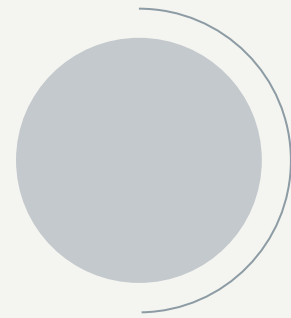


Equity in urban transportation  
planning: the 15-minute city approach.  
A case study of Oslo city, Norway

Professor Lisa Hansson  
Saeid Pira

Molde University, Norway

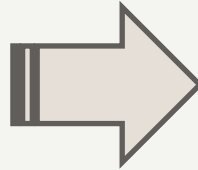
April 2024



# ◆ Transportation planning

❖ The World Bank estimation by 2045:

- ✓ Transportation demand,
- ✓ CO2 emissions increase,
- ✓ Land use constraints, etc.



One of the primary considerations for policymakers and city officials.

❖ Refers to the processes of decision-making (choice process).

❖ The outcome of transport planning will favor certain investments, certain transport modes, certain areas, certain people over others.

Transport planning raises equity concerns.

# ◆ Transport-related equity

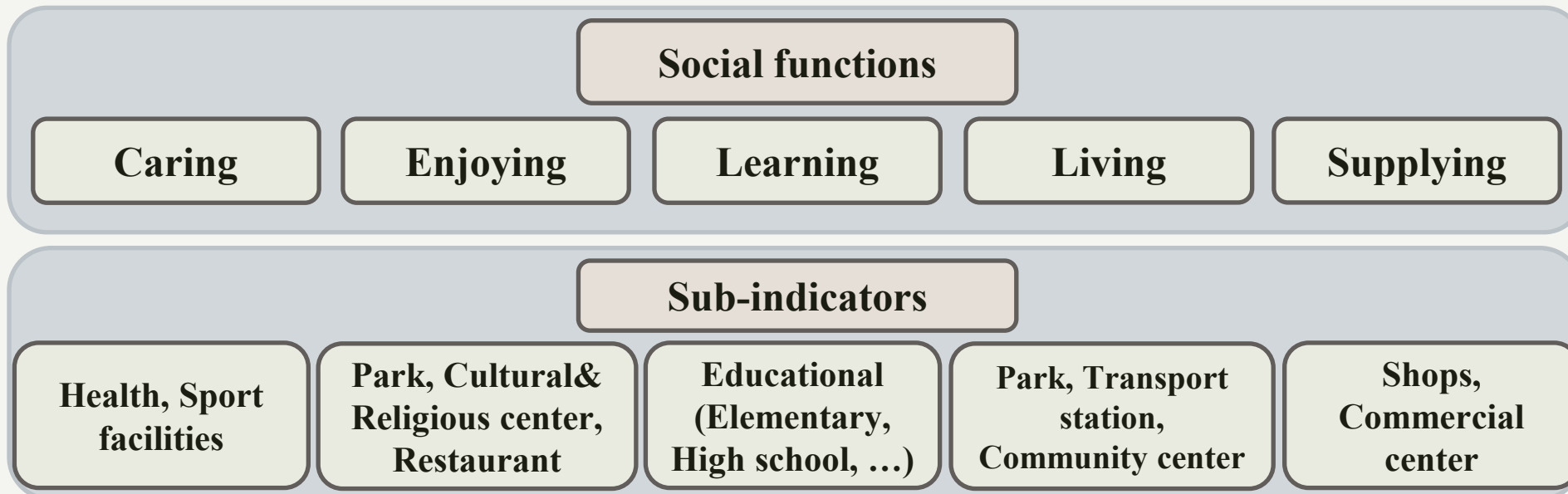
- ❖ “The morally proper distribution of benefits and costs (burdens) over members of society”.
  - The benefits and burdens, populations and social groups, yardstick
- ❖ Research goal: to identify a pattern of transport-related inequity in Oslo.
- ❖ Accessibility is one of the indicators used for measuring transport equity.

R.Q 1: *What is the discernible pattern of transport-related inequity within the urban fabric of Oslo?*

R.Q 2: *How do socioeconomic and physical variables influence the patterns of transport-related inequity in Oslo?*

# ◆ 15-Minute city concept

- ❖ This idea is mentioned in planning documents:
  - The Ministry of Local Government and Modernization (2019).
  - Strategic Plan for Hovinbyen (Adopted by Oslo City Council 2018).
- ❖ Analyze the "accessibility" based on new approach of the proximity of six social functions:
  - Caring, Enjoying, Learning, Living, Supplying, Working.



# Method

## GIS (Network Analysis method)

Residential access to services by Cycling and Walking mode

Zoning maps of neighborhoods based on the accessibility of activities

## TOPSIS method

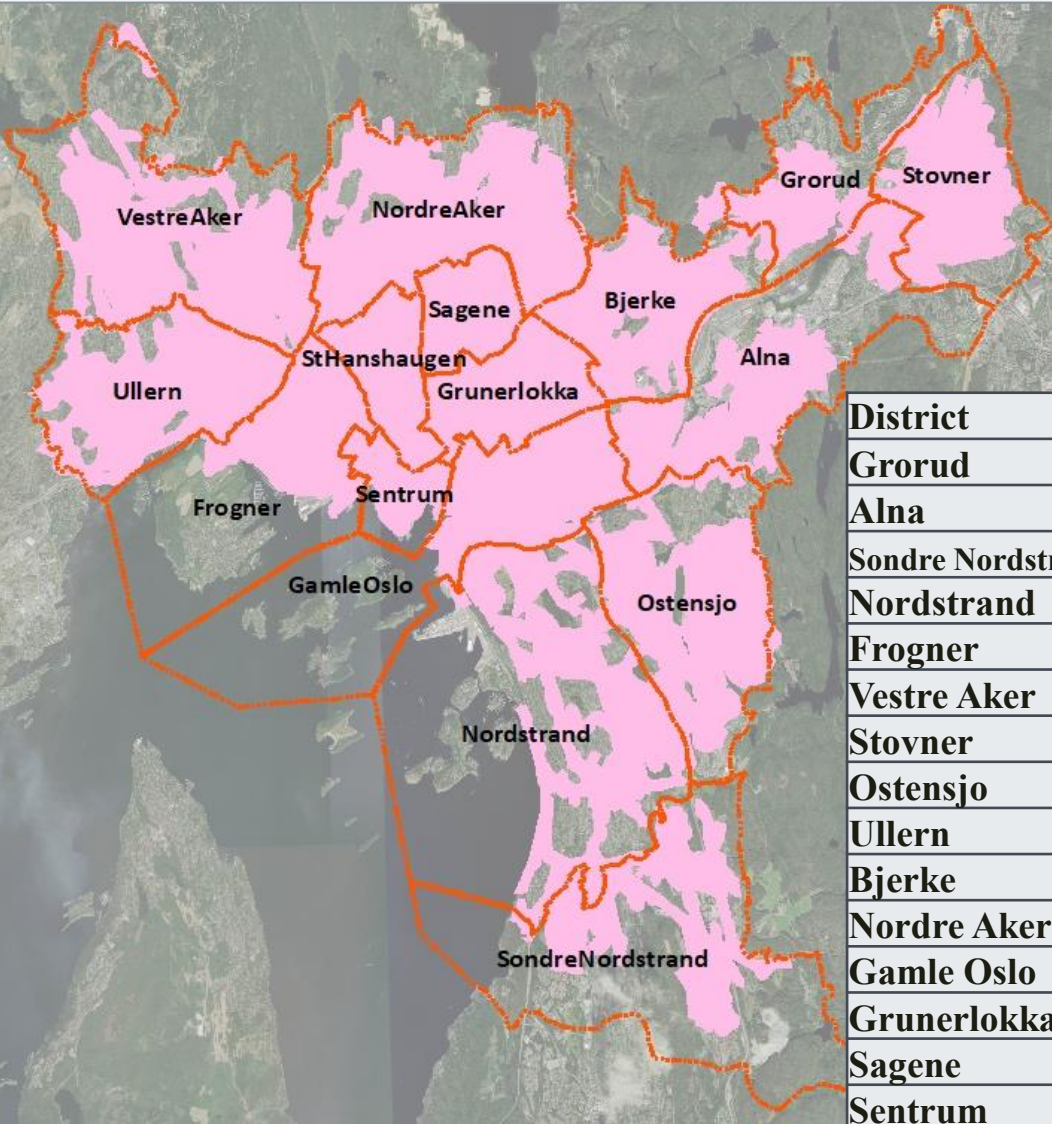
Ranking of neighborhoods based on the accessibility of social functions

## Multiple Linear Regression (MLR)

Analysis of the impact of socio-economic and physical variables  
on neighborhood ranking

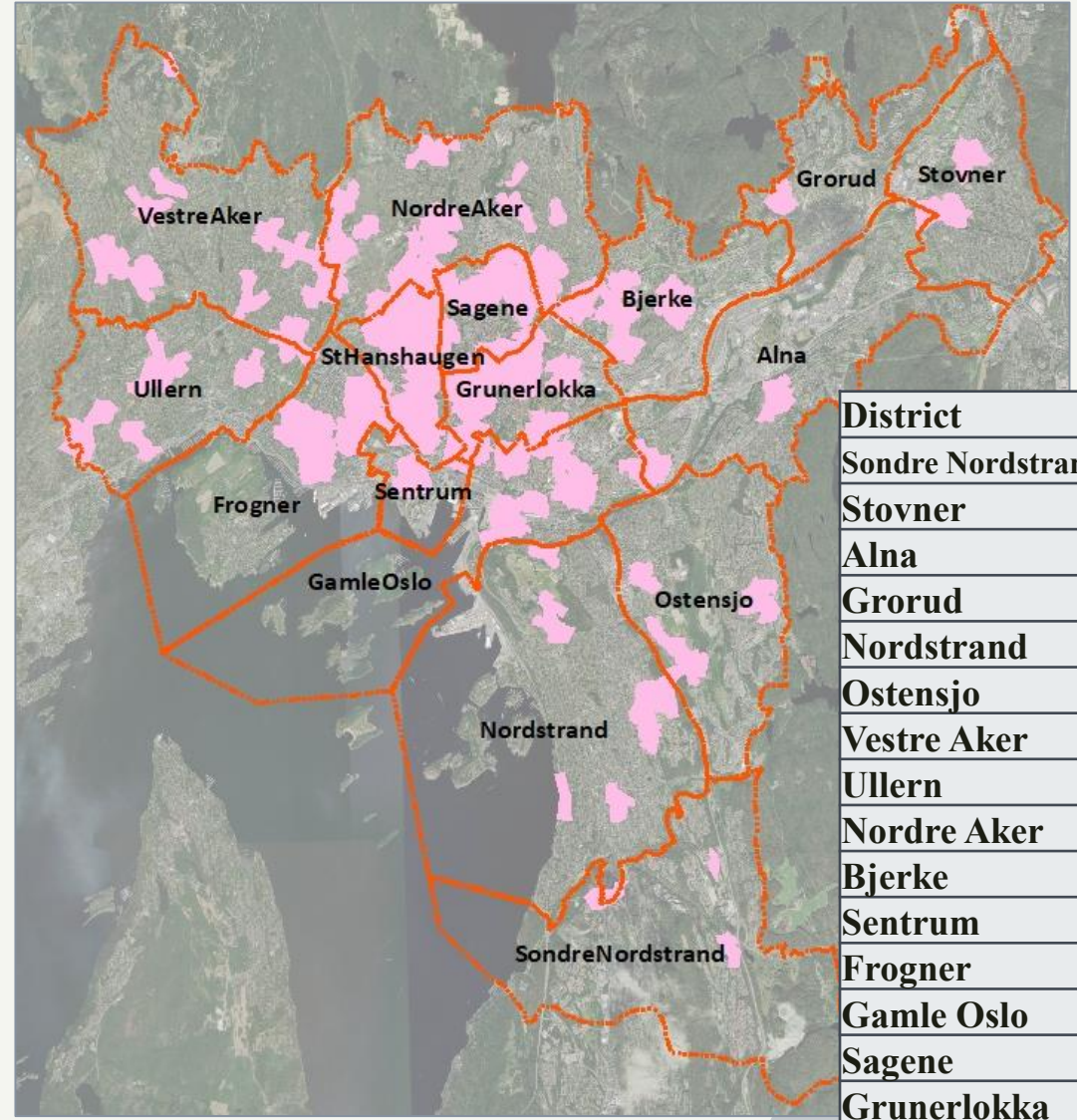
# Residential areas with access to Caring Health services

## Cycling



District	Percent
Grorud	50.1
Alna	53.2
Søndre Nordstrand	56.9
Nordstrand	62.9
Frogner	71.5
Vestre Aker	72.6
Stovner	74.2
Ostensjo	75.1
Ullern	83.5
Bjerke	84.7
Nordre Aker	84.9
Gamle Oslo	99.6
Grunerlokka	100.0
Sagene	100.0
Sentrum	100.0
St Hanshaugen	100.0

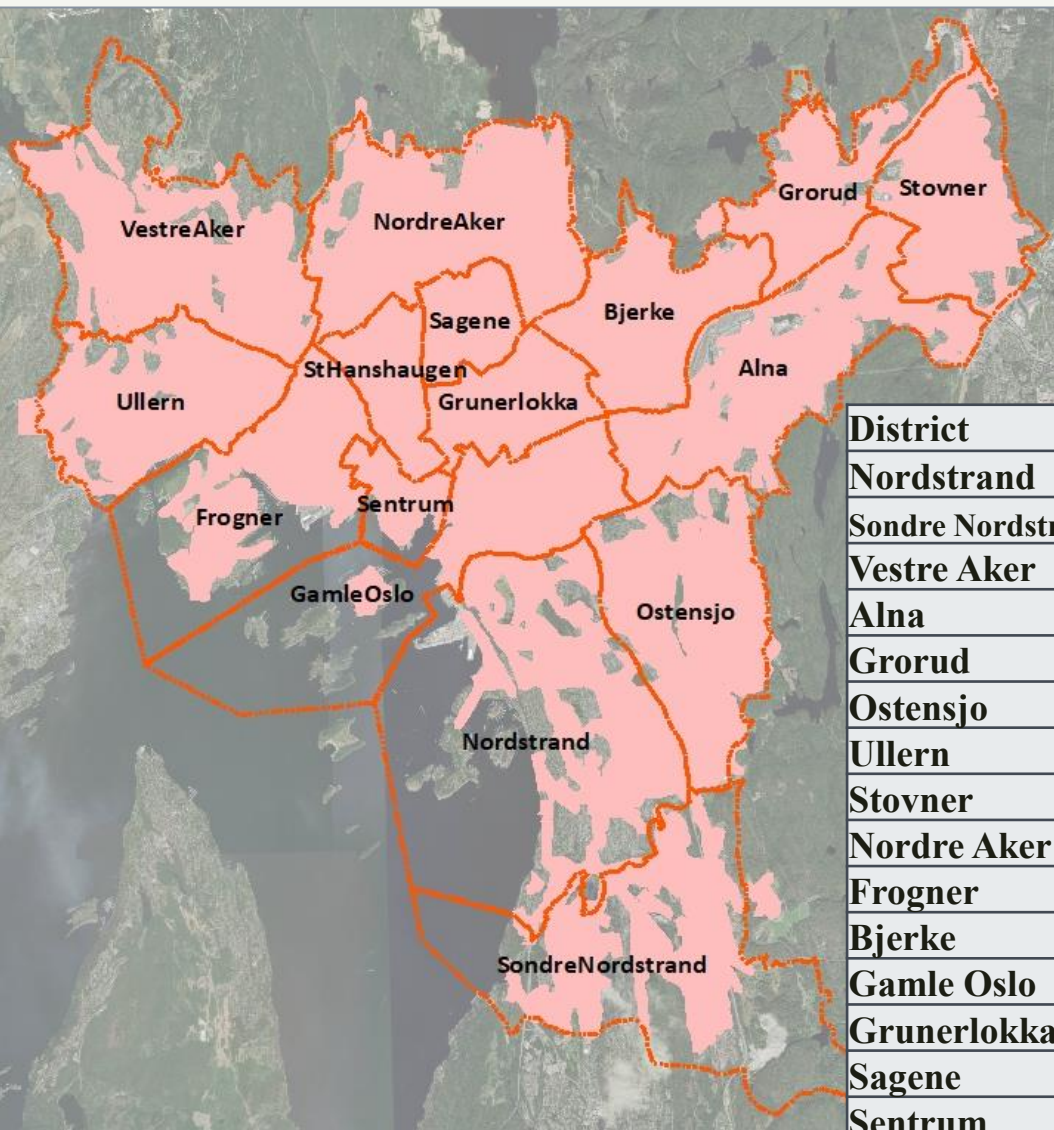
## Walking



District	Percent
Søndre Nordstrand	1.9
Stovner	3.3
Alna	4.8
Grorud	6.8
Nordstrand	9.8
Ostensjo	14.2
Vestre Aker	17.9
Ullern	18.3
Nordre Aker	24.6
Bjerke	28.8
Sentrum	44.7
Frogner	45.1
Gamle Oslo	48.7
Sagene	62.0
Grunerlokka	69.8
St Hanshaugen	79.5

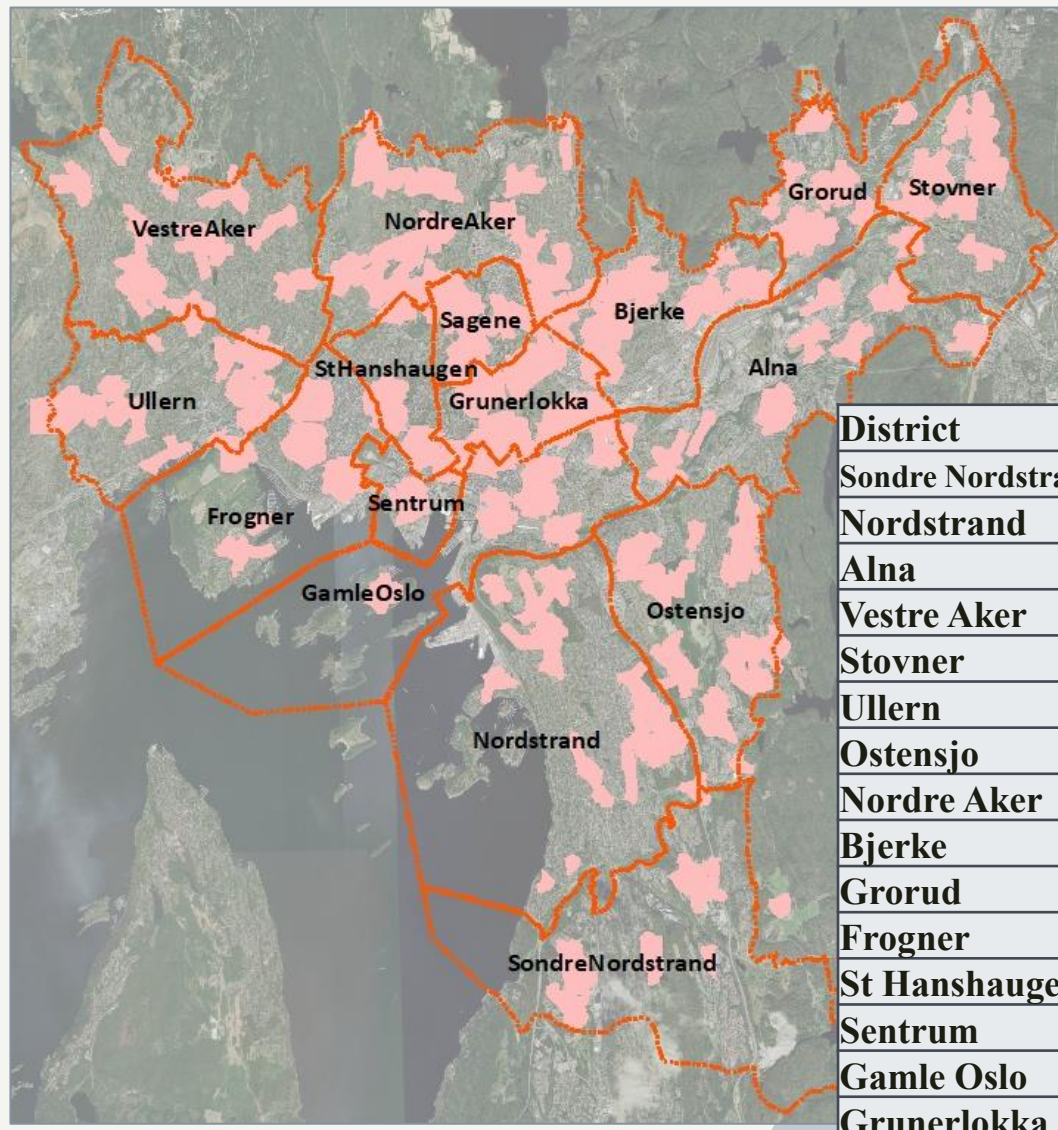
# Residential areas with access to Caring Sport facilities

## Cycling



District	Percent
Nordstrand	65.5
Søndre Nordstrand	69.8
Vestre Aker	72.5
Alna	80.1
Grorud	83.4
Ostensjo	87.0
Ullern	87.6
Stovner	90.7
Nordre Aker	94.2
Frogner	96.0
Bjerke	96.7
Gamle Oslo	99.6
Grunerlokka	100.0
Sagene	100.0
Sentrum	100.0
St Hanshaugen	100.0

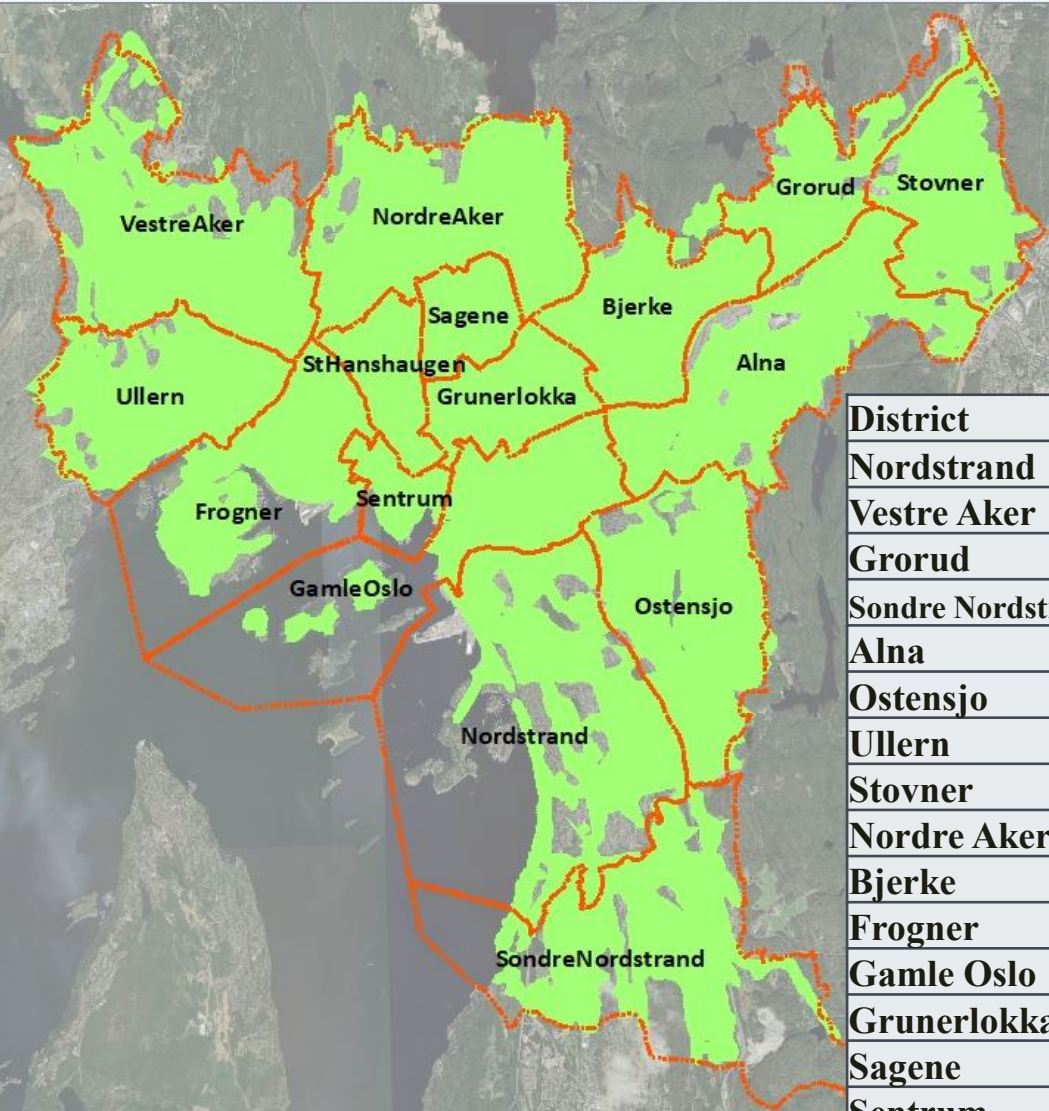
## Walking



District	Percent
Søndre Nordstrand	16.3
Nordstrand	18.1
Alna	19.1
Vestre Aker	22.0
Stovner	25.6
Ullern	29.8
Ostensjo	33.2
Nordre Aker	38.6
Bjerke	39.6
Grorud	43.4
Frogner	44.4
St Hanshaugen	47.3
Sentrum	50.0
Gamle Oslo	52.1
Grunerlokka	65.0
Sagene	71.1

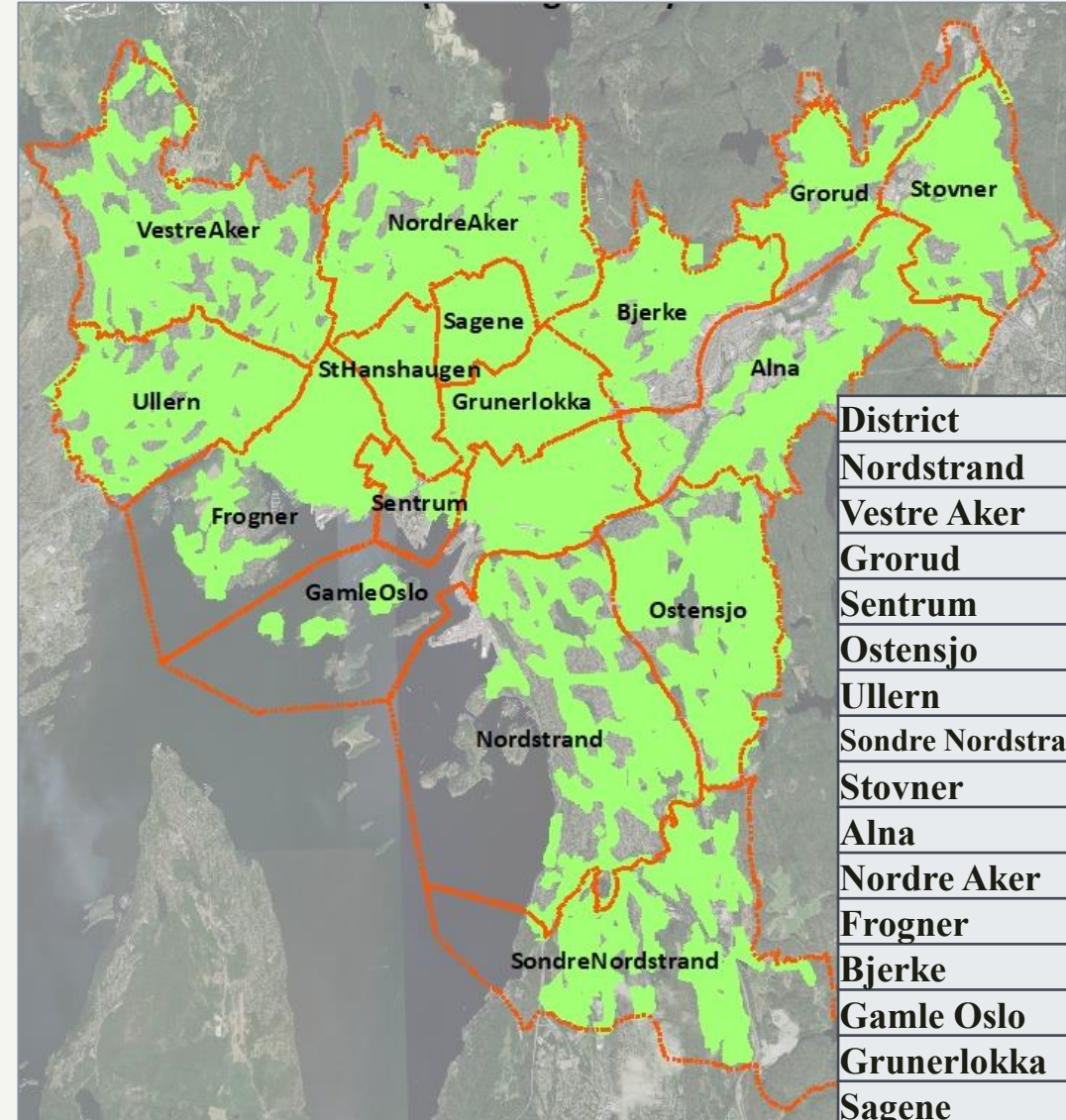
# Residential areas with access to Enjoying \_Park & playgrounds

## Cycling



District	Percent
Nordstrand	71.6
Vestre Aker	82.5
Grorud	84.0
Sondre Nordstrand	86.0
Alna	89.2
Ostensjo	90.8
Ullern	91.0
Stovner	94.1
Nordre Aker	95.1
Bjerke	96.8
Frogner	96.9
Gamle Oslo	99.7
Grunerlokka	100.0
Sagene	100.0
Sentrum	100.0
St Hanshaugen	100.0

## Walking

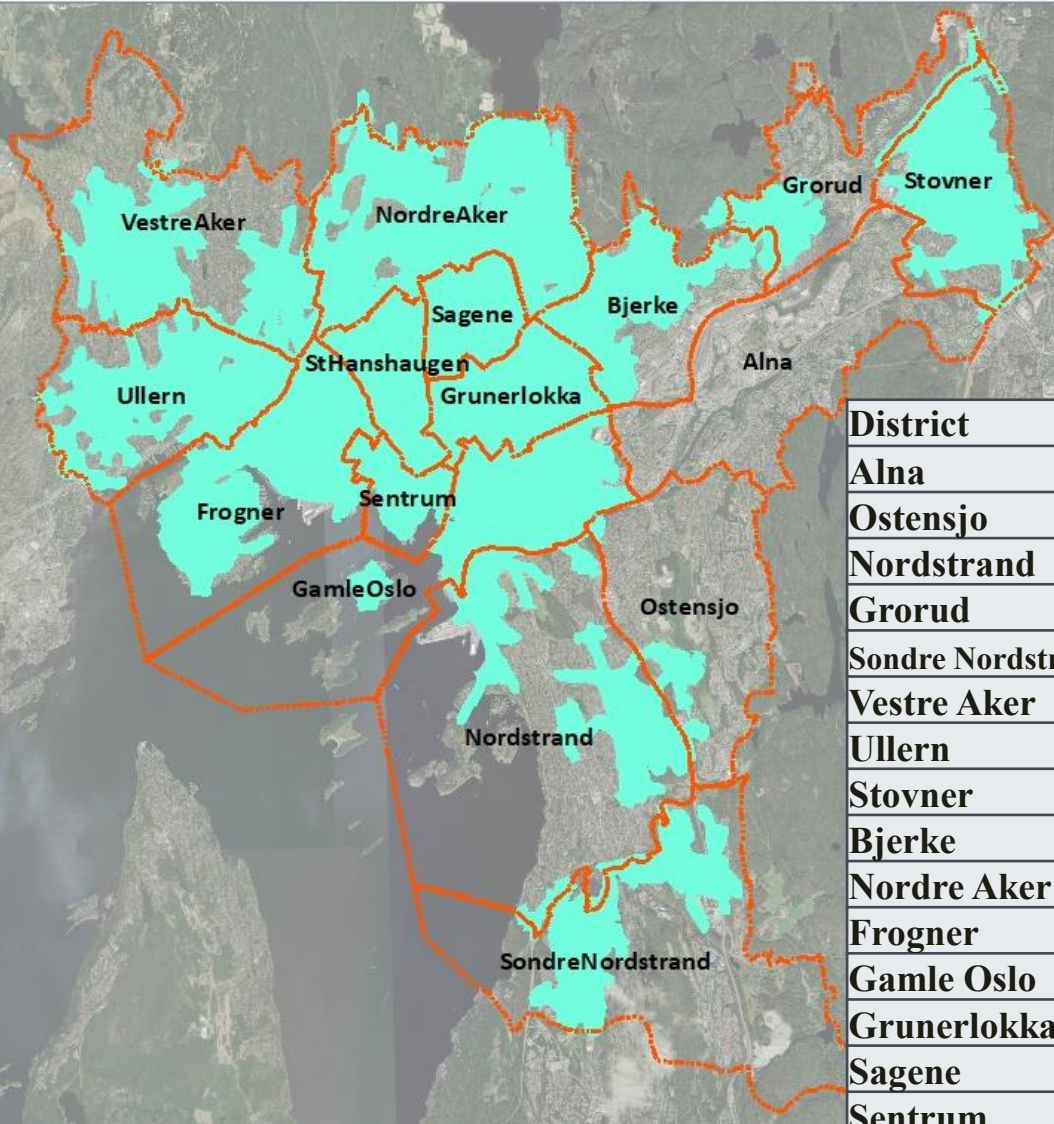


District	Percent
Nordstrand	55.2
Vestre Aker	69.0
Grorud	78.6
Sentrum	78.9
Ostensjo	80.6
Ullern	81.6
Sondre Nordstrand	82.0
Stovner	83.9
Alna	84.3
Nordre Aker	87.2
Frogner	88.0
Bjerke	88.4
Gamle Oslo	98.3
Grunerlokka	100.0
Sagene	100.0
St Hanshaugen	100.0



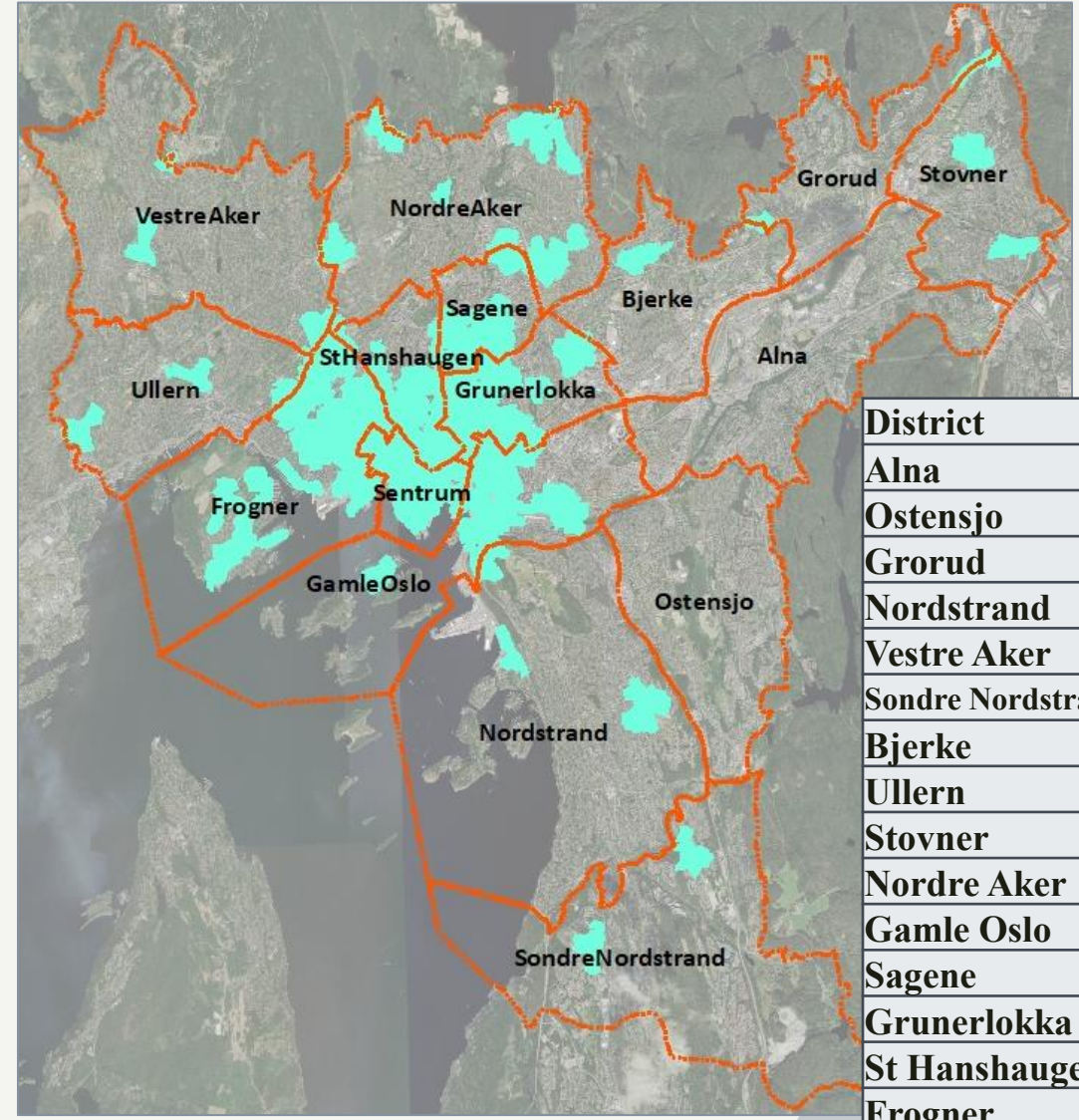
# Residential areas with access to Enjoying Cultural services

## Cycling



District	Percent
Alna	0.1
Ostensjo	10.8
Nordstrand	32.2
Grorud	32.9
Søndre Nordstrand	46.6
Vestre Aker	47.6
Ullern	71.7
Stovner	77.6
Bjerke	80.7
Nordre Aker	88.3
Frogner	96.8
Gamle Oslo	99.5
Grunerlokka	100.0
Sagene	100.0
Sentrum	100.0
St Hanshaugen	100.0

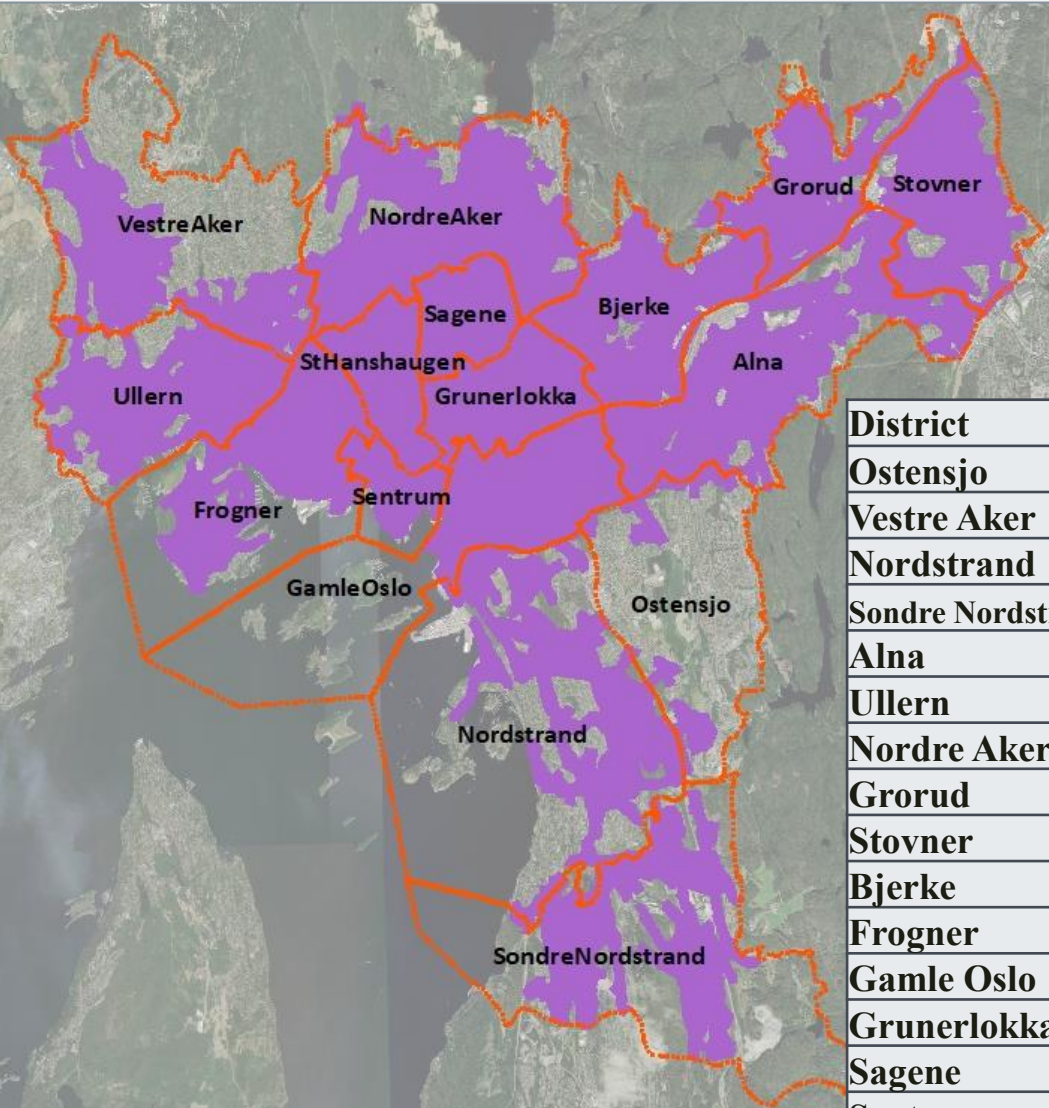
## Walking



District	Percent
Alna	0.0
Ostensjo	0.0
Grorud	0.2
Nordstrand	2.8
Vestre Aker	3.4
Søndre Nordstrand	5.3
Bjerke	6.2
Ullern	7.2
Stovner	9.4
Nordre Aker	14.5
Gamle Oslo	43.6
Sagene	58.6
Grunerlokka	68.2
St Hanshaugen	70.1
Frogner	73.7
Sentrum	100.0

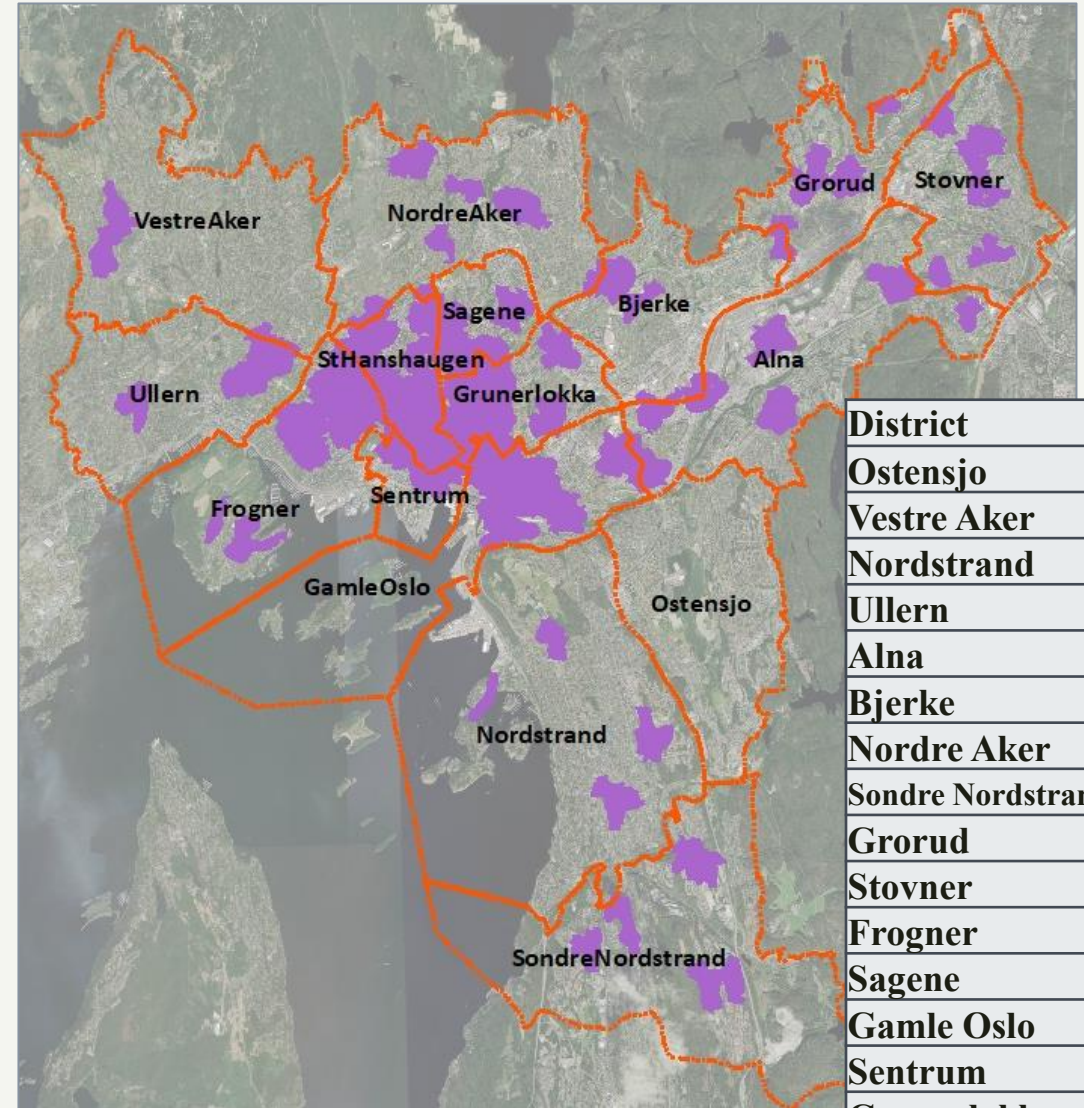
# Residential areas with access to Enjoying Religious centers

## Cycling



District	Percent
Ostensjo	18.5
Vestre Aker	43.3
Nordstrand	57.5
Søndre Nordstrand	75.6
Alna	78.7
Ullern	78.9
Nordre Aker	82.0
Grorud	82.7
Stovner	86.0
Bjerke	90.4
Frogner	96.6
Gamle Oslo	99.6
Grunerlokka	100.0
Sagene	100.0
Sentrum	100.0
St Hanshaugen	100.0

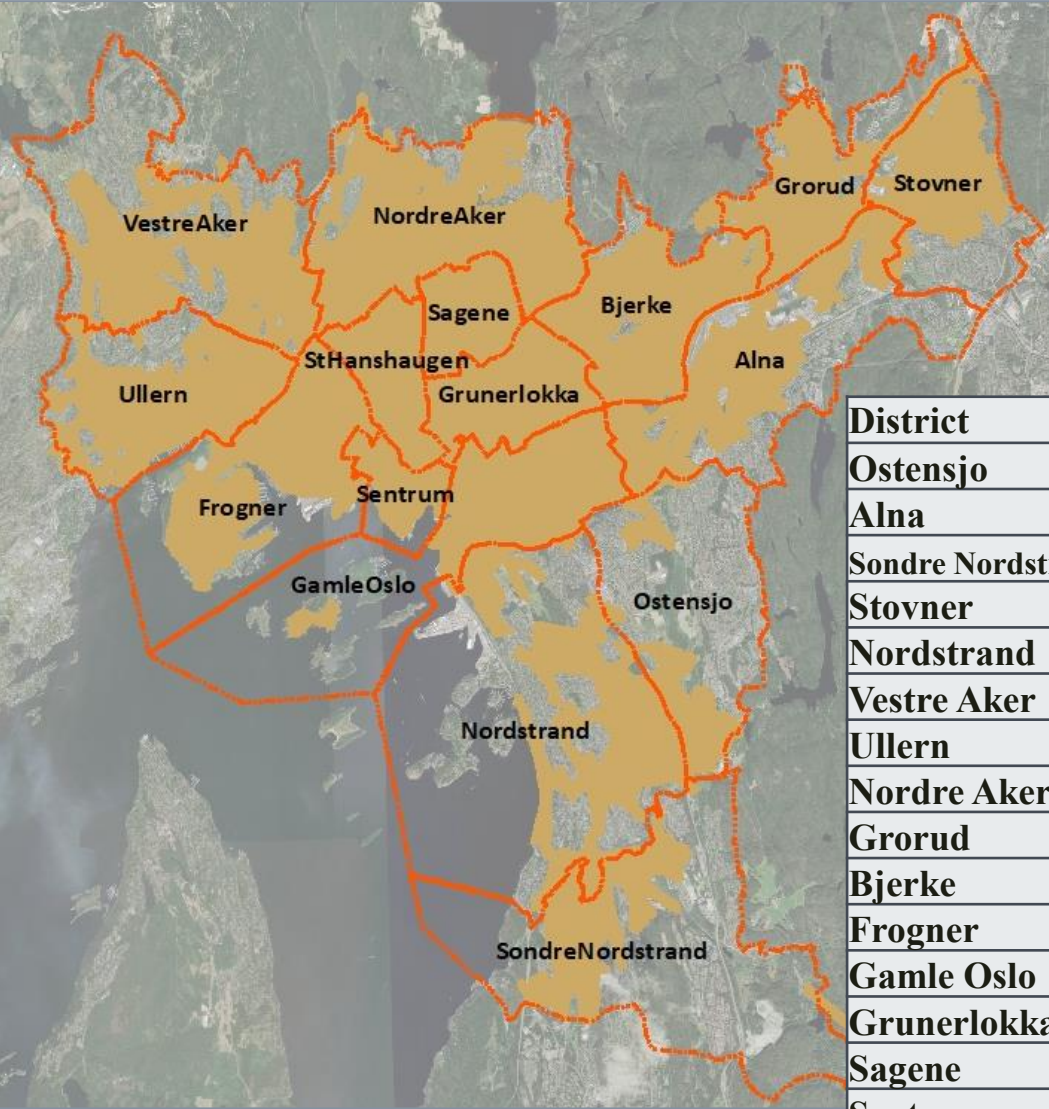
## Walking



District	Percent
Ostensjo	0.0
Vestre Aker	5.2
Nordstrand	8.7
Ullern	10.0
Alna	11.7
Bjerke	13.0
Nordre Aker	15.1
Søndre Nordstrand	15.5
Grorud	18.5
Stovner	20.4
Frogner	63.3
Sagene	65.4
Gamle Oslo	68.4
Sentrum	71.1
Grunerlokka	71.7
St Hanshaugen	93.6

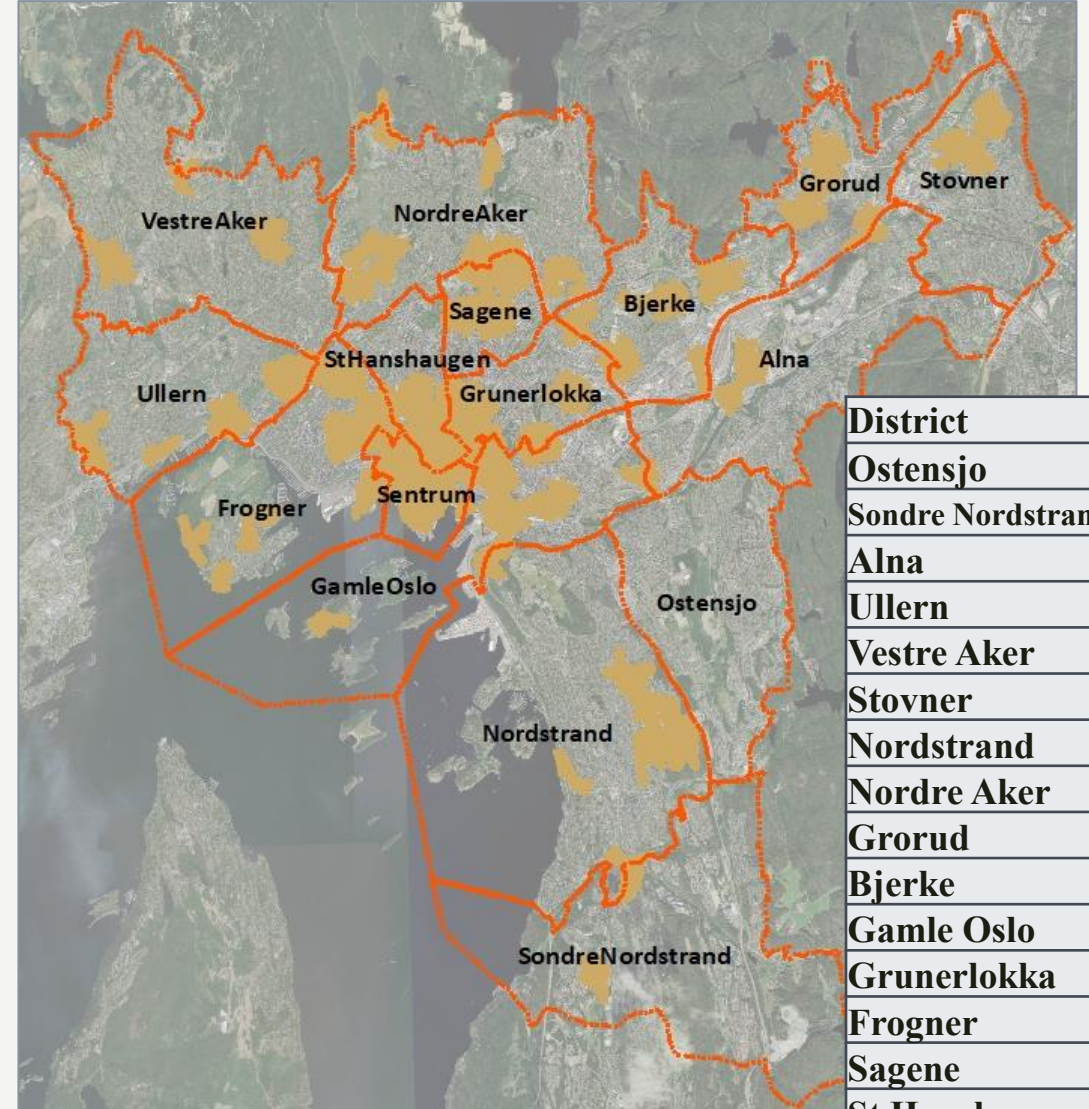
# Residential areas with access to Enjoying \_Restaurant & Cafes

## Cycling



District	Percent
Ostensjo	24.7
Alna	30.7
Sondre Nordstrand	38.0
Stovner	49.9
Nordstrand	53.8
Vestre Aker	62.3
Ullern	75.6
Nordre Aker	79.8
Grorud	80.8
Bjerke	90.0
Frogner	96.5
Gamle Oslo	99.6
Grunerlokka	100.0
Sagene	100.0
Sentrum	100.0
St Hanshaugen	100.0

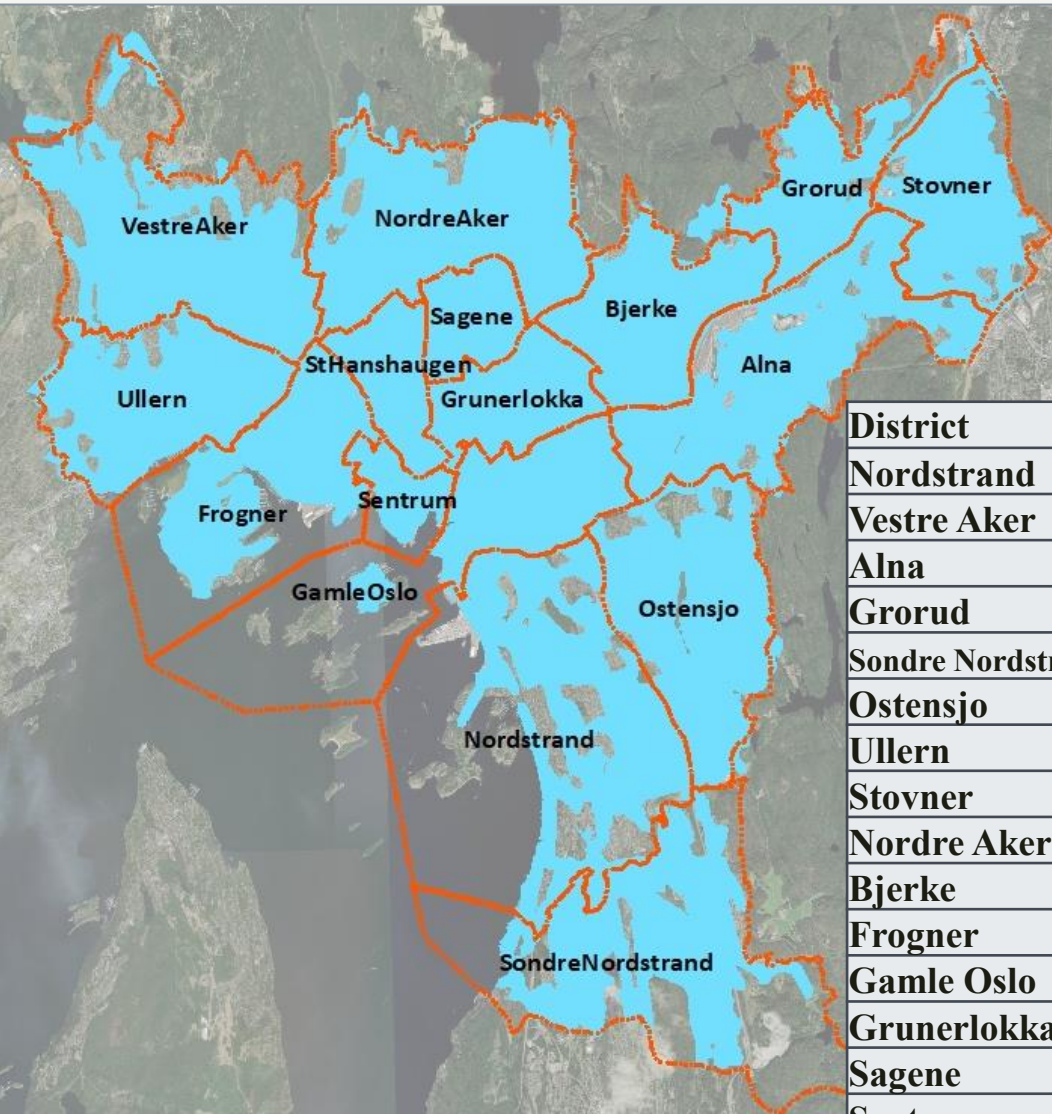
## Walking



District	Percent
Ostensjo	0.0
Sondre Nordstrand	3.0
Alna	3.0
Ullern	8.6
Vestre Aker	9.5
Stovner	11.3
Nordstrand	12.1
Nordre Aker	14.2
Grorud	16.0
Bjerke	23.2
Gamle Oslo	38.2
Grunerlokka	45.0
Frogner	47.3
Sagene	51.8
St Hanshaugen	53.2
Sentrum	100.0

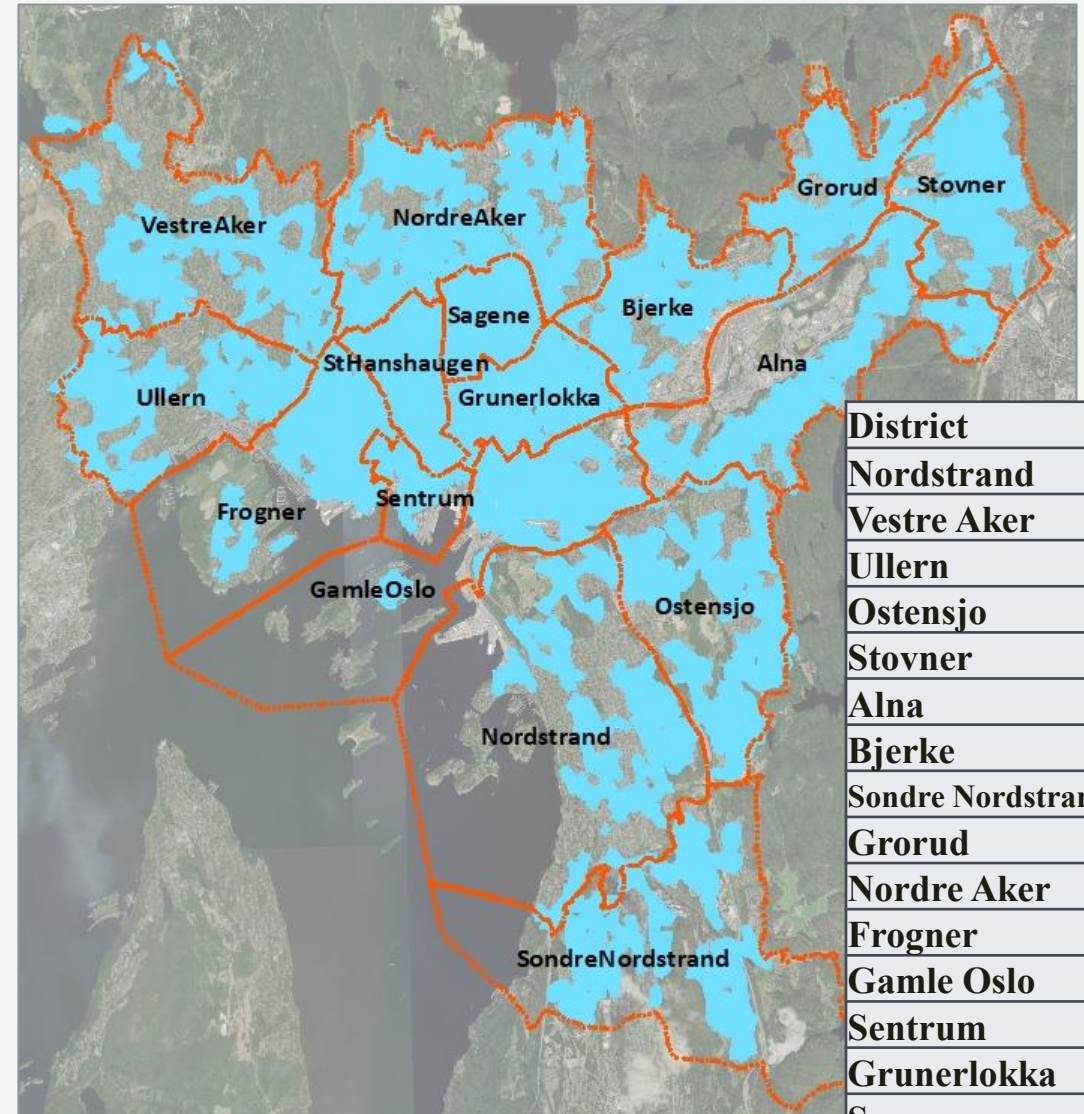
# Residential areas with access to Learning \_Educational centers

## Cycling



District	Percent
Nordstrand	69.3
Vestre Aker	76.5
Alna	83.0
Grorud	83.5
Sondre Nordstrand	84.5
Ostensjo	88.1
Ullern	89.5
Stovner	93.0
Nordre Aker	94.5
Bjerke	96.7
Frogner	96.8
Gamle Oslo	99.6
Grunerlokka	100.0
Sagene	100.0
Sentrum	100.0
St Hanshaugen	100.0

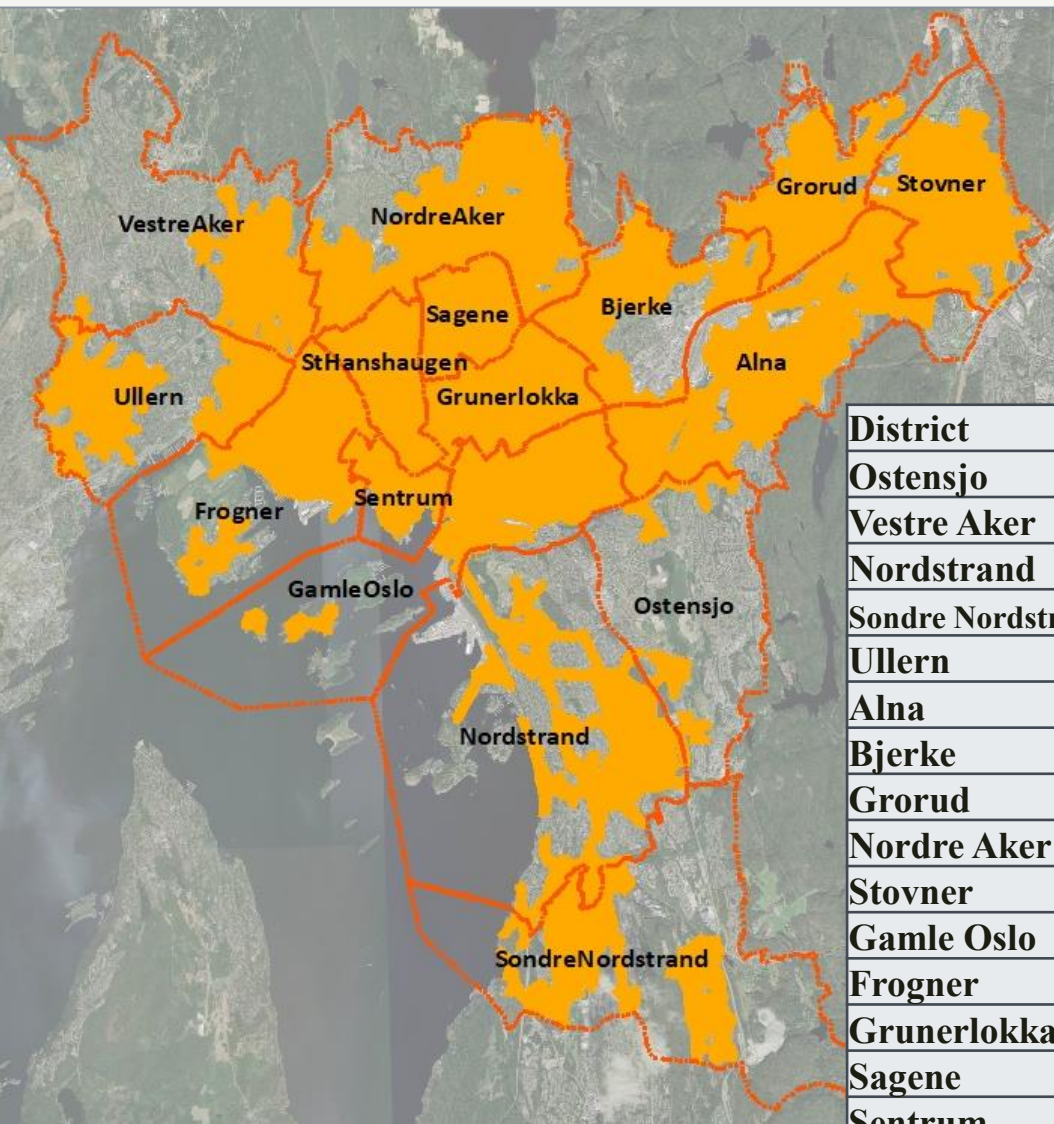
## Walking



District	Percent
Nordstrand	43.2
Vestre Aker	47.6
Ullern	57.5
Ostensjo	64.9
Stovner	66.4
Alna	67.1
Bjerke	68.6
Sondre Nordstrand	68.7
Grorud	69.1
Nordre Aker	71.5
Frogner	81.6
Gamle Oslo	95.5
Sentrum	97.4
Grunerlokka	99.9
Sagene	100.0
St Hanshaugen	100.0

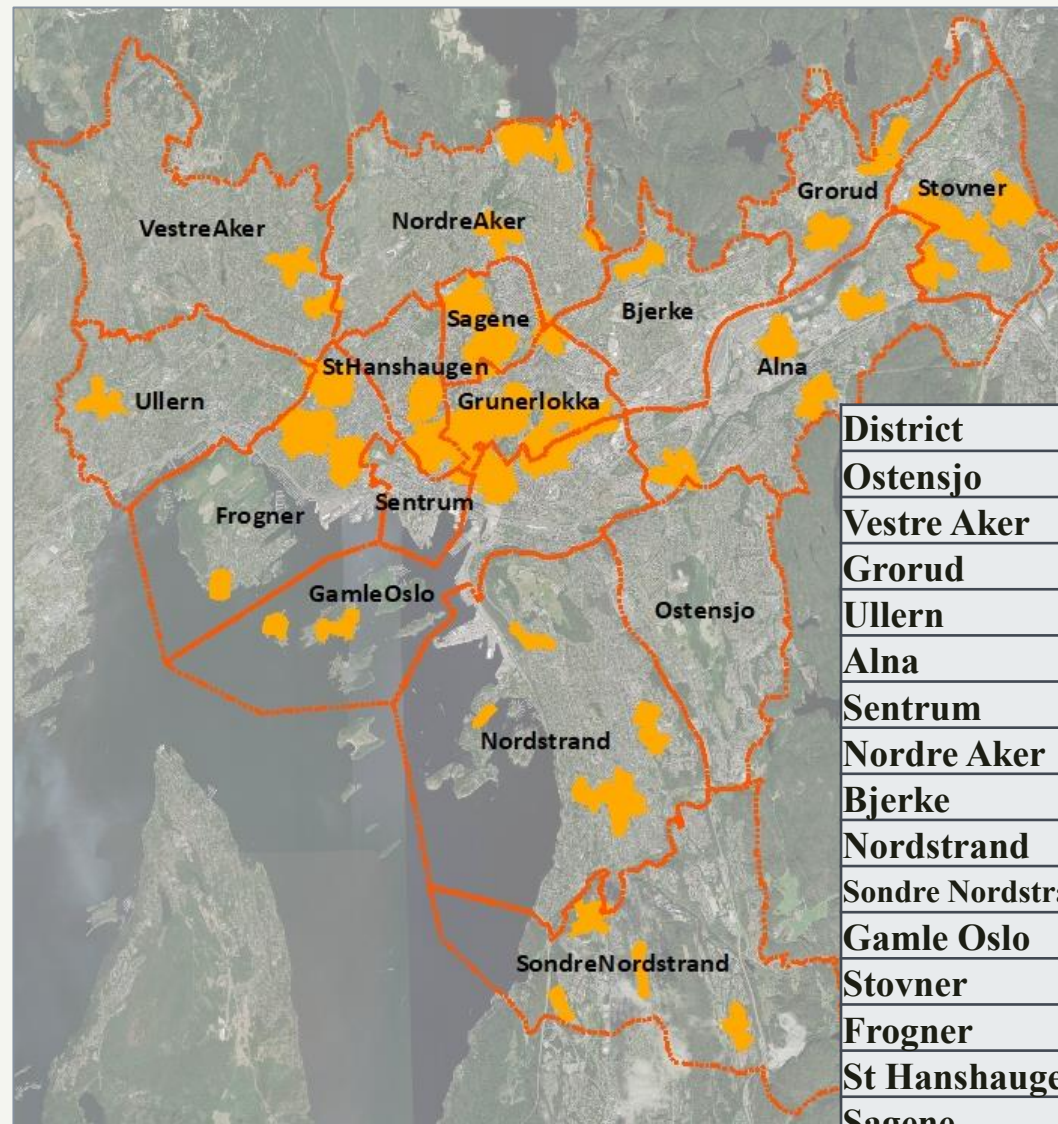
# Residential areas with access to Living Community centers

## Cycling



District	Percent
Ostensjo	16.3
Vestre Aker	32.6
Nordstrand	49.4
Søndre Nordstrand	52.8
Ullern	54.2
Alna	65.0
Bjerke	68.7
Grorud	71.3
Nordre Aker	73.5
Stovner	85.2
Gamle Oslo	86.6
Frogner	89.9
Grunerlokka	100.0
Sagene	100.0
Sentrum	100.0
St Hanshaugen	100.0

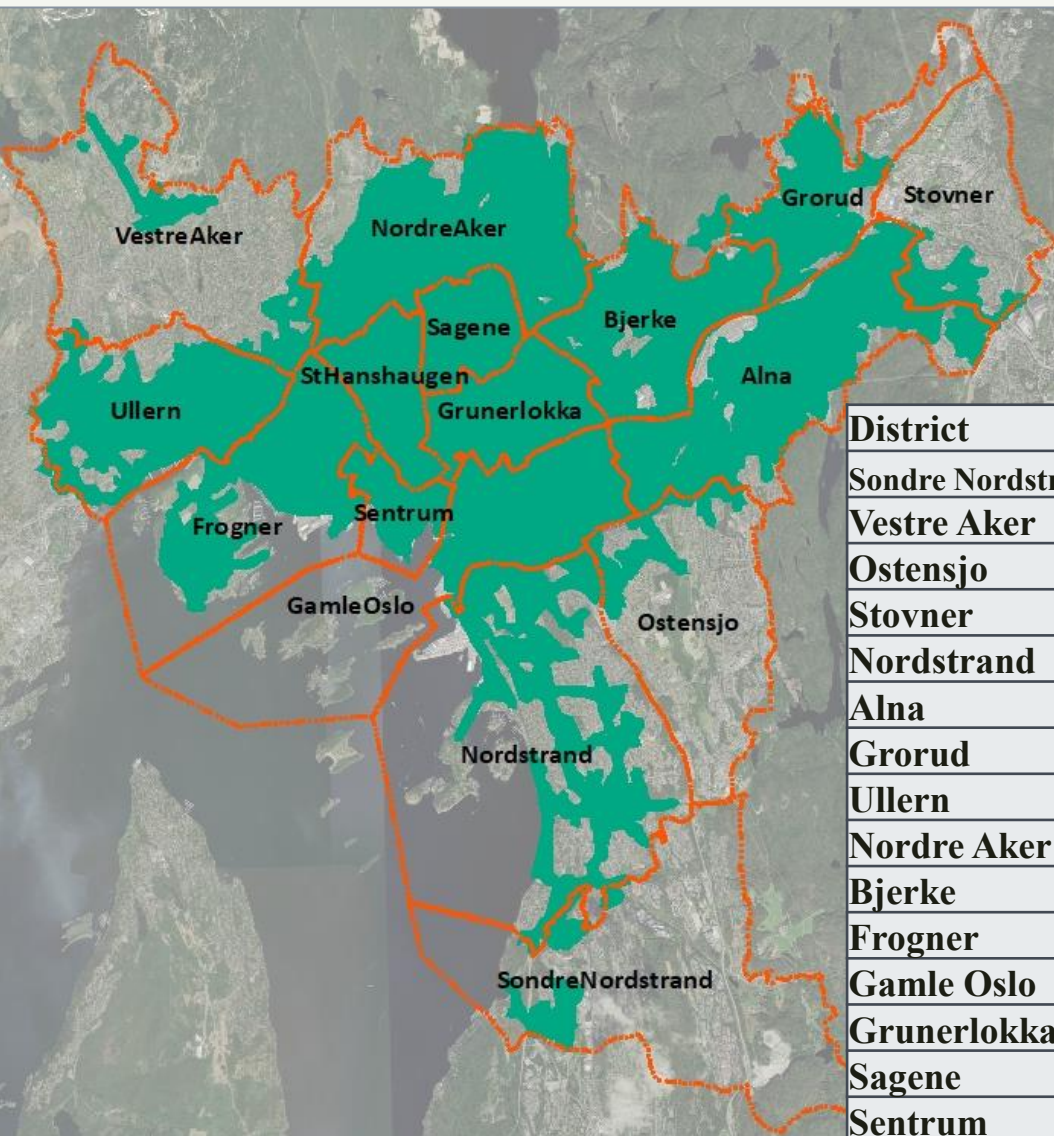
## Walking



District	Percent
Ostensjo	0.3
Vestre Aker	3.9
Grorud	6.1
Ullern	6.6
Alna	7.1
Sentrum	7.9
Nordre Aker	8.1
Bjerke	8.1
Nordstrand	10.9
Søndre Nordstrand	15.8
Gamle Oslo	24.4
Stovner	30.0
Frogner	34.7
St Hanshaugen	41.6
Sagene	48.4
Grunerlokka	62.2

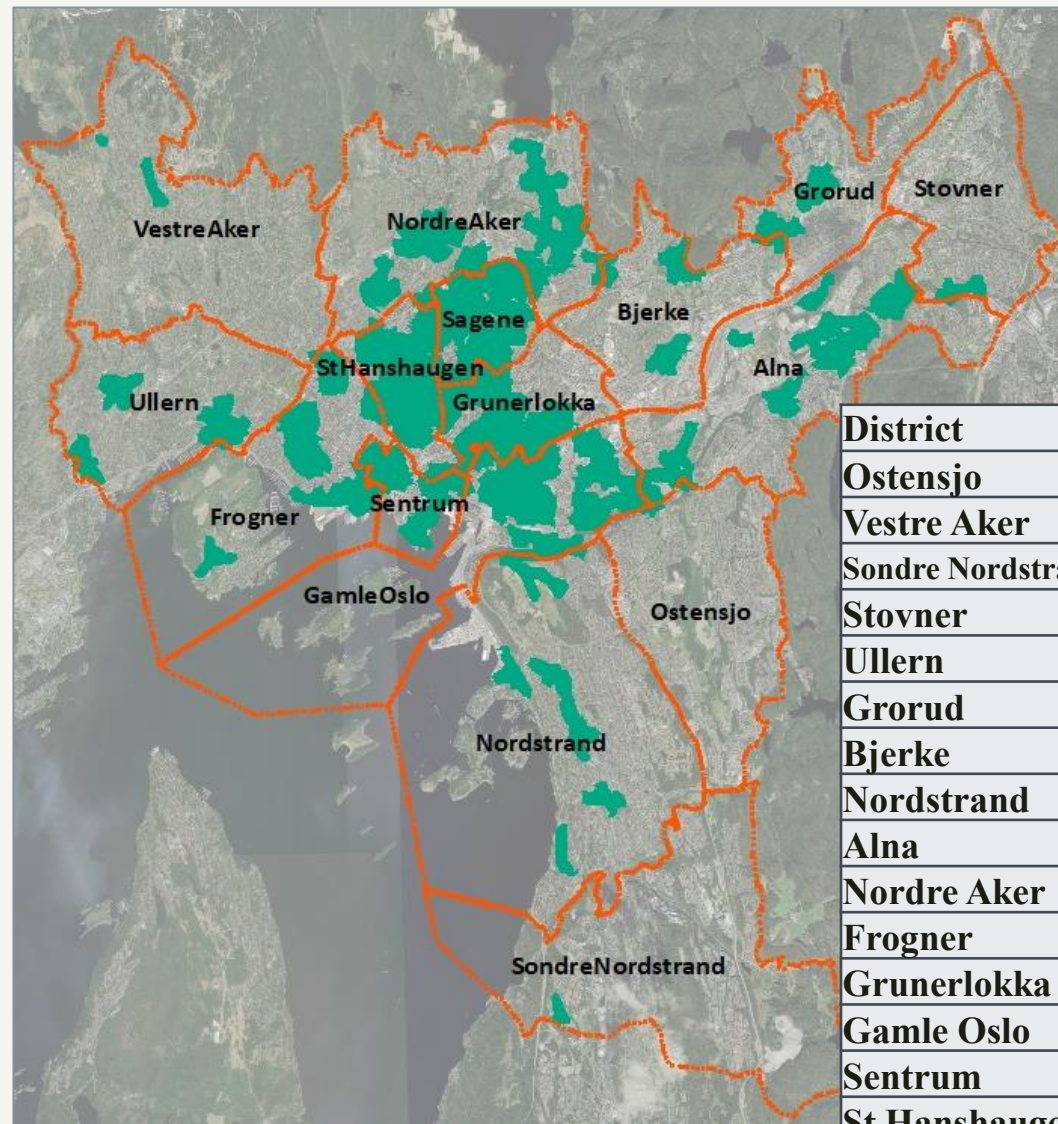
# Residential areas with access to Living \_Public transport station

## Cycling



District	Percent
Sondre Nordstrand	11.1
Vestre Aker	15.9
Ostensjo	16.6
Stovner	20.6
Nordstrand	52.0
Alna	72.1
Grorud	76.5
Ullern	77.4
Nordre Aker	87.5
Bjerke	88.9
Frogner	95.0
Gamle Oslo	99.6
Grunerlokka	100.0
Sagene	100.0
Sentrum	100.0
St Hanshaugen	100.0

## Walking



District	Percent
Ostensjo	1.0
Vestre Aker	1.3
Sondre Nordstrand	2.1
Stovner	4.6
Ullern	6.7
Grorud	10.4
Bjerke	13.4
Nordstrand	13.6
Alna	16.1
Nordre Aker	34.5
Frogner	39.1
Grunerlokka	63.0
Gamle Oslo	77.2
Sentrum	78.9
St Hanshaugen	84.6
Sagene	97.4

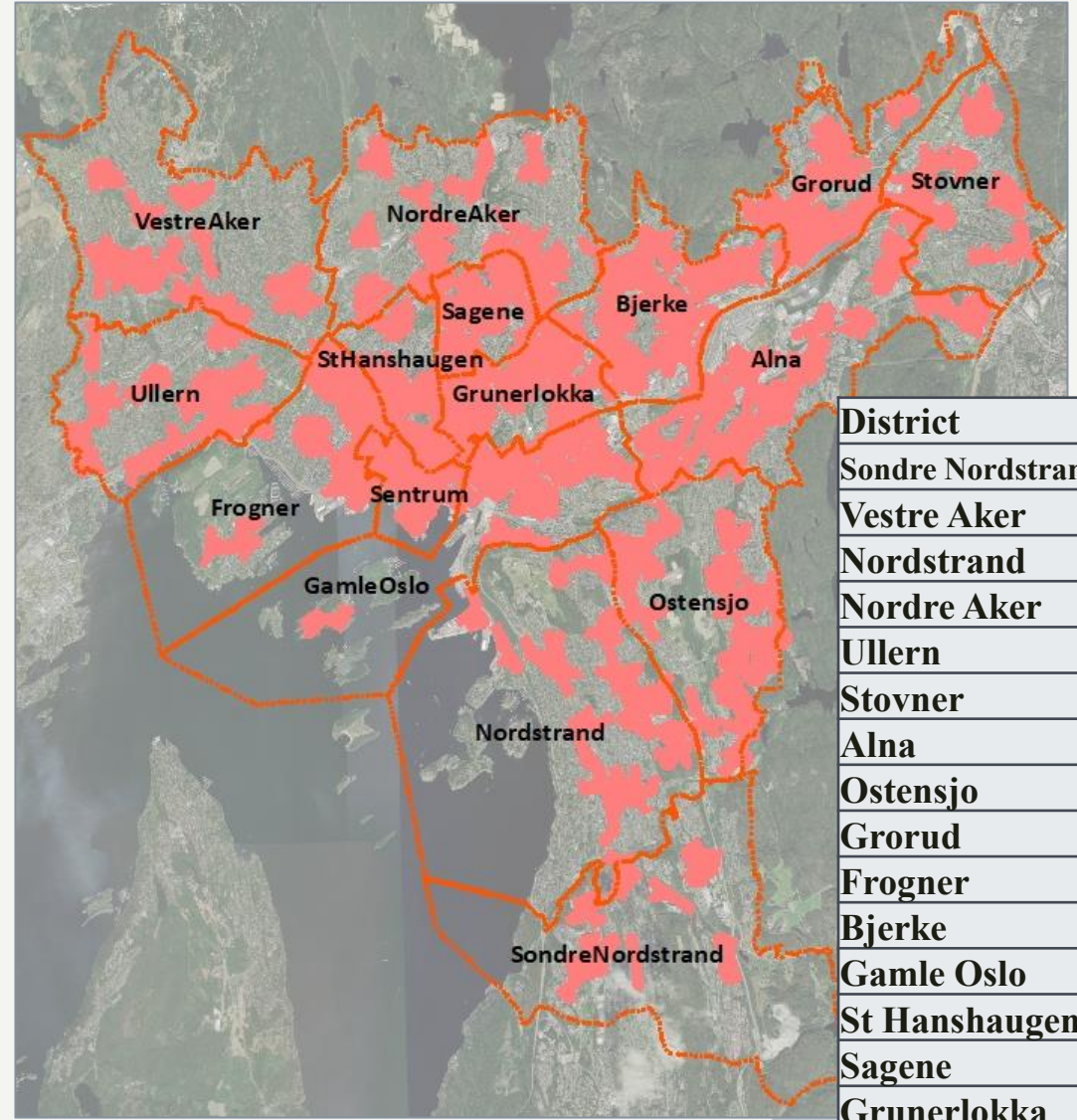
# Residential areas with access to Supplying Shops, Commercial centers

## Cycling



District	Percent
Nordstrand	65.5
Vestre Aker	70.6
Sondre Nordstrand	80.3
Alna	82.2
Grorud	82.8
Ostensjo	87.8
Ullern	87.9
Stovner	92.2
Nordre Aker	92.3
Frogner	96.4
Bjerke	96.5
Gamle Oslo	99.6
Grunerlokka	100.0
Sagene	100.0
Sentrum	100.0
St Hanshaugen	100.0

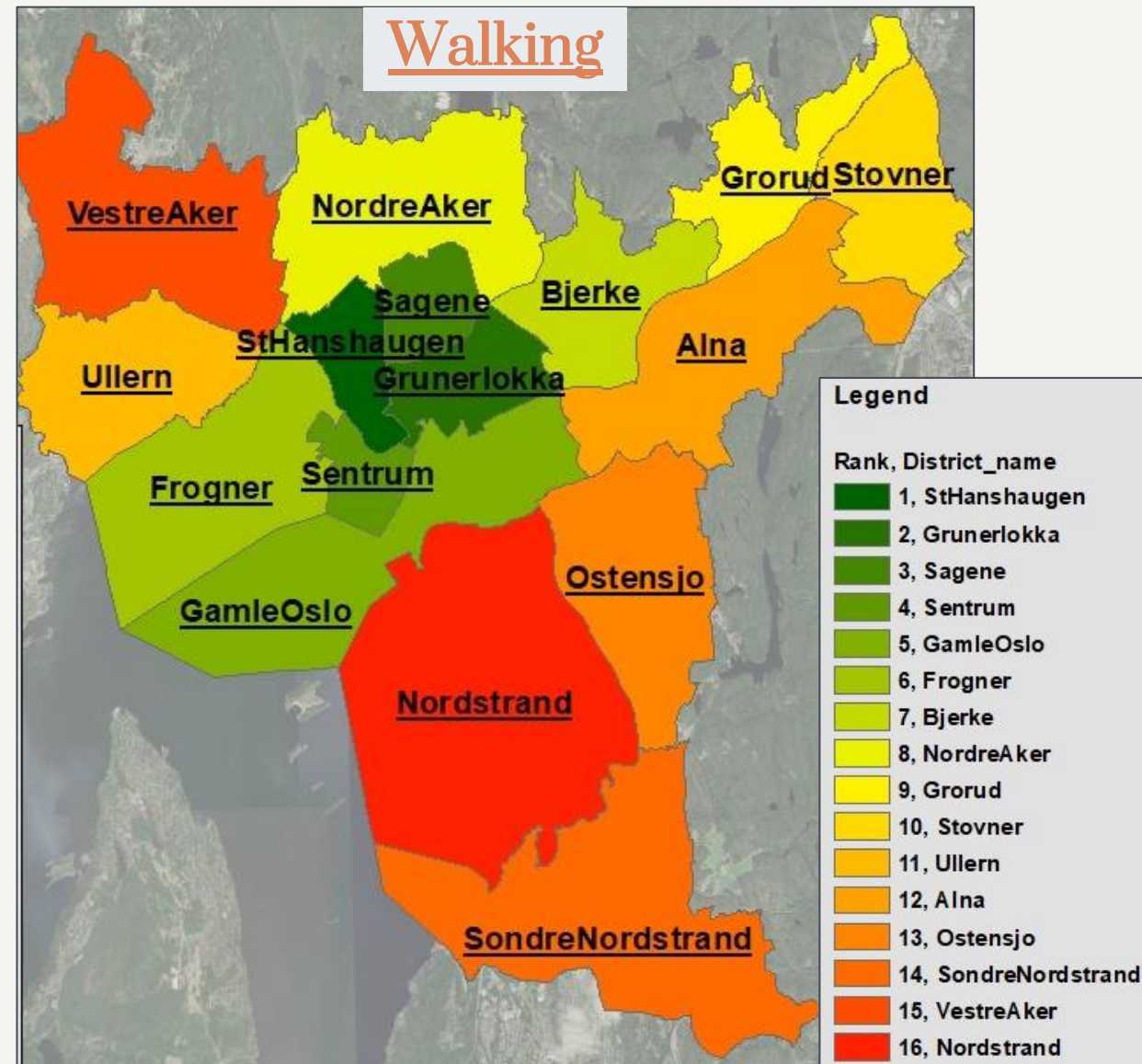
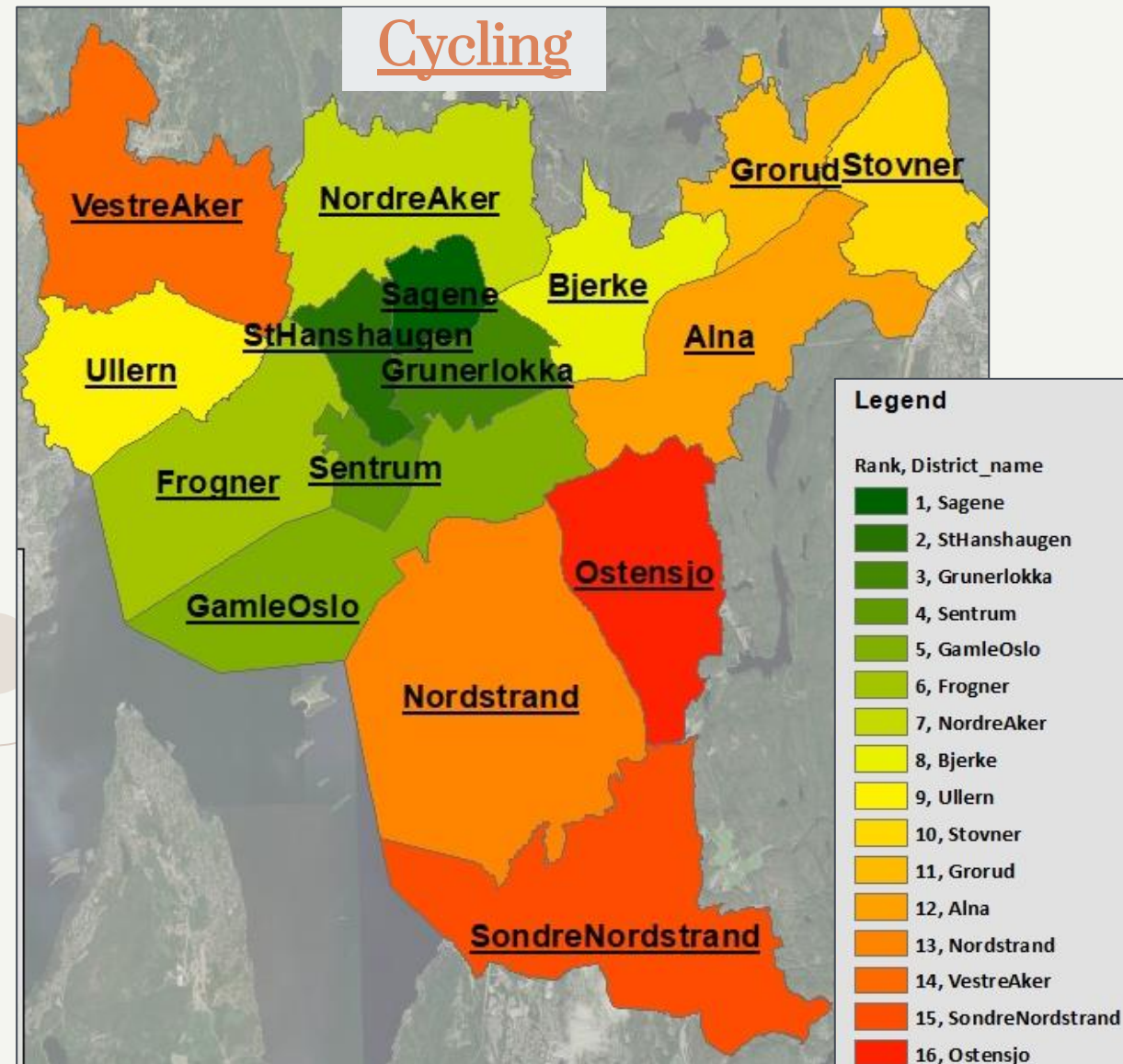
## Walking



District	Percent
Sondre Nordstrand	20.7
Vestre Aker	25.7
Nordstrand	33.7
Nordre Aker	35.4
Ullern	36.4
Stovner	37.4
Alna	37.5
Ostensjo	46.5
Grorud	51.3
Frogner	64.4
Bjerke	72.6
Gamle Oslo	75.2
St Hanshaugen	80.0
Sagene	84.7
Grunerlokka	93.8
Sentrum	100.0

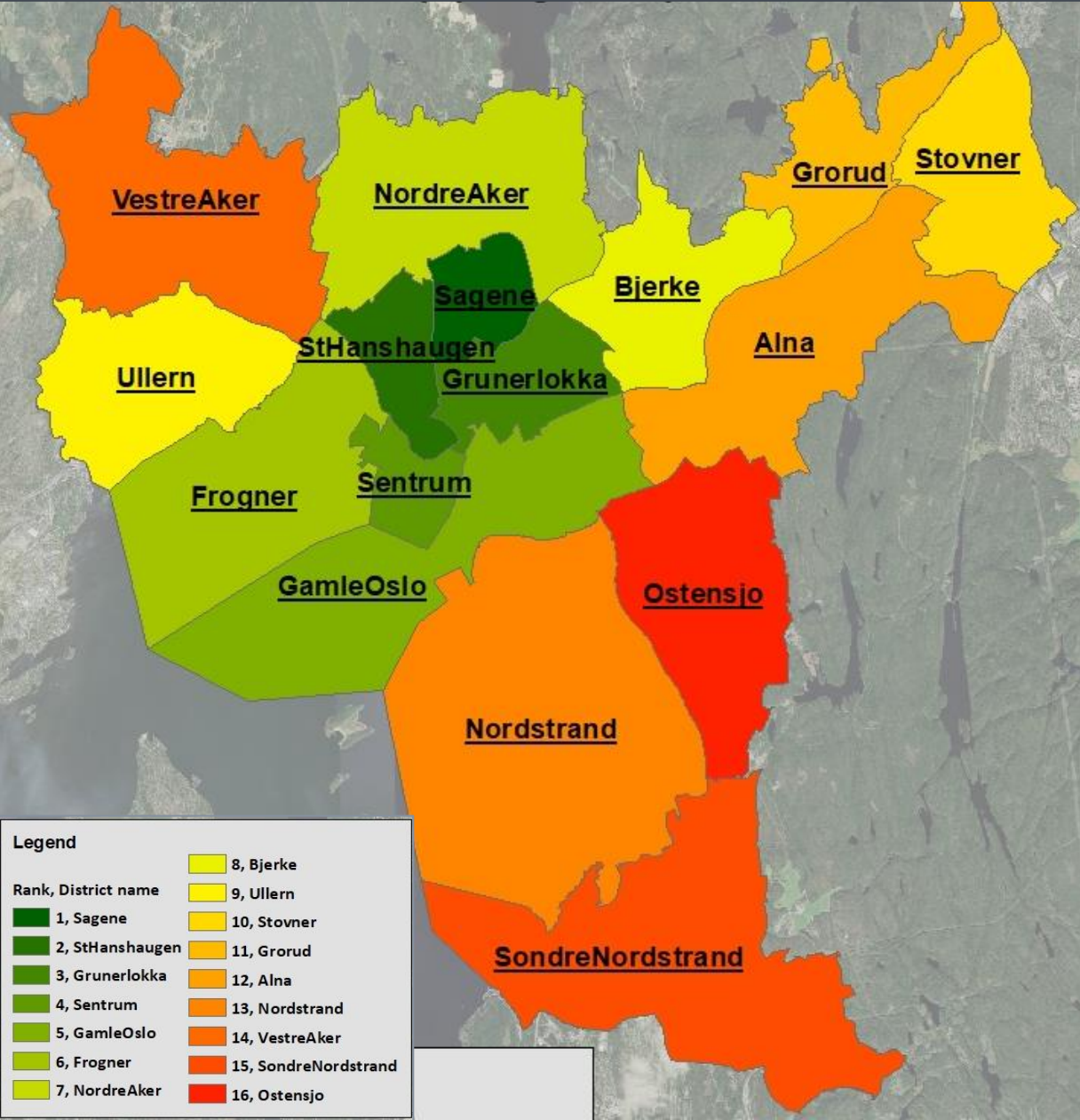
# Transport-related inequity pattern

(Neighborhoods ranking based on the residential accessibility to social functions)



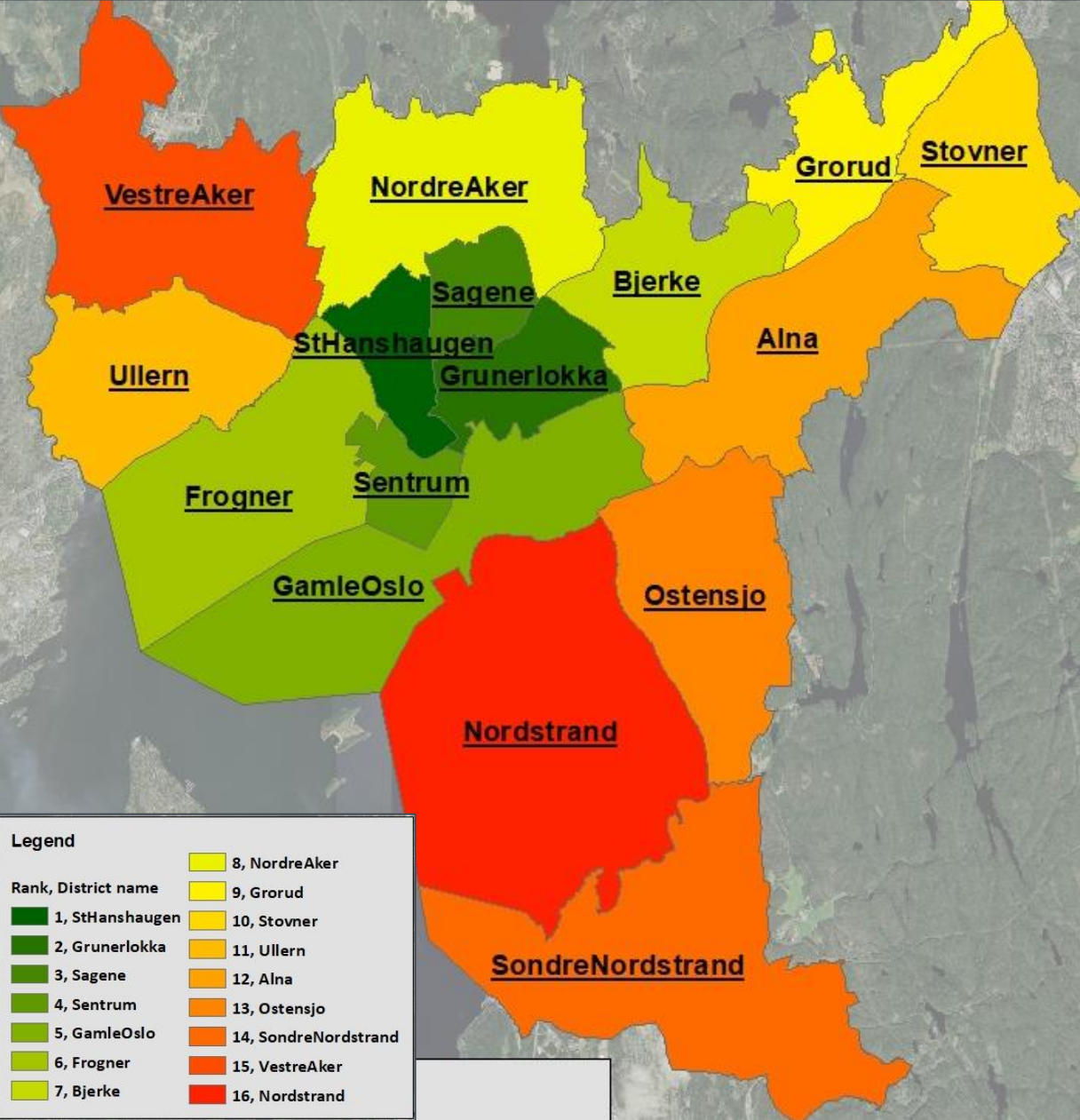


# ❖ Socio-economic and physical characteristics of neighborhoods (Cycling mode)



District rank	Norwegian _Percent	Population 2023	Gender _Ratio	Income 2020	Residential Density
1_Sagene	74	46984	96	507000	151
2_StHanshaugen	72	39487	100	516000	110
3_Grunerlokka	65	64270	104	488000	135
4_Sentrum	48	1626	147	346000	6
5_GamleOslo	61	61756	106	495000	39
6_Frogner	71	60163	97	711000	44
7_NordreAker	80	53697	99	640000	39
8_Bjerke	55	36335	103	471000	46
9_Ullern	78	35198	96	812000	36
10_Stovner	38	33755	103	391000	41
11_Grorud	46	27773	98	407000	39
12_Alna	44	49759	100	415000	36
13_Nordstrand	81	53151	96	666000	20
14_VestreAker	82	51487	95	882000	31
15_SondreNordstrand	42	39127	100	410000	19
16_Ostensjo	73	51340	94	524000	43

# ❖ Socio-economic and physical characteristics of neighborhoods (Walking mode)



District_name	Norwegian _Percent	Population 2023	Gender _Ratio	Income 2020	Residential Density
1_StHanshaugen	72	39487	100	516000	110
2_Grunerlokka	65	64270	104	488000	135
3_Sagene	74	46984	96	507000	151
4_Sentrum	48	1626	147	346000	6
5_GamleOslo	61	61756	106	495000	39
6_Frogner	71	60163	97	711000	44
7_Bjerke	55	36335	103	471000	46
8_NordreAker	80	53697	99	640000	39
9_Grorud	46	27773	98	407000	39
10_Stovner	38	33755	103	391000	41
11_Ullern	78	35198	96	812000	36
12_Alna	44	49759	100	415000	36
13_Ostensjo	73	51340	94	524000	43
14_SondreNordstrand	42	39127	100	410000	19
15_VestreAker	82	51487	95	882000	31
16_Nordstrand	81	53151	96	666000	20

## Assessing socioeconomic and physical variables

(Immigrant residents, population number, gender ratio, income and residential density)

- ❖ Gender ratio and Residential density affected the Neighborhoods ranking based on the residential accessibility to social functions (both cycling and walking).

✓ **Gender Ratio**



(Number of male/Number of females)\*100

The accessibility of  
neighborhoods



✓ **Residential Density**



(Number of dwellings/Area per hectare)

The accessibility of  
neighborhoods



## Conclusions

- ❖ The transport-related inequity level of **peripheral neighborhoods** is greater than in the central neighborhoods of Oslo.
- ❖ The **gender ratio** and **residential density** have a direct relationship with the proximity of residents to social functions.



Thanks!

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