Statens vegvesen

Organization, funding and prioritization of natural hazards on national (and county) roads in Norway

Heidi Kristin Bjordal

Legislation and Regulatory Authority, Directorate of Public Roads

Contents

Statens vegvesen

- About the road sector in Norway
- Landslides and avalanches on Norwegian roads
- Inventory of landslide and avalanche exposed roads
- Avalanche / landslide hazard index

Norwegian Road network

- 10 500 km national roads
- 44 000 km county roads

- 2015:

Statens vegvesen

Norwegian Public Roads Administration

Nye Veier

- 2020:
- Regional reform

Statens vegvesen

Statens vegvesen

Norwegian Public Roads Administration

Nye Veier

Nordland fylkeskommune

Finnmark fylkeskommune
Finnmárkku fylkkagielda
Finmarkun fylkinkomuuni

Vestland fylkeskommune

Møre og Romsdal fylkeskommune

Troms fylkeskommune
Romssa fylkkasuohkan
Tromssan fylkinkomuuni

Vestfold fylkeskommune

Oslo

ØSTFOLD fylkeskommune

AGDER fylkeskommune

Innlandet fylkeskommune

BUSKERUD fylkeskommune

Telemark fylkeskommune

Rogaland fylkeskommune

Trøndelag fylkeskommune
Tröndelagen fylhkentjïelte

AKERSHUS fylkeskommune

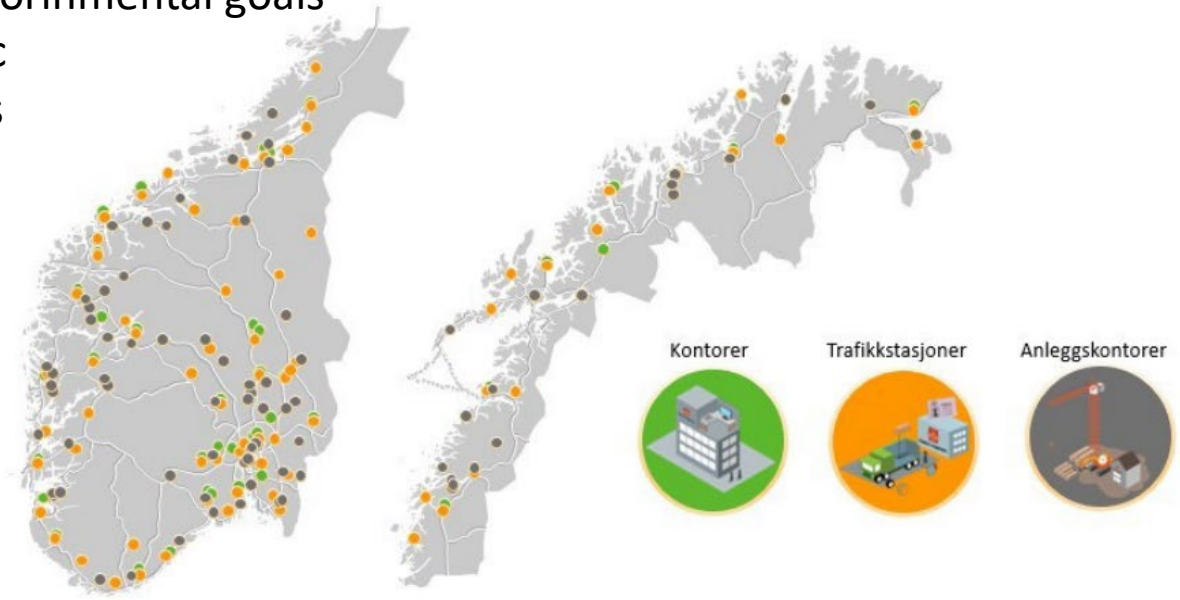
Norwegian Public Roads Administration

Statens vegvesen

- Governmental body under the Ministry of Transport and Communications

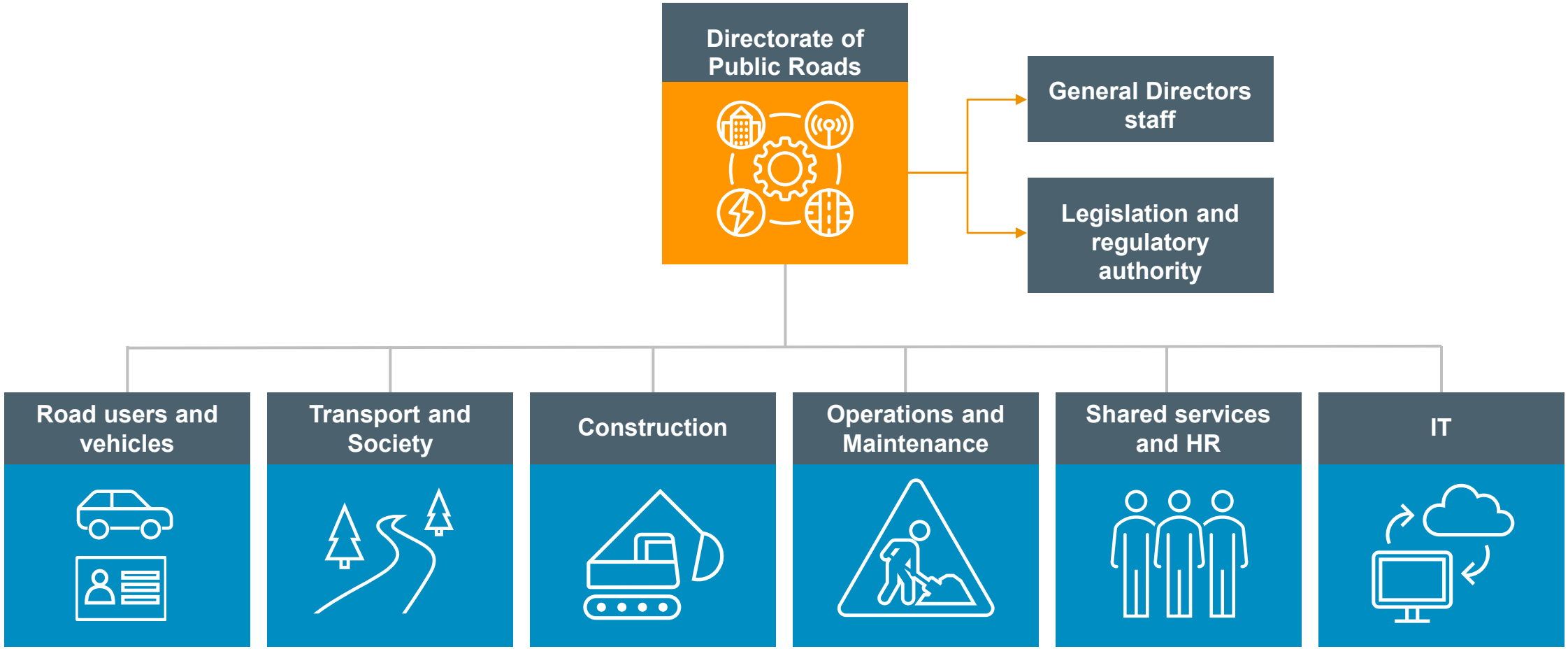
- Three different roles:
  - Professional body
  - Developer
  - Regulatory authority

- Develop an efficient, environmentally friendly and safe transport system through
  - More cost efficient use of funding
  - Efficient use of new technology
  - Contribute to the fulfillment of Norway’s climate and envorinmental goals
  - Vision zero for fatalities and serious injuries in road traffic
  - Easier travel and inreased competitiveness for businesses



The Norwegian Public Roads Administration consist of a Directorate of Public Roads and six divisions

Statens vegvesen



National Transport Plan

Statens vegvesen

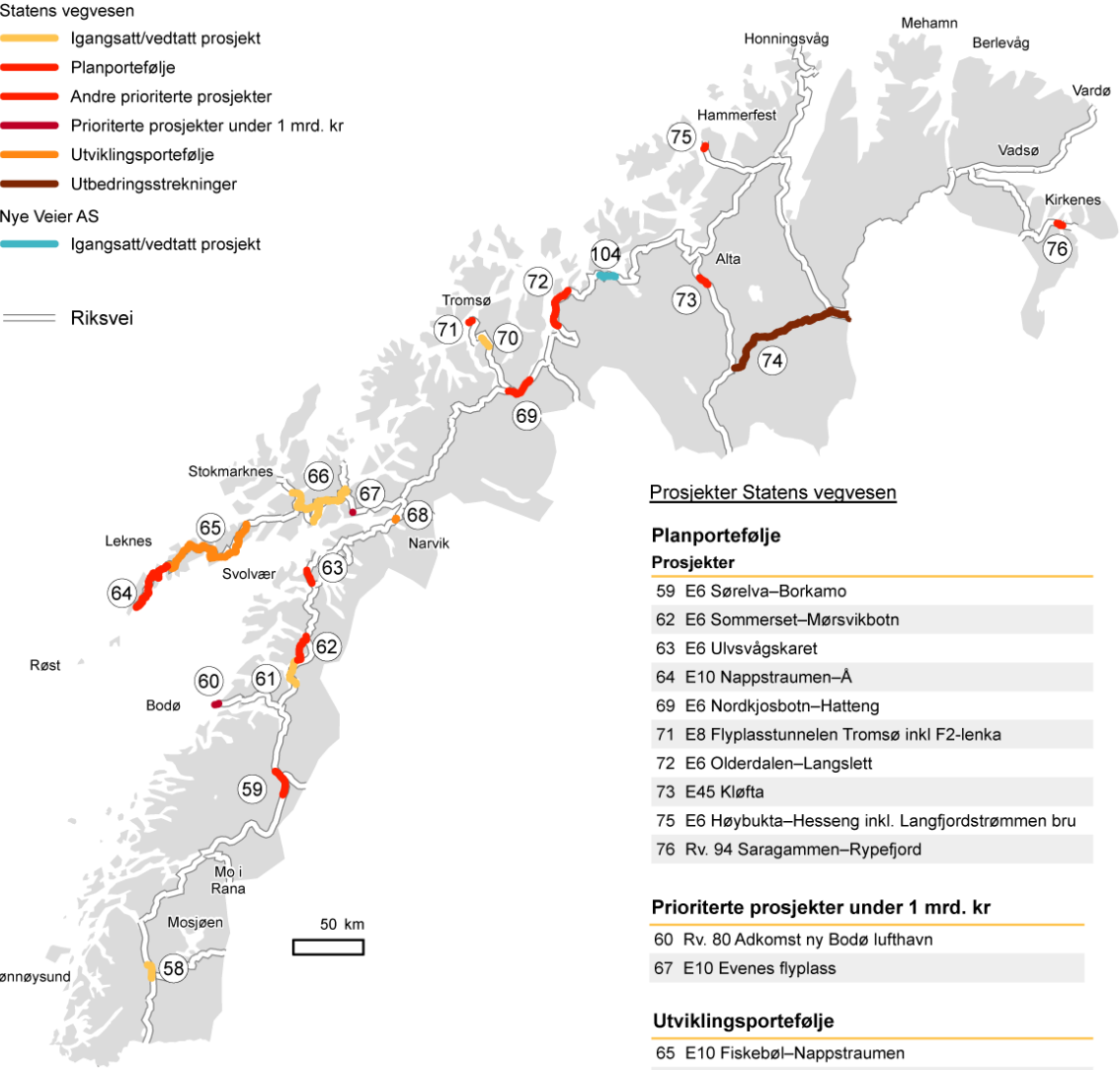
- The National Transport Plan presents the governments transport policy and long-term plan for development of the transportation system.
- The overarching transport polic goal is to achieve *"An efficient, environmentally friendly, and safe transportation system throughout the country by 2050."*
- The plan was published in March 2024, will be debated in the parliament before summer

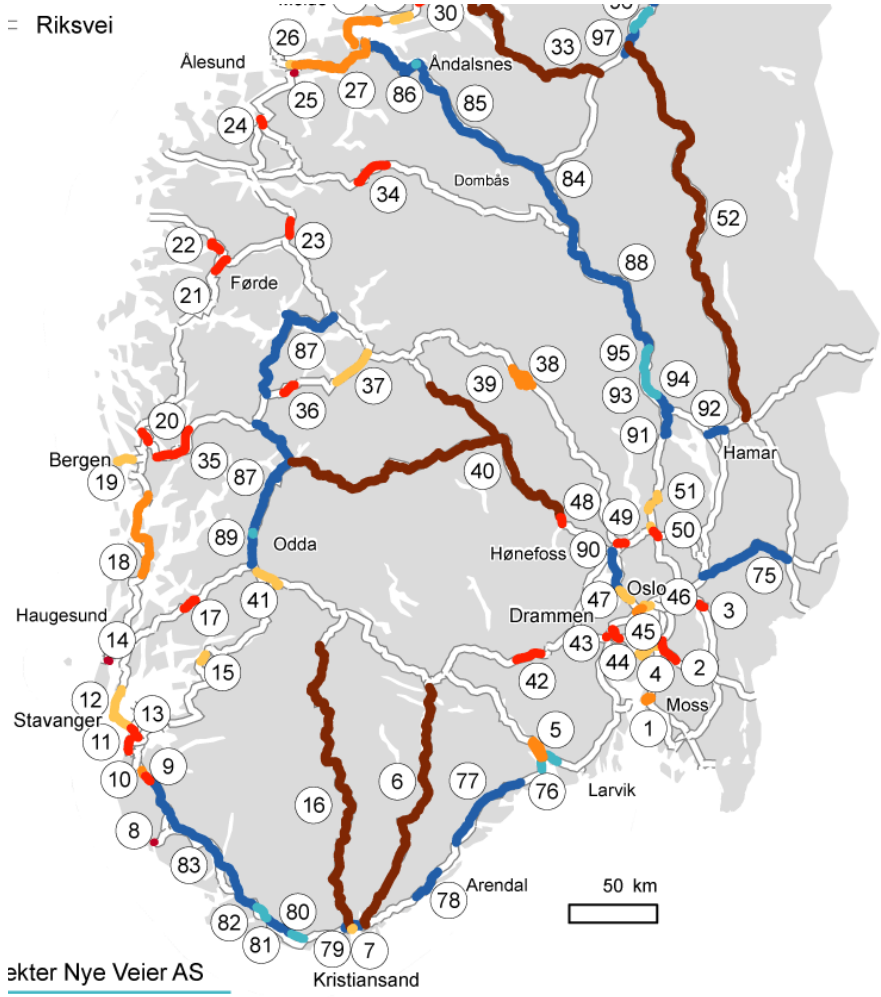
Statens vegvesen

Statens vegvesen
- Igangsatt/vedtatt prosjekt
- Planportefølje
- Andre prioriterte prosjekter
- Prioriterte prosjekter under 1 mrd. kr
- Utviklingsportefølje
- Utbedringsstrekninger

Nye Veier AS
- Igangsatt/vedtatt prosjekt

Riksvei





Prosjekter Statens vegvesen

Planportefølje

Prosjekter

59	E6 Sørelva–Borkamo
62	E6 Sommerset–Mørsvikbotn
63	E6 Ulvsvågskaret
64	E10 Nappstraumen–Å
69	E6 Nordkjosbotn–Hatteng
71	E8 Flyplasstunnelen Tromsø inkl F2-lenka
72	E6 Olderdalen–Langslett
73	E45 Kløfta
75	E6 Høybukta–Hesseng inkl. Langfjordstrømmen bru
76	Rv. 94 Saragammen–Rypefjord

Prioriterte prosjekter under 1 mrd. kr

60	Rv. 80 Adkomst ny Bodø lufthavn
67	E10 Evenes flyplass

Utviklingsportefølje

65	E10 Fiskebøl–Nappstraumen
68	E6 Narviktunnelen

Utbedringsstrekninger

74	Rv. 92 Kirkenes–Gievdneguoikka

Igangsatt/vedtatt prosjekt

58	E6 Helgeland sør, Svenningselv–Lien
61	E6 Megården–Sommerset
66	E10/rv. 85 Tjeldsund–Gullesfjordbotn–Langvassbukt
70	E8 Sørbotn–Laukslett

Prosjekter Nye Veier AS

Igangsatt/vedtatt prosjekt

104	E6 Kvænangsfjellet

ekter Nye Veier AS

	E16 Kongsvinger–E6
	E18 Tvedestrand–Bamble
	E18 Grimstad–Arendal
	E18 Ytre ringvei
	E39 Blørstad–Lyngdal
	E39 Lyngdal–Ålgård

Igangsatt/vedtatt prosjekt

76	E18 Rugtvedt–Langangen
80	E39 Mandal–Blørstad
82	E39 Lyngdal Ø–Lyngdal V
86	E136 Veblungsnes

Igangsatt/vedtatt prosjekt

4	E134 Oslofjordforbindelsen, byggetrinn 2
7	E18/E39 Gartnerløkka–Kolsdalen

13	E39 Smiene–Harestad
17	E134 Bakka–Mo
20	E39 Ringveg øst, Vågsbotn–Klauvaneset
21	E39 Storehaugen–Førde
22	Rv. 5 Erdal–Naustdal
23	E39 Klakegg–Byrkjelo
24	E39 Volda–Furene
30	E39 Bjerkeset–Astad
34	Rv. 15 Strynefjell
36	E16 Hylland–Slæn
42	E134 Saggrenda–Elgsjø
43	Rv. 291 Holmenbrua
44	E134 Dagslett–E18, Viker
48	Rv. 7 Ørgenvika–Kittilsvik
49	E16 Nymoen–Eggemoen
50	Rv. 4 Grua–Roa

Andre prioriterte prosjekter

11	Rv. 509 Kontinentalveien–Hagakrossen
31	Rv. 70 Vikansvingen–Kontrollplassen
35	Fellesprosjektet Arna–Stanghelle

Prioriterte prosjekter under 1 mrd. kr

8	Rv. 426 Eigerøy bru
14	E134 Helganeskrysset–arm Husøy
25	E39 Veibustkrysset
54	E6 Langnesberga

Utviklingsportefølje

1	Rv. 19 Moss
5	Rv. 36 Skjelsvik–Skyggestein
10	E39 Osli–Figgjo
18	E39 Ådland–Svegatjørn (Hordfast)
27	E39 Breivika (ved Ålesund)–Ørskogfjellet og Ørskogfjellet–Vik
28	E39 Vik–Molde

Planned budgets 2025-2036

Statens vegvesen

Tabell 13.4 Økonomiske rammer til riksveier. Statlige midler og annen finansiering. Mrd. 2024-kr

Formål	Budsjett 2024	NTP, årlig gj.snitt 2025–2030	NTP, årlig gj.snitt 2031–2036	NTP, totalt 2025–2036
Forvaltning	7,0	7,3	7,3	87,7
Drift og vedlikehold	9,7	11,6	12,8	146,3
Investeringer, hvorav:	14,2	17,0	20,9	227,6
– mindre investeringer	*4,7*	*5,7*	*7,2*	*77,1*
– store investeringer	*9,5*	*11,4*	*13,7*	*150,5*
Bompengetilskudd	0,7	0,7	0,6	7,8
Tilskudd riksveiferjer, netto	2,6	2,3	2,2	26,9
Sum Statens vegvesen	34,3	38,8	43,9	496,2
Sum Nye Veier AS	6,5	6,5	6,5	78,1
Sum riksveier	*40,8*	*45,3*	*50,4*	*574,3*
Anslag bompenger	14,8	-	-	100,3

Tabell 13.5 Økonomiske rammer til fylkesvei. Mrd. 2024-kr

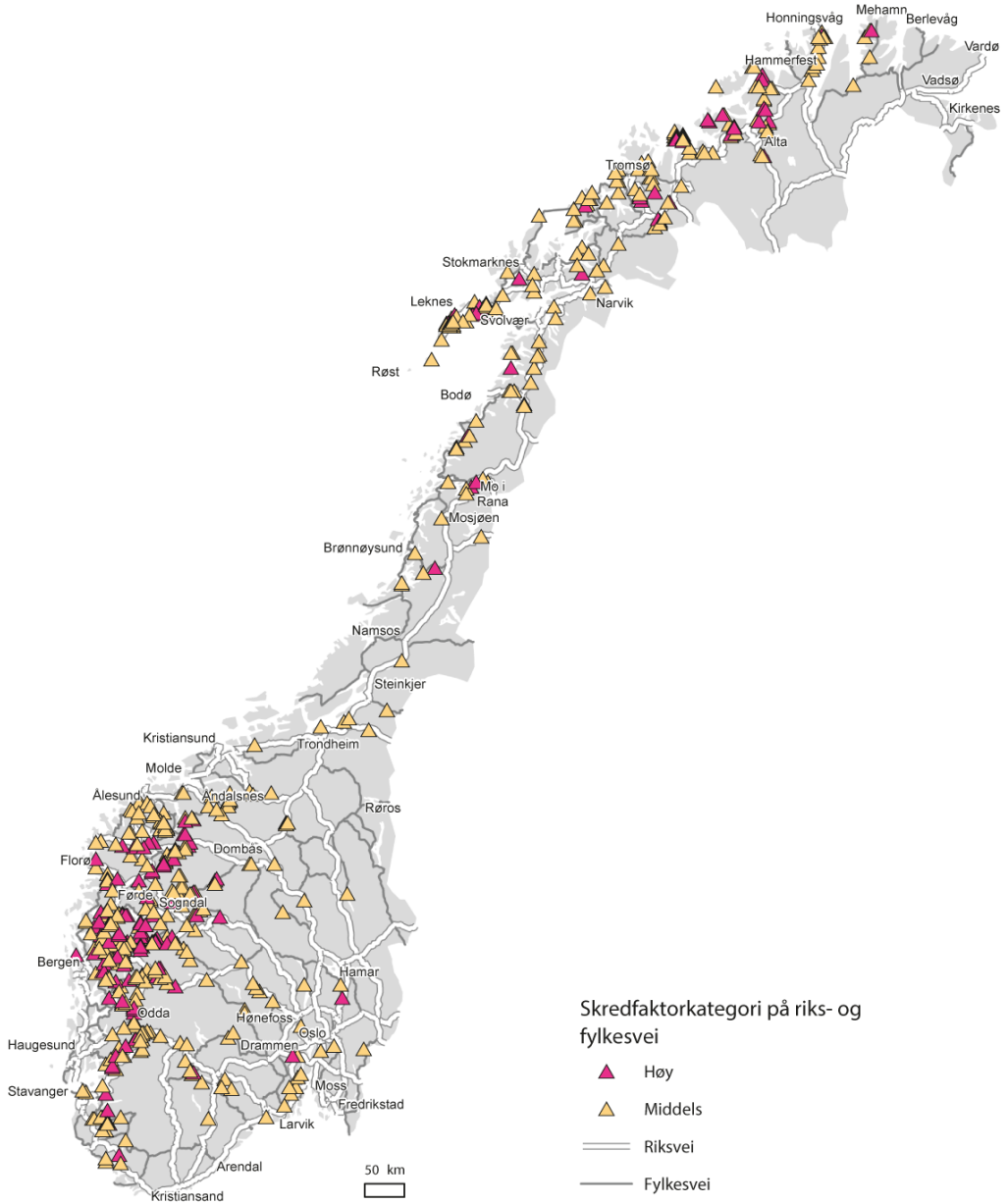
Formål	Budsjett 2024	NTP, årlig gj.snitt 2025–2030	NTP, årlig gj.snitt 2031–2036	NTP, totalt 2025–2036
Rammetilskudd til fylkeskommuner, hvorav:	3,7	4,8	5,6	62,1
– opprusting og fornying av fylkesveinettet[1]	*2,2*	*3,0*	*3,8*	*41,1*
– ras- og skredsikring fylkesvei	*0,9*	*1,1*	*1,2*	*13,8*
– kompensasjon forskrift om tunnelsikkerhet	*0,6*	*0,6*	*0,6*	*7,3*
Øremerkede tilskudd[2]	0,4	0,3	0,1	2,9
Sum prioritering til fylkesvei	4,1	5,1	5,7	65,0

Inventory of road segments exposed to landslides or avalanches

Statens vegvesen

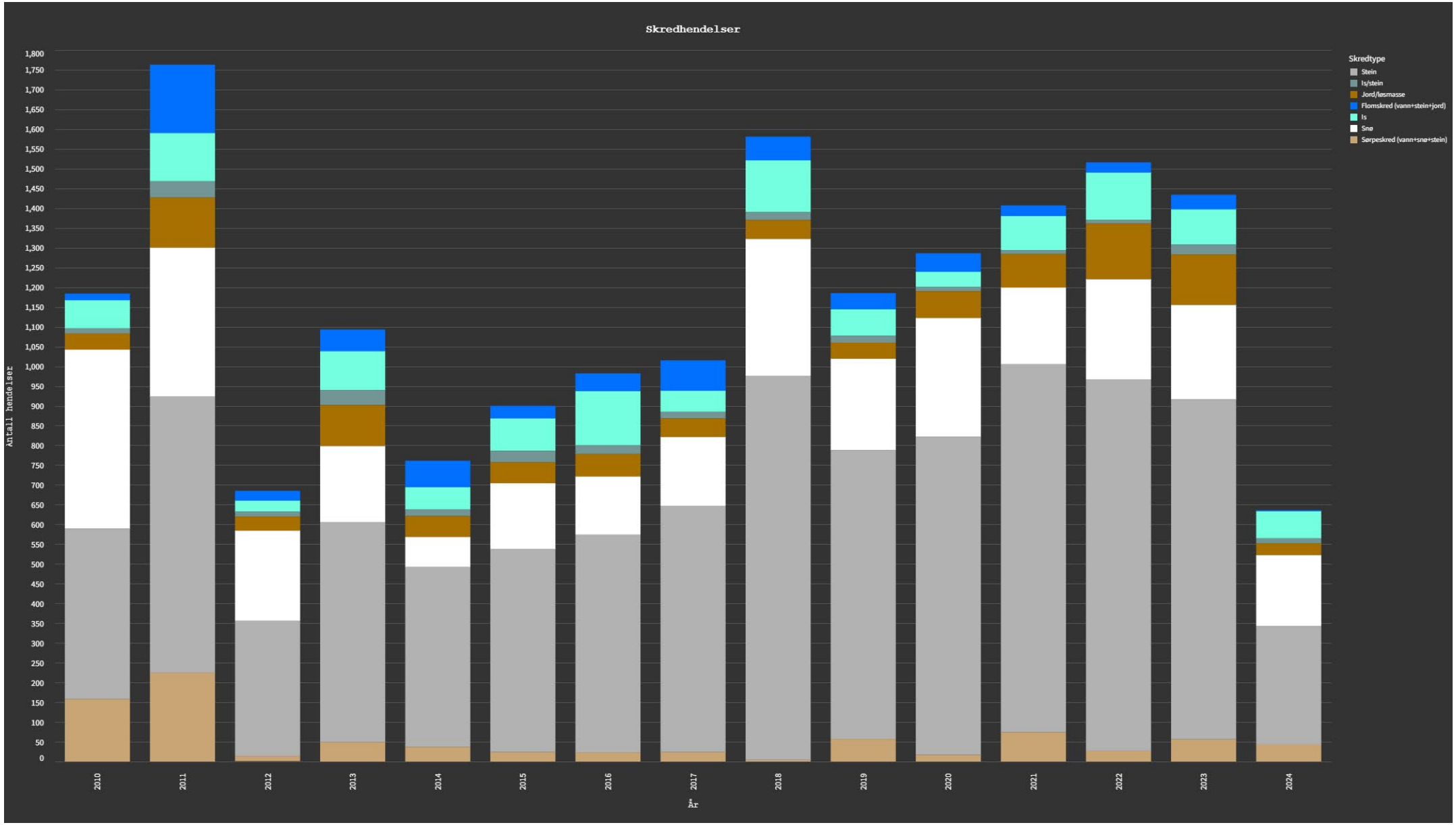
- Objects in the national road database
- Updated October 2023 – part of delivery to NTP

	Antall skredpunkt				
Vegkategori/fylke	**High**	**Medium**	**High and medium**	**Low**	**Total**
County roads total	123	419		1149	1691
Agder		1	1		
Akershus		4	4		
Buskerud		1	1		
Finnmark	9	16	25		
Innlandet	2	3	5		
Møre og Romsdal	9	72	81		
Nordland	11	36	47		
Rogaland	8	25	33		
Telemark	1	13	14		
Troms	12	88	100		
Trøndelag		3	3		
Vestfold		5	5		
Vestland	71	152	223		
Østfold			0		
National roads	78	177		206	461

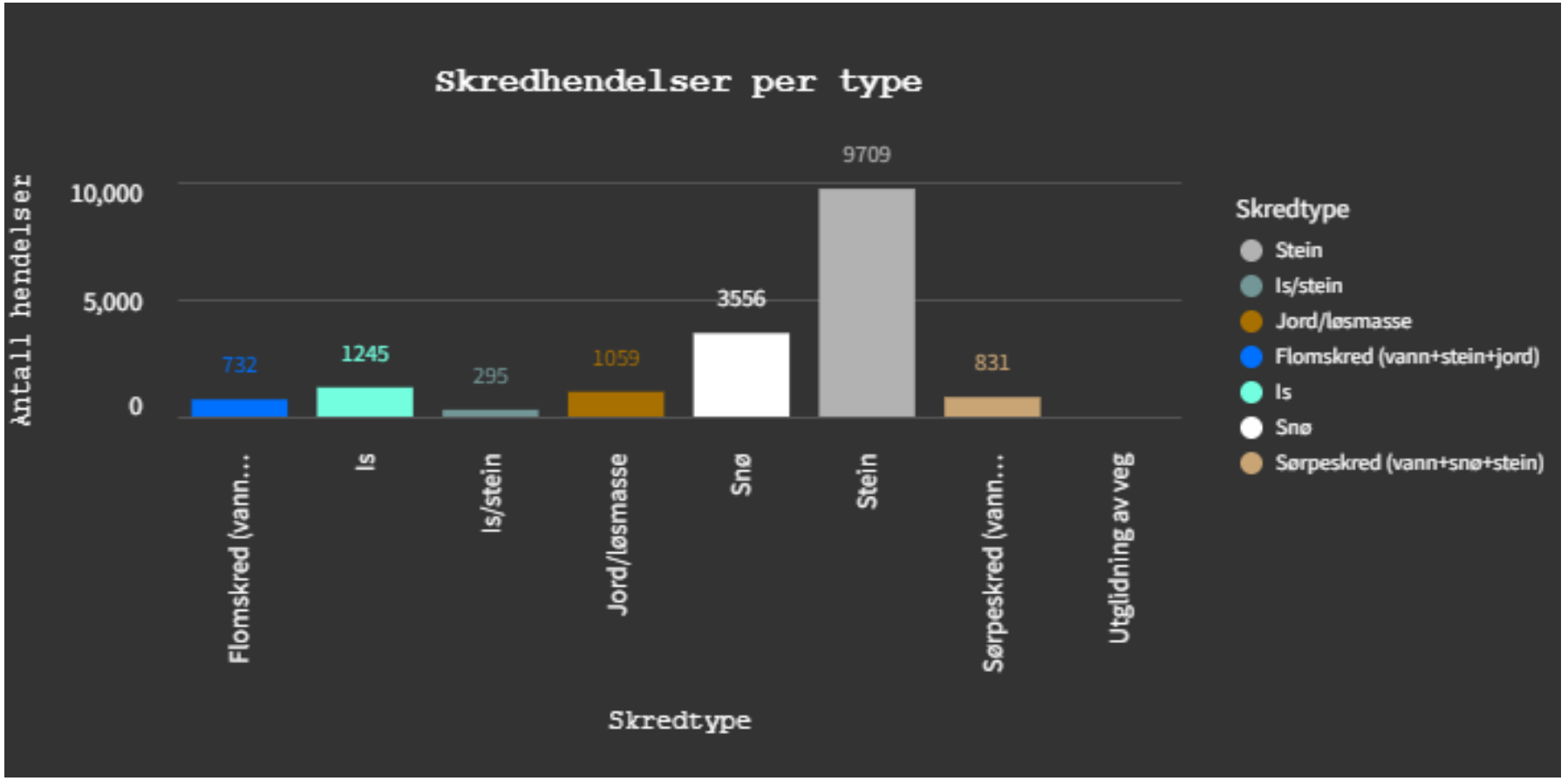


Landslides and avalanches from natural slopes 2010-2024

Statens vegvesen

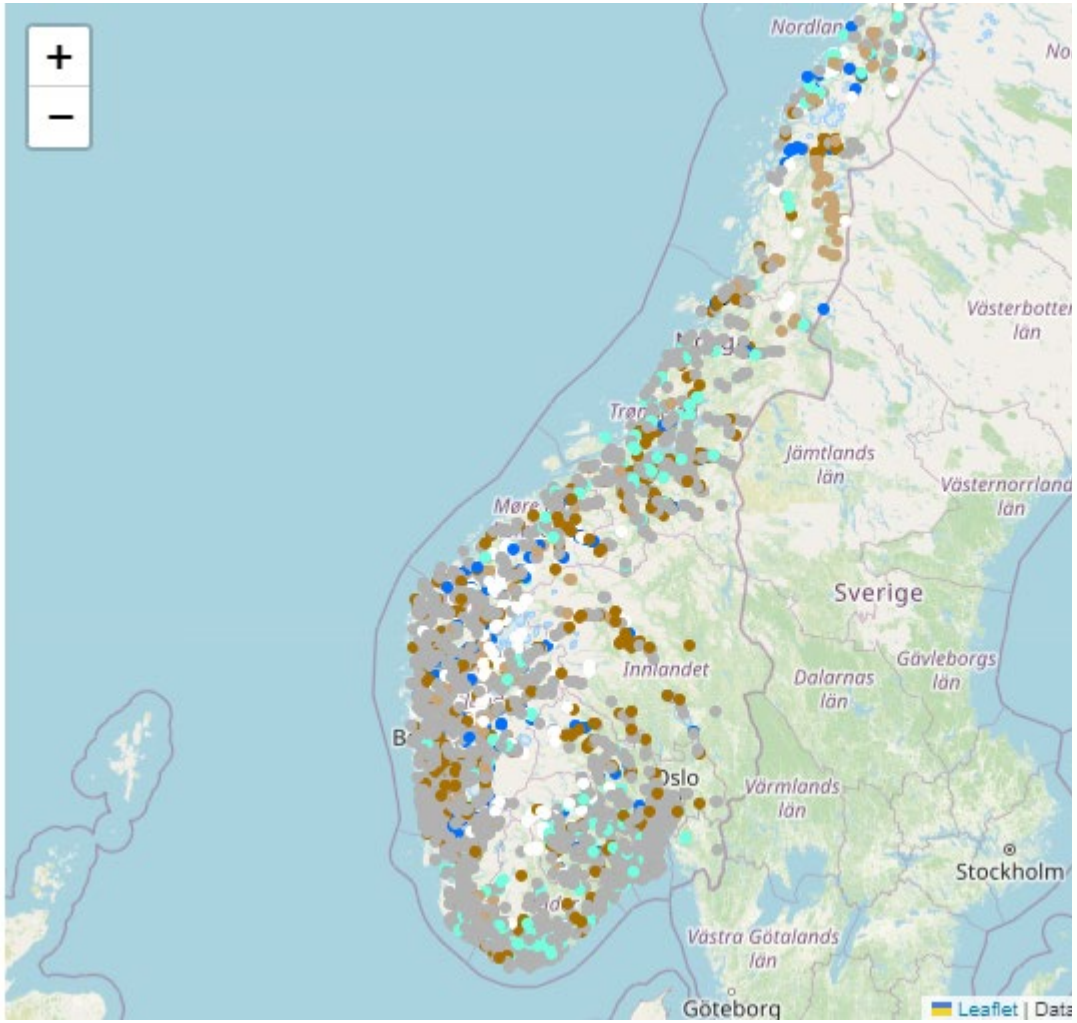


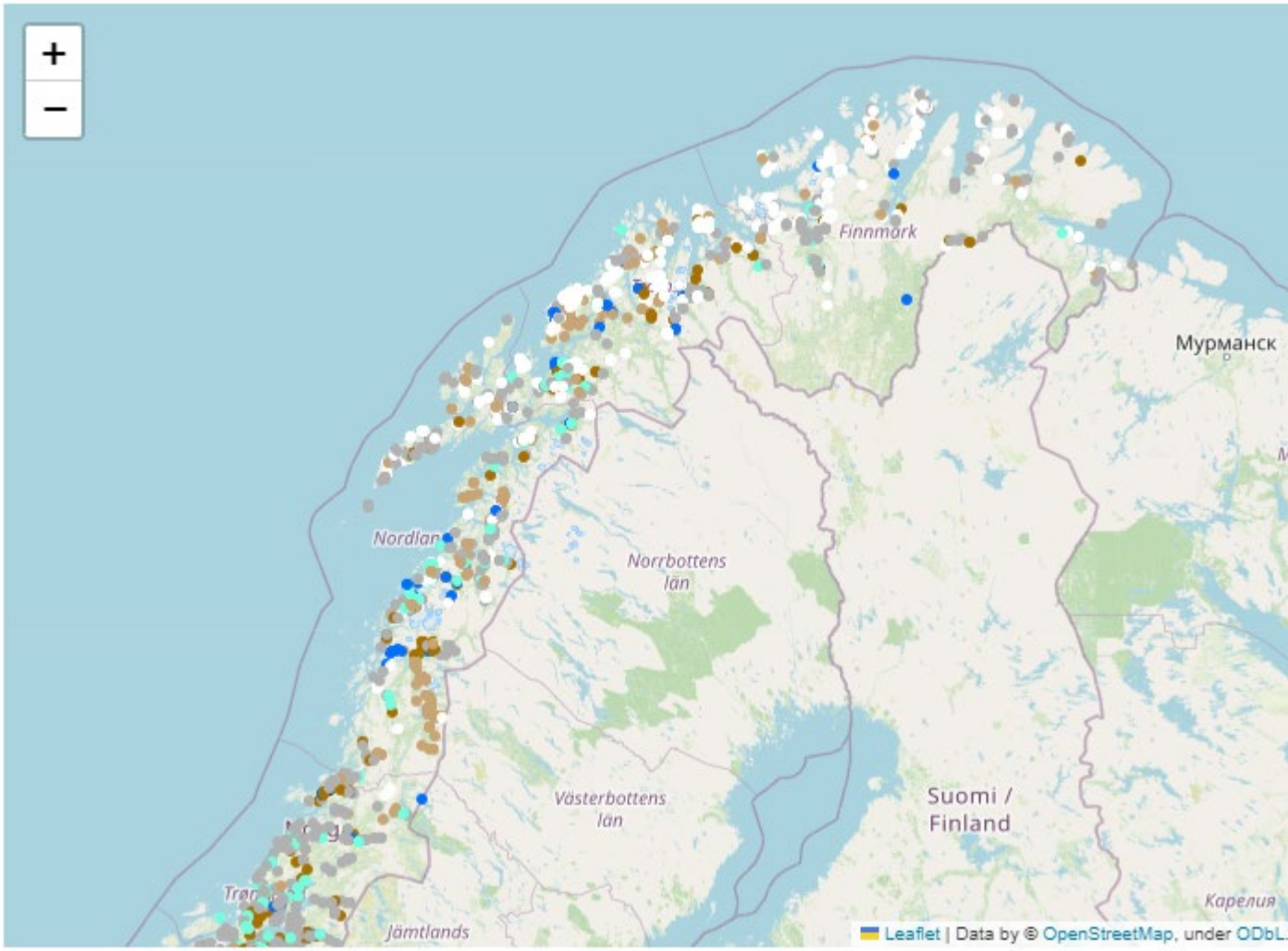
Landslides and avalanches from natural slopes 2010-2024, by type



Landslides and avalanches from natural slopes 2010-2024

Statens vegvesen





Statens vegvesen

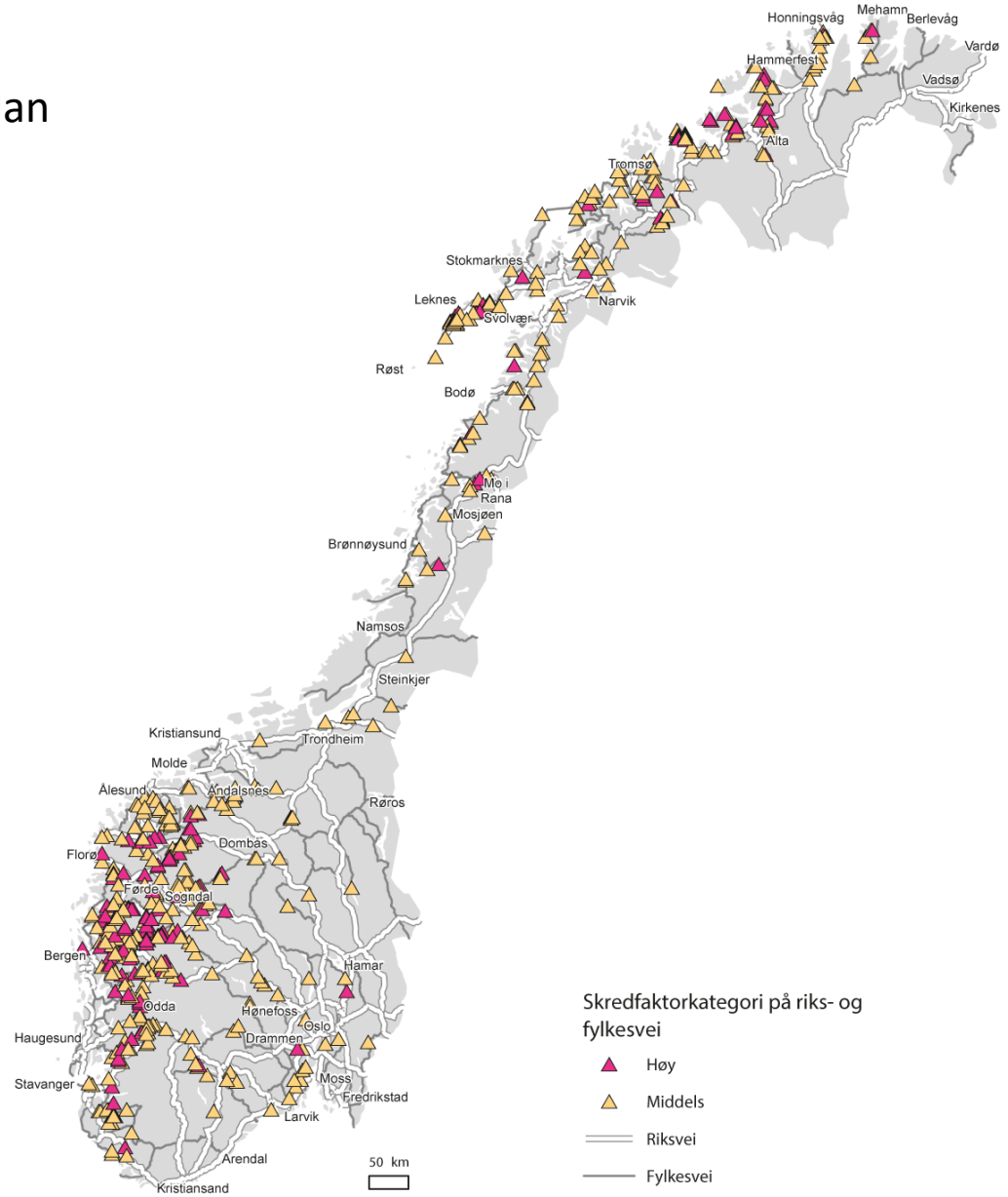
Inventory of road segments exposed to landslides or avalanches

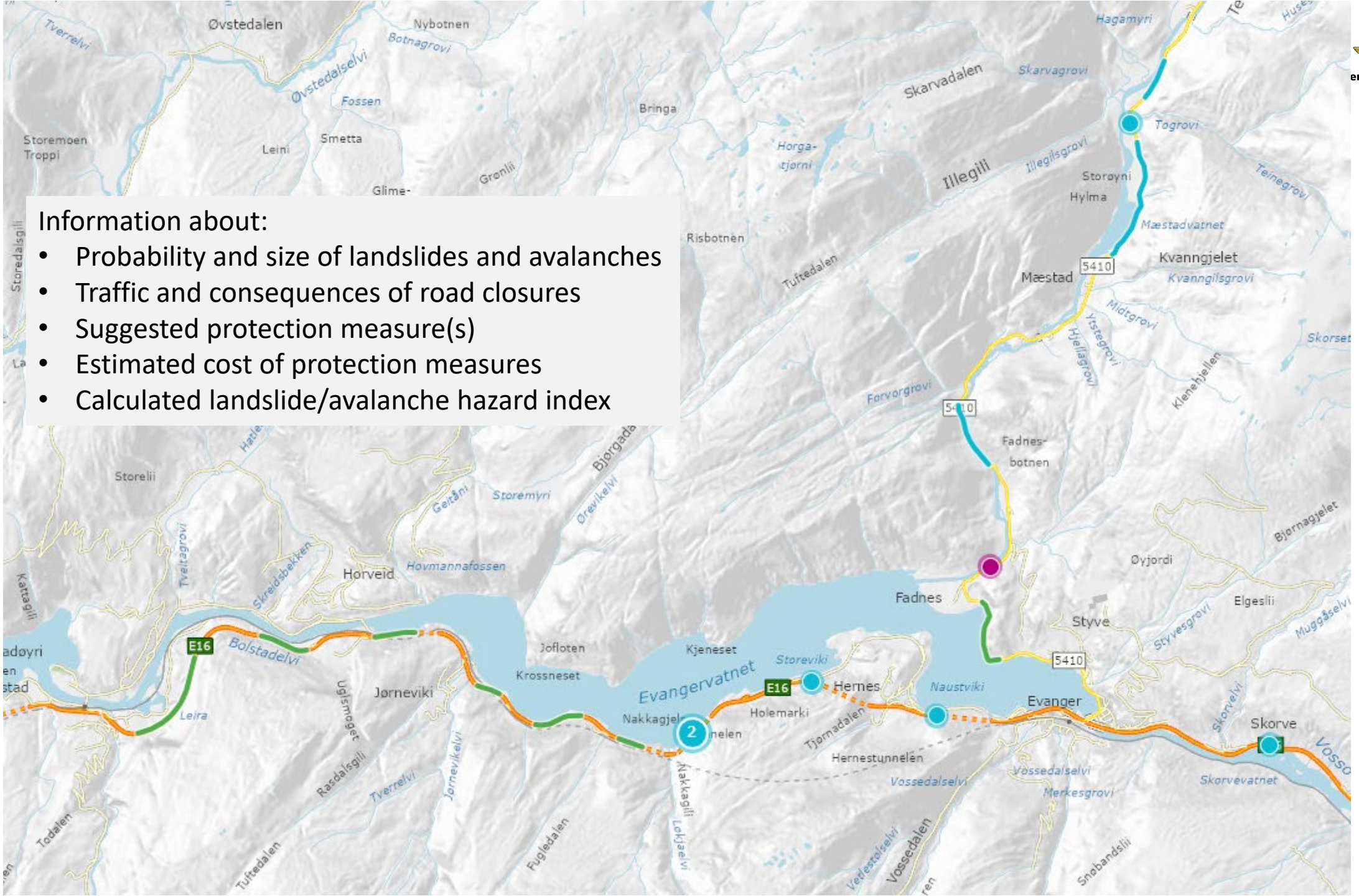
Avalanche/landslide hazard index

Inventory of road segments exposed to landslides or avalanches

- Objects in the national road database
- Has been revised every 4 years as an input to National Transport Plan
- Last updated October 2023 – part of delivery to NTP

	Antall skredpunkt				
Vegkategori/fylke	**High**	**Medium**	**High and medium**	**Low**	**Total**
County roads total	123	419		1149	1691
Agder		1	1		
Akershus		4	4		
Buskerud		1	1		
Finnmark	9	16	25		
Innlandet	2	3	5		
Møre og Romsdal	9	72	81		
Nordland	11	36	47		
Rogaland	8	25	33		
Telemark	1	13	14		
Troms	12	88	100		
Trøndelag		3	3		
Vestfold		5	5		
Vestland	71	152	223		
Østfold			0		
National roads	78	177		206	461




Information about:
• Probability and size of landslides and avalanches
• Traffic and consequences of road closures
• Suggested protection measure(s)
• Estimated cost of protection measures
• Calculated landslide/avalanche hazard index
Øvstedalen
Nybotnen
Botnagrovi
Øvstedalselvi
Fossen
Tverrelvi
Storemoen
Troppi
Leini
Smetta
Glime-
Gronli
Bringa
Horga-
tjørni
Skarvadalen
Skarvagrovi
Hagamyri
Togrovi
Illegili
Illegilsgrovi
Storøyni
Hylma
Teinegrovi
Mæstadvatnet
Risbotnen
Tuftedalen
Mæstad
5410
Kvanngjelet
Kvanngilsgrovi
Midtgrovi
Yrstegrovi
Hjellagrovi
Skorset
Forvorgrovi
Klenehjellen
Fadnes-
botnen
Storelii
Bjørgadø
Geitåni
Storemyri
Ørevikelvi
Tvetagrovi
Skreidsbekken
Horveid
Hovmannafossen
Kattagili
Fadnes
Øyjordi
Bjørnagjelet
Elgeslii
Styve
Styvesgrovi
Muggåselvi
E16
Bolstadelvi
Jofloten
Kjeneset
Storeviki
Krossneset
Evangervatnet
Hernes
Naustviki
Evanger
Jørneviki
Uglsmaget
Leira
Nakkagjel
Holemarki
Tjørnadalen
Hernestunnelen
Skorve
Skorvelvi
Skorvevatnet
Vossedalselvi
Merkesgrovi
Rasdalsgili
Tverrelvi
Jørnevikelvi
Nakkagili
Lekjaelvi
Todalen
Fugledalen
Vossedalen
Snøbandslii

Inventory of road segments exposed to landslides or avalanches

Statens vegvesen

	Number of locations					Estimated cost for protection (mill 2024)			
Road Category/County	**High**	**Medium**	**High and medium**	**Low**	**Total**	**Høy**	**Middels**	**Høy og middels**	**CAD**
County roads total	123	419		1149	1691	36868	23659	60527	**7750**
Agder		1	1				770	770	
Akershus		4	4				38	38	
Buskerud		1	1				19	19	
Finnmark	9	16	25			2300	2530	4830	
Innlandet	2	3	5			143	72	215	
Møre og Romsdal	9	72	81			3530	645	4175	
Nordland	11	36	47			2073	3150	5223	
Rogaland	8	25	33			3874	3395	7269	
Telemark	1	13	14			158	259	417	
Troms	12	88	100			6527	7386	13913	
Trøndelag		3	3				136	136	
Vestfold		5	5				52	52	
Vestland	71	152	223			18262	5207	23469	
Østfold			0					0	
National roads	78	177		206	461	26884	8474	35358	**4500**

Landslide avalanche hazard index is the sum of six different factors

Statens vegvesen

- Hazard index = F1 + F2 + F3 + F4 + F5 + F6

Factor	Based on	Maximum contribution to index
F1 Traffic amount	Average annual daily traffic	2
F2 Avalanche hazard	Probability and size	2
F3 Detours	Diversion time due to closed road	1,5
F4 Road closures	Closures due to avalanches and landslides	1,5
F5 Closures due to avalanche danger	Closures due to danger of avalanches and landslides	1
F6 Neighbour avalanche	Possibility of being hit by new avalanche when waiting at a closed road	1

- Category based on index:

Landslide index	Category
3,50-9	High
2,50-3,49	Medium
0-2,49	Low

Factors included in the landslide index (1/3)

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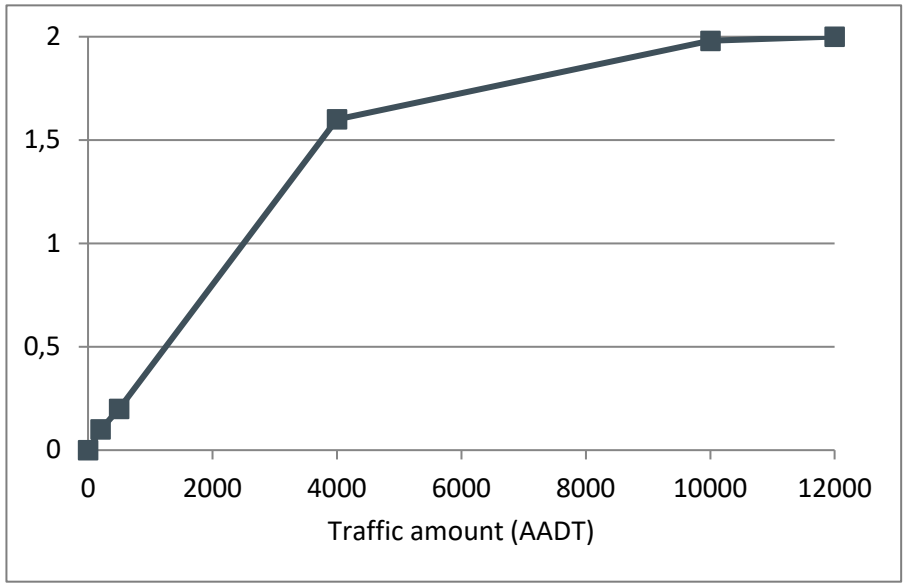
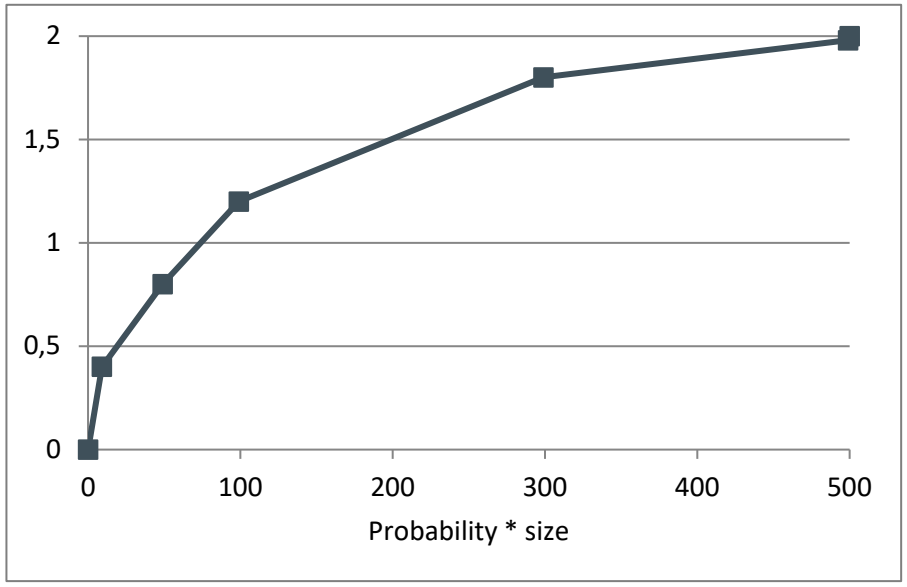
- Traffic amount
  - Based on daily average traffic numbers, easily available
  - Represent both the personal risk and problems related to closed roads and isolation
  - Varies between 0 and 2,00



- Landslide/avalanche hazard
  - Based on probability of landslides/avalanches happening, and how large they normally are
  - Represent possibility for future closures and risk to road users
  - Varies between 0 and 2,00



Factors included in the landslide index (2/3)

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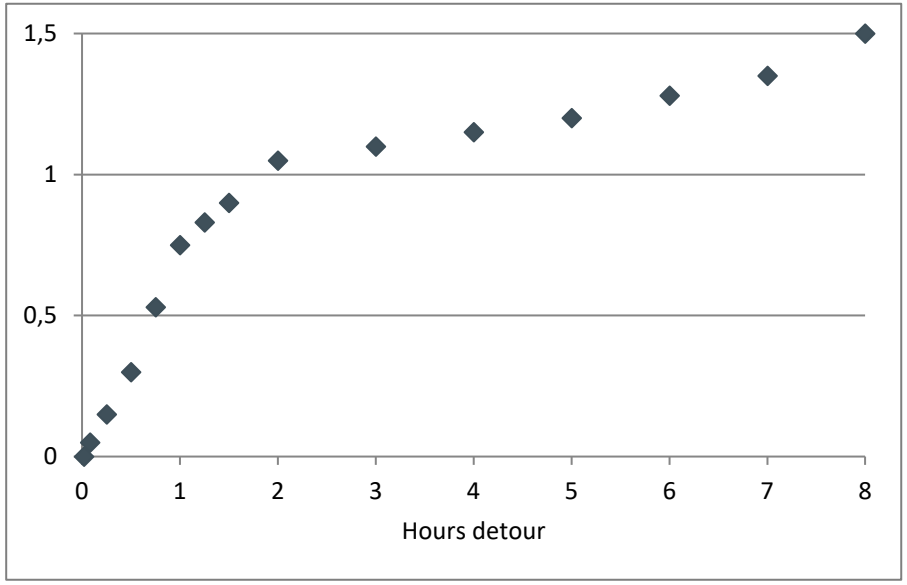
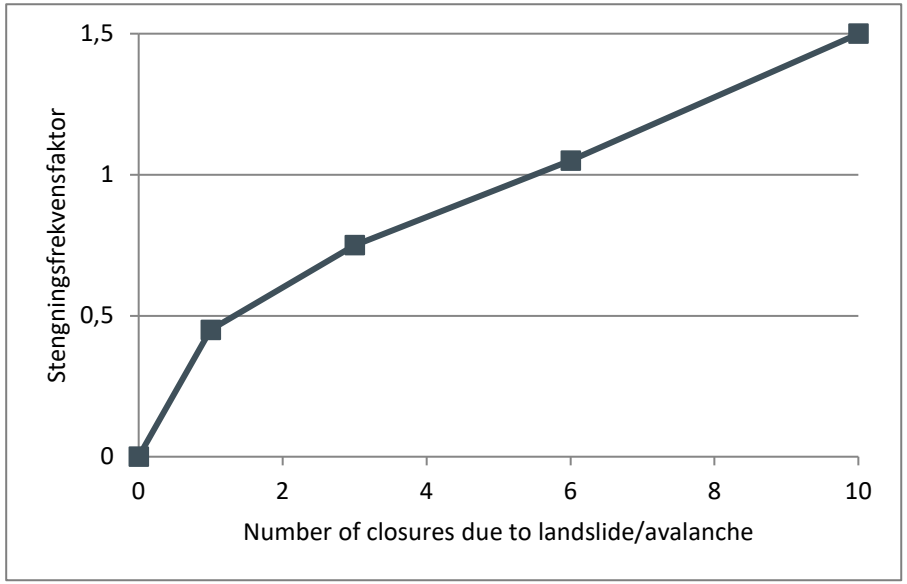
- Detours
  - How long is the alternate route if the road is closed
  - Number of hours driving, up to 8 hours
  - Varies between 0 and 1,50

- Road closures
  - How often the road has been closed due to landslides/avalanches
  - Number of times a year
  - Varies between 0 and 1,50

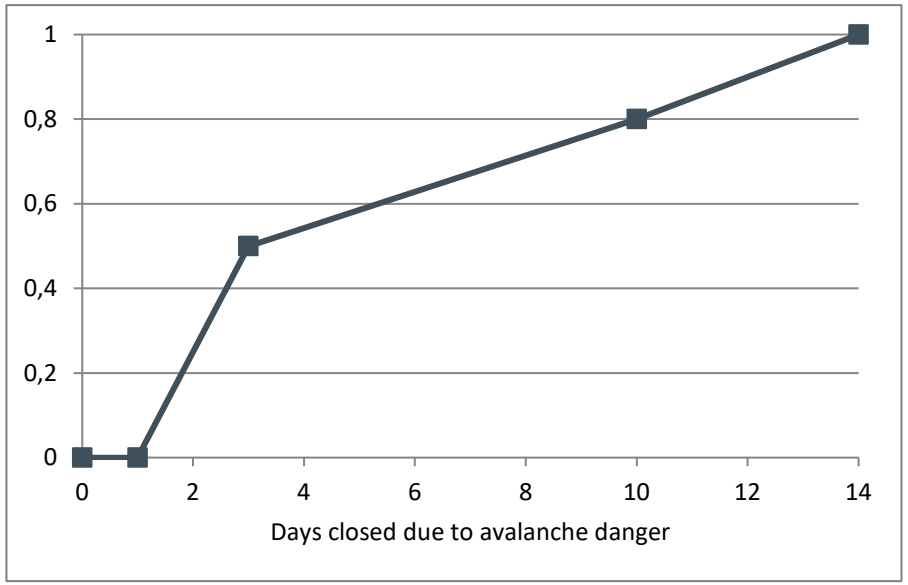




Factors included in the landslide index (3/3)

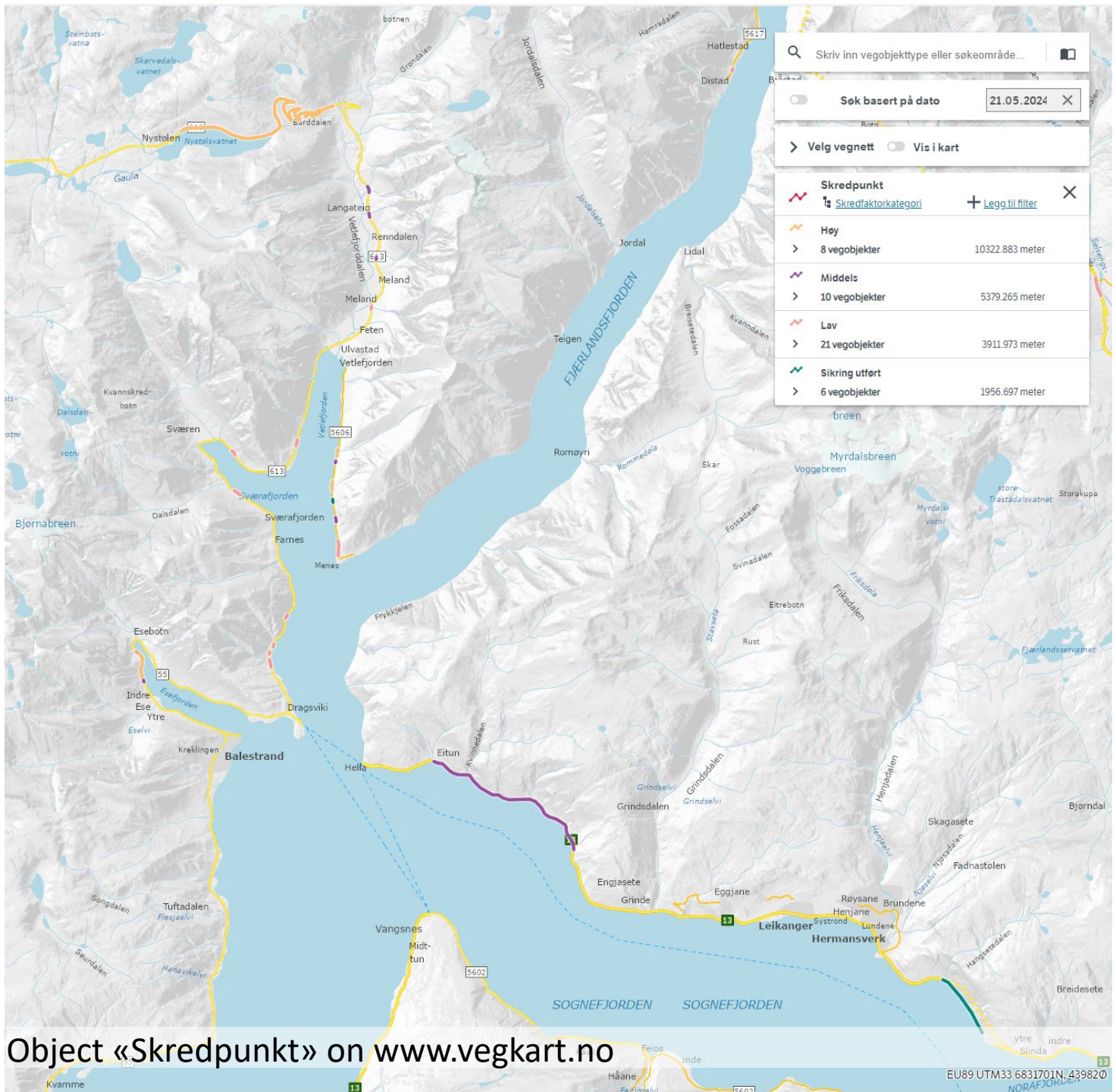
Statens vegvesen

- Road closure due to avalanche danger
  - How many days the road has been closed due to danger of landslide/avalanche every year
  - Only applies when the detour is more than 2 hrs
  - Varies between 0 and 1,00



- «Neighbouring» avalanches
  - Risk of being hit by another avalanche while waiting for reopening of the road
  - Varies between 0 and 1,00

Neighbour avalanche	Factor
No	0
Two paths, low simultaneity	0,50
Two paths, high simultaneity	0,80
Several paths	1,00



Object «Skredpunkt» on www.vegkart.no

Skred-punkt | Legg til i søk | Zoom til

Vegsystemreferanser:
FV613 K S2D1 m12730-20429
FV613 K S3D1 m0-1

Egenskaper

Navn
Gaularfjellet

ID
1469845991

ÅDT
157

ÅDT år
2023

Snøskred, sannsynlighet
20

Snøskred, bredde
40 m

Omkjøring
Ingen omkjøringsmulighet

Stengningsfrekvens, skred
5

Stengningdøgn, skredfare
15

Naboskred
Flere skredløp

F1 Trafikkmengde-faktor
0.08

F2 Skredfarefaktor
2

F3 Omkjøringsfaktor
1.5

F4 Stengningsfaktor
0.95

F5 Skredfarestengningsfaktor
1

F6 Naboskredfaktor
1

Skredfaktor
6.53

Skredfaktorkategori
Høy

Planstatus
Idé

Sikringstiltak A
Vinterstengning

Kostnadsoverslag (mill kr) for sikringstiltak A
0 mKr

Kostnadsnivå år
2019

Usikkerhet kostnad
0 %

Utført anslag
Nei

Merknad
Vegen er vinterstengt på grunn av kombinasjon av drifts- og rasproblematikk

Egenskaper

Navn
Kjenesskreda og Hølenskreda

ID
151

ÅDT
700

ÅDT år
2023

Snøskred, sannsynlighet
2.4

Snøskred, bredde
120 m

Sørpeskred, sannsynlighet
0.25

Sørpeskred, bredde
20 m

Omkjøring
2 t

Stengningsfrekvens, skred
2.4

Stengningdøgn, skredfare
4.5

Naboskred
Flere skredløp

F1 Trafikkmengde-faktor
0.28

F2 Skredfarefaktor
1.78

F3 Omkjøringsfaktor
1.05

F4 Stengningsfaktor
0.66

F5 Skredfarestengningsfaktor
0

F6 Naboskredfaktor
1

Skredfaktor
4.77

Skredfaktorkategori
Høy

Planstatus
Reguleringsplan

Sikringstiltak A
Bru

Kostnadsoverslag (mill kr) for sikringstiltak A
815 mKr

Kostnadsnivå år
2022

Usikkerhet kostnad
40 %

Restrisiko for sikringstiltak A
0

Sikringstiltak B
Tunnel og overbygg

Kostnadsoverslag (mill kr) for sikringstiltak B
533 mKr

Restrisiko for sikringstiltak B
0.001

Utført anslag
Ja

A little background on the index

Statens vegvesen

- Originally developed 2002/2003
- Revised in 2010/2011
- Used in regional inventories / protections plans made in 2011, 2015, 2019 and 2023

- Challenges with the index:
- What is valued the most?
- Are factors valued the same way by everyone?

New (revised) avalanche landslide index

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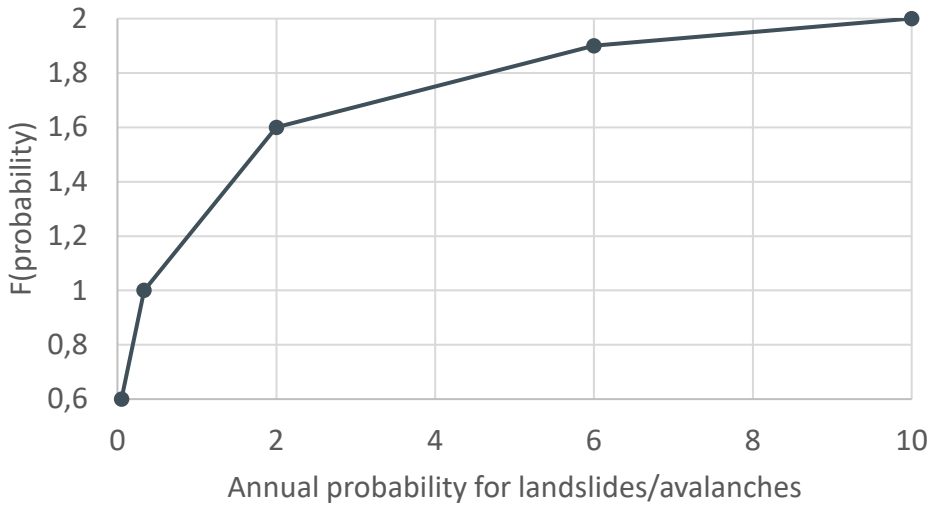
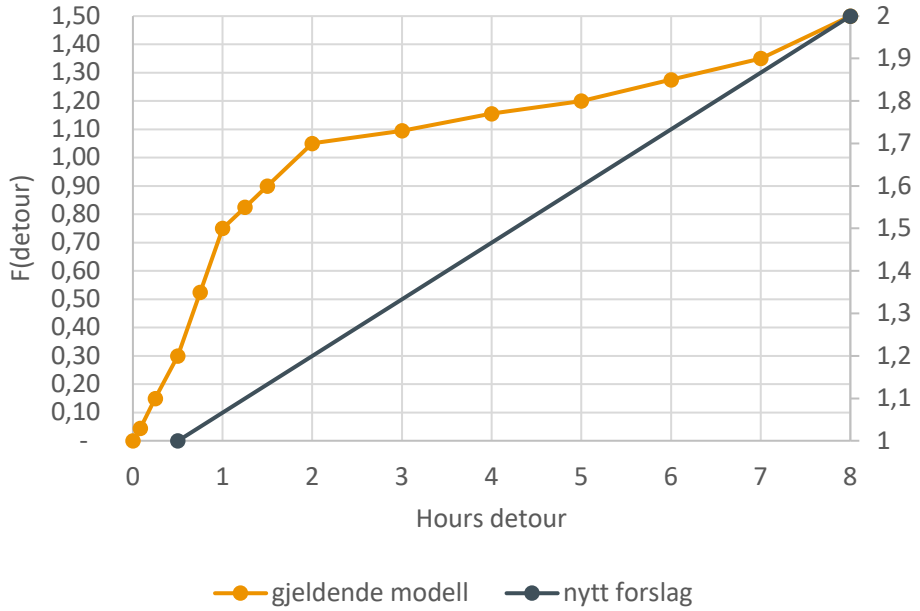
- Based on four factors
  - Probability
  - Size
  - Detours
  - Traffic

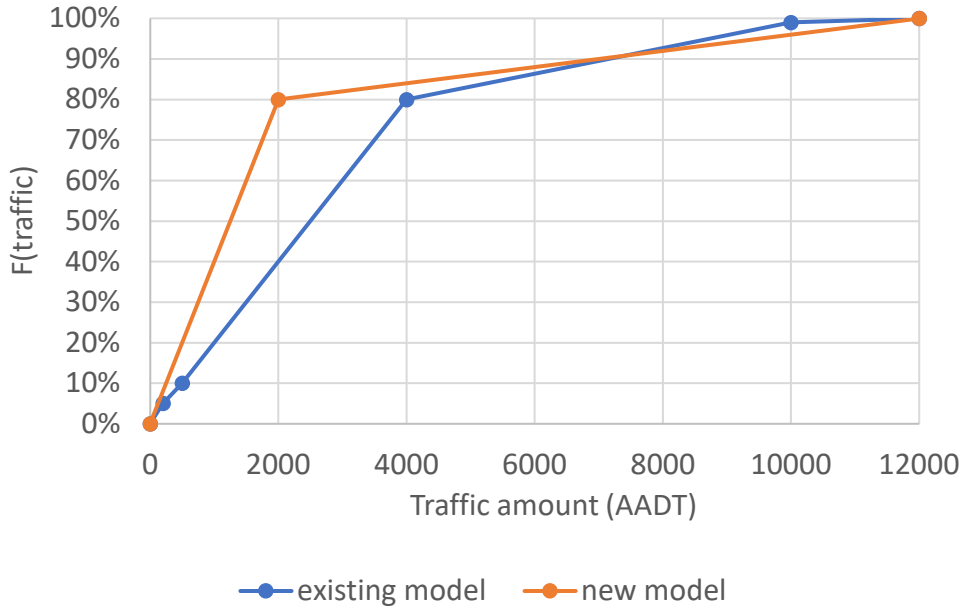
- Landslide index = F(probability)*F(size)*F(detour)*F(traffic)

Factors in new index



Avalanche size (width)		F(size)
Small	< 25 m	1
Ca. 50 m wide	25-75 m	1,2
Ca. 100 m wide	75-125 m	1,4
Ca. 150-250 m wide	125-275 m	1,6
Big, more than 300 m wide	>275	1,8





Summary

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- New/revised model isn’t yet described properly
- National road database must be updated with calculations of new model
- Old model will still be avaliable in road database

- New model will change what locations are in which categories
- Factors today are valued based on how much they «count» – many locations have too high probabilities

Thank you for your attention

Statens vegvesen

- Any questions?

- Feel free to contact me by mail or teams: heidi.bjordal@vegvesen.no