Research Centre on
ZERO EMISSION
NEIGHBOURHOODS
IN SMART CITIES

NTNU SINTEF

ZEN SPATIAL INDICATORS

Evaluation of Kommunedelplan 3 (KDP 3) för Fornebu

3 oktober 2019

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ZEN-SMS (Research group for Spatial Morphology Studies in ZEN)

ZEN Spatial indicators: evaluation of Bodø Vest

Norwegian University of Science and Technology (NTNU) | www.ntnu.no
SINTEF Building and Infrastructure | www.sintef.no

https://fmezen.no

Preface

Acknowledgements

This memo summarises a study conducted by the Research Centre on Zero Emission Neighbourhoods in Smart Cities (FME ZEN). The authors gratefully acknowledge the support from the Research Council of Norway, the Norwegian University of Science and Technology (NTNU), SINTEF, the municipalities of Oslo, Bergen, Trondheim, Bodø, Bærum, Elverum and Steinkjer, Sør-Trøndelag county, Norwegian Directorate for Public Construction and Property Management, Norwegian Water Resources and Energy Directorate, Norwegian Building Authority, ByBo, Elverum Tomteselskap, TOBB, Snøhetta, ÅF Engineering AS , Asplan Viak, Multiconsult, Sweco, Civitas, FutureBuilt, Hunton, Moelven, Norcem, Skanska, GK, Caverion, Nord-Trøndelag Elektrisitetsverk - Energi, Numascale, Smart Grid Services Cluster, Statkraft Varme, Energy Norway and Norsk Fjernvarme.

The Research Centre on Zero Emission Neighbourhoods (ZEN) in Smart Cities

The ZEN Research Centre develops solutions for future buildings and neighbourhoods with no greenhouse gas emissions and thereby contributes to a low carbon society.

Researchers, municipalities, industry and governmental organizations work together in the ZEN Research Centre in order to plan, develop and run neighbourhoods with zero greenhouse gas emissions. The ZEN Centre has nine pilot projects spread over all of Norway that encompass an area of more than 1 million m2 and more than 30 000 inhabitants in total.

In order to achieve its high ambitions, the Centre will, together with its partners:

- Develop neighbourhood design and planning instruments while integrating science-based knowledge on greenhouse gas emissions;
- Create new business models, roles, and services that address the lack of flexibility towards markets and catalyze the development of i innovations for a broader public use; This includes studies of political instruments and market design;
- Create cost effective and resource and energy efficient buildings by developing low carbon technologies and construction systems based on lifecycle design strategies;
- Develop technologies and solutions for the design and operation of energy flexible neighbourhoods;
- Develop a decision-support tool for optimizing local energy systems and their interaction with the larger system;
- Create and manage a series of neighbourhood-scale living labs, which will act as innovation hubs and a testing ground for the solutions developed in the ZEN Research Centre. The pilot projects are Furuset in Oslo, Fornebu in Bærum, Sluppen and Campus NTNU in Trondheim, an NRK-site in Steinkjer, Ydalir in Elverum, Campus Evenstad, NyBy Bodø, and Zero Village Bergen.

The ZEN Research Centre will last eight years (2017-2024), and the budget is approximately NOK 380 million, funded by the Research Council of Norway, the research partners NTNU and SINTEF, and the user partners from the private and public sector. The Norwegian University of Science and Technology (NTNU) is the host and leads the Centre together with SINTEF.

VISION:
«Sustainable neighbourhoods with zero greenhouse gas emissions»

https://fmezen.no
@ZENcentre
FME ZEN (page)

About ZEN Spatial indicators

ZEN Spatial indicators is a set of evidence based metrics that measure potential for spatial qualities and sustainable transport patterns. The aim is to evaluate plan proposals and support further stages of urban design by GIS laborations and policy recommendations. The ZEN Spatial indicators have been selected for supporting both the early phase of planning ("Kommundeleplaner") and later planning phase ("Reguleringsplaner") within ZEN Pilot projects. All metrics can be measured in free to use GIS software and the needed background data are usually available at Norwegian municipalities.

The ZEN Spatial indicators are currently not weighted and summarized. Future research will develop a KPI (Key Performance Indicator) for Spatial qualities that can be used in upcoming ZEN KPI Tool. Earlier studies where spatial indicators have been included in predictive models have shown a strong relationship between urban form as measured by the indicators and attractive urban environments and sustainable transport patterns. Based on the already generated GIS models for ZEN Spatial indicators in Bodø, Baerum and Trondheim, future research within ZEN can proceed in developing such predictive models.

The ZEN Spatial indicators and it's metrics has been developed by the research group ZEN-SMS (Spatial Morphology Studies in ZEN) at NTNU-AD (Faculty of architecture and design at NTNU).

EARLIER MODELS: SPATIAL INDICATORS THAT EXPLAINS HOUSING PRICE AND OFFICE RENTS (GOTHENBURG AND STOCKHOLM)

HOUSING PRICE

- CLOSENESS TO CITY CENTRE
- CLOSE TO PUBLIC TRANSPORT (500 M)
- LEVEL OF URBAN SERVICES (1 KM)
- ENTRANCE DENSITY AND BLOCKS
- CLOSENESS TO PARKS
- CLOSENESS TO WATER
- (SOCIO ECONOMICAL INDEX)

EXPLAINS **90 %**

OFFICE RENT

- CLOSENESS TO CITY CENTRE
- ACCESS BY PUBLIC TRANSPORT
- LEVEL OF URBAN SERVICES (1 KM)
- CLUSTER OF OFFICES
- MODERNITY

EXPLAINS **88 %**

Spacescape/Evidens, Värdeskapande stadsutveckling 2016

EARLIER MODELS: SPATIAL INDICATORS THAT EXPLAINS NUMBER OF CAR TRIPS PER NEIGBORHOOD (STOCKHOLM)

CLOSENESS TO CITY CENTRE

CLOSENESS TO PUBLIC TRANSPORT

DIVERSITY OF URBAN SERVICES (1 KM)

STREET LENGHT PER PERSON

SHARE OF SINGLE HOUSE

(SOCIO ECONOMICAL INDEX)

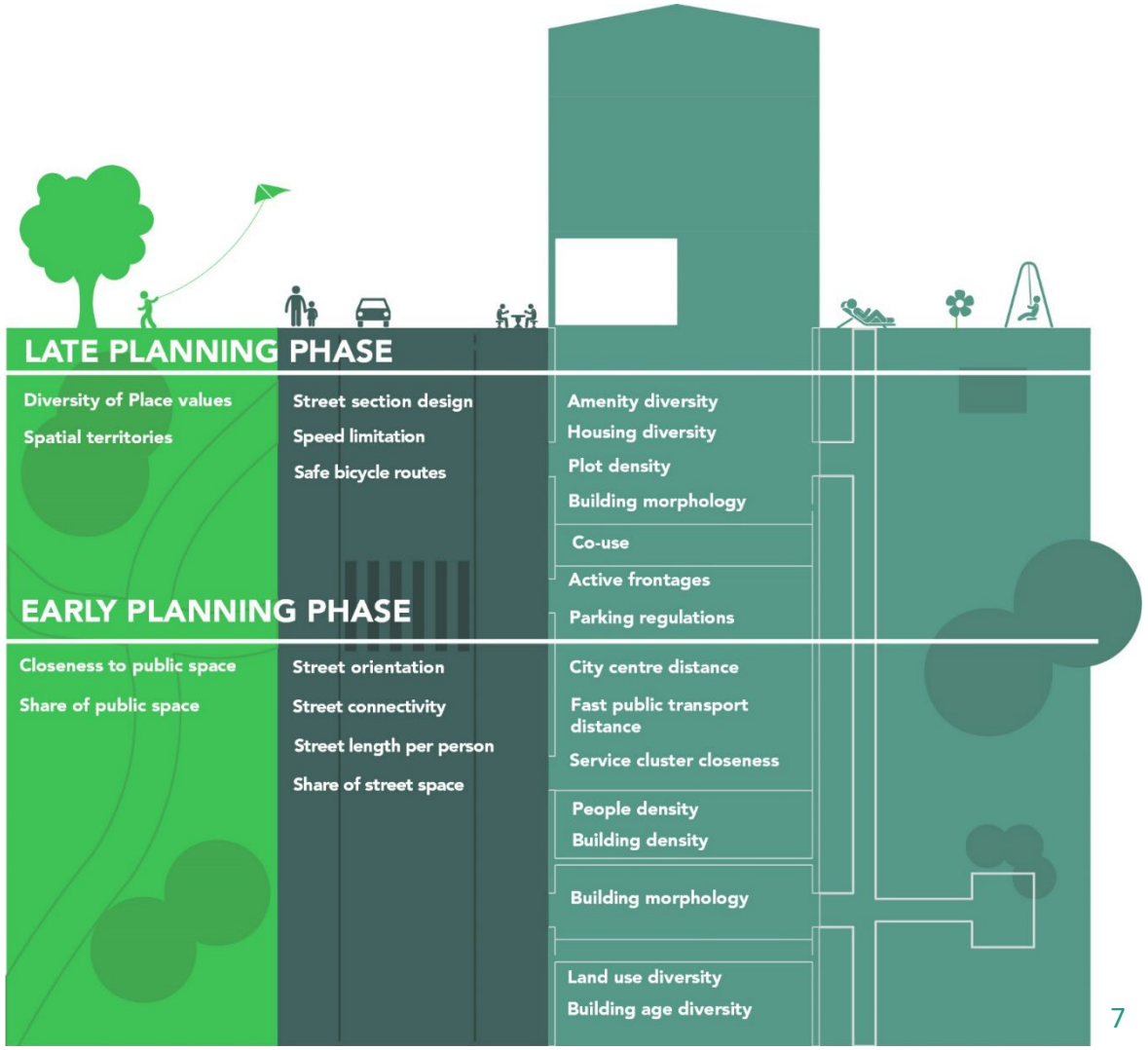
EXPLAINS 80 % OF NUMBER OF CAR TRIPS

Spacescape, Enkla planindikatorer för trafik 2018

SPATIAL INDICATORS IN LATE AND EARLY PHASES OF URBAN PLANNING

DESIGN MANAGING THE POTENTIAL

STRUCTURE THAT GIVES POTENTIAL



CLOSENESS TO A DIVERSITY OF URBAN QUALITIES WITHIN WALKING DISTANCE ALONG PEDESTRIAN FRIENDLY STREETS INCREASE SPATIAL QUALITIES AND SUPPORTS SUSTAINABLE TRANSPORT PATTERNS

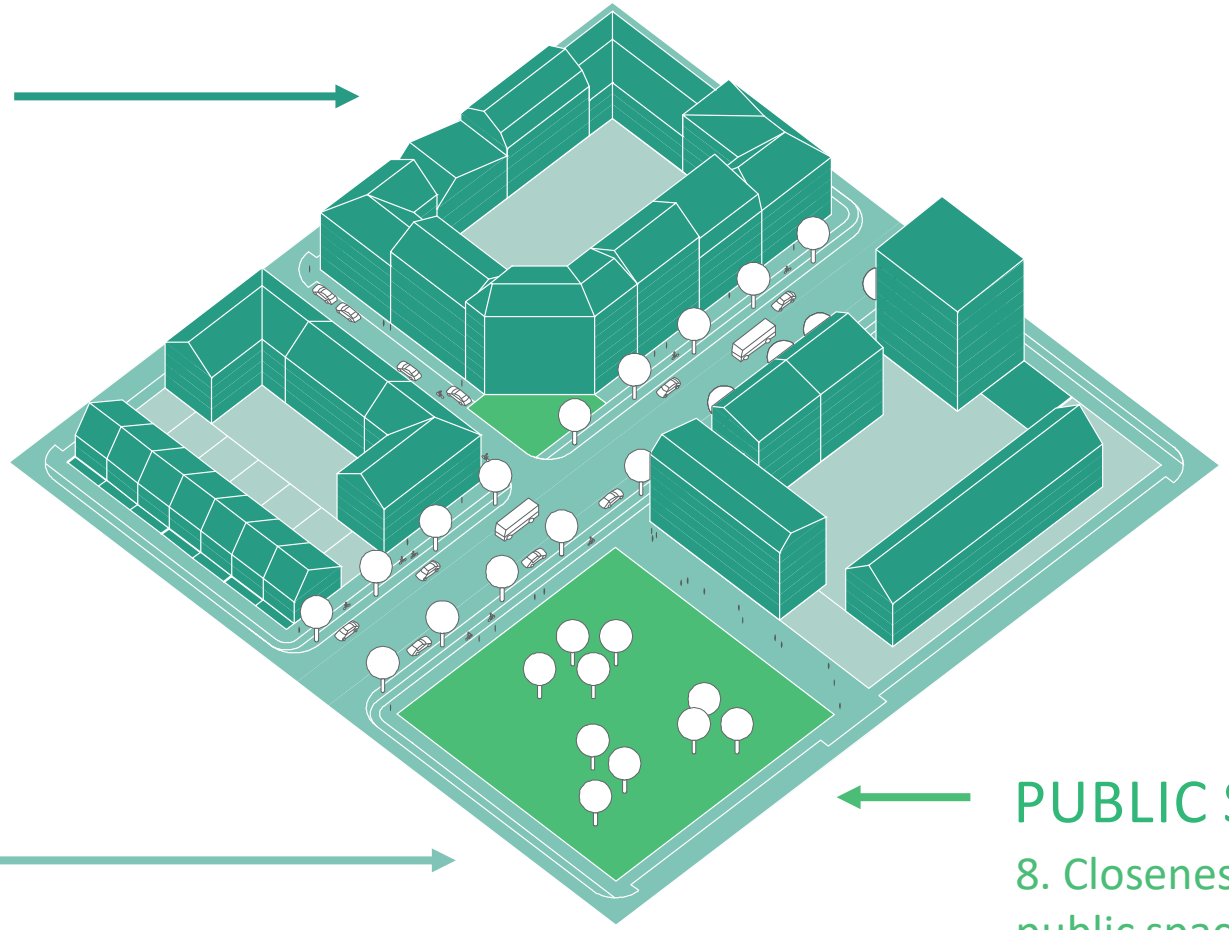
EVALUATION OF KDP 3

Kommunedelplan för Fornebu 2017-2035, Baerum kommune

10 SPATIAL INDICATORS

BUILDINGS AND BLOCKS

1. Closeness to region center
2. Closeness to public transport
3. Closeness to local centers
4. Closeness to primary and secondary school
5. People density
6. Land use diversity



STREET NETWORK

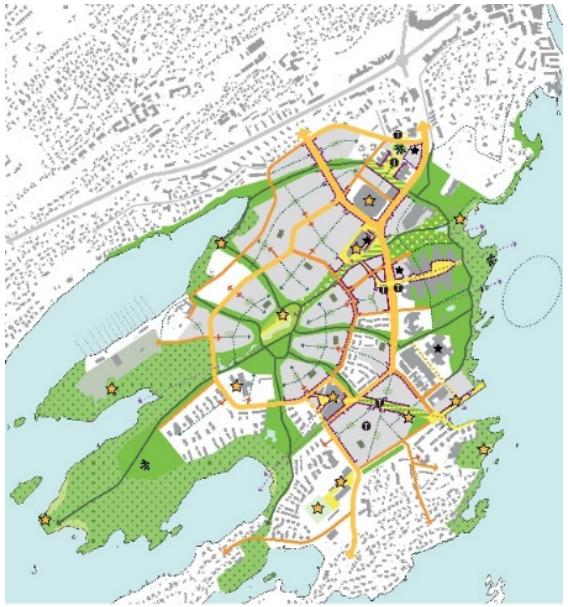
7. Street connectivity

PUBLIC SPACE

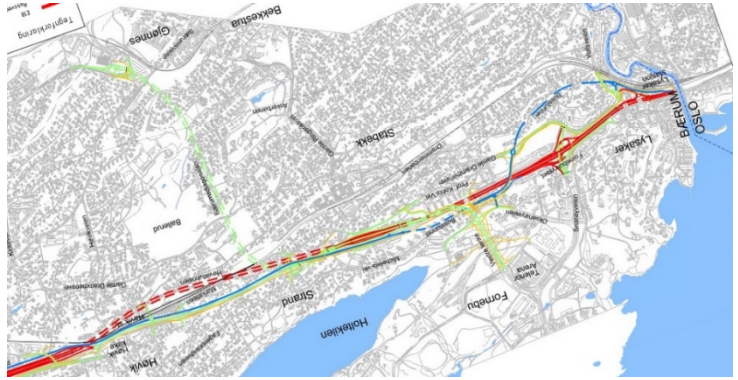
8. Closeness to public space
9. Share of public space
10. Closeness to water
11. Orientation to water

GIS MODEL 2035

INCLUDED PLANS IN GIS MODEL 2035



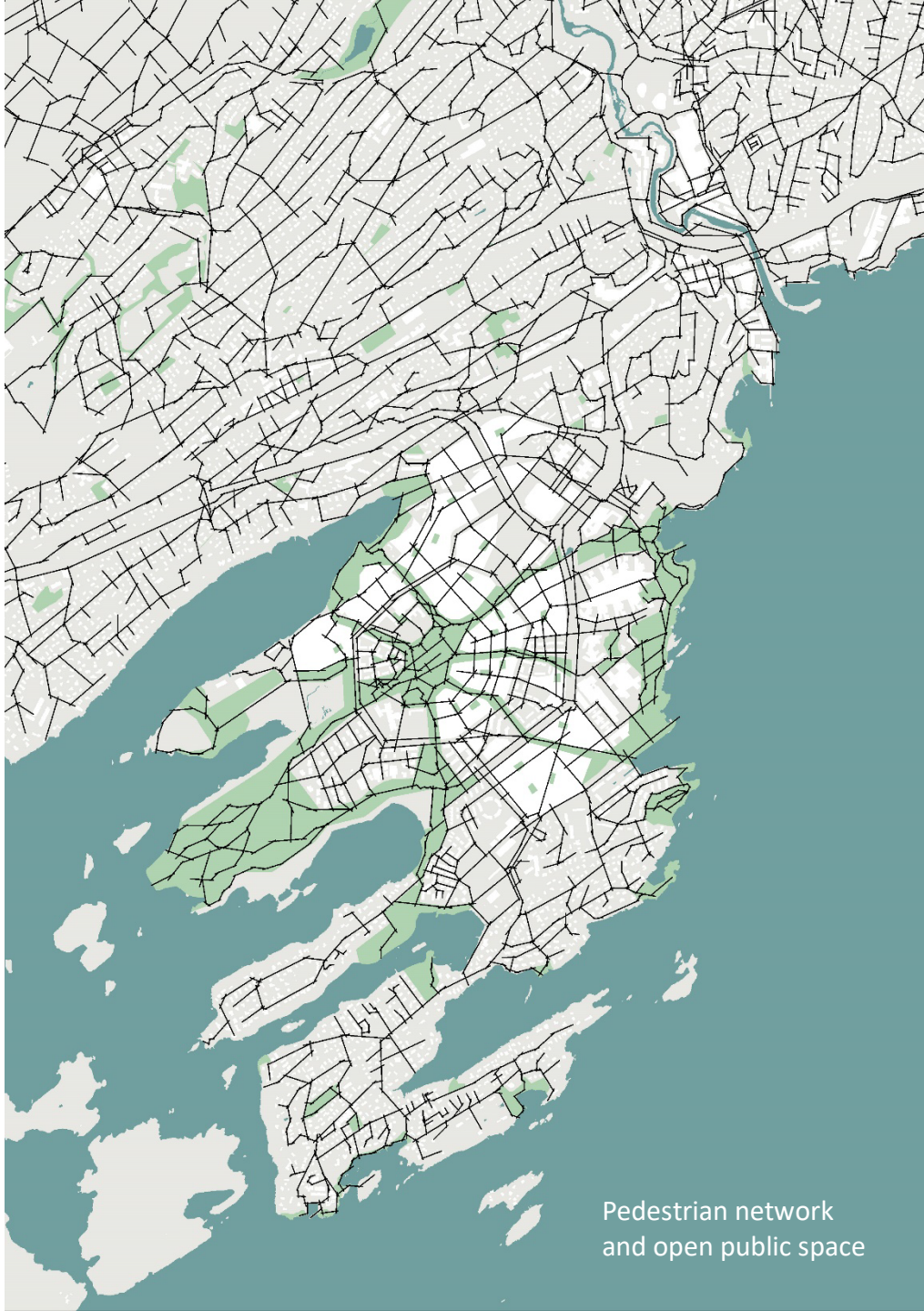
Illustrationsplan KDP 3



Plan för ny E18

Oksenoya O 9.7

Plan B9.6



Pedestrian network
and open public space

INCLUDED DENSITY IN NEW BLOCKS

BÆRUM - PLAN PROPOSAL POPULATION CALCULATION

OMRNAVN	Max_BRA	Res_Share	Residential	Office	Residents (50m2 per resident)	Employees (20m2 per employee)	Residents per building
S8.4	85142	0,65	55342,3	29799,7	1107	1490	
B9.1	81395	0,97	78953,15	2441,85	1579	122	
B1.1	71260	0,7	49882	21378	998	1069	
B9.2	68058	1	68058	0	1361	0	
B7.4_A	60332	1	60332	0	1207	0	
B9.4	59206	1	59206	0	1184	0	
B9.3	58382	0,96	56046,72	2335,28	1121	117	
S4.4_B	53722	0,95	51035,9	2686,1	1021	134	
B8.1	52754	1	52754	0	1055	0	
S8.3	48559	0,65	31563,35	16995,65	631	850	
B7.4_B	47159	1	47159	0	943	0	
B9.6	37818	1	37818	0	756	0	38
S4.3_A	30574	0	0	30574	0	1529	
S4.4_A	25274	0	0	25274	0	1264	
S4.3_B	202639	0,75	151979,25	50659,75	3040	2533	
S1.3_B	19168	1	19168	0	383	0	
KBA7.1	17133	0	0	17133	0	857	
B7.2	12629	1	12629	0	253	0	
O9.7	31000	1	31000	0	620	0	155
B7.3	33659	1	33659	0	673	0	
O1.1_A	12000	1	12000	0	240	0	
O1.1_B	4400	1	4400	0	88	0	
O8.6/8.7_A	16750	1	16750	0	335	0	
O8.9_A	5000	1	5000	0	100	0	
O8.9_B	4100	1	4100	0	82	0	

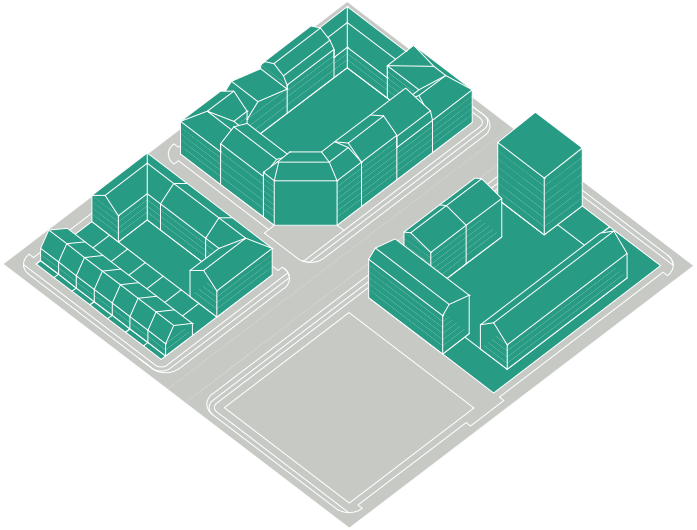
Område	Felt	Maks %-BRA	Maks BRA m2 *	Andel bolig %	Andel annet % **	Høyder +/- (etg. snitt) ***	MUA pr. 100m2	Noter	Tomte-areal m2
A	S 1.2_B			0,0	100,0	7		1	4 699
A	S 1.3_A			0,0	100,0	7		2	18 568
A	B 1.1	238	71 260	70,0	30,0	5	30		29 941
A	S 1.3_B	160	19 168	100	0,0	5	30	2	11 980
A	KBA 3.1				100,0	5			47 506
A	S 3.2				100,0	7		1	3790
C	KBA 4.1				100,0	3			18 973
A	S 4.3_A	240	30 574	0,0	100,0	7			12 739
A	S 4.3_B	240	202 639	75,0	25,0	7	30		84 433
A	S 4.4_A	240	25 274	0,0	100,0	7			10 531
A	S 4.4_B	240	53 722	95,0	5,0	7	30		22 384
C	KBA 7.1	50	17 133	0,0	100,0	3	50		34 265
C	B 7.2	70	12 629	100,0	0,0	3	50		18 041
C	B 7.4_A	131	60 332	100,0	0,0	4	50		46 079
A	B 7.4_B	155	47 159	100,0	0,0	5	30		30 425
A	B 8.1	180	52 754	100,0	0,0	6	30		29 308
A	S 8.3	240	48 559	65,0	35,0	7	30		20 233
A	S 8.4	240	85 142	65,0	35,0	7	30		35 476
B	B 9.1	155	81 395	97,0	3,0	5	40		52 513
B	B 9.2	160	68 058	100,0	0,0	5	40		42 536
B	B 9.3	155	58 382	96,0	4,0	5	40		37 666
B	B 9.4	158	59 206	100,0	0,0	5	40		37 472
B	B 9.6	120	37 818	100,0	0,0	4	40		31 515
-	Ufordelt BRA bolig	-	12 613	100,0	0,0	-	-	3	-

KDP 3

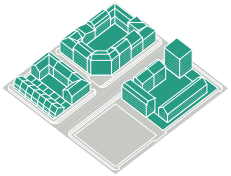
Dialoge with Baerum kommune

EVALUATION:

BUILDINGS AND BLOCKS

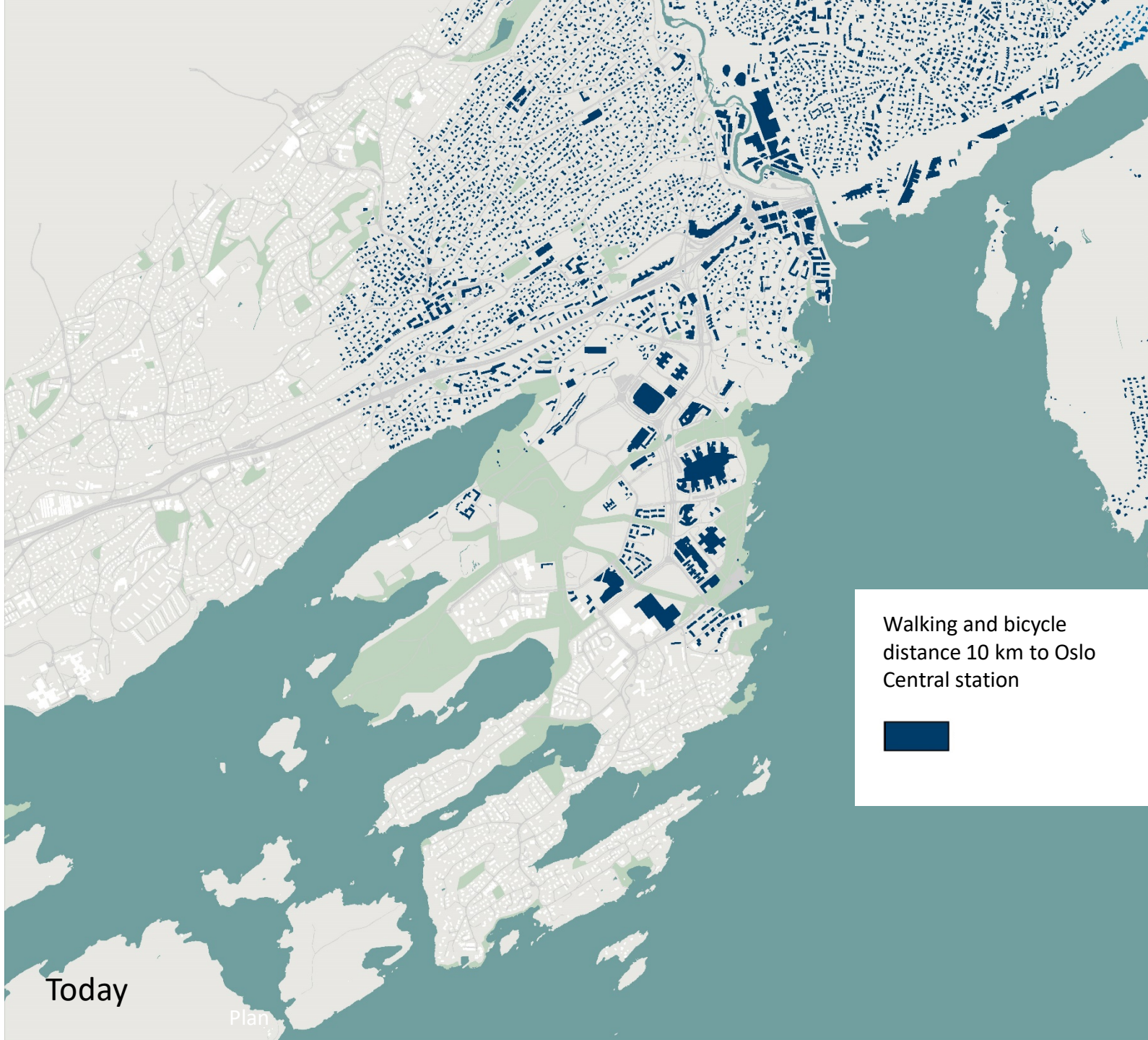


1. Closeness to region center

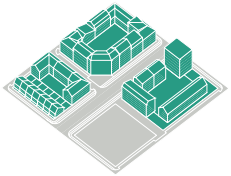


Contributes to attractiveness and are strongly related to energy demand and sustainable transport patterns.

- Gång- och cykelavståndet till centrala Oslo är idag 9,3 km i snitt från KDP 3 området. Det talar för en begränsad pendlingspotential med cykel och ett stort beroende av kollektivtrafik för en hög andel hållbara transporter.



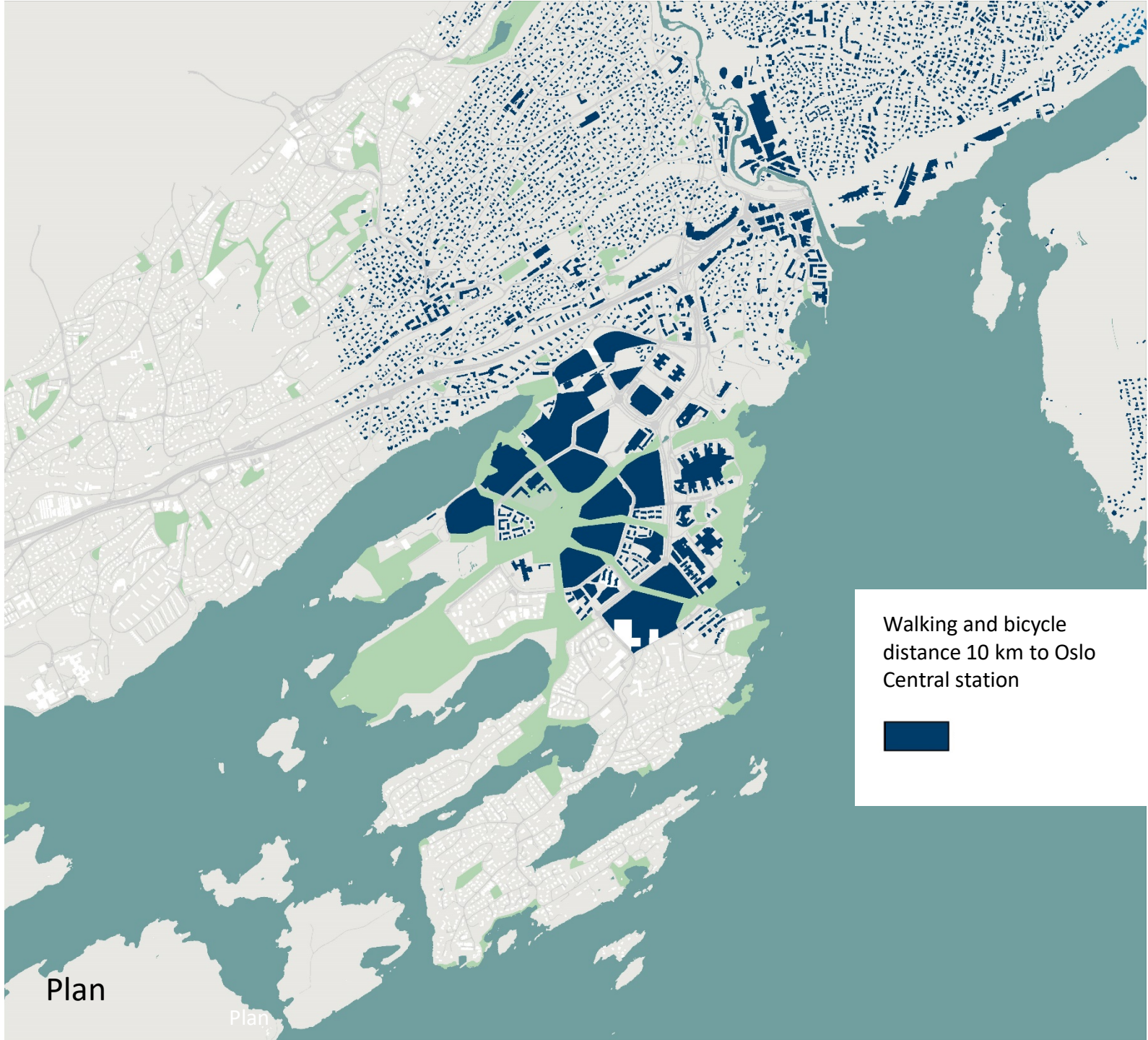
1. Closeness to region center



Contributes to attractiveness and are strongly related to energy demand and sustainable transport patterns.

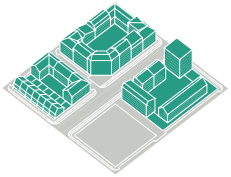
- Närheten till centrala Oslo påverkas inte nämnvärt av planerad gatustruktur. Ungefär lika stort område som idag har centrala Oslo inom 10 km gång-eller cykelavstånd. I snitt ökar avståndet något, vilket sannolikt beror på den ökade tätheten i den södra delen av KDP 3 längst bort från centrala Oslo.

Closeness to city center	
Existing	9277
Proposed	9323



2. Closeness to regional public transport

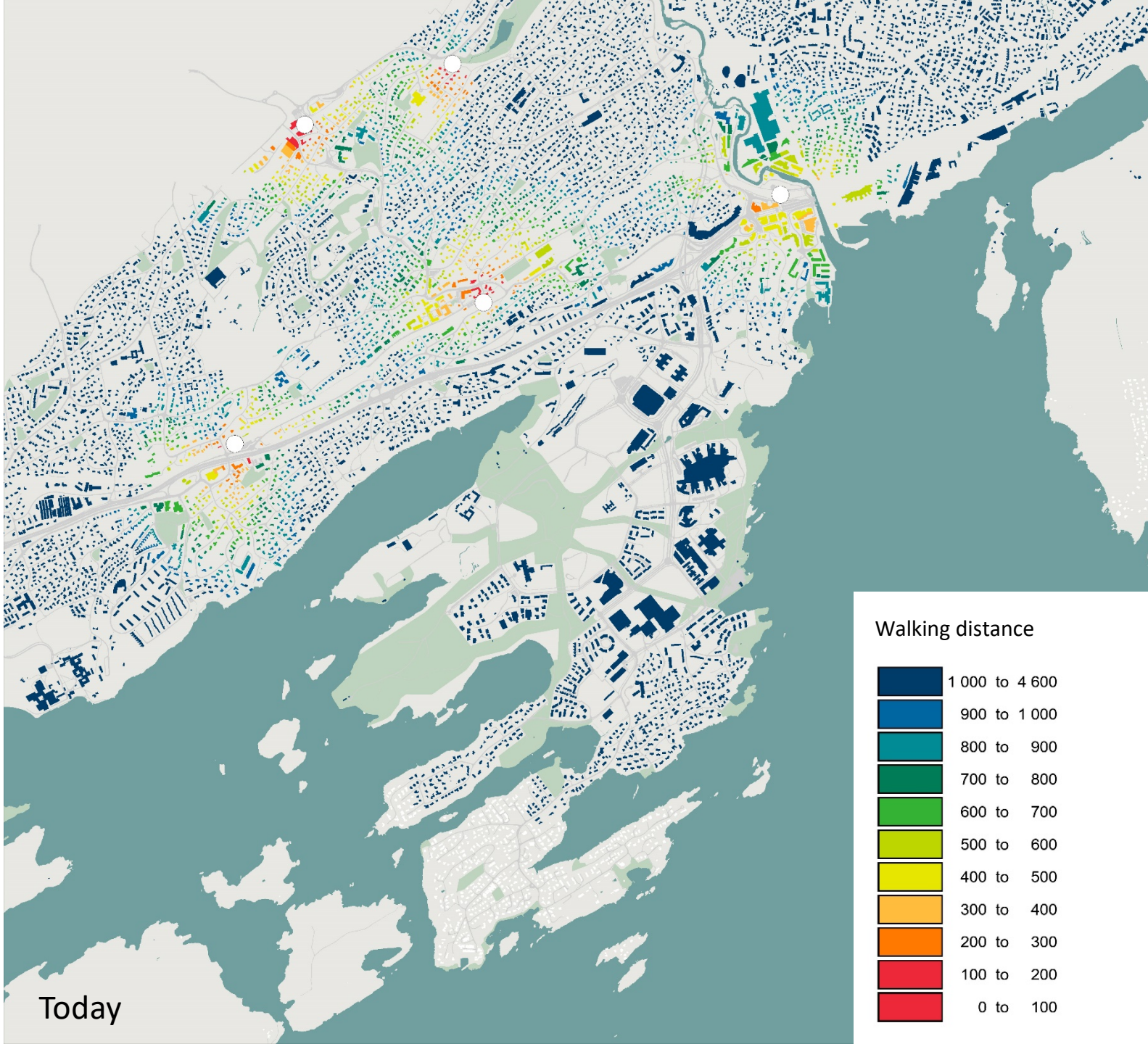
(metro and trains)



Contributes to attractiveness on housing market and office market and are strongly related to share of public transport. Recommended benchmark: > 1 000 metres

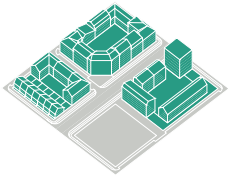
- Idag ligger de spårbundna stationerna inom cykelavstånd från stora delar av Fornebu men knappast inom gångavstånd från någon. I snitt har de boende ca 2,5 km. Inga har mindre än 1 km.

2 Closeness to public transport	
Existing	2418
Proposed	436



2. Closeness to regional public transport

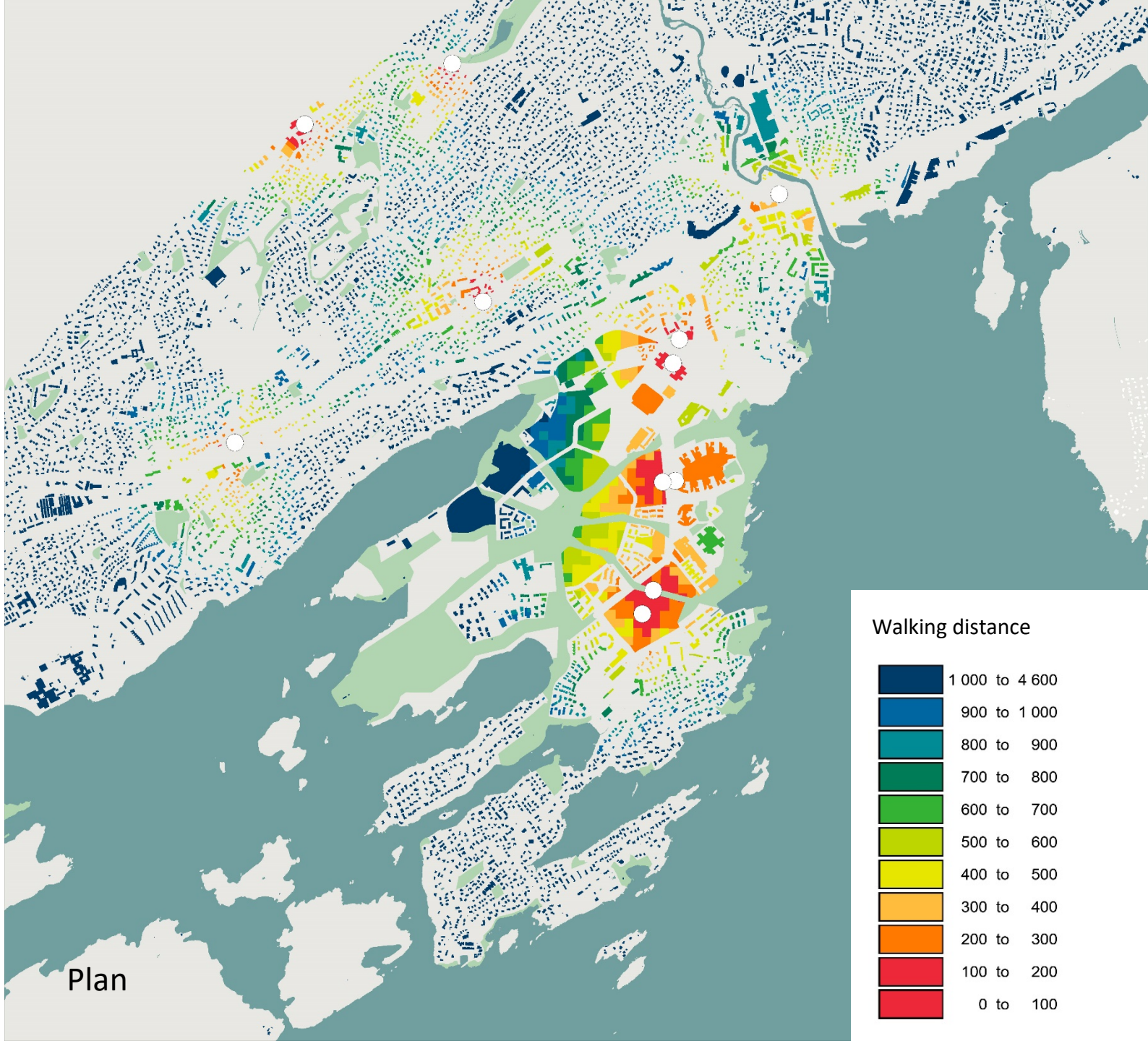
(metro and trains)



Contributes to attractiveness on housing market and office market and are strongly related to share of public transport. Recommended benchmark: > 1 000 metres

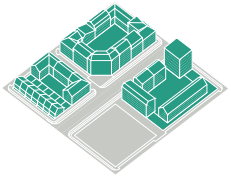
- Mycket god närhet till spårbundna stationer för en stor del av de boende och arbetande inom Fornebu.

Average values per person (day-night population)	
Existing	2418
Proposed	436



2. Closeness to all public transport

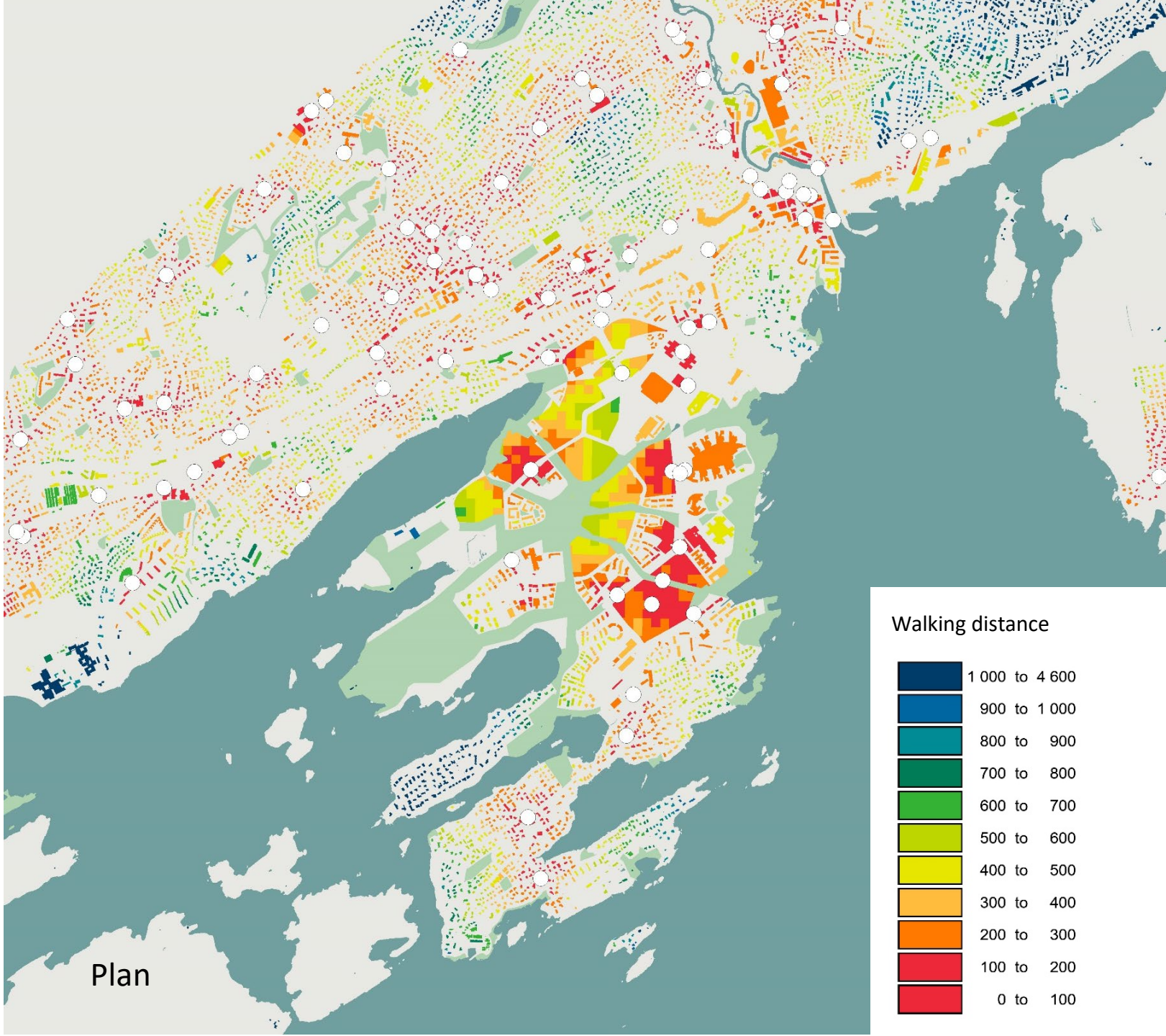
(metro, trains and buses)



Contributes to attractiveness on housing market and office market and are strongly related to share of public transport. Recommended benchmark: > 1 000 metres

- Komplettande bussar med hög turtähet (mindre än 15 minuter väntetid dagtid) i västra delen ger en god generell tillgång till effektiv kollektivtrafik inom hela KDP-området.
- Kollektivtrafiken kan ytterligare stärkas genom goda parkeringsmöjligheter för cykel och lätta elfordon nära metrostationerna.

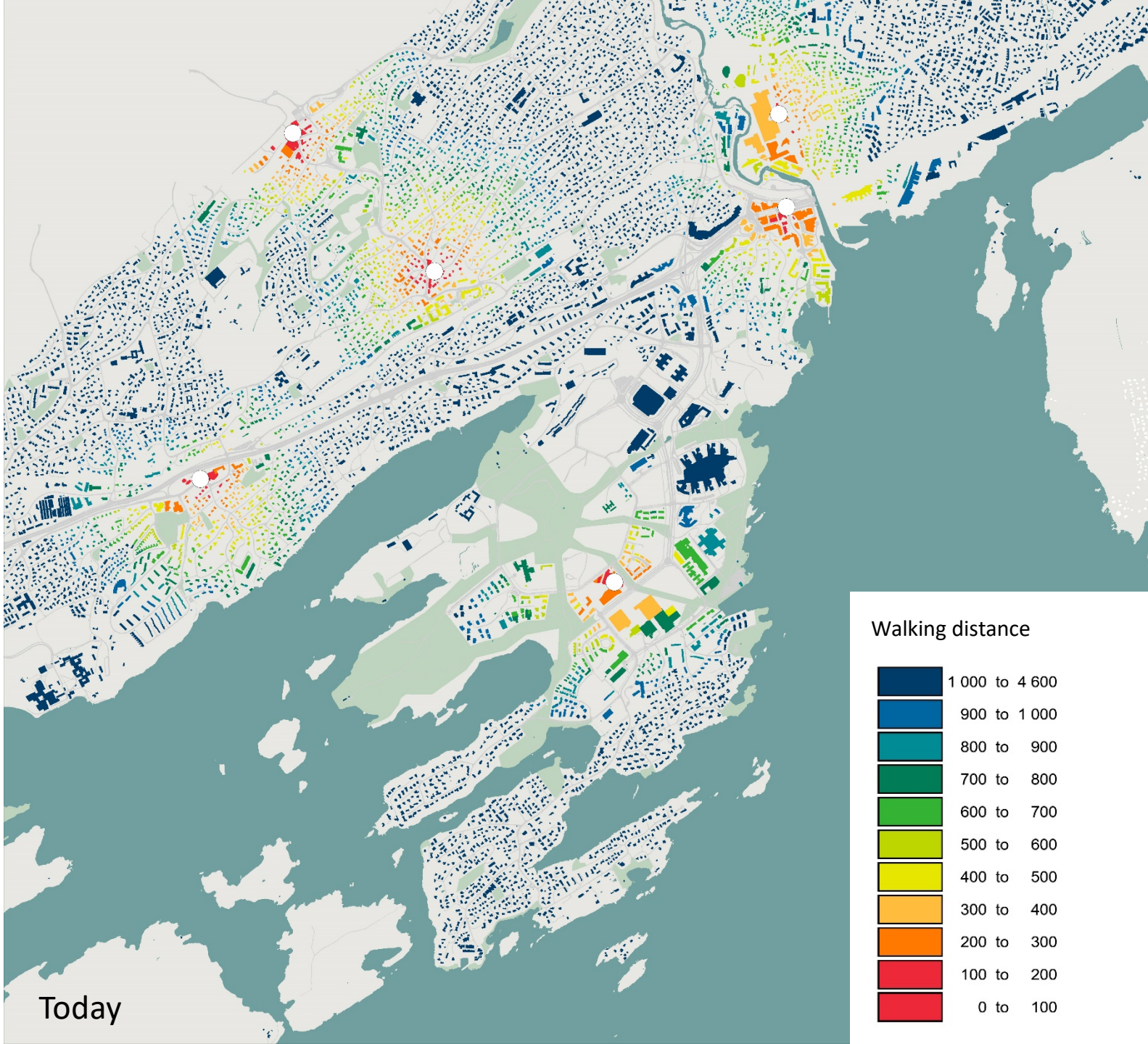
Average values per person (day-night population)	
Existing	497
Proposed	277



3. Closeness to local center

Is together with closeness to City centre one of the most important factors for explaining car use
Recommended benchmark: > 1 000 metres

- I snitt har de boende och arbetande inom KDP-området idag ca 900 meter gångavstånd till ett lokalt center.



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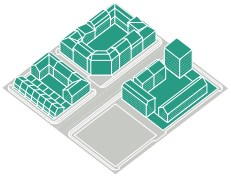
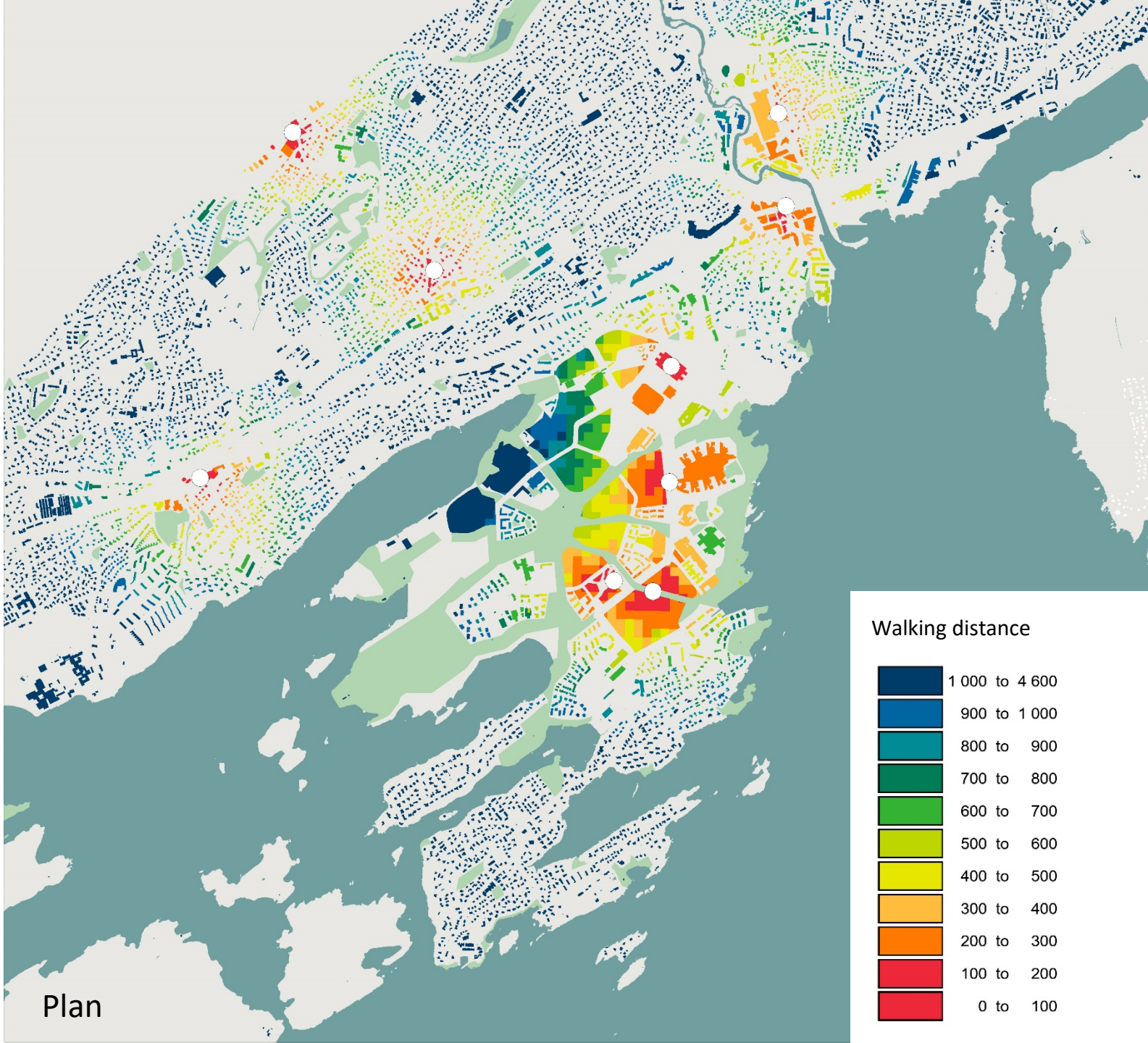


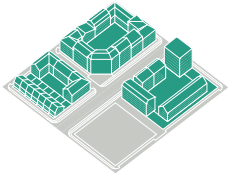
Is together with closeness to City centre one of the most important factors for explaining car use
Recommended benchmark: > 1 000 metres

- Med de kompletternade lokala centerna i de mer tätbefolkade delområdena ges en mycket hög närhet till en mångfald av service och handel. I snitt är avståndet bara ca 400 meter.
- Det är framför allt det lokala centret vid Flytårnet som ökar närheten till ett diversifierat handelsutbud för många.

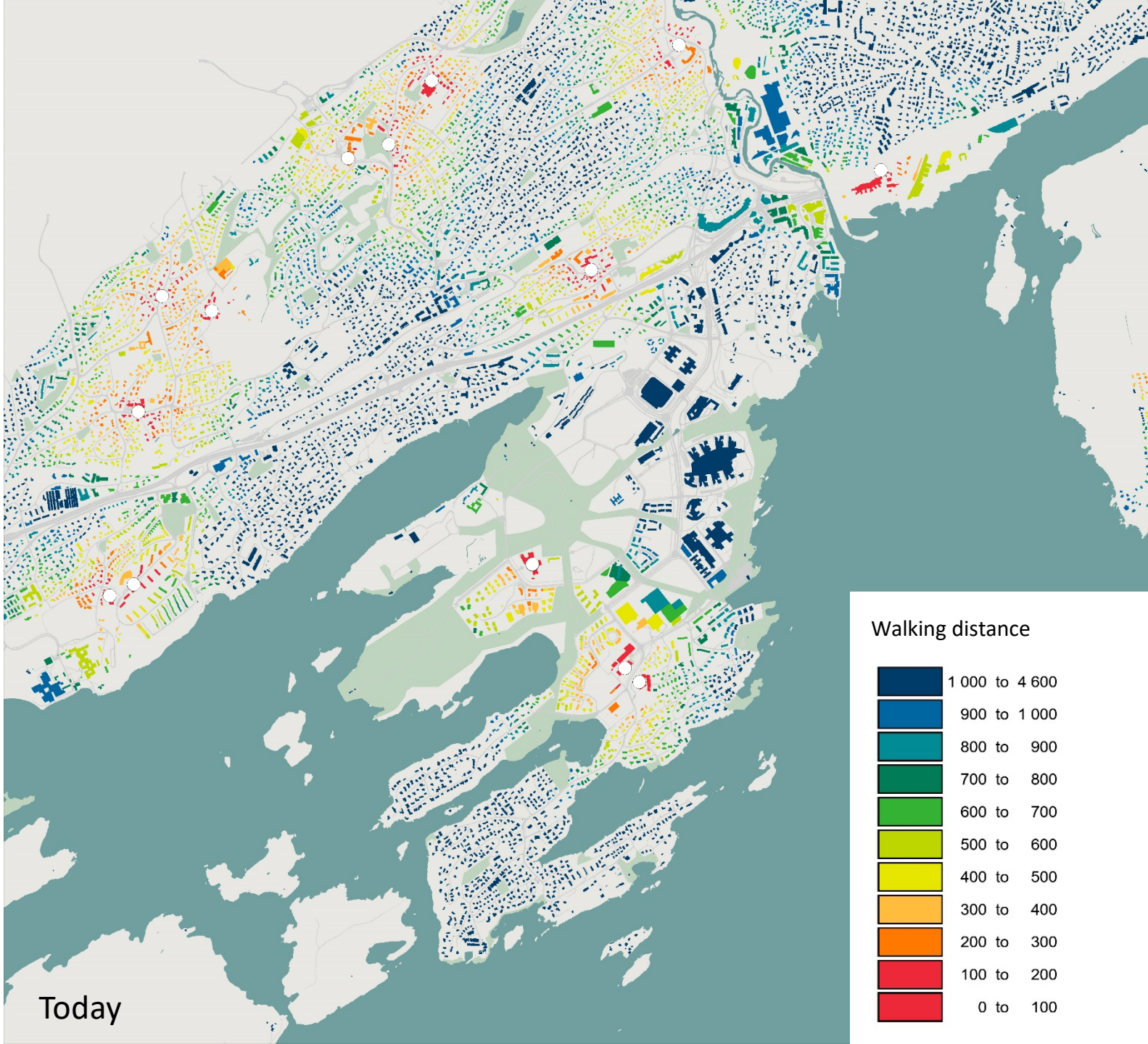
3 Closeness to local centre	
Existing	924
Proposed	433



4. Closeness to primary and secondary school



Closeness to schools are important for a high share of walking or bicycling among children.



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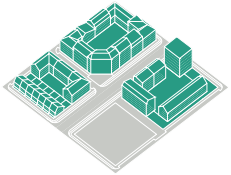
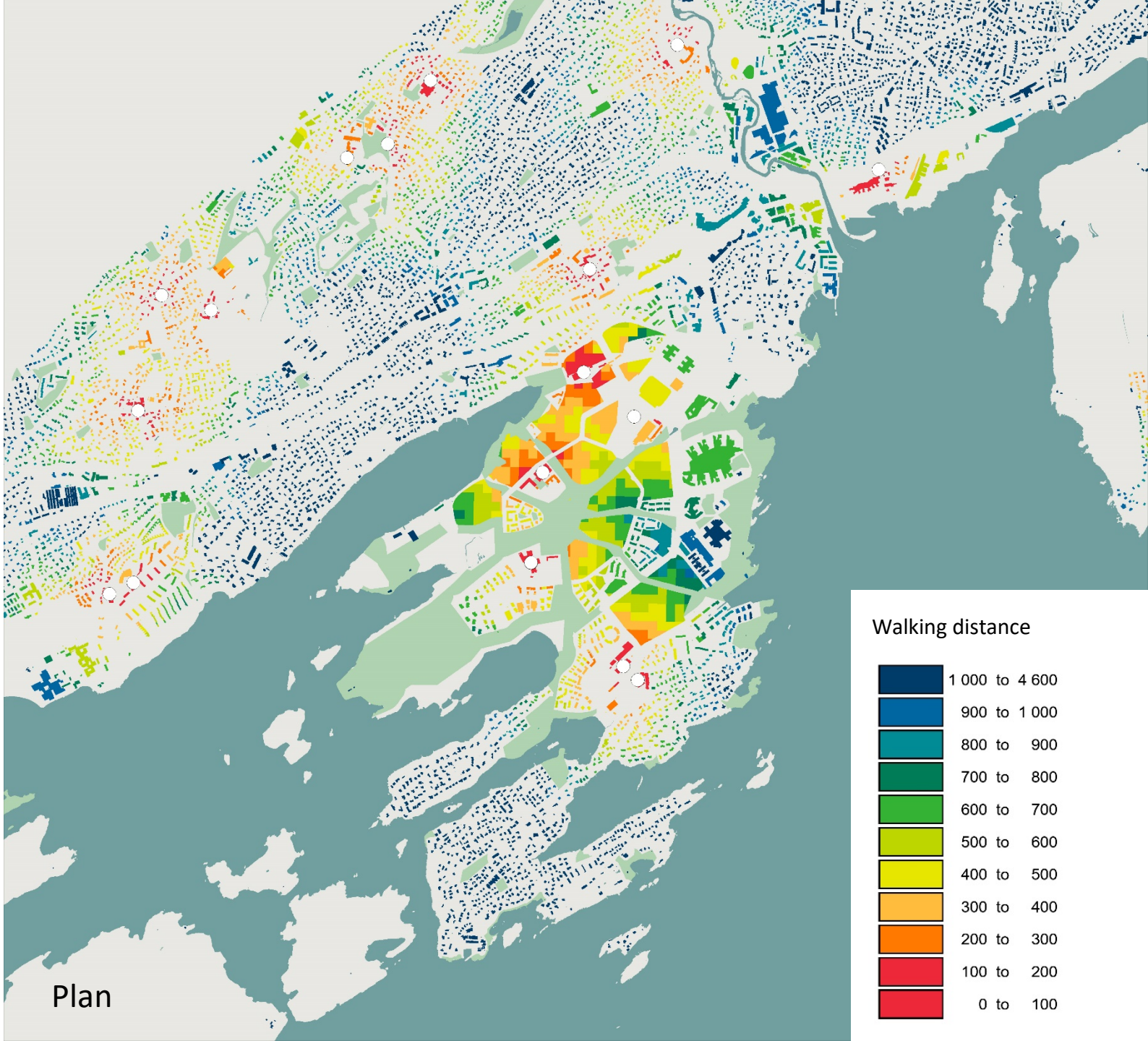


Closeness to schools are important for a high share of walking or bicycling among children.

- Med KDP halveras det genomsnittliga avståndet till skola. I snitt har barnen ca 600 meter till närmsta grundskola.

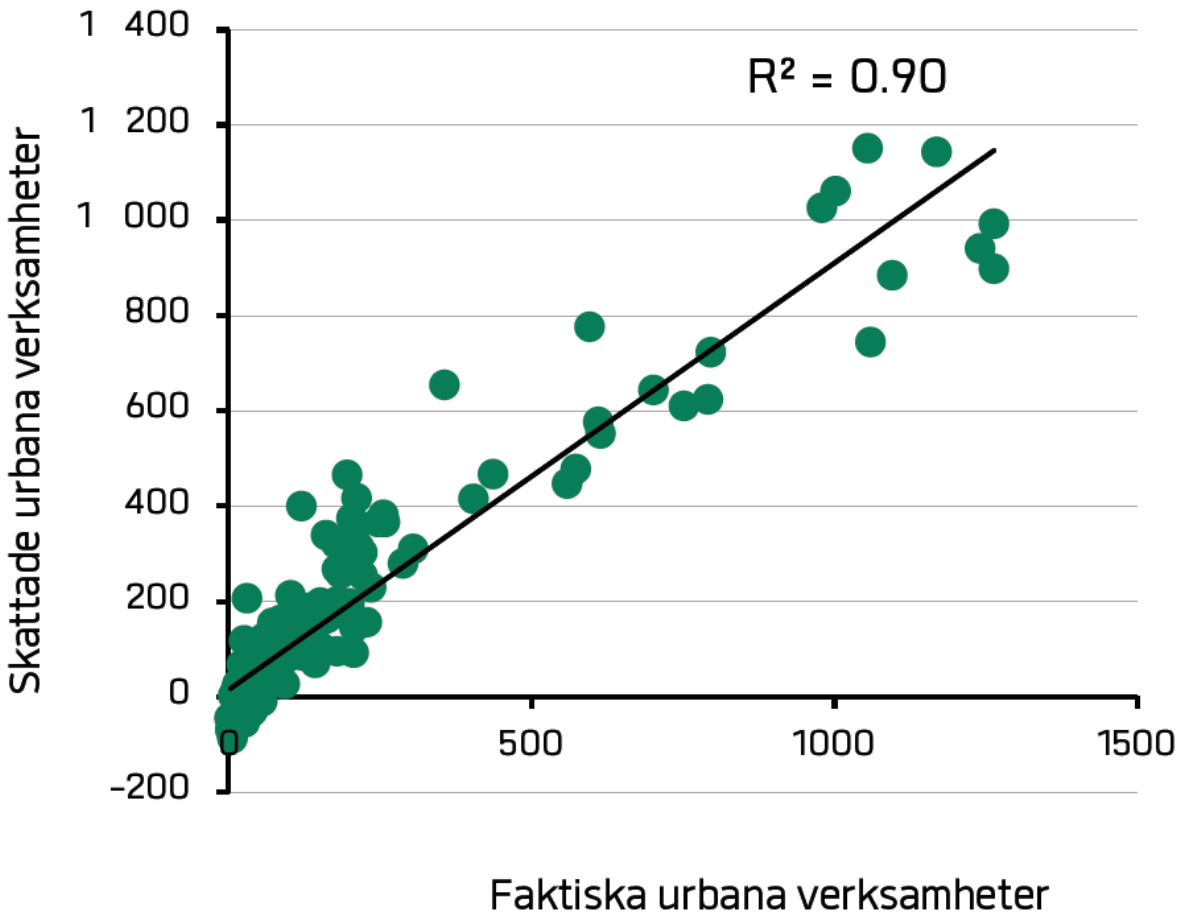
Closeness to primary and secondary school	
Existing	1107
Proposed	588



5. People density

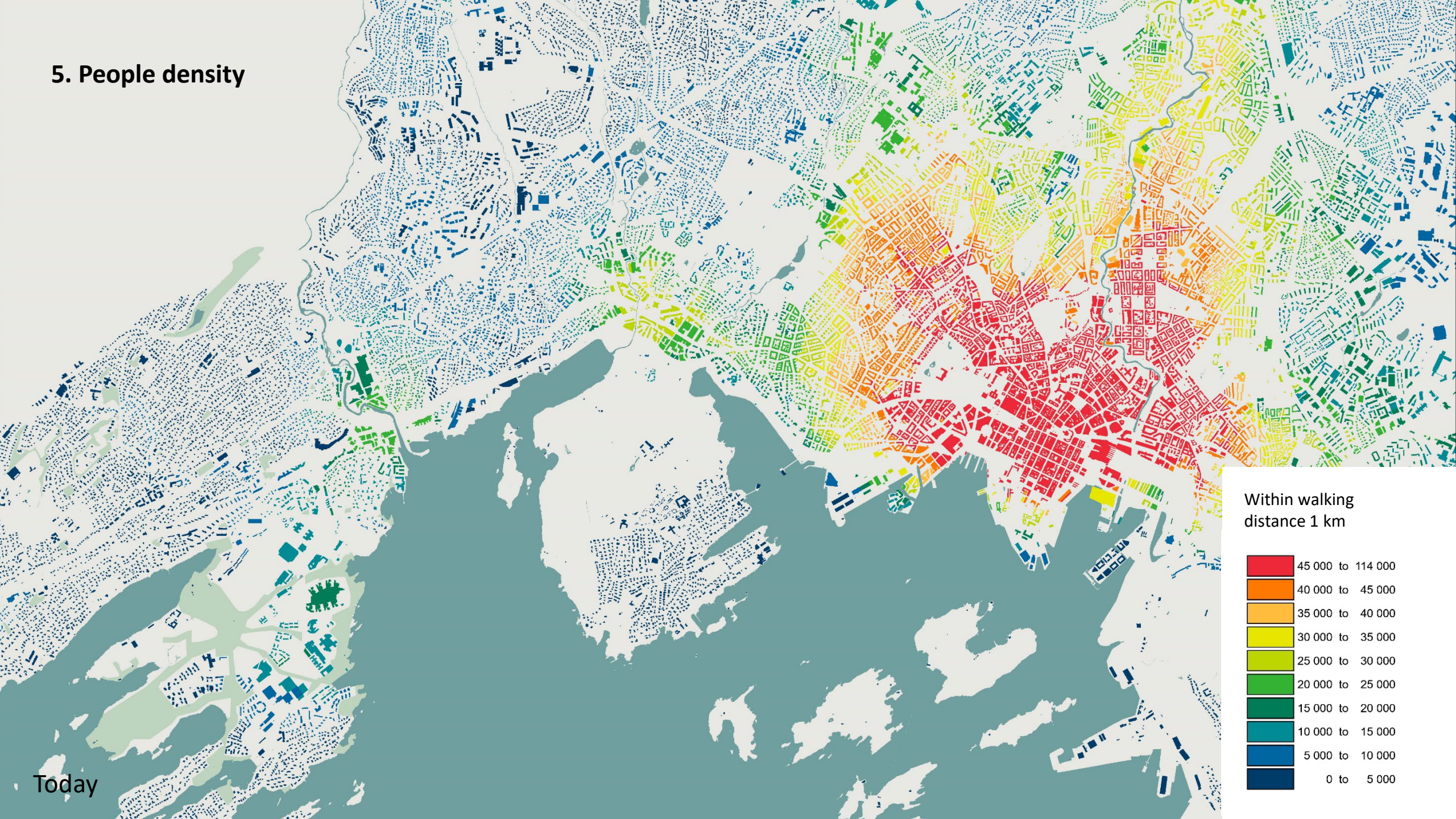
Increase potential for interactions and conditions for a rich supply of local services and public transport

Täthet och blandning av boende och arbetande inom 1 km har visat sig ha starkt samband med utbud av urbana verksamheter (restauranger, handel och kultur) i många svenska städer. Sambandet är ca 90 % i både Göteborg, Stockholm och Örebro.



Referens: värdeskapande stadsutveckling (Göteborgs stad et al 2016)

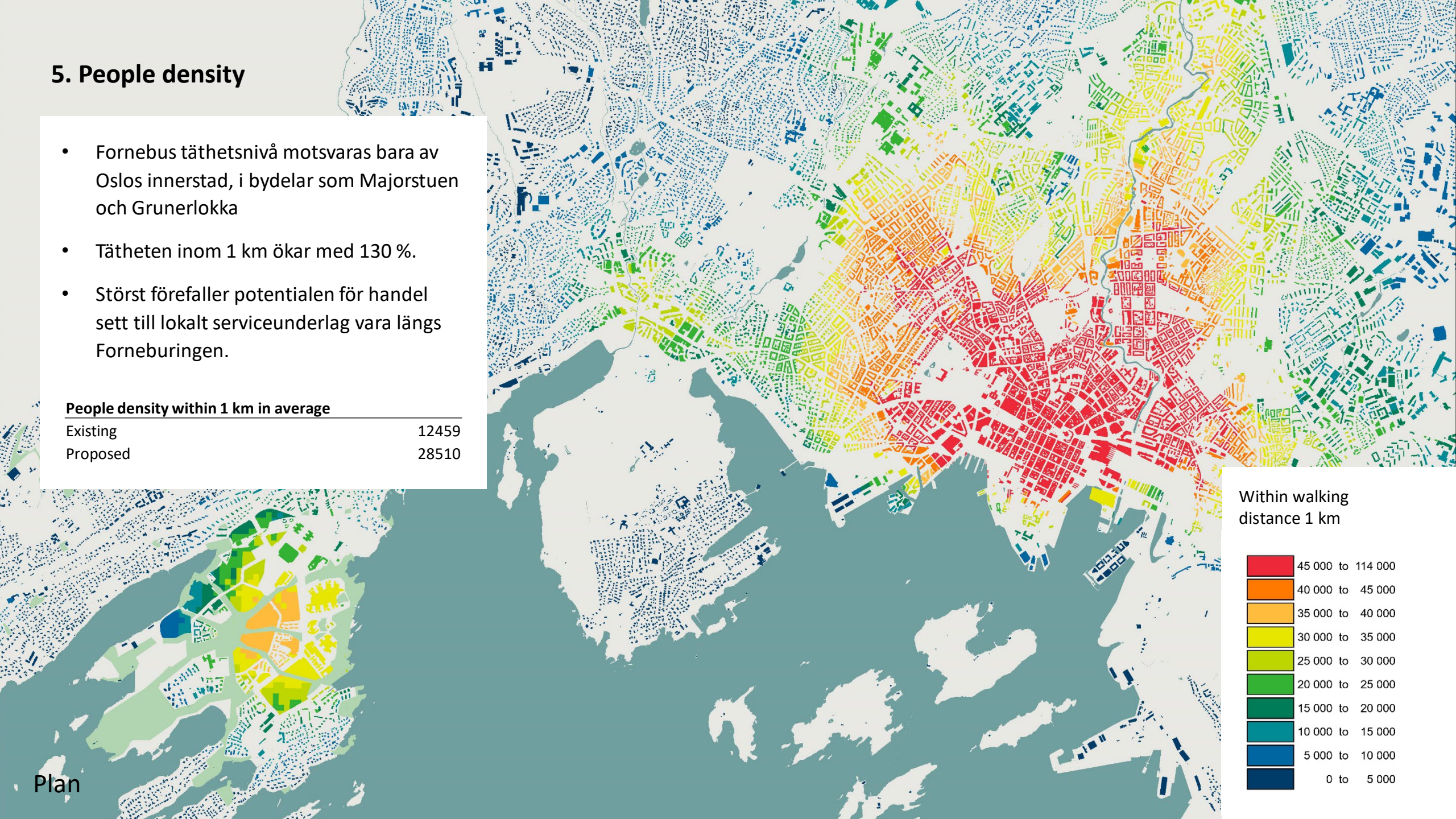
5. People density



5. People density

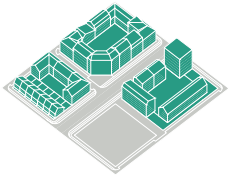
- Fornebus täthetsnivå motsvaras bara av Oslos innerstad, i bydelar som Majorstuen och Grunerlokka
- Tätheten inom 1 km ökar med 130 %.
- Störst förefaller potentialen för handel sett till lokalt serviceunderlag vara längs Forneburingen.

People density within 1 km in average	
Existing	12459
Proposed	28510



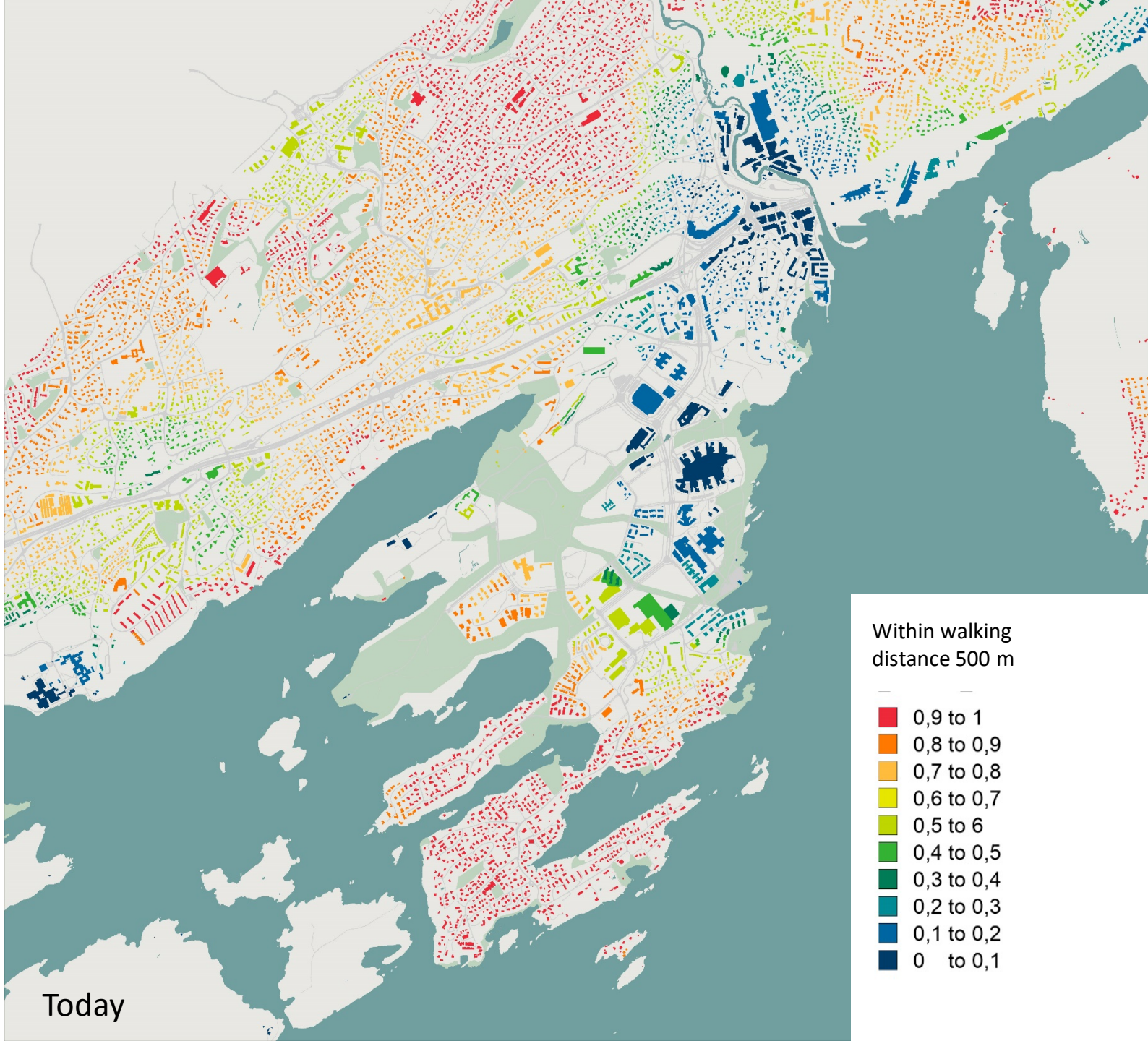
Plan

6. Land use diversity

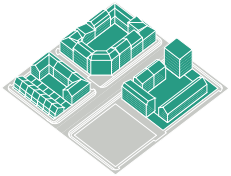


Reduce car dependency and support mixed communities. Recommended benchmark for high diversity: 30-70 %

Spatial indicator: Share of residents	
Existing	22%
Proposed	48%

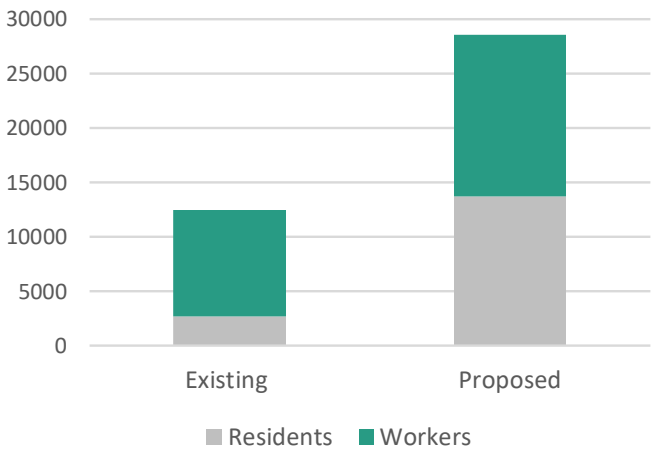


6. Land use diversity

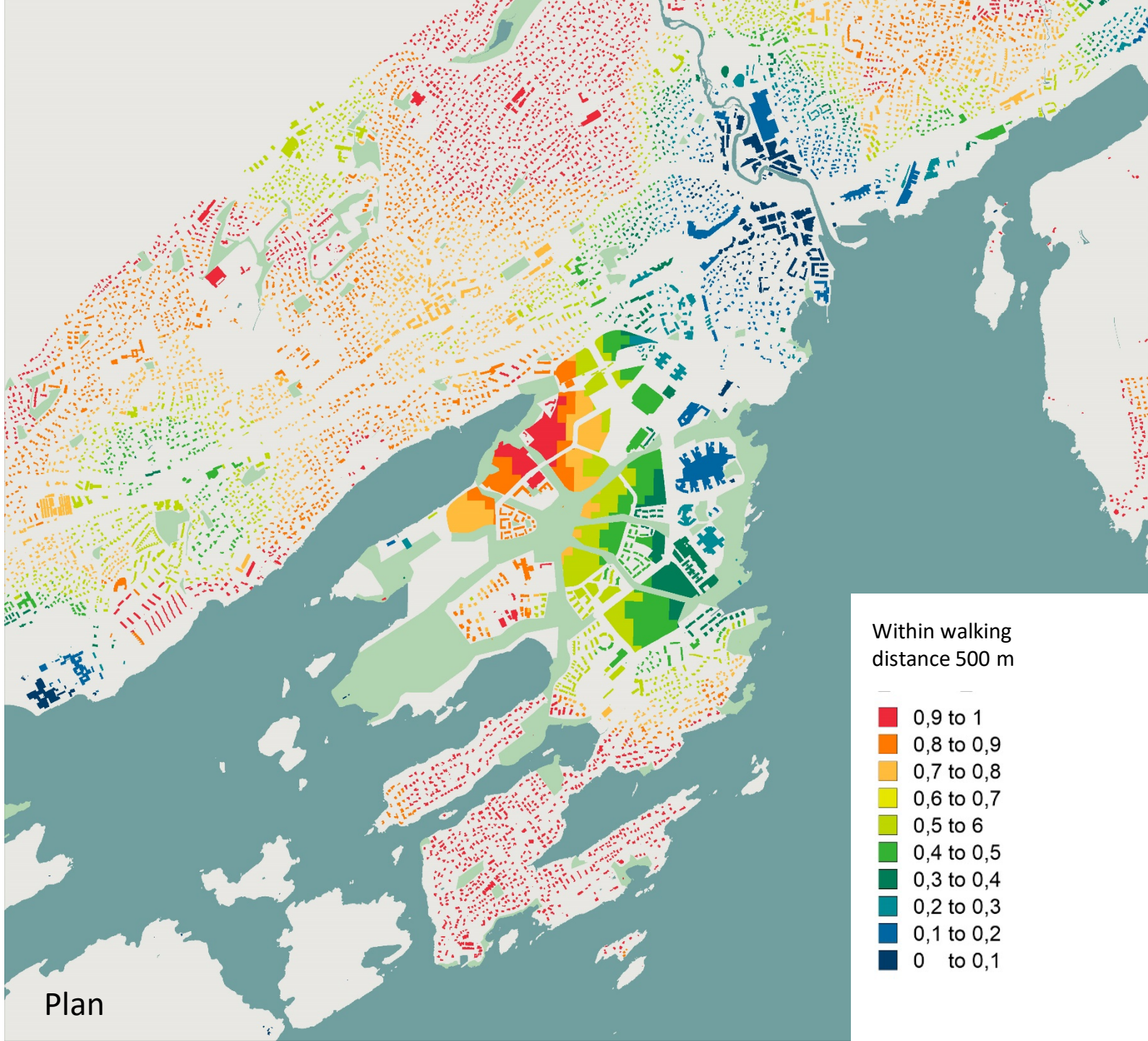


Reduce car dependency and support mixed communities. Recommended benchmark for high diversity: 30-70 %

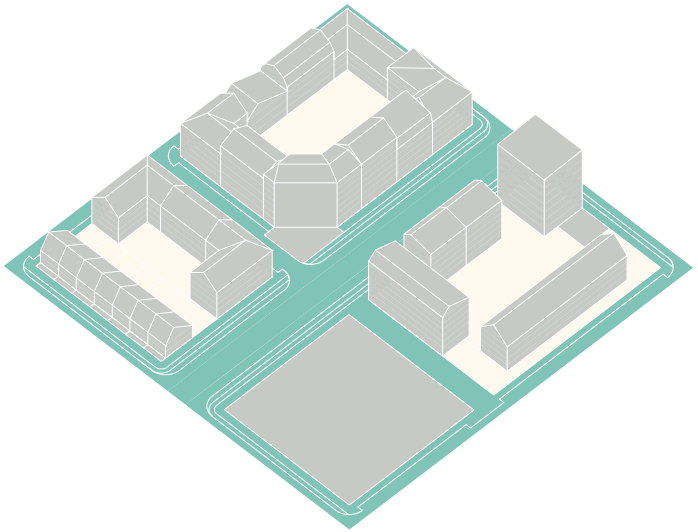
- Fornebu får en mycket hög grad av blandning utifrån internationella benchmarks. Detta understöder både trygghet, lokal handel och potentiellt korta avstånd mellan boende och arbete.



Spatial indicator: Share of residents	
Existing	22%
Proposed	48%



STREET NETWORKS



Reference: The importance of street connectivity for social inclusion and local trade potential

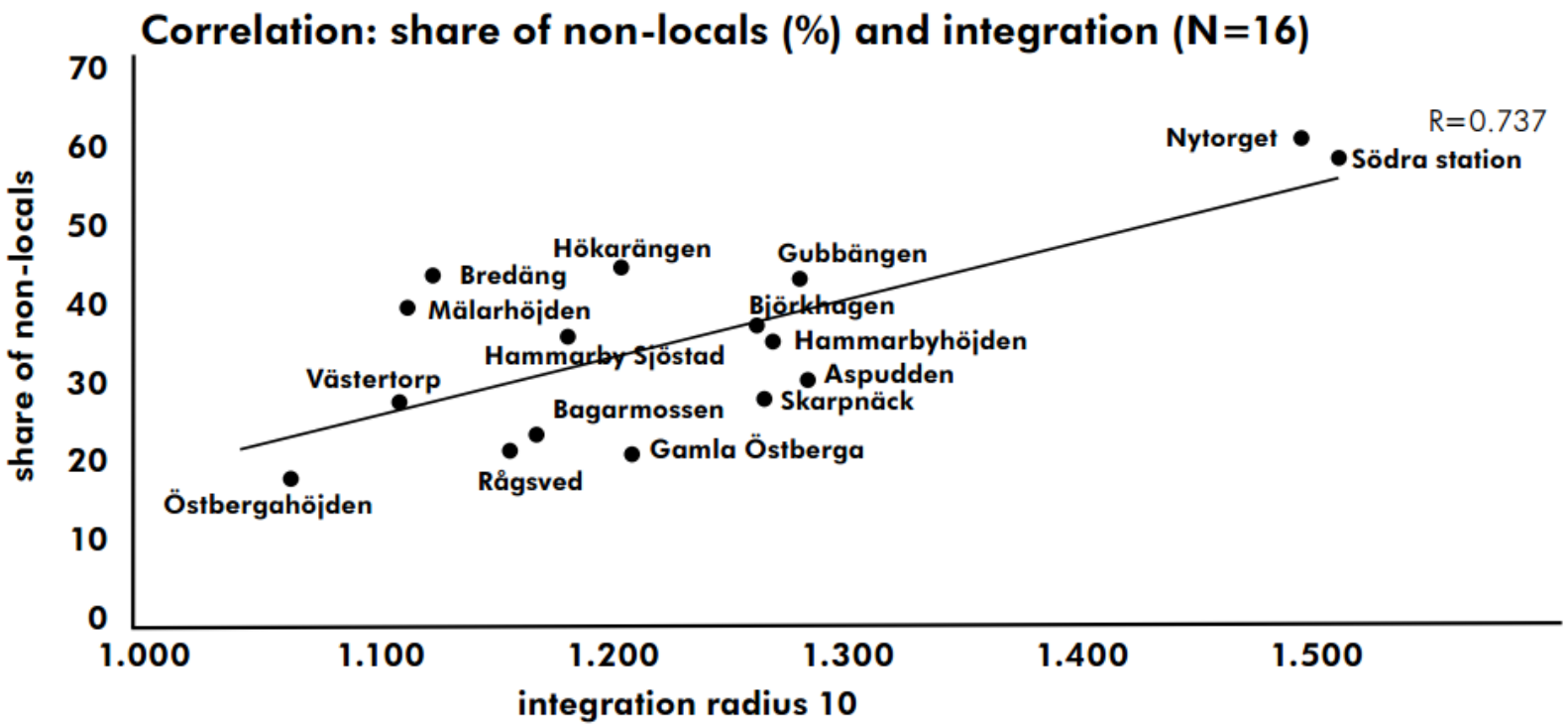
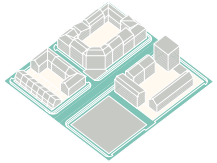


Figure 5:63. Correlation between the share of non-locals and integration at radius of 10 axial turns

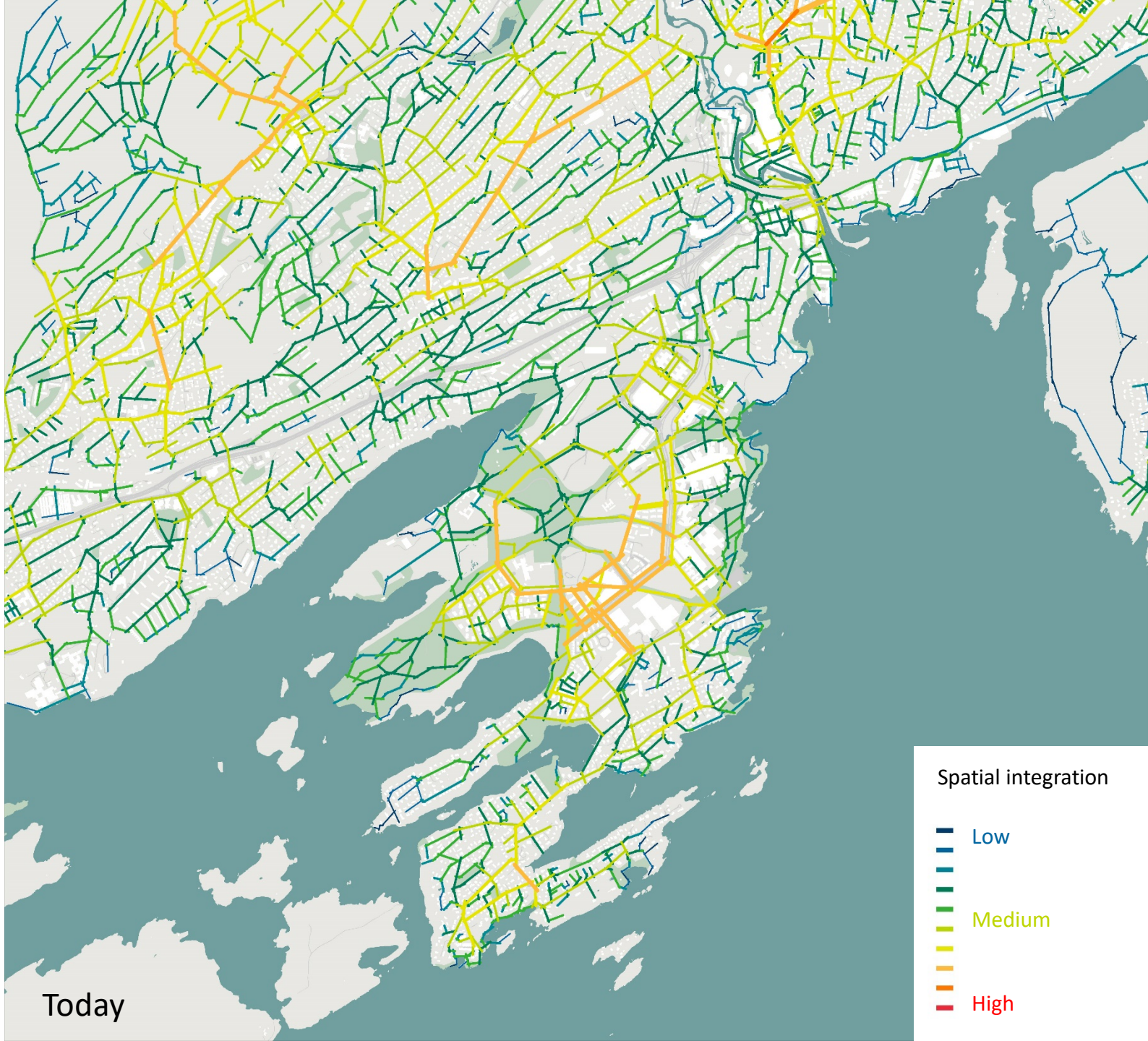
Legeby, A, Patterns of co precense, KTH, 2013

7. Street connectivity

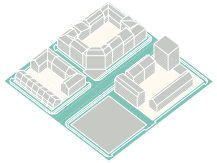


Contibutes to perceived closeness, mix of people in public space and potential for natural movement and local trade

- Idag långa mentala avstånd mellan Fornebu och omgivande stadsdelar.
- Området kring det lokala serviceklustet mellan Forneburingen och Snaröveien är den del av Fornebu med mest sammanhängande gatunät.
- Promenadrutterna längs vattnet är väl avskilda från övrigt gatunät vilket ger dem en rekreativ kvalitet men gör dem också svårare att hitta som besökare.

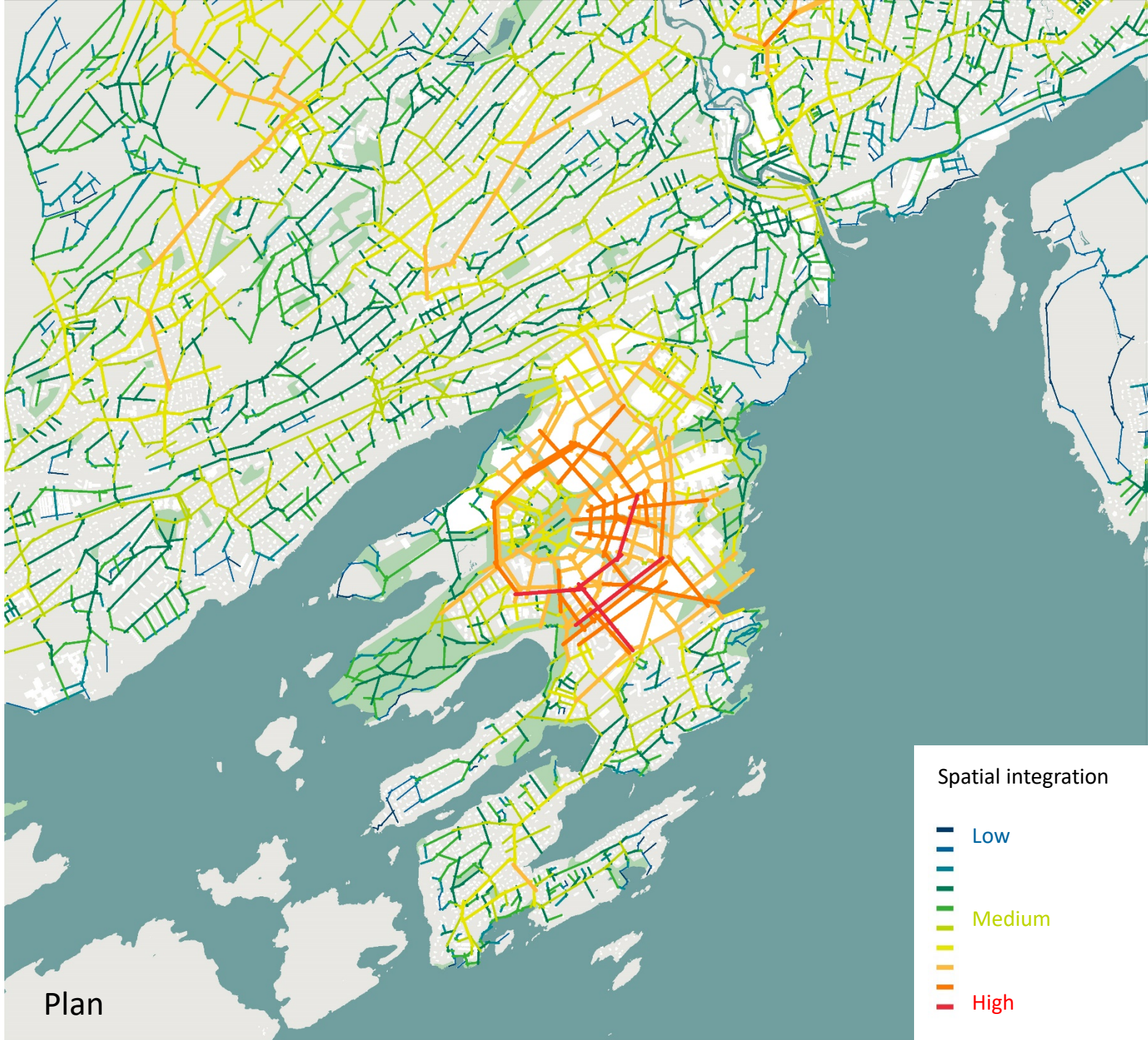


7. Street connectivity

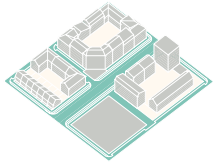


Contibutes to perceived closeness, mix of people in public space and potential for natural movement and local trade

- Med planen skapas ett väl sammanhängande gatunät inom Fornebu KDP-område. Den ökade korsningstätheten längs huvudgatorna är den enskilda viktigaste åtgärden för att öka närheten mellan stadsrummen.



7. Street connectivity



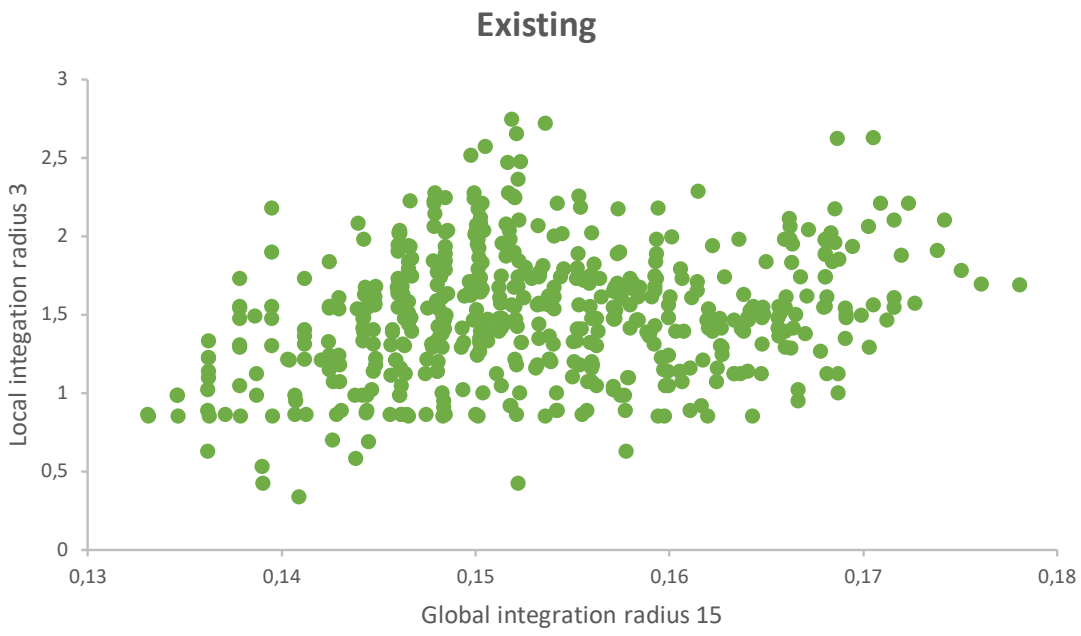
Contibutes to perceived closeness, mix of people in public space and potential for natural movement and local trade

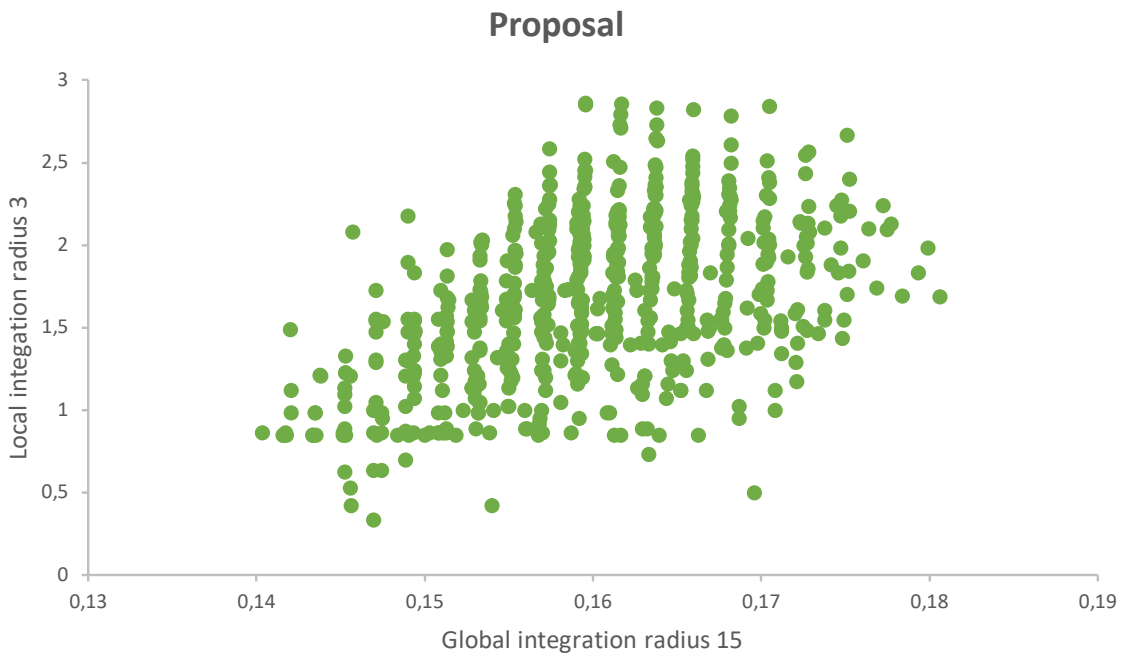
- Nära till det avskilda
- Tydliga gatuhierarkier främst i den västra delen – från väl sammanhängande huvudgator och parker till avskilda strandpromenader, och mer lokala byrum (exempelvis inom B 9.6 och Oksenoya)
- Hög orienterbarhet till parkerna då dess entréer ligger i anslutning till väl integrerade gator.

7. Street connectivity

- Genom att jämföra integration lokalt och inom byområdet som helhet kan gatunätets orienterbarheten analyseras. Ju högre samstämmighet ju lättare är det att förstå överordnade samband utifrån det lokala sammanhanget.

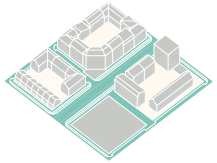
- Sambandet ökar i hög grad med KDP 3. Det talar för en betydligt högre orienterbarhet i bystrukturen än idag.





Street connectivity - R2-värde	
Existing	0,056
Proposed	0,231

7. Street connectivity



Contibutes to perceived closeness, mix of people in public space and potential for natural movement and local trade

- Tydliga interngator inom de två reguleringsplanerna för Oksenoya 9.7 och B.9.6 saknas.
- Detta väcker oro kring hur väl riktlinjerna om ett finmaskigt gatunät (se nedan) kommer förvaltas i senare planaser.

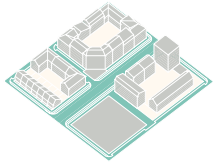
Interna gator i KDP 3 som skapar ett finmaskigt och sammanhängande gatunät

7. Street connectivity – plan för E18

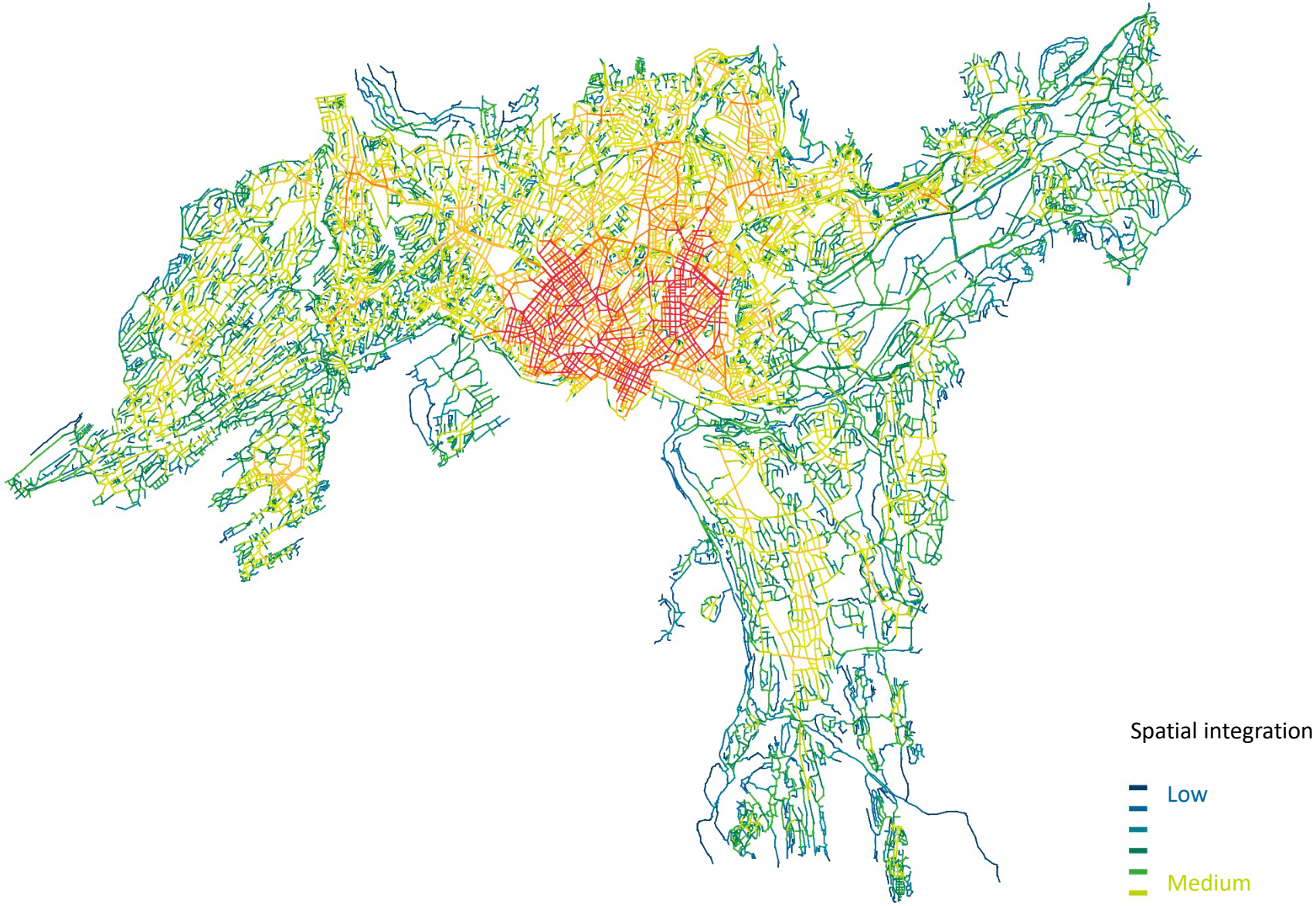
7. Street connectivity – plan för E18

- Minskar barriäreffekten något, bl.a genom det längsgående gång-cykelstråket på söder sida av motorvägen
- Men i det stora hela kvarstår tydliga barriäreffekter mellan Fornebu och omgivande stadsdelar som exempelvis Stabeck
- Möjligheterna att tydliggöra kopplingarna mellan centrala stadsrum i Fornebu och lokalt centrala stadsrum i omgivande bydelar förefaller begränsad

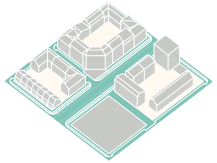
7. Street connectivity



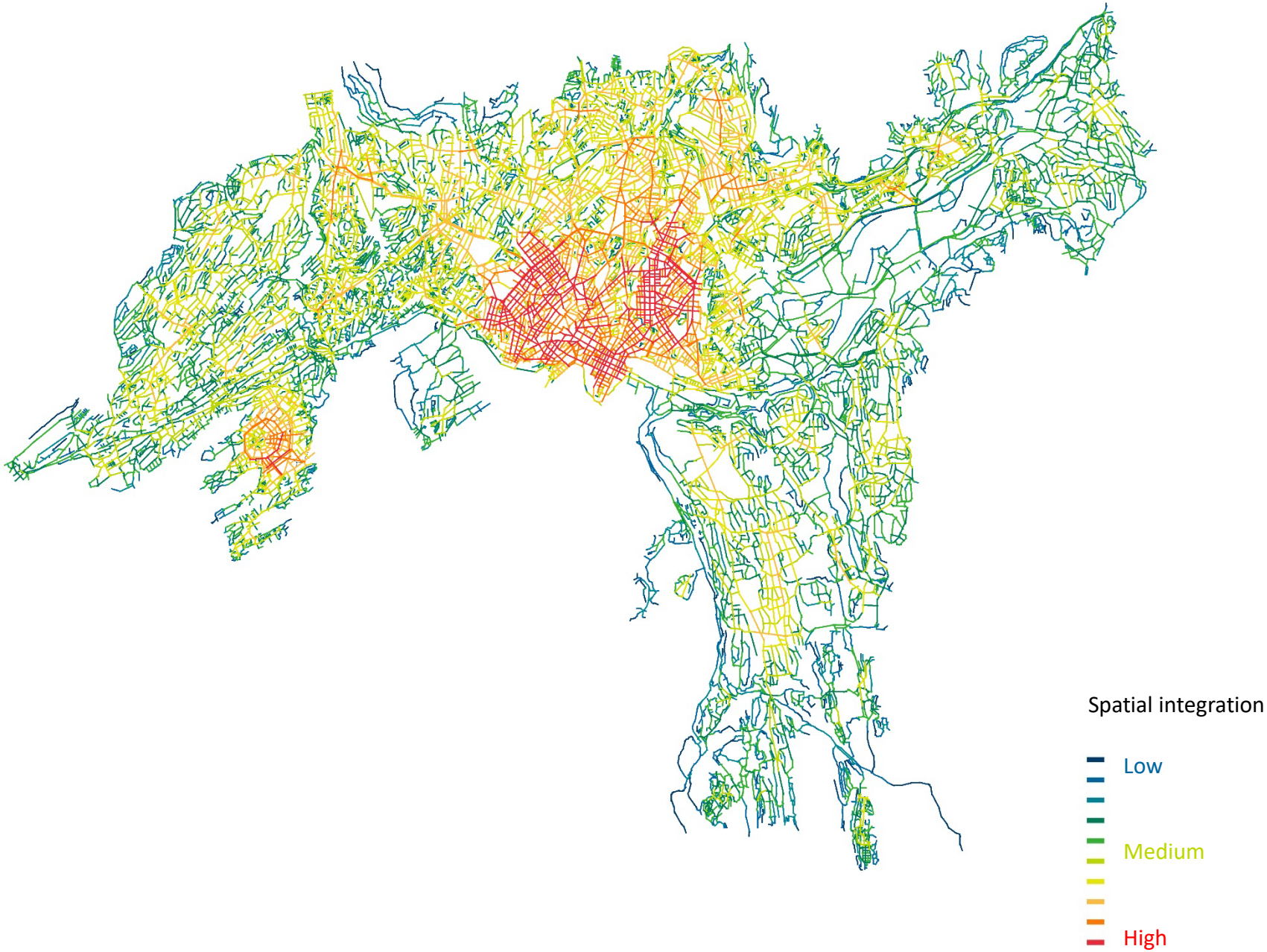
Contibutes to perceived closeness, mix of people in public space and potential for natural movement and local trade



7. Street connectivity



Contibutes to perceived closeness, mix of people in public space and potential for natural movement and local trade



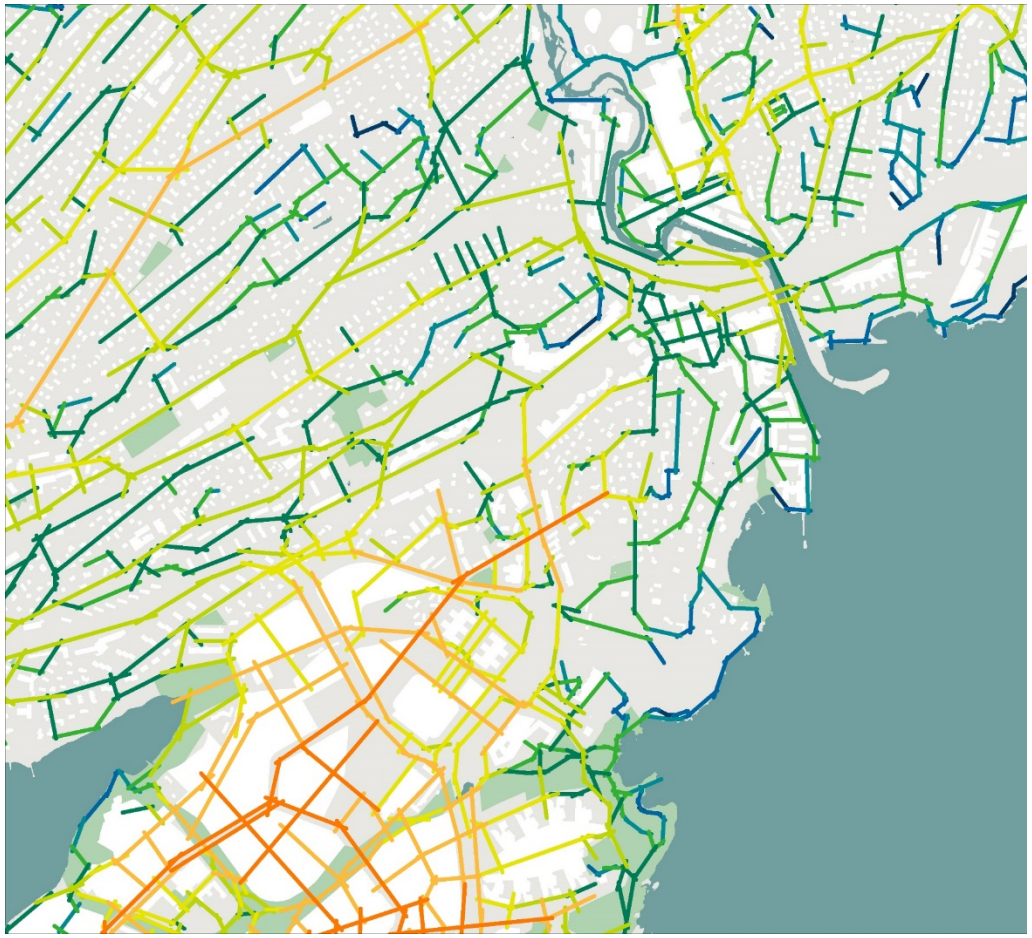
7. Street connectivity: lab

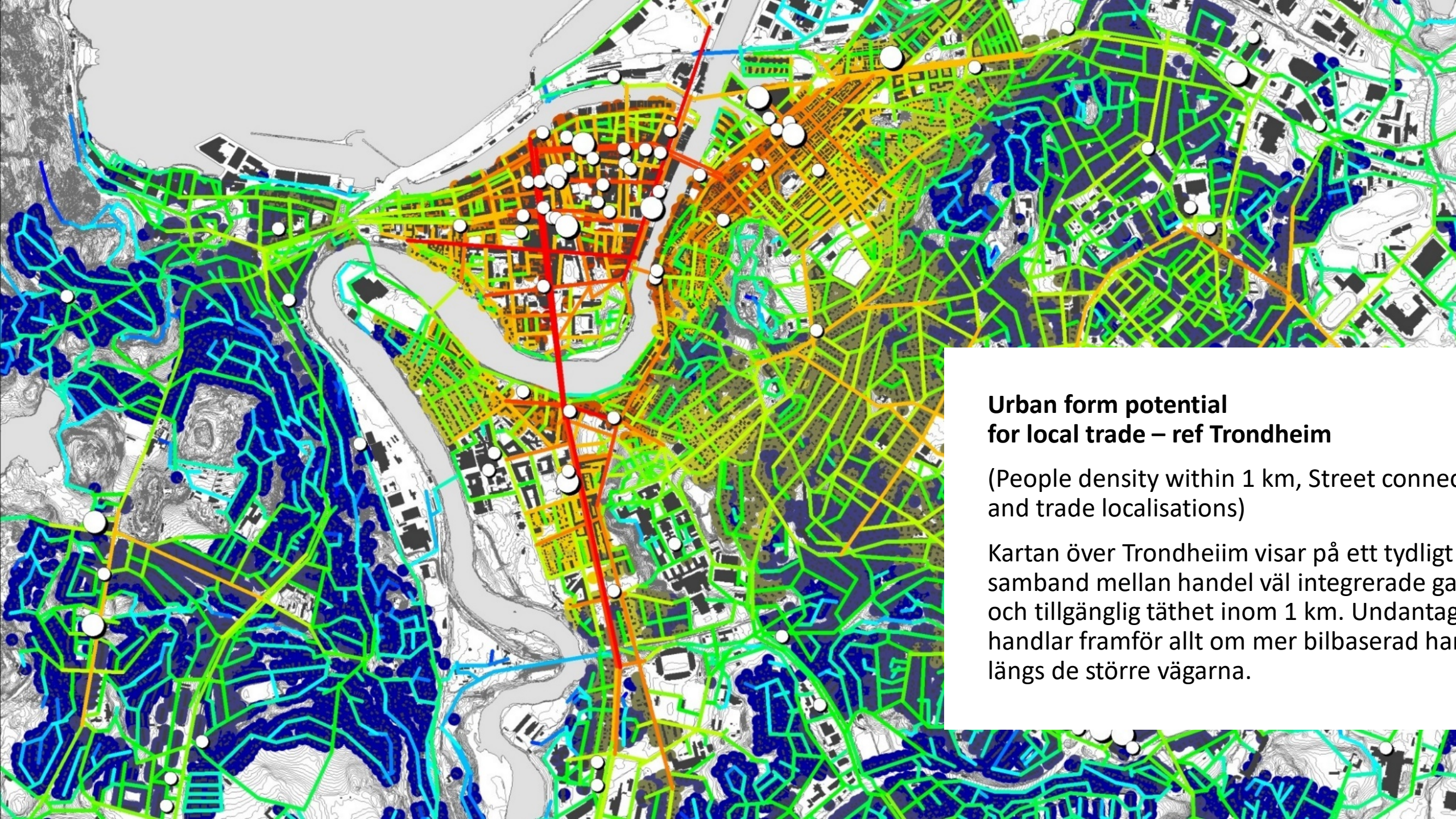
Förlängt lock över Snaröveien med ny koppling till Fornebuveien

7. Street connectivity: lab

- En viktig utgångspunkt för att förbättra närheten mellan bydelarna är att försöka skapa nya kopplingar mellan lokalt väl integrerade byrum. I Fornebu förefaller det svårt.

- Ett exempel på en koppling som ändå ökar integrationen med omgivningen är den som här testas. Om den dessutom skulle kunna kombineras med en direkt övergång över eller under E18 skulle effekten bli än större





Urban form potential
for local trade – ref Trondheim

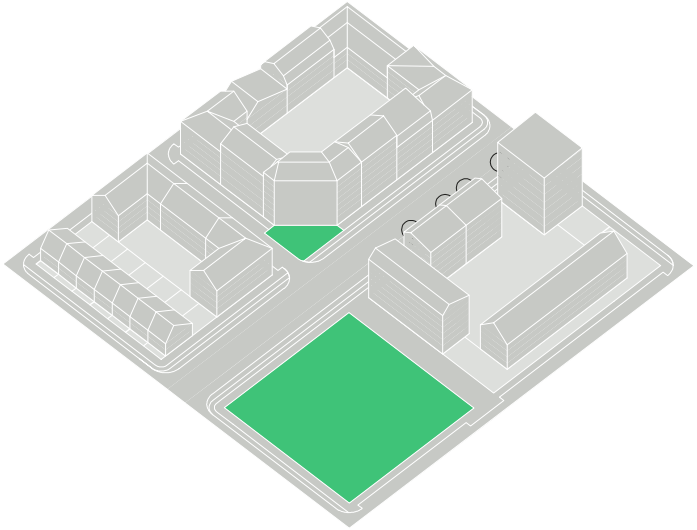
(People density within 1 km, Street connec
and trade localisations)

Kartan över Trondheiim visar på ett tydligt
samband mellan handel väl integrerade ga
och tillgänglig täthet inom 1 km. Undantag
handlar framför allt om mer bilbaserad har
längs de större vägarna.

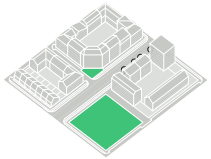
Urban form potential for local trade

- Stor potential för handel och aktiva fasader längs östra Forneburingen, i synnerhet då gatan är planerad som lågfartsgata.
- Stor potential för aktiva fasader och handel mellan metrostationen Fornebu och befintligt handelscenter
- Tydligt här är att den östra sidan av Snaröveien inte har samma potential för handel och aktiva fasader som den västra sidan.
- Fornebuporten ligger i ett mindre centralt läge inom Fornebu och har en lägre täthet av boende och arbetande inom gångavstånd än övriga lokala center. Samtidigt planeras mer bebyggelse norr om Fornebuporten som kan komma att öka det lokala serviceunderlaget. Dessa planer har inte varit med i följande analys.

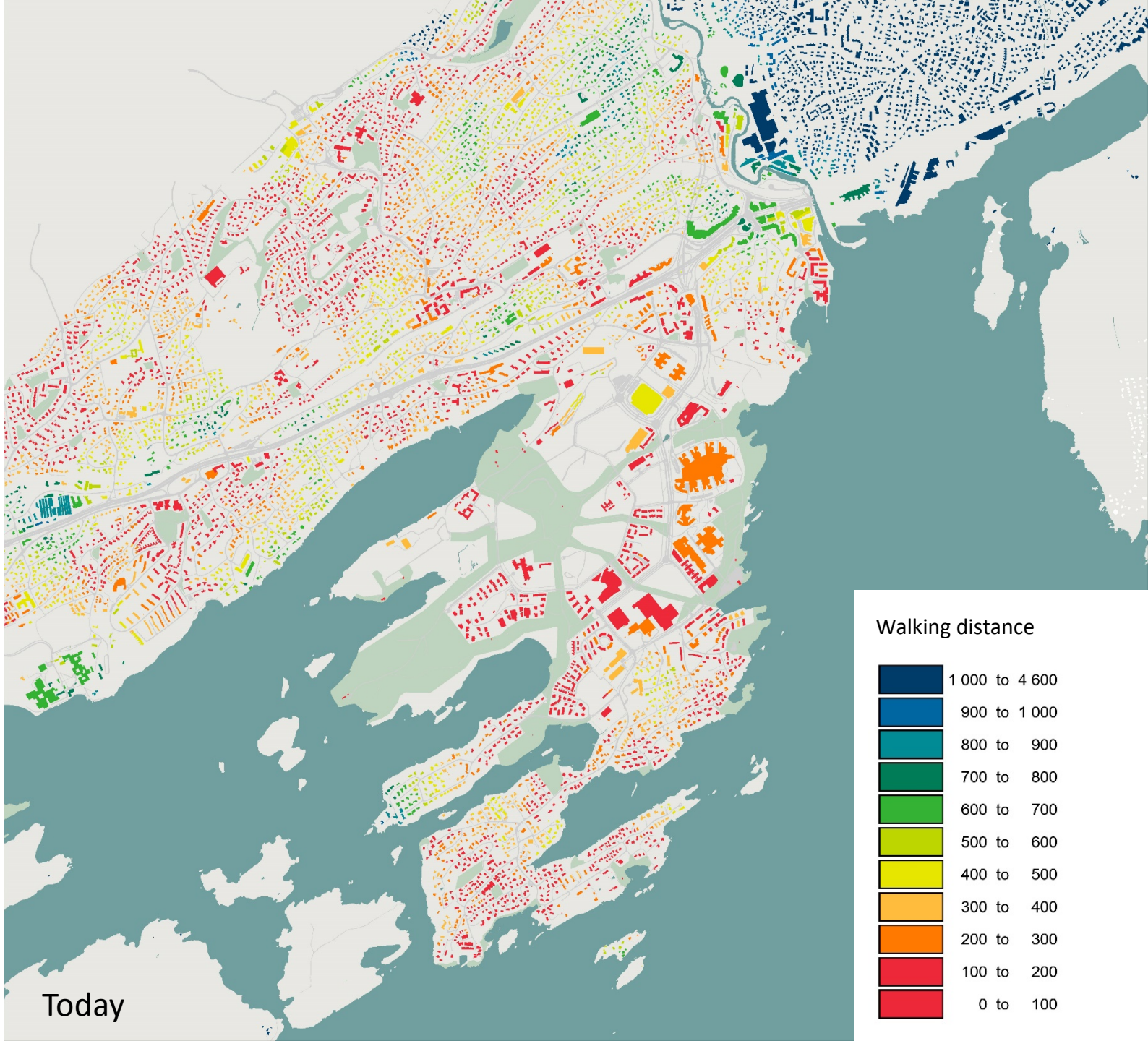
PUBLIC SPACE



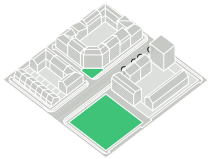
8. Closeness to open public space



Plays an important part in offering a more stress-free environment. People who live a greater distance from open green spaces also used such spaces less often. Recommended benchmark: < 300 meters



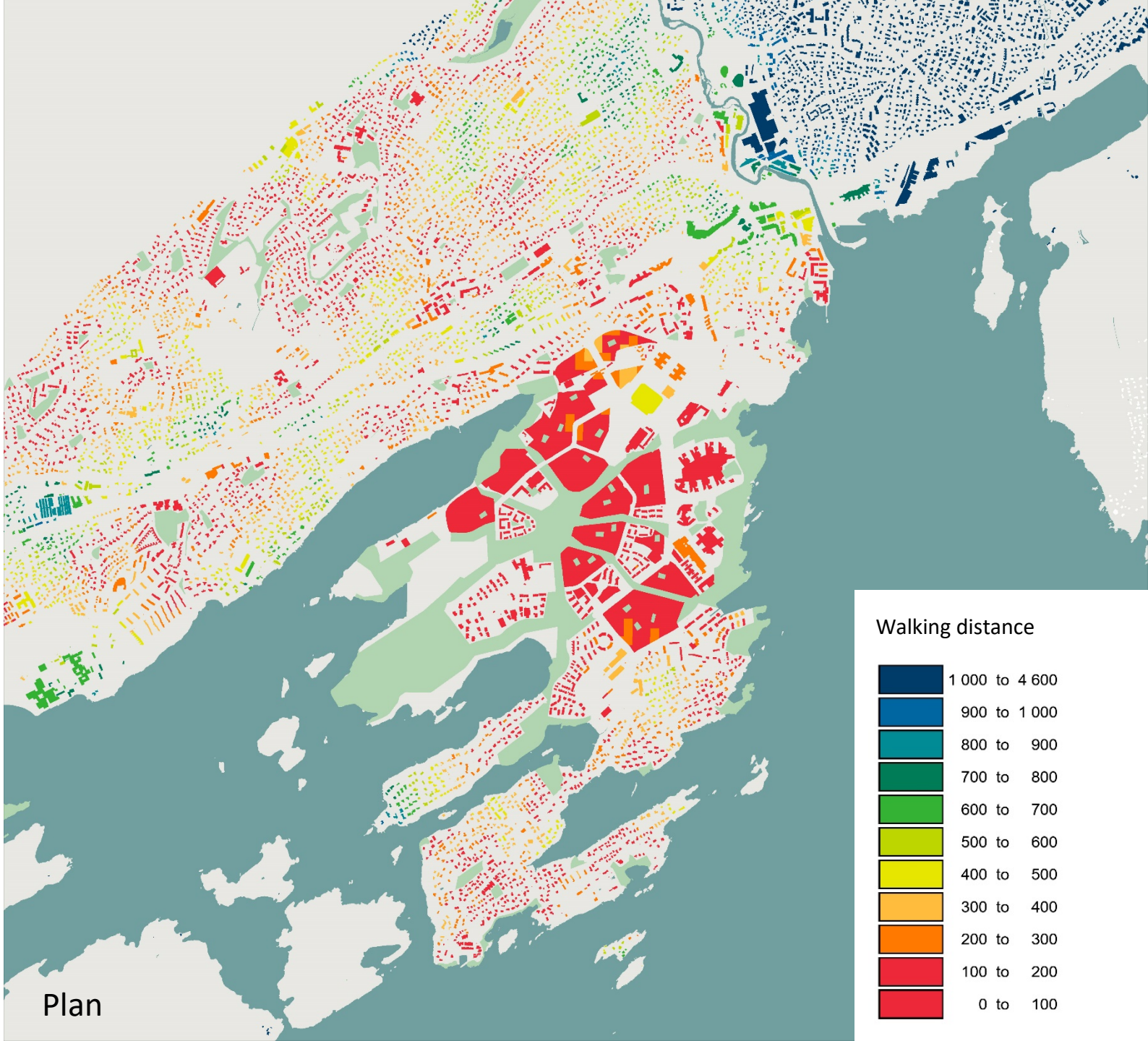
8. Closeness to open public space



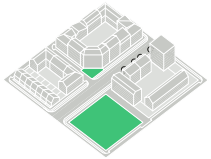
Plays an important part in offering a more stress-free environment. People who live a greater distance from open green spaces also used such spaces less often. Recommended benchmark: < 300 meters

- Parkstrukturen ger mycket hög närhet till kvalitativa offentliga platser. I snitt har de boende och arbetande ca 100 meter till en kvalitativ parkyta. Detta tack vare en både hög andel parkyta men också en parkstruktur som likt en bläckfisk grenar sig ut i bydelen och som kompletteras med mindre grannskapsparker.

Average distance to good quality open public space	
Existing	158
Proposed	105



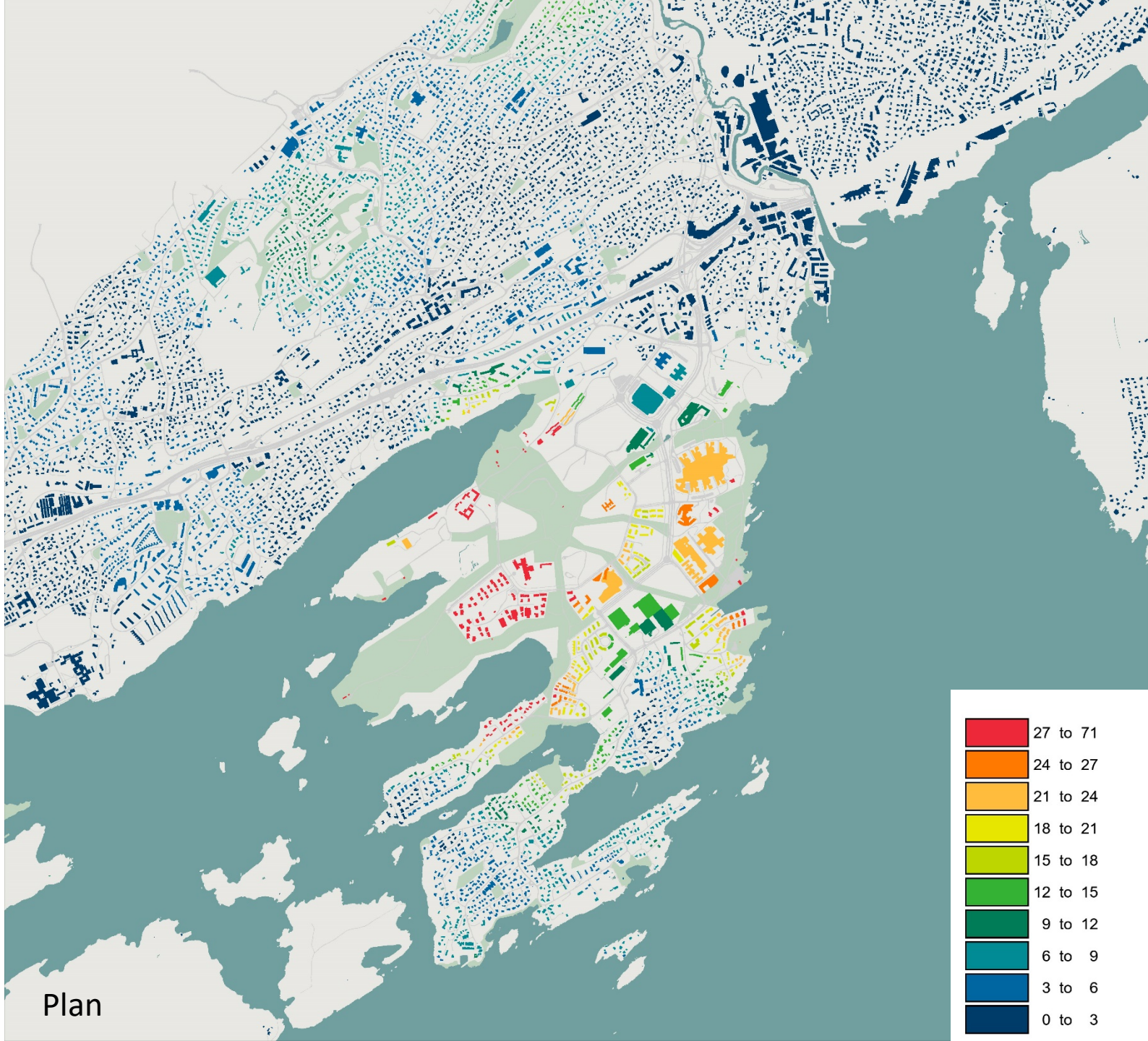
9. Share of open public space



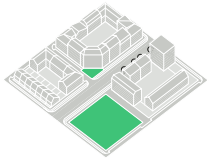
Achieving universal and safe access to open green and public spaces facilitates increased use of these spaces for physical activity- Recommended benchmark: > 15 %

- Andelen grönyta (19 %) är idag hög sett till internationella benchmarks. Bl.a rekommenderar UN Habitat minst 15 %

Share of open public space	
Existing	19%
Proposed	20%



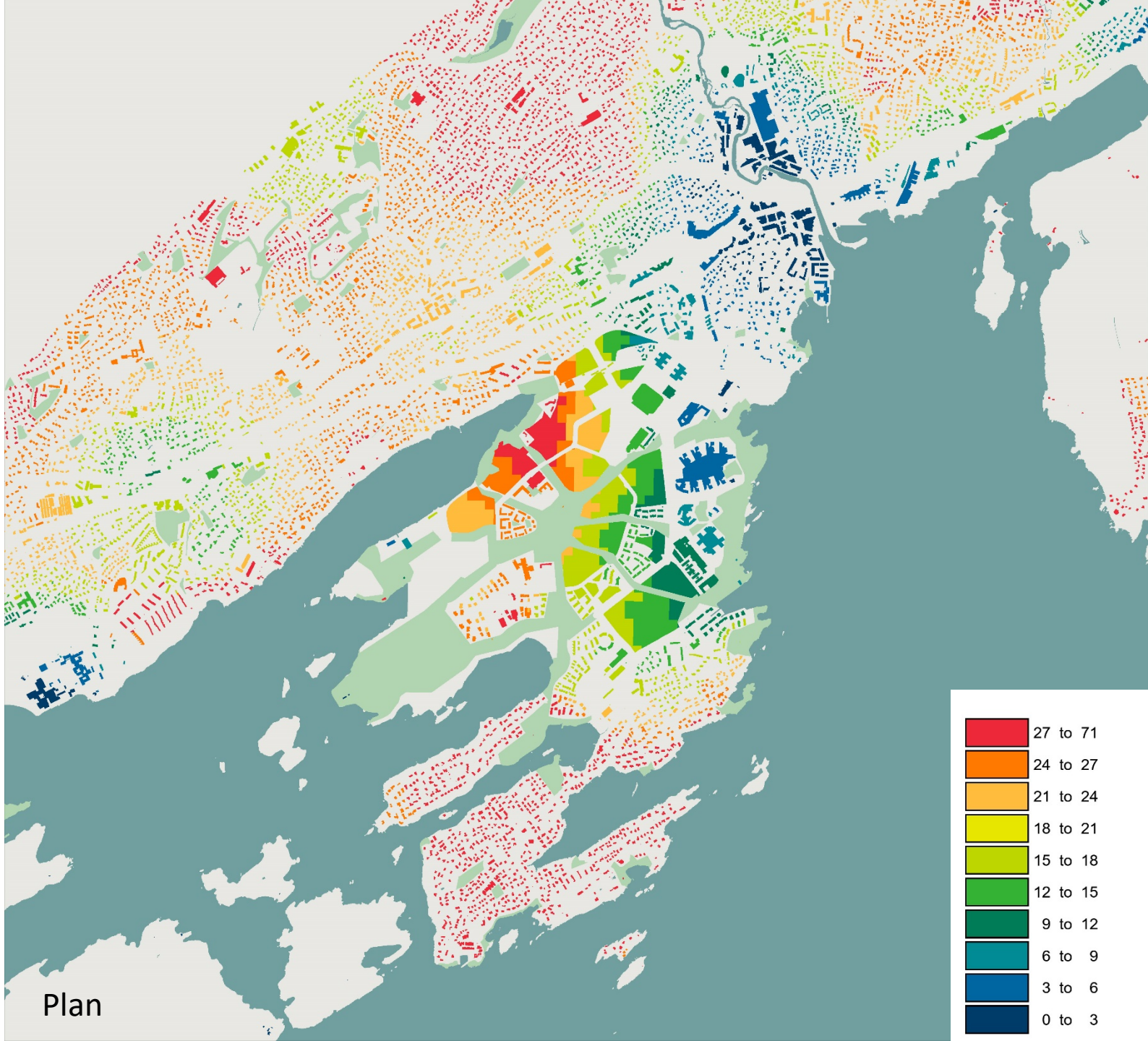
9. Share of open public space



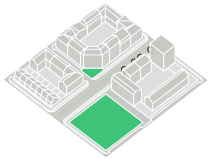
Achieving universal and safe access to open green and public spaces facilitates increased use of these spaces for physical activity- Recommended benchmark: > 15 %

- Andelen grön offentlig plats stiger till 20 %. Detta till följd av att den grundläggande parkstrukturen finns kvar och kompletteras med mindre grannskapsparker.

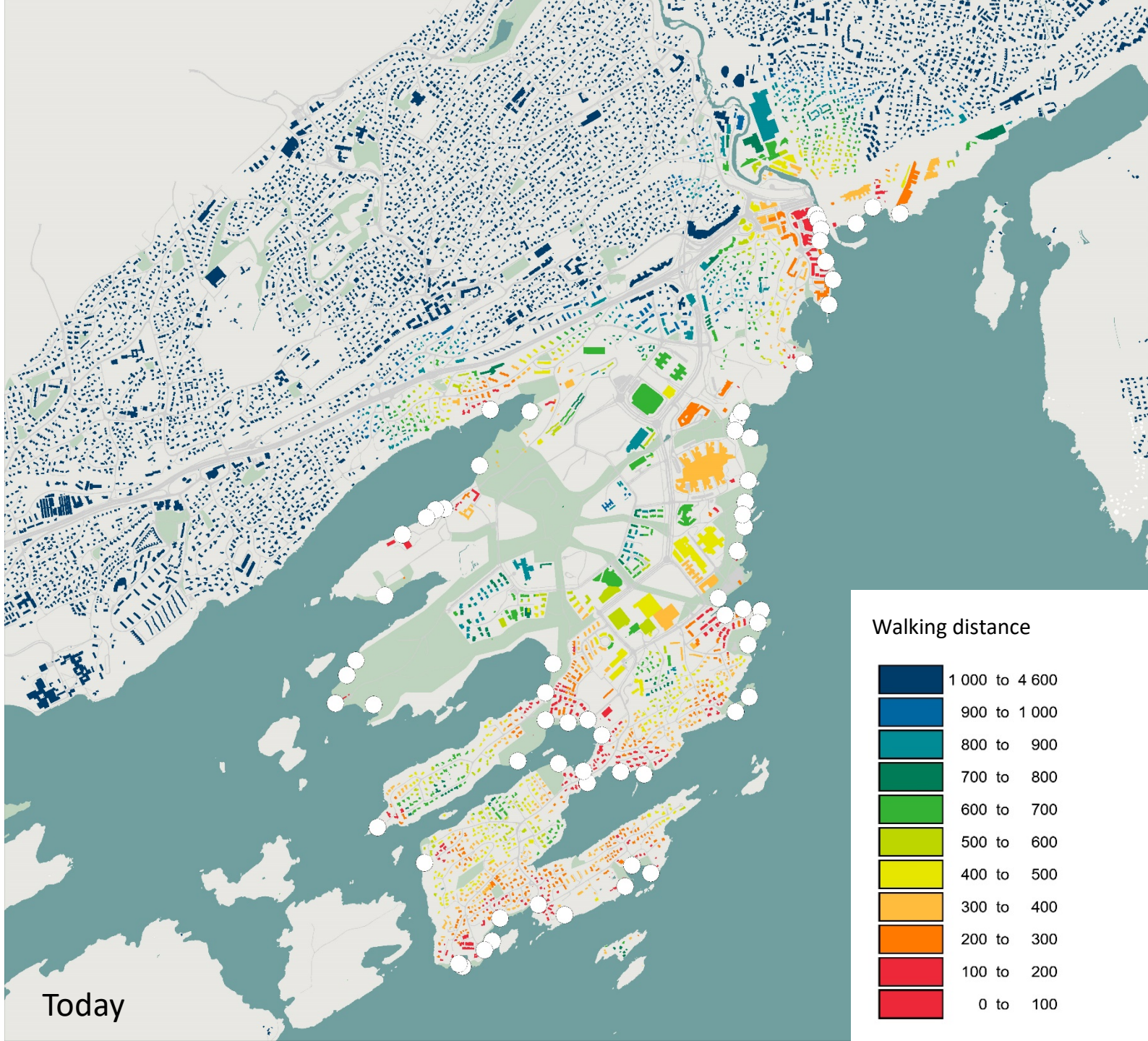
Share of open public space	
Existing	19%
Proposed	20%



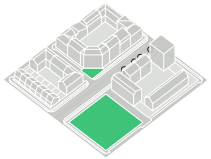
10. Closeness to water



Nordic studies shows significant contribution from closeness to water on housing market



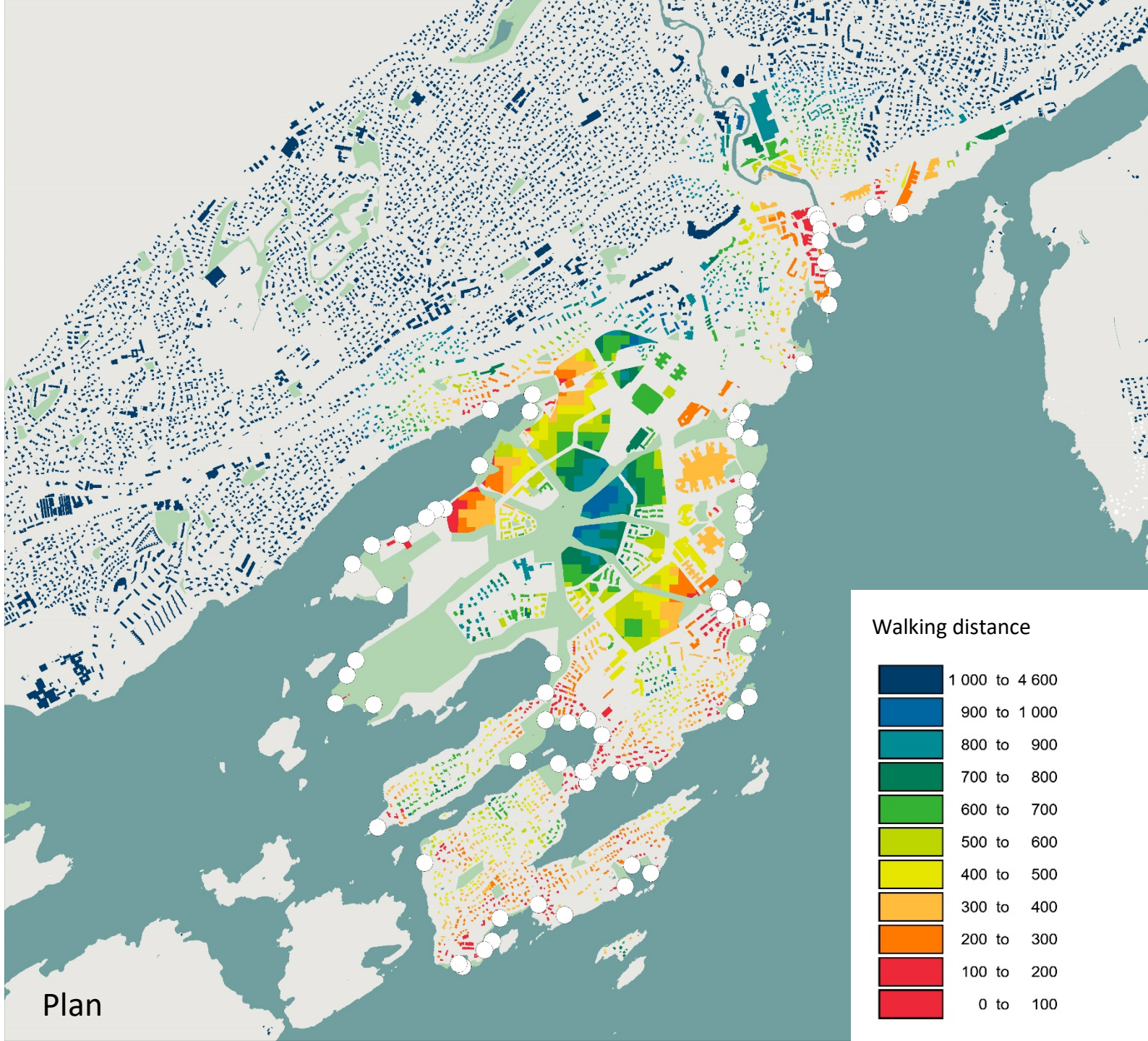
10. Closeness to water



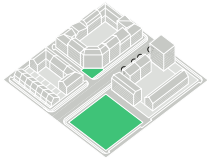
Nordic studies shows significant contribution from closeness to water on housing market

- Att snittståndet till vatten ökar beror sannolikt på att det tillkommer mycket täthet mitt i Fornebu.

16a Closeness to water - walking distance	
Existing	477
Proposed	526

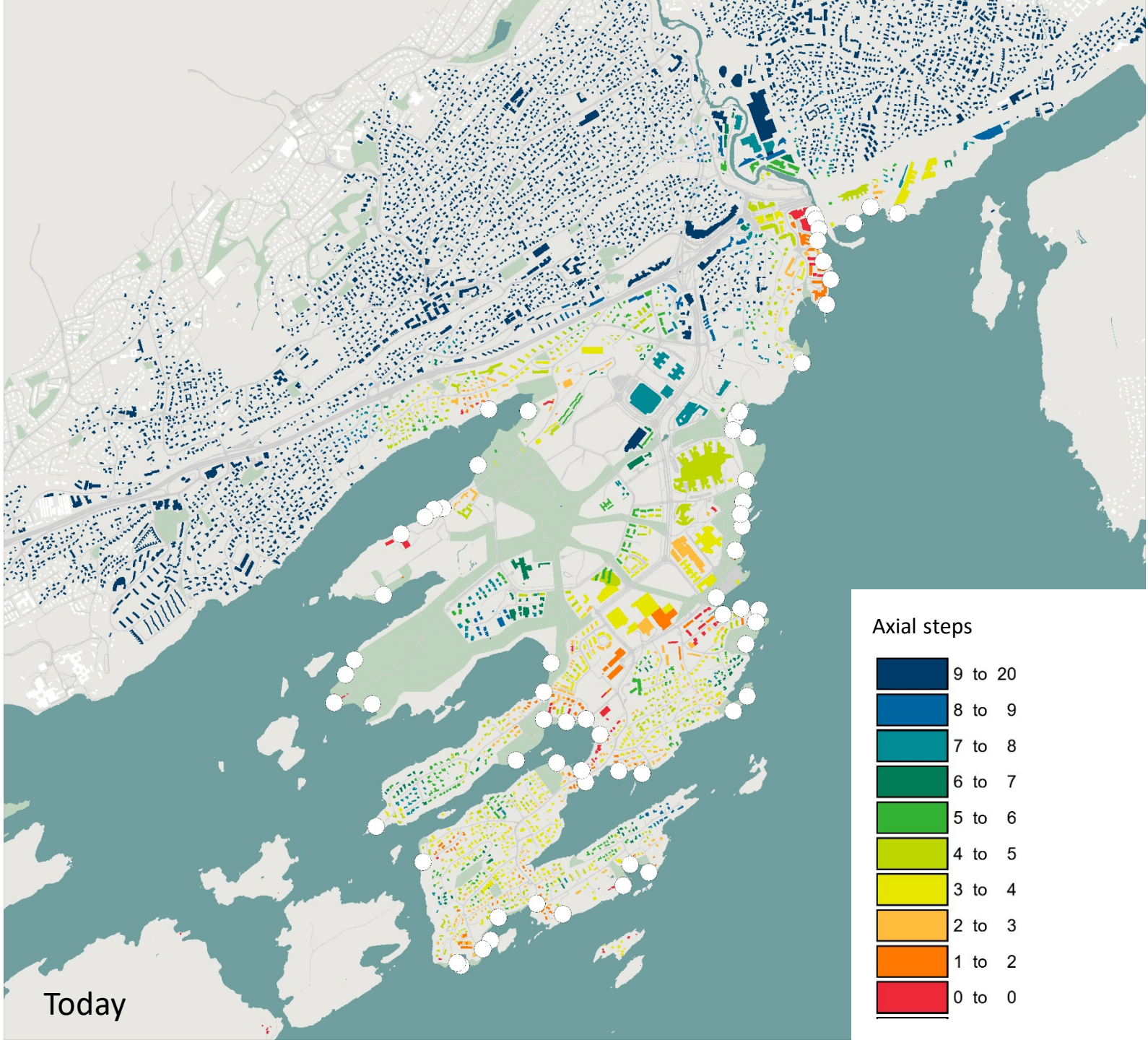


11. Orientation to water

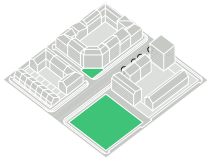


Nordic studies shows significant contribution from closeness to water on housing market

16b Closeness to water - axial steps	
Existing	4
Proposed	3



11. Orientation to water

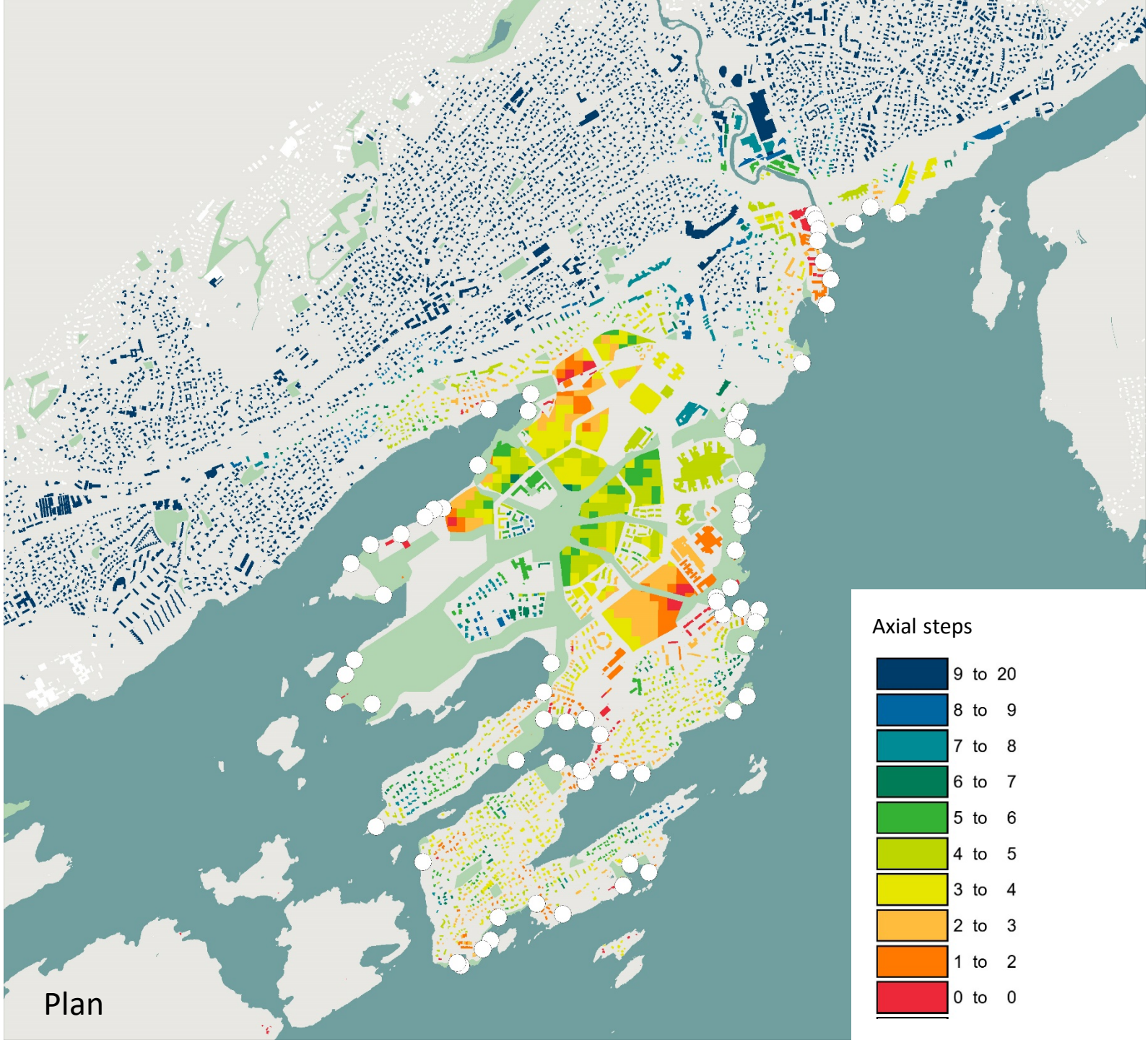


Nordic studies shows significant contribution from closeness to water on housing market

- På grund av ett uppbrutet gatunät öster om Snaröyveien kan de inre norra delarna av KDP 3-området uppleva ett förhållandevis långt avstånd till vattnet.
- I den sydöstra delen sprider gatunätet förhållandevis mer närhet till vatten än i övriga delar beroende på den raka gatan som angör stranden.

16b Closeness to water - axial steps

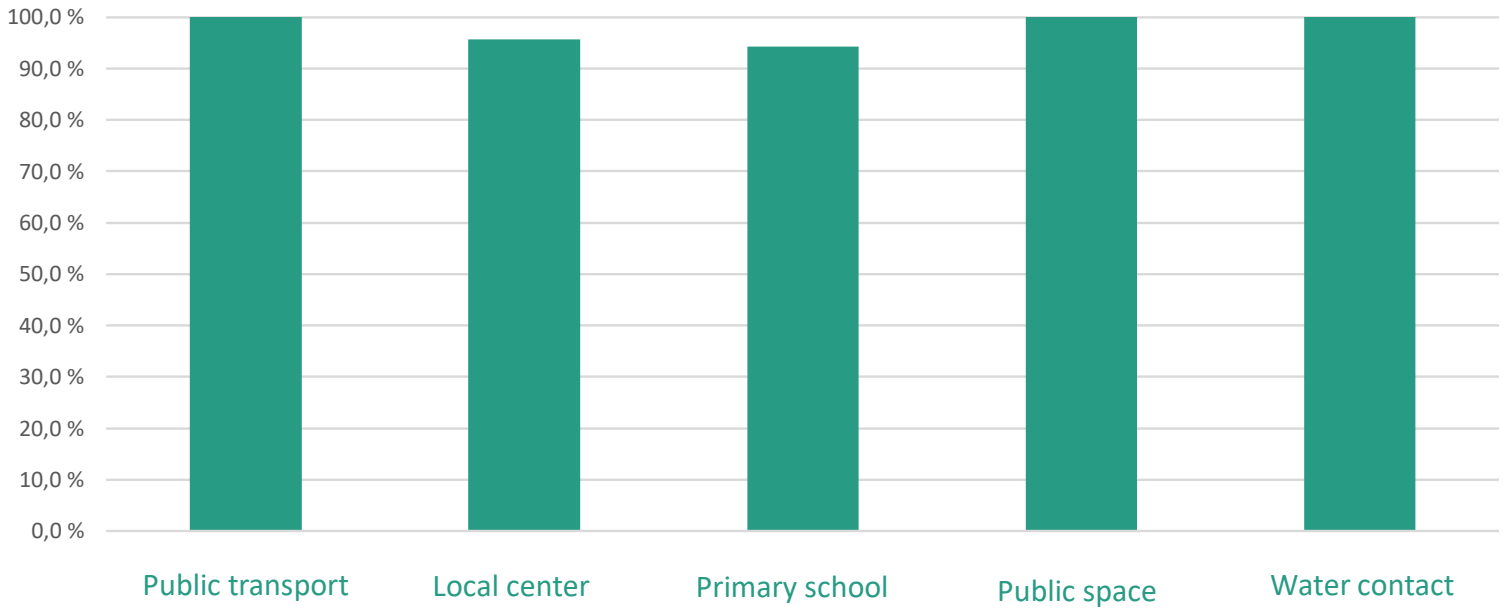
Existing	4
Proposed	3



SLUTSATSER

Kvaliteter

1. Huvudslutsats: Med KDP 3 skapas en närhet till många olika saker av stort värde för såväl bykvalitet och hållbara transporter.



Procent som når olika bykvaliteter inom 1 km gångavstånd

Kvaliteter

2. Väl sammanhängande gatunät inom Fornebu ger förutsättningar för gångvänlig stadsmiljö, samnärvaro och orienterbarhet

Detta beror till största del på ett finmaskigt gatunät som inkluderar både huvudgator och interna gator inom byggeområdena.

3. Byformen stöttar de tre byområdeskaraktärerna – men”byområdet” förefaller ligga något mer västerut

Detta medför potential för aktiva fasader längs östra Forneburingen och mindre potential för aktiva fasader och byliv på östra sidan på Snaröveien.

3. Kommundeleplanen visar prov på god kunskap om hur lägeskvaliteter både kan skapas och förvaltas

Exempelvis en sykkelgate i välintegrerat och tätt läge, reducering av parkeringstal nära kollektivtrafik, tydliga gärnser mellan privat-offentligt i tät bymiljö etc.

Utmaningar

1. Korsningstäta huvudgator och välintegrerade interna gator genom byggeområdena

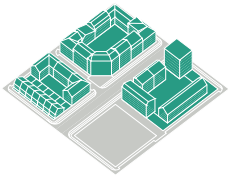
I annat fall finns en risk att Fornebu goda ambitioner om ett finmaskigt sammanhängande gatunät omintetgörs och en enklavby istället utvecklas. Här krävs tydliga riktlinjer i ett tidigt skede av kommande reguleringsplaner. Avsaknaden av välintegrerade interna gater i de två evaluerade reguleringsplanerna väcker frågetecken.

2. Överbrygga trafikbarriärer mellan Fornebu och omgivande bydelar

Förbättrade rumsligakontakter genom ökad konnektivitet behövs för att underlätta social integration sprida de bykvaliteter som skapas till ett större omland och öka förutsättningarna för hållbara transporter inom övriga Baerum. Här är illustrationsplanen något problematisk där den påvisar vidare kopplingar norrut som i praktiken är mycket svåra att förlänga. Trafikbarriärerna som omger Fornebu i norr och de omkringliggande bystrukturerna skapar stora utmaningar.

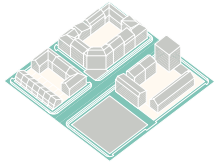
ZEN SPATIAL INDICATORS FOR LATER PLANNING PHASE

Minimum car parking



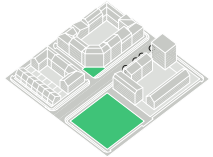
Minimal parking increase share of sustainable transport, lower building costs, gives more potential for quality public space. Less cars per apartment will also decrease CO2 emission from car production.

Traffic speed



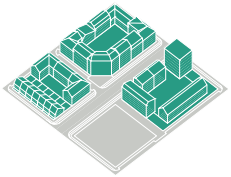
Share of streets with a speed limit of 30 km/h or lower

Uncovered public space



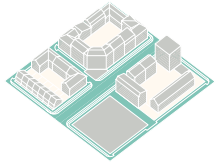
Covered surfaces with building overhand or arcade decrease feeling of safety and less attractive public spaces. Recommended benchmark: 0 %

Co-use



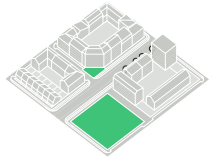
Co localisation saves building floor area demand (less energy consumption) and create potential for meeting points between different groups

Safe routes



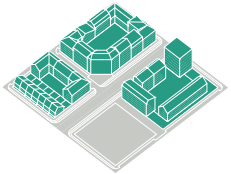
Safe conditions for bicyclists and pedestrians increase social equity since the city becomes more accessible for a wider variety of potential bicyclists

Diversity of public space value



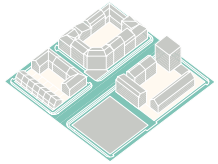
A density and diversity of public space values in squares and green areas create places where many different groups interact and are often considered as the most popular urban places

Active frontages



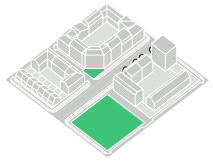
Active frontages increase feeling of safety and feeling of living urban environment.

Street section design



% of transparent building frontages along streets.

Clear social territories



% clear public and private space. Ambiguous social territories decrease use potential and sense of belonging. Recommended benchmark: 0 %

Research Centre on
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