

## Pollution from ships in fjord areas with heavy cruise traffic



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## ATTACHMENTS

- Report from Rambøll, 'Discharge and emissions from ships in fjord areas with heavy cruise traffic'
- Report for 2016 on the air quality monitoring programme for the Geirangerfjord - Long-Term Air Quality Monitoring Program UNESCO World Natural Heritage "Geiranger Fjord", Norway, Jörg Löffler (University of Bonn, Germany)
- MARINTEK's report on emission and discharge data from shipping in Norwegian world heritage fjords

# 1 SUMMARY

On assignment from the Ministry of Climate and the Environment (MCE), the Norwegian Maritime Authority (NMA) has coordinated and carried out a survey in order to map discharges and emissions in Norwegian fjord with heavy cruise traffic. The assignment was limited to the three world heritage fjords the Geirangerfjord, the Nærøyfjord and the Aurlandsfjord. The NMA commissioned Rambøll to carry out a comprehensive survey of discharges to sea and emissions to air from cruise ships, Hurtigruten and local traffic in the three selected fjords. This was important in order to assess the risk of possible impacts on health and harm to the natural environment in these three fjord areas. The NMA has mapped the applicable rules and regulations, both the regulation and management of the world heritage areas and legislation related to discharge and emissions from ships. As part of the process, there have been several meetings with various interested parties, who have contributed both in discussions and with written suggestions. In addition, the different problems at hand have been discussed with the Norwegian Environment Agency, the Norwegian Coastal Administration and the MCE.

World heritage sites shall have a high status in Norway. This is ascertained in Storting White Paper No. 35 (2012-2013), "Future with foothold":

*The Norwegian level of ambition for honouring the commitments laid down in the Convention is high: The preservation of Norwegian world heritage areas shall be beacons for best practice for conserving culture and nature, cf. Storting White Paper No. 26 (2006–2007), "The Government's Environmental Policy and the state of the Environment in Norway".*

The results from this survey should therefore be seen as a contribution to ensure that the intention of the white paper is achieved. This includes both measures directed at discharge and emissions and measures that could strengthen the management of the world heritage fjords.

Based on the scientific assessments and surveys made, it emerges that the level of nitrogen oxides (NO<sub>x</sub>) in Geiranger and Flåm at times exceed values that could have a negative impact on health. NO<sub>x</sub> together with soot/smoke particles and water vapour also contribute to the formation of smoke clouds in the fjords. In periods, the combination of older ship machinery, emissions, the number of ships and meteorological conditions leads to high formation of smoke.

The mapping conducted in the project shows that there is little discharge into the fjords from the cruise ships, but Hurtigruten and local ship traffic discharge some sewage and grey water.

Most ships operating in the fjords were built before 2000 and have engines without modern technology for reducing pollution. This leads, among other things, to emissions of particulate matter, sulphur oxides (SO<sub>x</sub>) and NO<sub>x</sub>. Nevertheless, emissions of SO<sub>x</sub> are not large enough to exceed the air quality criteria. This is due to the fact that the fuel used in the fjords has a low sulphur content or that scrubbers (exhaust gas cleaning systems) are being used.

The ships' operational patterns, such as speed, engine load, coordination of engines and time spent at berth/anchor, also effect the amount of emissions to air.

Based on the results from the survey, the NMA suggests several measures to reduce the discharges and emissions and the negative impact on the environment in the Geirangerfjord, Nærøyfjord and Aurlandsfjord.

- The emission of NO<sub>x</sub> from ships shall not exceed the values set out in MARPOL Annex VI, regulation 13.4 (Tier II) by 2018 and regulation 13.5 (Tier III) by 2020
- Only allow use of fuel with a low sulphur content, regardless of whether the ship has air pollution control devices (scrubbers) installed
- Visible emissions of smoke from ships shall have a density that reduces transparency by not more than 50% during cold start or 10% when underway
- Reporting requirements for all ships entering world heritage fjords
- Reducing the number of calls at port; total number or per day/week
- Determination of max speed in defined zones in the fjords to keep consumption of fuel and emissions to a minimum
- Prohibition against discharge of scrubber water
- Prohibition against discharge of grey water
- Prohibition against discharge of sewage, untreated and treated

When determining entry into force of regulatory requirements, the industry's possibilities for compliance must be taken into account. The provisions must also open for dispensations.

## 2 INTRODUCTION

Norway has many fjords with heavy cruise ship traffic. This is particularly the case in the period from June to August. The Aurlandsfjord in to Flåm and the Geirangerfjord have the most traffic, but other fjords also have a considerable amount of ship traffic.

In areas with heavy ship traffic, the shipping activities may generate significant amounts of discharge and emissions. The cruise ships area large, and are often moored with the auxiliary engines running, sometimes even with main engine running. This generates emissions of water vapour, sulphur dioxides (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), carbon dioxides (CO<sub>2</sub>), particulate matter (PM10 and PM2.5) and volatile organic compounds (VOC). Some of these substances may be detrimental to health in concentrations above a certain level. The emissions are smaller from auxiliary engines than from main engines. The same types of emissions will also be found in smaller ships such as ferries and high-speed craft, etc. In this project, the NMA wanted to identify relations between cruise traffic and other ship traffic and possible concentrations of substances that are detrimental to health, compared to air quality criteria and/or limit values.

On days with little wind, smoke clouds may from time to time be observed forming over the fjords. These consist of various amounts of the substances mentioned above. In addition to containing substances that are potentially harmful to health, these clouds area also a form of visual pollution which is not very compatible with the experience and marketing of the world heritage fjords.

Cruise ships and other ship traffic also discharge substances into the sea. Large cruise ships normally have systems installed for cleaning both sewage and grey water. Even though the legislation for the fjords allows discharge of sewage and grey water, we were interested to find out what was actually discharged into the fjords.

Environmental effects from ships usually occurs by discharge into the sea or emissions to air, but waves or noise may also have an impact. These factors are not included in this survey.

The three world heritage fjords are subject to a management regime where a high number of different administrative agencies and consultative bodies play a role. The areas are geographically subject to several municipalities and counties. The report describes the various actors, the applicable legislation and who administers the different parts of the legislation.

### **3 DESCRIPTION OF THE PROCESS AND THE PROJECT**

The survey is divided into several parts:

- Mapping of discharge and emissions
- Review of applicable legislation
- Mapping of where the administrative responsibility and authority lies today
- Recommendations regarding administrative responsibility and authority
- Suggestions for environmental measures with reference to existing legal basis in the legislation

The mapping of the discharge and emissions was carried out by Rambøll on assignment from the NMA. Their report is attached to this document. The assignment was limited to ship traffic which includes the cruise ships, Hurtigruten and local passenger ships. The report also includes simple calculations of emissions from road traffic, so that all substantial sources of pollutions are dealt with.

The NMA has furthermore carried out a review of relevant legislation related to shipping, protected areas, municipal areas and various administrative agencies. In the summary of possible measures, the legal bases for regulatory amendments have been identified.

An important part of the work has been to map all the administrative agencies and councils that have a responsibility for the conservation of the world heritage fjords. This has been a comprehensive and complicated task.

Two workshops have been held, on 18 October 2016 in Oslo and on 15 February 2017 in Bergen, where all interested parties were invited. The turnout for these workshops was good. The participants represented shipping companies, municipalities and counties, Bellona, the World Heritage Council for the West Norwegian Fjords, the Norwegian Coastal Administration, the NMA, the Norwegian Environment Agency and the Ministry of Climate and the Environment.

The participants in workshop 2 were invited to provide written comments about the process. These comments are attached to the report.

### **4 FINDINGS FROM THE SURVEY, THE RAMBØLL REPORT**

#### **4.1 Summary survey - cruise ships**

The cruise ships have a relatively high age. More than half of the ships were constructed before the year 2000, and are thus not in accordance with the standard of environmental technology required for ships being constructed today. This applies in particular to energy consumption and emission of NO<sub>x</sub>. The size varies from small craft up to ships of 150,000 gross tonnage carrying around 4,400 passengers and a crew of 1,500; a total of just under 6,000 people on board. The median size of the ships is around 40,000 gross tonnage with just over 1,000 passengers.

Sixty-three per cent of the ships use diesel-electric power system. This means that they have a flexible power system with several engines that may be operated in accordance with the need for power for propulsion, hotel activities, etc. The other ships, which have ordinary mechanical propulsion, mostly have several main engines and auxiliary engines, providing some flexibility with regard to engine use. Engine load is an important factor when it comes to emissions of particles, soot and NO<sub>x</sub>. A flexible power system makes it easier to operate engines with an optimal load.

Only 12% of the cruise ships from the survey stated that they used heavy fuel oil (HFO) in the fjords. In these cases, scrubbers were used in order to satisfy the requirements for

emission of SO<sub>x</sub>. More than 75% of the fuel used by the cruise ships contains less than 0.10% sulphur. The sulphur emissions are therefore not high in the fjords in questions. Sulphur and particles, however, are often correlated substances in exhaust gas emissions.

Common discharges from ships into the sea are sewage, grey water, bilge water and wash water from scrubbers. The results from the survey indicate that the amount of discharge into the sea in the fjords is modest compared to the allowed limit. Results from the mapping show that 91% of the ships do not discharge treated or untreated sewage in any of the defined zones in the world heritage fjords. For bilge water, the equivalent number is 94%. As for wash water from scrubbers, around 25% of the ships have scrubbers installed, but only 2 ships discharge wash water from scrubbers.

#### **4.2 Summary survey - Hurtigruten and local ship traffic**

Emissions from Hurtigruten and local ship traffic are significant for the pollution in the Geirangerfjord, Aurlandsfjord and Nærøyfjord. These vessels are relatively small, but operate a lot in these waters. The age of the machinery/technology on board varies.

It is estimated that Hurtigruten and local ship traffic with passengers emit 17% of all NO<sub>x</sub> in Geiranger and 9% in the Nærøyfjord and Aurlandsfjord.

Hurtigruten visited Geiranger 97 times in the summer season of 2016. In comparison, the total number of cruise calls in Geiranger was 189. The turn-around time is short – around half an hour. Hurtigruten varies in size from around 6,000 to 12,000 gross tonnage with around 500 passengers. Some cruise ships are smaller than that. Two-thirds of the Hurtigruten ships were constructed before the year 2000. The ships use fuel with a low sulphur content, so that sulphur emissions are not significant, but the NO<sub>x</sub> emissions are relatively high. Conversions have been made to 2 out of 12 vessels. The engines were mostly manufactured before requirements for NO<sub>x</sub> emissions were laid down. The average NO<sub>x</sub> factor for the main engines is between 50 and 80 kg NO<sub>x</sub> per tonne fuel.

As opposed to the cruise ships, several of the Hurtigruten ships discharge sewage and grey water in several of the defined zones.

Local ship traffic consists of ferries, passenger boats, local charters, tenders and RHIBs. The largest of these are vessels built in the 1960s and 1970s. Five of seven still have the original engines. The main machinery speed is between 660 and 1540 kW. Some of the vessels have high intensity of use. In total, the three ferries operate 2 regular services with more than 1000 round trips in the course of the season. The fuel consumption is around 500 tonnes per year. This is the same order of magnitude that the cruise ships consume when at port in Geiranger. The ferries also discharge sewage and grey water.

The four ferries serving the Aurlandsfjord and Nærøyfjord have the same operational pattern as the ones in the Geirangerfjord, and have for the most part the same emissions and discharges.

#### **4.3 Emissions from road traffic**

The estimated NO<sub>x</sub> emissions from road traffic in Geiranger constituted 2.0% of the total emissions. For the Aurlandsfjord and Nærøyfjord the equivalent value was 7.0%.

#### **4.4 Pollution by NO<sub>x</sub>**

Emission of NO<sub>x</sub> in the innermost parts of the Geirangerfjord and Flåm is a challenge. Most cruise ships (78%) spend between 4 and 10 hours in port. The power consumption of the auxiliary engines will be around 4 kW per passenger. Results from the dispersion model

show that NO<sub>2</sub> concentrations were at times elevated in Geiranger and Flåm. This may periodically constitute a moderate health risk according to the air quality criteria.

The smoke cloud that at times forms in the innermost parts of the Geirangerfjord, Aurlandsfjord and Nærøyfjord is mainly caused by emissions from visiting cruise ships, but local ship traffic contributes as well. Particularly when certain cruise ships start up cold engines and increase the speed out the fjord, a large amount of smoke is emitted, which settles in a clearly visible layer around 200 metres from the water.

The exact content of the smoke has not been measured, but based on the knowledge we have about emissions from engines as well as the meteorological conditions in the area, it is highly probable that the smoke consists of particles, NO<sub>x</sub> and water vapour. Water vapour can come from moisture in the emissions (when using scrubbers) or condensation of warm exhaust in cooler air masses. The formation of water vapour as condensation is to a large extent dependent of weather-related conditions, and little suggests that smoke formation only occurs during certain weather conditions.

Measurements done by Professor Löffler at the University of Bonn show that there are at times high concentrations of very small particles. Furthermore, NO<sub>x</sub> takes on colour in certain temperature and weather conditions, and has probably contributed quite a bit to rendering the emissions visible. NO<sub>2</sub> is particularly visible with its yellowish brown colour. Approximately one-fourth of the ships have NO<sub>x</sub> reducing technology installed, and thus reduce their NO<sub>x</sub> emissions by 85-90%. However, 65% of the cruise ships are so old that the requirements for NO<sub>x</sub> reduction are not applicable to them. The ships may therefore emit more NO<sub>x</sub> than the Tier I standard allows.

## **5 CURRENT REGULATION AND MANAGEMENT OF THE WORLD HERITAGE FJORDS**

### **5.1 Elaboration of the regulation of the world heritage sites**

This part of the document describes the legislation for and the management of the world heritage fjords that together make up the West Norwegian Fjords. This mapping is limited to the three fjords; the Nærøyfjord, Aurlandsfjord and Geirangerfjord. The Synnulvsfjord and the innermost part of the Tafjord are also part of the West Norwegian Fjords, but have not been included in the mapping.

The Nærøyfjord and Aurlandsfjord are situated in the municipalities Aurland, Vik and Lærdal in the county Sogn of Fjordane, and in the Voss municipality in Hordaland county.

The Geirangerfjord is situated in the municipalities Norddal and Stranda in the county Møre og Romsdal.

For this chapter, we have received valuable contributions from the Environmental Director at the County Governor of Møre og Romsdal, Linda Aaram.

### **5.2 The World Heritage Convention and the inscription of the West Norwegian Fjords**

Norway ratified the Convention concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention) in 1977. This means that Norway has taken on responsibility for conserving the areas in Norway that are inscribed on the World Heritage List.

In 2005, the West Norwegian Fjords, i.e. the five fjords the Nærøyfjord, Aurlandsfjord, Geirangerfjord, Synnulvsfjord and Tafjord, were inscribed on UNESCO's World Heritage List.



The two fjord districts, henceforth called the Geirangerfjord area and the Nærøyfjord area, are situated 120 km apart and are geologically speaking examples of classic fjord landscapes. They show how the landscape has evolved from the last ice age up until today.

For the West Norwegian Fjords, the inscription is based on the fulfilment of two selection criteria: 1) natural beauty and 2) geology<sup>1</sup>. The following is the basis for inscription on the World Heritage List:

**Criterion (vii):** *The Geirangerfjord and Nærøyfjord areas are considered to be among the most scenically outstanding fjord areas on the planet. Their outstanding natural beauty is derived from their narrow and steep-sided crystalline rock walls that rise up to 1400 m direct from the Norwegian Sea and extend 500 m below sea level. Along the sheer walls of the fjords are numerous waterfalls while free-flowing rivers run through deciduous and coniferous forest to glacial lakes, glaciers and rugged mountains. There is a great range of supporting natural phenomena, both terrestrial and marine such as submarine moraines and marine mammals. Remnants of old and now mostly abandoned transhumant farms add a cultural aspect to the dramatic natural landscape that complements and adds human interest to the area.*

**Criterion (viii):** *The West Norwegian Fjords are classic, superbly developed fjords, considered as the type locality for fjord landscapes in the world. They are comparable in scale and quality to other existing fjords on the World Heritage List and are distinguished by the climate and geological setting. The property displays a full range of the inner segments of two of the world's longest and deepest fjords, and provides well-developed examples of young, active glaciation during the Pleistocene ice age. The ice- and wave-polished surfaces of the steep fjord sides provide superbly exposed and continuous three-dimensional sections through the bedrock. The record of the postglacial isostatic rebound of the crust and its geomorphic expression in the fjord landscape are significant, and represent key areas for the scientific study of slope instability and the resulting geohazards.*

When it comes to the management of the world heritage site the West Norwegian Fjords, Norway is obliged by the Convention to ensure that the world heritage site is not exposed to harm or influences that threaten the outstanding universal values that formed the basis for the inscription on the World Heritage List.

The parties to the World Heritage Convention have later found reason to include sustainable development in the management of world heritage sites. In 2015, the parties to UNESCO's World Heritage Convention adopted a strategy<sup>2</sup> for conservation of world heritage sites based on integrated sustainable development in the management. The strategy defines sustainable development according to three dimensions: environmental sustainability, inclusive social development and inclusive economic development. In other words, through this the State Parties are obliged to manage the world heritage sites in a broader perspective than the criteria on which the inscription was based. The strategy calls upon Norway to avoid or mitigate all negative impacts on the environment when conserving and managing the world heritage site.

The sections on *Environmental Sustainability* (Nos. 14 and 15) and *Inclusive Social Development* (No. 17) are particularly relevant in this connection:

#### *Environmental Sustainability*

- *In implementing the Convention, States Parties should therefore promote environmental sustainability more generally to all World Heritage properties to ensure policy coherence and mutual supportiveness with other multilateral environmental*

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<sup>1</sup> <http://whc.unesco.org/en/decisions/469>

<sup>2</sup> <http://whc.unesco.org/archive/2015/whc15-20ga-inf13-en.pdf>.

agreements. This involves a responsible interaction with the environment in both cultural and natural properties, to avoid depletion or degradation of natural resources, ensuring long-term environmental quality and the strengthening of resilience to disasters and climate change.

- States Parties should ensure that biological and cultural diversity, as well as ecosystem services and benefits for people that contribute to environmental sustainability, are protected and enhanced within World Heritage properties, their buffer zones and their wider settings.

#### *Inclusive Social Development*

- The World Heritage Convention in Article 5 calls upon States Parties to “adopt a general policy which aims to give the cultural and natural heritage a function in the life of the community”. States Parties should recognise that inclusive social development is at the heart of the implementation of this provision of the Convention. States Parties should further recognise that full inclusion, respect and equity of all stakeholders, including local and concerned communities and indigenous peoples,
- Together with a commitment to gender equality, are a fundamental premise for inclusive social development. Enhancing quality of life and well-being in and around World Heritage properties is essential, taking into account communities who might not visit or reside in or near properties but are still stakeholders. Inclusive social development must be underpinned by inclusive governance.

### **5.3 Norway's goal for the world heritage sites**

World heritage sites shall have a high status in Norway. On 26 April 2013, the Storting White Paper No. 35 (2012-2013), "Future with foothold", the Cultural Heritage Policy, was recommended by the Ministry of the Environment and approved in the Council of State the same day. This white paper established the following:

*The Norwegian level of ambition for honouring the commitments laid down in the Convention is high: The preservation of Norwegian world heritage areas shall be beacons for best practice for culture and nature management, cf. Storting White Paper No. 26 (2006–2007), "The Government's Environmental Policy and the state of the Environment in Norway".*

It is therefore important to maintain a high environmental quality in the Norwegian world heritage fjords as well. As international show windows for Norway, strict requirements should therefore be laid down for the ships and others that operate there.

### **5.4 The world heritage fjords and the protected landscape areas**

The two world heritage areas, the Geirangerfjord area and the Nærøfjord area, are largely concurrent with the protected landscape areas in the region, which are protected areas pursuant to the Nature Diversity Act. The protected area in the Geirangerfjord area (called 'the protected landscape area' in Figure 1) consists of the Geiranger-Herdalen landscape protection area, Hyskjett nature reserve and Kallskaret nature reserve.

The protected area in the Nærøfjord area (called 'the protected landscape area' in Figure 2) consists of the Nærøfjord landscape protection area, Bleia-Storebotn landscape protection area, Bleia nature reserve, Nordheimsdalen nature reserve and Grånosmyrane nature reserve.

There are nevertheless some areas with status as world heritage areas, but not as protected areas. In 2008, management plans were drawn up for each of the two subareas of the West Norwegian Fjords – the Geirangerfjord area<sup>3</sup> and the Nærøyfjord area<sup>4</sup>.

Areas not protected pursuant to the Nature Diversity Act are referred to as municipal sector plan areas and are managed by the respective municipalities. For these areas, there are no concrete requirements for protection, but for sustainable management in line with the intentions of the world heritage status.

For the Geirangerfjord area, this applies to the areas that are located within the world heritage site, but outside the protected areas. In practice, this is the village of Geiranger in Stranda municipality and the Tafjord (the actual fjord) in Norddal municipality.

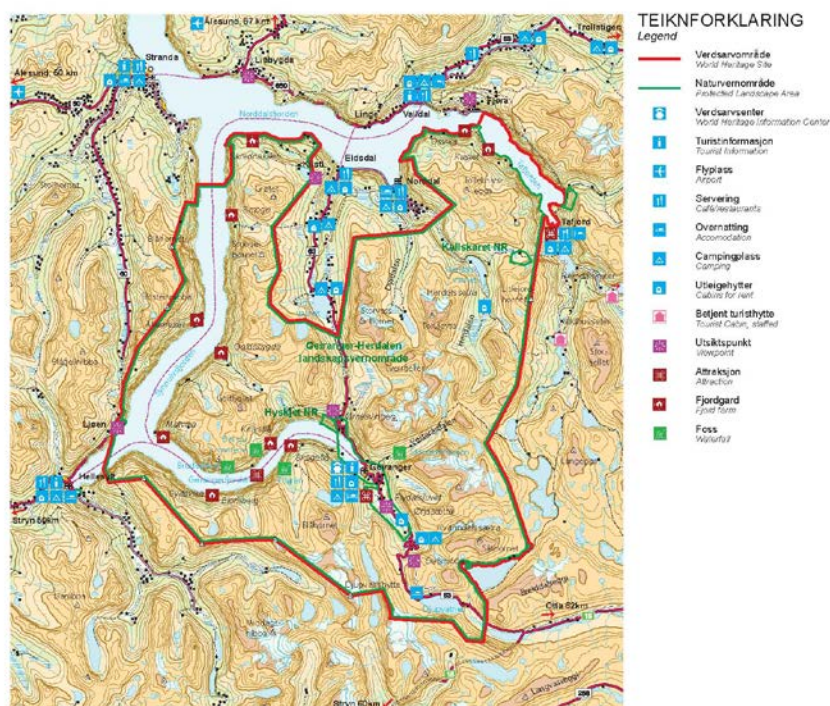


Figure 1. The map shows the Geirangerfjord area / the Geirangerfjord, Synnøvsfjord and Tafjord.

For the Nærøyfjord area, the municipalities have management authority for the populated areas in the world heritage site (Underdal, Bakka, Nærøydalen, Stalheim, Dyrdal and Breisnes), as well as for the inner parts of the Aurlandsfjord, which are not part of a protected area.

<sup>3</sup><https://www.fylkesmannen.no/Documents/Dokument%20FMMR/Milj%C3%B8%20og%20klima/Forvaltningsplanar%20verneomr%C3%A5de/Webkvalitet%20-%20Forvaltningsplan%20for%20Vestnorsk%20fjordlandskap.pdf>

<sup>4</sup> [http://www.nasjonalparkstyre.no/Documents/N%C3%A6r%C3%B8yfjorden\\_dok/Planer%20og%20publikasjoner/Forvaltningsplan/1-2008\\_Forvaltningsplan\\_Vestnorsk\\_fjordlandskap,\\_delomr%C3%A5de\\_N%C3%A6r%C3%B8yfjorden.\\_1QWm7.pdf](http://www.nasjonalparkstyre.no/Documents/N%C3%A6r%C3%B8yfjorden_dok/Planer%20og%20publikasjoner/Forvaltningsplan/1-2008_Forvaltningsplan_Vestnorsk_fjordlandskap,_delomr%C3%A5de_N%C3%A6r%C3%B8yfjorden._1QWm7.pdf)

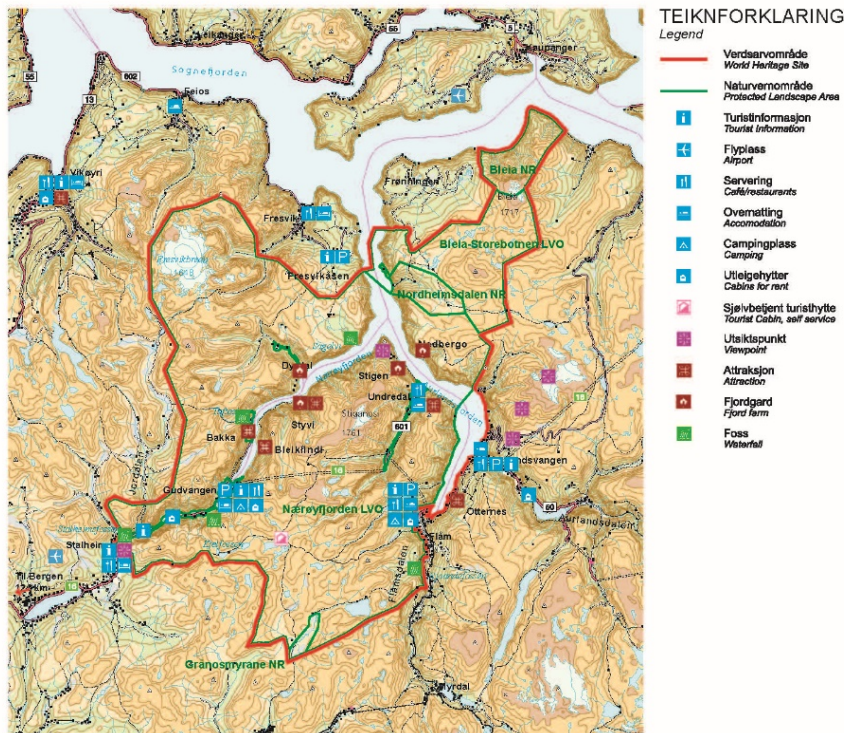


Figure 2. The map shows the Nærøfjord and Aurlandsfjord

## 5.5 No separate regulation of the world heritage fjords

There is no separate regulation of the world heritage fjords as a result of the UNESCO / world heritage status. A precondition for inscription on the World Heritage List was the national protected area that formed most of the world heritage site. An important premise for the inscription was that the areas were ensured long-lasting protection.

The world heritage fjords have status as "protected area" pursuant to the Nature Diversity Act, which applies regardless of UNESCO / world heritage status.

The world heritage status does not lead to further protection of or particular restrictions in the world heritage site.

It is therefore appropriate to take a look at the regulation of the protected areas and at who is responsible for the regulation.

The rules that apply to protected areas are laid down in the protection regulations. In addition, all other laws that apply to areas that are not protected, also apply correspondingly.

## 5.6 The Nature Diversity Act

The Act relating to the management of biological, geological and landscape diversity (Nature Diversity Act)<sup>5</sup> is the central act for the protection of natural values. The purpose of the Act is laid down in section 1:

*"The purpose of this Act is to protect biological, geological and landscape diversity and ecological processes through conservation and sustainable use, and in such a way that the environment provides a basis for human activity, culture, health and well-being, now and in the future, including a basis for Sami culture."*

Section 2 furthermore stipulates that the Act applies to "Norwegian land territory, including river systems, and to Norwegian territorial waters".

Chapter V of the Act regulates various types of protected areas.

<sup>5</sup> LOV-2009-06-19-100

## 5.7 The Planning and Building Act

The Act relating to planning and the processing of building applications (Planning and Building Act)<sup>6</sup> lays down rules for planning work and for what can be built, and is central to the management of protected areas. Pursuant to section 1-1, the purpose of the Act is as follows:

*"The Act shall promote sustainable development in the best interest of individuals, society and future generations.*

*Planning pursuant to this Act shall facilitate the coordination of central government, regional and municipal functions and provide a basis for administrative decisions regarding the use and conservation of resources.*

*The processing of building applications pursuant to this Act shall ensure that projects are carried out in compliance with statutes, regulations and planning decisions. Individual projects shall be carried out in proper manner.*

*Planning and administrative decisions shall ensure transparency, predictability and public participation for all affected interests and authorities. There shall be emphasis on long-term solutions, and environmental and social impacts shall be described.*

*The principle of design for universal accessibility shall be taken into account in planning and in requirements relating to individual planning projects. The same applies to due regard for the environment in which children and youth grow up and the aesthetic design of project surroundings."*

We will look more closely at the municipality's role as planning authority in sections 5.3.1.3 and 5.4.1 below.

## 5.8 Protection regulations

### 5.8.1 The following regulations apply to the protected areas:

- Regulations for protection of the Geiranger-Herdalen landscape protection area, Stranda and Norddal municipalities, Møre og Romsdal<sup>7</sup>
- Regulations for protection of Kallskaret nature reserve, Norddal municipality, Møre og Romsdal<sup>8</sup>
- Regulations for protection of Hyskjet nature reserve<sup>9</sup>
- Regulations for protection of the Nærøyfjord landscape protection area, Aurland, Vik and Voss municipalities, Sogn og Fjordane and Hordaland<sup>10</sup>
- Regulations on protection plan for Bleia. Protection of the Bleia-Storebotnen landscape protection area, Aurland and Lærdal municipalities, Sogn og Fjordane<sup>11</sup>
- Regulations on protection plan for Bleia. Protection of Bleia nature reserve, Lærdal municipality, Sogn og Fjordane<sup>12</sup>
- Regulations on protection of Nordheimsdalen as nature reserve, Aurland municipality, Sogn og Fjordane<sup>13</sup>

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<sup>6</sup> LOV-2008-06-27-71

<sup>7</sup> FOR-2004-10-08-1310, last amended by FOR-2015-02-09-1908.

<sup>8</sup> FOR-1984-11-16-1894

<sup>9</sup> <https://lovdata.no/dokument/MV/forskrift/2003-06-27-828>

<sup>10</sup> FOR-2002-11-08-1280 – last amended by FOR-2016-09-21-1125

<sup>11</sup> FOR-2004-10-08-1325

<sup>12</sup> FOR-2004-10-08-1324

<sup>13</sup> FOR-1999-12-17-1456

- Regulations for protection of the Grånosmyrane nature reserve, Aurland and Voss municipalities, Sogn og Fjordane and Hordaland<sup>14</sup>

The protection provisions are generally the most strict for all types of activities in the nature reserves and the least strict in the landscape protection areas. This applies, among other things, to measures, interventions and non-motorised and motorised traffic.<sup>15</sup>

We have looked more closely at the landscape protection regulations. The three regulations for the landscape protection areas are very similar, and have their legal basis in the repealed Nature Conservation Act from 19 June 1970 and the Nature Diversity Act section 77. The Nature Diversity Act replaces the Nature Conservation Act and applies correspondingly. The general provision on exemption in these protection regulations has been replaced by section 48 in the Nature Diversity Act, cf. section 77 of the Nature Diversity Act.

### 5.8.2 The purpose provisions in the protection regulations

The purpose is laid down in section 2 in all the regulations:

*"The purpose of establishing the Geiranger-Herdalen landscape protection area is to:*

- *preserve a distinctive and beautiful landscape of fjords and mountains with a rich and varied flora and fauna;*
- *preserve valuable cultural landscapes where fjord farms, summer mountain pastures and farms and cultural heritage form important elements in the distinctive character of the landscape;*
- *preserve geological features and landscape forms."*

*"The purpose of the Nærøyfjord landscape protection area is to preserve a beautiful and distinctive natural and cultural landscape from fjords to mountains in a magnificent glacier-formed landscape with a diversity of flora and fauna and where a cultural landscape with hay fields, pastures, mountain farms, farmsteads and cultural heritage, created through active agricultural operations, form important elements in the character of the landscape."*

*"The purpose of the Bleia-Storebotnen landscape protection area is to preserve a beautiful and distinctive natural and cultural landscape from fjords to mountains. Here, the way the glacier ice has moulded the old level land and the fjord landscape with its diverse flora and fauna with wild reindeer constitutes an important element of the character of the landscape."*

The protection provisions are laid down in section 3 of the regulations. The wording of the provisions varies slightly, but the basis for evaluation pursuant to the provision is whether it is an activity or a measure "that may significantly alter or affect the art or character of the landscape".

Several exemptions are listed for activities allowed onshore, and further rules for motorised traffic on land and sea.

### 5.8.3 Motorised traffic

As a starting point, all motorised traffic on land and sea is prohibited, but motorised traffic on the fjord, including landing or docking, is allowed. Motorised traffic on the public motorroads in the landscape protection areas is also allowed.

From the Regulations on protection of the Nærøyfjord landscape protection area section 3 item 2:

*"2. Motorised traffic*

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<sup>14</sup> FOR-1995-12-15-1071

<sup>15</sup><https://www.fylkesmannen.no/Documents/Dokument%20FMMR/Milj%C3%B8%20og%20klima/Forvaltingsplanar%20verneomr%C3%A5de/Webkvalitet%20-%20Forvaltningsplan%20for%20Vestnorsk%20fjordlandskap.pdf> s.25

- 2.1 *Motorised traffic on land and in waters/waterways is prohibited, likewise flying aircraft at altitudes lower than 300 metres and landing of aircraft. Landing also includes picking up and delivering passengers and goods even if an actual landing does not occur.*
- 2.2. *The provisions of 2.1 shall not preclude:*
- [...]*
- b) *motorised traffic on the fjord, including landing or docking. Maximum speed past Skalmenes-Bleiklini is 8 knots. The speed restriction does not apply to boats of less than 30 ft;*
- c) *motorised traffic on the public motorroads in the landscape protection area.*

An equivalent provision is laid down in the Regulations on protection of Geiranger-Herdalen landscape protection area section 3 item 5:

- "5. *Motorised traffic*
- 5.1 *Motorised traffic is prohibited on land and in water.*
- 5.2 *The prohibition of item 5.1 does not apply to:*
- [...].*
- b) *the use of motorboat on the Geirangerfjord and Synnulvsfjord;*
- g) *motorised traffic on roads that are indicated/approved in the management plan, cf. section 5; [...]."*

An equivalent provision is also laid down in the Regulations on protection of Bleia-Storebotnen landscape protection area section 3 item 5:

- "Motorised traffic on land and in waters/waterways is prohibited, likewise flying aircraft at altitudes lower than 300 metres and landing of aircraft. Picking up and delivering passenger and goods where the aircraft is not in direct contact with the ground, is also prohibited.*
- 5.2 *The provisions of 4.1 shall not preclude:*
- c) *motorised traffic on the fjord, including landing or docking and mooring; [...]."*

#### **5.8.4 Pollution**

Furthermore, the provision on pollution is relevant. This has the same wording in section 3 item 6 of the Regulations on protection of the Geiranger-Herdalen landscape protection area and in the Regulations on protection of the Bleia-Storebotnen landscape protection area:

- "6. *Pollution*
- 6.1 *Pollution and littering is prohibited as well as the use of chemical substances that may affect the natural environment.*
- 6.2 *Unnecessary noise is prohibited. Examples of this are engines on model airplanes and model boats. The list is not exhaustive."*

It is interesting to discuss how the wording "*[p]ollution and littering is prohibited as well as the use of chemical substances that may affect the natural environment*" is to be understood. The provision is very short and general. No further provisions are provided on pollution and discharges to sea and emissions to air from ship traffic and traffic on land. Based on this, it could be argued that the legal foundation for regulating pollution in the regulations on the protected areas should have been formulated more clearly.

### **5.9 Who manages the protected areas?**

#### **5.9.1 Elaboration of authorities and actors**

In this part of the document we will provide an overview of the different actors that play a role in the management of the protected areas. The description is based on information retrieved from the authorities in question.

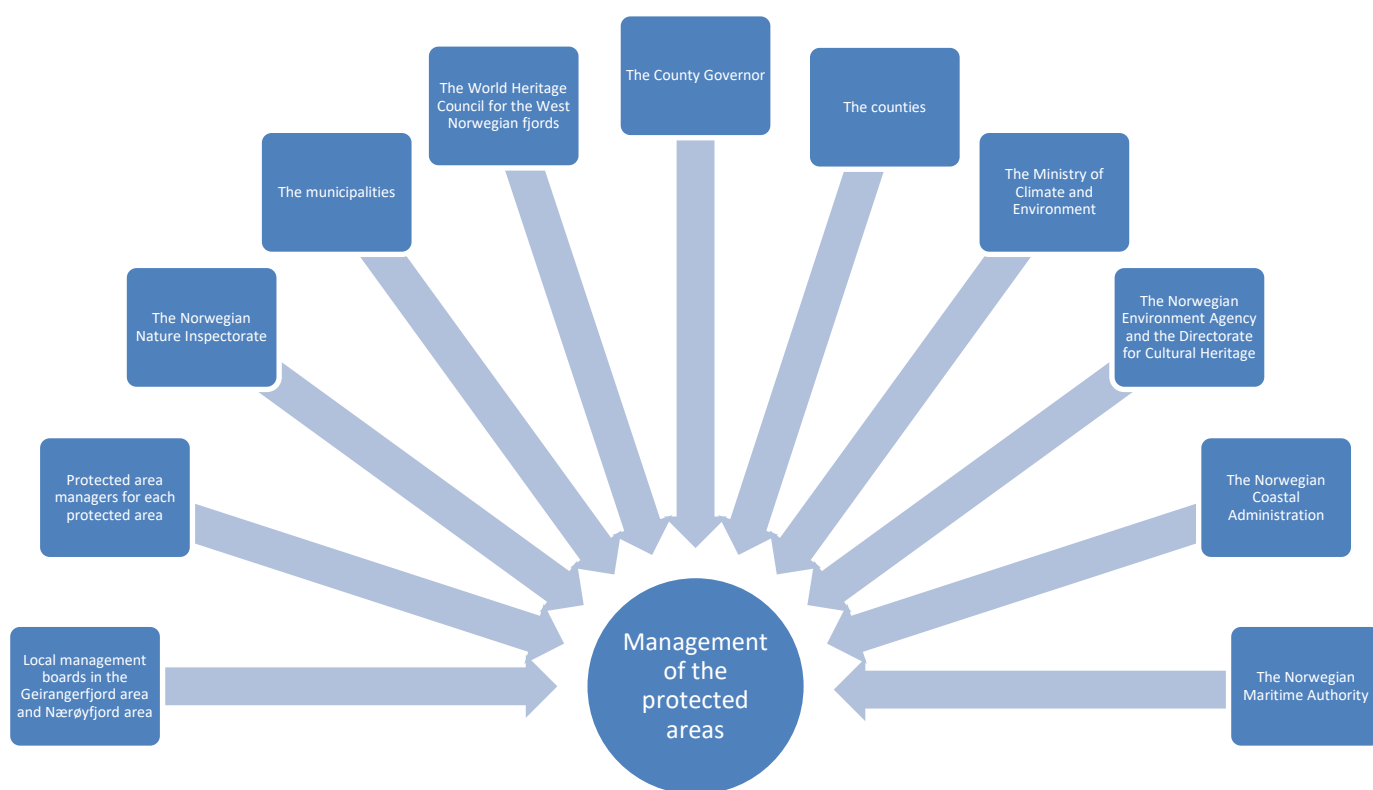


Figure 3 shows authorities and actors that play a role in the management of the protected areas

### 5.9.2 Local management boards

The local management boards in the Geirangerfjord area and the Nærøyfjord area are appointed pursuant to the Regulations on protection of the Geiranger-Herdalen landscape protection area and the Regulations on protection of the Nærøyfjord landscape protection area section 6 and section 7.

The local management boards for the protected areas are responsible for the management of important national and international natural resources. The boards have to base their decisions on the fact that they are managing the areas on behalf of the nation, and they have to ensure that national protected resources are conserved in accordance with the preconditions set when the areas gained protected status.

The management boards shall first and foremost enforce the rules for the protected areas and draw up strategic and operational management plans. They are also responsible for information and signs in the protected areas, and they may also be responsible for maintenance of footpaths and bridges. This is often conducted in cooperation with the Norwegian Nature Inspectorate.<sup>16</sup>

Up until 2010, the protected areas were managed by the County Governors of Sogn og Fjordane, Hordaland and Møre og Romsdal. A new management model for the protected areas was introduced based on the government's proposition in the Ministry for the

<sup>16</sup> <http://www.vestnorskfjordlandskap.no/forvaltning/44-forvaltningsstyresmakt-og-tilsyn>



Environment's proposed budget for 2010 (Prop. 1 S 2009-2010). This gained parliamentary support in the Storting.

In the selection of the new management model, emphasis was placed on making the management knowledge-based, locally based and as uniform as possible.

As of 2010, management boards have been established for our large protected areas and national parks. The boards are composed of representatives from the relevant municipalities and counties. In some areas, landowners and organisations have also been included in the board as a trial.

The management of the protected areas was delegated to local management boards in cooperation with protected area managers, see section 5.3.1.2.

In 2012, a local management board was appointed for the Geirangerfjord area and the management authority for the Geiranger-Herdalen landscape protection area and Kallskaret nature reserve was also delegated to this board. The local management board for the Geiranger-Herdalen landscape protection area has also been delegated the management authority for Hyskjett nature reserve at the Geirangerfjord.

The local management board is composed of the mayors of the municipalities of Stranda and Norddal and one person appointed by Møre og Romsdal county.

In the Nærøyfjord area, a local management board was appointed in 2011. The management board will manage the Nærøyfjord landscape protection area, the Bleia-Storebotn landscape protection area, Bleia nature reserve, Nordheimsdalen nature reserve and Grånosmyrane nature reserve.<sup>17</sup>

The local management board for the period 2016-2019 is composed of chair Noralv Distad, mayor of Aurland, vice chair Olav Turvoll, mayor of Vik, Bjørg Sjukastein from Voss municipality, Jan Geir Solheim from Lærdal municipality, Gunn Åmdal Mogstad from Sogn og Fjordane county and Iril Schau Johansen from Hordaland county. Gunn Beate Sjøthun is deputy for Lærdal municipality.

### **5.9.3 Protected area managers for each protected area**

The protected area managers are employed by the state and their duties include acting as a secretary to the local management boards. The County Governor is responsible for employing the protected area manager, and the area manager reports to the County Governor. The area manager will be subordinate to the local management board in all cases relating to management of the relevant protected areas. The intention of this position is to build up a strong base of local experts.<sup>18</sup> The link to the County Governor will contribute to giving the management a broader knowledge base in the management of the protected areas.

### **5.9.4 The Norwegian Nature Inspectorate**

The Norwegian Nature Inspectorate (SNO) is part of the Norwegian Environment Agency and is the agency's operative field branch. SNO is responsible for the inspection of natural areas and ensures compliance with the provisions in the environmental rules and regulations. SNO's supervisory tasks are two-part and are directed both at supervision of the state of the environment and human behaviour in nature. This includes supervision of all the more than 2800 protected areas in Norway. Guidance and information are also central duties. On assignment from the management authorities, SNO also carries out registration, monitoring, measures and care.<sup>19</sup>

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<sup>17</sup> <http://www.vestnorskfjordlandskap.no/forvaltning/21-forvaltningsstyresmakt-og-tilsyn/53-lokale-verneomradestyre>

<sup>18</sup> <http://www.vestnorskfjordlandskap.no/forvaltning/21-forvaltningsstyresmakt-og-tilsyn/54-verneomradeforvaltaren>

<sup>19</sup> <http://www.naturopsyn.no/>

### **5.9.5 The municipalities**

The municipalities manage information on area planning, pollution, outdoor life, hunting, fishing and game management, climate, cultural heritage, cultural environment and landscapes, motorised traffic, natural diversity and water management. Several of the measures within the protected areas require permission both from the local management boards and from the municipalities as planning and building authority, such as building projects and motorised traffic in outfields.<sup>20</sup>

### **5.9.6 The World Heritage Council for the West Norwegian fjords**

The World Heritage Council for the West Norwegian fjords was established in January 2006, and is responsible for conserving and promoting the world heritage status given to the Nærøyfjord and Geirangerfjord areas. The World Heritage Council is an advisory authority, and does not have power of decision under law or regulations.

The members of the World Heritage Council consist of the mayors of the municipalities of Stranda, Aurland, Vik, Voss and Lærdal, the county mayors of the counties of Sogn og Fjordane, Møre og Romsdal and Hordaland and the county governors of the mentioned counties. The Norwegian Environment Agency, the Directorate of Cultural Heritage and the Ministry of Climate and Environment have the right to attend and speak. The posts of chairman and vice-chairman alternate every 2 years between the Nærøyfjord and Geirangerfjord areas. For the period from 2016 to 2017, the mayor of Voss municipality, Hans Erik Ringkjøb, is the chairman of the World Heritage Council for the West Norwegian Fjords. The vice-chairman is the mayor of Stranda municipality, Jan Ove Tryggestad.

The Council is a meeting ground for the two areas of the West Norwegian Fjords twice a year. In the meetings, common challenges and strategies for development of the world heritage sites are discussed. The Council is consensus-based, and makes statements in cases that could have an effect on the world heritage status of the West Norwegian Fjords. The Council makes statements on their own initiative, but will also get sent certain cases for statement. The Council cooperates with the local management boards.

### **5.9.7 The County Governor**

The County Governor participates as an observer on the World Heritage Council, and is responsible for appointing protected area managers who report to the County Governor. The County Governor has the right to appeal the decisions from the local management boards.

### **5.9.8 The counties**

The counties participate in the local management boards in the Geirangerfjord and Nærøyfjord areas, and in the World Heritage Council for the West Norwegian Fjords. The counties grant service permissions for operating passenger boat traffic in the fjords. Companies operating without concession are excluded from this.

On assignment from the Nærøyfjord World Heritage Park, the law firm Selmer has assessed whether there are possibilities for setting environmental requirements as condition for service permissions for operating passenger boat traffic in the fjords in Norway. The assessment is limited to the possibility of setting terms for new service permissions, and does not look into the concrete possibility of changing or setting new terms for already existing service permissions. Selmer concludes as follows:

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<sup>20</sup> <http://www.vestnorskfjordlandskap.no/forvaltning/21-forvaltningsstyresmakt-og-tilsyn/55-kommunane>

*"In our opinion, there is a legal basis for concluding that there are formal possibilities for setting environmental conditions when granting service permissions for operating passenger boat traffic on the fjords in Norway. This is based on the wording of section 11 of the Professional Transport Act, and is supported by the authority's general opportunity to set terms for administrative decisions, section 112 of the Constitution of Norway and principles of environmental law. However, if environmental conditions are to be set, and which types of conditions to set, will be at the authorities' unfettered discretion – within the non-statutory boundaries for unfettered discretion. In any circumstance, the conditions have to be just (appropriate) and proportionate."*

Based on this, the counties have a certain scope of action for setting environmental requirements as condition for being granted service permission in the world heritage fjords. We have been in contact with the counties. They express uncertainty as regards the right thing to do and a need to have a policy covering this. No such policy exists today. They also raise questions as to whether the county is the correct authority for deciding whether to set environmental requirements when granting service permissions. It was said that the same policy should apply in all the world heritage fjords.

### **5.9.9 The Ministry of Climate and Environment**

The Ministry of Climate and Environment has the primary responsibility for safeguarding the government's climate and environmental policy as a whole. The Ministry of Climate and Environment has the overall responsibility for the protection of nature and for conserving the world heritage in Norway. The Ministry's cultural heritage department has the coordinating responsibility for UNESCO cases within the department's field of responsibility. The department is responsible for following up Norway's commitments under the UNESCO Conventions within the department's field of responsibility, including the Convention concerning the Protection of the World Cultural and Natural Heritage.

### **5.9.10 The Norwegian Environment Agency and the Directorate for Cultural Heritage**

The Norwegian Environment Agency (NEA) and the Directorate for Cultural Heritage are responsible for their respective specialist subjects in accordance with the respective legislation.

The NEA's work with the follow-up of the World Heritage Convention is placed with the National Park Section in Trondheim (part of the former Directorate for Nature Management). Locating the world heritage work to the National Park Section is connected with the fact that the management of protected areas constitutes an important part of the follow-up of world heritage sites that were inscribed on the basis of large natural values. At present, the NEA's part of the follow-up includes the two world heritage sites the West Norwegian Fjords and the cultural landscape Vegaøyan. The NEA manages large parts of the Natural Diversity Act, makes guides, etc.

The Directorate for Cultural Heritage has the equivalent role for the other six Norwegian world heritage sites, along with an extended responsibility for handling international world heritage work (coordinating reports to UNESCO, etc.). A general overview of the organisation is presented in the consultation paper "A new overall world heritage policy", which provided the basis for the discussion of the world heritage policy in Storting White Paper No. 35 (2012-2013) p. 19.

### **5.9.11 The Norwegian Coastal Administration**

The Norwegian Coastal Administration (NCA) is the national agency for coastal management, maritime safety and emergency response to acute pollution. The NCA's main objective is safe and efficient maritime navigation, and is responsible for fairways and

facilitation of ports. The NCA is subordinate to the Ministry of Transport and Communications.

### **5.9.12 The Norwegian Maritime Authority**

The Norwegian Maritime Authority (NMA) is a government body subordinate to the Ministry of Trade, Industry and Fisheries and the Ministry of Climate and Environment. The NMA is the administrative and supervisory authority in matters related to safety of life, health, material values and the environment on vessels flying the Norwegian flag and foreign vessels in Norwegian waters. The NMA is also responsible for ensuring the legal protection of Norwegian-registered ships and registered rights in those ships.

## **5.10 Elaboration of the municipalities' authority**

### **5.10.1 The municipalities as planning authority**

The planning authority lies with the municipalities, and is the central tool for managing the protected areas and world heritage sites. The municipalities are obliged to draw up a municipal master plan, where the status, development, industries, etc. of areas are taken into account. See section 5.2.1.4.

### **5.10.2 The municipalities as pollution control authority - local air quality**

The municipalities are the pollution control authority pursuant to the Pollution Regulations<sup>21</sup> chapter 7 on local air quality. The legal basis for the Regulations is the Act of 13 March 1981 No. 6 relating to protection against pollution and relating to waste (Pollution Control Act) and the Regulations contribute to implementation of the EU's directives on local air quality.

The Pollution Regulations lay down minimum requirements for outdoor air quality, as well as requirements for monitoring, action assessments and information. The provisions divide the responsibility between the different actors (authorities and plant owners).

The purpose is laid down in section 7-1:

*The purpose of the provisions in this chapter is to promote the health and well-being of people, and to protect vegetation and ecosystems by setting minimum requirements and target values for air quality and ensuring that they are complied with, and by setting requirements for the monitoring of and information about the concentration of tropospheric ozone.*

Chapter 7 applies to outdoor air quality, and covers several components (NO<sub>x</sub>, SO<sub>x</sub>, PM 2.5 and 10, etc.). Legally binding limit values for concentrations of various air pollution components have been set, cf. section 7-6, cf. section 7-2.

The polluters (the plant owners) will for instance be roads, industry, ports, transport terminals and heating plants. The NEA sets minimum requirements for monitoring.

The municipalities have responsibilities related to measuring air quality, action assessments and information and notification, cf. section 7-4. The municipality may issue orders to ensure that the requirements of the Regulations are satisfied, including orders to implement measures to ensure compliance with the limit values, cf. section 7-5.

The provisions of this chapter are directed at ports and other plant owners, but it does not seem like the provisions may be used directly to influence or regulate emissions from ships. The regulations that apply to emissions from ships are described in chapter 6 of the report.

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<sup>21</sup> FOR-2004-06-01-931

### 5.10.3 Municipal responsibility for port authority pursuant to the Harbour and Fairways Act

Municipalities have administrative responsibility and authority pursuant to section 9 of the Harbour and Fairways Act:

*"The municipality has administrative responsibility and authority pursuant to this Act within the area where the municipality has planning authority pursuant to the Planning and Building Act, unless otherwise provided in provisions issued in or pursuant to this Act.*

*The municipality shall ensure the safety and trafficability of ports and the municipality's sea area.*

*The Ministry may issue regulations and make decisions on the municipality's administrative responsibility and authority pursuant to this Act, including granting exemptions from or extending the municipality's administrative responsibility and authority."*

The purpose is laid down in section 1 of the Harbour and Fairways Act:

*"The Act shall facilitate good trafficability, safe traffic and proper use and management of the waters in accordance with public interest and the interests of the fisheries and other industries.*

*The Act shall furthermore facilitate efficient and safe port activities as part of maritime transport and combined transports, as well as efficient and competitive maritime transport of persons and goods within national and international transport networks."*

The preparatory work refers to the fact that the Act shall facilitate "proper use and management of the waters", and that it is thus also a tool that lays the foundation for weighing different user interests in the coastal area.<sup>22</sup>

Section 39 first paragraph furthermore stipulates:

*"Owners and operators of ports and port terminals have a duty to receive vessels to the extent that the berthing situation allows, and the vessel is not to the unreasonable displacement of the owner's need for own use of the port or others who have a guaranteed right to use the port. Owners and operators of ports and port terminals may set limitations to the right to call at the port out of consideration for safety, the environment and the fisheries industry."*

The question as to whether section 39 first paragraph second sentence of the Harbour and Fairways Act gives municipalities, in the same way as port owners, the legal basis to limit calls at port in order to contribute to the air pollution in a specified area not exceeding the limit values set out in the pollution legislation, was considered by the legal department at the Ministry of Justice and Public Security, on assignment from the Ministry of Transport and Communications, in a letter dated 24 April 2015.

*"The source material does not give a clear answer to whether section 39 first paragraph second sentence provides a legal basis for limiting calls at port in order to contribute to the air pollution in a specified area not exceeding the limit values set out in the pollution legislation, or to the exceedance being reduced. All in all, we believe that refusing calls at port may have a legal basis in section 39 first paragraph second sentence of the Harbour and Fairways Act, but that the answer may depend on circumstances that have currently not been particularly clarified. When assessing whether an arrangement with refusal of calls at port will work, it will in our opinion be of significance whether the arrangement is set up so that it makes a real contribution to reducing the air pollution, and that such a contribution is in reasonable proportion to the burdens imposed on the shipping industry.*

*To limit the right to call at port for vessels that are not in direct violation of the pollution legislation may have far-reaching consequences for the shipping industry. It is also a question about whether it is an appropriate and feasible measure for limiting air pollution. There are also several questions regarding how such limitations should be enforced and regulated. These factors causes us to say with significant doubts that we assume that the*

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<sup>22</sup> Ot.prp.nr. 75(2007-2008)

*local air quality falls under the environmental considerations that may form the basis for refusal of port call. In any case, it will be of significance how such an arrangement is effected, particularly with regard to predictability for the shipping industry."*

On assignment from the Ministry of Climate and Environment, the consulting company COWI carried out a survey in 2016 of the effects that limitations of port calls and other relevant measures had on the local air quality in the cities of Oslo, Bergen, Trondheim and Stavanger.<sup>23</sup> The summary from COWI's report was as follows:

*"The results show that the contribution from the shipping industry to PM10 concentrations in all four cities is low. The contribution to NO<sub>2</sub> concentrations in Trondheim and Oslo is relatively low. The contribution to NO<sub>2</sub> concentrations in Stavanger and particularly Bergen, on the other hand, is high. Measures directed at emissions from shipping in the two cities is important in order to reduce the contribution from the shipping sector. Rejection of all or certain ship groups on given hours or days will have little impact on the mean annual concentration of NO<sub>2</sub>. Rejection of ships on days where an exceedance of the NO<sub>2</sub> limit has been notified may have a positive effect on the air quality. This is particularly the case for Bergen, but also for Stavanger. It is assumed that the reduction of NO<sub>2</sub> will be so great that this could curb the acute situation and could contribute to the limit value for hourly mean being met. This is on the condition that all central ships are dismissed from port, that the meteorological conditions are favourable for dispersment of emissions from the shipping sources, that the measure is implemented immediately after the notification - and that other measures directed at NO<sub>2</sub> are included (e.g. measures directed at road traffic). It may be hard to fulfil the conditions in practice, which will in case reduce the effects of the measure.*

*There are doubts as to whether rejection of ships is a sustainable method compared to other possible available measures, particularly since it has little effect on annual mean NO<sub>2</sub> values. Long-term measures must be put in place in order to reduce the annual mean NO<sub>2</sub> concentrations.*

*It is clear that it is in Bergen and Stavanger, where the air quality is the most affected by emissions from ships, that measures are the most relevant. For both of these cities, the large percentage of offshore ships contribute the most to the pollutants NO<sub>x</sub> and PM<sub>10</sub>. In Trondheim and Oslo the results are not as clear, and the pollution comes from various vessel groups within cargo/freight transportation.*

*It is recommended that expansion of shore power is carried out, and that, in the meantime, a mix of the other measures are used until the emissions from ship traffic is on an acceptable level."*

A study of local air quality has also been carried out by the Nansen Environmental and Remote Sensing Centre (NERSC) in Bergen.<sup>24</sup>

#### **5.10.4 How is the traffic regulated in the world heritage fjords?**

The municipalities, as port owners, have the legal basis to limit calls at port to contribute to the air pollution in a specified area not exceeding the limit values set out in the pollution legislation. In the following we will look into how the traffic is currently handled in the two fjord areas of the West Norwegian Fjords.

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<sup>23</sup> Mapping of the effect on air quality of limitations of port calls to central ports: Trondheim, Bergen, Stavanger and Oslo, 16 March 2016 - Scott Randall and John Ingar Jenssen

[http://www.cowi.no/menu/Prosjekter/vannogmiljo/miljovurderinger/luftkvalitet/Documents/Kartlegging\\_skipstrafikk.pdf](http://www.cowi.no/menu/Prosjekter/vannogmiljo/miljovurderinger/luftkvalitet/Documents/Kartlegging_skipstrafikk.pdf)

<sup>24</sup> Dispersion and concentration of NO<sub>2</sub> and PM 2.5 in Bergen city centre - a case study with emphasis on contributions from ships in port - Tobias Wolf, Lasse H. Pettersson and Igor Esau 2016 - [https://www.nersc.no/sites/www.nersc.no/files/NERSC370-BOH-Luftkvalitet-090816-v1\\_0.pdf](https://www.nersc.no/sites/www.nersc.no/files/NERSC370-BOH-Luftkvalitet-090816-v1_0.pdf)

#### 5.10.4.1 The Aurlandsfjord and Nærøyfjord

Aurland municipality's sea area includes the Aurlandsfjord and the Nærøyfjord, and the ports Flåm, Gudvangen, Aurland, Undredal, Dyrdal, Styvi and Bakka. The entire sea area is located within UNESCO's world heritage site the West Norwegian Fjords - the Nærøyfjord sub area.<sup>25</sup>

The Aurland Port Authority KF and Aurland municipality has "*set a limit of 5,000 cruise passengers at any one time*", see their comments appended to the report. According to the Port Director, John Erik Johnsen, this is the definitive limit, which means that this is the number of passengers that governs which ships are allowed at berth and anchor in the Aurlandsfjord (Flåm). Flåm has berth space for one cruise ship. There is in addition anchor space for one large ship or two smaller ships at the same time.

In the Nærøyfjord (Gudvangen) there is a tender dock with space for one vessel. This means that there can be 5,000 passengers in Flåm and one ship at the same time in Gudvangen. Gudvangen also has anchor space, but since the fjord is shallow (3 to 12 metres), the Norwegian Coastal Administration has set restrictions on which ships may enter. A total of 10 cruise ships visited Gudvangen during last year's season. Nine of them also visited Flåm, whereas 10 only visited Gudvangen. Four out of 19 ships were in Gudvangen at times when there was no room in Flåm.

In Gudvangen there is a private tender dock, owned by Gudvangen Hotelldrift AS, Gudvangen Fjordtoll. The port authority owns the ferry pier and a smaller pier by the shop on the east side of the river Nærøyelvi.

The smaller ports in Aurland, Undredal, Dyrdal, Styvi and Bakka have no tender docks/floating wharfs and are built for local ferry services. In Aurland there is furthermore a pier for cargo ships for loading and unloading of gravel and asphalt. For the local traffic, the berthing space is the limitation. There is only room for one boat at the time at the ferry pier.

According to the Port Director, Hurtigruten does not have scheduled port calls in the Nærøyfjord and Aurlandsfjord. In 2016, *Trollfjord* and *Polarlys* visited Gudvangen and Underdal once each. This was in April, at a time when no other cruise ships were in the municipality's sea area. According to the Port Director, it is very rare that Hurtigruten visits the area. The Port Director states that a total of 421,000 persons travelled via the piers in Gudvangen and 423,000 via the piers in Flåm in 2016.

#### 5.10.4.2 The Geirangerfjord

Stranda municipality has three ports: Geiranger, Hellesylt and Stranda port (not ISPS). Stranda Port Authority KF has commented on the project in a letter dated 24 February 2017, which is appended to the report.

*"The Geirangerfjord has already set a limit of approx. 6,000 cruise passengers in Geiranger and Hellesylt, which corresponds to 1 ship at pier in Hellesylt and/or 2 ships in Geiranger. Whether the owner, i.e. Stranda municipality, wants to lay this down in local regulations, have to be up to the owner, cf. section 39 first paragraph of the Harbour and Fairways Act.*

Based on this, a limit has been set of around 6,000 cruise passengers, that it to say 1 ship at pier in Hellesylt and 2 ships in Geiranger. In Geiranger, there may additionally be 3-4 ships at anchor, depending on the size of the ships.<sup>26</sup> One anchor position is a back-up position. In Hellesylt there are no anchor positions for ships.

According to the Port Director, Rita Berstad Maraak, the port authority has to look at the overall capacity and consider the traffic handling as a whole. The consideration of cruise

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<sup>25</sup> <http://aurlandhavn.no/>

<sup>26</sup> <http://www.stranda-hamnevesen.no/ports>

traffic goes up to 2 years into the future, and is predictable. Parts of the other traffic are less predictable.

On average, there is 1 ship in Hellesylt and 1-2 ships in the Geirangerfjord, but never more than 3 ships in Geiranger at the same time. Using the entire capacity is a possibility, but never a reality. During the summer season there are rarely more than 3 ships in at the same time, normally just 1. In the period from April to September 2016 there were 16 days with 3 ships and 5 days with 4 ships. On the days when 4 ships were notified, there were never more than 3 ships in Geiranger at the same time.

In the Geirangerfjord, the Regulations on assigning anchor positions and mooring in the Geirangerfjord, Møre og Romsdal<sup>27</sup> apply. The Norwegian Coastal Administration owns the anchor plan. There are also separate guidelines drawn up by the pilot master, updated 25 February 2016.

Hurtigruten sails into the Geirangerfjord every day, 3 months a year in the summer season, with scheduled departure from Geiranger at 13.30. They carry 25,000 passengers in the course of a season. Hurtigruten's port calls involve 4-6 buses each day. In addition, there is bus traffic into Geiranger, transporting passengers from Hurtigruten out of Geiranger and to Ålesund.

The Port Director estimates the number of tourists in Geiranger/Hellesylt to around 900,000, whereof around 1/3 are cruise tourists. The number of cruise passengers in 2016 was 311,805, which is an increase of 0.62% from 2015, when the number was 309,895.

### 5.10.5 Speed restrictions

On our request, the Norwegian Coastal Administration has in a letter dated 9 April 2017 provided an assessment of whether the Regulations on speed restrictions give the municipalities the legal basis to set local speed restrictions in the world heritage fjords based on environmental considerations, including preventing leaching in the fjords and reducing emissions to air. The Norwegian Coastal Administration's assessment is rendered in its entirety below:

"The central Regulations on speed restrictions in sea, rivers and lakes (FOR-2009-12-15-1546) are laid down pursuant to sections 8 and 13 of the Harbour and Fairways Act (HFA).

HFA section 8 provides the legal basis for delegating administrative responsibility and authority pursuant to HFA to one or more municipalities, and in section 4 first paragraph of the central Regulations on speed restrictions, the municipalities are given the legal basis to make individual decisions and lay down local regulations on speed restrictions within the municipality's sea area (and in the municipality's rivers and lakes). In this connection, this also includes main and secondary fairways within the municipality's sea area, cf. the Regulations' foundation in HFA section 8. The main office of the Norwegian Coastal Administration shall nevertheless approve local regulations on speed restrictions before they are given effect. Outside of the municipality's sea area, the equivalent responsibility and authority lie with the main office of the Norwegian Coastal Administration, cf. section 4 second paragraph of the Regulations.

HFA section 13 provides the legal basis to *"make individual decisions or issue regulations on traffic handling, including relating to (...) a) navigation rules, including rules on speed."* Beyond the wording of the Act, this provision does not include any further limitation of the purposes and considerations on which such speed provisions shall or may be based, but the comment in the preparatory work to section 13 subparagraph a) includes the following examples, cf. Ot.prp.No. 75 (2007-2008), p. 157:

*"In subparagraph a), 'navigation rules' are mentioned: 'Navigation rules, including rules on speed' could, systematically speaking, supplement, specify or deviate from the general rules of the road at sea, which apply to all waters.*

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<sup>27</sup> FOR-2004-12-07-1634



*Relevant regulations may for instance be rules for approaching larger ports, for vessels with dangerous or polluting goods, in narrow waters, in waters with heavy traffic and when necessary to reduce the risk or harm or inconvenience to public or other interests.*

*Navigation rules may for instance be laid down for a particular activity or in connection with measures, and may be made limited in time and applicable in general or for a larger or smaller group. For example, in connection with approval of an application for a boat race, exemptions may be made from current speed provisions and navigation rules for the duration of the race, as well as particular rules on navigation for other traffic.*

*Examples of more concrete types of "navigation rules" that may be laid down are:*

*- rules on vessels' maximum permitted speed (...)"*.

The substantive scope of HFA section 13 - and thus also of the central Speed Regulations - must accordingly primarily be derived from the purpose laid down in HFA section 1 and within the framework that follows from the general requirement of a sufficiently clear legal basis for restrictions on *inter alia* users of the sea areas ("principle of legal authority").

HFL section 1 reads as follows:

*"The Act shall facilitate good trafficability, safe traffic and proper use and management of the waters in accordance with the public's interest and the interests of the fisheries and other industries.*

*The Act shall furthermore facilitate efficient and safe port activities as part of maritime transport and combined transports, as well as efficient and competitive maritime transport of persons and goods within national and international transport networks."*

In a consultation letter from the Ministry of Climate and Environment dated 23 December 2016 - on "[h]earing of proposed repeal of the Jet Ski Regulations" - the Ministry has assessed whether the current Harbour and Fairways Act allows the possibility of laying down speed restrictions out of consideration for the environment, see especially p. 6-10 in the consultation letter. The following is from page 6 of the consultation letter:

*"Such speed restrictions may be laid down both for parts of or all of the municipality's sea area. Both the central Speed Regulations and local regulations on speed restriction apply to all types of vessels, including jet skis. Exemptions from regulations on speed are exhaustively listed in section 6 of the central Speed Regulations. This means that it is not possible to issue regulations on speed restrictions that are only applicable to one vessel type."* [Our emphasis.]

We also refer to the following from page 9-10 of the consultation letter:

*"The purpose of the Act also mentions "public interest" as a factor to consider. It is evident from the preparatory work Ot.prp. No. 75 (2007-2008) pp. 33 and 34 that environmental considerations are included in the term "public interest". There is also the question whether e.g. noise pollution from activities on the water that are perceived as bothersome from the shore could be seen as environmental concerns to be taken into account when exercising power pursuant to the Harbour and Fairways Act. In the preparatory work it is stated that "the Act is [...] also a tool that lays the foundation for weighing different user interests in the coastal zone". "The coastal zone" must in this connection be understood as a zone that comprises the sea and land areas that in terms of use are in direct interaction with each other, so that it will be natural to assume to that regulation of activities at sea, with regard to exercising public authority pursuant to the Harbour and Fairways Act, will also impact the shore-side.*

*The different considerations and interests to be taken into account need to be weighed when laying down any restrictions in the use of the waters. The interests related to the use of the waters must be weighed against the interests that stand out ashore, such as the interests related to outdoor life or the consideration of permanent residents or cabin residents in the coastal zones as regards e.g. bothersome noise from vessels. In this assessment it will be decisive that a regulation of the use of vessels will contribute to reducing for example the noise pollution, and that such a regulation will be in reasonable proportion to the burdens imposed on the user group in the waters. This must be considered specifically for the waters in question in each municipality, and it is up to the municipality to introduce a regulation of use of the waters in line with the framework of the Harbour and Fairways Act."* [Our emphasis.]

In relation to the meaning of environmental impacts, HFA sections 1 and 13 and appurtenant speed regulations must also be assessed against the general requirements for exercise of public authority

laid down in section 112 of the Constitution of Norway and in section 7 of the Nature Diversity Act, cf. sections 9 to 12 of the same Act.

Like HFA section 13, the central Speed Regulations do not include any further specifications of the considerations to which importance should or may be attached when setting speed restrictions, but the general due diligence provision in section 2 of the Regulations may nevertheless give some guidance as to the considerations that the Regulations are meant to protect.

*"Vessels shall exercise caution and adjust the speed to the vessel's size, construction and manoeuvring ability and the conditions of the waters, so that damage or danger of damage to people, including bathers, other vessels, shore lines, piers, aquaculture farms or surroundings in general is not caused by the wash of the waves or otherwise."*

We also refer to the Norwegian Coastal Administration's publication "Guide to preparation of local speed regulations", cf. particularly page 13:

*"There are mainly two factors that make speed restrictions at sea necessary. One is the traffic density in relation to the condition of the waters. The goal here will be to limit the vessels' speed so that the risk of collisions, groundings and similar is reduced. In such cases it is natural to issue speed regulations stipulating a specific maximum speed in the waters.*

*The other factor is possible damage from wakes. The goal here will be to avoid wakes that could cause damage to installations in the waters, to vessels at berth, or that could expose people who are on installations in the waters to danger. In such cases it may be difficult to determine a maximum speed limit. This is due the fact that the size of the wakes from the vessels varies; some vessels cause large waves even at relatively low speeds, whereas others may have a high speed without causing any significant waves. This is connected with the vessel's draught, size and design, in addition to the conditions of the waters. In order to make a boat driver aware that he is entering waters where wakes may cause damage, notice could for instance be given by a 'slow speed' sign.*

Based on this, the main office of the Norwegian Coastal Administration finds that negative environmental impacts could be a relevant factor in an assessment of whether there is a need for local speed regulation pursuant to the Harbour and Fairways Act, noted, however, that such environmental considerations should be weighed against the effects of possible speed restrictions on e.g. users of the waters and other considerations that the Act is meant to protect."

The Norwegian Coastal Administration's evaluation shows that the municipalities have a scope of action for issuing local speed regulations, but that various considerations must be weighed.

A local speed restriction has been laid down in the Regulations on the protection of the Nærøyfjord, etc. section 3 item 2.2. (b):

*b) Motorised traffic on the fjord, including landing or docking. Maximum speed past Skalmenes-Bleiklini is 8 knots. The speed restriction does not apply to boats of less than 30 ft.*

Work is also underway for laying down local speed regulations in Geiranger, cf. comment from the port authority in Stranda.

#### **5.10.6 Municipalities' right to regulate sewage and grey water from ships**

Municipalities have a right to issue local regulations on discharge of sewage and grey water under section 23-2 of the Pollution Regulations:

*"Municipalities may lay down other requirements for the discharge of sewage and grey water than the requirements laid down in the Regulations of 20 May 2012 No. 488 on environmental safety for ships and mobile offshore units. This shall be restricted to ships which are not certified for international voyages and which either have a gross tonnage of 400 or above, or which are certified to carry more than 15 persons.*

*Stricter requirements shall be considered in relation to, inter alia, the availability of satisfactory reception facilities for sewage.*

*A thorough assessment of the environmental consequences shall be made before easier requirements are adopted.*

*The individual municipality shall, as a matter of course in the preparation of regulations pursuant to this provision, contact other municipalities with a view to co-operate on common solutions for more extensive areas for discharge into waterways or near-coastal waters within a distance of 300 metres from the mainland and islands."*

That is to say that municipalities may issue easier or more stringent requirements for sewage and grey water for certain types of ships. Cruise ships engaged on international voyages may not be regulated by such local Regulations. If municipalities choose to issue stricter rules for sewage and grey water, e.g. a total prohibition against discharge of sewage and grey water, the ships concerned must retain the sewage on board. Consideration should be given as to whether to set up reception facilities ashore or to determine where sewage may be discharged at sea.

This legislation may be used to influence discharge from ships, but is restricted to ships which are not certified for international voyages and which either have a gross tonnage of 400 or above or are certified to carry more than 15 persons.

#### **5.10.7 Summary – management of the protected areas and world heritage sites**

There is no separate legislation for the world heritage sites. The legislation for the protected areas is to a large extent authoritative, since the world heritage sites are largely the same areas, and are thus also protected as landscape protection areas pursuant to the protected area regulations for the Geirangerfjord area and Nærøyfjord area. Some parts of the world heritage sites are situated outside the protected areas and are subject to municipal management.

The protected area regulations do not have a clearly defined legal basis for regulating emissions and discharges from ships and traffic on land. The legal basis must be strengthened in order to reach the Norwegian ambition of the Norwegian world heritage sites being beacons for best practice within nature and culture management.

The legislation on protected areas is spread out, and the administrative responsibility is divided between several authorities and actors. This fragmentary division makes the picture very complex, leads to many different opinions and hinders the decision-making processes.

The Norwegian Maritime Authority feels that the management of the world heritage sites could benefit from all management being administered by one agency with superior decision-making powers, or from the protected areas being expanded to coincide with the world heritage sites, to ensure equal conservation status for the entire world heritage site.

The management of the world heritage sites could perhaps also become easier if we get a separate Act relating to the management of world heritage sites, or if separate Regulations are laid down for the West Norwegian Fjords.

The challenge with periodically large impacts on the environment in the world heritage fjords is not a recent one, it has been a challenge for many years. It is alarming that today's management regime has not been capable of implementing the necessary regulations to protect the areas. The NMA notes that the executive agency for the world heritage site the West Norwegian Fjords, consisting of representatives from all municipalities and counties, in the appended comment expresses a wish for a strict regime for controlling the environmental impact in the world heritage fjords. Despite this, few new regulating measures have been implemented in order to strengthen the protection of the world heritage sites.

## 6 LEGISLATION RELATED TO POLLUTION FROM SHIPS

### 6.1 Introduction

This part of the assignment has been about mapping the national laws and regulations that regulate the ship traffic and pollution from ships in the areas, as well as interfaces with international legislation and commitments related to the world heritage fjords. We have also been asked to suggest measures that could reduce emissions and discharges.

Cars and buses also contribute to the pollution in these areas, and in this survey, the emissions from road traffic have been calculated based on recognised methods in order to provide a basis for comparison between emissions on land and emissions from ships. We will discuss the possibilities that exist within the current legislation for regulating emission and discharge from ships. We have primarily looked at legislation administered by the NMA, but also rules administered by other authorities, largely the municipalities. We have also requested assessments from other authorities, and these are presented in the text.

### 6.2 Which rules apply to emission and discharge from ships?

No separate rules have been laid down for ships in world heritage sites, and in the following we will go through legislation related to emission and discharge from ships.

The Ship Safety and Security Act applies to Norwegian and foreign ships, cf. section 2. Further rules on prohibition against pollution are laid down in section 31 first paragraph of the Ship Safety and Security Act:

"Pollution of the external environment by the discharge or dumping from ships, or by the incineration of harmful substances, or pollution in any other way in connection with the operation of the ship is prohibited, unless otherwise decided by law or regulation laid down pursuant to law."

The International Convention for the Prevention of Pollution from Ships (MARPOL) has been implemented into Norwegian legislation by incorporation in the Regulations of 30 May 2012 No. 488 on environmental safety for ships and mobile offshore units.

#### *"Section 1. Scope of application*

*These Regulations apply to Norwegian ships, including recreational craft and mobile offshore units. Subject to limitations following from international law, these Regulations apply to foreign ships and mobile offshore units operating:*

- a) in Norwegian territorial waters, including waters near Svalbard and Jan Mayen;*
- b) in the Economic Zone of Norway;*
- c) on the Norwegian Continental Shelf.*

*For foreign ships which are voluntarily within a Norwegian port, at an installation on the Norwegian Continental Shelf or at an installation in the Economic Zone of Norway, sections 4 and 7 shall also apply to discharges in the high seas."*

MARPOL stipulates when discharge is allowed, and this applies to all types of discharge.

The Regulations on environmental safety and chapter 20 of the Pollution Regulations (reception facilities for waste, etc.) implement the technical rules of MARPOL.

During ordinary operation of ships, including cruise ships and smaller passenger ships, various types of waste will accumulate underway that the ship needs to get rid of, either by delivering this to reception facilities ashore or by discharging it into the sea in accordance with the applicable regulations.

It is also relevant to refer to the EEA Agreement and to the fact that environmental requirements are part of Norway's commitments. Some of the provisions in the Regulations on environmental safety are particular requirements for the EU, implemented into Norwegian legislation through the EEA Agreement – section 13 on sulphur content of fuel oil while the

ship is berthed or anchored, section 14 on sulphur content of fuel oil for passenger ships on a regular service in the EEA, and section 14a on trials of new emission abatement methods. We will return to the discussion on Norwegian jurisdiction to lay down rules for cruise ships in Norwegian fjords and the relationship with the Law of the Sea later in the document.

### 6.3 Emissions to air

Emissions to air include NO<sub>x</sub>, SO<sub>x</sub>, particulate matter - PM 2.5 and PM 10, soot (black carbon) and CO<sub>2</sub>. NO<sub>x</sub> is generated in the engines as a result of how the fuel is combusted. SO<sub>x</sub> is a result of how much sulphur the fuel contains. The particles PM 2.5 and PM 10 are produced during the combustion of the fuel.

Further rules on the air pollution from ships and mobile offshore units are laid down in section 12 of the Regulations on environmental safety:

*"MARPOL consolidated edition 2011 Annex VI on the prevention of air pollution as amended by MEPC.202(62), MEPC.203(66), MEPC.217(66) and MEPC.251(66), and the NO<sub>x</sub> Technical Code as amended by MEPC.177(58), MEPC.217(63) and MEPC.251(66), shall apply as regulation.*

*MARPOL Annex VI chapter 4 and regulation VI/5.4, cf. the first paragraph, shall apply correspondingly to ships of 400 gross tonnage and upwards, with the exception of the amendments laid down in MEPC.251(66).*

*New ship engaged on domestic voyages means, cf. MARPOL regulation VI/2.23, a ship:*  
*a) for which the building contract is placed on or after 1 July 2015;*  
*b) in the absence of a building contract, the keel of which is laid or which is at a similar stage of construction on or after 1 January 2016;*  
*c) the delivery of which is on or after 1 January 2018."*

MARPOL Annex VI applies to all ships, unless otherwise expressly provided. In the following we will look more closely at various types of emissions to air.

#### 6.3.1 Sulphur content of fuel – Emission Control Areas (ECA)

Special Sulphur Emission Control Areas (SECAs) have been established, cf. MARPOL VI/4.3.

In the SECAs, the sulphur content of fuel oil used on board ships shall, from 1 January 2015, not exceed 0.10%.

The SECA includes the North Sea south of 62°, cf. MARPOL Annex V/1.14.6.1. The Nørøysfjord and Aurlandsfjord are within the SECA. The Geirangerfjord is situated north of this SECA.

Outside of the SECAs, the maximum sulphur content is 3.50% (requirement from 1 January 2012).

From 1 January 2020 a general requirement of max. 0.50% sulphur content in fuel will apply.

#### 6.3.2 Sulphur content of fuel at berth or anchor

The sulphur content of fuel oil while a ship or mobile offshore unit is safely moored at berth or at anchor in port shall not exceed 0.1% m/m, cf. section 13 of the Regulations on environmental safety.

This is a particular requirement from the EU (the Sulphur Directive 1992/32/EC) that we have implemented through the EEA Agreement, and that applies in all Norwegian ports.

Note that the requirement for the sulphur content of fuel to not exceed 0.10% does not apply when using dynamic positioning (DP), which is a method for keeping ships in the same position above the seabed without using anchors, but by using the vessel's own propellers.

The requirement for maximum 0.10% sulphur content does not apply to ships in regular service when the stay in port is less than two hours, cf. the third paragraph.

### **6.3.3 Sulphur content of fuel oil for passenger ships on a regular service in the EEA**

*Section 14 Sulphur content of fuel oil for passenger ships on a regular service in the EEA*

For passenger ships on a regular service to and from ports within the EEA and which are in Norwegian territorial waters or in the Economic Zone of Norway outside emission control areas, the sulphur content of the fuel shall not exceed 1.50% m/m.

Regular service means a series of crossings between two or more ports, or a series of voyages to and from the same port without intermediate calls, either according to a published timetable, or with crossings so regular or frequent that they constitute a recognisable voyage plan.

This is a particular requirement from the EU that we have implemented through the EEA Agreement.

### **6.3.4 NO<sub>x</sub>**

The NO<sub>x</sub> emission requirements are laid down in MARPOL Annex XI regulation 13.

The purpose of the NO<sub>x</sub> Code is to specify the requirements for testing, inspection and certification of engines using marine diesel in order to ensure that they comply with the requirements for emission of NO<sub>x</sub> of MARPOL Annex VI regulation 13.

The Code applies to all diesel engines with a power output of more than 130 kW, which are installed, or are designed and intended for installation, on board a ship subject to Annex VI.

Marine diesel engines with an output of more than 130 kW are subject to the NO<sub>x</sub> emission requirements laid down in MARPOL Annex VI regulation 13.

The emission requirements depend on when the engines were installed on board the ship, and gradually become stricter:

Tier 0: No emission requirements for diesel engines installed on board ships constructed before 1 January 2000\*.

Tier I: The requirement applies to diesel engines installed on board ships constructed on or after 1 January 2000, but before 1 January 2011 (emission requirements as described in regulation 13.3).

Tier II: The requirement applies to diesel engines installed on board ships constructed on or after 1 January 2011 (emission requirements as described in regulation 13.4).

Tier III: The requirement applies to diesel engines used in an ECA and installed on board ships constructed on or after 1 January 2016\*\* (emission requirements as described in regulation 13.5).

\* Some large diesel engines are exempt from this requirement, cf. regulation 13.7.1.

\*\* The date will depend on the ECA in which the ship is operating. In the North American ECA, the requirements entered into force on 1 January 2016, whereas in the North Sea and Baltic Sea ECAs, the requirements will enter into force on 1 January 2021.

During MEPC 70, it was agreed to include NO<sub>x</sub> in the existing ECAs in the North Sea and Baltic Sea, and the regulatory amendment is now being circulated with a view to adopt at the next MEPC 71. The requirements will apply to ships the keel of which is laid on or after 1 January 2021. There are various technologies for meeting these requirements, i.a. use of catalysts (SCR systems), alternative fuels such as LNG, and exhaust gas recirculation (EGR).

### 6.3.5 Particulate matter (PM)

Particles are produced during the combustion of the fuel. There are no special requirements that apply to particulate matter. It is assumed that a reduction of sulphur in the fuel will also reduce the number of particles in the emissions from vessels.

### 6.3.6 CO<sub>2</sub>

The emission of CO<sub>2</sub> is regulated by MARPOL Annex VI - Chapter 4 on regulations on energy efficiency for ships (EEDI). It is laid down in regulation 19 that EEDI applies to all ships of 400 gross tonnage and above.

The Energy Efficiency Design Index (EEDI) was made mandatory for new ships and the Ship Energy Efficiency Management Plan (SEEMP) mandatory for all ships at MEPC 62 (July 2011) through the adoption of chapter 4 (resolution MEPC.203(62)) to MARPOL Annex VI. This was the first binding treaty on climate change since the Kyoto Protocol.

EEDI for new ships is an important technical measure, and is aimed at promoting the use of more energy efficient (less polluting) equipment and engines.

### 6.3.7 Incineration of waste

MARPOL Annex VI/16 regulates incineration of waste on board.

The ban on incineration is further regulated in section 21-2 of the Pollution Regulations.

*"The incineration of waste or other material on board ships and offshore units is banned in Norway. Within the remit of international law, this also applies to incineration in the Norwegian Economic Zone and on the Norwegian Continental Shelf.*

*The ban includes incineration on board Norwegian ships in all waters."*

Incineration is defined in section 21-1 (c) as *"any thermal destruction of waste or other material with the intention of disposing of such materials. Incineration does not include incineration connected with or following from normal operation of ships, offshore units or their equipment, except where the waste or material has been removed from the source of the waste to be disposed of elsewhere."*

This means that approved incinerator plans may be used to incinerate waste generated from normal operation on ships in Norwegian waters, in the Economic Zone of Norway and on the Norwegian Continental Shelf, cf. MARPOL VI/16 and V/9 (own waste) that apply. Nevertheless, it is not permitted to incinerate sewage sludge and sludge oil generated during normal operation of a ship while the ship is inside ports, harbours and estuaries.

### 6.3.8 Noise

Noise is not regulated in MARPOL.

The term pollution is explained in more detail in the preparatory work<sup>28</sup> to section 31 first paragraph of the Ship Safety and Security Act:

*"The first paragraph states as a general principle that it is prohibited to pollute the external environment from the ship. This expression includes both sea (ocean) and waterways, as well as air and soil. This applies whether the pollution occurs by discharge, emission, dumping or incineration of harmful substances or otherwise. The terms 'discharge', 'emission', 'dumping', 'incineration' and 'harmful substances' are defined in international conventions on environmental protection, and are defined accordingly in special Regulations,*

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<sup>28</sup> Ot.prp. No. 87 (2005-2006) p. 120

*cf. fourth paragraph below. The term "otherwise" will e.g. cover pollution as a result of radiation, noise or vibration".*

Based on this, noise could be included in the term pollution in section 31 of the Ship Safety and Security Act. No further rules have been stipulated in our legislation with regard to noise to the external environment from ships, only noise limits on board ships.

We cannot find any general provisions regulating noise, but have found local Regulations on limitation of noise in Oslo municipality - FOR-1974-10-09-2. The Regulations have later been amended by Regulations of 1 October 2015 No. 1151 (issued under the Act of 24 June 2011 No. 29 on public health (Public Health Act) section 8 and Regulations of 25 April 2003 No. 486 on environmental health care section 11).

### **6.3.9 Visual pollution**

MARPOL does not cover visual pollution.

One could ask whether visual pollution is included in the term "otherwise" in section 31 first paragraph of the Ship Safety and Security Act.

The same applies to smell.

## **6.4 Discharges to sea**

Discharges to sea include sewage (bacteria and nutrient salts), wash water, oil and oily mixtures, wash water from scrubbers, ballast water and garbage. Discharge includes both substances from the operation of the ship and from the cargo.

### **6.4.1 Sewage (black water)**

Further rules on sewage from ships and mobile offshore units are laid down in the Regulations on environmental safety:

*"Section 9 Prevention of pollution by sewage from ships and mobile offshore units - MARPOL Annex IV*

*MARPOL consolidated edition 2011 Annex IV on the prevention of pollution by sewage as amended by MEPC.200(62) and MEPC.216(63), shall apply as regulation. In MARPOL, "ship" also means mobile offshore units.*

*In addition to MARPOL Annex IV regulation 9 on sewage systems, the following requirements apply for comminuting and disinfecting systems:*

- a) comminuted sewage shall be able to pass through a grating with a maximum opening of 10 mm;*
- b) the system shall have capacity for the temporary storage of sewage, where recognized norms for the calculation are used and where the operation of the ship, the maximum number of persons on board and other relevant factors are taken into consideration;*
- c) the system's holding tank shall be provided with a visual indication of the amount of stored sewage and meet the construction requirements from a recognized classification society or the regulations concerning the construction of passenger ships, cargo ships and barges; and*
- d) a suitable disinfectant or sanitary fluid shall be introduced to the plant along with sewage.*

*The holding tank, as mentioned in MARPOL Annex IV regulation 9 (1) item 3 and regulation 9 (2) item 2, shall have sufficient capacity for the retention of all sewage. The capacity shall*



*be calculated according to the second paragraph (b), and the holding tank shall be constructed to comply with the requirements of the second paragraph (c)."*

Discharge of sewage is prohibited, with the exceptions listed in MARPOL IV/11.

**MARPOL Annex IV/9 lists three categories of sewage systems:**

- Approved sewage treatment plant
- Approved sewage comminuting and disinfecting system
- Satisfactory sewage holding tank

For ships with an approved treatment plant, there are no restrictions as to where sewage may be discharged, as this sewage has been chemically or biologically treated and is considered neutral.

Note that the effluent shall not produce visible floating solids nor cause discolouration of the surrounding water, cf. MARPOL IV/11.2.2.

For ships with approved comminuting or disinfecting system, sewage may be discharged in areas more than 3 nautical miles from nearest land.

For ships without approved comminuting or disinfecting system, sewage may be discharged in areas more than 12 nautical miles from nearest land.

For the two latter types of sewage system, sewage may not be discharged all at one time, but at a moderate rate when the ship is underway and proceeding at not less than four knots, cf. MARPOL IV/11.1.1.

Further rules on the prohibition to discharge in Norwegian waters are laid down in section 10 second and third paragraphs of the Regulations on environmental safety:

*"The discharge of sewage, grey water and similar into waterways is prohibited.*

*The discharge of sewage into Norwegian near-coastal waters within a distance of 300 metres from the mainland and islands is prohibited. The prohibition does not apply to ships and mobile offshore units using sewage treatment plants that meet the requirements of MARPOL Regulation IV/9.1.*

*Ships covered by MARPOL Regulation IV/2 cf. section 9 may discharge sewage into Norwegian sea areas south of Lindesnes (N 57° 58'8 E 7° 3'4) to the dividing line between Norway and Denmark (N 57° 10'3 E 7° 3'4) and into the waters from the dividing line to the Swedish border in accordance with MARPOL Annex IV."*

The connection between these two rules.

MARPOL Annex IV applies to ships engaged on international voyages. Section 10 of the Regulations on environmental safety stipulates the requirements for the rest of the ships. That is to say that ships engaged on international voyages shall comply with the rules of MARPOL Annex IV/2, cf. 9, and may discharge sewage in the area from Lindesnes to the Swedish border in accordance with the rules of MARPOL.

North of Lindesnes, the general prohibition against discharge up to 300 metres from land applies to all ships, on both international and domestic voyages. The background is most likely the prohibition against differential treatment laid down in MARPOL regulation V/11 No. 2. That is to say that cruise ships operating in the three selected fjords, the Geirangerfjord, Nærøyfjord and Aurlandsfjord, may discharge untreated sewage 300 metres from nearest mainland and islands.

That said, we have no information that cruise ships are actually discharging untreated sewage into Norwegian fjords, since they have no incentive to refrain from using their treatment systems. The ongoing survey is meant to shed some light on which sewage systems the cruise ships have installed, and how they are used.

One hot topic has been whether the local traffic in the world heritage fjords discharges large amounts of sewage.

Sewage has been defined more closely in section 10 fourth paragraph:

"Sewage means:

- a) drainage and other wastes from toilets, urinals and similar sanitary fixtures;
- b) drainage discharged from wash basins, wash tubs and scuppers located in medical premises;
- c) drainage from spaces used by living animals;
- d) other waste waters when mixed with the drainages mentioned in subparagraphs a to c.

It is possible to apply for exemption from the rules on sewage for "*protected ships*", cf. section 10 final paragraph of the Regulations on environmental safety.

#### 6.4.2 Grey water

MARPOL does not regulate the discharge of grey water.

Section 10 first paragraph of the Regulations on environmental safety only prohibits the discharge of wash water and similar into "*waterways*". Ergo, the prohibition does not apply to seawater.

#### 6.4.3 Oil and oily mixtures

Rules on the prevention of pollution by oil from ships and mobile offshore units are laid down in section 4 of the Regulations on environmental safety:

*"The International Convention for the Prevention of Pollution from Ships (MARPOL) consolidated edition 2011 Annex I Regulations for the prevention of pollution by oil as amended by MEPC.21(63), with the exception of regulation I/42, shall apply as regulation."*

As a starting point, MARPOL Annex I applies to all ships, cf. regulation I/2.

The discharge of oily mixtures **from engine rooms** into the sea is, as a starting point, prohibited, cf. MARPOL Annex I/15.

Outside **special areas**, the discharge of oil or oily mixtures from ships of 400 gross tonnage and above is prohibited, unless where five cumulative conditions are satisfied, cf. I/15 A:

- the ship is proceeding *en route*, (see MARPOL V/1.5)
- the oily mixture is processed through an oil filtering equipment meeting the requirements of regulation 14 of this Annex;
- the oil content of the effluent without dilution does not exceed 15 parts per million;
- the oily mixture does not originate from cargo pump room bilges on oil tankers; and
- the oily mixture, in case of oil tankers, is not mixed with oil cargo residues.

Within **special areas**, the discharge of oil or oily mixtures from ships of 400 gross tonnage and above is prohibited, unless where five cumulative conditions are satisfied, cf. I/15 B:

- the ship is proceeding *en route*;
- the oily mixture is processed through an oil filtering equipment meeting the requirements of regulation 14.7 of this Annex;
- the oil content of the effluent without dilution does not exceed 15 parts per million;
- the oily mixture does not originate from cargo pump room bilges on oil tankers; and
- the oily mixture, in case of oil tankers, is not mixed with oil cargo residues.

Rules for ships of less than 400 gross tonnage in all areas except the Antarctic area are laid down in regulation I/15 C.

For ships of less than 400 gross tonnage, oil and all oily mixtures shall either be retained on board for subsequent discharge to reception facilities or discharged into the sea in accordance with the following provisions:

- the ship is proceeding *en route*;
- the ship has in operation equipment of a design approved by the Administration that ensures that the oil content of the effluent without dilution does not exceed 15 parts per million;
- the oily mixture does not originate from cargo pump room bilges on oil tankers; and
- the oily mixture, in case of oil tankers, is not mixed with oil cargo residues.

Section 6 first paragraph of the Regulations on environmental safety stipulates further rules for retention of oily bilge water on ships of less than 400 gross tonnage:

*"Ships of 15 metres or more in overall length and less than 400 gross tonnage shall have equipment for the retention of oily bilge water and piping for discharge to reception facilities.*

*On ships of between 200 and 400 gross tonnage, the holding tank shall be fitted below deck. On ships of less than 200 gross tonnage, the holding tank may be fitted on the deck. Ships of less than 100 gross tonnage may, alternatively, have a properly fixed holding drum.*

*The Norwegian Maritime Authority may, in special cases and upon written application, grant exemption from the first and second paragraphs if the company provides evidence of having implemented compensating measures which the Norwegian Maritime Authority considers to maintain the same level of safety as the requirements of these Regulations."*

Rules to prevent discharge from cargo spaces are laid down in regulation I/34, but this is not a relevant issue for cruise ships.

#### **6.4.4 Wash water from scrubbers**

No particular requirements have been laid down internationally for the discharge of wash water from scrubbers. The discharge of scrubber water falls under MARPOL Annex VI, and is included in resolution MEPC.184(59), 2009 Guidelines for exhaust gas cleaning systems. These are guidelines, not requirements. The guidelines make up the basis for approving scrubbers, and are used by the classification societies.

New guidelines were adopted by resolution MEPC.259(68) on 15 May 2015; Guidelines for exhaust gas cleaning systems. These guidelines have not been implemented into Norwegian legislation.

The use of scrubbers leads to discharge to sea of "exhaust water" that has to a certain degree been treated.

Scrubbers "wash" the exhaust so that the emissions to air comply with the legislation. The system must be approved. The vessel's emissions of exhaust will be monitored by sensors.

There are no Norwegian rules on scrubbers.

#### **6.4.5 Garbage**

Rules on the prevention of pollution by garbage from ships and mobile offshore units are laid down in section 11 of the Regulations on environmental safety:

*"MARPOL Annex V on the prevention of pollution by garbage cf. MEPC.201(62) as amended by MEPC.216(63), shall apply as regulation. In MARPOL, "ship" also means mobile offshore units.*

*All ships entering the Antarctic area south of 60° S shall have sufficient capacity for the retention on board of all garbage produced on board while operating in the area and have arrangements for the discharge of retained garbage at a reception facility."*

MARPOL Annex V applies to all ships, unless otherwise expressly provided, cf. regulation V/2.

Garbage is defined in regulation V/1.9:

*"Garbage means all kinds of food wastes, domestic wastes and operational wastes, all plastics, cargo residues, incinerator ashes, cooking oil, fishing gear, and animal carcasses generated during the normal operation of the ship and liable to be disposed of continuously or periodically except those substances which are defined or listed in other Annexes to the present Convention. Garbage does not include fresh fish and parts thereof generated as a result of fishing activities undertaken during the voyage, or as a result of aquaculture activities which involve the transport of fish including shellfish for placement in the aquaculture facility and the transport of harvested fish including shellfish from such facilities to shore for processing."*

There is a general prohibition against discharge of garbage into the sea, with some listed exceptions, cf. regulation V/3.

MARPOL differentiates between discharge of garbage within special areas, cf. regulation V/6, and discharge outside special areas, cf. regulation V/3. In regulation V/1.14.6.1, the North Sea south of 62° is defined as a special area for garbage.

#### **6.4.6 Ballast water**

The International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention) enters into force on 8 September 2017. New Regulations on the implementation of the BWM Convention are currently underway.

#### **6.4.7 Prohibition against heavy fuel oil on board**

The carriage of heavy fuel oil on board ships is only prohibited in areas around Svalbard.

## **7 SCOPE OF ACTION / JURISDICTION**

### **7.1 Jurisdiction**

The principle that Norway may lay down its own rules within the territorial border, is stipulated by the Convention on Law of the Sea. The Convention on Law of the Sea was adopted 10 December 1982 and entered into force on 16 November 1994. Norway ratified the convention on 24 June 1996.

The border for the territorial sea indicates the outer limits of Norway's territory, and is called the territorial border. Norway's territorial waters consist of the territorial sea and the internal waters. The boundary between the territorial sea and the internal waters runs along the baselines drawn from point to point along the coast.

The Convention on Law of the Sea Article 2 lays down the principle that the Coastal State has full jurisdiction and authority over its territorial waters. This is limited by the principle of innocent passage, cf. Article 12 of the Convention on Law of the Sea. The right to innocent passage may be said to be a settlement between the flag State's and coastal State's concurrent jurisdictions and interests, where the right of innocent passage represents a compromise between the necessity of ships' navigation at sea and the interests of the coastal State.

In the internal waters of the coastal State, that is to say the sea areas within the coastal State's baselines, cf. Article 8 of the Convention on Law of the Sea, the coastal State has full jurisdiction. The right of innocent passage does not apply here. The coastal State's right to issue laws and regulations related to innocent passage is laid down in Article 21.

Since the three fjords are part of Norway's internal waters, Norway may issue particular rules if so desired, e.g. a regulation of ship traffic in Norwegian fjords with world heritage status.

Furthermore, the following is stipulated in the Convention on Law of the Sea Article 212 first paragraph item 3 first sentence:

*"States which establish particular requirements for the prevention, reduction and control of pollution of the marine environment as a condition for the entry of foreign vessels into their ports or internal waters or for a call at their off-shore terminals shall give due publicity to such requirements and shall communicate them to the competent international organization."*

## 8 SUGGESTED MEASURES

### 8.1 Findings from the survey:

- The survey found periodically high levels of particles, particularly the smallest PM<sub>2.5</sub> – PM<sub>1</sub>.
- The NO<sub>x</sub> levels are periodically worrying, and may be seen in connection with meteorological conditions, the number of ships and lack of pollution reducing technology on the cruise ships.
- SO<sub>x</sub> has not been identified as an air pollution issue in the World Heritage Fjords based on the questionnaire, control of fuel type and measurements. Even if only a handful of ships used HFO and scrubbers, more ships may choose to do the same. If so, this would lead to more scrubber water being discharged in the fjords. The scrubber water's effect on the environment over time is unknown.
- The smoke clouds formed from the ships result in an aesthetic problem in addition to the emissions themselves. The smoke clouds consist of particles, NO<sub>x</sub>, SO<sub>x</sub> and water vapour. The formation of smoke clouds is affected by meteorological conditions, the number of ships and whether the ships have NO<sub>x</sub> reducing technology installed.

#### **8.1.1 The emission of NO<sub>x</sub> from ships shall not exceed the values set out in MARPOL Annex VI, regulation 13.4 (Tier II) by 2018 and regulation 13.5 (Tier III) by 2020**

The surveys with dispersion modelling has shown that there is at times elevated concentrations of NO<sub>2</sub> at the innermost part of the Geirangerfjord, Aurlandsfjord and to a lesser degree the Nærøyfjord. According to the air quality criteria, the concentrations in the Geirangerfjord and Aurlandsfjord may in certain periods be detrimental to health.

High concentrations of nitrogen oxides are a health issue. Inhalation of NO<sub>2</sub> could trigger inflammatory reactions in the body, death of cells and loss of lung function. The NO<sub>2</sub> percentage of the NO<sub>x</sub> in the atmosphere will vary depending on amount of sunlight, temperature and other factors. NO<sub>x</sub> furthermore contributes to making the smoke clouds forming in the innermost parts of fjords visible. NO<sub>x</sub> reacts with sunlight, and together with other exhaust gases, the emissions could contribute to the formation of smog with a yellowish brown colour caused by NO<sub>2</sub>.

Approx. 11% of all cruise ships are constructed after 1 January 2011 according to statistics from Clarkson data. Data regarding cruise ships operating in the fjords in this survey (72

ships) suggest that the same percentage of these ships is somewhat higher than 11%. Ships constructed after 1 January 2011 shall satisfy the IMO Tier II requirements for NO<sub>x</sub> emissions. According to the survey, 20-25% of the cruise ships have NO<sub>x</sub> reducing technology installed, that helps them satisfy the IMO Tier III requirements that entered into force in 2016, while half the ships calling at the fjords are constructed before 1 January 2000 when there were no international requirements for NO<sub>x</sub> emissions.

The company either have to convert the engines to low NO<sub>x</sub>, install catalysts (SCR systems) or install other technical solutions in order to comply with the requirements. This will be relatively costly, but it is possible to apply for grants from the NO<sub>x</sub> fund.

### **8.1.2 Only allow use of fuel with a low sulphur content, regardless of whether the ship has air pollution control devices (scrubbers) installed**

The emissions of sulphur, in the current situation, are not large enough to cause substantial health-related or environmental problems these World Heritage fjords. However, a high sulphur content in fuel is associated with large emissions of particles. Emissions of particle matter in the innermost parts of the fjords are elevated, in particular the small particles (PM1).

Use of scrubbers in the fjords leads to discharge of acidic wash water, which could be a problem in the long run. On the other hand, scrubbers remove some of the particles, so that the emission of particle matter is somewhat reduced.

Another adverse effect of scrubber use is the emission of water vapour. This vapour will affect various chemical bonds in the air and will form part of the smoke clouds over the fjords, which will be very visible and constitute visual pollution of the fjords.

At present, there is a requirement for use of fuel with low sulphur content (0.10%) or use of HFO and scrubbers within Emission Control Areas (ECAs) and in European ports regardless of whether the port is located in an ECA. The Geirangerfjord is not located in an ECA, whereas the other relevant fjords area.

According to the survey, around 12% of the cruise ships operating in the fjords use HFO. They therefore have to use scrubbers. Between 75 and 80% of the ships use fuel with a sulphur content of less than 0.10%. Hurtigruten and local ship traffic use only fuel with a very low sulphur content – less than 0.05%. Regulations requiring use of fuel with a low sulphur content will therefore have consequences for around 12% of the cruise ships.

### **8.1.3 The smoke from ships shall have a density that reduces transparency by not more than 50% during cold start or 10% when underway**

As a future measure for reducing the smoke clouds that often form in the world heritage fjords, we propose a max density requirement for visible smoke of 50%, or 10% when underway. A similar requirement has been introduced by the environmental authorities in Alaska.

The measure will have a direct effect on the emissions from the ships that produce a particularly high amount of smoke. The consequence is that the ships either need to be modernised with regard to emissions, or that they will not be allowed into the world heritage fjords in the future.

Instruments have been developed for on-board measurements of the smoke density / transparency of the exhaust along with methods for measurement of the smoke density from ashore. However, these instruments and methods have to be assessed before they may be put to use in Norway.

#### **8.1.4 Reporting requirements for all ships entering world heritage fjords**

The mapping has shown that there is need for better monitoring and control of the ships operating in the world heritage fjords. The Norwegian Maritime Authority believes that there is a need for registration of operational data, emissions and discharges, fuel type, etc. What to be reported depends on the approach chosen with regard to control. A legal basis must be put in place allowing a management authority to introduce or remove reporting requirements at any time.

#### **8.1.5 Reducing the number of calls at port; total number or per day/week**

The prognoses indicate that more and more ships within the cruise industry will want to visit these areas.

To set a limitation in the number of cruise ships both simultaneously in the fjords and preferably also in the course of a season, will affect the overall load on the environment and reduce the likelihood of a deterioration of the pollution. A continuous monitoring regime would be able to provide indications as to whether the number of visiting ships could be adjusted up or down, since new pollution reducing technology is constantly being developed, and new cruise ships are constantly being constructed.

Today's limitation is largely based on limited berthing space. For the future, there needs to be a regime that to a larger degree gives the relevant authorities the necessary latitude to limit the number of ships based on environmental considerations.

In order to ensure predictability for the cruise industry and the local authorities, long-term agreements should be considered with the companies wishing to call at the fjords. The criteria for a long-term agreement could, among other things, have a clear environmental profile that contributes to reducing the environmental strain.

The question as to whether section 39 first paragraph second sentence of the Act relating to harbours and fairways gives municipalities, in the same way as port owners, the legal basis to limit calls at port in order to contribute to the air pollution in a specified area does not exceed the limit values set out in the pollution legislation, was considered by the legal department at the Ministry of Justice and Public Security, see section 5.3.3 above.

#### **8.1.6 Determination of max speed in defined zones in the fjords**

Speed reductions contribute to reducing the energy consumption on board, which in turn reduces the emission. Speed reduction is currently used with regard to the safety of boats at berth and ship traffic in narrow straits. This measure is mainly out of consideration for the vessel's safety, and not environmental concerns.

The Norwegian Coastal Administration's evaluation in section 5.3.4 show that the municipalities have a scope of action for issuing local speed regulations, but that various considerations must be weighed. By reducing the speed, the fuel consumption will go down and the smoke emissions be reduced. At the same time, safe manoeuvring speed is key, and will vary from vessel to vessel. The correct speed reduction will vary from ship to ship. Regulations therefore have to include a scope of action for the authority managing the rule, so that individual factors from ship to ship are taken into consideration. A starting point may be that the individual ship should in advance report and give reasons for optimal speed in order to minimise emissions.

## **Measures for limiting discharges into the sea**

### **8.1.7 Prohibition against discharge of scrubber water**

Internationally, there are no requirements related to discharge of scrubber water. Wash water from scrubbers is described in section 6.4.4. The effect over time is not known, but based on the components of scrubber water, there is reason for caution. A prohibition against discharge of scrubber water is suggested as a preventive measure.

### **8.1.8 Prohibition against discharge of grey water**

Most large cruise ships in the survey have closed systems that either store the grey water until the vessel is in more open waters or that treat the grey water before discharging it. Very few confirmed in the survey that they discharge any scrubber water into the fjords. It should nevertheless be taken into account that only half of the cruise ships participated in the survey.

When it comes to the local ship traffic and Hurtigruten, they state that they discharge grey water into the fjords.

### **8.1.9 Prohibition against discharge of sewage, untreated and treated**

The survey shows that discharge of treated sewage occurs only to a slight degree from the large cruise ships that participated in the survey. As for local ship traffic and Hurtigruten, some sewage is discharged into the fjords. The legislation permits discharge when the ship is at least 300 metres from the shore, and the discharge is normally conducted in a way so that it is not visible.

Heavy ship traffic with a great deal of older tonnage increases the likelihood of more discharge. Environmental consequences could among other things be algae bloom. Since large ships for the most part are well equipped with sewage systems and holding tanks, a tightening of the regulations will most likely have little cost-related effect for the industry.

As for smaller local vessels, the extent of discharges is limited, so measures may be considered over time.