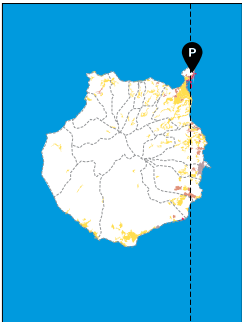
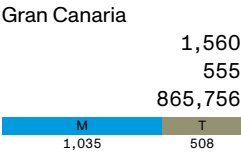
LPA



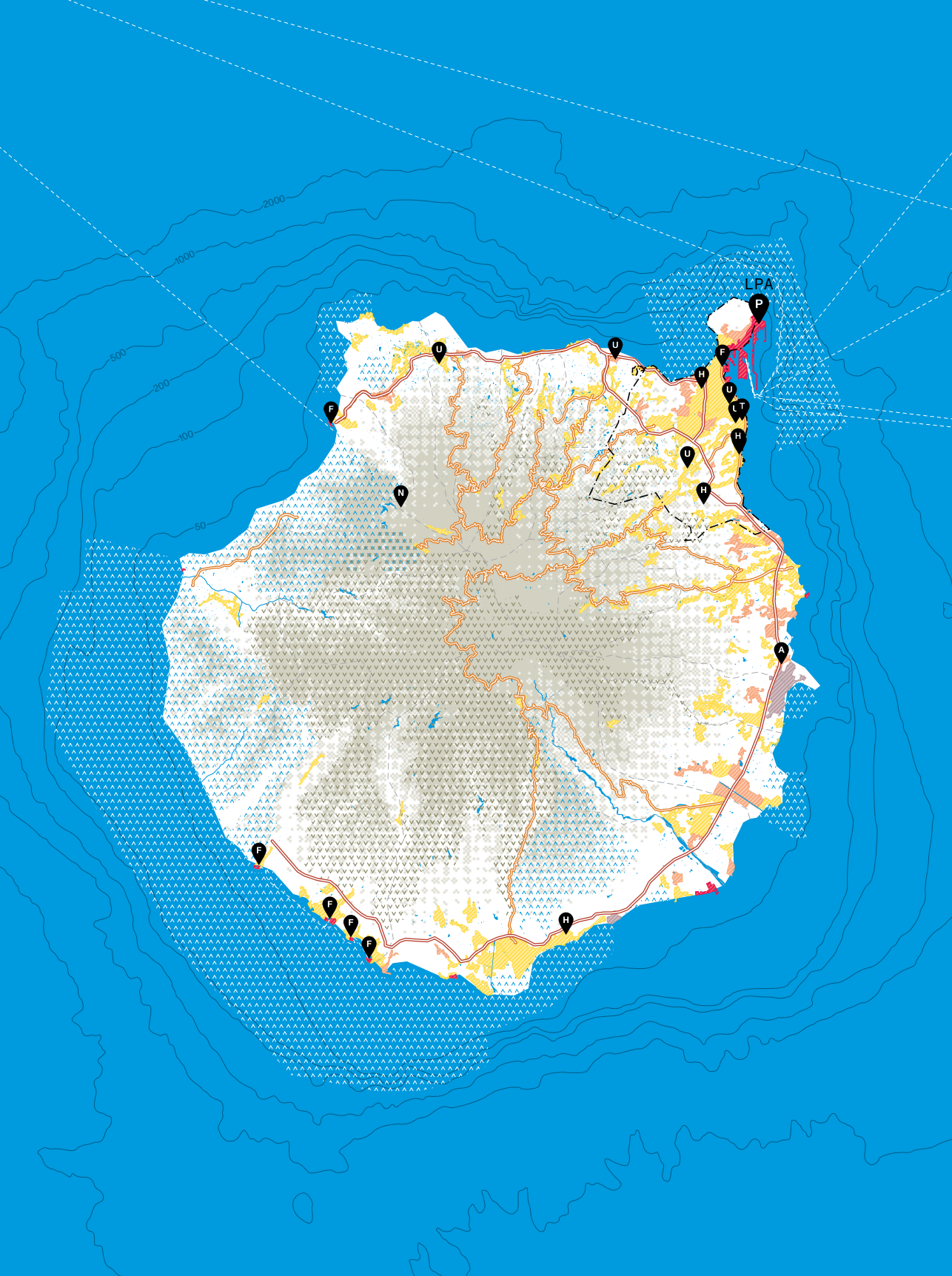
TERRITORY



LPA









PORT



SCT (%)

1.8

61.8

36.4



SCT

Liquid	814	●
Dry bulk	149	●
Container	907	●
Specialized	18	●
General	6,124	●
Cruise ship	511	●
Passenger	7,623	●
Other		



SCT

Liquid bulk	4,812	●
Dry bulk	422	●
Containers	2,170	●
RoRo	2,338	●
Other	46	●

Cargo (t) 9,788



Passengers 5,615

Vessels 16,132

CITY



SCT

Santa Cruz de Tenerife

→ Capital national (km)

→ Madrid 2136

→ Capital regional (km)

→ Las Palmas 101

Area (km²)

253

Built-up area (km²)

58

Density (per km²)

1,445

Population

364,815

Population structure (%)



Distribution built area (%)



TERRITORY



SCT

Tenerife

Area (km²)

2,035

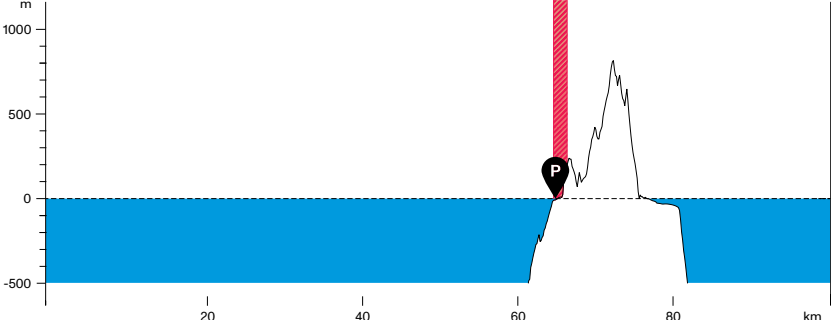
Density (per km²)

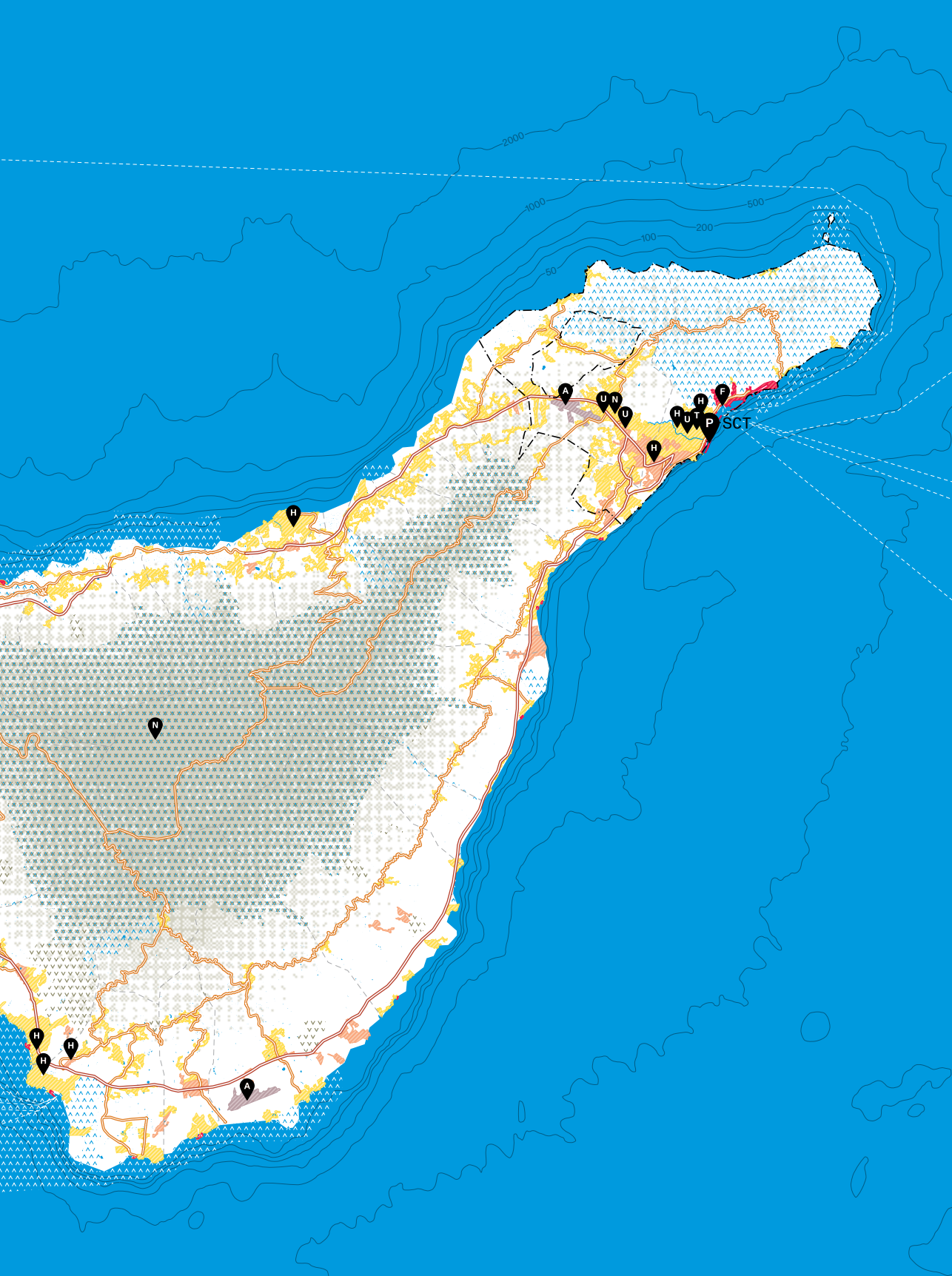
467

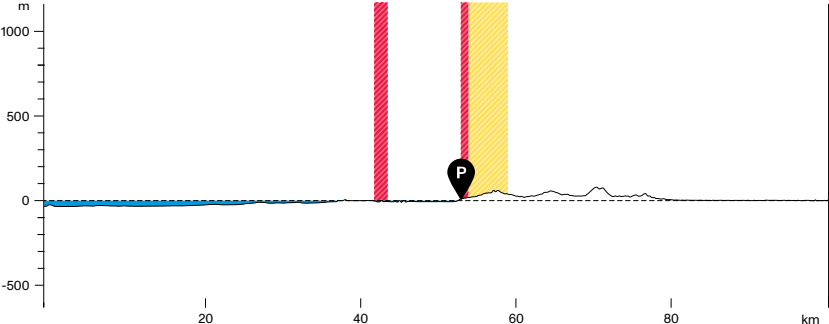
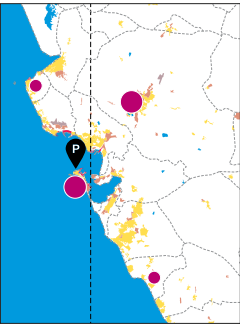
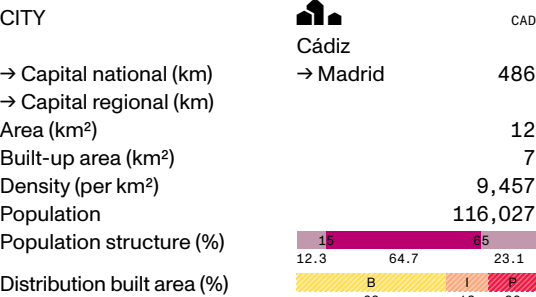
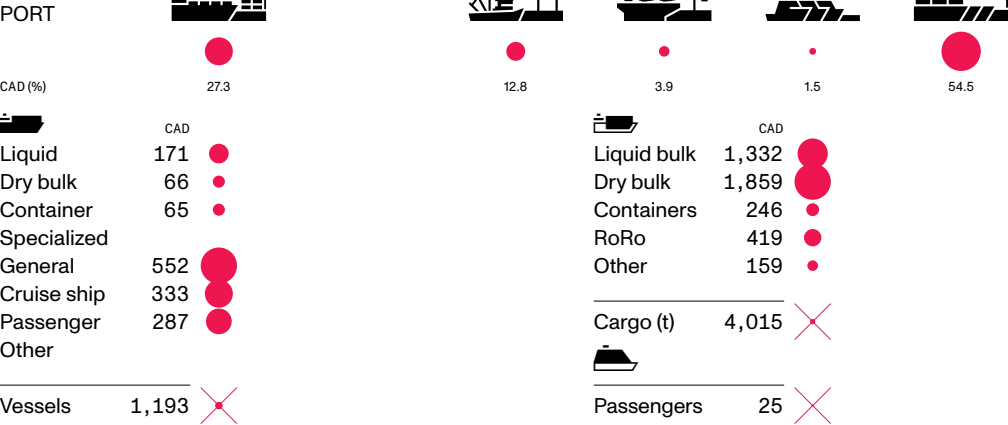
Population

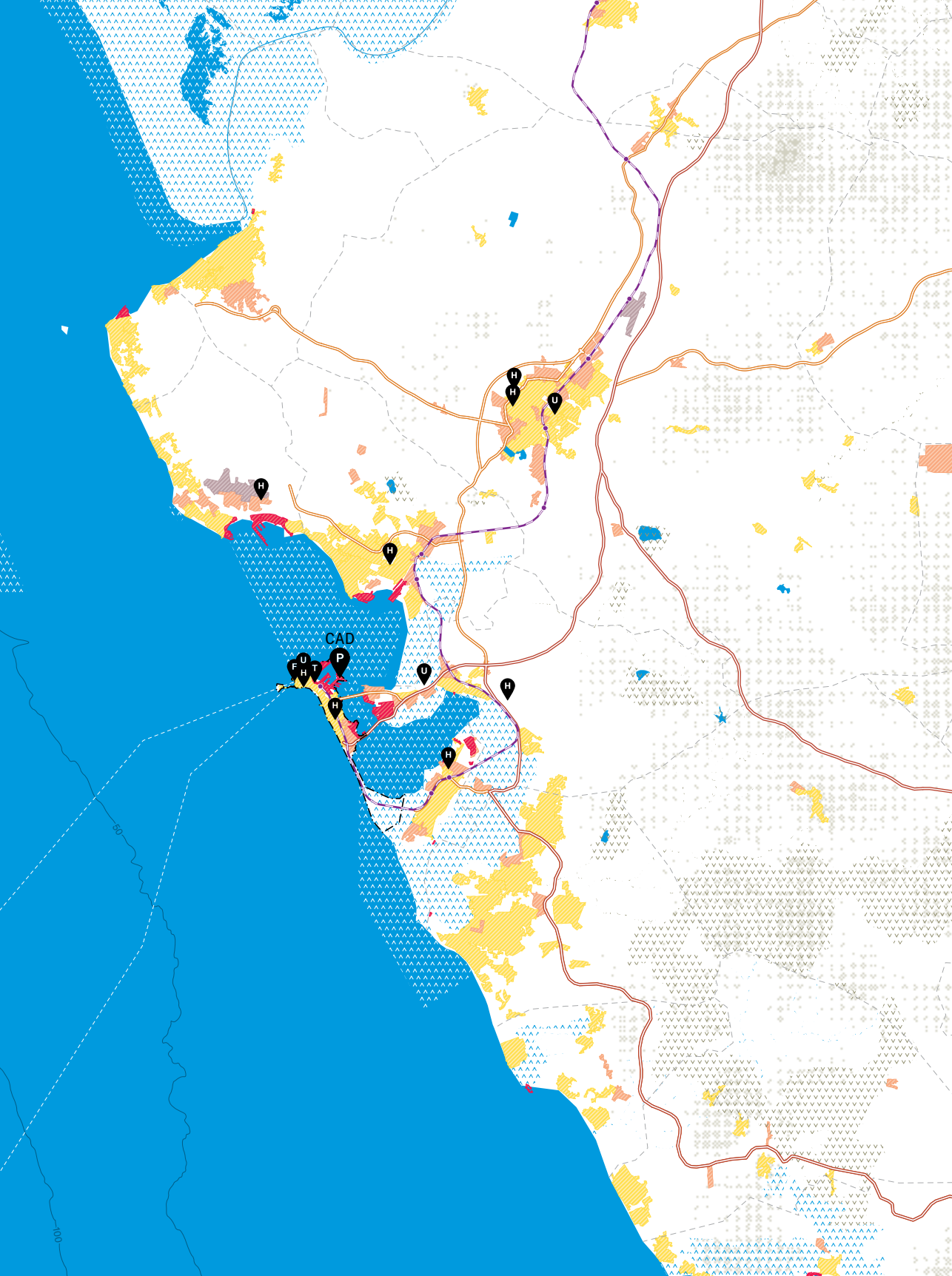
949,471

Natura2000 (km²)









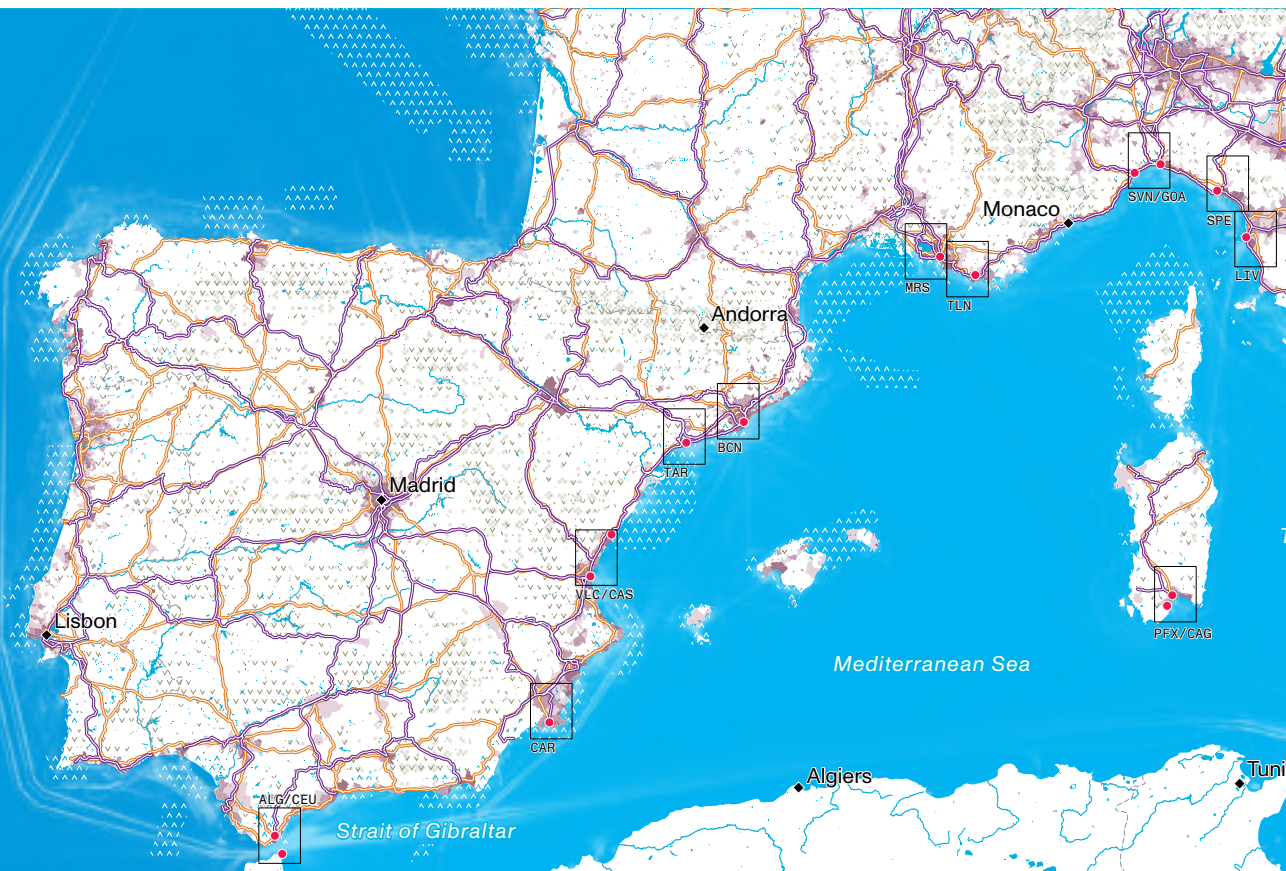


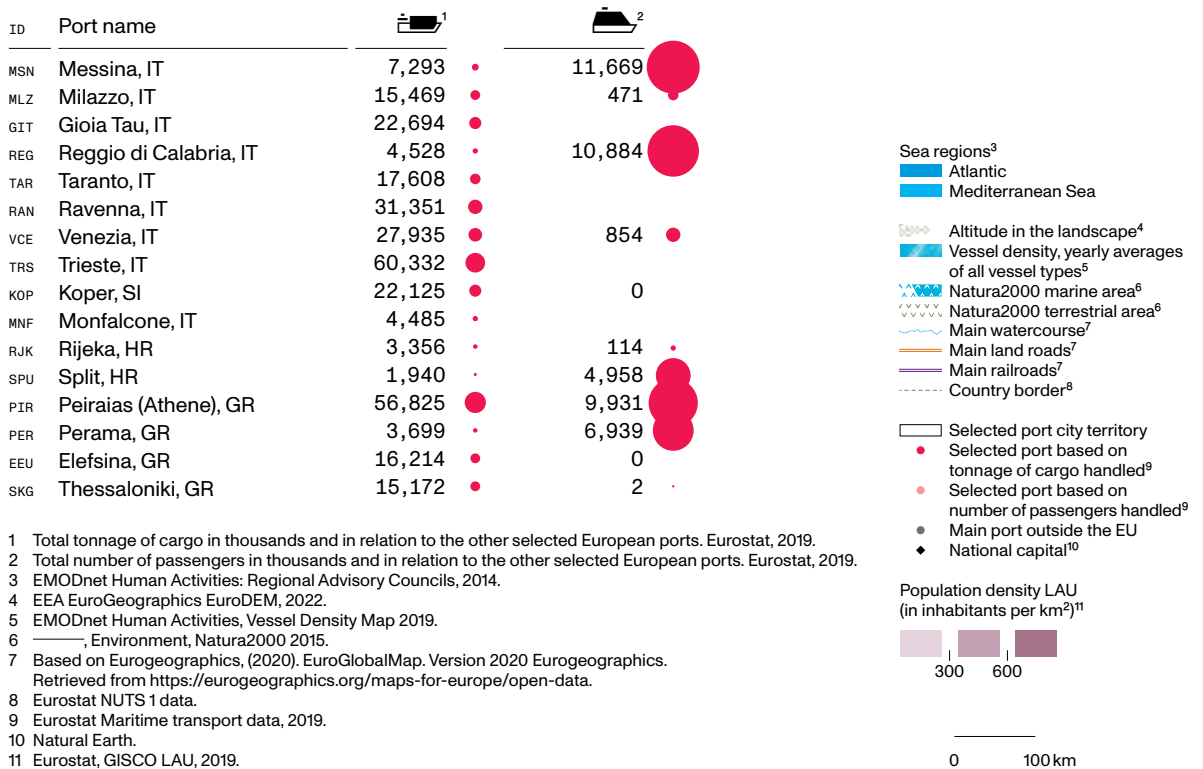


# Mediterranean Sea

## Map and Statistics

ID	Port name	 <sup>1</sup>	 <sup>2</sup>
ALG	Algeciras, ES	89,908	6,148
CEU	Ceuta, MA	1,247	2,102
CAR	Cartagena, ES	33,933	1
VLC	Valencia, ES	65,308	757
CAS	Castellón, ES	20,265	0
TAR	Tarragona, ES	32,584	31
BCN	Barcelona, ES	54,713	3,239
MRS	Marseille, FR	74,049	1,705
TLN	Toulon, FR	1,742	1,749
GOA	Genova, IT	49,698	2,881
SVN	Savona, IT	13,450	806
SPE	La Spezia, IT	18,805	
LIV	Livorno, IT	36,262	2,941
CVV	Civitavecchia (Roma), IT	9,527	2,886
NAP	Napoli, IT	15,431	9,257
PFX	Porto Foxi, IT	28,818	
CAG	Cagliari, IT	12,680	389
PMO	Palermo, IT	10,047	2,017
SIR	Siracusa, IT	12,132	





1 Total tonnage of cargo in thousands and in relation to the other selected European ports. Eurostat, 2019.

2 Total number of passengers in thousands and in relation to the other selected European ports. Eurostat, 2019.

3 EMODnet Human Activities: Regional Advisory Councils, 2014.

4 EEA EuroGeographics EuroDEM, 2022.

5 EMODnet Human Activities, Vessel Density Map 2019.

6 —, Environment, Natura2000 2015.

7 Based on Eurogeographics, (2020). EuroGlobalMap. Version 2020 Eurogeographics.

Retrieved from <https://eurogeographics.org/maps-for-europe/open-data>.

8 Eurostat NUTS 1 data.

9 Eurostat Maritime transport data, 2019.

10 Natural Earth.

11 Eurostat, GISCO LAU, 2019.



ALG

CEU

# Algeciras, ES

## Ceuta, MA

  Strait of Gibraltar

  Strait of Gibraltar

## PORT

ALG / CEU (%)

	ALG	CEU
Liquid	2,805	1,017
Dry bulk	517	446
Container	3,440	62
Specialized	43	
General	3,312	9,551
Cruise ship		7
Passenger	18,840	7187
Other		

Vessels 28,957 11,084

	ALG	CEU
Liquid bulk	30,703	872
Dry bulk	849	24
Containers	53,772	80
RoRo	1,251	271
Other	3,333	0

Cargo (t) 89,908 1,247

Passengers 6,148 2,102

## CITY

 Algeciras

ALG

→ Capital national (km)

→ Madrid

499

→ Capital regional (km)

Area (km<sup>2</sup>)

86

Built-up area (km<sup>2</sup>)

19

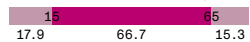
Density (per km<sup>2</sup>)

1,421

Population

121,957

Population structure (%)



Distribution built area (%)


 Ceuta

CEU

→ Rabat

249

Area (km<sup>2</sup>)

20

Built-up area (km<sup>2</sup>)

8

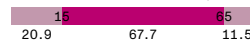
Density (per km<sup>2</sup>)

4,287

Population

84,777

Population structure (%)



Distribution built area (%)



## TERRITORY

 Cádiz

ALG

Area (km<sup>2</sup>)

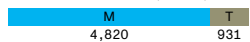
7,438

Density (per km<sup>2</sup>)

168

Population

1,249,739

Natura2000 (km<sup>2</sup>)
 Ceuta

CEU

Area (km<sup>2</sup>)

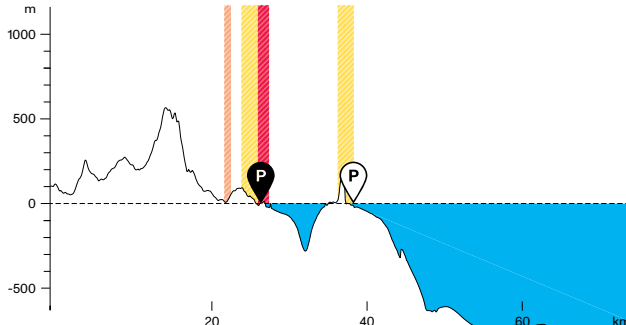
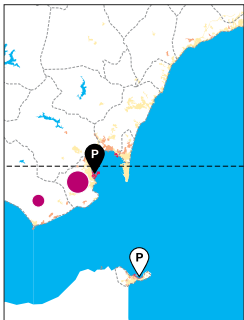
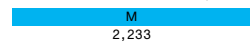
20

Density (per km<sup>2</sup>)

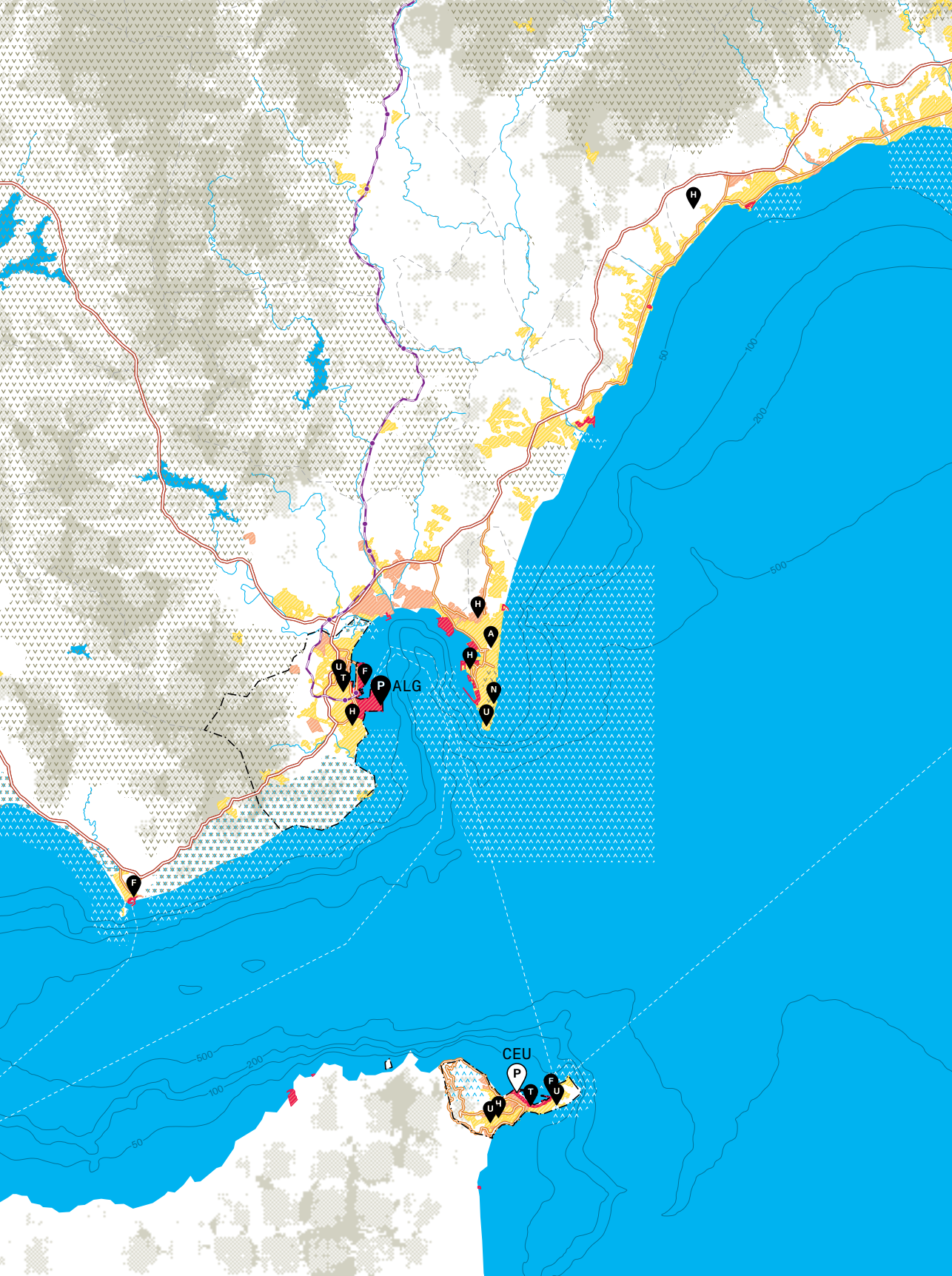
4,241

Population

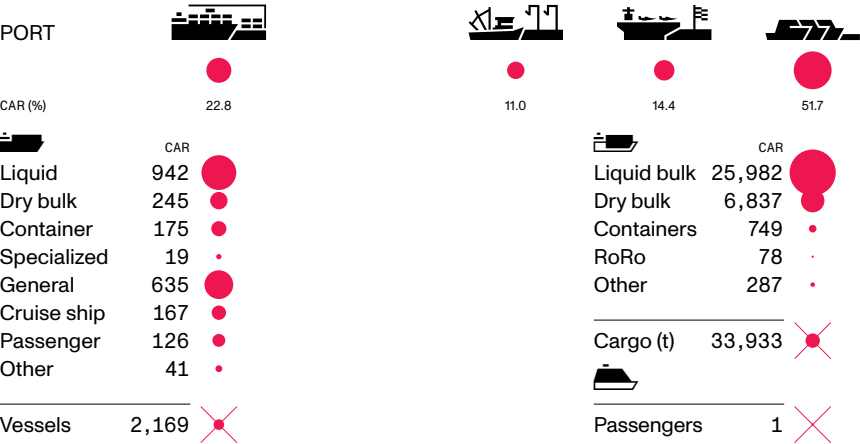
84,829

Natura2000 (km<sup>2</sup>)

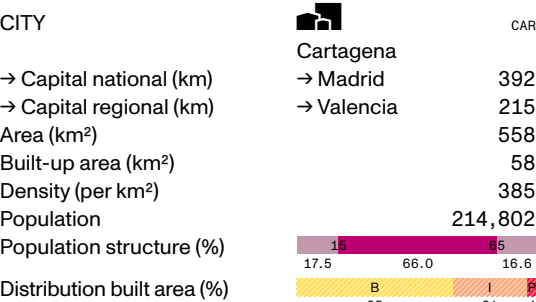




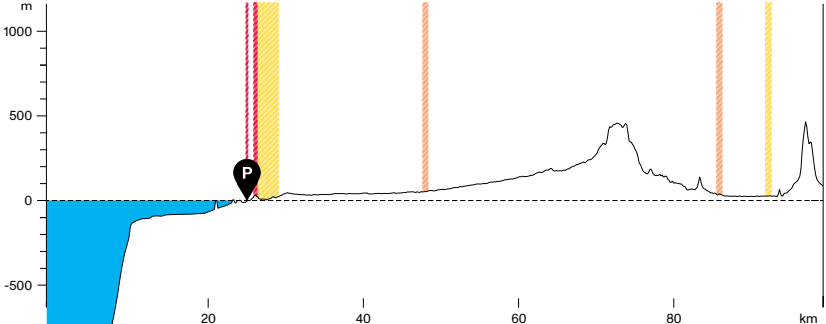
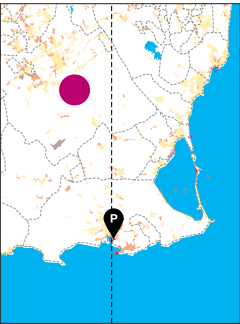
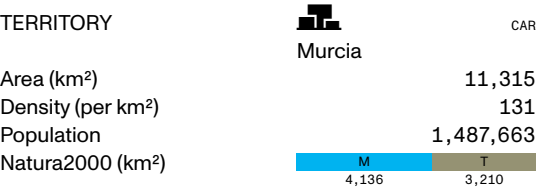
PORT

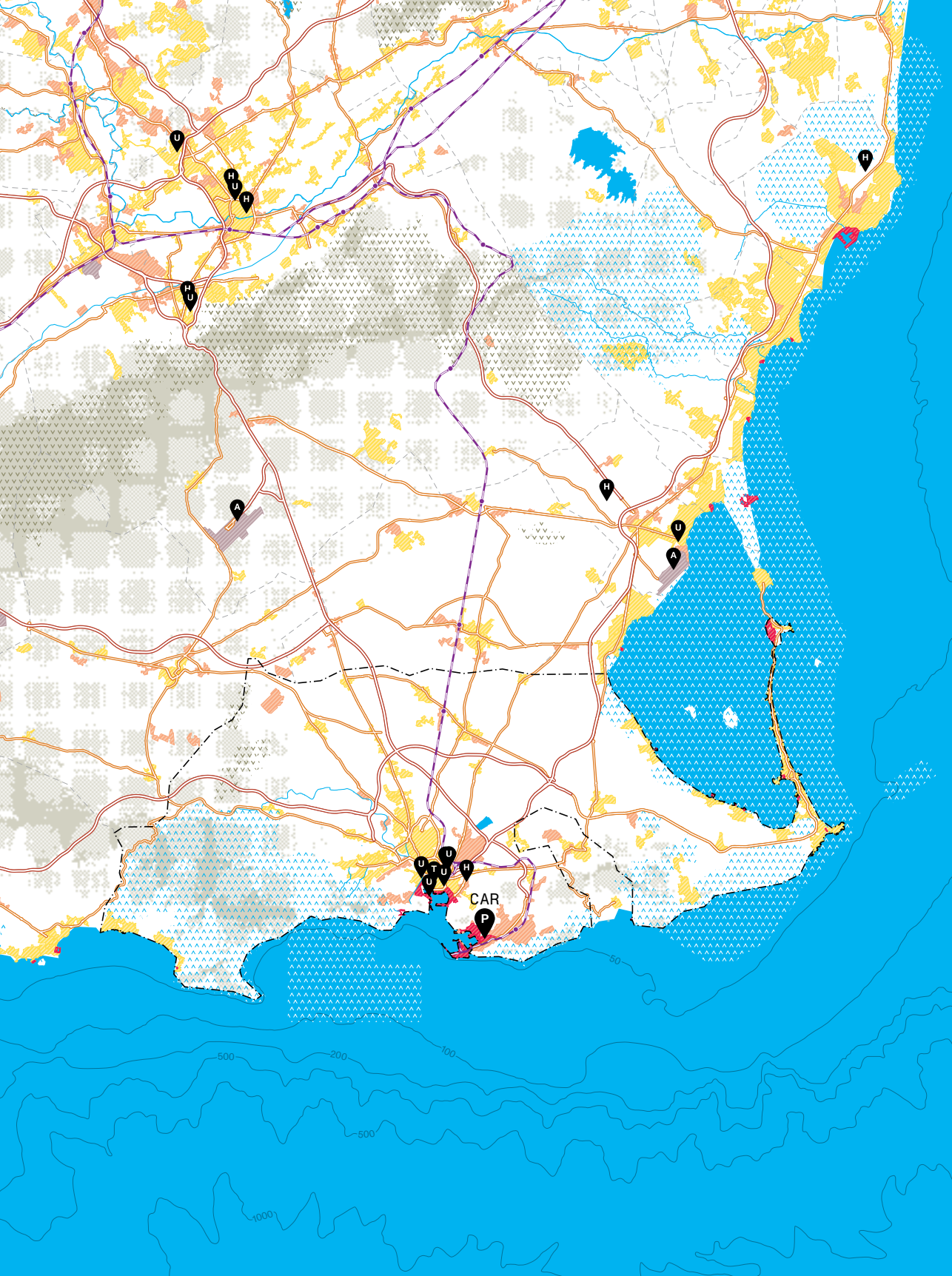


CITY



TERRITORY





VLC

CAS

# Valencia, ES

## Castellón, ES

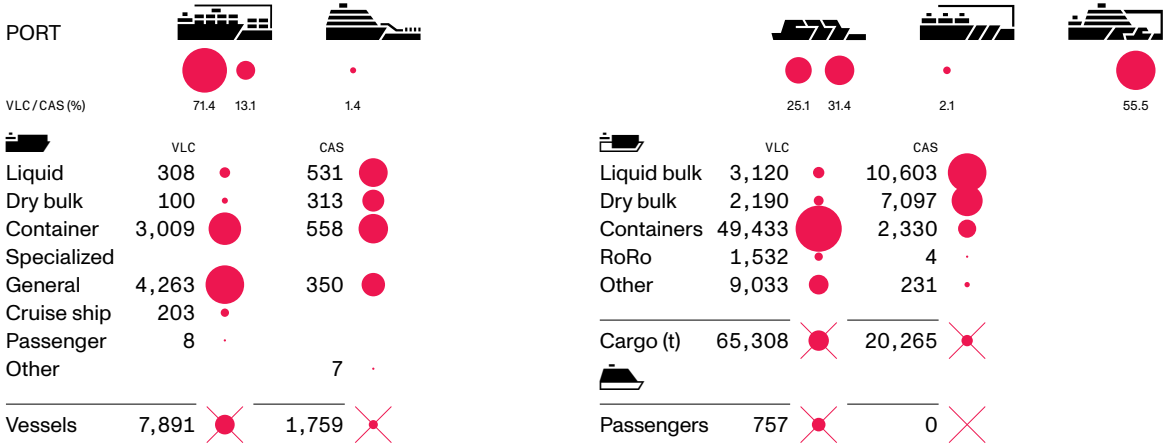


Balearic Sea

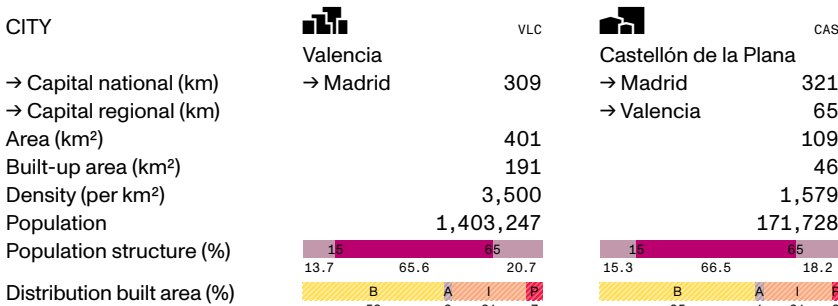


Balearic Sea

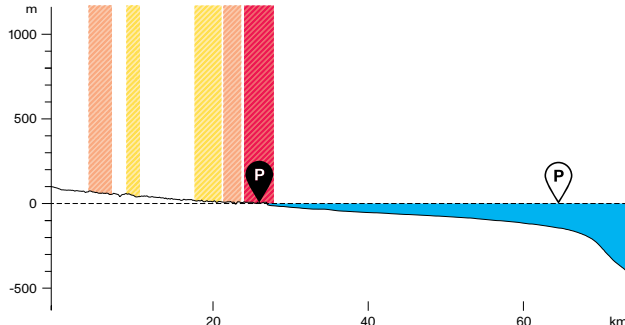
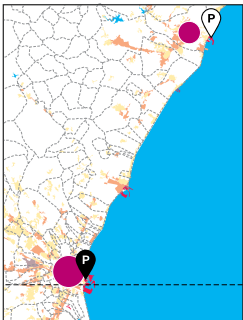
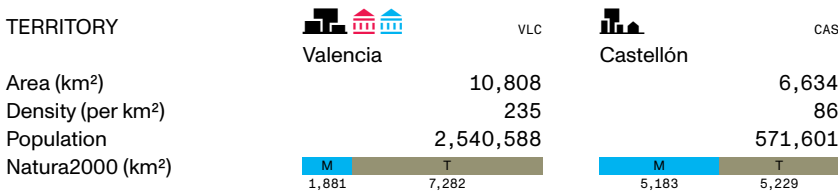
### PORT



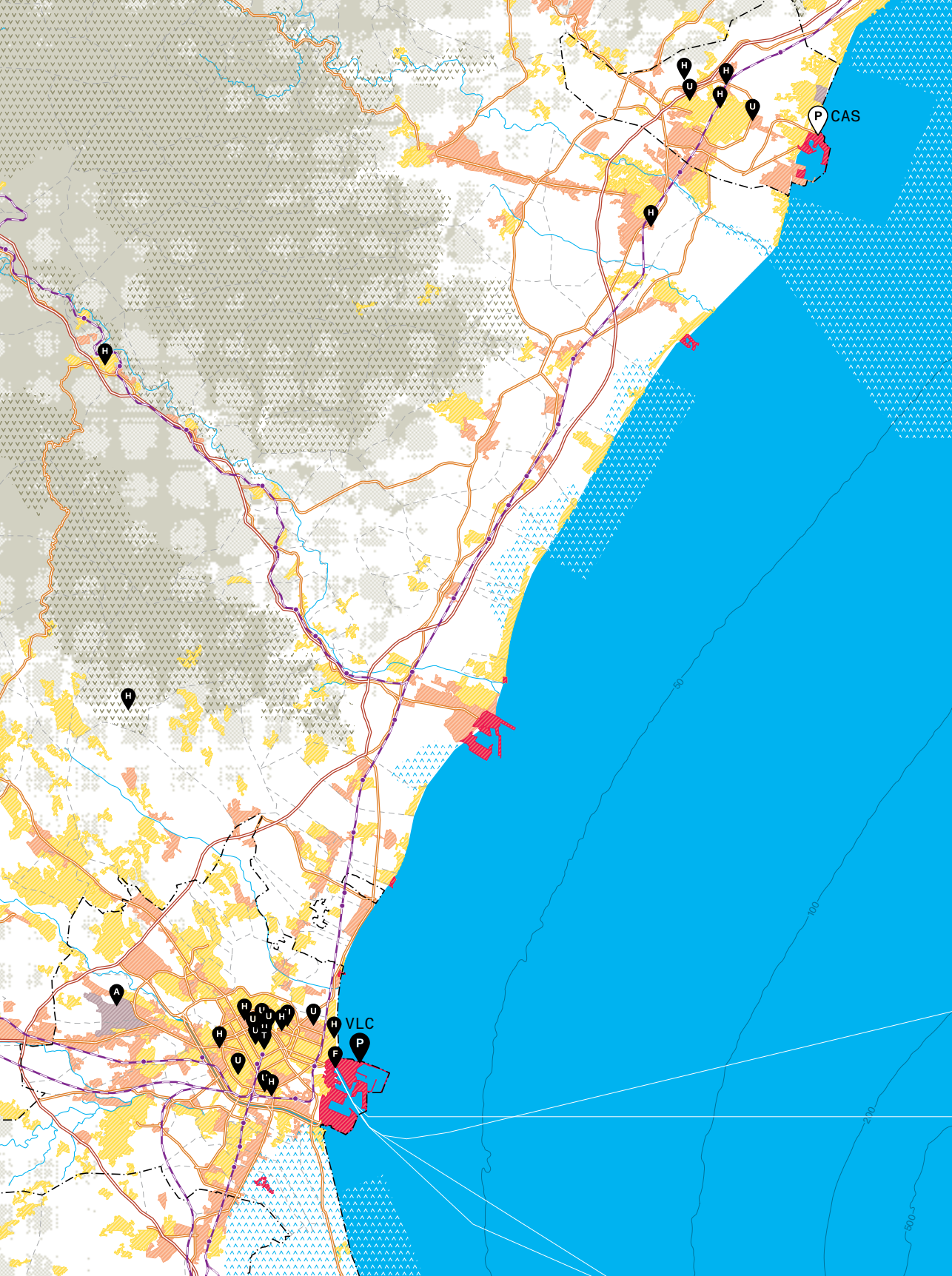
### CITY



### TERRITORY











PORT



85.5



7.2



5.0



2.3

TAR (%)



TAR

Liquid	1,231	
Dry bulk	347	
Container	148	
Specialized	80	
General	682	
Cruise ship	57	
Passenger		
Other	6	

Vessels 2,551



TAR

Liquid bulk	20,412	
Dry bulk	9,759	
Containers	352	
RoRo	340	
Other	1,721	

Cargo (t) 32,584



Passengers 31

CITY



TAR

Tarragona

→ Capital national (km)

→ Madrid 424

→ Capital regional (km)

→ Barcelona 82

Area (km<sup>2</sup>)

55

Built-up area (km<sup>2</sup>)

32

Density (per km<sup>2</sup>)

2,444

Population

134,515

Population structure (%)



Distribution built area (%)



TERRITORY



TAR

Tarragona

Area (km<sup>2</sup>)

6,302

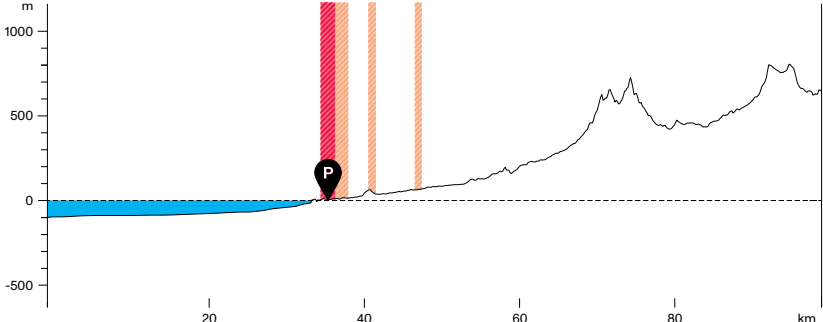
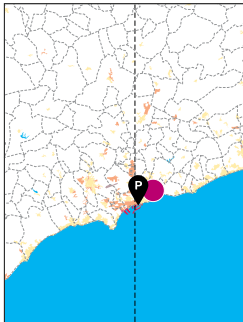
Density (per km<sup>2</sup>)

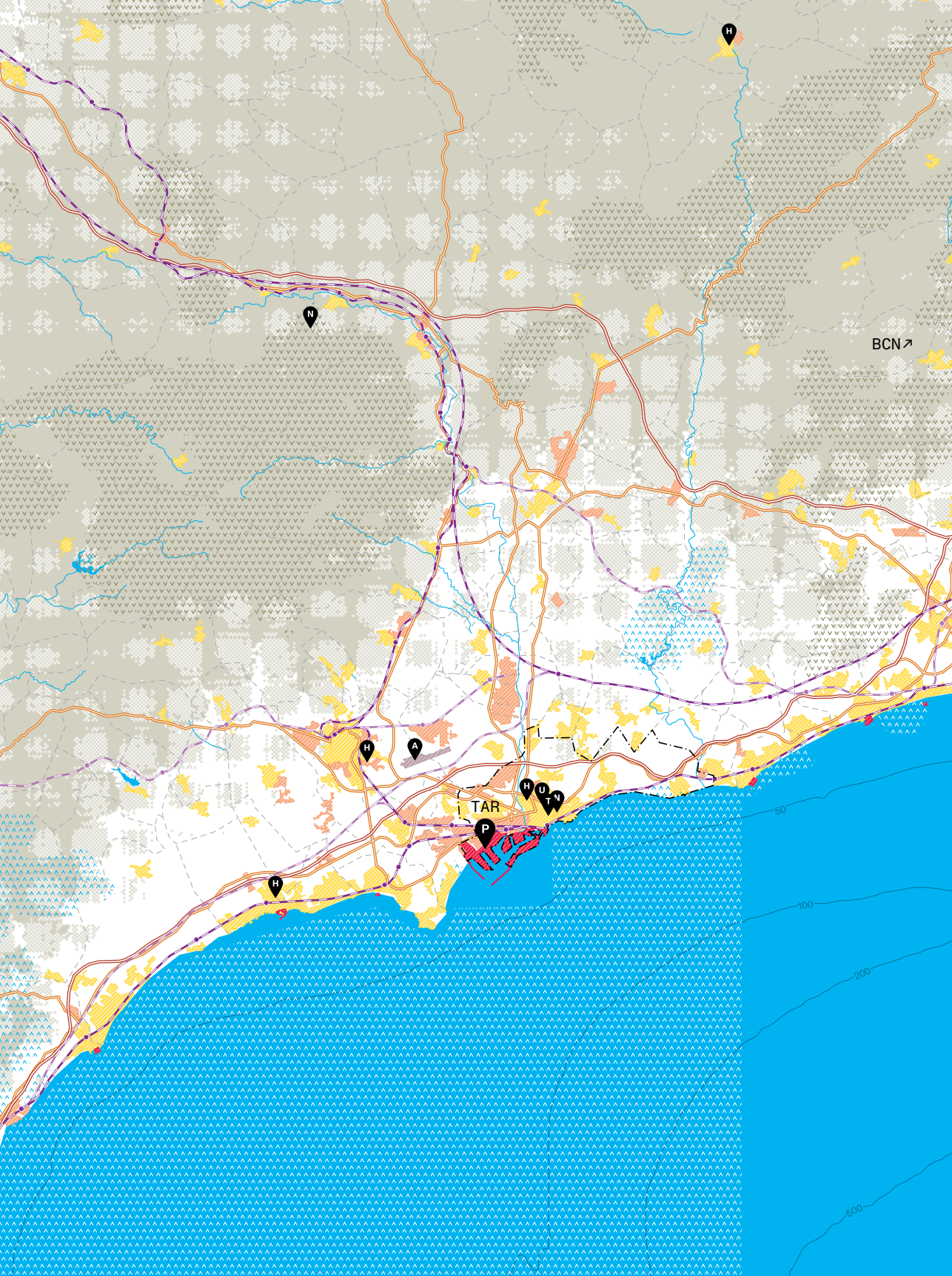
127

Population

802,547

Natura2000 (km<sup>2</sup>)





BCN ↗

TAR

50

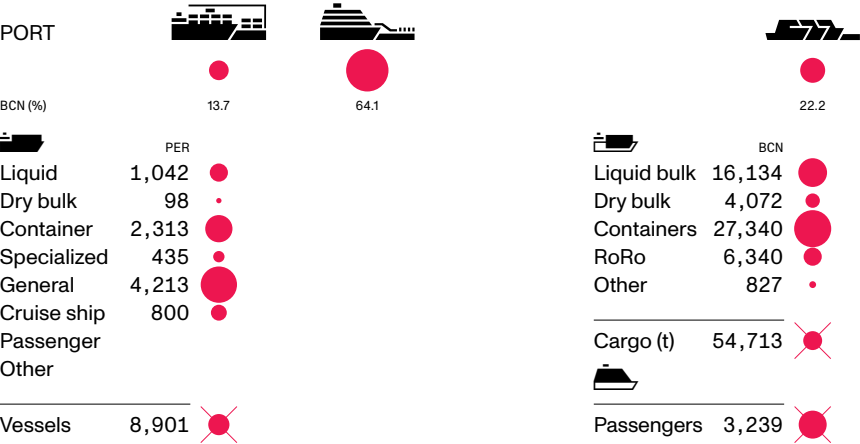
100

200

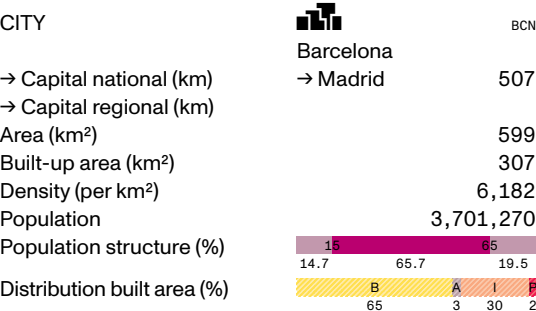
500



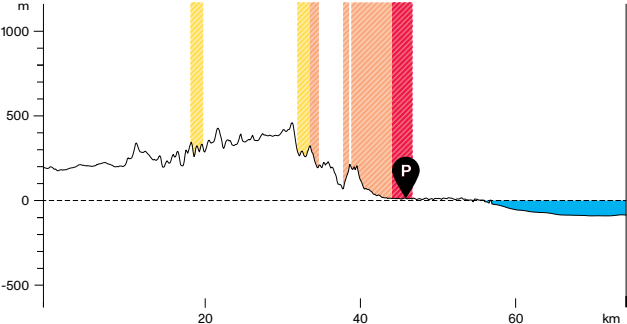
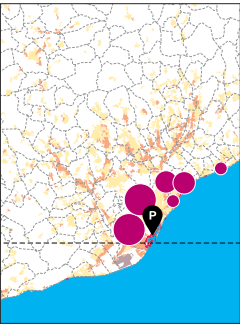
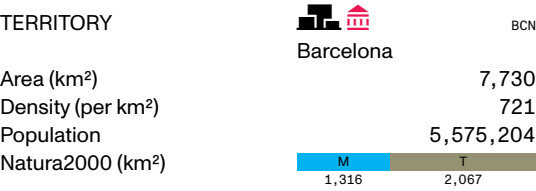
PORT

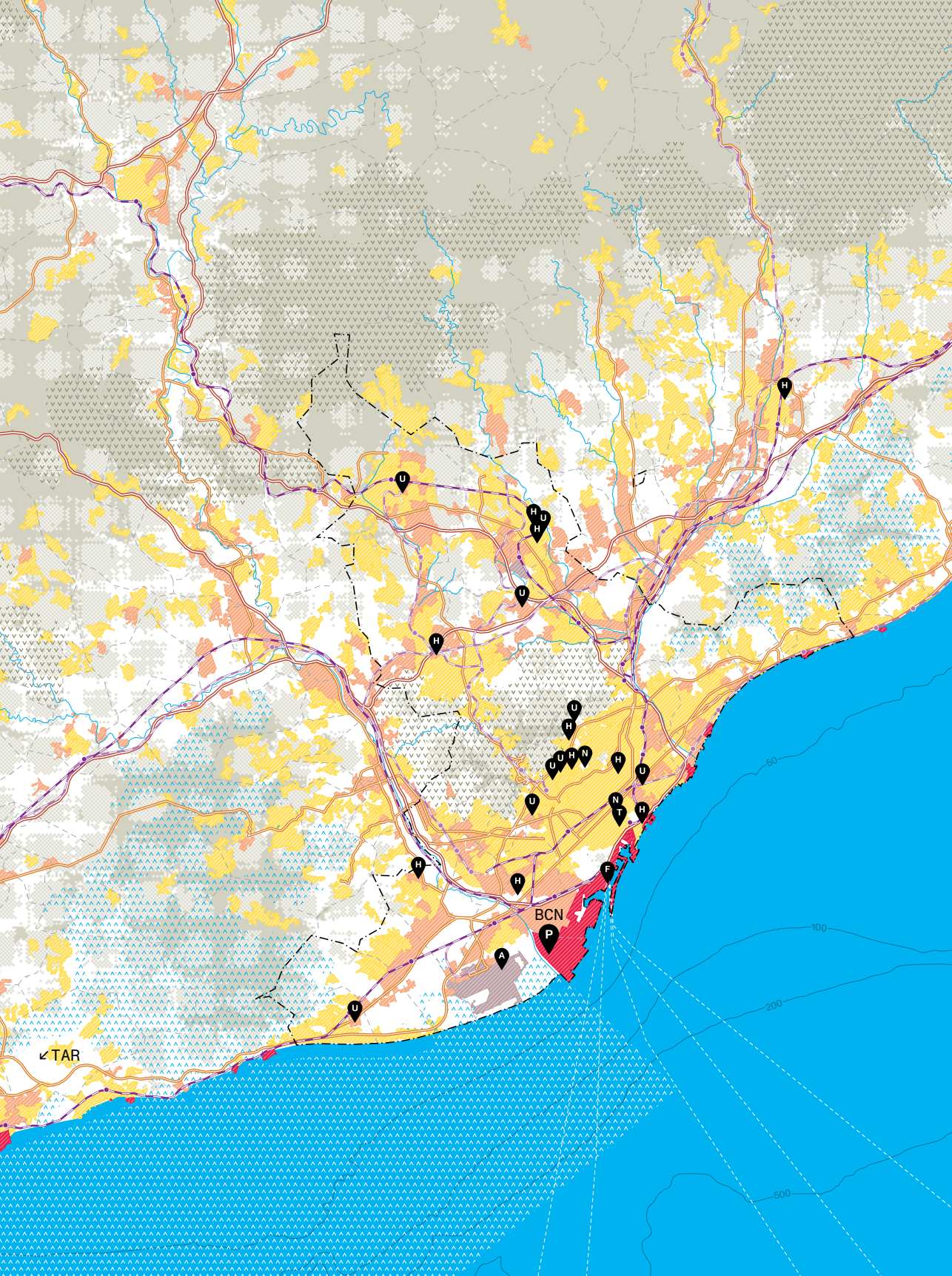


CITY



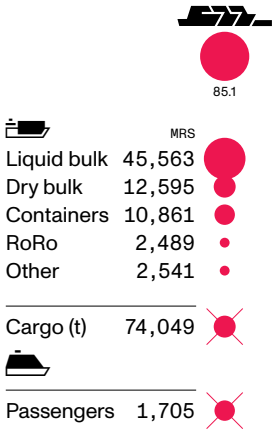
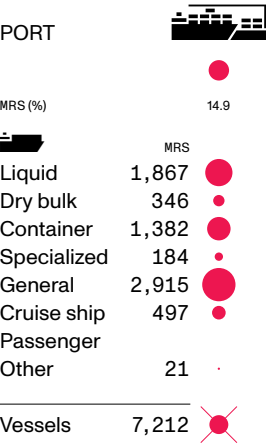
TERRITORY



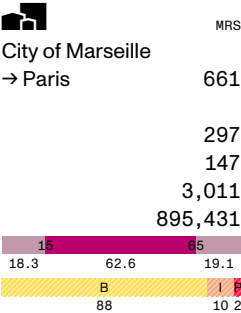




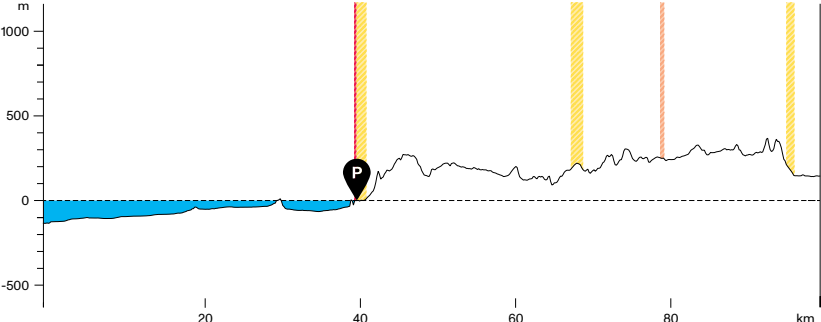
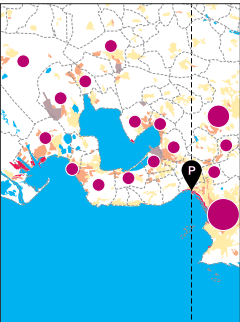
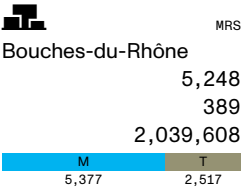
PORT



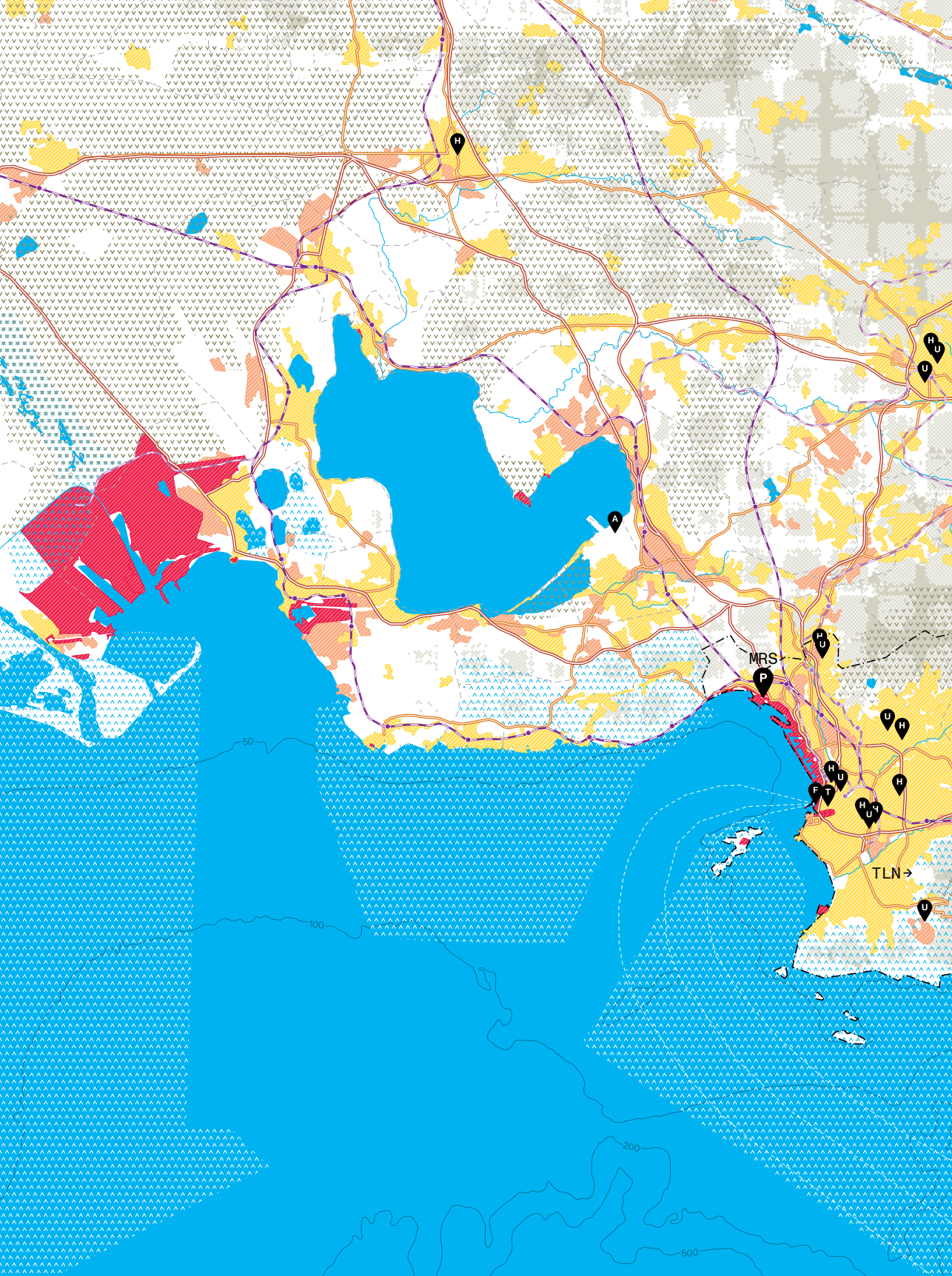
CITY



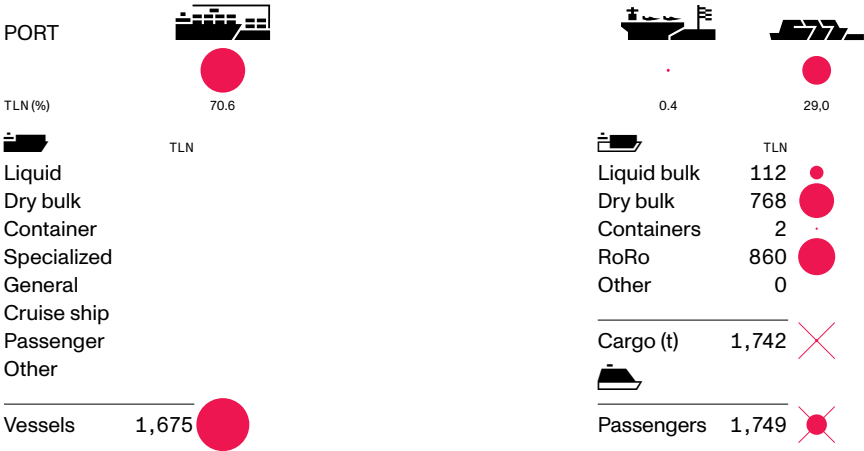
TERRITORY



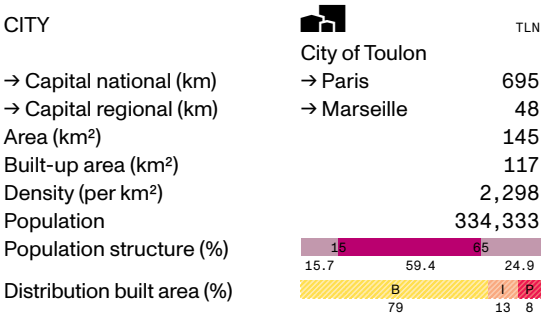




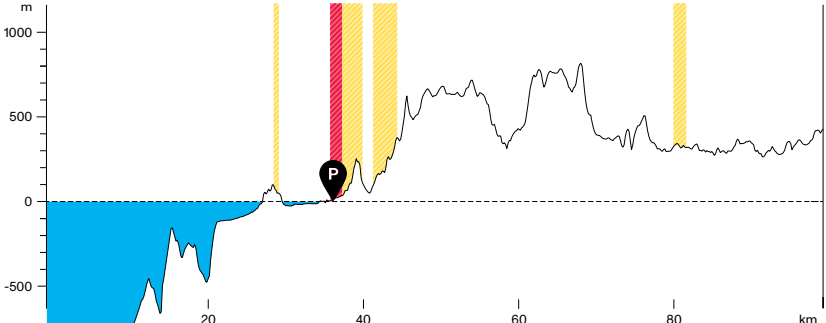
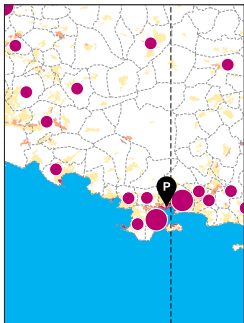
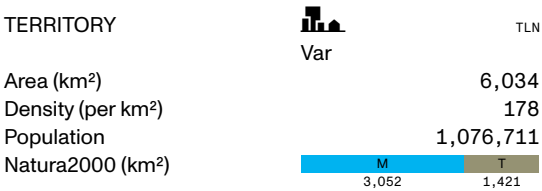
PORT



CITY



TERRITORY





GOA

SVN

# Genova, IT

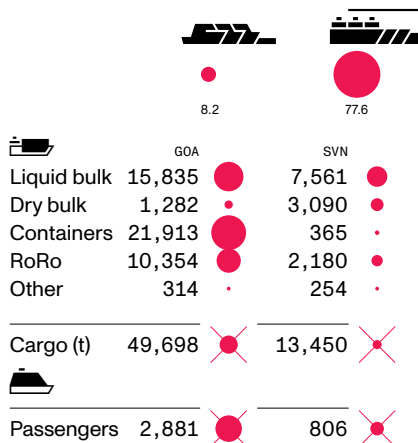
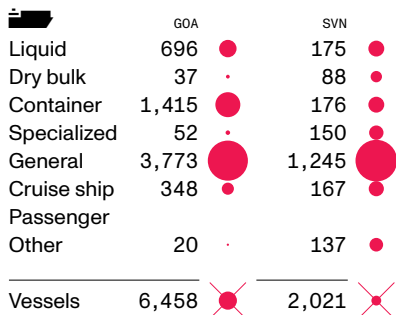
## Savona, IT

 Gulf of Genoa

 Gulf of Genoa

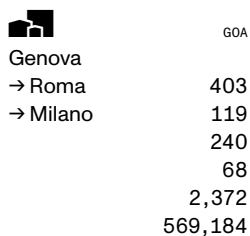
## PORT

GOA / SVN (%)

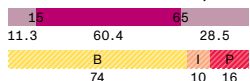


## CITY

→ Capital national (km)  
→ Capital regional (km)  
Area (km<sup>2</sup>)  
Built-up area (km<sup>2</sup>)  
Density (per km<sup>2</sup>)  
Population



Population structure (%)

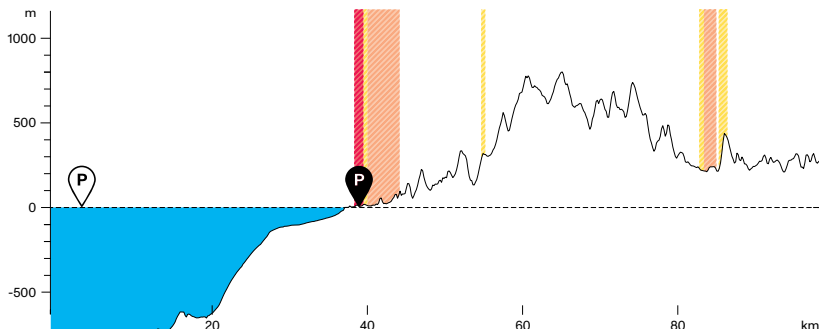
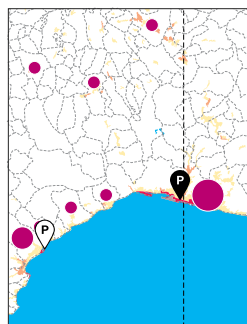
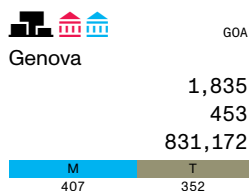


Distribution built area (%)

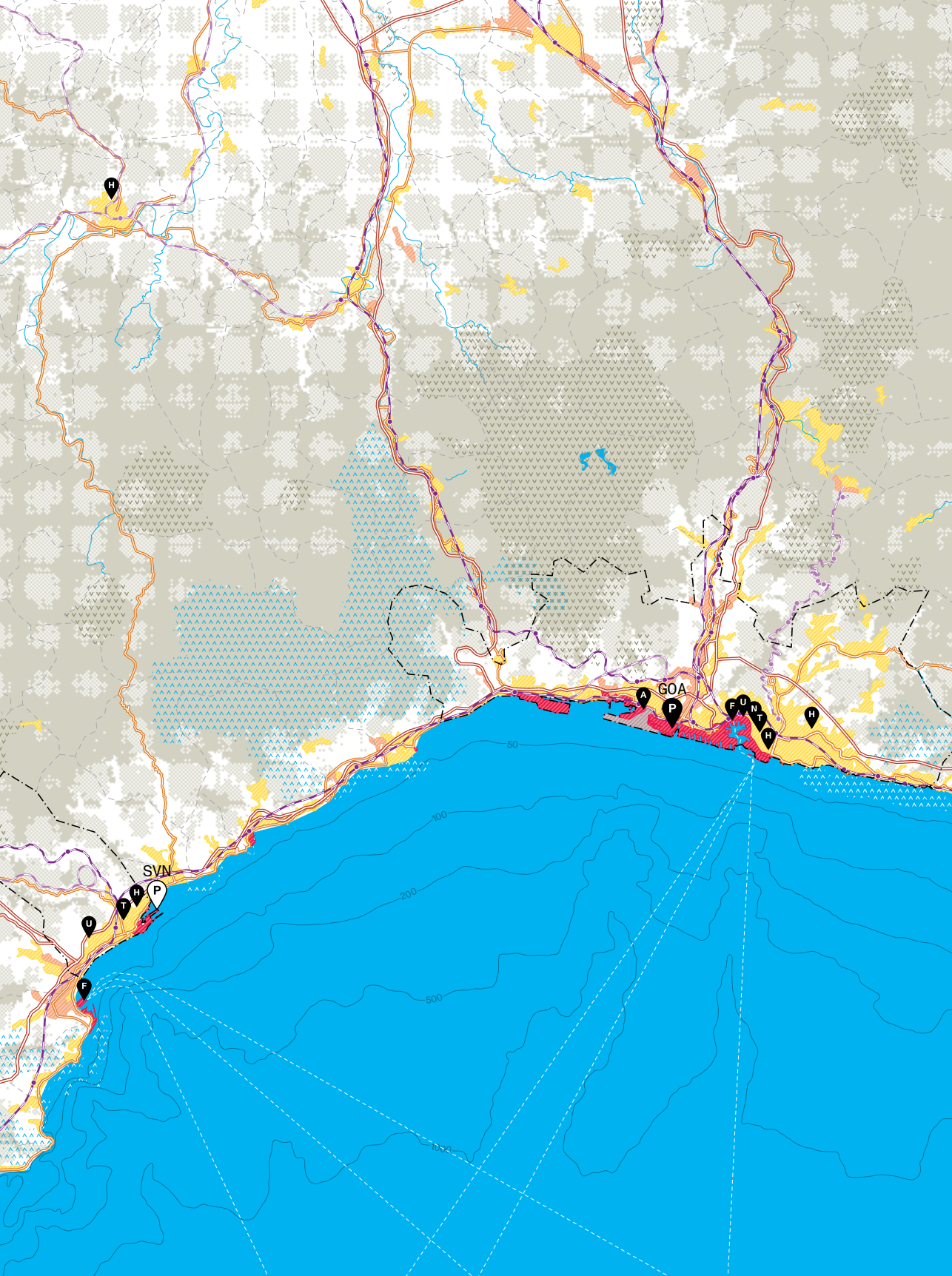


## TERRITORY

Area (km<sup>2</sup>)  
Density (per km<sup>2</sup>)  
Population  
Natura2000 (km<sup>2</sup>)







H

SVN

P

H

T

U

F

GOA

A

P

F

U

N

T

H

H

50

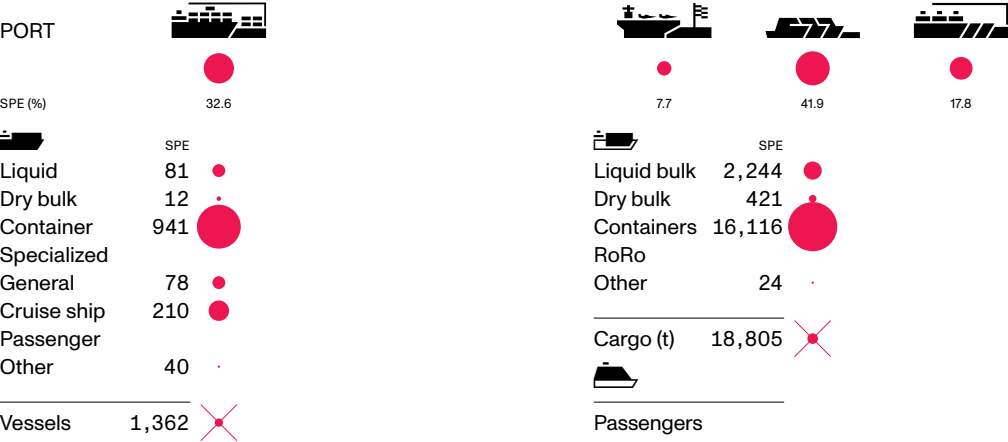
100

200

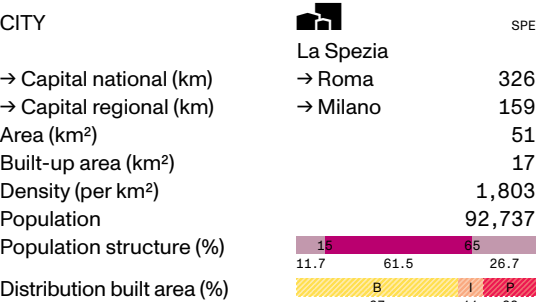
500

1000

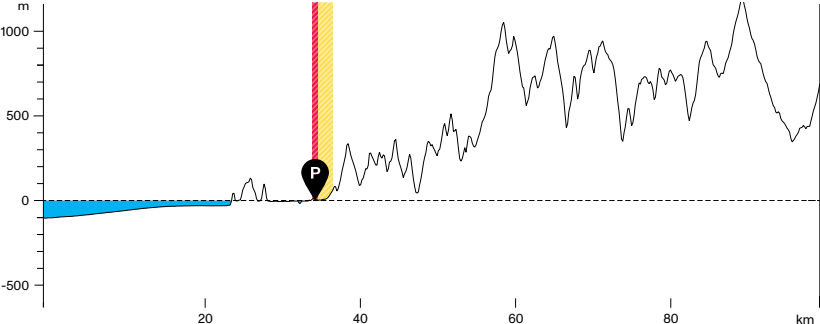
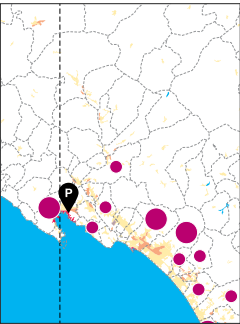
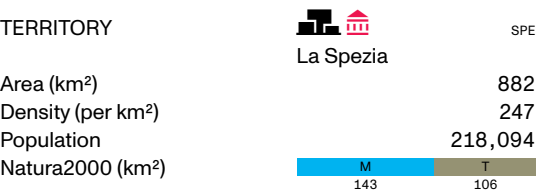
PORT



CITY



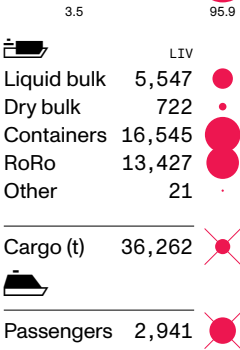
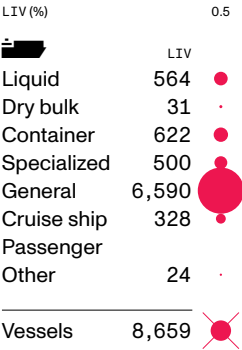
TERRITORY







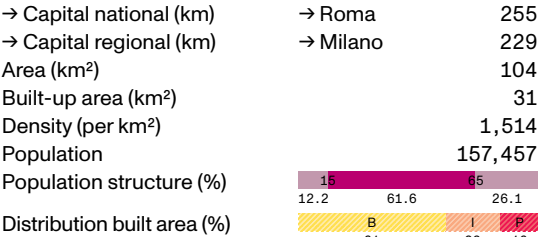
PORT



CITY



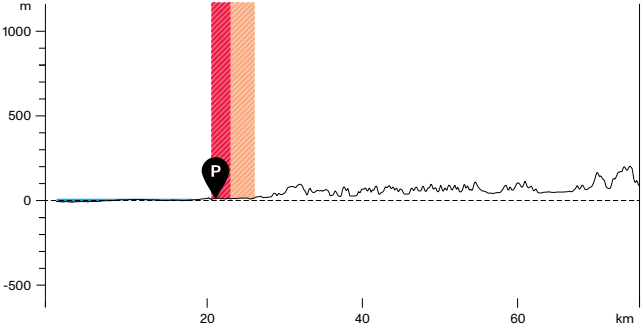
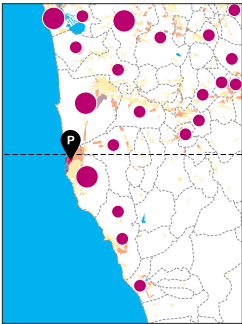
LIV



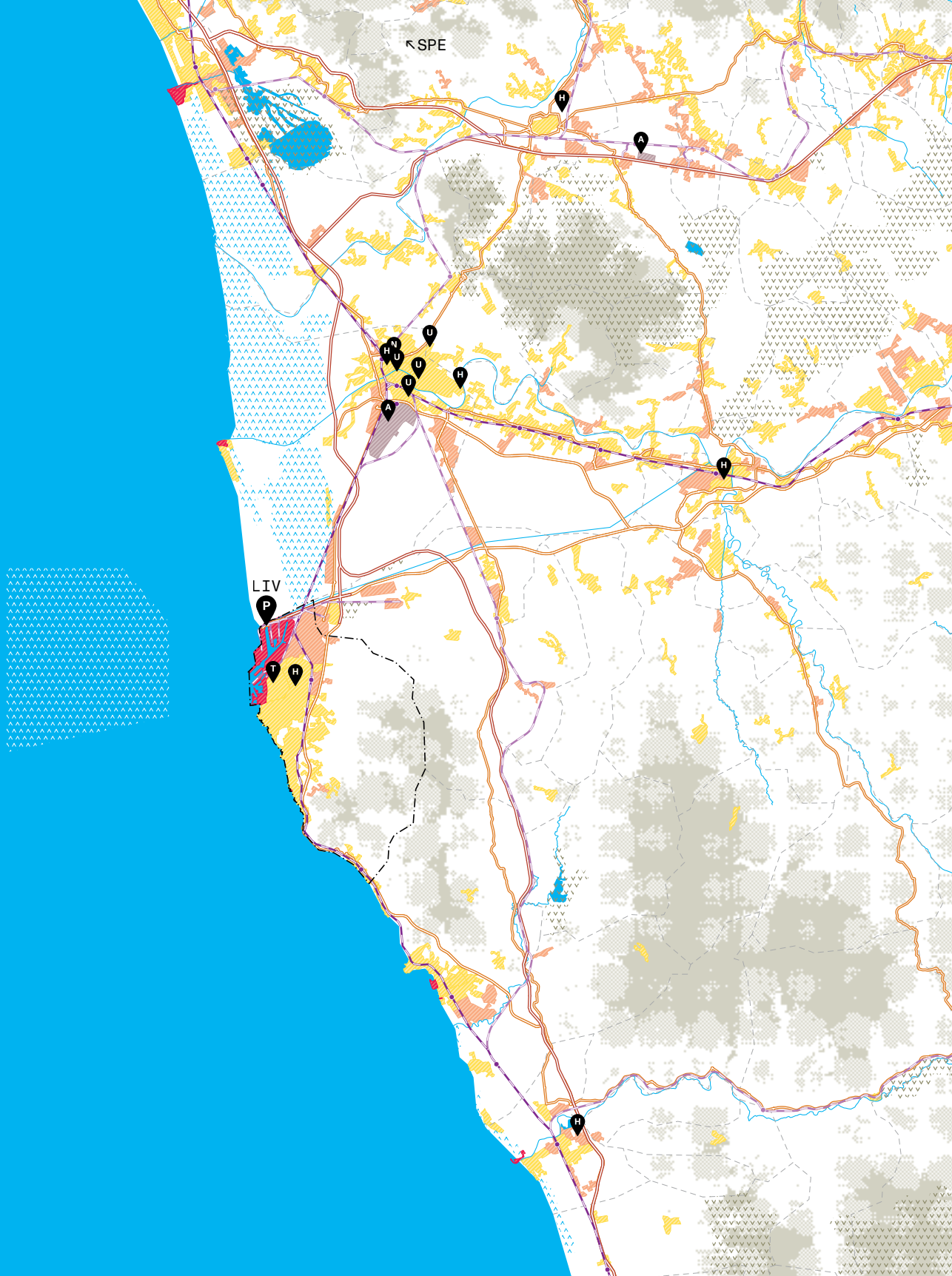
TERRITORY



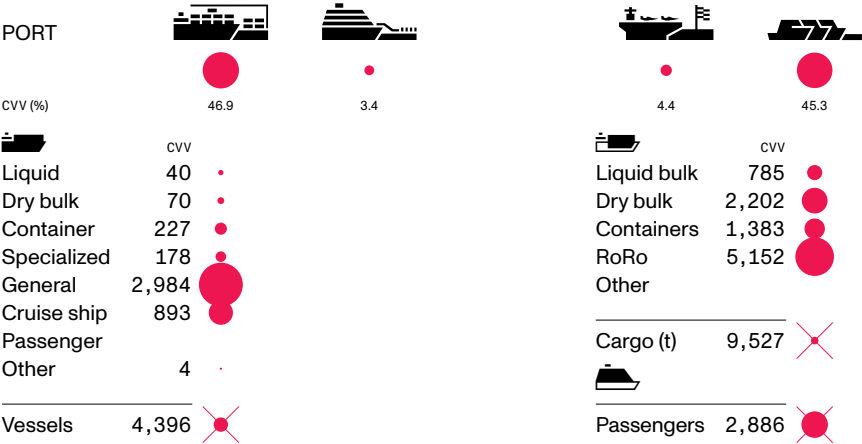
LIV



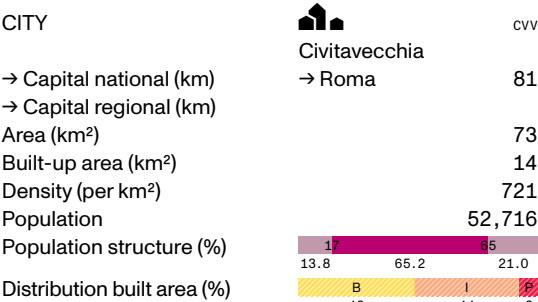




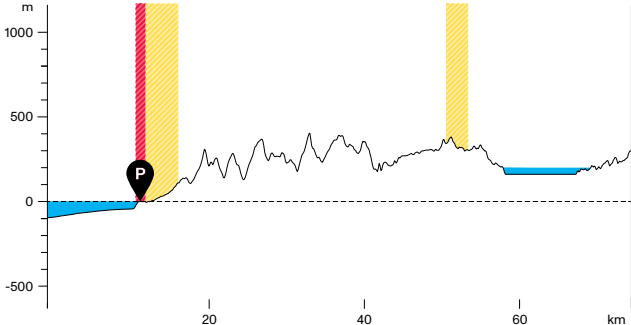
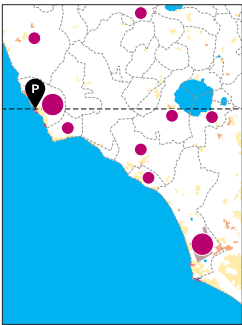
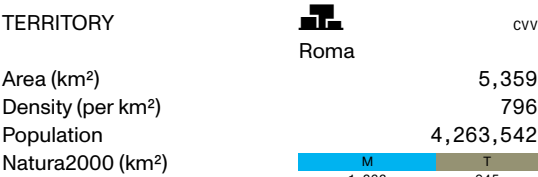
PORT

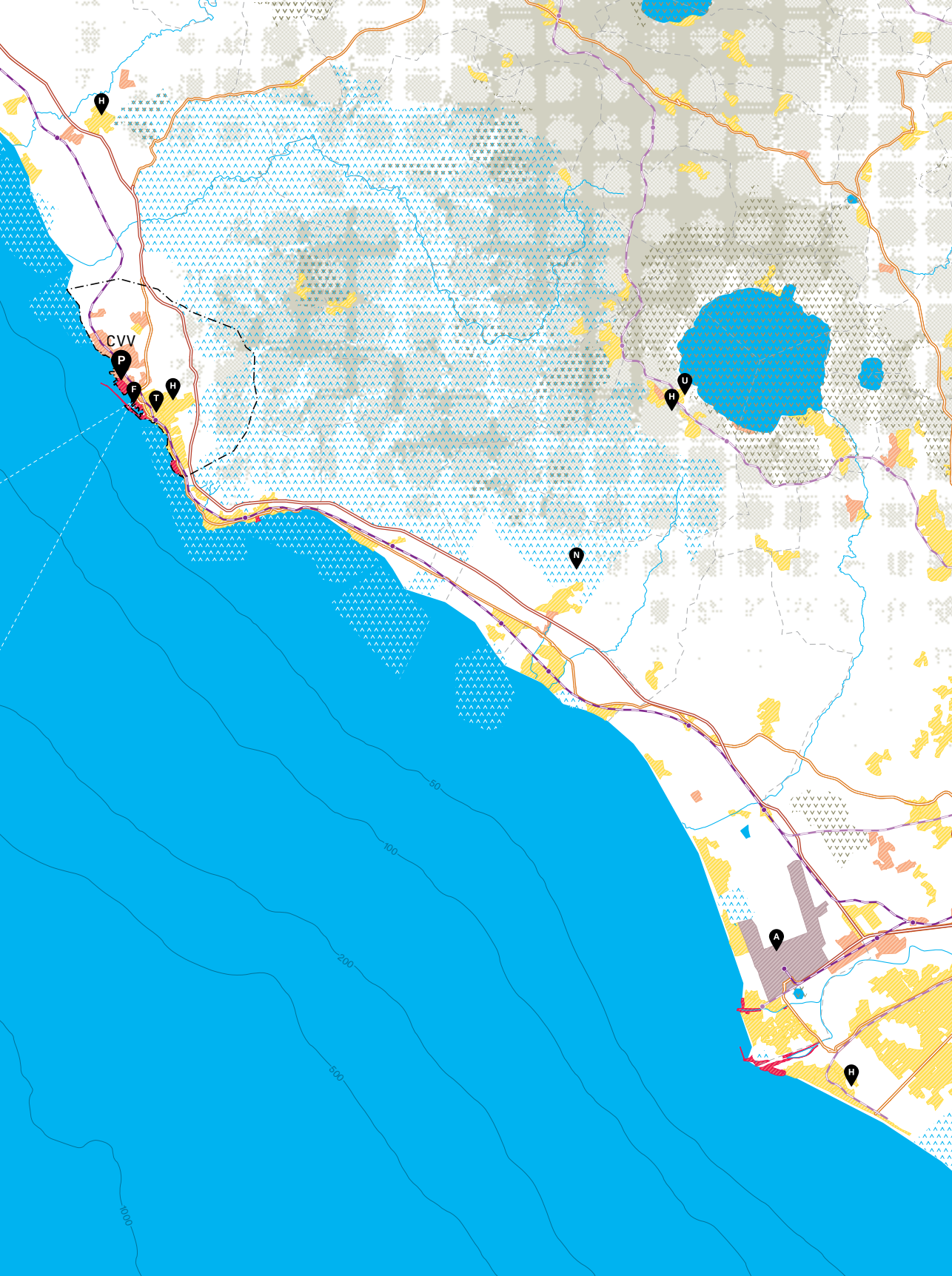


CITY

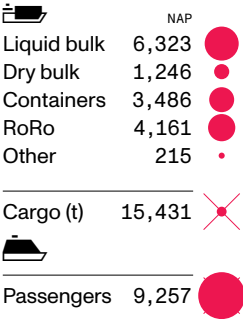
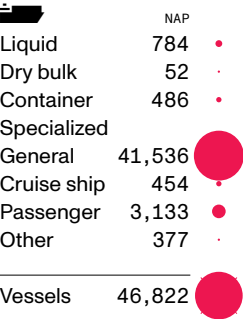


TERRITORY

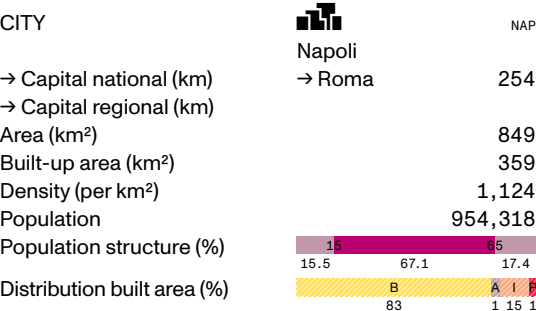




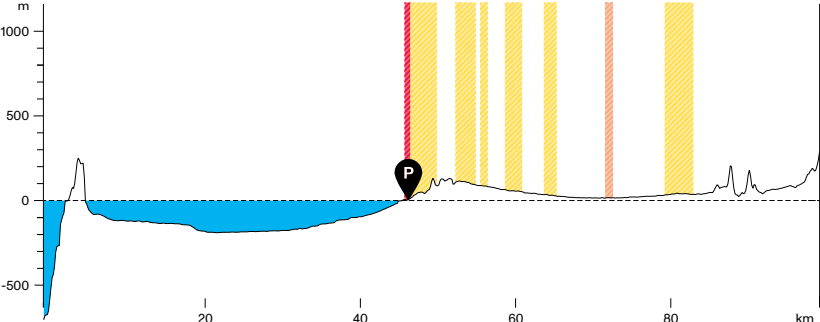
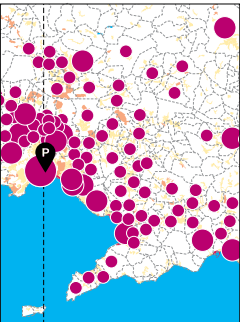
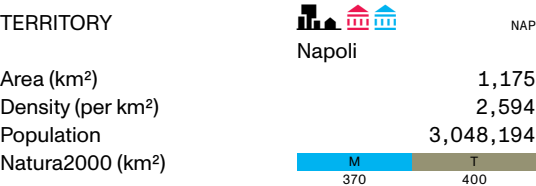
PORT



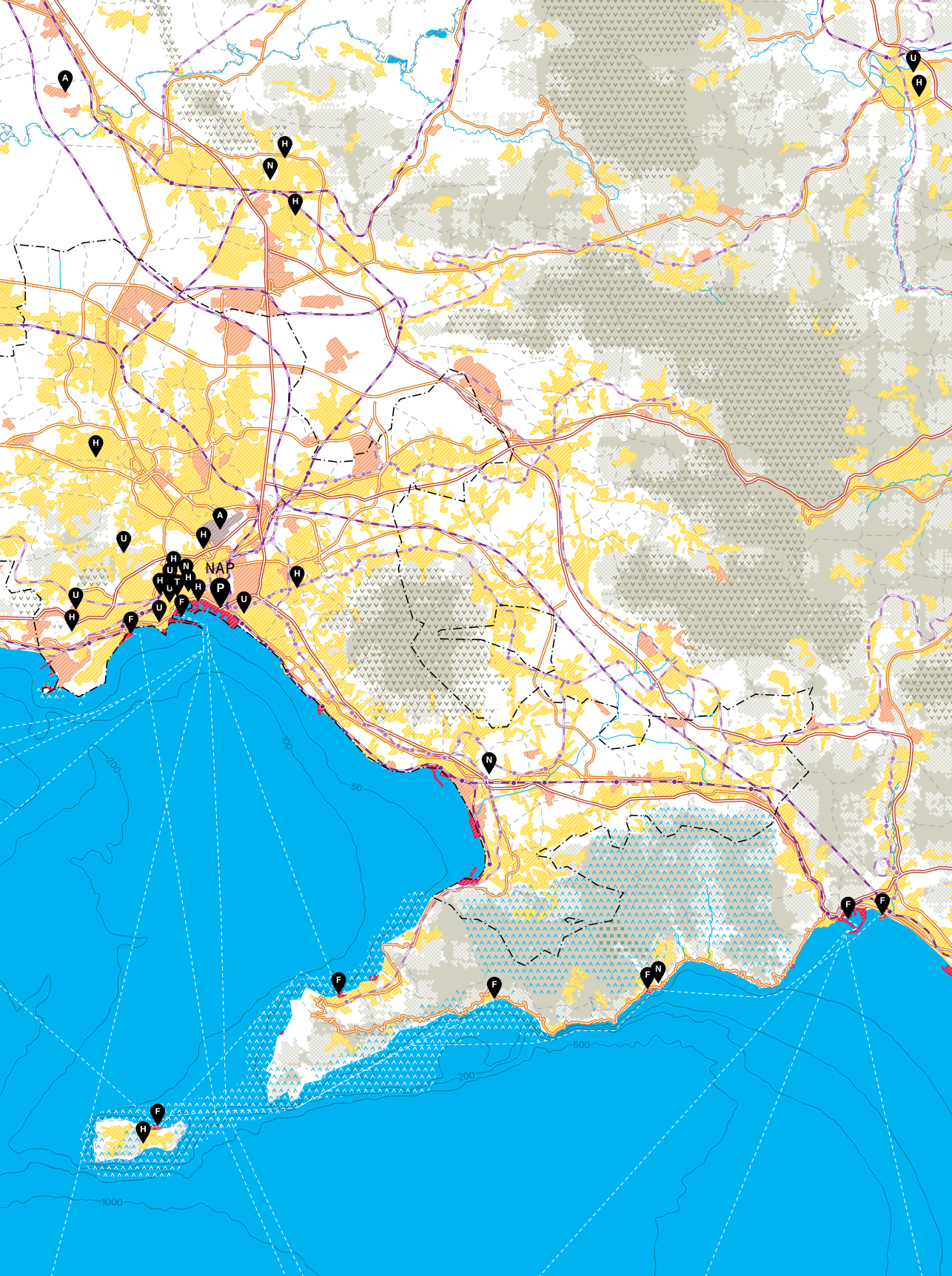
CITY



TERRITORY







PFX

CAG

# Porto Foxi, IT

## Cagliari, IT



Mediterranean Sea



Mediterranean Sea

### PORT



PFX / CAG (%)

1.9

2.6

21.5

89.6

4.4

78.5

1.5



PFX

CAG

Liquid  
Dry bulk  
Container  
Specialized  
General  
Cruise ship  
Passenger  
Other

1,072

216

47

114

1,793

109

16

22

Vessels

1,088

2,301



PFX

CAG

Liquid bulk 26,721

1,057

Dry bulk

2,842

Containers 57

1,485

RoRo

5,129

Other

2,167

Cargo (t)

28,818

12,680



Passengers

389

### CITY



PFX

Sarroch

→ Capital national (km)

→ Roma

564

→ Capital regional (km)

→ Palermo

503

Area (km<sup>2</sup>)

68

Built-up area (km<sup>2</sup>)

8

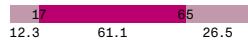
Density (per km<sup>2</sup>)

77

Population

5,266

Population structure (%)



Distribution built area (%)



CAG

Cagliari

→ Roma

544

→ Palermo

500

Area (km<sup>2</sup>)

84

Built-up area (km<sup>2</sup>)

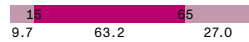
44

Density (per km<sup>2</sup>)

1,808

Population

151,504



### TERRITORY



PFX

Cagliari

Area (km<sup>2</sup>)

1,249

Density (per km<sup>2</sup>)

336

Population

419,770

Natura2000 (km<sup>2</sup>)

CAG

Cagliari

Area (km<sup>2</sup>)

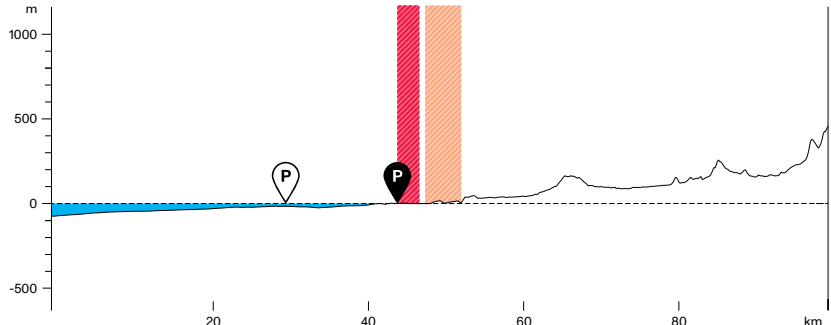
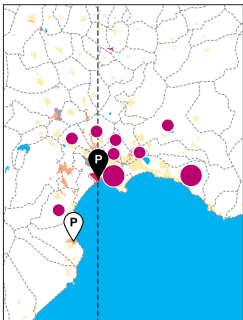
1,249

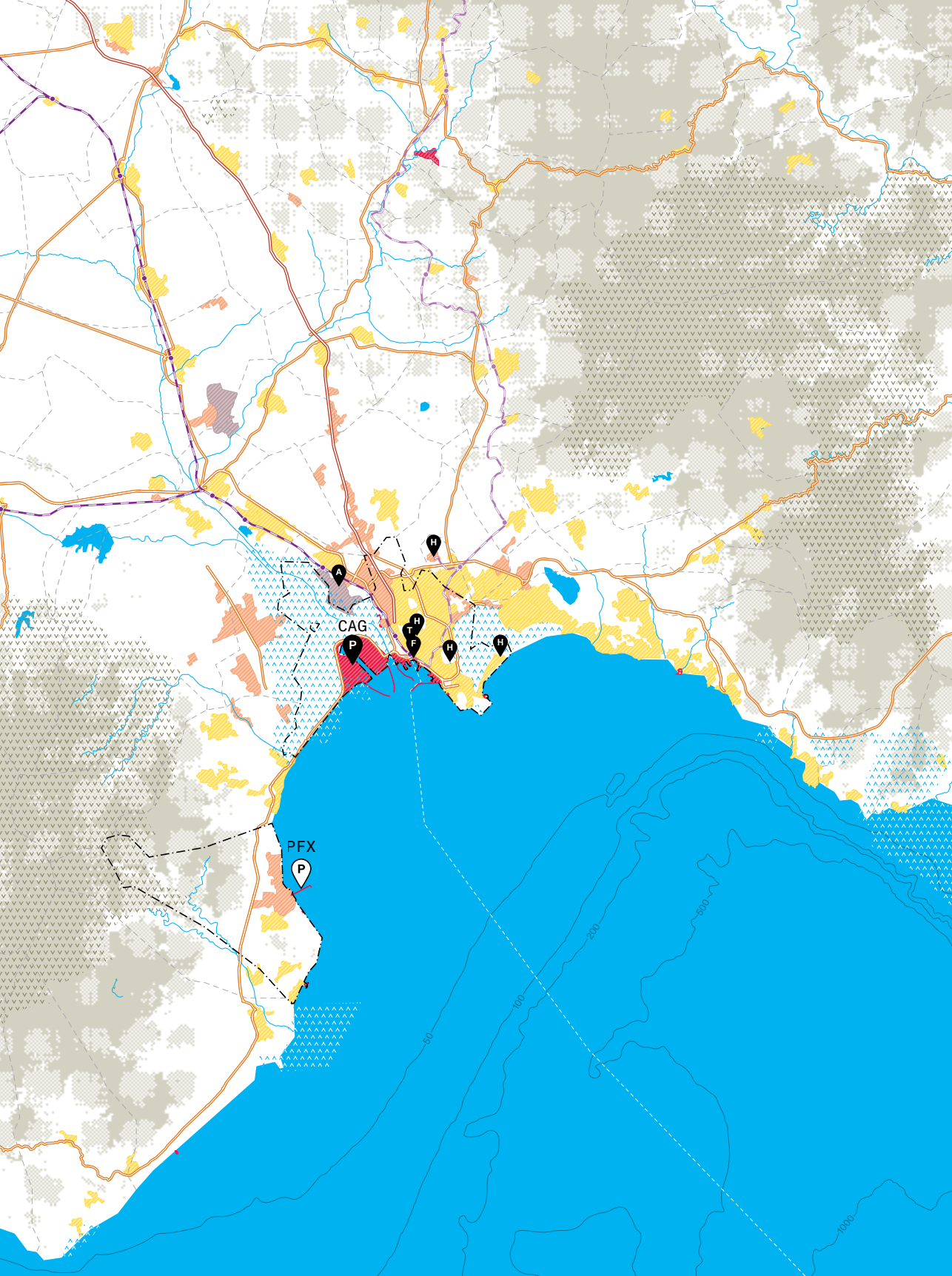
Density (per km<sup>2</sup>)

336

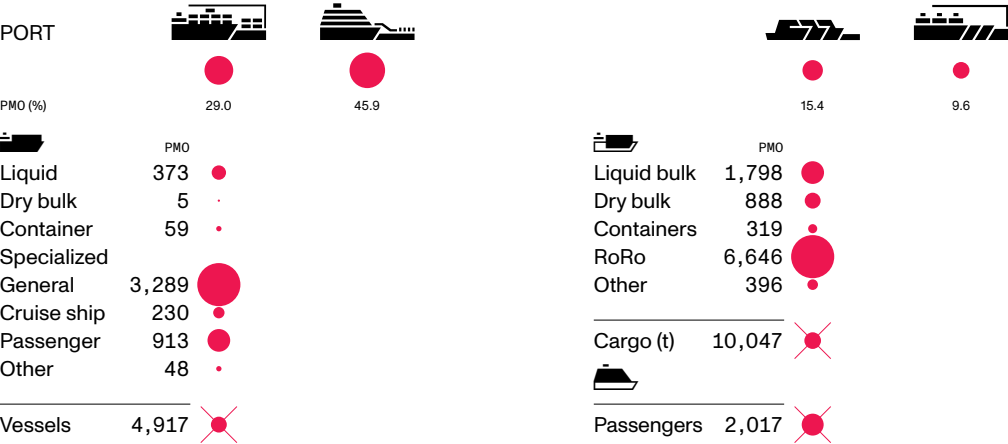
Population

419,770





PORT



  
Liquid 373  
Dry bulk 5  
Container 59  
Specialized  
General 3,289  
Cruise ship 230  
Passenger 913  
Other 48

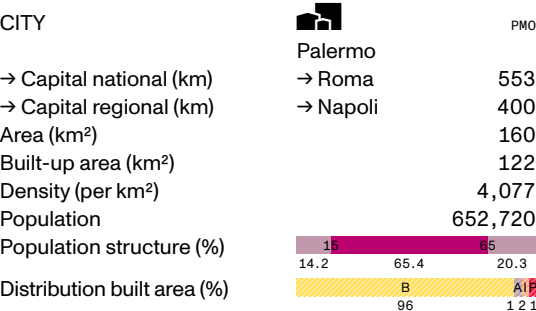
  
Liquid bulk 1,798  
Dry bulk 888  
Containers 319  
RoRo 6,646  
Other 396

  
Vessels 4,917

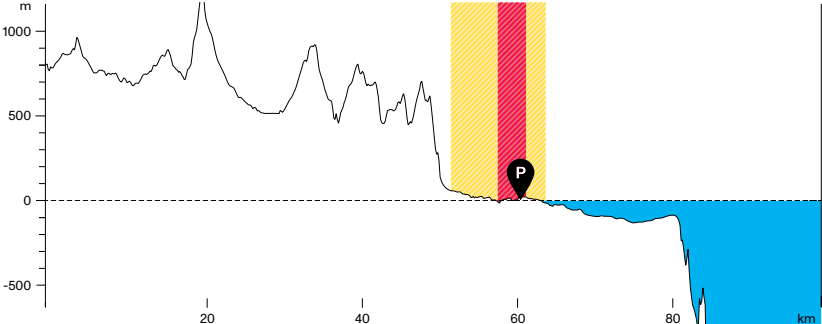
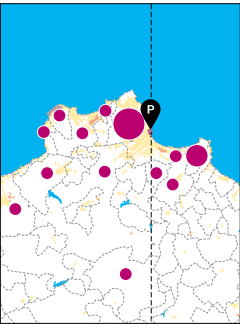
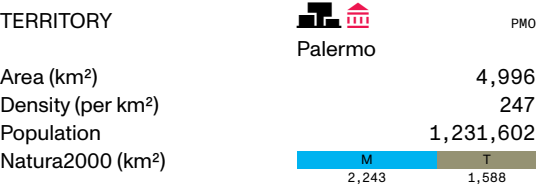
  
Cargo (t) 10,047

  
Passengers 2,017

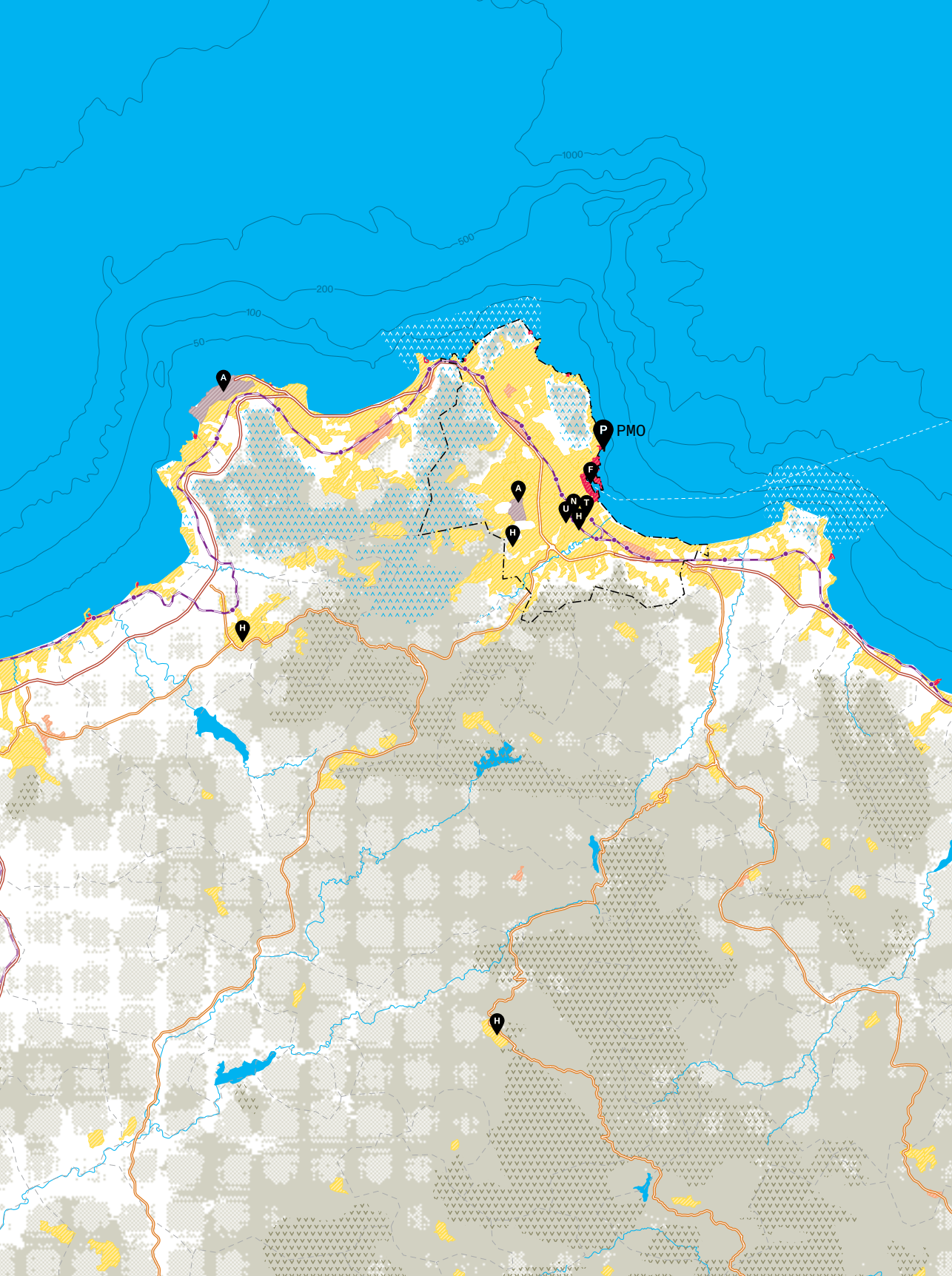
CITY



TERRITORY







PORT



SIR (%)



Liquid  
Dry bulk  
Container  
Specialized  
General  
Cruise ship  
Passenger  
Other



Vessels 448



Liquid bulk 12,132  
Dry bulk  
Containers  
RoRo  
Other



Cargo (t) 12,132



Passengers

CITY



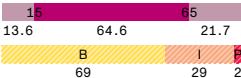
SIR

Siracusa

→ Capital national (km)  
→ Capital regional (km)  
Area (km²)  
Built-up area (km²)  
Density (per km²)  
Population

→ Roma 764  
→ Palermo 262  
206  
35  
580  
119,710

Population structure (%)



Distribution built area (%)

TERRITORY

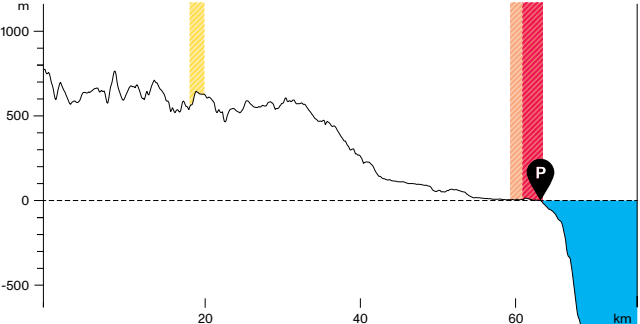
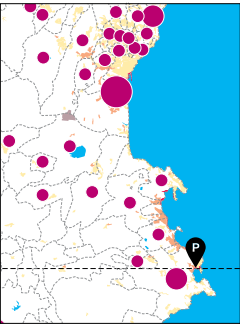


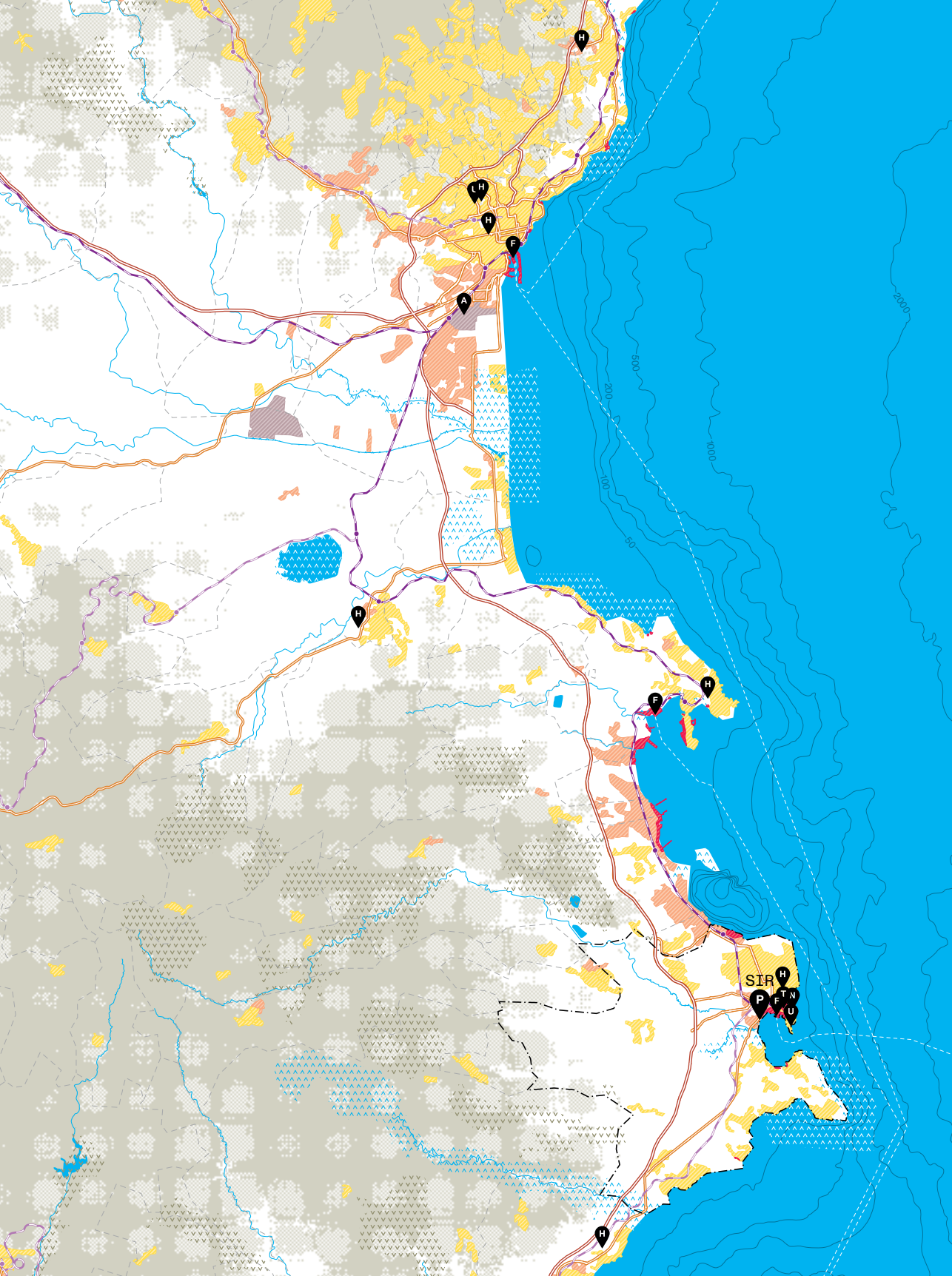
SIR

Siracusa

Area (km²)  
Density (per km²)  
Population  
Natura2000 (km²)

2,110  
185  
391,400  
M 1,092 T 225





MSN

MLZ

# Messina, IT

## Milazzo, IT



Tyrrhenian Sea



Tyrrhenian Sea

### PORT



MSN / MLZ (%)

98.9

100

1.1



MSN

MLZ

Liquid	9	673
Dry bulk		7
Container		
Specialized		
General	53,379	2,661
Cruise ship	140	
Passenger	448	3,223
Other		4

Vessels	53,561	6,568
---------	--------	-------



MSN

MLZ

Liquid bulk		15,452
Dry bulk		17
Containers		
RoRo	7,293	
Other		

Cargo (t)	7,293	15,469
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Passengers	11,669	471
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### CITY



MSN

Messina



MLZ

Milazzo

→ Capital national (km)

→ Roma 641

→ Capital regional (km)

→ Palermo 244

Area (km<sup>2</sup>)

211

Built-up area (km<sup>2</sup>)

42

Density (per km<sup>2</sup>)

1,084

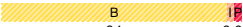
Population

229,280

Population structure (%)



Distribution built area (%)



→ Roma 617

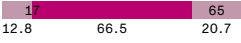
→ Palermo 209

Area (km<sup>2</sup>) 25

Built-up area (km<sup>2</sup>) 13

Density (per km<sup>2</sup>) 1,259

Population 31,028



Distribution built area (%)



### TERRITORY



MSN

Messina



MLZ

Messina

Area (km<sup>2</sup>)

3,247

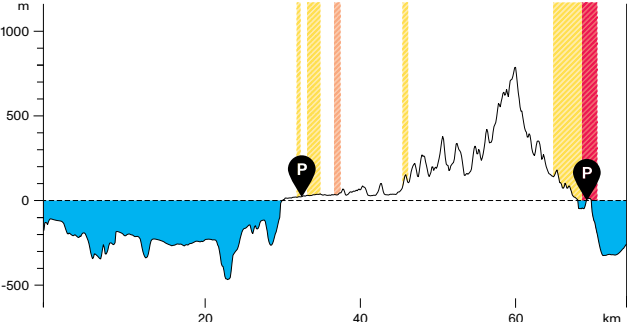
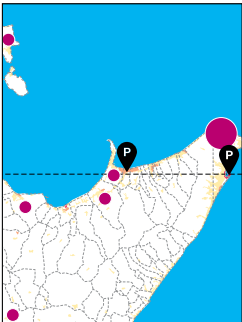
Density (per km<sup>2</sup>)

191

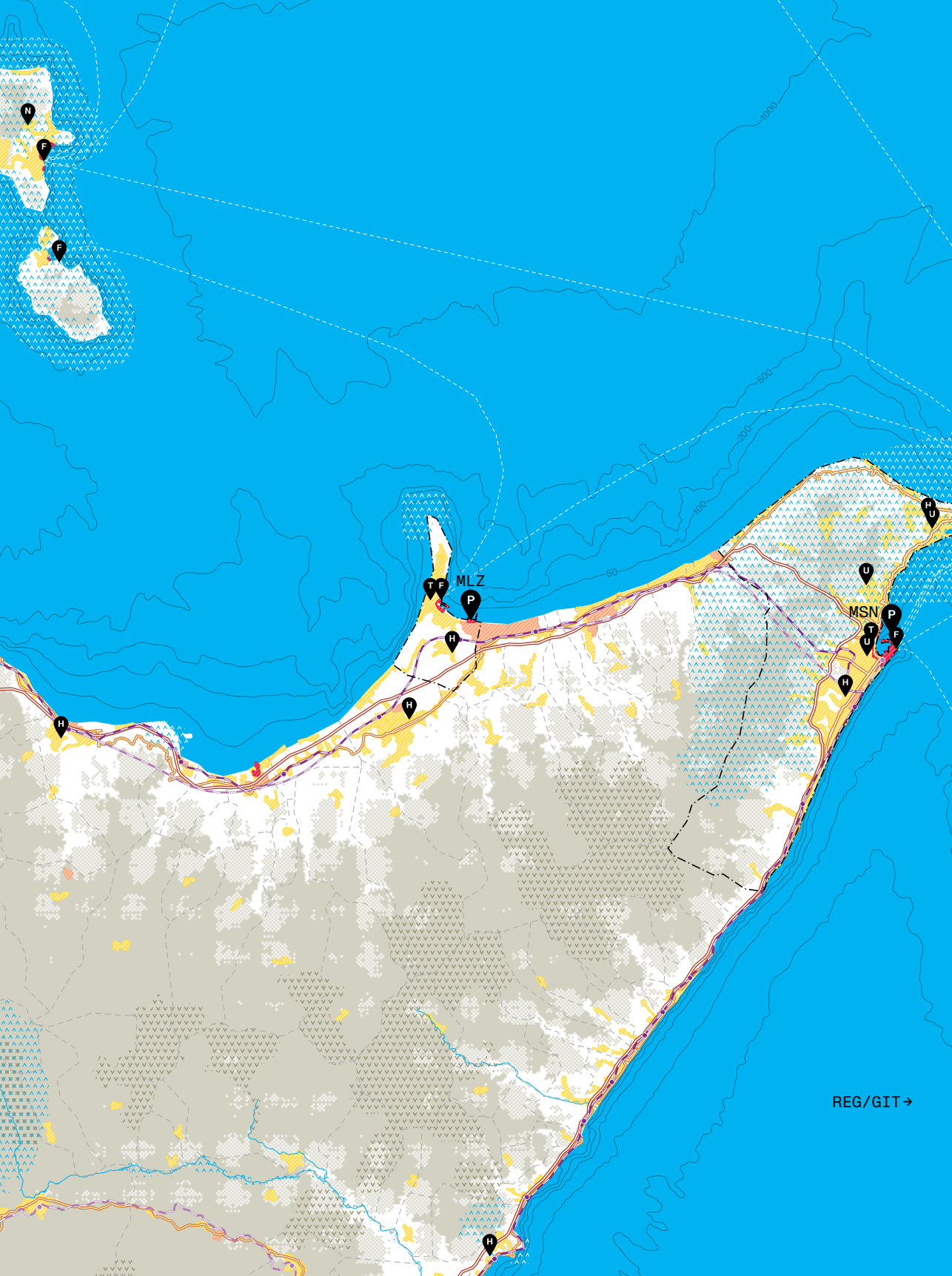
Population

618,713

Natura2000 (km<sup>2</sup>)







GIT

REG

# Gioia Tauro, IT

## Reggio di Calabria, IT



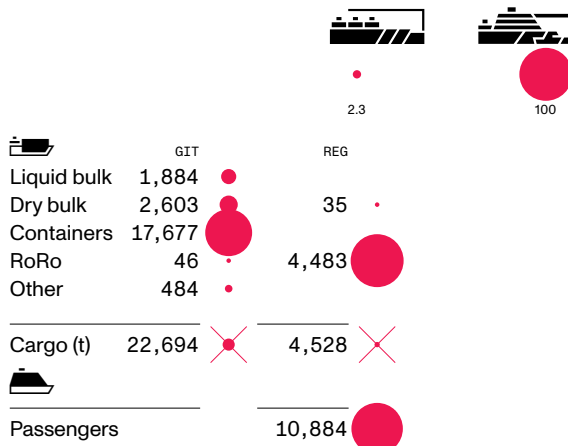
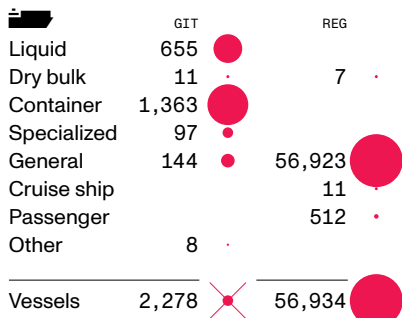
Tyrrhenian Sea



Strait of Messina

PORT

GIT / REG (%)



CITY



Gioia Tauro

GIT

→ Capital national (km)

→ Roma

630

→ Capital regional (km)

→ Palermo

286

Area (km²)

38

Built-up area (km²)

16

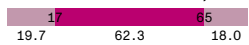
Density (per km²)

531

Population

20,078

Population structure (%)



Distribution built area (%)



Reggio di Calabria

REG

→ Roma

651

→ Palermo

254

Area (km²)

237

Built-up area (km²)

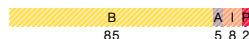
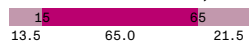
40

Density (per km²)

744

Population

176,299



TERRITORY



Reggio di Calabria

GIT

Area (km²)

3,180

Density (per km²)

169

Population

536,487

Natura2000 (km²)



Reggio di Calabria

REG

Area (km²)

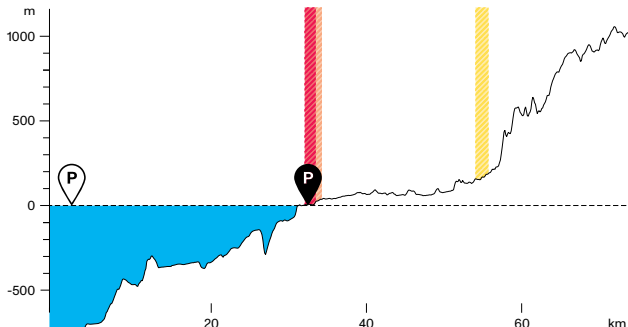
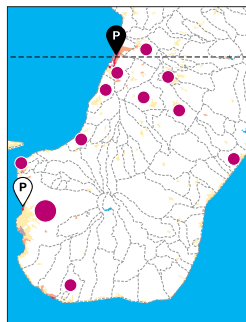
3,180

Density (per km²)

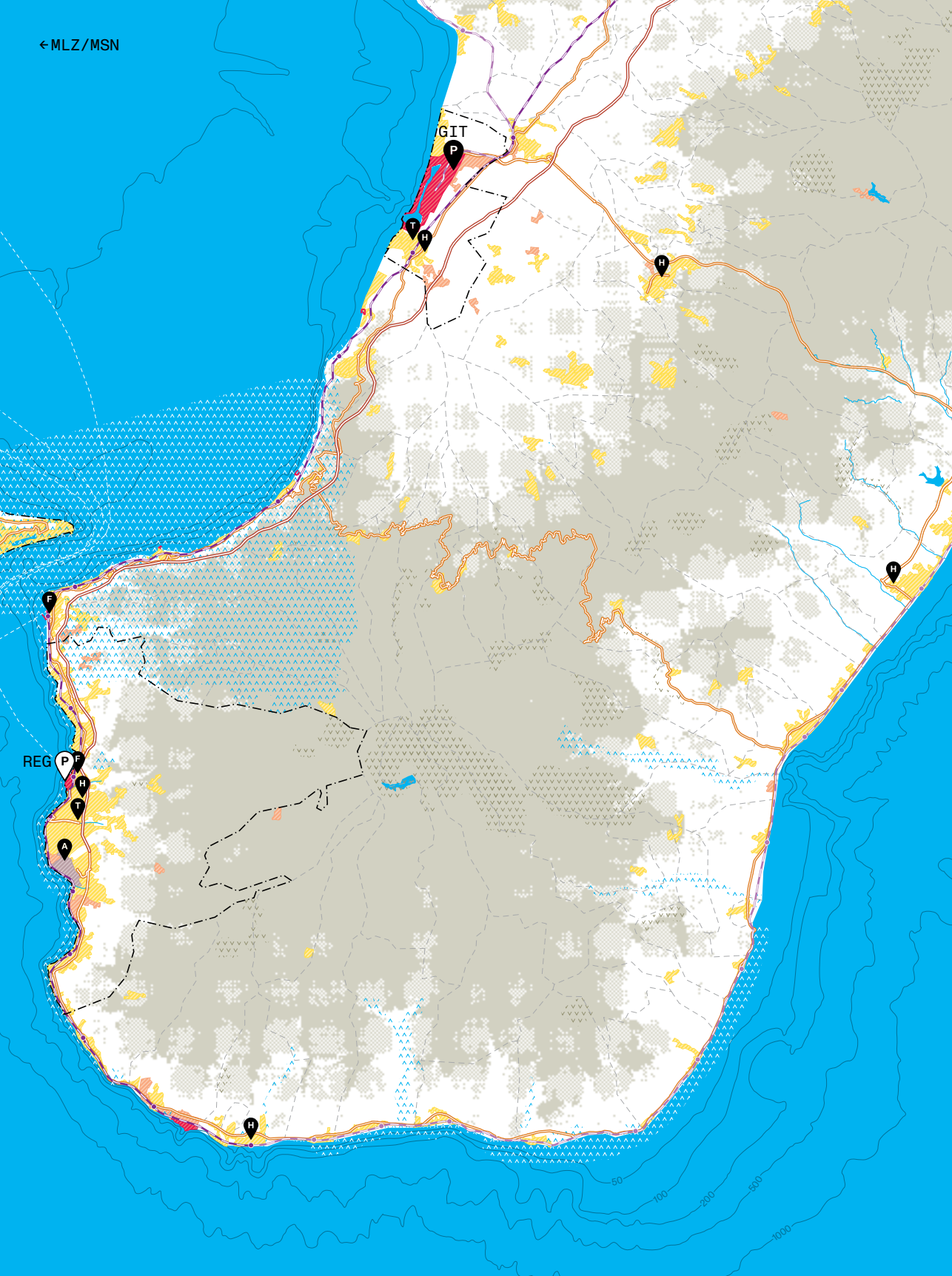
169

Population

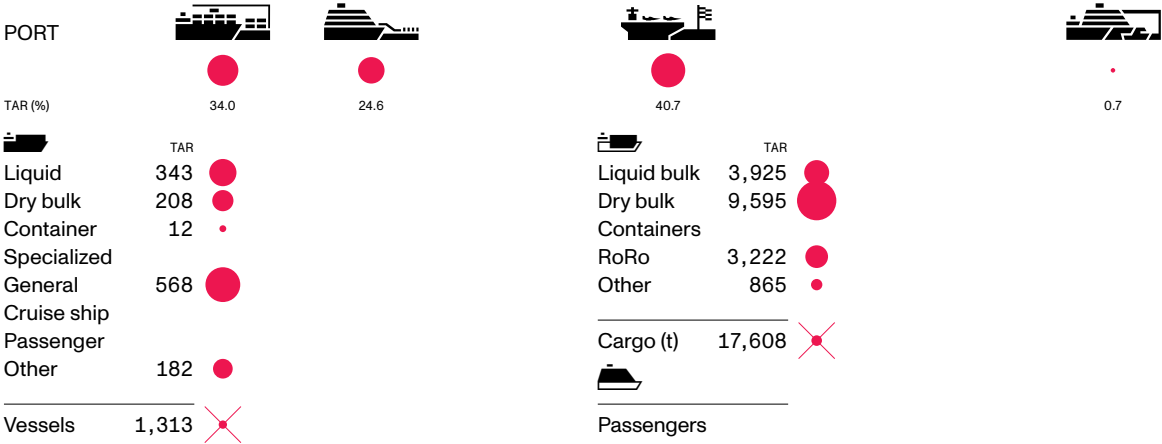
536,487



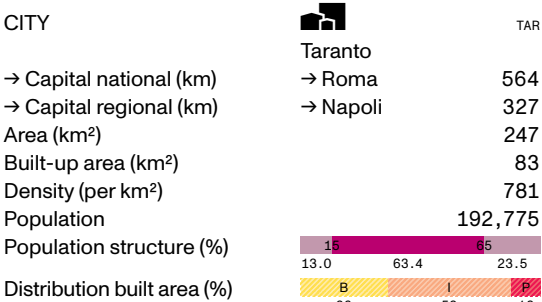
← MLZ/MSN



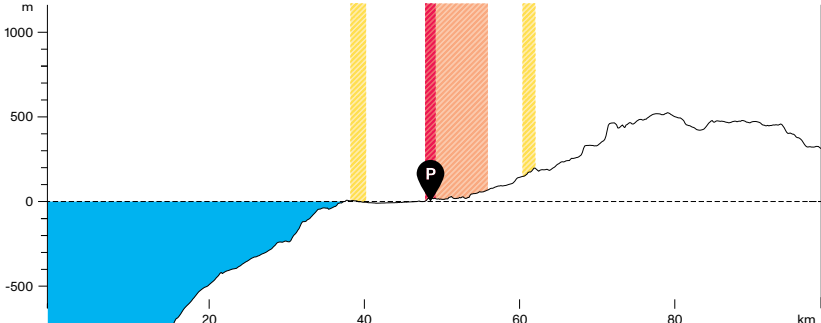
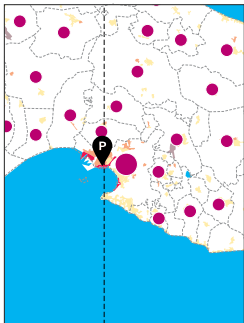
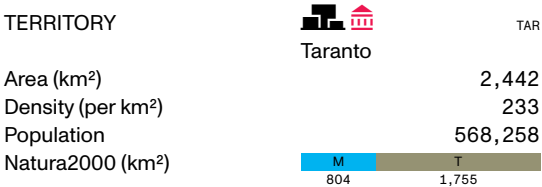
PORT



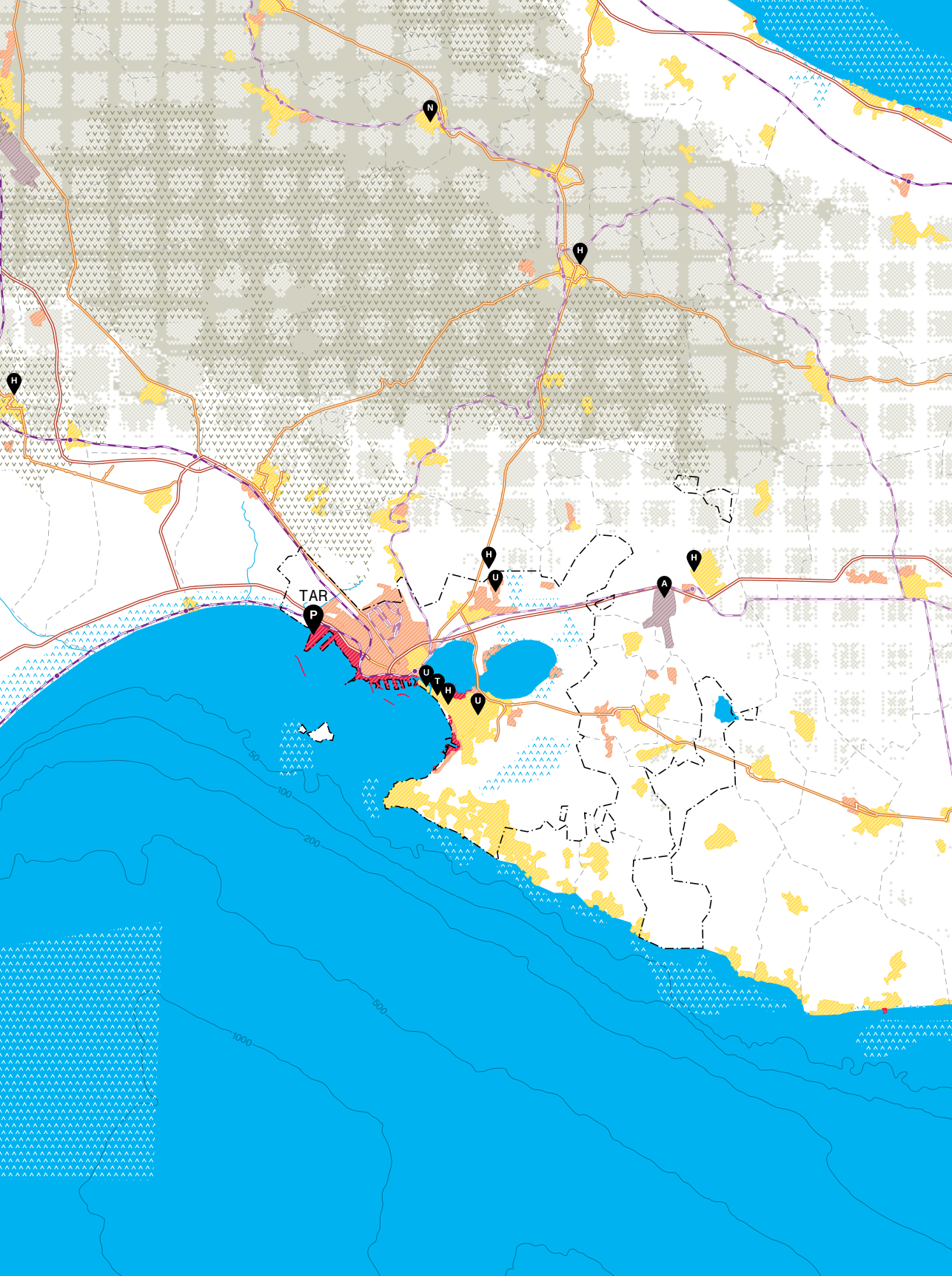
CITY



TERRITORY









PORT



RAN (%)

		RAN
Liquid	807	
Dry bulk	607	
Container	565	
Specialized	44	
General	1,325	
Cruise ship	15	
Passenger		
Other	719	
Vessels	4,082	

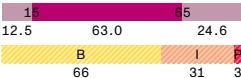
		RAN
Liquid bulk	7,970	
Dry bulk	15,793	
Containers	2,742	
RoRo	2,740	
Other	2,106	
Cargo (t)	31,351	
Passengers		

CITY



RAN

→ Capital national (km)	→ Roma	594
→ Capital regional (km)	→ Milano	376
Area (km²)		653
Built-up area (km²)		58
Density (per km²)		243
Population		158,923
Population structure (%)		
Distribution built area (%)		

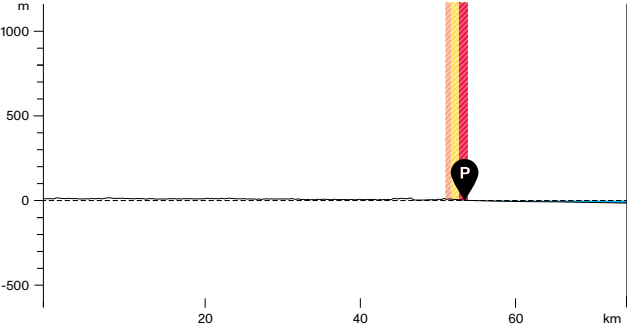
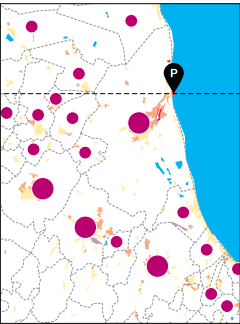


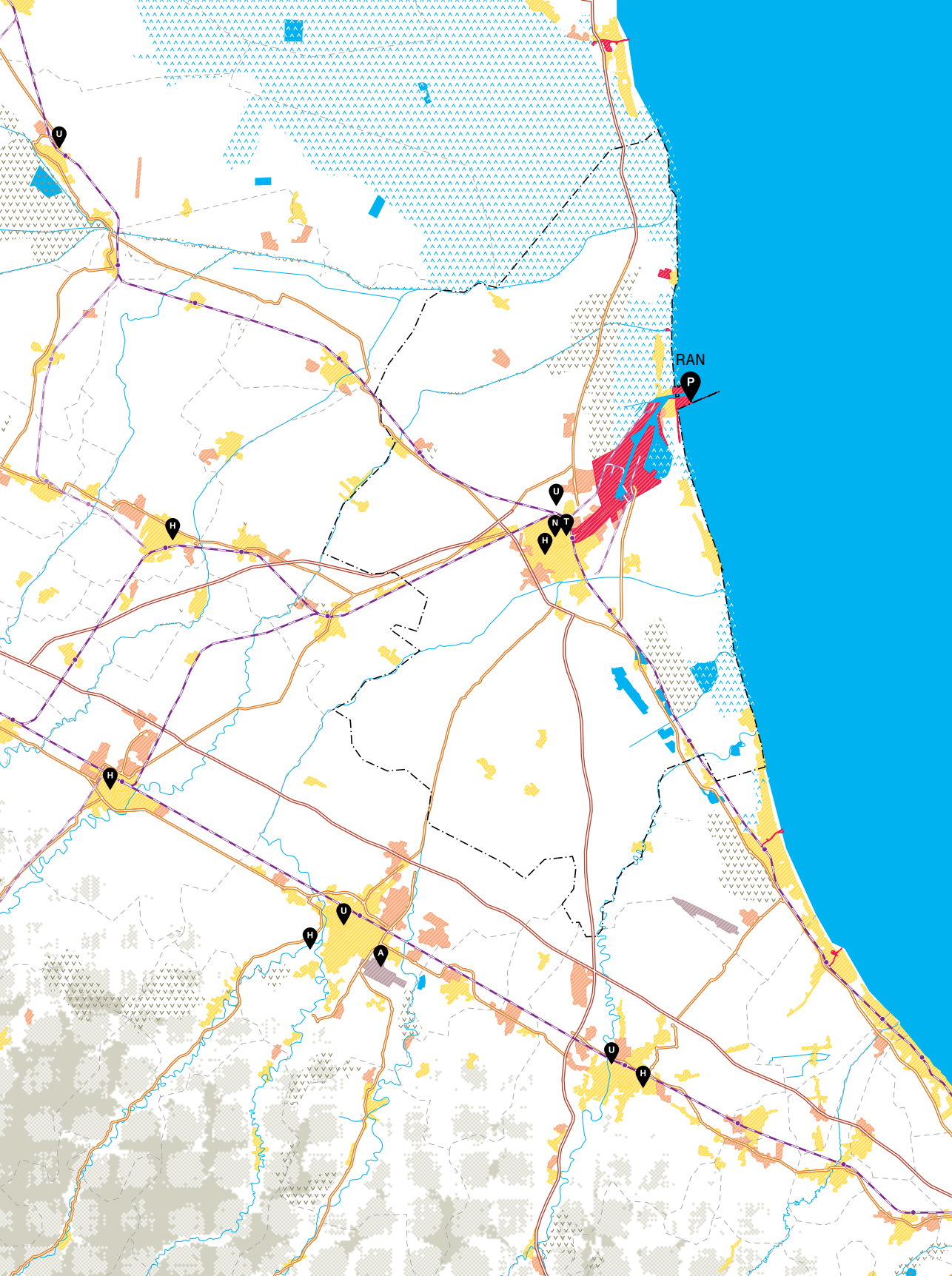
TERRITORY



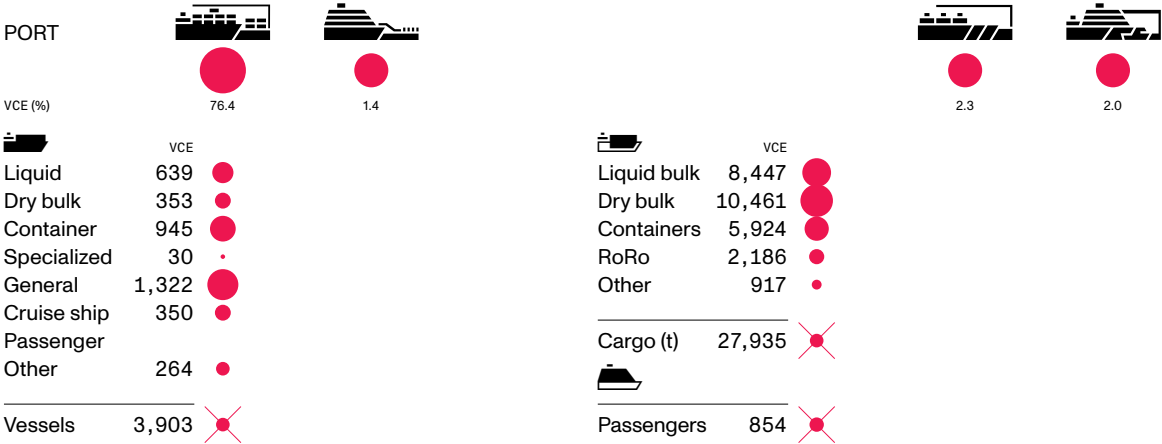
RAN

Area (km²)	1,859
Density (per km²)	209
Population	388,913
Natura2000 (km²)	

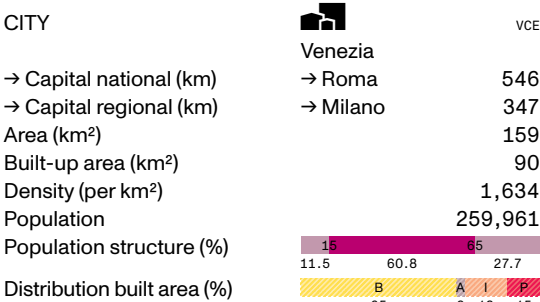




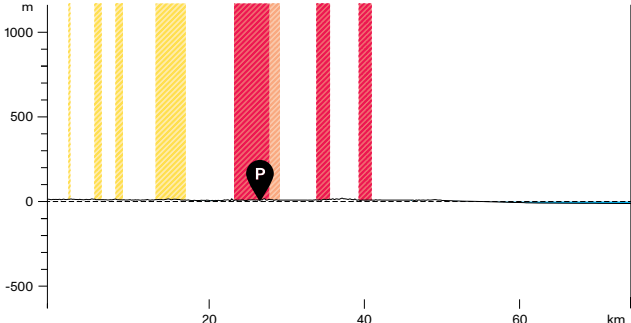
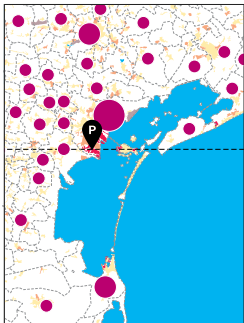
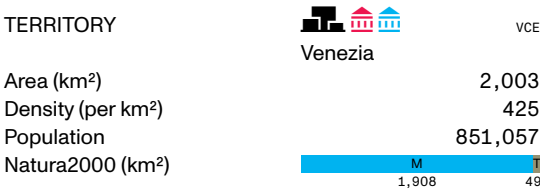
## PORT



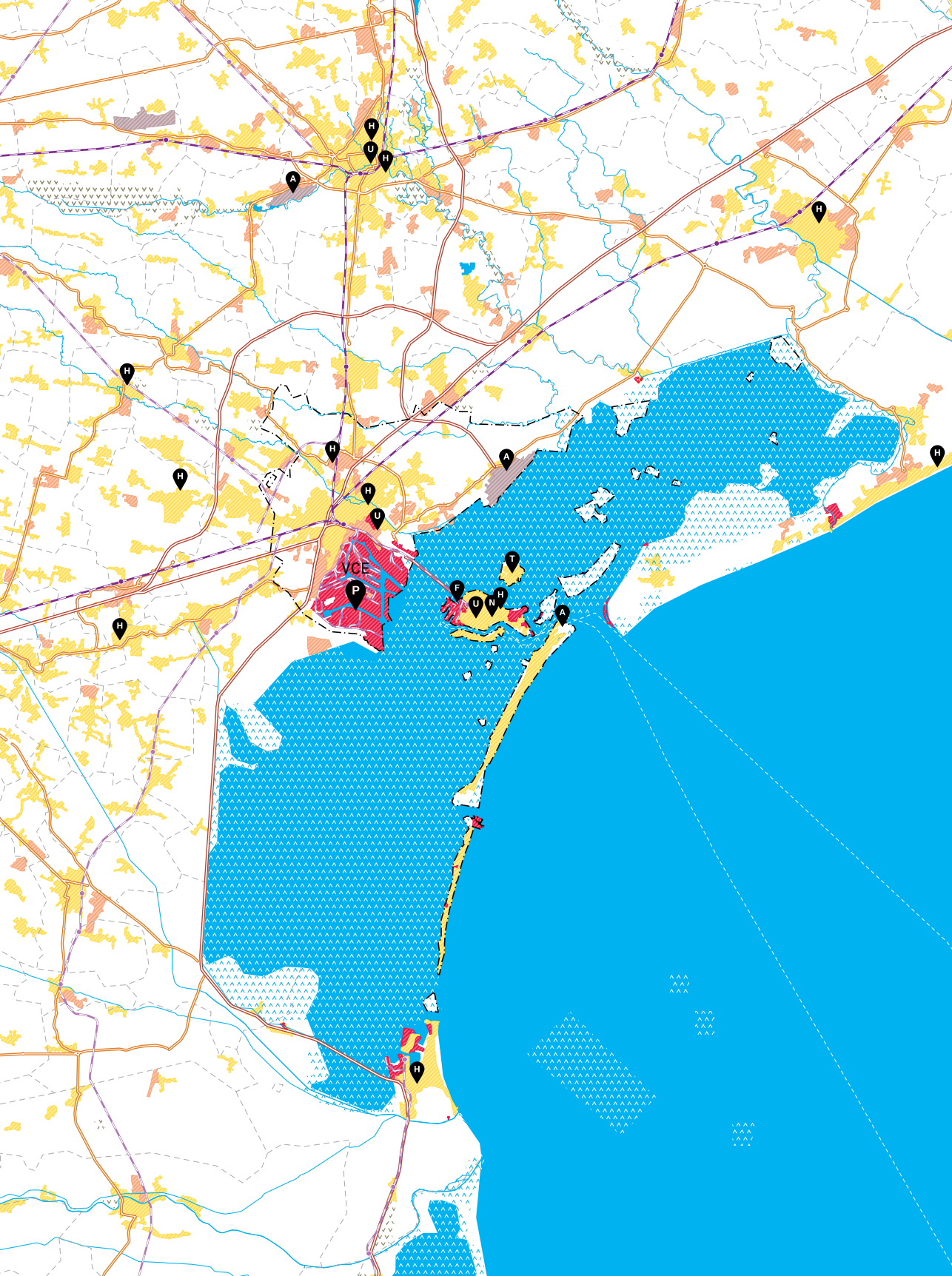
## CITY



## TERRITORY







TRS

KOP

MNF

# Trieste, IT

## Koper, SI

## Monfalcone, IT

  Gulf of Trieste

  Koper Bay

  Gulf of Trieste

PORT

TRS / KOP / MNF (%)



	TRS	KOP	MNF
Liquid	480	170	
Dry bulk	54	125	108
Container	654	621	10
Specialized		36	70
General	1,119	554	362
Cruise ship	55	72	
Passenger			
Other	168	71	152
Vessels	2,530	1,649	702

	TRS	KOP	MNF
Liquid bulk	39,883	4,288	
Dry bulk	4,300	6,368	3,725
Containers	7,886	8,970	1
RoRo	3,109	1,130	589
Other	5,154	1,359	170
Cargo (t)	60,332	22,125	4,485
Passengers		0	

CITY



TRS

Trieste

→ Capital national (km)

→ Roma

596

→ Capital regional (km)

→ Venezia

165

Area (km<sup>2</sup>)

85

Built-up area (km<sup>2</sup>)

37

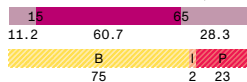
Density (per km<sup>2</sup>)

2,386

Population

202,351

Population structure (%)



Distribution built area (%)



KOP

Koper/Capodistria

→ Ljubljana

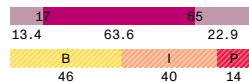
117

303

12

172

52,234



MNF

Monfalcone

→ Roma

612

→ Venezia

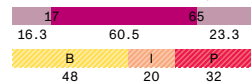
148

20

19

1,389

28,453



TERRITORY



TRS

Trieste

Area (km<sup>2</sup>)

5,248

Density (per km<sup>2</sup>)

389

Population

2,039,608

Natura2000 (km<sup>2</sup>)

KOP

Obalno-kraška

212

1,096

232,405



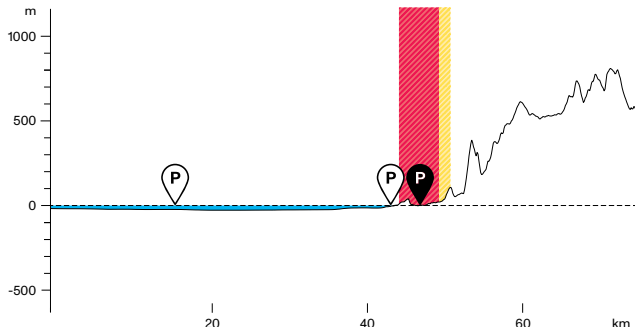
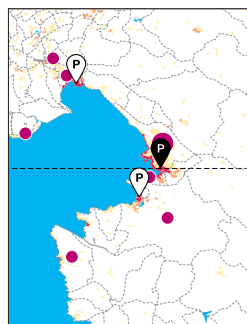
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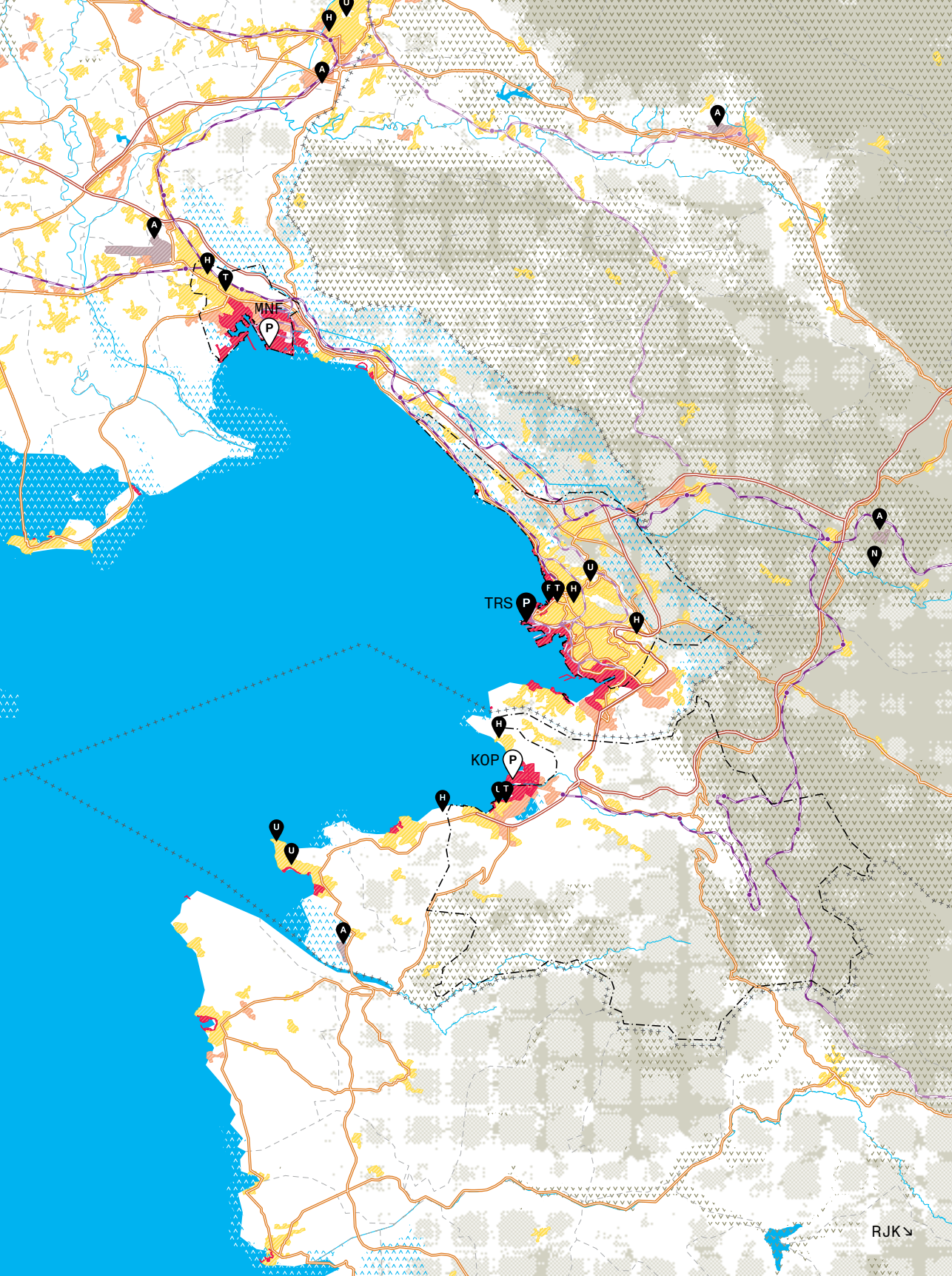
Gorizia

1,043

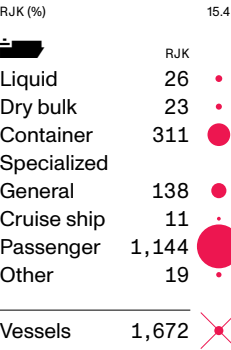
110

115,016





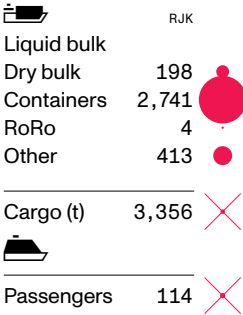
PORT



5.0



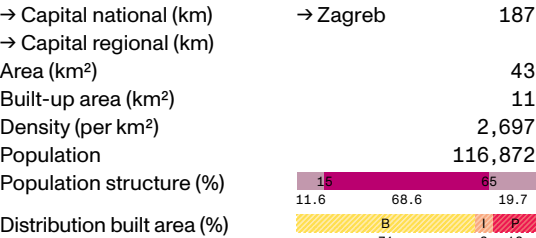
79.6



CITY



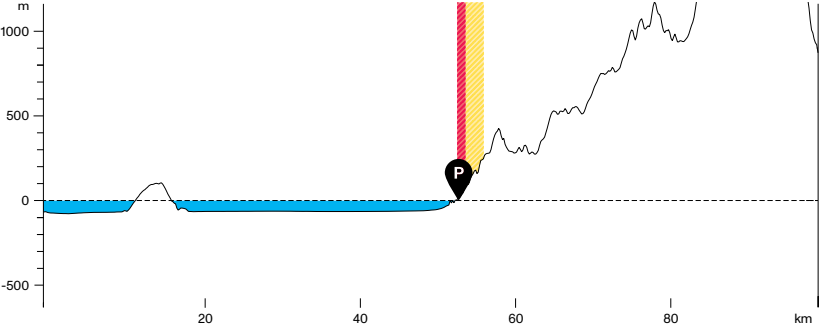
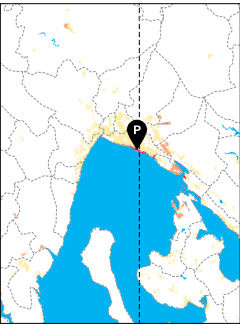
RJK



TERRITORY



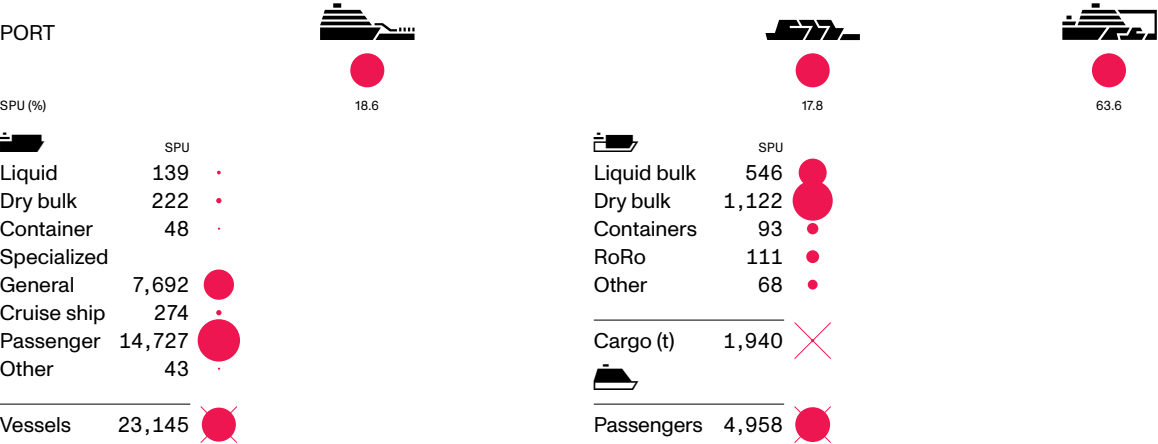
RJK



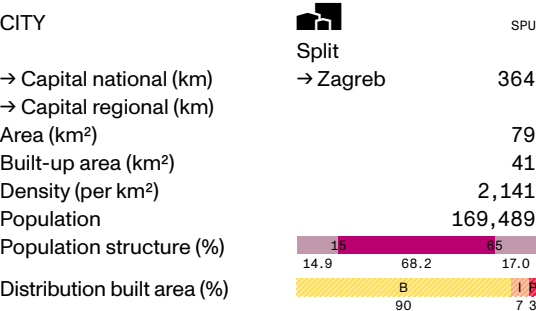




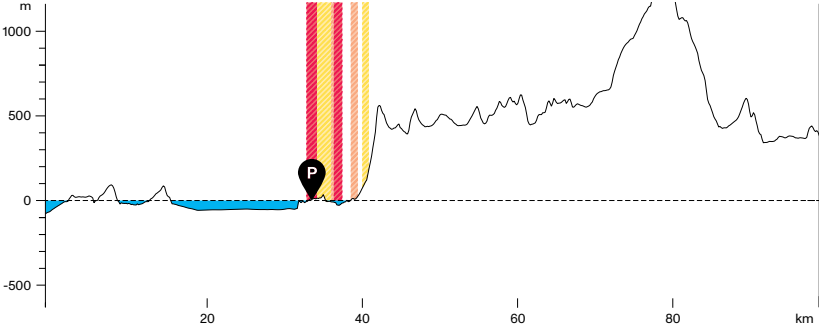
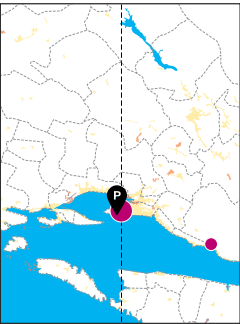
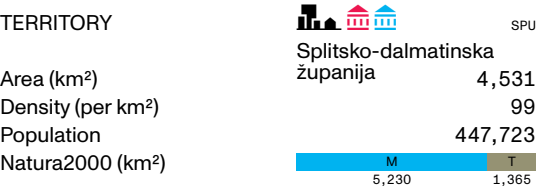
PORT

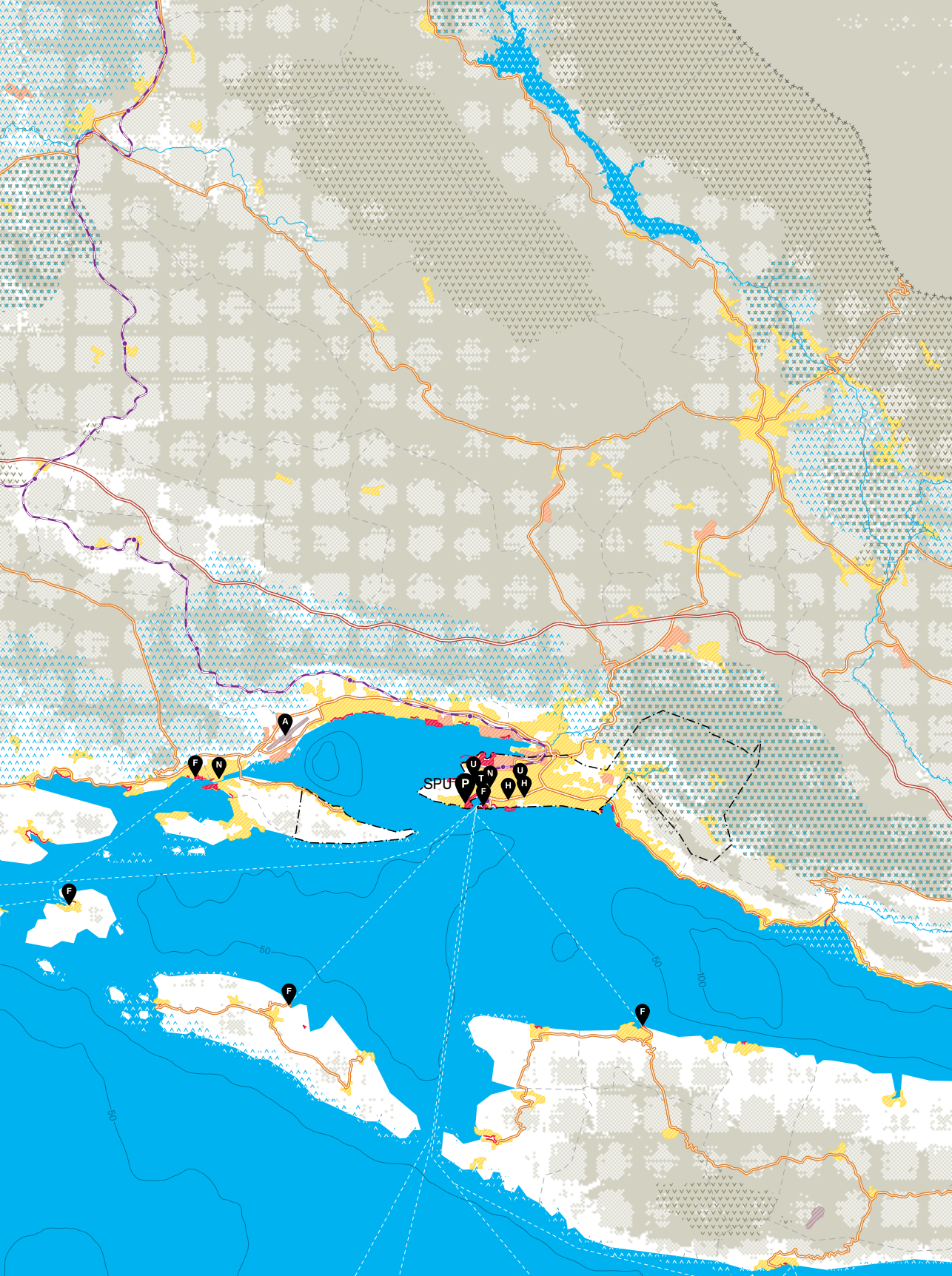


CITY



TERRITORY





PIR

PER

EEU

# Peiraias (Athens), GR

## Perama, GR

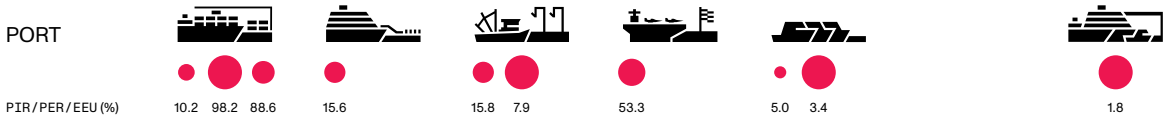
## Elefsina, GR

  Aegean Sea

  Aegean Sea

  Aegean Sea

PORT



	PIR	PER	EEU		PIR	PER	EEU
Liquid	615	1,083	1,437	Liquid bulk	1,314	2,386	12,852
Dry bulk	117		123	Dry bulk	353		2,733
Container	3,481			Containers	49,866		
Specialized	966			RoRo	5,276	1,313	46
General	11,460	33,129	194	Other	16		583
Cruise ship	625						
Passenger	9,737						
Other							
Vessels	27,001	34,214	2,317	Cargo (t)	56,825	3,699	16,214
				Passengers	9,931	6,939	0

CITY



PIR

Athens



PER

Perama



EEU

Elefsina

→ Capital national (km)

→ Athens 0

→ Athens 9

→ Capital regional (km)

→ Thessaloniki 392

→ Athens 18

Area (km²)

613

16

Built-up area (km²)

402

8

Density (per km²)

4,280

1,594

Population

2,622,404

25,389

Population structure (%)



Distribution built area (%)



TERRITORY



PIR

Peiraias, Niso



PER

Peiraias, Niso



EEU

Dytiki Attiki

Area (km²)

933.65

933.65

Density (per km²)

530

530

Population

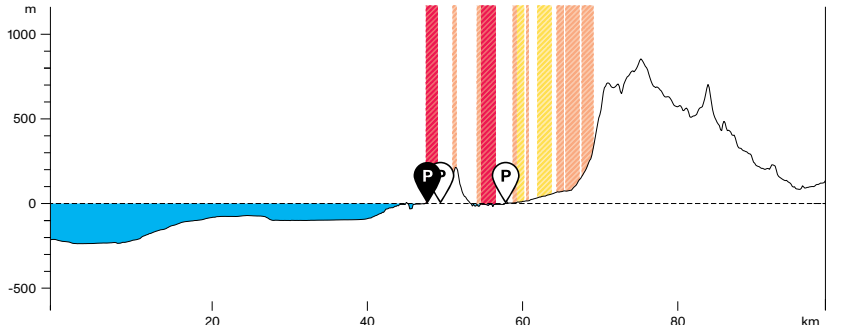
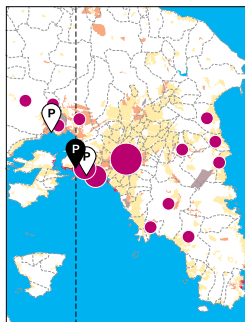
494,908

494,908

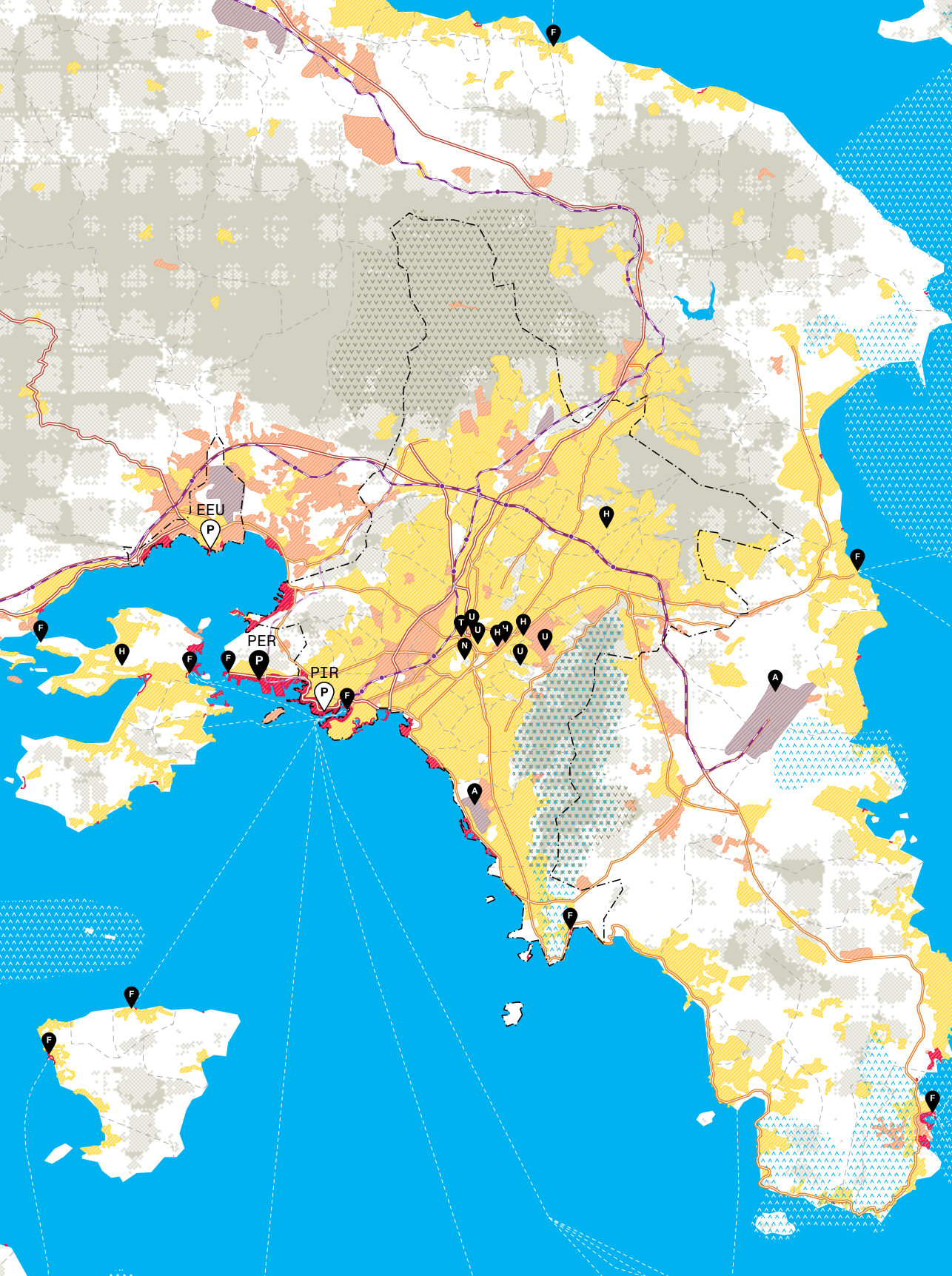
Natura2000 (km²)

0

0







PORT



SKG (%)

100



SKG

Liquid	405	
Dry bulk	298	
Container	337	
Specialized		
General	534	
Cruise ship	35	
Passenger		
Other		

Vessels	1,585	
---------	-------	--



SKG

Liquid bulk	6,618	
Dry bulk	3,913	
Containers	3,876	
RoRo		
Other	737	

Cargo (t)	15,172	
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Passengers	2	
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CITY



SKG

Thessaloniki	
→ Athene	392

→ Capital national (km)	
→ Capital regional (km)	
Area (km²)	113
Built-up area (km²)	97
Density (per km²)	6,697
Population	754,566
Population structure (%)	
Distribution built area (%)	

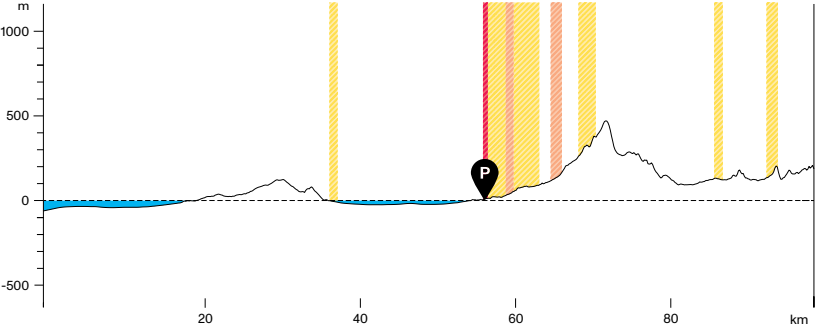
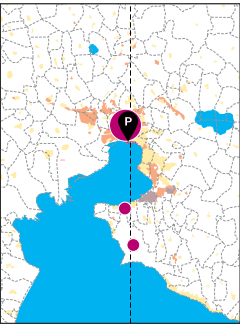
TERRITORY

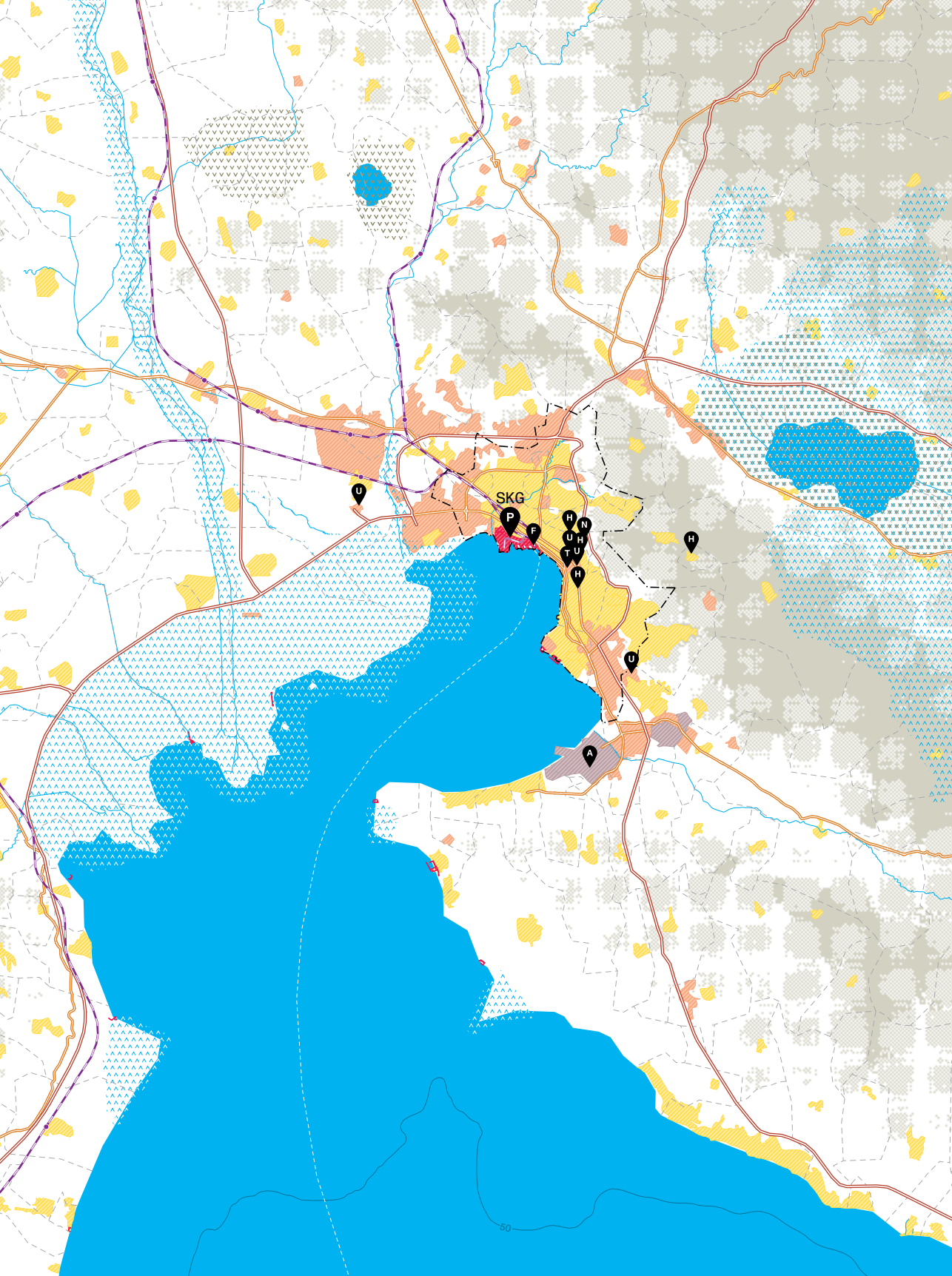


SKG

Thessaloniki	
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Area (km²)	3,685
Density (per km²)	300
Population	1,104,690
Natura2000 (km²)	









### III Interpreting



# 7 Planning Challenges and Opportunities in Port City Territories: an Analysis through Infographics and Maps

## Abstract

Analysing 100 port city territories through maps and infographics, we can see both planning challenges and planning opportunities. Port authorities are continuously adapting the capacity of their ports to manoeuvre ever larger ships, handle more cargo and improve their operations. As a result, they are constantly seeking to move into adjacent empty land and taking over areas of unused land and water in the port city and port city territory, while moving out of other areas and sometimes giving land back to cities. The maps and infographics provide a basis for the interpretation of future spatial development, illustrating the relationship between the different parts of the port city territory, different relationships between port functions and their impact on the port city territory. Our maps mark the outlines between parts of the territory to help planners and authorities plan connections between ports and the European transport network of motorways and railways. Finally, citizens and planners alike can draw on these maps for co-design, negotiation or citizen science regarding the planning of the port, port city and port territory.

## Introduction

Planning has long helped ports adapt to multiple changes, regardless of who or what the drivers of these changes were, whether technological, geostrategic or environmental changes in the Port-CityScape or the changing role of governance and port authorities. On the sea, port authorities have added wharfs to accommodate more ships and moved to deeper waters to accommodate bigger ships; they have expanded their operational coastlines by constructing new structures, such as piers with higher platforms needed because of rising water levels caused by climate change. On land, port authorities have expanded into new territory: adding more rail lines for more and better access to the hinterland, and adding roads within the port territory to connect to national and international road networks.

The following sections explore current and upcoming transitions in port city territories that planners at all levels are facing. Where possible, these transitions are exemplified through our maps and infographics as shown on page 298. The maps can help identify past conditions, some future challenges, and opportunities for developments and strategic decisions. With cartographic features illustrating a territory's built-up area, the area occupied by the port and distribution of industry across the territory, the maps can help port city territory actors site new port areas without encroaching on protected areas or complicating the connection of ports to road and rail networks. Infographics and the data they contain offer an immediate territorial assessment tool planners can use to create scenarios for spatial variations in port city territories, and decision-makers (port authorities, states, city councils, citizens) can co-create new visions for port city territory change and support transformative port planning.

#### Maps and Infographics for Port Planning and Port City Territory Planning

The maps of the 100 leading port city territories provide information that planners can use at both the cartographic level and the analytical level. They show the relationship today between each port, port city and the rest of their port city territory (including areas on the coast) as a result of the history of port planning, urban planning and spatial planning over time. Though the spatial relations between the different parts of the port city territory vary widely among the 100 ports, we can discern some planning patterns in the maps. In some cases, the city is far from the sea and has no direct access to it at all (e.g., Ravenna, Valencia, Zeebrugge, Riga, Lübeck); usually such a city is connected to the sea by a river or marshes, so port infrastructure was planned and built inland rather than on the coast. Sometimes port development almost completely blocks access from the city to the water (e.g., Trieste, Rijeka, Esbjerg, Helsingborg, Klaipeda, Le Havre), while in other cases the contact between the urban area and the water is extended, and the city and the port share the land-water contact zone (e.g., Livorno). Planners in similar spatial predicaments can perhaps learn from each other.

The infographics offer additional information to planners on a port's predominant cargo, from dry bulk to liquid bulk to containers; on the size of a city, its built-up area and port area; as well as on the size of a territory and its degree of urbanization (e.g., according to Eurostat, a NUTS 3 territory can be urban, intermediate or rural). It is therefore possible to interpret the different relationships among port function and their impact on the port city territory, such as the handling of each type of cargo in relation to the size of the total area of the Local Administrative Unit (LAU) and use this information



for planning. In Le Havre, for example, liquid bulk throughput as shown by the infographic is 36.132 tons in an area of 86 km<sup>2</sup>; in Milford Haven throughput is 34.051 tons in a much larger area of 1.623 km<sup>2</sup>. This means that Milford Haven has 20 times less liquid bulk per square kilometre of total Local Administrative Unit area than Le Havre, which indicates that Le Havre is a *pollution-laden* problem location. Knowing these ratios, port and urban planners might limit industrial development in La Havre LAU, while in Milford Haven, LAU concerns about industrial pollution are not paramount and would not restrict expansion.

Planners may want to rely on the combined information from maps and infographics to limit the impact of port specialization and functions on the environment. They need to acknowledge the delineations between ports, city and territory, all of which are relevant to planning. In commercial ports, the boundaries of the port area are more clearly defined than in other kinds of ports, although those boundaries can also be permeable. Passenger ports are integrated into the city and are the domain of not only port planning, but also urban planning, as for example in Koper.<sup>1</sup> Cruise and ferry terminals, in particular, allow easy access to the city or its most interesting parts.

For future planning proposals, planners can look to the maps for the present configuration of port city territories. In Bristol, for example, the port is indistinguishably merged with other industrial areas; in Milford Haven, the port has expanded outside the old town into previously undeveloped land and has plenty of empty space for further expansion; while in Cairnryan, the port is located completely on its own, directly adjacent to protected areas. In Marseille, the port's further development is restricted by protected areas; in Ravenna, the port has encroached on the fabric of the city, ending the historical separation between the two areas. In Dublin, Clydeport, Liverpool, Helsingborg and Trieste, ports are completely enclosed and surrounded by the urban fabric. In each location there are thus different opportunities and challenges for the development of port city territory.

#### Land, Water and Air Access to the Port

Our maps show road and rail connections by land, access routes by water, and airports and heliports. They show one or more high-way routes through each port city territory and one or more land road accesses to the port, such as in Zeebrugge, Hirtshals and Friederikshaven, Rotterdam, Bristol, Barcelona and Marseille; they also show where such accesses are missing, as in Helsinki, Szczecin, Haysham and others. Such information lets port planners strategically define the most favourable land and water entrances to the port, while planning in the larger port city area to enable access to the port.

1 L. Ažman Momirski, 'Urban waterfronts in Koper: a comparison of spatial issues in the initial and current plans for Koper's port', *Annales: anali za istrske in mediteranske študije, Series historia et sociologia* 25/1 (2015), 19–32.

All this is necessary, if not urgent, because traffic through the hinterland and the foreland to ports is increasing. There is little point in planning and making improvements to port facilities if land transport cannot handle the increased cargo flows. In one recent initiative to address the problem, the EU Commission connected selected seaports in the Trans-European Transport Network (TEN-T), a planned network of roads, railways, airports and waterways and also energy networks and telecommunications networks across EU territory. The TEN-T also provides grants to ports, maritime operators and hinterland transport operators to support infrastructure projects, mainly rail and inland waterways connecting ports with their hinterlands and basic port infrastructure.<sup>2</sup> Ports can also ask the EU Commission to update the TEN-T network, for example to extend the Baltic-Adriatic Corridor, which currently stops in Ravenna, to the entire Italian Adriatic-Ionian side of the Adriatic Sea. The maps do not only show the European infrastructural networks, but demonstrate that the main traffic bottlenecks in most ports are increasingly in the hinterland, not the coast. The maps help planners and authorities to suggest where the European transport network should run in the future.

Today, port authorities and state administration intend to integrate port and airport access,<sup>3</sup> which have been planned separately, and to locate airports close to ports in order to make supply chains more efficient and shorten freight transit times. Our maps identify airports near ports in the port city territories: in some cases, the airports are located either inside the port or they sit at its edge, as in Bremen, Belfast, Nantes Saint-Nazaire, Genova, Barcelona; in other cases, they are located close to the port, as we can observe in Bilbao, Le Havre and Cagliari. There are also some exceptions in which the airports are not present on the maps: on the Mediterranean, the airport of Toulon is far enough east of the city to fall outside the map; in La Spezia there is only one helipad near the port, and the nearest airport is in Pisa, which is beyond the map; for Messina and Milazzo the airport is across the channel in Reggio Calabria; and in the Baltic Sea we cannot see airports at all for Sillamäe, Skoldvik, Kalundborg and Fredericia. This means that the infrastructural links of the port city territory effectively extend beyond the map section.

Infrastructural access to the port goes beyond the land side. Planning for water entrances has to take into account sea depths, not only in the approach to the port but in the port itself, where dredging usually removes underwater sediments to accommodate larger vessels. In addition, maritime traffic also shapes port planning for access. The infographics show the total number (in thousands) of vessels and percentage of vessel types calling at each port from Eurostat Maritime transport data in 2019 (vessels in main ports by type and size of vessels). For example, maritime traffic is

2 European Commission, 'Ports' (2022). Online. Available HTTPS: [https://transport.ec.europa.eu/transport-modes/maritime/ports\\_en](https://transport.ec.europa.eu/transport-modes/maritime/ports_en).

3 J.-P. Rodrigue, *The Geography of Transport Systems* (New York: Routledge, 2020).

heaviest in the port of Santa Cruz de Tenerife in Western Waters, in Reggio di Calabria in the Mediterranean Sea, in Rotterdam in the North Sea and in Helsingborg in the Baltic Sea. Such information complements the view of the maps, which indicate the directions from which ships arrive to the port.

### Environmental Issues

Both our infographics and our maps highlight environmental challenges; the first identifies the total area of terrestrial and marine Natura2000 sites in figures and the second the presence or absence of protected areas in the port city territory. The Organisation for Economic Co-operation and Development (OECD), which is an international organization working to set evidence-based international standards and find solutions to a range of social, economic and environmental challenges, defines three subcategories of environmental harms associated with ports:<sup>4</sup> those caused by port activities, those caused at sea by ships entering the port, and emissions from intermodal transport networks to the hinterland. Port planners and port authorities pay close attention to these harms, and to the encroachment of ports on protected areas, and accordingly take special measures in planning. As part of preparing a master plan, experts from different disciplines put together a comprehensive environmental impact assessment—aimed at preventing or reducing the harmful effects of planned activities on the environment and their consequences. These findings must be considered in the planning process. We can conclude from the maps, for example, that planners will have to take extra care in the port of Swinoujscie in Baltic Sea, which is in a difficult situation in terms of further spatial growth and planning, because it is surrounded by marine Natura2000. Similarly, most of the area around the port of Antwerp and the port of Bremen in the North Sea is protected by Natura2000 Terrestrial. Such proximity does not necessarily mean that ports cannot expand. The master plan for the port of Koper included restoration of habitats at its north side that would be damaged by port expansion. This was part of the detailed and in-depth evaluation that won the natural heritage and hydrology sectors' approval to build a third container port pier.

In many port city territories, the energy crisis has made energy production a top priority, pushing port authorities to search for alternative energy sources and planners to implement them in new designs. Another response to the crisis is European circular economy policy, which mandates that ports reform their organization of production and consumption to save energy, but the question remains how to implement the measures. One possible solution in the port city territory, with its concentration of different industries, is industrial symbiosis. This is a concept in industrial ecology (IE) that looks at the stages of the production processes

4 OECD, 'Environmental impacts of ports' (2022). Online. Available HTTPS: <https://www.oecd.org/greengrowth/greening-transport/environmental-impacts-of-ports.htm>.

5 M.R. Chertow, 'Industrial Ecology in a Developing Context', in: C. Clini, I. Musu, M. Lodovica Gullino (eds), *Sustainable Development and Environmental Management* (Dordrecht: Springer, 2008).

6 P. Badurina, M. Cukrov and Č. Dundović, 'Contribution to the implementation of "Green Port" concept in Croatian seaports', *Scientific Journal of Maritime Research* 31 (2017), 10–17.

7 C. Ducruet, H. Itoh and O. Joly, 'Port-region linkages in a global perspectives', *MoLos Conference 'Modeling Logistics Systems'* (Le Havre, 2012).

8 J. Cerceau, N. Mat, G. Junqua, L. Liming, V. Laforest and C. Gonzalez, 'Implementing industrial ecology in port cities: international overview of case studies and cross-case analysis', *Journal of Cleaner Production* 74 (2014), 1–16.

9 'homePORT'. Online. Available [HTTPS: https://www.homeport.hamburg/](https://www.homeport.hamburg/).

of goods and services, and attempts to mimic a natural system through the conservation and reuse of resources.<sup>5</sup> IE is based on the concept of the circular economy, in which different entities form networks of actors to share resources such as materials, energy, information, services or technologies. Eco-industrial parks hosting these activities could be built in areas where ports intersect with industrial areas, as is the case in the port of Rotterdam, where the industrial waste heat of the port refinery fuels the Rotterdam city district heating system.

Waste management is one of the most important planning and environmental issues in port city territories, as resource-intensive industries here benefit from the proximity of ship loading and unloading; but this process cannot be read directly from the maps or infographics. Ports are changing their approach towards waste management. Some authors propose master plans for waste management measures and methods in ports, reporting observed pollution and defining a model for handling the waste, as they have in the Croatian ports Rijeka and Split.<sup>6</sup> A team of French researchers have produced an international overview of port industrial ecology initiatives, looking methodologically at case studies, types of port regions (following the typology of Ducruet et al.)<sup>7</sup> and port IE actors, including port authorities, local authorities, national governments, companies, and researchers.<sup>8</sup> The authors found that many ports in Europe are pursuing IE initiatives, including ports in the Netherlands, Belgium, the UK, Spain and France. The research revealed that ports can make an important contribution to the development of IE by including industrial symbiosis in future transitions.

### Partnerships in Planning that Facilitate Transitions: Co-design, Negotiation, Citizen Science

To contribute to contemporary transitions, planners at all levels in port city territories can form multilateral partnerships and collaborations with local people and organizations: co-designing with stakeholders to ensure that outcomes meet their needs; negotiating to reach agreements on plans; and in citizen science, collaborating with citizens on scientific research projects to help solve world problems. In all such partnerships, planners should treat community members as equal collaborators in the planning process. For the most part, however, the foundations for such collaborations, relevant institutions and tools still need to be established in many port city territories.

An example of *co-design* can be found in the port of Hamburg: a maritime laboratory called homePORT, in which the port, citizens, other port stakeholders, research institutions and start-ups work together to design changes in the port.<sup>9</sup> Specifically, this campaign asks what will happen to port areas after the end of the container era, identifies alternative scenarios for the use of those areas and

simulates approaches for a circular economy with zero-emissions. *Negotiations* do not take place very often in port city territory planning; the restructuring and redevelopment of a port in Copenhagen is among a handful of examples of its complexity and success. Important components are participants' learning processes, cooperation and continuous adaptation of approaches to achieve better solutions.<sup>10</sup> In *citizen science*, citizens can be involved at any stage of planning, from defining questions, to developing assumptions, to discussing the results and answering new questions.<sup>11</sup> Citizens can then also initiate projects to improve local spaces. There are many opportunities for planners and communities in port city territories to use citizen science and its findings to influence local policymakers to improve public health, quality of life, social cohesion and awareness of local issues and networks.

### Conclusions

Our maps and infographics offer all stakeholders the opportunity to examine individual case studies in depth and with regard to the specifics of their own location and situation, as well as to identify general approaches to addressing planning issues. Port planning practice shows that no single authority controls the form of the port city territory, or its components of hinterland, foreland, port city and port. Rather, that form is shaped by a mixture of bureaucracy and market forces.<sup>12</sup>

New partnerships in planning will change and shape port city areas in the future that are not yet visible on the maps. Global climate change, to which by far the largest contributors are fossil fuels—coal, oil and gas—and sea level rise, caused by global warming, are the latest in the series of changes. Other challenges and tensions facing ports and their territories are the sustainability of spatial development in line with the Sustainable Development Goals,<sup>13</sup> such as Goal 9—developing high-quality and reliable infrastructure—or Goal 13—strengthening resilience and adaptive capacity. Security issues caused by fears of piracy, armed robbery incidents and military combat increase the importance of these issues. Accordingly, the resulting changes are more complex than ever and the interests at play among port city territory actors have multiplied and become more diverse. For example, to become sustainable, ports must incorporate renewable energy and green chemistry, reducing or eliminating the use or generation of hazardous substances. These are changes that can only be achieved and implemented through collaborative planning by all stakeholders.

10 L. Ažman Momirski, *Obalne preobrazbe: Izola vzhod* (Ljubljana: Fakulteta za arhitekturo, 2013).

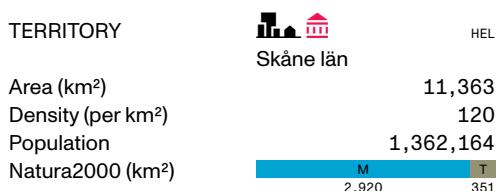
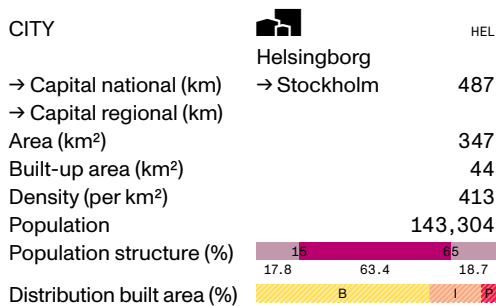
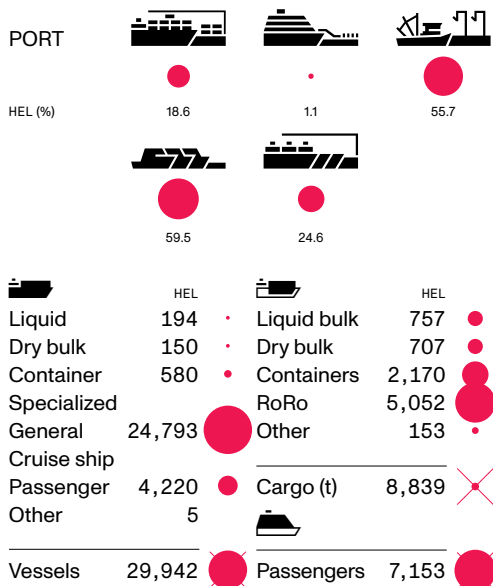
11 'What is citizen science?'. Online. Available HTTPS: <https://www.citizen-science.at/en/immerse/what-is-citizen-science>.

12 L. Ažman Momirski, 'The Port of Koper: the youngest modern North Adriatic port', *Portus* 4/7 (2004), 70–75.

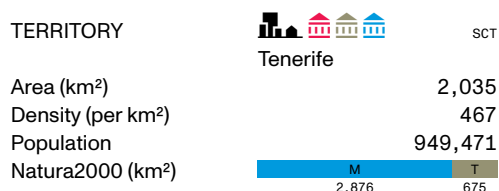
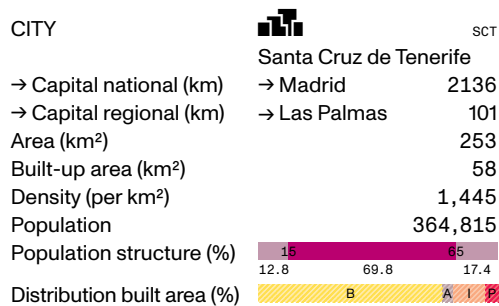
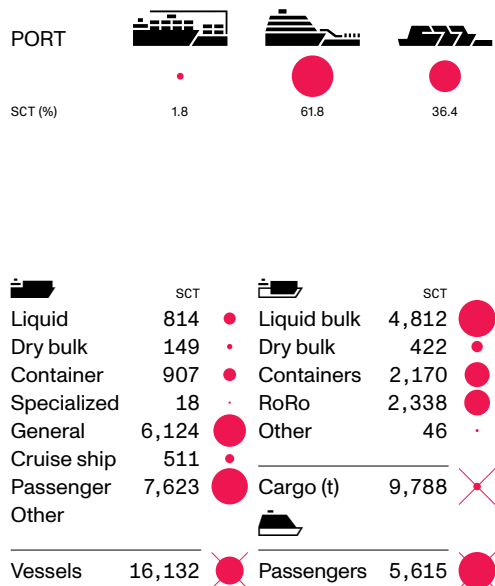
13 United Nations, 'The Sustainable Development Goals' (2022). Online. Available HTTPS: <https://www.un.org/sustainabledevelopment/>.

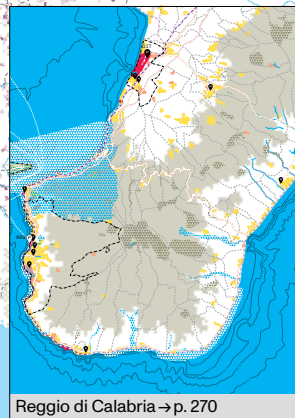
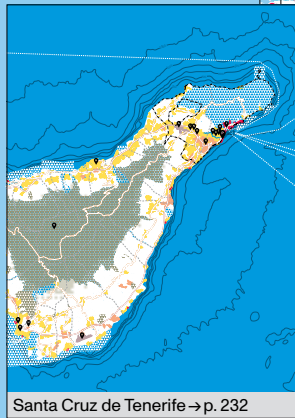
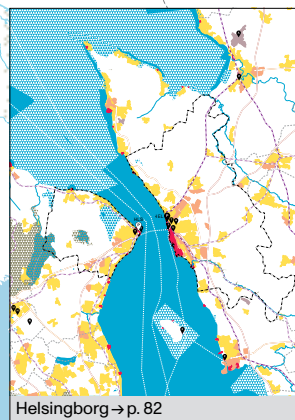
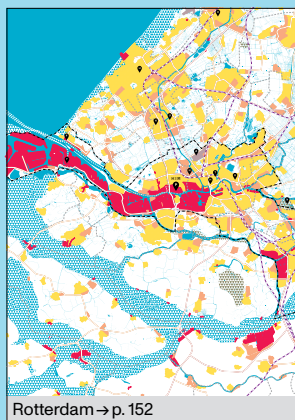


# Helsingborg, SE



# Santa Cruz de Tenerife, ES





# 8 What Can We Learn from the Maps and Mapping Process about European Port City Territories?

## Abstract

Maps and infographics that translate statistical and spatial data into visual forms offer a wealth of information that requires careful analysis and provides a foundation for research, planning, and sustainable development. This chapter first discusses some initial insights on the benefits of mapping port city territories in terms of the natural geographical conditions on the edge of land and water, and of man-made spatial patterns of port city relations and urban forms. These spatial conditions, clearly identifiable on the maps, give us insight into the spatial and institutional structures that characterize port city territories; thus mapping can help us address future research questions on spatial development strategies or challenges such as energy transition, mass migration and climate change. Based on the observations made during data research, we then discuss insights into data unavailability that have affected the mapping and the mapped results, and address limitations of data and lack of (detailed) data. The chapter concludes that geo-spatial mapping and other visualizations such as infographics can play a key role in the study of port city territories, and in port planning, illuminating complex governance structures and showing the different stakeholders involved in port city territories, and how the natural geographical landscape affects the performance of ports. But we also call for more, and more specific, data.

## Introduction

Port city territories all host the same flows of goods and people, yet, as our atlas shows, they are distinctive and complex ecosystems that have evolved over time, connecting natural features of sea and land, urban structures focused on the port and maritime activities, complex governance structures, and actors with different interests and means of power. The uniform mapping of port city territories helps us understand these overlapping patterns, and allows us to describe, define and ultimately classify port city territories according to their spatial characteristics. By looking at (urban)

morphological patterns, the maps can help us answer questions about port city territories, as these first insights into the spatial and institutional structures of port city territories exemplify.

The chapter starts with the question: looking at the maps, how can we interpret the morphological patterns in the natural topography and geography of port city territories, and in their man-made features such as urban settlements and the port city relation? Second, it addresses what the complexity of data obscures. While working with European datasets, we encountered several challenges. Mapping-based research largely depends on the availability and structure of (existing) datasets and on standardized administrative units. Uniform maps allow for comparison, but also level out individual particularities. We conclude with a call for more available and more detailed data, and a greater awareness of both the possibilities and the limitations of geospatial data.

#### Deriving Lessons from Complex Spatial Data:

##### How to Interpret the Morphology of 100 Port City Territories

In reality, port city territories can stretch (far) beyond our 75 by 100-kilometre map-cut-out, but this framing makes it possible to explore complex spatial and institutional relationships, as well as spatial or urban patterns. In the approach chosen for this chapter and applied in the maps on page 308, we highlighted specific map layers to explore select spatial characteristics of port city territories for specific analytical purposes. In this case we chose to focus on the natural geographical conditions on the edge of land and water, and patterns of the man-made relation between port and city, and urban patterns. These morphological patterns allow us to predict some spatial planning challenges; they also illuminate the institutional structures that influence port city territories and point to planning strategies that could improve the performance of the port.

##### Ports in their Natural Morphology of Land and Water

While we focus on Europe as a whole, our maps also highlight national differences. This becomes particularly clear when examining the length of the coastline in relation to the number of leading ports on our list. Countries with long coastlines have more leading port city territories than those with short coastlines—though the amount of transshipment can be much less. Rotterdam, for example, transits a larger tonnage of cargo per year than all 14 Italian leading port city territories (containing 19 ports) combined. This may be the result of national policies or path dependencies, but we found that natural geographical conditions are also a factor. Increased access to maritime waters, and thus more opportunities for port development, is not a precondition for success. The naturally present limitations and opportunities of such access can also be determinant. By examining the natural morphology of land and water,

we observe explainable differences between the four maritime waters: a maritime perspective is more insightful than a national view. France, for example, has eight leading port city territories across three waters. Almost all the ones on the Atlantic coastline (Le Havre, Nantes Saint-Nazaire and Bordeaux but not La Rochelle) are situated in an estuary or on a river, which may be due to the rougher conditions of the Atlantic Ocean. In the Mediterranean Sea, with calmer seas, fewer major rivers and deltas, but more mountains and an irregular coastline, the ports (Marseille and Toulon) are situated in a natural embayment. Dunkirk and Calais are situated on the relatively shallow North Sea where there are multiple deltas and major rivers, but these ports are in a (narrow) strait and have an engineered coastline, as natural protection to safely load and unload ships is lacking. Similar patterns in morphological conditions can also be discovered in other port city territories.

Some patterns are consistent for specific natural morphological conditions. Ports located along a coast (such as Dunkirk or Naples), often block the city's access to the sea. Such a situation can be advantageous for deep-sea ports but can be prone to disasters. Public resistance to further development is also more likely. Ports on rivers and estuaries face different challenges and have different opportunities. They can be developed on both sides of a river and have greater access to nearby territory (such as Antwerp or Hamburg), but face the risk of flooding from the hinterland and from the sea. Similar to ports on a bay (Dublin), the need for continuous dredging causes problems in terms of ecology. Ports on islands (Las Palmas) require good transport connections with the mainland, as a sizeable hinterland is often lacking.

If we read the maps along with port statistics, it becomes clear that the natural geography of port city territories affects port performance as well as the quantity of throughput: of the 15 largest cargo ports in Europe, 11 are located in an estuary or on a river, including the five largest cargo ports in Europe: Rotterdam, Hamburg, Antwerp, Amsterdam and London, all in the North Sea. Here the main river on which they are located serves as a transport connection to the fore- and hinterland, which gives them an advantage over ports that are not located on waterways. The next four largest cargo ports are located in an embayment, including Algiers and Marseille in the Mediterranean. Most of the largest 15 passenger ports, in contrast, are on a sea strait, an engineered coast or are surrounded by islands. These ports are often closely linked by ferries. So, mapping helps us to better understand the size, function and functioning of specific ports; and that there is no point for some ports to strive to be like Rotterdam, because they are bound by the possibilities and limitations of their location.



### Port City Relations in the Territory

Port cities include two key man-made morphological entities—an urban entity and a port entity—plus an institutional entity. Cities developed simultaneously with port terminals, housing and feeding workers, and many terminals were the original reason for a city's existence. Maritime activities have long been a direct driver of urban growth, resulting in a strong, albeit evolving, relationship between the port and the metropolitan area in which they are located. Sometimes the relationship is contentious, as the port continuously encroaches on nearby territories. Nonetheless, the territorial maps show that most ports are still urban, located in and closely linked to the morphology of the city. Indeed, they are connected to a central city with surrounding built-up areas (themselves tied to the city by commuting and other daily interactions),<sup>1</sup> as well as through infrastructure and pollution.

Looking at the scalar relationships between ports, cities and territories, we can observe several morphological patterns on the maps and read them in light of urban histories. The port can be a contiguous morphological zone, expanding (far) beyond the urban morphology of the city, but maintaining the port city relation and remaining within the administrative boundaries of the city, as for instance in Rotterdam and Barcelona. A port city can have moved several (smaller) port function to peripheral locations, some of which no longer have a physical connection with the morphology of the city where they started and are no longer within their administrative boundaries, as in Bordeaux, London and Marseille. Only a few of the 100 leading ports in terms of transshipment have no spatial relationship with an urban centre. These include the transshipment hubs Puttgarden and Sjællands Odde, and the oil port Skoldvik, which were designed and rationally planned in rural locations, away from all the limiting factors of urban areas.<sup>2</sup> Bremerhaven and Zeebrugge can also be included in this category.

Based on the maps, we can argue that a city near a port benefits from having control over port entities and development, for environmental, social and safety reasons. A better understanding of patterns in the scalar development of port city territories from a comparative perspective, as in this atlas, and of the intersection between spatial and social development can inspire better planning in port city territories.<sup>3</sup>

### Urban Patterns in the Port City Territory

Ports have a huge impact on the development of a territory, spatially, socially and politically, as well as in terms of air, noise, water or land pollution. Then there is the complexity of shared and conflicting interests of port authorities. The impact of ports on their immediate urban environment calls for far-reaching coordination, even cooperation, between ports and their surrounding municipalities. The

1 P.V. Hall & W. Jacobs, 'Why are maritime ports (still) urban, and why should policymakers care?', *Maritime Policy & Management* 39/2 (2012), 189–206. Also online. Available [HTTPS: DOI: 10.1080/03088839.2011.650721](https://doi.org/10.1080/03088839.2011.650721).

2 L. Ažman Momirski, Y. van Mil & C. Hein, 'Straddling the fence: land use patterns in and around ports as hidden designers', *Urban planning* 6/3 (2021), 136–151. Also online. Available [HTTPS: doi: 10.17645/up.v6i3.4101](https://doi.org/10.17645/up.v6i3.4101).

3 C. Hein & Y. van Mil, 'Mapping as Gap-Finder: Geddes, Tyrwhitt, and the Comparative Spatial Analysis of Port City Regions', *Urban Planning* 5/2 (2020), 152–166. Also Online. Available [HTTPS: https://doi.org/10.17645/up.v5i2.2803](https://doi.org/10.17645/up.v5i2.2803).

infographics show us that more than half of the leading ports are in a predominantly urban territory. About 10 per cent are in predominantly rural territories, often linked to smaller ports that act as transport hubs, or to medium-sized port cities whose community, commercial, recreational, and cultural dynamics make them territorial centres. Moreover, of these 100 leading port city territories, almost 50 per cent consist of more than one port, so that within an area of 75 by 100 kilometres, there are two or more port authorities, all with their own spatial and economic interests. Which calls for inter-port collaboration. In Italy, for example, the government merged several of such smaller port authorities in the Naples area into one larger and stronger port authority. Studying patterns of urban settlements in the territory helps us understand the complexity and difficulties of governance structures, and the distinctive conditions for cooperation between each port, city and territory; it also helps us grasp the degree of urbanization and centralization of the territories.

In the port city territories, we can discern four different morphological urban patterns on the maps: monocentric area with a single port; monocentric area with multiple ports; polycentric area with a single port; and polycentric area with multiple ports.<sup>4</sup> In territories with a *monocentric* urban structure, port cities have a strong centre function, such as in the single port territories Le Havre and Szczecin. Here the urban centre is in the immediate hinterland of the port.<sup>5</sup> Monocentric urban territories with multiple ports are port cities (mostly larger) that have deployed several port sites across or near the metropolitan area, as the result of the changed port city relationship. These include Clydeport, Bordeaux, and Aalborg. In *polycentric* port city territories, several urban cores are located near each other, often in predominantly urban territories. Multiple configurations exist in this category. The most common is a polycentric area with a single port, in which a large non-port city is connected by urban sprawl to a smaller port city, as in Piraeus, 12 kilometres from the centre of Athens, and Leixões, the port of Porto. Administratively, the port is a separate entity, but it is physically and functionally intertwined with the city. Another example of a polycentric port city territory with a single port is two large neighbouring cities of which only one has a port, such as the Liverpool-Manchester agglomeration. Polycentric territories with multiple ports involve at least two port cities in contiguity or proximity, forming a coherent entity in which cities and ports are managed by distinct municipalities and authorities.<sup>6</sup> Examples of this type of coastal agglomerations include Gdynia-Gdańsk, Lisbon-Setubal and Immingham, Hull & Humber. Adjacent port city territories shown in multiple territorial maps can also be considered as one polycentric entity, such as Rotterdam and Amsterdam and Bremen and Hamburg. The four different patterns are characterized

4 O. Merk et al., 'The Competitiveness of Global Port-Cities: the Case of the Seine Axis (Le Havre, Rouen, Paris, Caen)—France', *OECD Regional Development Working Papers* 07 (OECD Publishing, 2011). Online. Available HTTPS: <http://dx.doi.org/10.1787/5kg58xppgc0n-en>.

5 Merk et al., 'The Competitiveness of Global Port-Cities'.

6 Merk et al., 'The Competitiveness of Global Port-Cities'.

by varying degrees of independence from the surrounding urban centres in the territory, ranging from independent with agglomeration effects stemming from the port city itself to lock-in effects by the nearby metropolis.<sup>7</sup>

#### Learning from the Mapping Process:

##### What Does the Complexity of Data Obscure?

Not all spatial conditions that affect or concern port city territories, directly or indirectly, can easily be shown on a map, such as historic events in which a port city territory is locked in development paths, and subsequent path dependency. The lack of specific data can also obscure our ability to interpret the maps. In the mapping of 100 European port city territories, we have learned for example that we need more precise information on land cover, land use and land ownership in ports and more detailed data on the types of transport. We also need more awareness of the limitations of data restricted by administrative borders, and the accuracy of datasets. Most datasets are valuable for a specific purpose, for instance monitoring changes in land cover/land use, but often not suitable for other purposes or for combining and comparing with other data. In addition, datasets and maps are always slightly behind the current situation because it takes time to process data, and institutions revise datasets only every few years. Nonetheless, it is an exciting time in the mapping world, as more and more global and European heterogeneous datasets—such as European Commission data—are becoming openly available, due to new techniques such as satellite imagery, spatial data mining technologies, and ground-based, airborne, and seaborne measurement systems. The European Commission implemented INSPIRE directives in 2007 to establish an infrastructure of spatial data of the European Union; but the Commission has no instruments to oblige member states to provide this data. Our data research shows that many datasets are incomplete as a result, making comparative studies like ours more difficult.

##### Land Cover

To truly understand the role of ports in their territories, we need comprehensive datasets that identify shipping, industry and logistics-related functions. Ports are identifiable spatial structures; they are often delineated from nearby urban and rural areas by fences or other visible boundaries and have clear functions in the landscape. But this apparent clarity becomes complex when explored through the lens of land cover data.<sup>8</sup> The interpretation of land cover categories differs per dataset (Corine Landcover and Coastal Zone), and land cover categories in general do not match the total footprint or extent of the port. Industries located within the fences or borders of the port, for example, are categorized as industrial or

8 Ažman Momirski et al., 'Straddling the fence'.

commercial areas, and the port basins (including ships on the water surface) are not indicated as ports, but categorized as water bodies, though they are indeed part of the port. Consequently, the interwovenness of industry and port functions is not clear from the maps and a port—and the size of ships docking—may appear much smaller than it actually is. Also, uniform data showing the total areas controlled by port authorities, including the industries or fallow land et cetera within the port boundaries, is also lacking. Spatial datasets do not include property data or governance structures and maritime statistical data do not include spatial or administrative entities. As a result, the mapping cannot provide insight into the number of stakeholders in the territory or the impact of the port on its surroundings. For the planning of a sustainable future for port city territories, this knowledge is key.

### Transport Networks

The online interactive map of European Transport Corridors<sup>9</sup> provides us insight into fore- and hinterland connections. This European Commission network consists of nine corridors, and is a selection of motorways, railways, waterways and short sea shipping routes from the comprehensive TEN-T network that connect all urban hubs in Europe to the main departure and destination points for goods and passengers. The interactive map shows that the ports of Liepaja and Esbjerg, for example, are not connected to these corridors; some ports (including Brünsbuttel) are only connected through water, and others (such as Gijon) only by rail. These kinds of insights can help us to improve the development of future sustainable connections to the fore- and hinterland. This requires that the TEN-T corridor network becomes available as geospatial data (as a download or WMS service) so that it can be integrated into our maps and surveys. In addition, we need more detailed statistical data (meaning information from smaller administrative units) on the transport of goods and people on the various types of infrastructure; this level of detail is now only available for NUTS 1 (country level) at Eurostat. This would make it possible for the impact of transport to and from the port on the territory—inhabitants, Natura2000 areas, et cetera—to be more accurately included in planning and design.

### Administrative Borders

To overcome the wide variation in administrative entities in size and population density, we based the classifications of port city territories on Eurostat's Urban Audit categories: Local Administrative Units (LAU), Cities and Greater Cities.<sup>10</sup> Another reason to use the Urban Audit as a basis is that it includes an interpretation of what it describes as the functional area of the city, which is the area we intend to show on the port city territorial maps. According

9 European Commission, 'Mobility and Transport. Interactive Map Viewer' (2018). Online. Available HTTPS: <https://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/map/maps.html>.

10 Eurostat, 'Applying the Degree of Urbanisation. A methodological manual to define cities, towns and rural areas for international comparisons' (2021). Online Available PDF: <https://ec.europa.eu/eurostat/documents/3859598/12519999/KS-02-20-499-EN-N.pdf/0d412b58-046f-750b-0f48-7134f1a3a4c2?t=1615477801160>.

to the Urban Audit, the territory would then be a Functional Urban Zone (FUZ), which is the commuter zone of a City or Greater City. But not all selected port cities meet the indicators for a City or Greater City, meaning that—based on the Urban Audit—there is no statistical data available for either the port cities or their territories. To study the territory, we therefore must rely on the Urban Type of NUTS 3 regions,<sup>11</sup> which often contains a much larger area than the FUZ that extends (far) beyond our map frame, and the size of NUTS regions varies greatly from nation to nation. This standardization keeps us from seeing the dynamics and diversity of port city territories. Ignoring these limitations of data can lead to premature or incorrect interpretation.

### Conclusion

Geo-spatial mapping can help stakeholders better understand port city territories and plan their sustainable development, laying the foundation for further research. Many more relevant insights or patterns can be discovered by studying and comparing the maps and infographics in more detail. Consider the overlap of Natura2000 areas with port city territories, for example. Looking at all territorial maps, it is striking that in multiple port city territories conflicts have arisen over whether to preserve valuable maritime landscapes or to further the economic interests of the port, and economic interests often seem to be the winning force. This often means that development at port locations threatens the network of protected areas holding Europe's most valuable and endangered species and habitats.

However, there are still many steps to be taken in order to better understand these kinds of spatial impacts of ports on their surroundings and the complex spatial and institutional structures that underpin them. While our work shows that geo-spatial mapping is an essential tool for the systematic and analytical study of port city territories and a basis for knowledge-based planning and design, it simultaneously provides insight into the limitations and peculiarities of spatial and statistical data.

To better understand the processes that underlie spatial changes, or spatial conflicts and aligned interests in European port city territories, we therefore call for more data: more up-to-date data, including more detailed data on ownership and land use, especially of land controlled by port authorities; and more complete data, that is for all EU nations and seas, and for smaller administrative units.

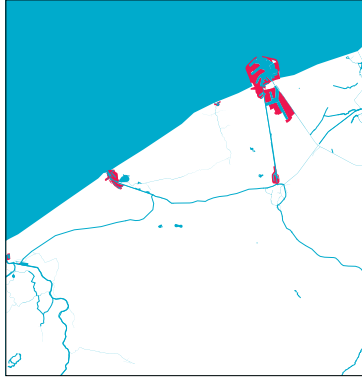


# Interpreting the Morphology of Port City Territories

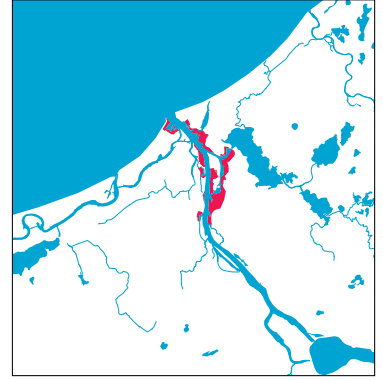
## Ports in their Natural Morphology of Land and Water



Situated in (narrow) straits  
→ Helsingborg and Helsingør, p. 82

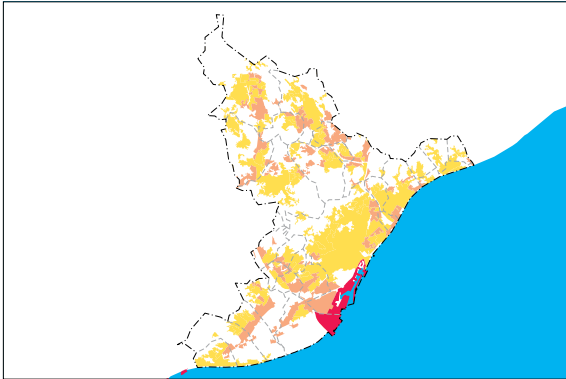


Located along the coast  
→ Zeebrugge, p. 158

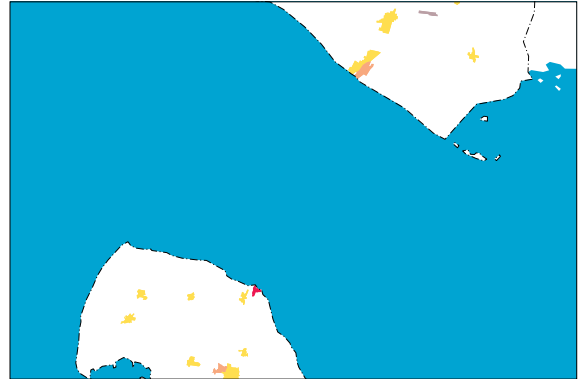


Located in a estuary or river  
→ Riga, p. 104

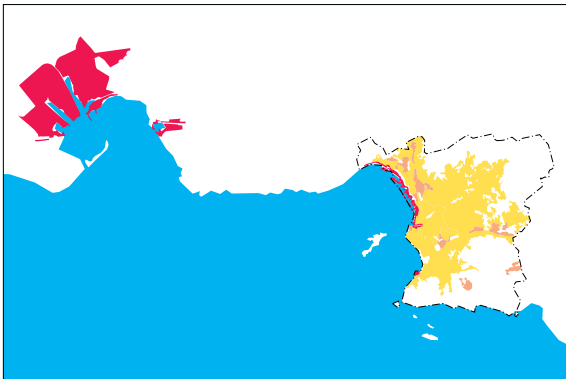
## Port City Relations in the Territory



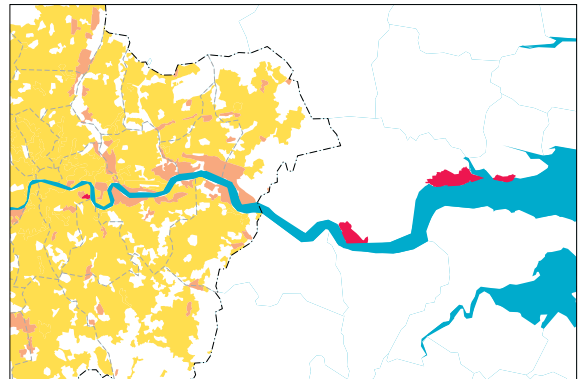
The port as a contiguous morphological zone connected to the city  
→ Barcelona, p. 246



Port not interwoven with a city from their foundation  
→ Puttgarden and Rødby, p. 120



Port area not connected to the city  
→ Marseille, p. 248



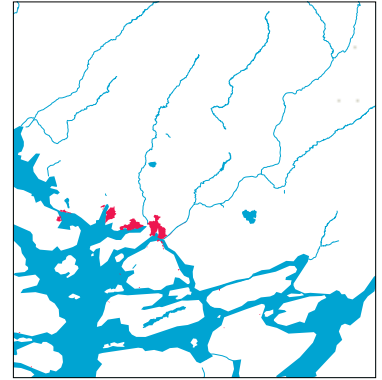
Port area not connected to the city  
→ London, p. 166



Located in a bay  
→ Trieste, Koper and Monfalcone, p. 278

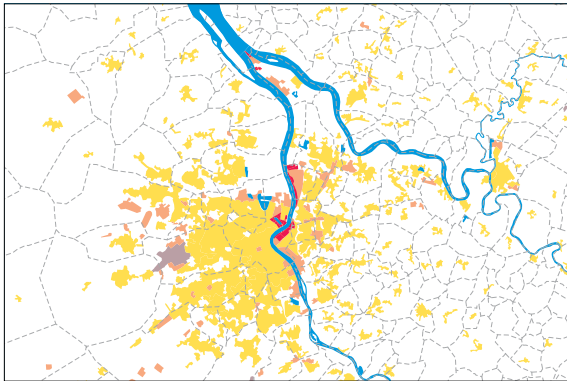


Located on an irregular coastline  
→ Toulon, p. 250

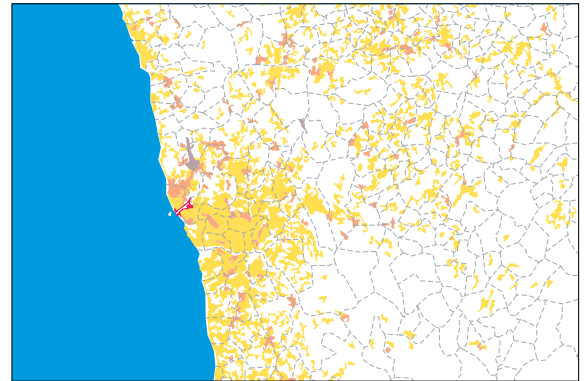


Surrounded by islands  
→ Turku and Naatalin, p. 94

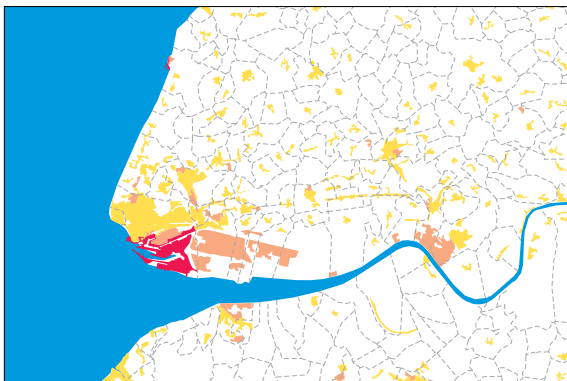
### Urban Patterns in the Port City Territory



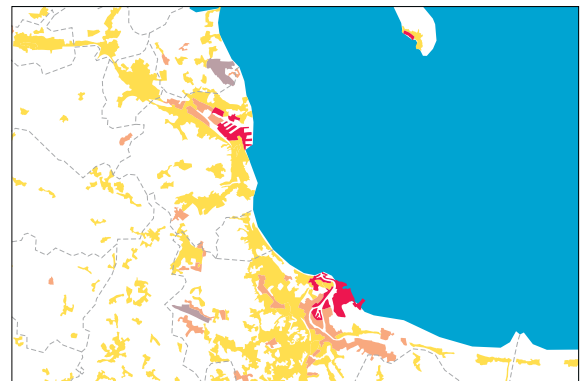
Monocentric urban territory with multiple port sites  
→ Bordeaux, p. 216



Polycentric urban territories with a single port  
→ Leixões (Porto), p. 224



Monocentric urban territory with a single port  
→ Le Havre, p. 210



Polycentric urban territory with multiple ports  
→ Gdynia-Gdańsk, p. 112

# 9 Port City Territories and UNESCO World Heritage Properties: an Opportunity for Implementing the UNESCO Historic Urban Landscape Approach

## Abstract

Port city territories across Europe are rich settings for natural and cultural World Heritage properties, many of them related to maritime practices. In protecting and conserving this heritage, and passing it to future generations in line with the World Heritage Convention, territories can face challenges related to water and climate change and to important logistic flows of goods and people between sea and land. On the other hand, they can also have the opportunity to support sustainable development for historic cities and settlements in these areas. To show the intersection of the interests of port city territories and World Heritage sites from a spatial perspective, this chapter focuses on two select areas of the European seas: the first area being a section of the North Sea and the Baltic Sea, the second Italy. We chose these areas for their long coasts, high number of port city territories and long maritime history, as well as their numerous World Heritage properties. In each of these maps, the article explores World Heritage properties where the Outstanding Universal Value (OUV) is specifically related to maritime practices and cultural exchanges. People and institutions protecting World Heritage properties are working to integrate World Heritage properties into their surroundings in line with the World Heritage Convention (Art.5), the UNESCO Historic Urban Landscape (HUL) policy, and the Faro Convention. In port city territories, it is important for these people and institutions to acknowledge the interests of special actors, such as strong port authorities, which can impact policymaking. The chapter invites stakeholders of port city territories to more closely explore the ways in which the protection of World Heritage properties can intersect with the dynamics of port city territories to provide a foundation for discussion.

## Introduction

The unique and delicate coastline at the edge of sea and land has attracted people and stimulated urban growth over centuries. Port city territories today are places where different stakeholders and interests intersect and sometimes clash. In particular, maritime

logistics, industry, urban development, and economic activities can conflict with the historic preservation and local sustainable development of coastal natural and cultural World Heritage properties. This challenge is further exacerbated by the climate crisis and related water changes. The World Heritage Convention of 1972 recognized (p. 1) that “the cultural heritage and the natural heritage are increasingly threatened with destruction not only by the traditional causes of decay, but also by changing social and economic conditions which aggravate the situation with even more formidable phenomena of damage or destruction”.<sup>1</sup> The challenges faced by world heritage sites have not decreased over time; on the contrary. Ironically, the maritime practices, flooding, and sea level rise that all threaten the historic city partly result from modern industrial activities in port city territories. By the same token, however, natural and cultural World Heritage properties in port city territories can also be sites for strategic design and planning and for climate action. As the architect Paola Viganò phrased it in an interview: “If we want to save Venice, and I think we should save Venice, we need to save the planet”.<sup>2</sup>

The Convention formulated goals to address these challenges and opportunities. One of these goals is “to adopt a general policy which aims to give the cultural and natural heritage a function in the life of the community and to integrate the protection of that heritage into comprehensive planning programmes” (Article 5a). The World Heritage Convention and the UNESCO Historic Urban Landscape (HUL) as well as the Faro Convention also link this heritage protection to sustainable development of local communities. HUL notably aims “at preserving the quality of the human environment, enhancing the productive and sustainable use of urban spaces, while recognizing their dynamic character, and promoting social and functional diversity”.<sup>3</sup> These are calls for the diverse stakeholders in port city territories to act together. A port authority, often a large and powerful actor, has the mandate to control and administer the port operation.<sup>4</sup> But the port authority’s focus on economic development and throughput has been detrimental to heritage preservation and local sustainable development. Recently, port authorities have started to pay more attention to their neighbouring cities and territories. In light of shared needs for sustainable development, these very different stakeholders can embrace an ecosystem approach to port city territories at the border between sea and land.

To explore the spatial interrelation of port city territories and World Heritage, we opted to make specific map layers that focus on their co-existence. We selected two areas of the European seas (displayed on page 310) that have long coasts, and that are home to both a large number of port city territories and World Heritage properties dating from diverse historic periods. We used two different scales for a closer analysis of the challenges and opportunities relating to World Heritage properties in port city territories. To

1 UNESCO, The World Heritage Convention. Online. Available [HTTPS: https://whc.unesco.org/en/convention/](https://whc.unesco.org/en/convention/).

2 Paola Viganò in the Film (6:57–7:03): *Water Ports and the UNESCO Historic Urban Landscape Approach*, Presented during the World Heritage City Lab—Historic Cities, Climate Change, Water, and Energy 16–17.12.2022, <https://whc.unesco.org/en/events/1633/Concept/script/supervision>: C. Hein; Interviews/research: P. Martino, H. van de Rhee; Production/editing: BonteKoe Media, P. Tekenbroek; Voice over: M. Harrigan; Special thanks to interview partners: H. Ovink, J. Hosagrahar, P. Viganò, H. Meyer, M. Ndiaye, A. Aziz Guissé, J.P. Corten; Additional thanks to: C. van Rooijen, J. van den Boogert, A. Roders. This film has been made possible with the financial support of the Ministry of Education, Culture and Science of the Netherlands.

3 UNESCO, Recommendation on the Historic Urban Landscape, including a glossary of definitions. Online. Available [HTTPS: https://en.unesco.org/about-us/legal-affairs/recommendation-historic-urban-landscape-including-glossary-definitions#:~:text=The%20historic%20urban%20landscape%20approach,promoting%20social%20and%20functional%20diversity](https://en.unesco.org/about-us/legal-affairs/recommendation-historic-urban-landscape-including-glossary-definitions#:~:text=The%20historic%20urban%20landscape%20approach,promoting%20social%20and%20functional%20diversity).

4 T. Notteboom, A. Pallis and J.P. Rodrigue, *Port Economics, Management and Policy* (New York: Routledge, 2022). Also online. Available [HTTPS: https://porteconomicsmanagement.org/pemp/contents/part4/port-authorities/](https://porteconomicsmanagement.org/pemp/contents/part4/port-authorities/).

show the overlap between World Heritage properties and port city territories in different maritime waters, we mapped the two areas respectively at the scales of 1 to 1,350,000 (North Sea and Baltic Sea) and 1 to 10,000,000 (Italy in the Mediterranean Sea). At these scales the maps show us the great number of World Heritage sites located in the port city territories, and raises questions about the historic connections of World Heritage properties around a shared water body. In mapping them, we found that the question of scale remains a challenge. With one exception, each World Heritage property is indicated here as a dot, as the actual extent of each property or its buffer zone would not be visible in a meaningful way at either of our chosen scales. Thus, the scale of the maps invites further, more detailed investigation into the relationship between port city territory and World Heritage property.

The one property that can be made visible at this scale is the Wadden Sea, an area of 1,143,403 hectares along the Dutch, German and Danish coast. UNESCO inscribed the Wadden Sea in 2009 as “the last remaining large-scale, intertidal ecosystem where natural processes continue to function largely undisturbed”.<sup>5</sup> It includes Biosphere Reserves and seven so-called Ramsar sites, wetlands designated under the Ramsar Convention. The Wadden Sea is also known also for its Halligen, islands with man-made mounds where people live; the mounds are flooded several times a year, surrounding them with water so that sediment adds to the height of each island. Such practices of living with water require attention and evaluation in a time of climate change and rising sea levels. Moreover, as we can see in the maps, the Sea intersects with or gives shipping water access to several port city territories, defined in the *Port City Atlas* as including the maritime foreland as well as the hinterland. The Wadden Sea is thus part of the port city territories of Esbjerg, Brunsbüttel, Bremerhaven and Wilhelmshaven. Furthermore, it is crossed by the Elbe and Weser Rivers through which ships access the port city territories of Hamburg and Bremen. Ports’ dredging and disposal of dredged material in the North Sea; ships’ water, air and sound pollution; overfishing; and invasive tourism can all have a direct negative impact on natural sites and their preservation. Organizations like the German NGO Friends of the Earth (Bund für Natur- und Umweltschutz Deutschland, or BUND) regularly decry such activities.<sup>6</sup> Decreasing pollution—for example, through cleaner shipping or smaller ships for fishing or transport—could create healthier futures for local communities.

To be listed on the UNESCO World Heritage list, properties must be of outstanding quality and meet at least one of ten criteria of Outstanding Universal Value (OUV). To better understand how the World Heritage sites in our port city territories are related (or not) to maritime and port city networks, we set out to systematically identify the OUVs for which UNESCO selected them. We manually checked the abstracts of World Heritage properties published on the UNESCO World Heritage Centre website,<sup>7</sup> looking for words

5 UNESCO, Waddensee. Online. Available HTTPS: <https://whc.unesco.org/en/list/1314><https://whc.unesco.org/en/list/1314>

6 Bedrohungen und Belastungen des Lebensraums Wattenmeer. Online. Available HTTPS: <https://www.bund-hamburg.de/themen/naturschutz/wattenmeer/bedrohungen-und-belastungen-des-lebensraums-wattenmeer/>.

7 UNESCO World Heritage List. Online. Available HTTPS: <https://whc.unesco.org/en/list/>.



8 Dai, Tianchen, Carola Hein, and Dan Baciú 'Heritage Words: Exploring Port City Terms', in: *Creative Practices in Cities and Landscapes* (CPCL) 4, no. 2 (2021): 36–59.

associated with port functions and activities.<sup>8</sup> The OUV of some heritage sites in the Atlas are explicitly connected to maritime infrastructure, including wharfs, cranes and quays, canals, rail and road infrastructure, warehouses, and administrative buildings. Many other World Heritage sites are located in our port city territories but don't have an obvious link to the maritime past. Nonetheless, their preservation may be affected by it, notably in light of climate change.

### A First Exploration of the Relation between Port City

#### Territories and Maritime-related World Heritage Properties

We first wanted to explore how widespread the co-existence of port city territories and World Heritage sites actually is. So, we selected an area that includes a part of North Sea and Baltic Seas centred on the Skagerrak strait. These seas surround the peninsula of Jütland and the Danish islands, spanning from the adjacent port city territories of Kent and Calais on the Strait of Dover in the West to the port city territories of Gdansk and Gdynia on the Baltic Sea in the East. This area has long been home to maritime practices and shipping-based exchange, which partly explains its density of port city territories—38 of 50 port city territories mapped in the whole *Port City Atlas*—and of World Heritage properties—23 natural and cultural sites.

Second, we wanted to see whether these World Heritage properties were selected for their maritime connections, and what those histories could tell us about port city territories. Here we can only briefly explore four select World Heritage properties that specifically mention shipping, maritime or port city functions as part of their OUV in the UNESCO World Heritage description. Each site merits further individual analysis to explore both the historic relation to shipping and maritime practices, and the challenges and opportunities of the current relation. These four World Heritage sites are: the historic cities of Lübeck and Brugge, and the cities of Amsterdam and Hamburg, located in Germany, Belgium and the Netherlands. The historic centres of the smaller cities of Lübeck and Brugge have been kept intact as the working port has been moved (in different degrees) to the nearby seaside. The larger cities of Amsterdam and Hamburg have also detached the historic areas from active shipping, with the exception of cruise shipping.

The Hanseatic City of Lübeck was listed by UNESCO as a World Heritage site in 1987 based on criterion iv: an outstanding ensemble. The city's function as a port city has played an important role in the city's historic development as "the former capital and Queen City of the Hanseatic League" that "has remained a centre for maritime commerce to this day, particularly with the Nordic countries."<sup>9</sup> The historic city centre is an 81.1-hectare site with a 693.8 buffer zone that encompasses the Trave and Wakenitz water-ways and the canal surrounding the city; it is detached from Travemünde, a borough of Lübeck at the mouth of the Trave River that has emerged over time as Germany's major ferry port. The further develop-ment

9 UNESCO, Hanseatic City of Lübeck. Online. Available HTTPS: <https://whc.unesco.org/en/list/272>

of the port along the Trave and in Travemünde continued this separation, which ultimately helps those working to preserve the historic city, as the big ships, major land infrastructure and traffic are located at some distance from it.

The Historic Centre of Brugge was inscribed on the World Heritage list in 2000, for criteria ii, iv, and vi, which emphasize the city's cultural links to other parts of the world, its typology and its artistic achievements. It covers 410 hectares and has a 168-hectare buffer zone.<sup>10</sup> As one of the commercial and cultural capitals of Europe, Brugge developed cultural links, plus land- and sea-based infrastructure networks, with different parts of the world. In the greater Brugge region, the 1907 construction of new port infrastructure called Zeebrugge, or the seaport of Brugge, separated the active port from the historic city. The port is today among Europe's leading ports. Meanwhile, the city government promotes sustainable tourism in the historic city.

UNESCO inscribed the seventeenth-century walled canal ring area of Amsterdam, with 198.2 hectares and a buffer zone of 481.7 hectares, in the World Heritage List in 2010 according to criteria i, ii, and iv, as a human masterpiece, a result of cultural interchange and a unique typology. It described it as a network of canals "with a medieval port that encircled the old town and was accompanied by the repositioning inland of the city's fortified boundaries, the Singelgracht". The city lost direct access to the sea with the closure of the IJ River in 1872, and today IJmuiden acts as the port of Amsterdam, hosting the Tata steel factory and large cruise ships. That site is also the access point for ships to the North Sea Canal with its large locks.<sup>11</sup> Cruise and leisure shipping are a challenge in Amsterdam due to the already high pressure from tourism. However, innovative activities can provide creative solutions. Plastic fishing—cleaning the waste from Amsterdam's canals—is just one approach to relating heritage preservation and maritime awareness.<sup>12</sup>

The Speicherstadt and Kontorhausviertel with Chilehaus in Hamburg were jointly named as a World Heritage site in 2015. It is recognized according to criteria iv as "one of the largest coherent historic ensembles of port warehouses in the world (300,000 m<sup>2</sup>)" and is included for the Kontorhaus (office) district "featuring six very large office complexes built from the 1920s to the 1940s to house port-related businesses".<sup>13</sup> With 26.08 hectares and a buffer zone of 56.17 hectares, it is smaller than the other three sites, yet located in a much bigger city and integrated into ongoing maritime and urban activities. Hamburg's World Heritage property has a shorter history than the others. At the turn of the last century, the removal of port functions from the north side of the River Elbe to the south side, with the exception of cruise shipping, set the stage for the creation of a multifunctional district; here, heritage ships create new relationships between the historic city and the water. The nearby HafenCity development invokes this maritime history in names, styles, and architecture, links that are valuable

10 UNESCO, Historic Centre of Brugge Online. Available HTTPS: <https://whc.unesco.org/en/list/996>

11 UNESCO, Seventeenth-Century Canal Ring Area of Amsterdam inside the Singelgracht Online. Available HTTPS: <https://whc.unesco.org/en/list/1349/> <https://whc.unesco.org/en/list/1349/>

12 Plastic Whale "Come Fishing ... for Plastics". Online. Available HTTPS: <https://plasticwhale.com/plastic-fishing/>

13 UNESCO, Speicherstadt and Kontorhausdistrikt with Chilehaus. Online. Available HTTPS: <https://whc.unesco.org/en/list/1467>

both to remaining maritime activities, notably cruise ships, and the preservation of World Heritage property.

The four case studies briefly explored here show that even when maritime practices radically change and active ports are moved away from historic settlements, a site's historic relationship to water remains. Water constantly flows and continues to link ports and cities, opening several opportunities for stakeholders to work together: to include water in heritage management plans; to apply the UNESCO Historic Urban Landscape approach to promote inclusive local development of port city territories; and to not only preserve World Heritage properties but activate them to address the climate crisis. Port development and preservation alike require citizen participation, community-based planning, and an approach that includes socio-cultural values.

#### A National Approach to Port City Territories and World Heritage Properties: the Case of Italy

We then wanted to explore how port city territories and World Heritage sites interrelate in a national setting, such as Italy, where both are particularly abundant. The right site of the map (Map 114) explores port city territories and World Heritage sites in a single country—Italy—focusing on the southern waters surrounding its boot-shaped peninsula with the Tyrrhenian Sea, the Ligurian Sea, Tuscan Archipelago and Ionian Sea in the west and south, and the Adriatic Sea in the east. Italy alone is home to 14 (including the border crossing Trieste/Koper area) of the leading 25 port city territories of the Mediterranean, which may not be a surprise given its long coastlines and central location. Except for Porto Foxi & Cagliari and Gioia Tauro & Reggio di Calabria, each of these port city territories is also home to a cultural World Heritage property, in part because Italy has a long and outstanding history, and it was among the first countries to propose sites to UNESCO for World Heritage status. Three of these heritage sites are closely related to maritime and shipping practices: Venice and its lagoon (1987), Genoa: Le Strade Nuove and the system of the *Palazzi dei Rolli* (2006), and the historic centre of Naples (1995).

The descriptions of these sites on the list of the World Heritage Convention note their historic links to maritime and shipping practices, even if UNESCO did not list them for these links. For example, the description of Venice states: “Founded in the 5th century and spread over 118 small islands, Venice became a major maritime power in the 10th century.”<sup>14</sup> The presence of the Port of Marghera in the Venice Lagoon is now highly debated, because it pollutes the water and disrupts the ecosystem of the lagoon. Nonetheless, it is notable that the Port Authority of Venice is involved in the management plan for the World Heritage property. Naples identifies itself as a port city, the “Historic Centre of Naples, one of the foremost Mediterranean port cities.”<sup>15</sup> Nowadays, the port and the World Heritage property often come into conflict here, as both

14 (UNESCO, Venice and Its Lagoon. Online. Available HTTPS: <https://whc.unesco.org/en/list/394/>

15 (UNESCO, Historic Centre of Naples. Online. Available HTTPS: <https://whc.unesco.org/en/list/726/>)

16 UNESCO, Genoa: *Le Strade Nuove* and the system of the *Palazzi dei Rolli*. Online. Available HTTPS: <https://whc.unesco.org/en/list/1211>

strive to claim space along the coast and in the hinterland. The story of the construction of the metro line in the historic city documents the long history of the site, the challenges of preservation and the careful integration of the cruise ship terminal nearby into the historic urban fabric. In Genoa, the World Heritage site is “The Strade Nuove and the system of the Palazzi dei Rolli in Genoa’s historic centre date from the late 16th and early 17th centuries”; the abstract links it to the period “when the Republic of Genoa was at the height of its financial and seafaring power.”<sup>16</sup> (The World Heritage property abuts a revitalized waterfront and a partly active port with all the challenges of pollution.

Port authorities have the opportunity and the responsibility to work with cities and metropolitan governments as well as territorial authorities to implement the UNESCO Historic Urban Landscape approach to balance development with historic preservation of World Heritage properties. In the case of Italy, multiple ports are managed in port clusters, opening up opportunities for comprehensive approaches to protecting World Heritage. Indeed, as this chapter and these maps demonstrate, heritage sites are more than simply places to be protected from development; they can drive a better kind of development. Port city territories can mobilize their heritage, honour the maritime culture that has allowed them to thrive, and use these historic sites as foundation for sustainable and inclusive development and for climate action. This work of preserving World Heritage, and of attracting and distributing touristic flows, can also catalyse the emergence of port city territorial governance. Re-thinking existing ports and cities in sustainable ways requires investing in new infrastructure, urban developments and buildings; it also requires European-wide planning and policy-making.

### Goals

Understanding, recognizing, and preserving these historic maritime connections, planners and politicians can position World Heritage properties for local sustainable development, whether as sites of education on maritime awareness or as creative hubs. Such solutions need to go beyond attracting cruise and leisure ships, which are particularly prominent in the Mediterranean. In fact, cruise and leisure shipping are not sustainable development, as they are major threats to World Heritage properties. Modern ports must also acknowledge and address the impact of their shipping, dredging, and water pollution on nearby natural World Heritage properties. Actors in port city territories need to carefully balance the positive and negative externalities of tourism on World Heritage properties. New, carefully managed forms of ecotourism and slow tourism—including non-polluting boats—could add value to preservation.<sup>17</sup> Stakeholders must tie new activities to their sites’ preservation. Today’s interventions often focus on festivals, harbour birthdays, and other tourist events that nostalgically celebrate traditional forms of shipping. It may be possible to mobilize these maritime

17 Sustainable Tourism Charter for the Northern Lagoon in Venice. Online. Available PDF: <https://www.veneziaunica.it/sites/default/files/33.pdf>

activities for broader education on maritime practices, including sustainable food from the sea.<sup>18</sup> More largely, in line with the UNESCO Historic Urban Landscape (HUL) approach, heritage sites can help redefine maritime culture as innovative, and focused on preservation of water-related infrastructure.

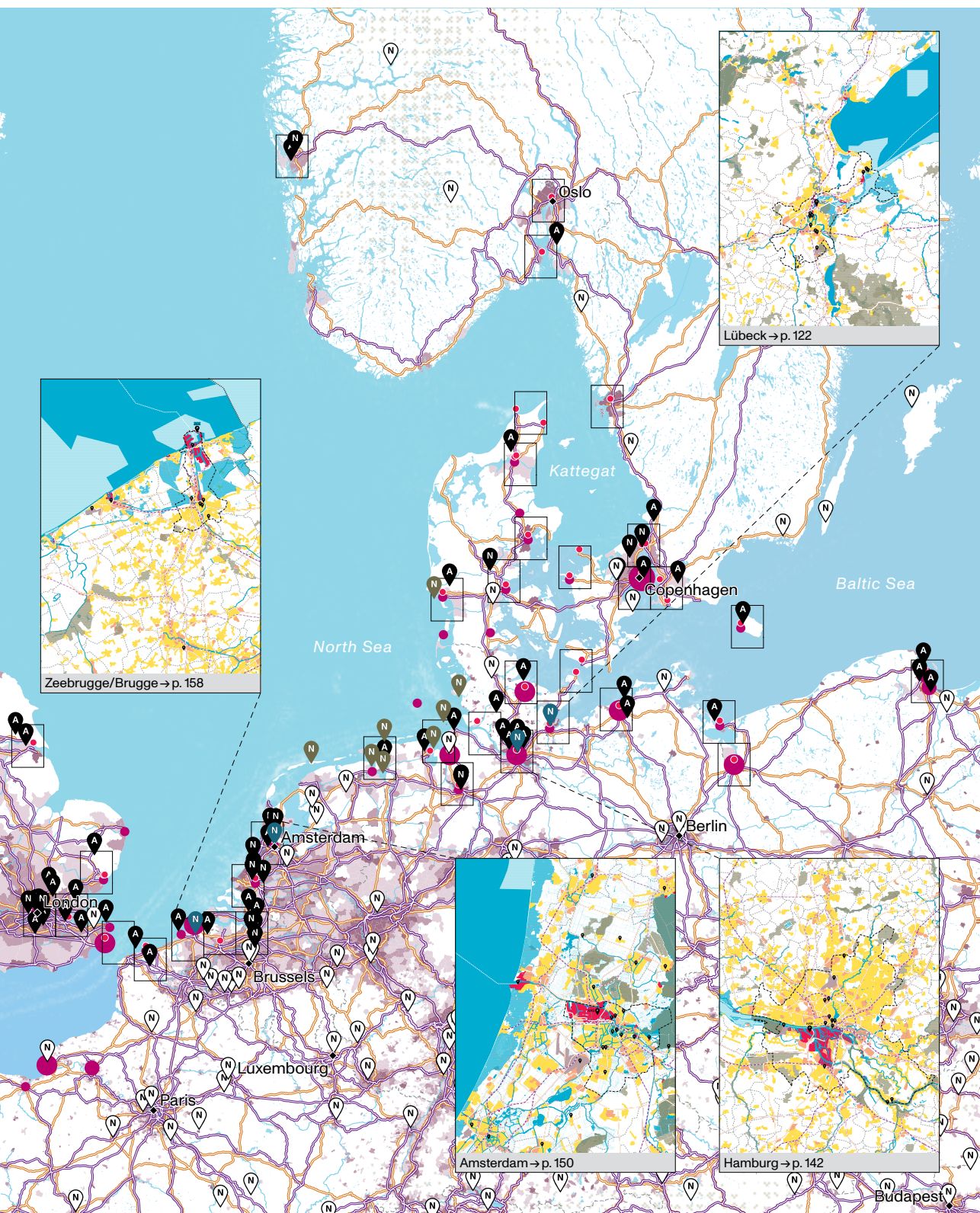
We envision a kind of heritage protection and sustainable development that is like the ecosystem approach of our Atlas: networked, multi-scalar, and understanding current conditions both as the outcome of path-dependent past developments and the frame for future transformations. Given the need for collaboration within and among port city territories, and the necessity for sustainable practices across complex territories, the *Port City Atlas* proposes conceptual and methodological innovation to complement and support other tools that are currently being developed. Providing standardized geospatial maps of port city territories as a visual foundation for discussion within their territory and across territories, it will help planners overcome siloed approaches to spatial planning. The *Port City Atlas* helps to envision tourism and creativity, mobility and connectivity on the sea and in the hinterland, a key element for port city territories and at the heart of European Union policy.

We hope that port authorities, and urban and territorial leaders will use this book as a point of discussion for conversations on shared goals. First, we suggest that stakeholders start to think of port city territories as sites where multiple domains come together: past, present and future; heritage preservation and sustainable economic development; ecological riches and climate change. The *Port City Atlas* invites these stakeholders to have conversations, to (re)imagine port, city and territory as a single spatial unit with long histories, diverse heritage and shared values. All this may require some ports (or cities) to adjust their preservation and development plans to adapt to a shared future, and specifically to adopt a maritime perspective.

Second, we hope that different port city territories will explore shared challenges and opportunities together. One positive outcome could be a partnership between communities that have shared maritime connections and World Heritage properties, engaging with historic shipping networks for contemporary (touristic) activities. Finding shared strategies to engage with underwater archaeological sites or Natura2000 sites next to working ports could be another positive outcome. Working groups on the role of shipping channels, or road- or rail infrastructure or warehousing or tourism, as part of an ecosystem approach may be developed based on this atlas. An ecosystem approach is also at the heart of the UN Sustainable Development Goals (SDG), established in 2015 to address global challenges. A better understanding of specific values or identities inherent in port cities can help stakeholders develop shared strategies as an inherent part of balanced and sustainable development in line with SDG 11.7 to protect and safeguard the world's cultural and natural heritage.



## European Port City Territories and UNESCO World Heritage Properties



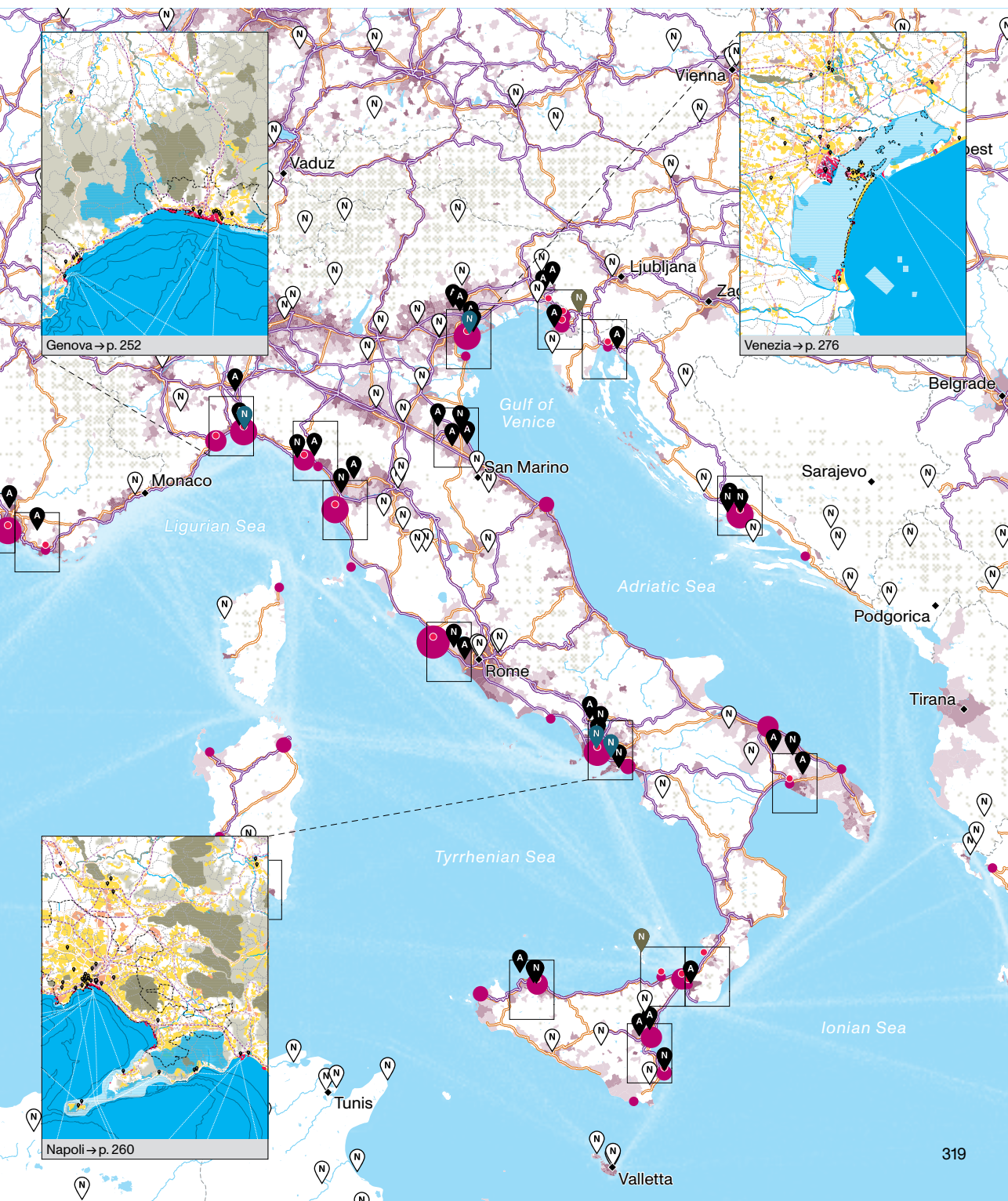


UNESCO World Heritage properties  
 Europe  
 UNESCO World Heritage properties  
 in port city territory  
 Cultural Natural Maritime

Density leisure vessels  
 from 1 to 3 million  
 European motorways  
 European railways  
 Airport in port city territory

Total number of cruise  
 ship calls/year  
 50 100 250 500

Population density LAU  
 population/km<sup>2</sup>  
 300 600



## Comparative Analysis of the Port City Territory

### BALTIC SEA





















































































































ID	Port Name	W	P	C	T
HEL	Helsingborg, SE				
HLS	Helsingør, DK				
CPH	Københavns, DK				
TRG	Trelleborg, SE				
MMA	Malmö, SE				
RNN	Rønne, SE				
STO	Stockholm, SE				
LLA	Luleå, SE				
TKU	Turku, FI				
NLI	Naantali, FI				
HEL	Helsinki, FI				
SKV	Sköldvik, FI				
TLL	Tallinn, EE				
RIX	Riga, LV				
VNT	Ventspils, LV				
LPX	Liepāja, LV				
KLJ	Klaipėda, LT				
BOT	Butinge, LT				
GDN	Gdansk, PL				
GDY	Gdynia, PL				
SZZ	Szczecin, PL				
SWI	Swinoujście, PL				
RSK	Rostock, DE				
ROF	Rødby, DK				
PUT	Puttgarden, DE				
SLM	Sillamäe, EE				
LBC	Lübeck, DE				
KEL	Kiel, DE				
FRC	Fredericia, DK				
AAR	Århus, DK				
SST	Statoil-Havnen, DK				
SJO	Sjællands Odde, DK				

### NORTH SEA

ID	Port Name	W	P	C	T
AAL	Aalborg, DK				
FDH	Frederikshavn, DK				
HIR	Hirtshals, DK				
EJB	Esbjerg, DK				
BRB	Brunsbüttel, DE				
HAM	Hamburg, DE				
BRE	Bremen, DE				
WVN	Wilhelmshaven, DE				
BRV	Bremerhaven, DE				
DZL	Delfzijl, NL				
EME	Emden, DE				
AMS	Amsterdam, NL				
RTM	Rotterdam, NL				
ANR	Antwerp, BE				
GNE	Ghent, BE				
ZEE	Zeebrugge, BE				
DKK	Dunkirk, FR				
DVR	Dover, UK				
COF	Calais, FR				
MED	Medway, UK				
LON	London, UK				
FXT	Felixstowe, UK				
HRW	Harwich, UK				
IPS	Ipswich, UK				
IMM	Immingham, UK				
HUL	Hull, UK				
MME	Tees & Hartlepool, UK				
TYN	Tyne, UK				
FOR	Forth (Edinburgh), UK				
BGO	Bergen, NO				
TON	Tønsberg, NO				
OSL	Oslo, NO				
GOT	Göteborg, SE				

Waterside  
Port main typology  
City typology  
Territory typology (NUTS 3)

## ATLANTIC

ID	Port Name	W	P	C	T
CYP	Clydeport (Glasgow), UK				
CYN	Cairnryan, UK				
BEL	Belfast, UK				
LAR	Larne, UK				
DUB	Dublin, IE				
LMK	Limerick, IE				
ORK	Cork, IE				
HYM	Heysham, UK				
LIV	Liverpool, UK				
HLV	Holyhead, UK				
MLF	Milford Haven, UK				
BRS	Bristol, UK				
SOU	Southampton, UK				
PME	Portsmouth, UK				
LEH	Le Havre, FR				
NTE	Nantes Saint-Nazaire, FR				
LRH	La Rochelle, FR				
BOD	Bordeaux, FR				
BIO	Bilbao, ES				
GIJ	Gijón, ES				
LCG	La Coruña, ES				
FRO	Ferrol, ES				
LEI	Leixões (Porto), PT				
LIS	Lisboa, PT				
SET	Setúbal, PT				
HUV	Huelva, ES				
LPA	Las Palmas, ES				
SCT	Santa Cruz de Tenerife, ES				
CAD	Cádiz, ES				

## MEDITERRANEAN SEA

ID	Port Name	W	P	C	T
ALG	Algeciras, ES				
CEU	Ceuta, MA				
CAR	Cartagena, ES				
VLC	Valencia, ES				
CAS	Castellón, ES				
TAR	Tarragona, ES				
BCN	Barcelona, ES				
MRS	Marseille, FR				
TLN	Toulon, FR				
GOA	Genova, IT				
SVN	Savona, IT				
SPE	La Spezia, IT				
LIV	Livorno, IT				
CVV	Civitavecchia (Roma), IT				
NAP	Napoli, IT				
PFX	Porto Foxi, IT				
CAG	Cagliari, IT				
PMO	Palermo, IT				
SIR	Siracusa, IT				
MSN	Messina, IT				
MLZ	Milazzo, IT				
GIT	Gioia Tauro, IT				
REG	Reggio di Calabria, IT				
TAR	Taranto, IT				
RAN	Ravenna, IT				
VCE	Venezia, IT				
TRS	Trieste, IT				
KOP	Koper, SI				
MNF	Monfalcone, IT				
RJK	Rijeka, HR				
SPU	Split, HR				
PIR	Peiraias (Athene), GR				
PER	Perama, GR				
EEU	Elefsina, GR				
SKG	Thessaloniki, GR				

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# Port City Atlas

## Mapping European Port City Territories: From Understanding to Design

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