Riksrevisjonen

The Office of the Auditor General's investigation into government authorities' effort to adapt infrastructure and built-up areas to a changing climate

Document 3:6 (2021–2022)

Riksrevisjonen

To the Storting (Norwegian Parliament)

The Office of the Auditor General hereby presents Document 3:6 (2021–2022) *The Office of the Auditor General's investigation into government authorities' effort to adapt infrastructure and built-up areas to a changing climate.*

The document comprises the following sections:

- The Office of the Auditor General's conclusions, elaboration of conclusions, recommendations, the Ministers' responses and the Office of the Auditor General's statement to the Ministers' responses
- Appendix 1: The Office of the Auditor General's letter to the Minister of Climate and Environment
- Appendix 2: The Office of the Auditor General's letter to the Minister of Petroleum and Energy
- Appendix 3: The Office of the Auditor General's letter to the Minister of Local Government and Regional Development
- Appendix 4: The Ministers' responses
- Appendix 5: The Office of the Auditor General's letter to the Minister of Justice and Public Security
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- Appendix 7: The Office of the Auditor General's letter to the Minister of Transport
- Appendix 8: The Minister's response
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- Appendix 10: The Minister's response
- Appendix 11: Performance audit report with assessments

The Office of the Auditor General, 3 March 2022

For the Board of the Auditors General

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The Office of the Auditor General uses the following severity rating scale, ranked from the most to the least severe:

1. **Extremely serious** is used in circumstances where the consequences for society or the affected citizens are extremely serious, such as a risk to life or health.
2. **Serious** is used in circumstances that may have significant consequences for society or affected citizens, or where the sum of errors and omissions is so great that this must be considered serious.
3. **Highly reprehensible** indicates circumstances that have less serious consequences, but concern matters of principle or great importance.
4. **Reprehensible** is used to characterise inadequate management where the consequences are not necessarily serious. This may apply to errors and omissions that have financial consequences, violation of regulations or matters that have been addressed earlier and have still not been corrected.

1 Introduction

The Intergovernmental Panel on Climate Change (IPCC) presented the first part of the sixth assessment report on climate change on 9 August 2021. According to the report, climate change is proceeding at a faster pace, will become more intense, and some of the trends are now irreversible.[1] Climate change is already causing more extreme weather across the globe and changes in climate systems.

Since 2013, the Norwegian authorities have had a national objective for society to be prepared for and adapted to climate change, cf. Report No. 33 to the Storting (White Paper) (2012–2013) Climate change adaptation in Norway, and Recommendation 497 S (2012–2013). According to the white paper, **climate change adaptation** involves recognising that the climate is changing, understanding the impacts, and taking steps either to prevent damage or to make use of opportunities that may arise. The Ministry of Climate and Environment emphasizes that climate change impacts all areas of society and requires extensive cooperation, a common knowledge base and interdisciplinary solutions.[2]

According to the IPCC's report from August 2021, the average global temperature has already risen by 1.1 degrees Celsius.[3] With the current rate of emissions, the increase over the next 20 years will pass 1.5 degrees. This means that we will notice climate change earlier than expected and that we have shorter time to adapt. According to the report, without immediate, extensive and sustained cuts to emissions we will not be able to achieve the goal of limiting global warming to 1.5 degrees.

An important starting point for society's adaptation to climate change is the national **climate projections**, which show the impact of climate change in Norway. Report no. 33 to the Storting (White Paper) (2012–2013) states that, when working with climate change adaptation, the government authorities must assume a scenario in which there are high greenhouse gas emissions. According to the white paper, this is done as a precautionary approach.[4] The requirement for using the high emissions alternative as a

Climate projections and emissions scenarios

Climate projections are calculations of what the climate will look like up to 2100. Among other things, the calculations can be used as a basis for adapting land-use planning and the dimensioning of infrastructure and buildings to a future climate.

The projections are based on the Intergovernmental Panel on Climate Change's (IPCC) different scenarios for future greenhouse gas emissions.

[1] The United Nations (2021) *Report of the Intergovernmental Panel on Climate Change: A Code Red for Humanity*, 9 August 2021.
[2] Report No. 33 to the Storting (White Paper) (2012–2013) Climate change adaptation in Norway and letter from the Ministry of Climate and Environment to the Office of the Auditor General dated 6 September 2019.
[3] The Norwegian Environment Agency (2021) *The IPCC's Sixth Assessment Report, Main findings in the first part of the Sixth Assessment Report*
[4] Report No. 33 to the Storting (White Paper) (2012–2013) *Climate change adaptation in Norway*, page 35 and *Central Government Planning Guidelines for Climate and Energy Planning and Climate Change Adaptation, Chapter 4.3.*

basis is also stated in the *Central Government Planning Guidelines for Climate and Energy Planning and Climate Change Adaptation*.[5]

In the scenario of high greenhouse gas emissions, it is estimated that temperatures in Norway will rise by between 3.3 and 6.4 degrees toward the end of the century.[6] In line with this scenario, annual rainfall will increase by approximately 18 per cent, and incidents of torrential rain will become more intense and occur more frequently. Floods caused by rain will also become more intense and occur more often, while floods resulting from snowmelt will be fewer and smaller. The sea level will rise by between 15 and 55 cm depending on the location. More rainfall and flooding will also result in more frequent landslides. Scenarios with lower greenhouse gas emissions produce less climate change. However, higher temperatures and more rainfall have also been predicted for the lower emission scenarios.[7]

According to Finance Norway's natural damage statistics, approximately NOK 2.5 billion was paid in compensation for damage caused by extreme weather and natural disasters combined from 2018 to 2020. The largest proportion of the compensation amounts concerned damage from storms and landslides.[8] Costs associated with repairs to roads, railways and other public infrastructure are added to this. Climate change may increase the risk of damage and inflict significant costs on society if climate change is not taken into consideration in the long-term planning.[9]

The objective of the investigation was to assess the work of the government authorities in adapting infrastructure and built-up areas to a changing climate. By government authorities, we mean both central government authorities and the municipalities. The municipalities are at the forefront of dealing with climate change because the effects of climate change are local.

In terms of infrastructure, we particularly looked at central government transport infrastructure. The reason for this is that society is reliant on well-functioning transport systems, and that climate change increases the risk of natural hazards that reduce the accessibility and safety of roads, railways, and sea lanes along the coast.[10]

A fundamental principle for the work on climate change adaptation is that the responsibility lies with the stakeholder that is in charge of a task or function that is affected by climate change (the principle of responsibility). All sectoral authorities thereby have a responsibility to ensure that climate change is taken into consideration within their own areas. In addition, the Ministry of Climate and Environment has a special responsibility for facilitating the government's overall work on climate change adaptation. The Norwegian

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[5] REG-2018-09-28-1469, *Central Government Planning Guidelines for Climate and Energy Planning and Climate Change Adaptation*

[6] The Norwegian Centre for Climate Services (NCCS) (2015) *Climate in Norway 2100 – a knowledge base for climate adaptation,* updated in 2015, report no. 2/2015, 2nd edition.

[7] The Norwegian Centre for Climate Services (NCCS) (2015) *Climate in Norway 2100 – a knowledge base for climate adaptation updated in 2015,* report no. 2/2015

[8] Finance Norway (2021) *Amounts of compensation for storms, floods, storm surges and landslides*. Norwegian Natural Damage Statistics (NASK) Finance Norway, date accessed: 1 September 2021.

[9] Report No. 33 to the Storting (White Paper) (2012–2013) *Climate change adaptation in Norway.*

[10] Larsen et al. (2010) *National Transport Plan (2014–2023) Investigation Phase, Climate Change Adaptation*, page 8.

Environment Agency, which is the Ministry's specialist agency, is responsible for coordination.

The investigation included the areas of responsibility of the Ministry of Climate and Environment, the Ministry of Local Government and Modernisation (now the Ministry of Local Government and Regional Development)[11], the Ministry of Justice and Public Security, the Ministry of Transport, and the Ministry of Petroleum and Energy that involve the adaptation of transport infrastructure and built-up areas to a changing climate. Following the change of government in autumn 2021, responsibility for coastal infrastructure and agency management of the Norwegian Coastal Administration was transferred from the Ministry of Transport to the Ministry of Trade, Industry and Fisheries.[12]

Furthermore, the investigation included the Ministry of Agriculture and Food's follow-up of the Forestry Act when concerning the provisions relating to natural hazards. The reason for this is that large parts of built-up areas and the rail and road network border forested areas, and that the management and operation of forests has an impact on the risk of flooding and landslides.

The investigation primarily covered the period from 2013, after Report No. 33 to the Storting (White Paper) (2012–2013) *Climate change adaptation in Norway* was considered, and until 2021. Some documents before and after the period were included.

Among other things, the investigation was based on the following decisions and prerequisites from the Storting:

- Act relating to Municipal Emergency Preparedness, Civil Protection and the
  Norwegian Civil Defence (Civil Protection Act)
- Act relating to Planning and the Processing of Building Applications (Planning and Building Act)
- Act relating to forestry (Forestry Act)
- Act relating to Norway's climate targets (Climate Change Act)
- Act relating to protection against and compensation for natural damage (Natural Damage Act)
- Act relating to public roads (Public Roads Act)
- Act relating to the establishment and operation of railways, including tramways, underground railways and suburban railways etc. (Railways Act)
- Act relating to harbours and fairways (Harbours and Fairways Act)
- Recommendation 497 S (2012–2013), cf. Report No. 33 to the Storting (White Paper) (2012–2013)
  Climate change adaptation in Norway
- Recommendation 358 S (2012–2013), cf. Report No. 15 to the Storting (White Paper) (2011–2012) *How to live with the hazards – floods and landslides*

[11] The Ministry of Local Government and Modernisation became the Ministry of Local Government and Regional Development from 1 January 2022. Since this occurred after the period in which the investigation was conducted, we have not used the new name until the recommendations in Chapter 4.
[12] Cf. Royal Decree of 22 October 2021.

The report was presented to the Ministry of Climate and Environment, the Ministry of Petroleum and Energy, the Ministry of Justice and Public Security, the Ministry of Local Government and Modernisation, the Ministry of Transport, and the Ministry of Agriculture and Food in the letter of 3 November 2021. In letters dated between 6–10 December 2021, the ministries provided comments to the report. Most of the comments have been incorporated into the report and this document.

The report, the Board of the Auditors General's cover letter of 18 January 2022 to the ministries that received recommendations and the ministers' responses on 4 and 7 February 2022 have been enclosed as appendices.

2 Conclusions

Conclusions

- The number of buildings within mapped hazard zones will increase as a result of climate change.
- The government authorities do not have the necessary overview of the risks of natural disasters in a future climate.
- Existing built-up areas are not being adequately protected from the effects of future climate change.
- The Ministry of Transport lacks an overview of the existing transport infrastructure's vulnerability to future climate change.
- Key ministries do not have good enough information to be able to assess the status of climate change adaptation in Norway.
- The reporting in the Ministry of Climate and Environment's annual budget proposal does not provide information on goal attainment or known challenges.
- The work on climate change adaptation between national authorities is weakly coordinated.

3 Elaboration of conclusions

It is a national objective that society shall be prepared for and adapted to climate change. Climate change impacts all areas of society, and the Ministry of Climate and Environment has determined that this requires extensive cooperation, a joint knowledge base and interdisciplinary solutions.

The investigation demonstrates that the government authorities have inadequate knowledge about how vulnerable existing built-up areas and transport infrastructure are to natural hazards in future climatic conditions. This presents a risk that necessary preventive measures are not being initiated. The government authorities lack the necessary overview of how far Norway has progressed with the climate change adaptation work, and coordination between national authorities is inadequate.

In light of the significant consequences that climate change will have, the Office of the Auditor General considers it serious that the government authorities have failed to ensure adequate oversight and initiate the necessary measures for protecting existing built-up areas and infrastructure.

This may result in unnecessarily high costs to society and could also have consequences for the safety of citizens.

3.1 The number of buildings within mapped hazard zones will increase as a result of climate change.

At present, there are already approximately 191,000 buildings within mapped hazard zones for floods, landslides, quick clay landslides and storm surges.[13] As stated in the introduction, the average global temperature has already increased by 1.1 degrees Celsius, which means that we will notice the impact of climate change earlier than we previously expected and that we have less time in which to adapt. This entails that more buildings will be vulnerable to natural hazards.

Table 1 provides an overarching overview of the number of buildings that hazard mapping shows are located in areas at risk of various natural hazards and in areas at risk of surface runoff (urban floods). For example, based on the high emissions scenario that the government authorities have decided to use, in some counties there will be a 50 per cent increase in the number of flood-prone buildings up until 2100. Storm surges with levels that currently occur every 200 years will occur much more frequently. In Western Norway, storm surges of this magnitude will probably occur every second year going toward 2100.

Recurrence intervals

Recurrence intervals provide a statistical measurement of how often a natural disaster of a particular magnitude will occur. A flood with a recurrence interval of 200 years, (also called a 200-year flood), occurs on average every 200 years. At the same time, it cannot be ruled out that a flood of this magnitude could occur more often than every 200 years.

[13] Areas which have been mapped for the risk of 200-year floods, 1,000 and 5,000-year landslides, quick clay landslides and 200-year storm surges. Storm surges are a calculation and not a survey carried out in the terrain.

Table 1 Buildings located in areas with natural hazards for the current and future climate.

Natural hazard	Number of buildings and potential natural hazard in a changing climate
Flood	• Approximately 22,000 buildings are currently located in areas that are at risk of 200-year floods, and 60 per cent of these are in Eastern Norway. • The number of buildings vulnerable to 200-year floods will increase by 10 per cent until 2100, and by 50 per cent in some counties. • Climate change will result in more frequent and severe flooding events.
Landslides in steep terrain*	• Approximately 46,000 buildings are currently located within areas that are at risk of 1,000-year landslides and 5,000-year landslides, the majority of which are in Western Norway. • Climate change may result in landslides occurring in new areas and becoming more frequent.
Quick clay landslides	• Approximately 54,000 buildings are currently located in areas that are at risk of quick clay landslides, principally in Eastern Norway and Trøndelag. • More frequent and intense rainfall episodes (and therefore flooding) will lead to increased erosion, which can trigger more quick clay landslides at new locations, and quick clay landslides may occur more frequently.
Storm surges	• Approximately 72,000 buildings are currently located in areas that may be vulnerable to 200-year storm surges, principally in Western Norway. • By 2090, approximately 116,000 of the current buildings will be located in areas that are at risk of 200-year storm surges. This is an increase of about 60 per cent. • The frequency of storm surges will increase significantly. There is presently a 0.5 per cent probability of a 200-year storm surge in Western Norway occurring within a year. In 2090, this may occur every second year until 2100.
Surface runoff	• Approximately 315,000 buildings in urban areas with more than 2,000 inhabitants are located within areas of potential water accumulation. • The number of incidents involving surface runoff will increase, and areas of potential water accumulation will be impacted more often.

Source: Statistics Norway and Norwegian Centre for Climate Services. *Landslides, debris floods, rockslides, slush flows and avalanches.

3.2 The government authorities do not have the necessary overview of the risks of natural hazards in a future climate.

The municipalities have a general and fundamental responsibility to ensure the safety and security of the population within their geographical areas.[14] The responsibility that the municipalities have for civil protection entails that they play a vital role in the work of adapting infrastructure and built-up areas to climate change. As part of the civil protection work, the municipality must carry out **a comprehensive risk and vulnerability assessment (comprehensive RVA)**.[15] The assessment shall provide the municipality with an overview and knowledge of risks and vulnerabilities and measures to strengthen the civil protection work.

Through municipal planning, the municipalities shall also prevent the risk of loss of life, damage to health, the environment and vital infrastructure, property etc., and adapt society to expected climate change.[17] The municipality must take climate change into consideration through preventing negative consequences of land use. Important tools for achieving this are the **risk and vulnerability assessment associated with the planning processes**.

Pursuant to the Civil Protection Act, the county governors oversee the work of municipalities on behalf of the Ministry of Justice and Public Security. The Norwegian Directorate for Civil Protection (DSB) provides guidance. In addition, the county governors provide planning guidance to the municipalities on behalf of the Ministry of Local Government and Modernisation and Ministry of Climate and Environment. The Norwegian Water Resources and Energy Directorate (NVE), which is subordinate to the Ministry of Petroleum and Energy, assists the municipalities through both mapping and guidance.

3.2.1 The majority of municipalities do not pay sufficient attention to the consequences climate change will have.

A survey we have conducted of the municipalities demonstrates that almost all municipalities consider natural hazards and assess whether infrastructure and built-up areas are vulnerable to natural hazards in the comprehensive RVA, strategic plans and the municipal master plan for land use. However, many municipalities do not consider natural hazards and vulnerability in light of **the future climate**

In the survey, the municipalities were asked whether they had considered natural hazards and the vulnerability of infrastructure and built-up areas for a period longer than the next twelve years in the comprehensive RVA,

Comprehensive risk and vulnerability assessment

The assessments involves mapping, systematizing and assessing the probability of undesired events that may occur in the municipality, and how these can affect the municipality, cf. Section 2 of the Regulations relating to municipal preparedness duty.

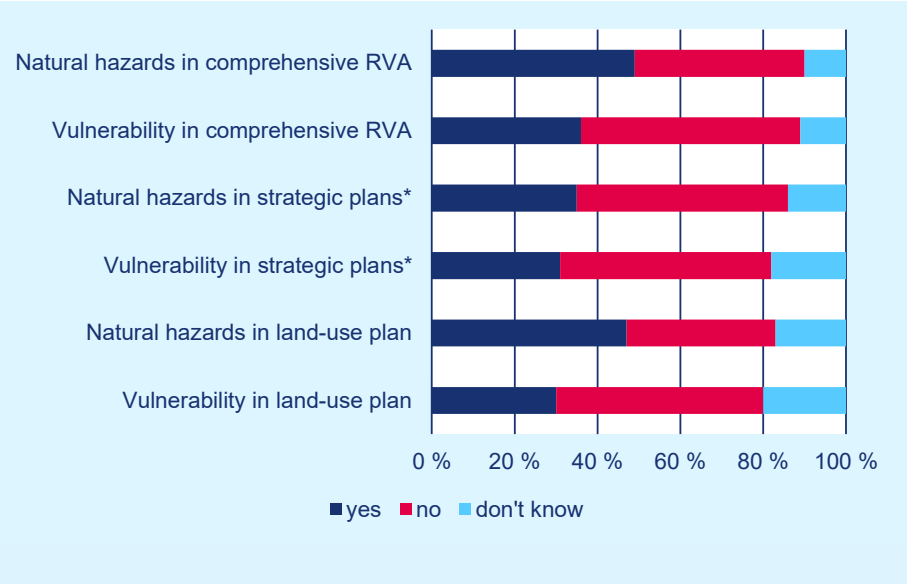
Municipal master plan

The municipality is required to have a municipal master plan which includes municipal, regional and national objectives, interests and tasks.[16] It is intended to serve as a policy instrument for the municipality's development.

[14] Cf. Recommendations 311 L (2009–2010) relating to the Civil Protection Act.
[15] *Section 2 of the Regulations relating to the municipal preparedness duty.*
[16] The Ministry of the Environment (2011) *The Municipal Planning Process – the social element – the implementation element*. Page 8 of the Guide.
[17] Cf. Section 3-1 of the Planning and Building Act.

strategic plans and the municipal master plan's land-use element.[18] Figure 1 shows the distribution of the responses provided by the municipalities. It shows that less than half of the municipalities consider the risk of natural hazards and the vulnerability of built-up areas and infrastructure for a period of longer than the following twelve years. This applies to the comprehensive RVAs, strategic plans and the municipal master plan for land-use.

Figure 1: Whether the municipality has assessed natural hazards and vulnerability for a period of longer than the following twelve years in various documents



Source: The Office of the Auditor General's survey. *Strategic plans are the municipality's planning strategy, the social element in the municipal master plan, with the associated implementation element and any other strategic documents.

Furthermore, the survey shows that, when developing the comprehensive RVA, only 29 per cent of the municipalities have considered natural hazards in terms of the climate 50 years into the future. 19 per cent considered the vulnerability of infrastructure and built-up areas with a climate 50 years into the future.

With regard to the municipality's overall land-use planning, which forms the basis for planning further development in the municipality, only 38 per cent of the municipalities had considered how the climate would influence the risk of natural hazards in 50 or more years. This is despite the fact that the municipal plan establishes guidelines for new building projects normally intended to remain standing for a longer period of time.

On the whole, this demonstrates that, in the emergency preparedness and planning, the municipalities do not pay sufficient attention to how future climatic conditions will impact both existing and planned infrastructure and buildings. The Office of the Auditor General finds there to be a low

[18] The planning documents must be long-term. Some operate with a period of twelve years, i.e. three planning periods. The guide proposes that the municipalities think 20–30 years into the future when concerning land-use planning. We therefore gave the municipalities the option of crossing off for a medium-term period of 12–50 years and a period of longer than 50 years.

proportion of municipalities that have considered the future climate. In connection with this, we refer to both the significant impact of climate change on civil protection and the fact that a clear national objective has been set that society must be prepared for and adapted to climate change. The municipalities should have a longer-term perspective in order to be prepared for the consequences of climate change.

3.2.2 In many instances, the analyses and plans prepared by the municipalities are neither extensive nor updated.

As stated above, the survey showed that most municipalities consider one or more natural hazards when developing the comprehensive RVAs and the municipal master plans. However, in the interviews we conducted, several challenges with the analyses were identified.

In many cases, the comprehensive risk and vulnerability assessment that are carried out in connection with the emergency preparedness, lack an assessment of what the expected climate change will entail for the municipality in practice.

With regard to the risk and vulnerability analyses that are carried out in connection with the municipal master plan for land-use, several of those we interviewed thought that the analyses could have been more extensive and more specific. Many municipalities find it difficult to conduct risk and vulnerability analyses as a part of the municipal planning. Furthermore, there is little transfer of knowledge from the various processes. For example, many municipalities do not follow up problem areas identified in the comprehensive risk and vulnerability assessment in the municipal planning.

With regard to the zoning plans, several of those we interviewed noted that the analyses can often be conducted by consultants without the necessary expertise. The small municipalities in particular do not have the expertise to set the correct requirements to the consultants. Many of the municipalities also do not have sufficient expertise for evaluating results that they receive from the consultants.

Another challenge is that plans which have been adopted are not amended even if there are new requirements or updated knowledge regarding natural hazards. The survey we conducted among the municipalities showed that few municipalities abolish previously adopted plans, despite discovering new natural hazards in the planning work. A consequence of few municipalities abolishing previous plans despite natural hazards being revealed is that insufficient consideration is paid to natural hazards in the planning process.

The survey demonstrates that the municipalities also do not make good enough use of the county-level climate profiles the Norwegian Centre for Climate Services has prepared in recent years. 72 per cent of municipalities have not used the regional climate profiles when developing the municipal master plan for land-use. When a portion of the municipal master plans are also 10 years old or older, the plans become outdated and unsuitable as tools for managing the risks associated with a changing climate.

Climate profiles

The climate profiles prepared by the Norwegian Centre for Climate Services provide a brief summary of the present climate, expected climate change and climate challenges. These are intended to serve as a knowledge base for climate change adaptation.

On the whole, the Office of the Auditor General is of the opinion that there is a risk of municipalities permitting development in areas vulnerable to future natural hazards without first having conducted an adequate risk assessment.

3.2.3 Central government and municipal mapping do not provide an adequate overview of the hazard zones in Norway

The Norwegian Water Resources and Energy Directorate (NVE) has a national responsibility for floods and landslides. As part of this responsibility, the NVE produces maps showing areas where there may be a risk of floods or landslides (susceptibility maps) and maps where natural hazards are proven to exist (hazard zone maps). The municipalities also map areas as part of the emergency preparedness work and municipal planning work. In addition, developers study the risks associated with new developments.

Susceptibility and hazard zone maps

The susceptibility maps are intended to assist the municipalities and others in identifying areas that are at risk of natural hazards.

The hazard zone maps show areas with natural hazards. The hazards are mapped in these areas.

The investigation showed that hazard mapping in the municipalities primarily occurs in areas where development is planned, not in areas that are fully developed. This means that the risk and vulnerability assessments carried out in connection with emergency preparedness and in planning do not provide a good and complete overview of the natural hazards in the municipality. As we have noted in section 3.2.1, the municipalities do not adequately consider the risk of natural hazards based on the future climate in either the medium or long-term. This further weakens the ability of the municipalities to adapt infrastructure and buildings to a future climate.

The investigation also showed that most of the maps prepared by the NVE were only produced for the current climate. Therefore, they do not, for example, show how much larger a flood zone will become or how frequently flooding will occur with a future climate.

The maps showing areas that are at risk of flooding, and which were prepared after 2012, take climate change into account. According to the NVE, it will take time to update the rest of the maps. Until this is achieved, the municipalities themselves have to calculate the potential extent of flooding caused by climate change.

In addition to the maps not being updated so that climate change is taken into account, there are areas that fall outside both the central government and municipal mapping. Our case study in Voss Municipality illustrates this problem. The municipality reported that it alone is unable to adequately map all flood risks before it adds new areas to the municipal master plan for land-use. Specific mapping therefore does not take place until development. According to Voss Municipality, it is more difficult to set restrictions or reject regulatory proposals from developers at that point.

In its risk assessment for 2021, the NVE found that there is a high probability that the mapping is inadequate, and that a lack of knowledge in the community regarding hazard areas constitutes a major risk. According to the directorate, when critical areas are not mapped well enough, this can result in municipalities approving development in areas that are at risk of floods and landslides.

The municipalities can receive support to assess the risk of natural hazards through assessment guidelines, central government hazard mapping, financial support schemes and guidance. The central government also conducts supervision. However, the investigation showed that it can, in practice, be difficult for the municipalities to apply the available knowledge and guidance to take climate change into consideration in their planning and risk and vulnerability assessments. In addition, work remains to be done on updating central government hazard mapping based on the changing risk profile created by climate change.

On the whole, the Office of the Auditor General finds that the mapping is inadequate when considering the challenges of a changing climate. When critical areas are not adequately mapped, this can result in development occurring in areas with natural hazards. This is ultimately about the safety of the inhabitants. The Office of the Auditor General regards this as serious.

3.3 Protection of existing built-up areas from the effects of future climate change is not adequately attended to.

General requirements to take natural hazards into account were reinforced in the Planning and Building Act of 1985, and were later further emphasized in the current Planning and Building Act of 2008. In 2010, these requirements were specified and quantified in the regulations relating to technical requirements for construction work, which set the minimum features a building must have in order to be legally erected in Norway.[19]

The investigation shows that the need for protective measures is greatest in areas where dwellings were erected before requirements for climate change adaptation were introduced. 75 per cent of the buildings in areas with natural hazards were built before general requirements for protection against natural hazards were strengthened in 1985.[20] Equivalently, 93 per cent of all buildings vulnerable to landslides, floods or storm surges were constructed before the requirements were inserted in the technical regulations in 2010. Most of the hazard-prone buildings were also erected before national hazard mapping was commenced. In 2021, the NVE estimated that it will cost NOK 85 billion if buildings vulnerable to landslides in steep terrain, flooding, erosion and quick clay landslides are to be protected against climate change in accordance with the current technical requirements for construction work.

Pursuant to the Planning and Building Act, Civil Protection Act and the Natural Damage Act, the municipalities are responsible for adapting to future climate change, the safety of citizens, and for taking precautions against natural hazards. The investigation also demonstrated that the municipalities are struggling with initiating protective measures for existing built-up areas. According to the DSB, several municipalities enquired about who is

[19] TEK10, which has now been continued in TEK17. The requirements set the limit for the minimum features building works must have in order to be legally erected in Norway, and include, among other things, technical requirements for protection against natural hazards in the current climate.
[20] The figures for surface runoff (potential for water accumulation) are not included here.

responsible if revealed risks and vulnerabilities are not mitigated and an event occurs.

The municipalities also often brought up the fact that protective measures can be expensive and that the municipality has to consider whether it has the funds to implement such measures. Municipalities can apply to the NVE for grants for protective measures, however more than half the applications for grants from the municipalities are rejected. One reason for this is that the need for support is greater than the funds the NVE has at its disposal.

When natural hazard damage has first occurred, there are several compensation and insurance schemes that can enter into force to cover the costs of those affected. However, the schemes provide weak incentives for prevention and protection rather than repair and replacement. This was among the problems identified by the Climate Risk Commission, which presented its report in 2018. According to the Climate Risk Commission, the absence of incentives for prevention may result in climate change adaptation becoming more socio-economically costly than necessary.

In Report No. 15 to the Storting (White Paper) (2011–2012) *How to live with the hazards – floods and landslides*, the Ministry of Petroleum and Energy noted that there is some uncertainty relating to who is responsible for protecting existing built-up areas. The Natural Damage Act contains provisions which state that the municipalities are obligated to take precautions against natural hazard damage (as stipulated in the Planning and Building Act), as well as in connection with necessary protective measures. As a follow-up to the white paper, the Ministry of Petroleum and Energy has assessed whether the municipality's duty must be further clarified. As part of this, the Ministry has been in dialogue with the NVE and other ministries. The Ministry has concluded that it is difficult to set a precise limit on the municipality's responsibilities. According to the Ministry, the need to clarify the municipality's responsibilities can largely be remedied by a review of practices and clarifications through guidance.

However, the Ministry will address whether changes should nevertheless be made to the division of responsibilities for existing built-up areas and infrastructure when the expert commission formed to investigate the quick clay landslide in Gjerdrum (the Gjerdrum Commission) has completed its work in 2022.

Although the Ministry is thus far of the opinion that existing legislation is as clear as it can be, it is still very demanding for the municipalities to determine how far their responsibilities extend. The uncertainty associated with responsibility, coupled with weak incentives for prevention, represent a risk that existing built-up areas will not be protected against natural hazards. This is particularly problematic when viewed in light of the fact that a very large number of buildings are located in areas that are vulnerable to future natural hazards. The Office of the Auditor General finds that there is a need to clarify, through guidance or other measures, what responsibilities the municipalities have for protecting existing built-up areas.

3.4 The Ministry of Transport does not have an overview of the existing transport infrastructure's vulnerability to future climate change.

Roads, railways and ports are presently exposed to natural disasters and will become increasingly more vulnerable to the consequences of climate change in the coming decades. The maintenance backlog for roads and railways makes the existing infrastructure less resilient in terms of its ability to withstand climate change. Climate change also means that protective measures will have to be implemented at locations that were not previously vulnerable to natural hazards.

During the investigation period, the Ministry of Transport had overall responsibility for climate change adaptation of road, rail and coastal infrastructure. This involves responsibility for the agency management of the Norwegian Public Roads Administration and Norwegian Coastal Administration, and management of the ownership interests in Bane NOR SF.[21]

Following the investigation period, responsibility for agency management of the Norwegian Coastal Administration was transferred from the Minister of Transport to the Minister of Trade, Industry and Fisheries, cf. Royal Decree of 22 October 2021. In 2020, responsibility for county roads, ports and breakwaters was transferred to the county municipalities as a result of the Regional Reform. However, notice was given that the fishing ports would be returned to the central government.[22] The municipalities otherwise have authority for municipal roads.

3.4.1 Mapping the vulnerability of existing transport infrastructure is largely carried out based on the current climate, not a future climate.

Climate change adaptation in the transport sector primarily involves implementing measures that reduce the risk of damage when events occur.[23] The vulnerability of infrastructure to climate change must first be mapped in order to initiate risk-based measures.

The Norwegian Public Roads Administration, Norwegian Coastal Administration and Bane NOR[24] have mapped parts of the infrastructure, however the investigation showed that there are weaknesses in the completed mapping and that many locations have not been mapped. For example, much of the mapping was based on the present climate, not a future climate. The mapping showing the consequences that climate change will have is therefore inadequate for large parts of the rail and road network. For example, the Norwegian Public Roads Administration stated that the risk analyses of existing national roads that are used to rank priority road

[21] As infrastructure manager, Bane NOR has operational responsibility for civil protection on the national rail network and coordinates this work with other railway operators.
[22] In the Hurdal platform for a government issued by the Labour Party and the Centre Party (2021–2025), it states that the government will make the fishing ports a central government responsibility. According to the Ministry of Transport, it has not been determined as to how this will be implemented.
[23] Report No. 20 to the Storting (White Paper) (2020–2021) *National Transport Plan 2022–2033*.
[24] Bane NOR is a state-owned company responsible for the Norwegian national railway infrastructure.

projects in connection with the national transport plan to remove stretches with a high risk of natural hazards are often, in practice, based on the current climate Ports and breakwaters are also not mapped for natural hazards, despite the fact that storm surges will occur significantly more often.

A review of the transport entities' reporting to the Ministry of Transport shows they are implementing measures that make existing infrastructure more resilient to natural hazards. This includes, for example, replacing navigational devices at sea, carrying out flood and landslide protection measures and building culverts with greater capacity under roads and railways. However, in the reports, the transport entities do not distinguish between measures that adapt the infrastructure to the current climate, and measures implemented that take into consideration a future climate. It is therefore difficult to assess whether the measures contribute to making existing infrastructure more resilient to future climate change. Transferring the responsibility for existing infrastructure to the county municipalities has also contributed to the Norwegian Public Roads Administration and Norwegian Coastal Administration not having an overview of climate change adaptation measures implemented by county municipalities and other owners.

3.4.2 Adapting to a future climate has been better ensured for new transport infrastructure

The Norwegian Public Roads Administration, Bane NOR[25] and the Norwegian Coastal Administration are responsible for adapting the infrastructure to climate change. The investigation showed that they have integrated considerations relating to climate change adaptation into existing guides and guidelines for the construction of new roads, railways and for the part of the coastal infrastructure that the Norwegian Coastal Administration is responsible for. Therefore, when new central government infrastructure is planned and constructed, demands are set which are based on knowledge of future climate change.

The investigation also showed that the Ministry of Transport does not request information of how municipalities and county municipalities are ensuring the adaptation of new transport infrastructure. The Ministry of Transport therefore does not have an overview of how county municipalities and municipalities address climate change concerns when constructing new infrastructure such as county roads, ports and breakwaters. The Ministry also lacks guidelines or guides for how ports should be dimensioned for climate change.

3.4.3 The Ministry of Transport does not have the necessary governance information regarding the status of climate change adaptation of the transport infrastructure

Since 2015, the Ministry of Transport has had the objective of making transport infrastructure more resilient to future climate change. The Ministry of Transport sets requirements for the transport entities to follow up the

[25] Bane NOR is a state-owned company responsible for the Norwegian national railway infrastructure.

objectives, requirements and priorities in the *Strategy for Civil Protection in the Transport Sector* in their civil protection work. According to the strategy, climate change adaptation must be quantifiable, systematic and traceable and be included as an integrated part of the agencies' activities.

The Ministry of Transport has communicated over several years to underlying agencies an expectation to make the infrastructure more resilient to the larger, more frequent and more severe natural hazards expected with climate change.The Ministry has specified to the transport entities that it must be regularly briefed on the status of the individual agencies' follow-up of the climate change adaptation effort. It also sets requirements for the agencies to prepare strategies and action plans and develop a sound knowledge base to determine which measures are the most appropriate and effective to protect transport infrastructure and people from the impact of climate change. However, the Ministry still lacks an overview of the status of the climate change adaptation of existing infrastructure. As shown in section 3.4.1, the transport entities have little knowledge about how implemented measures contribute to making the infrastructure more resilient to climate change and the mapping of the infrastructure's vulnerability to future climate change is inadequate. The transport entities also have little knowledge about what it will cost to adapt the infrastructure to future climate change.

In the view of the Office of the Auditor General, the Ministry of Transport has a weak decision-making basis for implementing cost-effective and risk-mitigating measures when they lack adequate knowledge about where there is the greatest vulnerability, where measures are required and what the measures will cost. The same applies to the Ministry of Trade, Industry and Fisheries after they have taken over responsibility for coastal infrastructure. The Office of the Auditor General considers the lack of a good decision-making basis to be reprehensible.

3.5 Key ministries do not have good enough information to be able to assess the status of climate change adaptation in Norway.

The Planning and Building Act, enforced by the Ministry of Local Government and Modernisation, and the Civil Protection Act, enforced by the Ministry of Justice and Public Security, are two of the most important laws in this area. The laws set requirements for *how* the municipalities should process and manage cases that concern planning and emergency preparedness. Similarly, the reports from the county governors largely concern procedural matters, such as how they have advised the municipalities, and how the municipalities follow up climate change concerns in risk and vulnerability assessments and in municipal planning. The Ministry of Local Government and Modernisation noted that they are confident that the municipalities are complying with the Planning and Building Act in this area. Since the reports primarily concern how the municipalities work with the issue of climate change adaptation, it is the view of the Office of the Auditor General that there is insufficient information for being able to assess what the municipalities achieve within the climate change adaptation.

An important policy instrument within the Ministry of Agriculture and Food's area of responsibility is to use forests to protect against damage from natural disasters, for example, against avalanches, rockfalls, floods and landslides. Both the municipalities and county governors can use different types of legal authority from the Forestry Act, Planning and Building Act, and the Natural Damage Act to protect forests. However, the Ministry has no information as to whether the legal authority is applied for the protection against damage from natural disasters.

As we stated in section 3.4, the reporting from the transport entities to the Ministry of Transport contains little information about the actual status of infrastructure adaptation to future climate changes.

On the whole, the investigation showed that key sectoral ministries do not have the necessary overview of the status of climate change adaptation and the use of important policy instruments in the climate change adaptation effort. When areas that may be vulnerable to natural disasters are not mapped, this further weakens the information available to decision-makers. Based on the assessment by the Office of the Auditor General, this entails that there is a weak information base for making decisions and initiating measures.

3.6 The reporting in the Ministry of Climate and Environment’s annual budget proposal provides no information about goal attainment or known challenges.

Pursuant to the *Act relating to Norway's climate targets* (Climate Change Act), the government must provide an account of how Norway is preparing for and adapting to climate change in the annual budget proposal. Furthermore, it states in Section 9 of the Appropriations Regulations that the Ministry shall provide information about the results achieved during the most recent financial year.

A review of the Ministry of Climate and Environment’s budget proposal shows that the annual reports regarding adaptation to climate change only contain information about what a few key entities are doing. Furthermore, the review shows that much of the reporting concerns what climate change will mean at a general level. This makes it difficult to assess the content of the reporting in relation to the principal objective of making the country more resilient to climate change. The reporting to the Storting therefore does not provide a basis for assessing the efforts or effect of the measures that are being implemented. For example, it is difficult to deduce from the Ministry of Climate and Environment’s budget proposal as what the status is in terms of making the transport infrastructure more resilient to future climate change. In 2021, the government gave notice that it will prepare a comprehensive system for measuring and evaluating the effect of climate change adaptation measures, cf. Report No. 40 to the Storting (White Paper) (2020–2021) *Goals that have meaning – Norway's action plan for achieving the sustainable development goals by 2030.*

A review of the Ministry of Climate and Environment's reporting in the budget proposal further demonstrates that there is no mention of known challenges in the climate change adaption effort. In connection with this, we particularly note that the responsible ministries have long been aware that the municipalities have challenges in implementing the necessary measures for protecting existing built-up areas and infrastructure against natural disasters, cf. Chapter 3.3. These challenges have existed for a long period without having been reported in the annual reports to the Storting concerning climate change adaption.

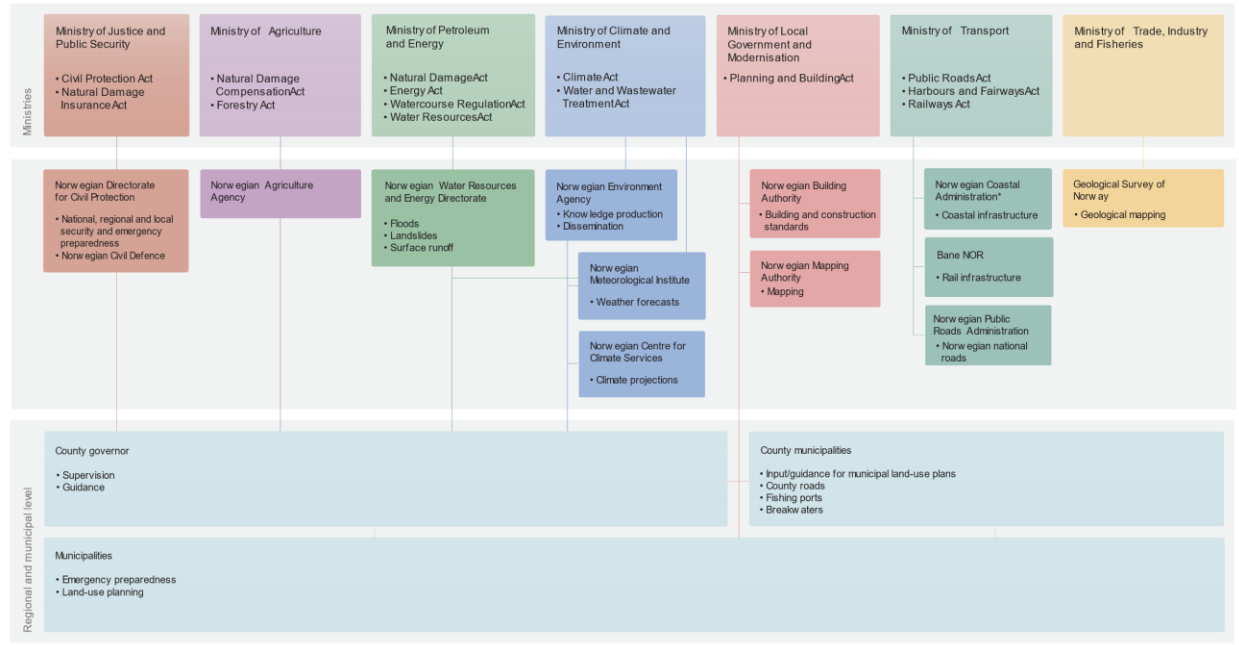
In the view of the Office of the Auditor General, this shows that the Storting does not receive good enough information about the results of the government authorities' efforts in preparing and adapting society to climate change.

3.7 The climate change adaptation effort is weakly coordinated between national authorities.

The objective of preparing and adapting society to climate change is a national objective that needs to be addressed by several ministries. All sectoral authorities have a responsibility to ensure that climate change is taken into consideration within their own areas. This is enshrined as a fundamental principle of the work with climate change adaptation, in cf. Report No. 33 to the Storting (White Paper) (2012–2013) *Climate change adaptation in Norway.* At the same time, the Ministry of Climate and Environment must facilitate the government's overall efforts toward climate change adaptation, cf. the Ministry of Climate and Environment's budget proposals for 2014–2022.

Responsibility for climate change adaptation at national, regional and local levels is divided among a number of stakeholders. In terms of climate change adaptation of built-up areas and infrastructure, there are a number of ministries, state enterprises, county governors, county municipalities and municipalities that are involved. Despite the municipalities having a key role in local climate change adaptation work, they are reliant on legislation, decisions, guidance and assistance from central government enterprises and ministries to draft plans and make local decisions that take into account future climate change. In addition, when incidents occur that impact buildings and infrastructure, many of the same central government enterprises and ministries will become involved.

Figure 2 Overview of key public entities involved in the climate change adaptation effort during the investigation period



Source: The Office of the Auditor General. *Since the change of government in autumn 2021, the Ministry of Trade, Industry and Fisheries has assumed responsibility for coastal infrastructure and agency management of the Norwegian Coastal Administration, cf. Royal Decree of 22 October 2021.

The Ministry of Climate and Environment established a coordination group for the ministries ahead of the presentation of the 2013 white paper on climate change adaptation. Following this, the ministries did not have formalised cooperation until the inter-ministerial working group for climate change adaptation was re-established under the direction of the Ministry of Climate and Environment in 2019. In 2020, the Ministry of Petroleum and Energy established a working group for natural hazards between the ministries. Cooperation has also been strengthened at enterprise level through the Natural Hazards Forum and the Directorate Group for Climate Change Adaptation. In this way, ministries and directorates have established several arenas for coordination.

Although the ministries meet and exchange information, there is no cross-sectoral strategy or plan for how the overall effort shall contribute to Norway achieving objectives in the area. The Ministry of Climate and Environment considers Report No. 33 to the Storting (White Paper) (2012–2013) *Climate change adaptation in Norway* to be the applicable strategy. It is the view of the Office of the Auditor General that the report is neither updated nor specific enough to be an effective tool for coordinating the efforts, establishing measures and ensuring progress in the work with climate change adaptation.

In the opinion of the Office of the Auditor General, the problems with there not being an overarching strategy or plan are expressed by the fact that important challenges are not being dealt with:

Mapping of natural hazards has been identified as an important measure for assessing the need for protecting existing built-up areas and avoiding development in hazard zones. There is still a need to increase the scope of hazard mapping, cf. 3.2. The need for more hazard mapping is something that the NVE already made reference to in 2014. The NVE identified inadequate hazard mapping as a serious risk in their risk assessment for 2021.

As stated in section 3.3, **the implementation of protective measures** in areas with existing built-up areas is a significant challenge. Several ministries have adjoining responsibilities and have been aware of the challenges for several years.

The annual reports to the Storting in the Ministry of Climate and Environment's budget proposal also demonstrate that the overview the ministries have of climate change adaptation largely concerns **what ministries and enterprises are doing, and less about what they are achieving**, cf. 3.6. This means that the Ministry of Climate and Environment has a weak basis on which to coordinate efforts.

As a coastal nation, Norway is particularly vulnerable to **sea level rise** and storm surges. The investigation shows that by 2090, 116,000 of the current buildings could be located in areas at risk of 200-year storm surges. This is 60 per cent more than those vulnerable to 200-year storm surges today. The Standing Committee on Energy and the Environment noted in 2013 that it is vital to clarify who shall have central government authority for sea level rise.[26] After eight years, the responsibility for following up the municipalities in this area is still divided among several central government stakeholders. Multiple bodies are seeking clarification of responsibility at central government level to enable the municipalities, and particularly the smaller municipalities, to coordinate with one authority.

The Ministry of Climate and Environment considers responsibility for sea level rise to have been assigned and also made reference to various central government authorities having updated the knowledge base and prepared guidelines. However, the interviews we conducted in this investigation, including with DSB, would suggest that this is not sufficient. It was noted in the interviews that assessments of sea level rises, with subsequent storm surge levels and wave impact are difficult for the municipalities, and that small municipalities in particular request clearer guidelines for how they should address considerations relating to sea level rise. The analyses that the municipalities need to carry out can be professionally and technically demanding. The Office of the Auditor General's assessment is that the municipalities do not receive sufficient specialist assistance and follow-up from central government authorities to be able to perform the significant task they are required to carry out. This involves the risk of municipalities permitting development in hazard zones and that no necessary protective measures are initiated in areas with existing built-up areas.

[26] Cf. Recommendations 497 S (2012–2013) to Report No. 33 to the Storting (White Paper) (2012–2013) *Climate change adaptation in Norway*.

When viewed in light of the major challenges that climate change will create, the Office of the Auditor General considers the current coordination between the ministries to be too weak for being able to make the preparations and adjustments that are necessary for society to address climate change. The Office of the Auditor General considers the weak coordination and lack of an updated cross-sectoral plan for the work on climate change adaptation to be reprehensible.

4 Recommendations

The Office of the Auditor General recommends that the Ministry of Climate and Environment:

- in cooperation with other appurtenant ministries, prepares a cross-sectoral plan which addresses the most important challenges in the work with climate change adaptation,
- ensures that the reporting to the Storting on climate change adaptation provides information concerning the results that have been achieved and the most important challenges associated with the work on climate change adaptation.

The Office of the Auditor General recommends that the Ministry of Justice and Public Security, Ministry of Climate and Environment, Ministry of Local Government and Regional Development and Ministry of Petroleum and Energy:

- assess how central government authorities can contribute to the municipalities assessing future climate to a greater extent in their plans and analyses of risk and vulnerability,
- assess measures that can contribute to better mapping of natural hazards under both central government and municipal auspices, and that the mapping takes greater account of future climate change,
- assess measures that may contribute to better protection of existing built-up areas in light of the impending climate change,
- clarify, through guidance or other measures, what responsibility the municipalities have for protecting existing built-up areas.

The Office of the Auditor General recommends that the Ministry of Transport and the Ministry of Trade, Industry and Fisheries:

- follow up that the transport enterprises improve the mapping of the existing infrastructure’s vulnerability to future climate change.

5 The Ministers' responses

5.1 The Ministry of Climate and Environment, Ministry of Local Government and Regional Development and Ministry of Petroleum and Energy

In their joint response, the Minister of Climate and Environment, Minster of Local Government and Regional Development and Minster of Petroleum and Energy stated that the Office of the Auditor General's investigation provides grounds for drawing the conclusions set forth in Document 3. They also essentially agreed with the recommendations. The Ministers considered the report to be of great benefit to the ministries in their efforts to further develop their work with climate change adaption and will use the Office of the Auditor General's conclusions and recommendations as a basis for their continued effort.

5.1.1 New national strategy

The Ministers emphasised that Report No. 33 to the Storting (White Paper) (2012–2013) *Climate change adaptation in Norway* is the current national strategy and that it still sets good frameworks for this work, both with regard to the division of responsibilities and guiding principles. At the same time, new perspectives, connections and synergy effects with other policy and specialist areas create a need to understand climate change adaptation as part of a major restructuring of society. The government has therefore decided to commence work on preparing a new strategy for climate change adaptation in the form of a white paper. The Office of the Auditor General's findings and recommendations will be included as a natural and important part of this work. The Ministers looked forward to an extensive discussion about climate change adaptation when the Storting considers the Office of the Auditor General's report and the forthcoming white paper to the Storting.

5.1.2 Measurement, reporting and evaluation

The Ministers agreed with the Office of the Auditor General that there is inadequate information about the effects and results of the climate change adaption efforts. The Ministers made reference to Report No. 40 to the Storting (White Paper) (2020–2021) *Goals that have meaning – Norway's action plan to achieve the sustainable development goals by 2030,* which states that the government will prepare a comprehensive system for measuring and evaluating the effect of climate change adaptation measures and efforts at a national, regional and local level.

With regard to the Office of the Auditor General's finding that the ministries do not have good enough information for assessing the status of climate change adaptation in Norway, the Ministers stated that they will take this observation into consideration in the annual reporting pursuant to the *Climate Change Act* and in the work on a new strategy for the climate change adaptation effort. Furthermore, the Ministry of Climate and

Environment will ask the other ministries involved to report on the key challenges in next year's reporting to the Ministry.

5.1.3 Assessments by the municipalities of future climate in plans and analyses

The Ministers reported that they will evaluate how they can contribute to the municipalities assessing the future climate to a greater extent in their municipal plans and assessments of risk and vulnerability. At the same time, they emphasised that any measures relating to climate change adaptation must be designed in accordance with the principles of central government control of the municipal sector. The municipalities are independent, popularly elected and self-governing bodies.

The Ministers further noted that several central government stakeholders are actively working to enable the municipalities to assess future climate in their plans and assessments of risk and vulnerability, and that they are making a major effort to provide the municipalities with joint information and guidance. In his letter of allocation to the county governors, the Minister of Local Government and Regional Development will emphasise that climate change adaptation is an area in which the county governors need to follow up the planning carried out by the municipalities. The ministry will also consider emphasising climate change adaptation in the next document containing national expectations regarding municipal and regional planning scheduled for completion in spring 2023.

The Ministers further noted that they, when working on the new white paper, will consider how the municipalities' risk and vulnerability assessments can be improved, and that the Office of the Auditor General's investigation provides important information for this.

5.1.4 Mapping of natural hazards

The Minister of Petroleum and Energy agreed with the Office of the Auditor General's recommendation that central government mapping needs to be improved. According to the Minister, it is decisive that older hazard maps are updated with current knowledge about climate change. The Minister noted that the NVE takes climate change into consideration when updating current maps and for new mapping of flood-prone areas.

Furthermore, since 2014 and in collaboration with appurtenant agencies, the NVE has obtained natural hazard studies conducted by the municipalities and consultants and has publicized these in national landslide and flood hazard databases. The voluntary scheme has proven to be inadequate for society to be able to derive sufficient benefit from the natural hazard studies that have been carried out. The NVE is now investigating a proposal to introduce a compulsory scheme to submit natural hazard studies and ground investigations. This will result in a consultation memorandum with proposals for the enactment of the scheme by statutes and regulations. The Minister of Petroleum and Energy and the Minister of Local Government and Regional Development will follow up the NVE's report.

The Ministers also reported that the Norwegian Centre for Climate Services has prepared climate projections for Norway up to the year 2100, and county-level climate profiles for all the country's counties. Work has commenced on new climate projections for Norway based on the IPCC's sixth assessment report that will be presented in 2022, and this work is scheduled for completion in 2024.

5.1.5 Protection of existing built-up areas

The Ministers acknowledged that there is a major need to protect existing built-up areas in light of the impending climate change. This is long term effort and it is important to have a systematic and risk-based approach to ensure that the areas at greatest risk are prioritised first. Prioritization takes place in accordance with the annual appropriations, and the effects of climate change have an impact on the NVE's prioritization of protective measures. There may be several locations where older protection systems require upgrades to ensure that they are better equipped to provide protection against events in a future climate.

The Minister of Petroleum and Energy agreed that there is a need for updated guidance on how municipalities and other stakeholders should understand and address their responsibilities for protecting existing built-up areas. Such guidance, and any other measures, must be formulated in dialogue with the municipal sector, other relevant agencies and respective specialist ministries. The follow-up must also be viewed in connection with the recommendations from the Gjerdrum Commission in March 2022.

5.1.6 Sea level rise, storm surges and wave impact

The Ministers noted that the Office of the Auditor General found that the municipalities do not receive adequate specialist assistance to manage tasks associated with sea level rise, storm surges and wave impact. They referred to the Norwegian Environment Agency having commenced an update of the knowledge base for assessing sea level rise and storm surges in connection with the IPCC issuing its sixth assessment report in 2021/2022. In addition, arrangements are being made to prepare a historical wave climate on a rougher scale along the Norwegian coast. This may be able to provide better data for more detailed wave analyses for the individual coastal municipalities. Furthermore, the Norwegian Environment Agency has established a reference group to discuss various issues relating to the management of sea level rise, storm surges and wave impact.

5.2 The Ministry of Justice and Public Security

The Minister of Justice and Public Security was of the view that the Office of the Auditor General's investigation provides grounds for arriving at the conclusions made by the Office of the Auditor General when concerning the Minister's areas of responsibility in Document 3, and essentially supported the recommendations that have been made. The Minister will use the Office of the Auditor General's remarks and recommendations as a basis for the continued work. The Minister also made reference to the response from the Minister of Climate and Environment, Minister of Local Government and

Regional Development and Minister of Petroleum and Energy and was essentially in agreement with this.

The Minister noted that if existing buildings and infrastructure are to be adapted to new requirements, significant investments will be needed. She made reference to the government's decision to commence work on a new national climate change adaptation strategy in the form of a new white paper. This will form the basis for strengthening the overall climate change adaptation work.

The Minister stated that it can appear as if the requirements outlined by the Office of the Auditor General to meet future challenges go beyond the requirements set out in the present regulations. The Minister was therefore of the view that it will be vital to the continued work that there is a broad discussion in the Storting about the ambitions that will form the basis for the continued work. A new white paper in this area will be a useful contribution to this discussion, and the Minister considered it to be natural for the white paper to address most of the Office of the Auditor General’s findings and recommendations.

The Minister noted that assessments of how risk and vulnerability are impacted by a changing climate must be included in social planning at local, regional and national levels. The Minister considered it important that DSB continues its ongoing efforts to integrate climate change into relevant work, for example, when methods and guidelines are further developed and revised.

The Minister intended to follow this up through the governance dialogue with DSB and the county governors in the area of civil protection. In connection with this, she made reference to the Ministry of Justice and Public Security having tasked DSB with continuing to work on the comprehensive prevention and coordination of the emergency response to climate risk and the national hazards in the letter of allocation for 2022. DSB has also been tasked with preparing a recommendation on how efforts to prevent the consequences of future extreme weather events can be strengthened in terms of planning, as well as how the division of responsibility for prevention and crisis management in connection with extreme weather events can be clarified and possibility improved.

5.3 The Ministry of Transport

The Minister of Transport reported that, in the letter of allocation for 2022, the Norwegian Public Roads Administration and Norwegian Railway Directorate were provided with guidelines that will assist in following up the infrastructure's vulnerability to climate change.

Among other things, the Norwegian Public Roads Administration has received guidance on further developing methods for analysing civil protection as part of the planning of the future transport system. The Norwegian Public Roads Administration has also been asked to commence work on developing condition indicators for the national road network in order to measure the development over time. The measurement shall be

formulated in such a way that it can be used as a basis for providing information about maintenance backlogs over the coming years.

According to the Minister, it may become applicable to issue an assignment to prepare a comprehensive and binding plan to reduce the maintenance backlog on the county road network in cooperation with the county municipalities. The Ministry of Transport will also assess whether other measures should be initiated to monitor that the enterprises responsible for road construction are following up on the mapping of the infrastructure's vulnerability to future climate change.

In terms of rail infrastructure, in the letter of allocation to the Norwegian Railway Directorate for 2022, the Ministry of Transport provided instructions which included the Directorate having to consider relevant climate change adaptation measures in assessments and concept evaluation assignments, as well as investing in knowledge building through research and development, monitoring and mapping. The Minister further noted that the follow-up of Bane NOR SF's climate change adaptation work takes place through dialogue with the company in accordance with Report No. 8 to the Storting (White Paper) (2019–2020) The state's direct ownership of companies – Sustainable development. The Minister otherwise noted that climate change adaptation will become a bigger part of the systematic follow-up of both Bane NOR SF and other companies, as a result of the EU's adopted classification of sustainable activities (taxonomy), in which climate change adaptation is one of six environmental objectives.

5.4 The Ministry of Trade, Industry and Fisheries

The Minister of Trade, Industry and Fisheries was of the opinion that the Office of the Auditor General had a solid professional basis for the conclusions and recommendations relating to his area of responsibility. The Minister will follow up that the Norwegian Coastal Administration improves its mapping of the existing infrastructure's vulnerability to future climate change. The Minister will follow up this work through agency management and, in connection with this, ensure that the Norwegian Coastal Administration maps and investigates the condition and vulnerability of the infrastructure the agency is responsible for. The Minister will also ensure that there is sufficient knowledge of where the vulnerability and potential consequences of climate change are greatest, where measures are required and what measures provide the greatest possible risk reduction at the lowest possible cost. The Minister will also follow up that the reporting from the Norwegian Coastal Administration to the Ministry becomes more result-oriented and provides a good overview of how measures that are implemented contribute to making existing infrastructure more resilient to future climate change.

6 The Office of the Auditor General's statement to the Minister's response

The Office of the Auditor General had no further comments.

The matter will be submitted to the Storting.

Adopted at the meeting of the Office of the Auditor General
15 February 2022.

Karl Eirik Schjøtt-Pedersen Tom-Christer Nilsen

Helga Pedersen Anne Tingelstad Wøien Arve Lønnum

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Jens Gunvaldsen