DSA DSB

Recommendation for Impact Assessment Program for a Nuclear Power Plant in Taftøy Industrial Park in Heim og Aure Municipalities

Project proposer: Trondheimsleia Kjernekraft AS

Contents

Introduction

The Norwegian Radiation and Nuclear Safety Authority (DSA), the Directorate for Civil Protection (DSB), and the Norwegian Water Resources and Energy Directorate (NVE) refer to the assignment received from the Ministry of Energy (ED), the Ministry of Health and Care Services (HOD), the Ministry of Climate and Environment (KLD), and the Ministry of Justice and Public Security (JD) in a letter dated 8 April 2025. In this assignment, we were requested to prepare a recommendation for a joint impact assessment programme for a nuclear power plant at Taftøy Industrial Park, located in the municipalities of Heim and Aure in Trøndelag and Møre og Romsdal counties. The original project developer was Norsk Kjernekraft AS, but, on 23 April 2025, Trondheimsleia Kjernekraft AS was established as the new developer. The company was founded in partnership between the prospective host municipalities, the local energy company, NEAS, and Norsk Kjernekraft AS.

DSA is the supreme nuclear safety authority in Norway and is the recommending authority for licensing of nuclear facilities, as well as the permitting authority under the Pollution Control Act. According to the Regulation on Impact Assessments (KU Regulation), Annex I, DSA is the competent authority for nuclear power plants under the Nuclear Energy Act and the Pollution Control Act, in addition to HOD and KLD. In a letter to DSA dated 3 December 2019, it was clarified that DSA is, as a general rule, the competent authority for impact assessments for projects under the Nuclear Energy Act, the Radiation Protection Act, and the Pollution Control Act. Under the KU Regulation, the Ministry of Energy is the competent authority for impact assessments of nuclear power plants under the Energy Act.

Nuclear Facilities Require Special Considerations

A nuclear power plant is typically planned for operation over a minimum of 60 years. In addition, several years are required for planning, construction, and eventual decommissioning. Therefore, the location and suitability of the site must be carefully assessed to ensure reasonable certainty that the plant can be constructed, operated, and decommissioned over time at the proposed site without undue risk to human health, the environment, or other societal and commercial interests. The siting of a nuclear power plant must also consider economic and societal factors, such as power demand, electricity infrastructure, logistics, transportation, emergency preparedness resources, and access to human resources and expertise. Other considerations include proximity to national borders or to other civilian or military installations that may pose risks or have critical national functions that could, for example, complicate evacuation procedures.

Risks associated with nuclear power plants encompass various aspects of facility safety, particularly in relation to operational safety. Strict measures must be implemented to prevent accidents, such as criticality incidents involving elevated radiation levels and releases of radioactive substances. Such events may have severe consequences for human health and the environment. In the worst-case scenario, a nuclear incident could necessitate evacuation of large areas, significantly impact the environment and food production, and affect other countries, as exemplified by the Chernobyl disaster in 1986.

There are also risks related to the handling and transport of spent nuclear fuel and other radioactive waste. Unwanted incidents in these processes may lead to releases of radioactive substances. Additionally, there is a security risk that nuclear and radioactive materials could be diverted and used for non-peaceful purposes, such as the development of nuclear weapons. Other unwanted events may also result in radioactive contamination, both near the facility and across large geographical areas, depending on weather conditions and dispersion patterns. Therefore, strict requirements are imposed to ensure safe, secure, and responsible operation of a nuclear power plant. Safety must always be the highest priority.

Norway is party to several international conventions related to nuclear safety, the handling of radioactive waste and spent nuclear fuel, liability in the event of nuclear accidents, and non-proliferation of materials that can be used for nuclear weapons, including additional protocols. These obligations are implemented in Norwegian legislation. Norway has also adopted the international safety standards developed by the IAEA. In 2019, Norway was evaluated by IAEA-affiliated experts, who conducted a thorough review of the implementation of these standards. The review resulted in a report with recommendations that Norway must follow up. This is relevant for the interpretation of the regulatory framework, and the project developer should thoroughly familiarize themselves with the international framework. A follow-up review is scheduled for late 2025.

Relationship Between an Impact Assessment and a Safety Case for a Nuclear Power Plant

According to Section 4 of the Nuclear Energy Act, a license is required to construct, own, or operate a nuclear facility in Norway. An application for such a license must, pursuant to Section 7 of the Act, include information about the construction site, the facility's purpose, nature and scope, and a presentation and assessment of the facility's safety aspects (safety case).

A safety case for a nuclear facility must detail how safety is ensured throughout all phases of the facility's lifetime. The safety case is a comprehensive document describing all relevant safety aspects and measures to ensure safe, secure, and responsible operation. It must demonstrate that the facility meets all safety requirements. For an application to construct a nuclear power plant, a preliminary safety case is sufficient, but a complete safety case must be submitted well before the facility is commissioned. The requirements for the safety case will also change when the facility is to be decommissioned.

The safety case will include, among other things, technical descriptions of the facility, safety analyses, identification of vulnerabilities and risk factors, measures to minimize risk, operational procedures, emergency preparedness plans for handling incidents at the facility, and descriptions of required expertise and personnel. It will also assess defence-in-depth strategies, including how to manage deviations from normal operations, detect and correct safety-related anomalies, and describe active and passive safety barriers, including physical measures. The safety case will evaluate various levels of protection and physical

barriers to isolate radioactive material. Other measures supporting defence-in-depth must also be identified, including explanations of safety margins in the design and operation of the facility and descriptions of how cascade effects can be avoided. The content requirements for a safety case will vary depending on the development stage of the facility, from construction to operation and eventual decommissioning.

Certain aspects relevant to the impact assessment may also be relevant to the safety case. To ensure a holistic and consistent evaluation of the project's impact and safety, it is important that the assessments in the impact assessment align with those presented in the safety case. The content, analyses, and evaluations in both documents must support each other, particularly where there is overlap, such as environmental impacts and safety considerations.

The relationship between an impact assessment and a safety case for a nuclear power plant is also discussed in Chapter 3.4 of the accompanying justification memorandum.

Content of This Document

The following chapters of this document constitute the recommendation from DSA, DSB, and NVE for the impact assessment programme. The rationale for the requirements and methods included in the recommendation is presented in a separate document titled *Justification for Recommendation for Determination of Impact Assessment Programme for Nuclear Power Plant at Taftøy Industrial Park*. The requirements in the recommendation must be viewed in light of this document.

1 Common Requirements for Methodology and Participation

1.1 General Requirements for the Impact Assessment

The project developer shall:

- Conduct the impact assessment in accordance with the requirements set out in the Regulation on Impact Assessments.
- Assess the impacts of all components of the nuclear power plant, including associated infrastructure and activities, related to reactor buildings, turbine halls, other buildings such as pump houses, roads, power lines, chimneys and/or potential cooling towers, cooling systems, buildings/areas for storage and other handling of radioactive waste and spent fuel, fences, other installations, and land use interventions (collectively referred to as “the project”).
- Assess positive and negative, direct and indirect, temporary and permanent, short-term and long-term impacts.
- Assess the cumulative impacts of the project on relevant topics, in the context of existing, approved, or planned projects or measures within the area of influence, cf. Section 21 of the Regulation on Impact Assessment.
- Evaluate relevant and realistic mitigation measures in accordance with the mitigation hierarchy, cf. the Impact Assessment Handbook M-1941 by the Norwegian Environment Agency and the Directorate for Cultural Heritage, for all phases of the facility’s lifetime. Any disadvantages associated with the mitigation measures shall also be assessed.
- Consider the need for baseline and follow-up studies, including how the conducted assessments may contribute to potential research projects.
- Assess transboundary impacts in accordance with the Espoo Convention.
- Assess each discipline/topic separately, while ensuring interdisciplinary coherence where assessments complement each other or are necessary to fully understand the consequences.
- Include new topics in the impact assessment if further project development reveals that topics not covered by this programme become relevant.
- Adapt and/or limit the scope of the assessment if further project development shows that specific topics or proposed methodologies are irrelevant to the decisions to be made. Any deviations from the impact assessment programme must be justified.
- Base the planning and execution of the assessments on the evaluations and justifications provided in the accompanying justification memorandum.

1.2 Requirements for Presentation and Compilation

The project developer shall:

- Prepare a compilation of the impact assessment to be presented in any applications for licenses under the Energy Act and the Nuclear Energy Act, and for necessary permits under the Pollution Control Act and approvals under the Radiation Protection Act and other relevant legislation. The compilation may be presented in a separate summary report attached as an annex to the applications. The compilation shall include:
    - References to relevant technical reports and chapters for further information.
    - An overview of the key values affected by the project, illustrated with maps.
    - Table(s) showing the impacts for each discipline/topic for each comparable alternative.
    - An overview and consolidated assessment of mitigation measures. A distinction must be made between measures the developer plans to implement and measures not included in the plans but which may be considered further during the permitting process.
    - A description of the development plans sufficient for the reader to understand the design, extent, and scope of the project, and detailed enough to assess its impacts on the environment and society.
- Prepare an English version of the impact assessment for use in the Espoo consultation. Translation into other languages may also be required, but this must be clarified further in the permitting processes.
- Assess whether any information is subject to confidentiality, conduct a value assessment, and, if applicable, label sensitive information with the correct legal basis and submit such information as separate documents.
- Include a description of the development plans in each technical report, sufficient for the reader to understand the design, extent, and scope of the project, and detailed enough to assess its impacts on the environment and society.
- Prepare a table summarizing key data for the project, as illustrated below.

Parameter	Unit	Low estimate	High estimate	Potential remarks
Number and type of reactors	Number			
Expected lifetime of reactors	Years			
Expected lifetime of the entire project	Years			
Type of nuclear fuel	-			
Annual consumption of nuclear fuel	Tonnes/year			
Expected total amount of spent nuclear fuel	Tonnes			
Installed capacity per reactor	MW			
Total installed capacity	MW			
Annual electricity production	GWh			
Full load hours	Hours			
Investment cost	MNOK			
Transformers	Units			
Height of cooling towers	m			
Cooling water requirement	m^3/s			
Cooling water tunnel length	m			
Cross-section of cooling water tunnel	m^2			
Internal grid – length	km			
Grid connection – length	km			
Grid connection – voltage level	kV			

1.3 Methodology and Data Basis

The project developer shall:

- Prepare assessments and conduct field investigations in accordance with recognized methodology, international best practice, and by individuals with relevant professional expertise. The methods used, the individuals responsible for the assessments and fieldwork, and their relevant qualifications must be clearly stated.
- Use the zero alternative as the baseline in all topic-spesific assessments, cf. the Impact Assessment Handbook M-1941 by the Norwegian Environment Agency and the Directorate for Cultural Heritage. The zero alternative refers to the current environmental situation and its expected development based on other adopted plans and measures, assuming the proposed project is not implemented. The zero alternative shall serve as the reference scenario for evaluating the consequences of the proposed project.
- Conduct field surveys/inspections during relevant time periods. The timing, route, and duration of inspections must be specified and justified.
- Collect knowledge from other nuclear power plants to document operational experience and impacts on people, the environment, and society, both during normal operation and in the event of incidents.
- Adhere to the internationally recognized radiation protection principle that radiation use must be justified, exposure must be kept as low as reasonably achievable (ALARA), and humans and the environment must be protected from the harmful effects of radiation.
- Comply with the requirements of the International Atomic Energy Agency's (IAEA) SSR-1 "Site Evaluation of Nuclear Installations" and associated guidance documents listed in the table in Annex 1.
- Ensure that the assessment covers all factors influencing and included in the various evaluations, and that these are representative of the nuclear facilities being considered (e.g. technology choice, reactor type, reactor lifetime, number of reactors to be built, construction sequence, and relevant support facilities), and of all phases of the facility's lifetime.
- Describe key uncertainties, including technical limitations and knowledge gaps in the data basis. It must be stated whether the technical assessor believes further investigations are needed to support decisions on licenses, approvals, and permits.
- Use relevant sources for the various assessment themes. All sources used must be referenced.
- Systematize collected data in accordance with applicable standards and submit data to public databases where such systems are available, cf. Impact Assessment Handbook M-1941.
- Assess whether regulatory or administrative requirements from one authority related to the project may pose a risk of conflict with requirements or guidance issued by other relevant authorities.

1.4 Stakeholder Involvement

The project developer shall:

- Develop a stakeholder involvement plan early in the assessment process, in dialogue with the host municipalities.
- Involve relevant national, regional, and local authorities in the assessment process.
- Establish extensive cooperation with emergency response officers, fire and rescue services, and the police in the host municipalities as part of the assessment. The County Governors of Trøndelag and Møre og Romsdal shall also be involved.
- Engage interest organizations, businesses, local experts, landowners, and rights holders in the work on relevant assessment topics. This shall include, among others:
    - Friluftsrådet Nordmøre og Romsdal
    - Hemne Hunting and Fishing Association
    - Aure Hunting and Fishing Association
    - BirdLife Heim-Aure Local Chapter
    - Nordlandet Outfield Association
    - Nordlandet Community Association
    - Aure and Tustna Farmers' Union
    - Heim Farmers' Union
    - Aure Farmers and Smallholders' Union
    - Aure Business Forum
    - Heim Business Association
    - Equinor
    - Nearby aquaculture companies
- Establish appropriate forms of consultation and communication with local and regional stakeholders. This may include consultation groups, open office hours, public site visits, and public meetings about the project and the assessment process.
- Describe how stakeholder involvement will be ensured throughout the entire lifetime of the nuclear facility, in line with international best practice.
- Describe how the requirements for stakeholder involvement have been met, including dates of meetings, site visits, etc.

1.5 Compliance with Relevant Legislation

The project developer shall:

- Describe how requirements in relevant legislation will be complied with.

Method:
Reference is made to Annex 1 of the document *Justification for Recommendation* for a description of applicable legislation. This description is not exhaustive.

1.6 Environmental Condition / Zero Alternative

The project developer shall:

- Describe the current environmental situation in the project area and adjacent areas, including background levels of radioactivity in the project area and nearby regions.
- Assess how the environment is expected to develop if the project is not implemented.

Method:
The environmental situation / zero alternative shall be defined in accordance with the Impact Assessment Handbook M-1941 by the Norwegian Environment Agency and the Directorate for Cultural Heritage.

2 Description of the Project

2.1 Project Description

The project developer shall:

- Describe the project area and present it on a map.
- Provide an overall description of the project, including design, construction, operation, and decommissioning.

2.2 Justification for the Project

The project developer shall:

- Justify the need for a nuclear power plant in the region, and specifically in the host municipalities (Heim and Aure).
- Describe relevant alternatives to the project. This shall include an assessment of both alternative regional and national locations for nuclear power plants, as well as relevant regional and national alternatives to nuclear power generation.

2.3 Site Location

The project developer shall:

- Describe past and current land use, as well as plans for development and construction in the project area and adjacent areas.
- Assess all relevant risk and vulnerability factors to determine whether the site is suitable and safe for development, including potential impacts of climate change. The analysis shall demonstrate how the planned development will and could affect the surrounding environment.

- Describe the site's proximity to other commercial or industrial activities and critical societal functions, military installations, and other facilities of importance to national security interests.
- Justify the choice of location.
- Describe water sources and how the facility will be ensured a secure and stable supply of cooling water, even under extreme conditions such as droughts and other adverse events, so that safety at the facility is maintained at all times and significant impacts on power supply security are avoided.
- Describe access to electricity for the facility and how stable power supply will be ensured, including the need for backup power systems such as backup generators and/or batteries to maintain operations, enable safe shutdown, and ensure safe restart after shutdown.
- Describe and map relevant existing infrastructure in and around the project area (both natural and man-made), demographic conditions in adjacent areas, emergency preparedness zones, and evacuation possibilities to safeguard environmental and societal safety around the facility. This also includes access to firefighting water.
- Identify natural external conditions and hazards that may affect the safety of the nuclear facility, such as seismic activity, tsunami risk, weather and precipitation patterns, flood and landslide risk, and climate change.
- Describe man-made external events such as aircraft crashes, accidents, groundings, or other incidents related to nearby commercial or industrial activity that may be relevant to the safety of the facility.
- Assess how activities in and around the project area may affect safety, and how the project may, in turn, influence activities in the area (mutual influence).
- Assess the location in terms of the ability to secure and monitor all access routes to and from the facility and its infrastructure, to prevent sabotage and theft.
- Assess the location in terms of risk of intentional adverse events during armed conflict and war, such as attacks involving direct weapon effects including drones, missiles, and artillery.
- Assess the location in terms of its potential implications for total defence capabilities during crises and war.
- Describe the available emergency response capacities in the vicinity of the site for managing accidents (e.g. hospitals, fire services, and other emergency services), and for managing intentional adverse events such as sabotage or theft (e.g. the police, and if applicable, the Armed Forces).

Method:
The description of water sources and secure water supply should include an assessment of alternative cooling solutions in the event of cooling water loss. The requirements in this chapter shall be considered in conjunction with the requirements in Chapters 9 and 10.

2.4 Land Use Requirements

The project developer shall:

- Describe the required land area.
- Present the exact location of all facilities/components and land use interventions included in the project on a map.
- Specify which land use is temporary and which is permanent.
- Quantify the occupation of land-use types based on the national base map.

Method:
Land use requirements and land occupation shall be summarized in tables as illustrated below.
Land Requirements of the Project

Land-use Type	**Temporary Land Requirement (daa)**	**Permanent Land Requirement (daa)**	**Potential remarks**

Land Occupation by Land-use Type

Land-use Type	**Temporary Land Requirement (daa)**	**Permanent Land Requirement (daa)**	**Potential remarks**

2.5 Grid Infrastructure

The project developer shall:
- Describe all grid infrastructure required to connect the power plant to the existing or planned electricity grid, based on a concept selection study.
- Specify which grid infrastructure is included in the license application for the nuclear power plant under the Energy Act, and which components, if any, will be applied for by other entities.

Method:
The choice of grid connection solution shall be based on a concept selection study in accordance with the Regulation on Energy Studies.
For grid infrastructure for which the project developer will apply for a license, the description shall be prepared in accordance with NVE's guidelines for preparing license applications for grid facilities.

2.6 Construction Phase

The project developer shall:

- Provide an overall description of how the construction work is planned to be carried out, including the expected duration of the construction phase.
- Specify the types of construction machinery that will be used.
- Describe the need for blasting, excavation, material extraction, and deposition.
- Describe transportation needs during the construction period, including the need for road upgrades and the upgrading/use of port facilities.
- Explain how the project is planned to reduce greenhouse gas emissions from materials and construction-related transport.

2.7 Project Timeline

The project developer shall:

- Present a realistic timeline for the planning, design, and construction of the project, including any plans for sequential development of nuclear reactors.
- Describe the planned processes for obtaining the necessary licenses and other permits.

3 Nuclear Facility and Nuclear Safety

3.1 General Information on the Facility, Technology, and Activities

The project developer shall:

- Describe the nuclear facility and all relevant aspects of significance for nuclear safety.
- Describe and provide the rationale for the choice of reactor technology, including the number and type of nuclear reactors.
- Describe the planned production capacity.
- Describe the expected lifetime of the various facilities/components included in the project.
- Explain how the chosen facility design and choice of nuclear fuel prevent undesirable events, including sabotage and theft.
- Assess alternative facility designs to reduce the risk of undesirable events.
- Describe other facilities, components, and land use interventions included in the project, including support/auxiliary/subsidiary facilities necessary during one or more phases of the project's lifecycle.
- Describe how the facility design will facilitate decommissioning and dismantling.
- Describe how the facility design will ensure safeguards and verification of nuclear fuel. "Safeguards by Design" must be incorporated from the planning phase.

- Describe how nuclear and radioactive materials will be safely and securely transported to and from the facility.
- Describe the activities planned during the operational phase of the facility.
- Describe the need for spare equipment and storage space, as well as the methodology for storing such equipment.
- Describe how nuclear safety ("Safety", "Security", and "Safeguards") will be ensured at the facility, including information system security, personnel security, etc.
- Describe which hazardous substances will be handled at or in the vicinity of the facility, and in what quantities.
- Describe the measures to be implemented, including land-use and spatial planning measures, to ensure an adequate level of safety for the surroundings, including any designated safety zones around the facility.

Method:
The assessment must demonstrate how the requirements and principles of nuclear safety, as set out in Norwegian nuclear legislation and international conventions and standards, will be upheld throughout all stages of the facility's lifecycle—from design, construction, and operation to decommissioning. This includes radiation protection for both occupationally exposed individuals and the general public, emissions of radioactive substances, handling of radioactive waste at the facility, plans for environmental monitoring of radioactive substances, emergency preparedness plans, non-proliferation of weapons-usable nuclear material, safeguards, and physical protection of the facility. Reference is also made to Chapters 4.3, 4.4, and 4.5 below.

In the description of the need for spare/emergency equipment, particular emphasis shall be placed on technology-specific components such as turbine parts and other equipment that cannot be procured through cooperation with other power sector actors. Required storage space and storage methodology for spare equipment must comply with recovery requirements under the Power Preparedness Regulation.

Handling of hazardous substances shall be assessed against the DSB's thematic report on safety at facilities handling flammable, reactive, pressurized, and explosive substances, as well as the guidelines for quantitative risk assessments for facilities handling hazardous substances.

3.2 Nuclear Fuel

The project developer shall:
- Describe the nuclear fuel cycle from extraction to final disposal of spent nuclear fuel.
- Describe the overall impact of the fuel cycle on the environment and society.
- Explain how nuclear fuel will be handled and stored at the nuclear power plant (including any treatment and storage of spent nuclear fuel), and assess the

environmental and societal impacts of these activities. This shall include both unirradiated and spent nuclear fuel.

3.3 Safety at the Facility (Safety)

The project developer shall:

- Describe how safety at the facility will be ensured through the choice of technology, design, construction, operation, and decommissioning, including defence-in-depth strategies, so that human health and the environment are protected from the harmful effects of radiation throughout all operational phases and all stages of the facility's lifecycle.
- Describe how safety will be ensured in accordance with the requirements of Norwegian legislation, IAEA international safety standards, and guidance.
- Outline the contents of the safety case for the nuclear facility that are relevant to the impact assessment.
- Describe how safety culture and safety leadership will be developed and maintained throughout the facility's lifecycle.
- Describe the human resources, organizational structure, and competencies required to operate the facility in a safe, secure, and responsible manner.
- Describe how protective zones and evacuation zones will contribute to ensuring safety at the facility based on radiation risk.
- Explain how safety functions at the facility will be maintained without conflicting with physical protection measures, personnel safety, and safeguards systems (interface between security/safeguards/safety).

Method:
The assessment must demonstrate how the requirements and principles of nuclear safety, as set out in Norwegian nuclear legislation and international conventions and standards, will be upheld in the selection of technology, design, construction, operation, and decommissioning of the facility. This includes radiation protection for both occupationally exposed individuals and the general public, emissions of radioactive substances, plans for environmental monitoring of radioactive substances, emergency preparedness plans, non-proliferation of weapons-usable nuclear material, safeguards, and physical protection of the facility. It also includes requirements under radiation protection regulations and pollution control regulations related to radioactive contamination and waste.

3.4 Security at the Facility

The project developer shall:

- Describe how a comprehensive security concept will ensure both logical and physical protection of the nuclear facility during its design, construction, operation, decommissioning, dismantling, and waste management phases. The concept must account for potential changes in the classification of nuclear material before and after irradiation in the reactor.

- Describe how information security, cybersecurity, and personnel security will be maintained during planning, construction, operation, decommissioning, dismantling, and waste management.
- Specifically describe how reactor safety systems will be protected against sabotage through digital attacks.
- Outline general procedures for sizing, adapting, and regularly testing the security system based on the regulatory design basis threat, as specified in the Regulation on Physical Protection of Nuclear Material and Nuclear Facilities.
- Outline general procedures for monitoring the threat landscape based on national threat assessments and the local security situation, and for implementing additional measures in response to increased threat levels.
- Describe how relevant authorities, including the police and the Armed Forces, will be involved in developing security plans for the facility. This includes plans for peacetime, crisis, and wartime in accordance with the Object Security Directive, and how the project developer will facilitate cooperation with these actors regarding the facility's security.
- Describe how physical protection at the facility will be maintained without conflicting with safety requirements, employee safety, or safeguards systems (interface between security/safety/safeguards).
- Describe principles for how the facility's design will be adapted to ensure physical protection ("Security by Design"), including access routes, clear zones, sensors, building construction, and choice of materials.

Method:
Physical protection shall be assessed in accordance with requirements set out in Norwegian nuclear legislation. In addition, IAEA recommendations shall be followed, including:

- *Nuclear Security Series No. 13: Physical Protection of Nuclear Material and Nuclear Facilities*
- *Nuclear Security Series No. 27-G: Physical Protection of Nuclear Material and Nuclear Facilities (Implementation of INFCIRC/225/Revision 5)*
- *Nuclear Security Series No. 35-G: Security During the Lifetime of a Nuclear Facility*

3.5 Non-Proliferation of Weapons-Usable Material and Safeguards

The project developer shall:

- Describe how Norway's international obligations related to the non-proliferation of weapons-usable nuclear material, as well as activities, technologies, and knowledge (dual-use items) that may be used for non-peaceful purposes, will be upheld throughout the design, construction, operation, decommissioning, dismantling, and waste management phases of the facility.
- Describe how the facility's design will facilitate verification of nuclear fuel and other nuclear material at the facility, to ensure that declared material accounts are

accurate ("Safeguards by Design"). This shall include design choices based on economic and operational considerations, while ensuring nuclear safety, radiation protection, safeguards, and security throughout the facility's lifetime.
- Describe how potentially conflicting objectives and measures related to safety, security, and safeguards have been assessed (interface between safety/security/safeguards).

Method:
Non-proliferation and safeguards shall be assessed in accordance with requirements set out in Norwegian nuclear legislation and international agreements, including:
- *Treaty on the Non-Proliferation of Nuclear Weapons (NPT)*
- *Comprehensive Safeguards Agreement IAEA INFCIRC/177 between IAEA and Norway*
- *Additional Protocol to the Safeguards Agreement (INFCIRC/177/Add.1)*

Relevant IAEA guidance includes:
- *IAEA NP-T-2.8: Integrated Nuclear Safeguards – Guidance for the Design and Construction of New Nuclear Facilities*

4 Competence Requirements

The project developer shall:
- Describe the competence requirements for all phases of the nuclear facility's lifecycle, at all organizational levels, and explain how access to sufficient expertise will be ensured.
- Assess the need for competence in radiation protection, nuclear safety, radioactive waste management, and nuclear emergency preparedness to ensure safety at the facility.
- Assess the availability of personnel with the necessary specialized expertise for operation and incident management throughout all phases of the facility's lifecycle.

Method:
In describing the competence requirements and access to sufficient expertise, it must be taken into account that the nuclear facility, or parts thereof, may be subject to the Norwegian Security Act and designated as a security-sensitive object. Consequently, personnel must be eligible for security clearance.

5 Radiation Protection

The project developer shall:
- Identify all sources of radiation at the nuclear facility throughout its entire lifecycle.
- Estimate radiation exposure during all operational phases and operational states, as well as during decommissioning, for all workers at the facility.

- Describe how the developer will monitor radiation sources and doses to workers during operation and decommissioning of the facility.
- Describe how radiation doses to occupationally exposed individuals at the facility will be monitored.
- Specify dose limits for exposure and reference levels for protective measures during operation and decommissioning.
- Identify radiation sources that may contribute to doses to occupationally exposed individuals through various exposure pathways (inhalation, ingestion, and external exposure) during normal operation and decommissioning of the facility.
- Describe how radiation protection will be ensured at the facility, including how the principle of optimizing protection for occupationally exposed individuals will be implemented through a radiation protection programme.
- Assess radiation protection measures, including design principles applied in the facility's layout and mitigation measures to reduce or prevent exposure. These measures shall be described in light of the requirements for justification and optimization.
- Describe technical safety functions and other arrangements and measures that, in the event of incidents or accidents, will ensure that radiation-related consequences remain low.
- Describe how radiation and shielding measures will be arranged to ensure that non-occupationally exposed workers and the general public are not exposed to an effective dose exceeding 0.25 mSv/year.
- Assess which monitoring solutions are best suited, considering that radiation from the facility will occur in various forms and that radioactive substances exist in different chemical and physical states.
- Estimate radiation exposure during transport of nuclear and radioactive material to and from the facility.

Method:
Section 5 of the Radiation Protection Regulations requires justification and optimization of radiation use. Justification means that the benefits of radiation use must outweigh the disadvantages. Optimization means that exposure to ionizing radiation must be kept as low as reasonably achievable, taking into account technological knowledge, social, and economic factors. These principles must form the basis of the assessments.

The IAEA provides guidelines and recommendations on radiation protection, use, and transport of radiation sources, primarily through its safety standards. Radiation protection aspects related to operation and decommissioning of the facility shall be assessed in accordance with these standards.

Relevant IAEA safety standards include:
- SSR-2/1 (Rev. 1): *Safety of Nuclear Power Plants: Design* – requirements for nuclear power plant design, including radiation protection.
- SSG-90: *Radiation Protection Aspects of Design for Nuclear Power Plants* – guidance on how to meet radiation protection requirements.

- GSR Part 3: *Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards* – general requirements for radiation protection.
- GSG-7: Recommendations on how to meet occupational exposure requirements in GSR Part 3.
- SSR-6: *Regulations for the Safe Transport of Radioactive Material* – requirements for the transport of radioactive material.

Assessment approaches that may be used include:

- Modelling atmospheric/hydrological dispersion using established calculation tools and credible source terms.
- Analysing critical exposure pathways (inhalation, ingestion, and external exposure) for vulnerable groups.
- Describing design principles relevant to radiation protection at the facility, including shielding, material selection (to minimize activation), ventilation, zoning, radiation monitoring, etc., with associated modelling/assessment of radiation exposure to facility personnel, the public, and the environment under various operational conditions.

6 Radioactive Pollution and Waste

6.1 Emissions of Radioactive Substances During Operation of the Nuclear Facility

The project developer shall:

- Survey background radiation levels in the planning and influence area prior to construction of the facility.
- Identify and describe emissions of radioactive substances, including radionuclides, emission points and recipients, the physical and chemical form of the emissions, and whether any emissions may exceed the threshold values set out in Annex II of the Regulation on Radioactive Pollution and Waste.
- Describe geological conditions, including surface and groundwater characteristics, that may influence the dispersion of radioactive substances in the environment.
- Assess the consequences of emissions of radioactive substances during normal operation for humans, the environment, and other societal interests. Emissions must also be evaluated in light of the cumulative burden on relevant recipients.
- Assess and describe measures to prevent or limit emissions of radioactive substances during normal operation, and how best available techniques and technologies will be applied.
- Describe how radioactive pollution from the facility will be monitored (environmental monitoring), including monitoring of conventional emissions to air and water, as well as uptake in sediments and biota.

Method:
The assessment of radioactive emissions shall be based on mathematical modelling to evaluate, for example, dispersion pathways of radionuclides in the environment, transfer of radionuclides in air, water, soil, and biota, uptake of radionuclides in humans and biota within the food chain, and resulting radiation doses to humans from external and internal exposure. Models must be adapted to the specific context and should be verified by a third party. Assumptions and parameter choices must be described in detail and clearly referenced to ensure transparency and enable independent third-party review.
Models must include information on:

- Activity of each radionuclide (source term), emission form, emission routes, and environmental dispersion pathways.
- Environmental characteristics affecting radionuclide dispersion (e.g. wind speed and direction, surface water currents, groundwater flow, soil and rock types, land use, chemical properties of soil and water).
- Demographic conditions, including locations of potentially exposed populations and land use (e.g. residential, commercial, or recreational areas).

IAEA Safety Guides provide guidance on:

- Conducting consequence assessments for planned releases from site-based activities and releases due to accidents or other events (GSG-10).
- Aspects of site investigation and characterization relevant to such assessments (currently NS-G-3.2; an updated version has been approved by the IAEA, but the final draft is not yet available).

Background radiation mapping in the planning and influence area prior to project establishment may include surveys of air, water, and biota to measure the presence of natural radionuclides (e.g. U-238, Th-232) and background radiation levels.

6.2 Radioactive Waste, Including Spent Nuclear Fuel

The project developer shall:

- Provide an overview of the type and quantity of radioactive waste that may be generated during the establishment of the nuclear facility.
- Provide an overview of the type and quantity of radioactive waste, including spent nuclear fuel, that will be generated during operation of the facility.
- Describe how radioactive waste, including spent nuclear fuel, will be classified and characterized.
- Explain how the amount of radioactive waste generated at the facility will be minimized.
- Describe how radioactive waste from the facility, including spent nuclear fuel, will be handled. This includes any storage and treatment that will take place at the facility. If handling and treatment are primarily to occur at a location other than the facility, the handling at the facility and transport from the site must be assessed.
- Describe the planned disposal solution.

- Describe how radioactive waste, including spent nuclear fuel, will be managed to align with the planned disposal solution, and demonstrate that the various steps in the waste management process are interdependent and will follow one another in accordance with the planned lifespans of the respective facilities.
- Assess how necessary infrastructure for waste management and decommissioning can be planned for shared use.

Method:
Assessment of handling, characterization, classification, and minimization of radioactive waste, including spent nuclear fuel, shall be conducted in accordance with applicable regulations and international obligations, and in line with the *Strategy for Safe, Secure and Responsible Management of Radioactive Waste in Norway*.

Relevant IAEA safety standards include:
- GSR Part 5: *Predisposal Management of Radioactive Waste*
- SSR-5: *Radioactive Waste Disposal*

For security requirements related to spent fuel, see:
- NSS 13 (INFCIRC/225/Revision 5): *Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities*

6.3 Other Waste

The project developer shall:
- Describe the expected type and quantity of conventional and hazardous waste, and how this waste will be managed.

7 Decommissioning

The project developer shall:
- Describe how the facility will be decommissioned once it is no longer in operation, including plans for cessation of activities and waste management, including handling of spent nuclear fuel (decommissioning strategy).
- Describe the desired end-state of the site following completion of decommissioning.
- Explain how the requirement to keep exposure to humans and the environment as low as reasonably achievable will be upheld throughout the entire process of shutdown and decommissioning.
- Describe how the project will meet dose limitation requirements for occupationally exposed individuals and the general public throughout the decommissioning phase of the facility.
- Assess the risks associated with decommissioning in terms of safety—i.e., risks to humans, the environment, and society.

- Describe how sufficient competence and resources for decommissioning and waste management will be ensured.

Method:
The description of decommissioning should be based on the principles outlined in the *Strategy for Safe, Secure and Responsible Management of Radioactive Waste in Norway*. The description must demonstrate how requirements for "Safety", "Security") and "Safeguards" will be upheld.

Relevant guidance includes:
- IAEA GSR Part 6: *Decommissioning of Facilities* – key requirements for decommissioning.
- DSA Guide No. 16: *Guide for Planning Cleanup of Norwegian Nuclear Facilities* – provides guidance on decommissioning requirements that are also applicable to nuclear power plants.

8 Nuclear Incidents and Other Adverse Events

The project developer shall:
- Describe potential nuclear incidents that may result in elevated radiation levels and acute radioactive contamination at or near the facility.
- Describe accidents, intentional adverse events, and other incidents that may pose a risk of elevated radiation levels and acute radioactive contamination during transport of radioactive and nuclear material, including spent nuclear fuel and radioactive waste to and from the facility.
- Describe other adverse events at or near the facility that may pose risks to human health, the environment, and society and/or affect security of power supply.
- Assess the likelihood of nuclear incidents at or near the facility.
- Assess the likelihood of nuclear incidents related to the transport of radioactive and nuclear material, including spent nuclear fuel and radioactive waste to and from the facility.
- Assess the likelihood of other adverse events at or near the facility.
- Evaluate the consequences of nuclear incidents and other adverse events for humans, the environment, and society, including impacts on the power supply.
- Estimate radiation exposure resulting from nuclear incidents at the facility or during transport to and from the facility, for personnel, the general public, and the environment.
- Assess the safety measures required to prevent and mitigate nuclear incidents and other adverse events, and describe how the effectiveness of these measures will be ensured at all times.

Method:
"Nuclear incidents" refer to accidents, intentional adverse events, and other occurrences

that may lead to elevated radiation levels and acute radioactive contamination, or affect the operation and safety of the facility. “Other undesirable events” refer to accidents, intentional adverse events, and incidents that may pose risks to humans, the environment, and society, or affect power supply security. These include events both within and outside the project area, such as fire and explosion.

“Intentional adverse events” refer to incidents resulting from deliberate harmful actions, such as theft of nuclear material, sabotage or threats of sabotage, explosions, physical disabling of safety functions, cyberattacks, or terrorism, which may occur during peacetime, armed conflict, or war. Reference is made to the Royal Decree on the Mandate and Composition of the Nuclear Emergency Preparedness Committee and its advisors, as well as the mandate for the County Governor (Mandate for the Nuclear Emergency Preparedness Committee, dated 1 September 2013).

The assessment of nuclear incidents shall include evaluation of various scenarios:

- Beyond Design Basis Accident (BDBA): Unlikely events outside the design basis.
- Design Basis Accident (DBA): Events within the design basis that may occur but are not considered likely during the facility’s lifetime.
- Anticipated Operational Occurrences (AOO): Expected operational events during the facility’s lifetime, with consequences within regulatory limits for emissions and radiation doses to workers and the public.

Consequences and risk-reducing or mitigating measures must be assessed based on IAEA Safety Standard GSR Part 7: Preparedness and Response for a Nuclear or Radiological Emergency, and may also refer to IAEA SSG-77: Protection Against Internal and External Hazards in the Operation of Nuclear Power Plants.

A Risk and Vulnerability Analysis (ROS analysis) must be conducted for the planned project to identify potential nuclear and other undesirable events and their consequences. The ROS analysis shall assess all internal and external risk and vulnerability factors relevant to safety at the proposed site, in accordance with international best practice. The analysis must demonstrate how the planned development may affect the surrounding environment and security of power supply.

The assessment shall be conducted using recognized methodology for risk and vulnerability analysis.

The ROS analysis shall cover the planning and influence area, including areas that may be subject to mitigation measures, restrictions, or similar. The influence area for various types of incidents and accidents must be mapped and described.

A consolidated overview of findings from the analysis shall be prepared, including any follow-up mitigation measures and identification of responsible parties.

Relevant authorities shall be involved in the preparation of the ROS analysis.

The assessment must consider the consequences of nuclear incidents in light of the facility's proximity to operations of national security significance or other critical infrastructure such as airports, ports, hospitals, etc.

9 Nuclear Emergency Preparedness and Other Emergency Preparedness

The project developer shall:

- Describe the facility's preparedness and capacity to detect, minimize, and mitigate the consequences of nuclear incidents and other adverse events throughout the facility's lifetime.
- Describe how the project will affect national nuclear emergency preparedness.
- Specify which incidents the operator is expected to handle independently, and which require response from the national nuclear emergency preparedness system, including local and regional emergency resources.
- Obtain information from the County Governors and assess the potential consequences of the project for regional nuclear emergency preparedness.
- Describe how the facility's emergency preparedness can be coordinated with the national nuclear emergency preparedness system, including regional and local preparedness arrangements.
- Describe how the project will affect power supply preparedness, including the type of repair preparedness required to maintain electricity delivery.
- Identify incidents that may require support from external emergency resources in addition to those available to the operator.
- Assess the consequences for emergency response actors (e.g. fire and rescue services, police, health services, and the Civil Defence), including the need for increased capacity, new competence, new equipment, updates to emergency plans, and the need for integrated exercises arising from the project.
- Obtain information from host and neighbouring municipalities and assess the potential consequences of the project for municipal emergency preparedness.
- Describe how the operator will notify DSA, emergency services, municipalities, County Governors, NVE, and other relevant authorities in the event of an incident.
- Describe how the operator's emergency preparedness can be coordinated with other relevant preparedness systems at the local, regional, and national levels.
- In dialogue with local, regional, and national emergency response actors, assess the additional costs the project may entail for emergency preparedness.

Method:
The national nuclear emergency preparedness system includes the Nuclear Emergency Preparedness Committee, its advisors, and the County Governor as the regional arm of the committee. The County Governor is responsible for coordinating preparedness at the regional level and with municipalities.

The nuclear emergency preparedness organization is established to provide expertise for managing nuclear incidents and to ensure rapid implementation of measures to protect life, health, the environment, and other critical societal interests.

The Nuclear Emergency Preparedness Committee, County Governors, host municipalities, and other relevant emergency authorities, including the Civil Defence, shall be involved in the assessment process. Impacts on local, regional, and national preparedness—including fire and rescue services—shall be included in the assessment. DSA provides guidance on nuclear emergency preparedness on its website, including the six scenario types that form the basis for national nuclear emergency preparedness planning.

The IAEA provides guidelines and recommendations on Emergency Preparedness and Response (EPR) primarily through its safety standards. The IAEA Safety Standard GSR Part 7: Preparedness and Response for a Nuclear or Radiological Emergency sets out the requirements for preparedness and response to nuclear incidents or radioactive releases, regardless of cause, and should form the basis for the assessment.

The facility is expected to be classified as Class 3 under the Power Contingency Regulation. The project developer must therefore describe how all requirements applicable to a Class 3 facility will be met, including requirements related to physical protection, repair preparedness, and information security.

Requirements in the Power Contingency Regulation concerning information security also apply to information during the planning and design phases of the nuclear facility. It is essential that the project developer handles sensitive information in accordance with these requirements from the outset of the project. This includes assessing whether special considerations must be made for information security and implementing appropriate procedures, as well as evaluating how information security can be best ensured during the planning phase.

10 Energy Production

10.1 Electricity Generation

The project developer shall:

- Calculate the expected annual net electricity production and the annual production profile for the relevant development alternatives, and specify the assumptions used in the calculation. Factors affecting production shall be described and assessed, including electrical losses, scheduled maintenance, downtime due to fuel replacement, and any other relevant conditions.

Method:
The production profile shall be presented as an hourly time series of estimated output.

10.2 Utilization of Surplus Heat

The project developer shall:

- Describe the surplus heat from the nuclear power plant, including the estimated annual amount of surplus heat (GWh/year), temperature, form (water, steam, exhaust gases, or air), and operating time for surplus heat production.
- Describe how the project will ensure internal and/or external utilization of surplus heat, including any new land use required to realize the planned utilization, such as new industrial developments.
- Describe the technical measures that will ensure surplus heat can be delivered in a form and at a temperature suitable for utilization.
- Assess potential external demand points for heat utilization, including possible recipients such as industry, district heating systems, etc.
- Evaluate costs, potential revenues, and socio-economic profitability of surplus heat utilization, compared to a zero alternative without utilization.
- Assess direct and indirect impacts of heat utilization, including effects on local businesses, additional land use, uncertainties, the project's relationship to other assessments, and cumulative impacts.

Method:
NVE's guide for conducting cost-benefit analyses of surplus heat utilization (*Cost-Benefit Analysis of Surplus Heat*) shall be used.

When assessing technical measures to deliver surplus heat at a usable temperature, the consequences for the facility's energy production must be described.

When assessing demand points and potential recipients for heat utilization, the project developer shall consider both existing and future locations suitable for businesses that can utilize the heat. The assessment shall include a realistic evaluation of which industries, businesses, or recipients may benefit from the heat. If the developer plans to deliver surplus heat for food production (e.g. greenhouses, aquaculture), measures to ensure reliable delivery must be described. Relevant municipalities, county authorities/County Governors, grid operators, district heating companies (if applicable), and business stakeholders shall be contacted to assess the impacts and opportunities for surplus heat utilization.

11 Costs and Financing

The project developer shall:

- Provide estimated investment costs for the project. The investment shall be presented as a total cost with a breakdown of the following elements:
    - Nuclear facility including all necessary mechanical and electrotechnical components, including transport and installation.

    - Groundwork and site preparation, including any channels/tunnels for cooling and port facilities.
    - Grid connection solution to the external grid, including internal grid infrastructure and any customer-specific grid installations owned by the grid operator.
    - Reinforcement of existing grid infrastructure. The power plant's share of costs for necessary upgrades (cf. grid connection charge).
    - Land acquisition.
    - Financing costs.
    - Project costs prior to investment decision: planning, process management, assessments, etc.
    - Project costs after investment decision: engineering, planning, administration, etc.
- Provide estimated annual fixed and variable operating and maintenance costs, broken down by relevant cost categories, stated in øre/kWh and million NOK/year.
- Describe costs associated with decommissioning of the facility and restoration of the site.
- Estimate costs for nuclear fuel and handling of spent nuclear fuel, broken down by storage and other waste management, including security measures.
- Describe costs related to future reinvestments.
- Estimate revenues from electricity sales.
- Describe opportunities for providing system services and participating in other balancing markets, and estimate potential revenues. Describe how much and how quickly production can be technically and economically regulated up or down.
- Describe how activities at the facility will be financed. Financing for decommissioning and waste management shall be included in the description.
- Describe how nuclear liability under Chapter 3 of the Nuclear Energy Act will be addressed, including insurance or other guarantees to cover nuclear damage in the event of an accident.
- Assess other relevant monetized socio-economic benefits and disadvantages, such as costs related to grid reinforcement needs and the need to strengthen local, regional, and national emergency preparedness.

12 Natural Hazards and Vulnerability to Climate Change

The project developer shall:

- Identify natural hazards and the impacts of climate change, including extreme weather events, that are relevant to the safety of the nuclear power plant, in accordance with international recommendations from the IAEA.
- Assess the actual risk of storm surge, flooding, and erosion, and document that the project meets the safety requirements in accordance with Section 7-2, first paragraph, of the Norwegian Building Regulations (TEK17).

- Assess the actual risk of landslides in steep terrain, and document that the project meets the safety requirements in accordance with TEK17 § 7-3, first paragraph, and § 7-4.
- Assess the actual risk of quick clay landslides, and document that the project meets the safety requirements in accordance with TEK17 § 7-3 and its associated guidance.
- Identify other natural hazards, including events triggered by natural conditions that may pose a risk to human life and health or significant material assets, if information indicates that such hazards may be relevant in or near the planning area, in accordance with TEK17 § 7-1.
- Document that the construction site and adjacent terrain will not be subject to damage or significant disadvantage as a result of the project, cf. TEK17 § 7-1, second paragraph.
- Assess whether risk-reducing measures are necessary. If so, it must be demonstrated that such protective installations do not require maintenance or inspection to maintain their risk-reducing effect.

Method:
IAEA SSG-18: Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations provides guidance and recommendations on how to assess natural hazards and climate change impacts for nuclear facilities, including the types of data to be used. Other relevant IAEA safety standards and recommendations include NS-G-3.6: *Geotechnical Aspects of Site Evaluation and Foundations for Nuclear Power Plants*, SSR-2/1: *Safety of Nuclear Power Plants: Design* and SSG-38: *Construction for Nuclear Installations.*

The assessment of actual natural hazards must take climate change into account. For landslides in steep terrain, the evaluation shall follow NVE's guidelines for assessing landslide safety NVEs veileder for utredning av sikkerhet mot skred i bratt terreng. Flood and erosion risks shall be assessed in accordance with NVE's guidelines for flood hazard assessments NVEs veileder om utredning av flomfare. Quick clay landslide risk shall be clarified in accordance with NVE's Guide 1/2019 *Safety Against Quick Clay Landslides* NVEs veileder 1/2019 «Sikkerhet mot kvikkleireskred. Hazards from surface water shall be assessed in accordance with NVE's guidance on managing surface water in land-use planning NVEs rettleiar for handtering av overvatn i arealplanar. For further information and clarification of actual hazard levels, refer to NVE's website on natural hazard assessments. NVEs nettsider om utredning av naturfare

Basic requirements for mechanical resistance and stability of structures under TEK17 § 10-2 *Structural Safety* may be met through design according to Eurocodes with national annexes. An initial geotechnical assessment should be conducted to evaluate the suitability of the construction site and provide a basis for further design.

Natural hazard assessments must be reported to NVE in accordance with the Planning and Building Act § 2-4 and the Regulation on Mandatory Reporting of Ground Investigations and Natural Hazard Assessments. Geotechnical ground investigations must be submitted to NGU via NADAG. Information is available here: Meld inn naturfareutredninger - NVE

13 Other Pollution and Emissions

13.1 Water and Soil Pollution

The project developer shall:

- Map areas that may be affected by runoff from construction activities or by discharges of oil and other chemicals.
- Identify and map all waterworks, private wells, and designated backup water sources, including associated catchment areas, that may be affected by runoff as described above.
- Describe potential discharges to water during both construction and operational phases. In particular, discharges of cooling water—including volume, temperature, and any pollutants in the cooling water—shall be described.
- Assess the likelihood of pollution during construction and operation. Potential impacts on aquatic environments and biodiversity in coastal and freshwater systems shall be assessed under Chapter 17.6.
- Assess the risk of contaminated soil within the planning area. The current conditions must be investigated and documented.
- Evaluate how the project may affect drinking water sources and their associated catchment areas.

Method:
Assessments of water and soil pollution that do not involve radioactive contamination shall be conducted in accordance with the requirements of the Regulation on Impact Assessment and using the methodology described in the Impact Assessment Handbook M-1941 by the Norwegian Environment Agency and the Directorate for Cultural Heritage. The assessment of soil contamination risk must also include radioactive pollution.

Owners/operators of waterworks, backup water sources, and private wells, as well as host municipalities and the Norwegian Food Safety Authority, shall be contacted during the assessment. Information on current land use in the planning and influence area, and on water area management plans, shall be obtained. If the mapping reveals water sources/wells used for purposes other than drinking water, it may be necessary to assess potential impacts on these sources as well. Discharges shall be specified as precisely as possible. Examples from other facilities with similar discharges and how these were managed may be used.

13.2 Noise

The project developer shall:

- Assess whether and how noise from the facility may affect noise-sensitive buildings during construction and operation.

- Prepare noise zone maps in accordance with guidelines and threshold values for industrial noise. Buildings with a calculated noise level above Lden 40 dB shall be indicated on the map. The noise level and distance to the relevant noise source shall be specified for all buildings with a noise level above Lden 40 dB.
- Calculate any significant cumulative noise from multiple sources.

Method:
The assessment shall follow the requirements and guidance in the *Guideline for the Treatment of Noise in Land Use Planning* (T-1442) and the *Guide to the Treatment of Noise in Land Use Planning* (M-2061). The methodology used shall be explained. Noise zone maps shall be prepared in accordance with the calculation methods described in the Norwegian Environment Agency's guide M-2061.

14 Visual Impacts, Landscape, Outdoor Recreation, and Cultural Heritage

14.1 Landscape and Visualizations

The project developer shall:
- Describe the landscape and landscape values within the project and influence areas.
- Prepare a visibility map for the project.
- Produce photorealistic visualizations that provide a representative impression of the project's visual impacts both near the site and from a distance.
- Assess how the project will affect the landscape and its values.
- Evaluate visual impacts on residential buildings, holiday homes, and other relevant structures, based on proximity to the project and viewing direction.
- Describe the effect of any obstruction lighting from point structures.

Method:
The assessment shall be conducted using recognized methodology in accordance with the Impact Assessment Handbook M-1941 by the Norwegian Environment Agency and the Directorate for Cultural Heritage. Visualizations shall provide a representative view of the project from locations where people are present. Visualizations shall include the entire project, cf. Chapter 3. Photo viewpoints and directions shall be shown on maps, and visualizations shall be produced as photomontages and, if relevant, 3D models. Suggestions for photo viewpoints shall be obtained from affected municipalities (Aure, Heim, and Hitra), owners/tenants of residential and holiday homes in the vicinity, and relevant interest organizations. As a minimum, the project shall be visualized from/in the following areas:
- Osmarkfjellet
- Skålvassfjellet
- Storfonna

- Vardheia
- Trondheimsleia

Visual impacts shall also be assessed for other relevant topics, such as cultural environments and outdoor recreation.

14.2 Cultural Heritage and Cultural Environments

The project developer shall:

- Provide an overview of known automatically protected cultural heritage sites, modern cultural heritage sites, and formally protected cultural environments within the project and influence areas, and present these on maps.
- Assess how the project may affect cultural heritage and environments through direct interventions/land use and indirectly through visual impacts, noise, or other effects. Both near-field and distant impacts shall be considered.
- Produce visualizations where the project is expected to have significant visual impacts on important cultural heritage sites or environments.
- Assess the potential for discoveries of automatically protected cultural heritage within the project and influence areas.
- Consult with cultural heritage authorities to determine whether § 9 investigations under the Cultural Heritage Act are required as part of the impact assessment.

Method:
The assessment shall be conducted using recognized methodology in accordance with the Impact Assessment Handbook M-1941 by the Norwegian Environment Agency and the Directorate for Cultural Heritage. Cultural heritage sites and environments shall be presented on maps alongside the project. Value maps and maps showing areas with potential for new discoveries of automatically protected cultural heritage shall also be prepared. If relevant LIDAR data exist for the project and influence areas, they shall be used in the assessment.

Cultural heritage authorities shall be contacted to assess the potential for discoveries of automatically protected cultural heritage in the planning and influence areas, to provide information on the need for site inspections, and to identify any gaps in available information.

Affected municipalities (Aure, Heim, and Hitra) shall be consulted to select representative photo viewpoints for visualizations of valuable cultural heritage sites and environments.

14.3 Outdoor Recreation

The project developer shall:

- Describe current use of the project and influence areas for outdoor recreation, including hunting, fishing, and marine-based recreational activities.

- Prepare a value map for outdoor recreation showing recreational areas, trails, and important viewpoints within the project and influence areas.
- Refer to any municipal or regional plans for outdoor recreation in the project and influence areas.
- Assess how the project may affect outdoor recreation on land and at sea. Both direct impacts, such as physical barriers and land use, and indirect impacts, such as visibility and noise, shall be considered. Impacts from potential undesirable events shall also be assessed.
- Produce visualizations where the project is expected to have significant visual impacts on important recreational areas.
- Briefly describe alternative recreational areas offering similar activity opportunities.

Method:
The assessment shall follow the methodology outlined in the Impact Assessment Handbook M-1941 by the Norwegian Environment Agency and the Directorate for Cultural Heritage.

Outdoor recreation shall be described based on site visits and existing knowledge, including mapped recreational areas, state-secured recreational areas, and recreational trails and routes listed in databases such as Naturbase, Turrutebasen, UT.no, and others.

For areas where recreational use has not been mapped, or where existing mapping is outdated or incomplete, an evaluation shall be made to determine whether the area is important for outdoor recreation and whether the project may significantly affect this. If so, mapping or supplementary mapping shall be conducted using the applicable methodology.

Relevant county authorities, municipalities, and local and regional outdoor recreation organizations, hiking associations, and local experts shall be contacted to gather information, cf. the list in Chapter 2.4 on stakeholder involvement.

Affected municipalities (Aure, Heim, and Hitra) shall be consulted to select representative photo viewpoints for visualizations from important recreational areas.

The assessment of outdoor recreation shall also be based on information from relevant thematic studies that affect recreational experiences or infrastructure, including land use, biodiversity, landscape, cultural heritage, and noise.

15 Overarching Environmental Objectives and Climate Impacts

15.1 National and International Environmental Objectives

The project developer shall:

- Describe, in general terms, which national and international environmental objectives are relevant to the project.
- Assess how the project may affect these environmental objectives.

Method:
The assessment may be based on information from the Norwegian Environment Agency's website *Miljøstatus*. The evaluation of impacts on species management objectives shall be included as part of the biodiversity assessment, cf. Chapter 17.

15.2 Greenhouse Gas Emissions and Climate Benefits

The project developer shall:

- Provide an estimate of the project's climate benefit from an energy system perspective.
- Calculate expected greenhouse gas emissions from all processing of carbon-rich materials associated with the project, including drainage of peatlands.
- Describe and calculate expected greenhouse gas emissions from, among other things, material use, fuel production, construction activities, and transport.

Method:
The assessment shall be conducted using recognized methodology in accordance with the Impact Assessment Handbook M-1941 by the Norwegian Environment Agency and the Directorate for Cultural Heritage.

16 Biodiversity and Aquatic Environment

16.1 General Methodology for Biodiversity Assessment

The project developer shall:

- Follow the methodology outlined in the Impact Assessment Handbook M-1941 by the Directorate for Cultural Heritage and the Norwegian Environment Agency.

- Prepare value maps showing protected areas, habitat types, species functional areas/landscape ecological functional areas, species occurrences, and geological diversity within the project's influence area.
- Prepare tables listing biodiversity elements that may be affected by the project.
- Assess the project in accordance with the principles in Sections 8 to 12 of the Nature Diversity Act.
- Evaluate whether and how undesirable events may affect the subtopics below, based on the assessment of such events.
- Assess uncertainty and the potential for additional natural values beyond those already identified. If the entire area affected by the project is not mapped during the assessment, this must be justified.

16.2 Area Description and Natural Basis

The project developer shall:

- Provide a general ecological description of the affected natural areas, with emphasis on the natural basis, main habitat types, previous interventions, and other characteristic features of the area.

16.3 Protected Areas and Areas Subject to Land Use Restrictions

The project developer shall:

- Provide an overview of existing and proposed protected areas, including names and conservation objectives, as well as selected habitat types within the project and influence areas. These areas shall be shown on maps together with the project.
- Assess the project's direct and indirect impacts on biodiversity within any protected areas. It must be stated whether the project may conflict with the conservation objectives and the objectives described in management plans.

Method:
Assessments shall be based on available information, consultation with relevant authorities, and supplementary mapping of selected habitat types where necessary.

16.4 Terrestrial Habitat Types

The project developer shall:

- Provide an overview of habitat type locations within the project and influence areas that are red-listed according to the current Norwegian Red List for habitat types or have key ecosystem functions, and that may be significantly affected by the project.

- Conduct field mapping of habitat types in all parts of the project and influence areas where no previous mapping has been carried out according to the Norwegian Environment Agency's instructions, or where existing mapping is outdated or incomplete.
- Assess how the project may affect habitat type locations due to land use, fragmentation, or weakening/loss of landscape ecological connectivity.

Method:
Existing information on habitat types shall be obtained from public databases and any previous surveys.

Field mapping shall be conducted in accordance with the Norwegian Environment Agency's mapping instruction M-2209 (terrestrial). Fieldwork shall be carried out at a suitable time of year, considering the growing season for vascular plants and fungi where relevant.

The term "influence area" in bullet points 1 and 2 above refers to the area in which the project may affect habitat types through construction activities and regular operations.

16.5 Terrestrial Species, Their Functional Areas, and Landscape Ecological Connectivity

The project developer shall:

- Provide an overview of red-listed species according to the current Norwegian Red List for species, species prioritized under Section 23 of the Nature Diversity Act, protected species, responsibility species, special ecological forms of species, and other species requiring special consideration, including those of national management interest listed in Naturbase. The overview shall also include Least Concern (LC) species if the project may significantly affect their populations. The overview shall cover species that may be significantly affected within the project and influence areas, and shall include the following groups:
    - Vascular plants, mosses, lichens, fungi, and their functional areas.
    - Mammals (including otters), birds, insects, amphibians, and reptiles with ecological and/or landscape ecological functional areas.
- Assess how the project may affect species and their ecological and landscape ecological functional areas due to, for example, land use, fragmentation, disturbance, and collision risk.

Method:
Existing information on relevant species shall be obtained from public databases, previous surveys, relevant local and regional authorities (including the environmental departments of County Governors for sensitive species data), interest organizations, and individuals with local expertise.

Field mapping shall be conducted in areas with insufficient data and potential for decision-relevant species that may be significantly affected. Decision-relevant species include red-listed species in categories CR, EN, VU, and NT, species prioritized under Section 23 of the Nature Diversity Act, protected species, responsibility species, special ecological forms of species, and species requiring special consideration, as listed in Naturbase. Mapping of sensitive bird species and other raptors shall be conducted during the breeding season.

16.6 Aquatic Environment and Biodiversity in Coastal and Freshwater Systems

The project developer shall:

- Map the planned project area in which physical interventions may affect coastal and freshwater environments during the construction phase, including potential removal of riparian vegetation.
- Define the influence area to be assessed, including delineation and mapping of coastal and freshwater bodies that may be affected during both construction and operational phases.
- Clarify existing knowledge about habitat types, species, and their functional areas within the project and influence areas, and assess whether additional data is needed.
- Conduct field surveys of decision-relevant limnic and marine species and habitat types within the project and influence areas.
- Determine the value of decision-relevant habitat types, species, and their functional areas in the project and influence areas, using the valuation criteria outlined in M-1941.
- Assess the project's direct and indirect impacts on decision-relevant habitat types, species, and their functional areas during construction and operation. The assessment shall also consider whether the project may affect biodiversity in designated or proposed marine protected areas, and whether it may conflict with conservation objectives and management plans.
- Describe the consequences of the project during construction and operation, including the need for mitigation measures to avoid or reduce negative environmental impacts on decision-relevant habitat types, species, and their functional areas.
- Clarify existing knowledge about the current ecological and chemical status of affected water bodies, and assess whether further data is needed.
- Report on existing environmental objectives for affected water bodies and assess any consequences the project may have on these objectives. The project must be assessed in accordance with Section 12 of the Water Management Regulation, and proposals for relevant monitoring studies shall be described.

Method:
To delineate the project and influence areas in coastal waters, data on current patterns

and other relevant environmental parameters must be collected. These data shall form the basis for modelling dispersion and dilution in the recipient, and be used to estimate the area potentially affected by cooling water discharge. Recognized dispersion models and relevant expertise in hydrodynamic modelling shall be used.
Field surveys shall be conducted by qualified personnel with documented expertise in marine and limnic mapping, in accordance with *Marin metodehåndbok NiN 3.0*, *The Institute of Marine Research's metode for kartlegging av sårbare arter og naturtyper på grunt vann (0-50 meter)*, *Metodehåndbok limnisk NiN 3.0* and *Faggrunnlag for artskartlegging i Noreg (M-2881)*. Fieldwork shall be conducted during periods in which relevant biodiversity can be observed, primarily between April and September, and timed according to species life cycles and local conditions.

Mapping and assessment of the aquatic environment shall follow the *Veileder for klassifisering av miljøtilstand i kyst- og ferskvann (02:2018)*. In this context, "aquatic environment" refers to the physical, chemical, and ecological status of a water body. A water body is a defined and significant quantity of surface water—such as a lake, reservoir, river, stream, canal, fjord, or coastal stretch—or a defined volume of groundwater in one or more aquifers. Results from new sampling shall be reported and registered in the database Vannmiljø.

Field surveys shall be conducted in areas with insufficient data to gather information on decision-relevant species and habitat types that may be negatively affected by the project. Decision-relevant species include:

- Red-listed species in categories CR, EN, VU, and NT
- Species prioritized under Section 23 of the Nature Diversity Act
- Protected species
- Species of national responsibility
- Special ecological forms of species
- Species requiring special consideration, including those of national management interest in Naturbase
- Species particularly vulnerable to radioactivity (e.g. molluscs, crustaceans, marine mammals)

The overview shall also include Least Concern (LC) species if the project may negatively affect them.

An assessment of uncertainty in the knowledge base shall be conducted, including uncertainty related to previous data collection, new sampling, data analysis, and any knowledge gaps. If field surveys do not cover the entire affected area, this must be justified. The potential for undocumented natural values shall also be assessed.

Interventions in freshwater (lakes, ponds, rivers, streams, and groundwater) requiring a license under the Water Resources Act are described on NVE's website konsesjonspliktvurdering av vassdragstiltak, and in Veileder til vannressursloven og NVEs behandling av vassdrags- og grunnvannstiltak. If the project is not subject to licensing under the Water Resources Act, it must be clarified under the *Regulation on Permits for Physical Measures in Watercourses*. Application forms from relevant county authorities and

County Governors should be used. Sources such as Vann-Nett, Vannmiljø, and municipal map services may be used. If uncertain about the appropriate authority, contact the county authority or County Governor for clarification.

In Chapter 17.6, the term “influence area” refers to the area in which the project may affect species and habitat types through construction activities and regular operations.

16.7 Geological Diversity

The project developer shall:

- Provide an overview of decision-relevant geotopes according to the current Norwegian Red List for habitat types and geological heritage within the project and influence areas. Any valuable sites shall be shown on maps together with the project.
- Assess how the project may affect geological diversity at both site and landscape levels.

Method:
The assessment shall be based on existing information on geological diversity from public databases and other relevant sources (e.g. NGU), as well as site visits if necessary. Landforms shall be mapped according to *DN Handbook 13* where remote sensing data are not available.

16.8 Ecosystem Services

The project developer shall:

- Assess whether the project will affect fundamental ecosystem services such as climate regulation, stormwater management, erosion control, pollination, and water purification.

16.9 Invasive Alien Species

The project developer shall:

- Provide an overview of occurrences of invasive alien species with a high risk of spreading and negatively impacting biodiversity as a result of the project.
- Assess where mapping should be conducted prior to the start of construction activities, and which measures should be implemented in accordance with Section 24 of the Regulation on Alien Organisms.

Method:
The overview shall be based on the current list of alien species and draw on known and available information from *Naturbase* and *Artskart*. Reference should also be made to the

report Håndtering av løsmasser med fremmede skadelige plantearter og forsvarlig kompostering av planteavfall med fremmede skadelige plantearter.

16.10 Cumulative Impacts – Nature Diversity Act § 10

The developer shall:

- Assess whether the project, in combination with other projects, may cause significant adverse effects on ecosystems, for example due to impacts on specific environmental values that affect the ecosystem as a whole.
- Evaluate the extent to which the project and other existing or planned interventions may collectively influence the management objectives for species and habitat types as stated in §§ 4 and 5 of the Nature Diversity Act.

Method:
The guidance document Veileder Naturmangfoldloven kapittel II should form the basis for the assessments.

17 Public Health

The developer shall:

- Assess whether and how the project may have local, regional, and national public health consequences. The following topics shall be considered:
    - Health impacts related to local environmental quality, infrastructure, and transport
    - Health impacts from radiation
    - Health impacts from radioactive contamination and other pollution
    - Health impacts from potential unwanted incidents
    - Health impacts from noise
    - Mental health effects due to the possibility of unwanted incidents
- Evaluate any cumulative public health impacts of the project together with other implemented, approved, or planned projects in the surrounding area.

Method:
Municipalities are the local public health authorities, and the developer shall engage in dialogue with the host municipalities during the assessment of health impacts. The County Governors shall also be contacted. The assessment shall be based on the evaluations of radiation protection (Chapter 6), radioactive contamination and waste (Chapter 7), nuclear incidents and other unwanted events (Chapter 9), and visual impacts, landscape, outdoor recreation, and cultural heritage (Chapter 15).

18 Other Societal Interests

18.1 Defence Interests

The developer shall:

- Assess whether and how the project, including potential unwanted incidents, may affect activities at Ørland Air Base.
- Assess whether and how the project, including potential unwanted incidents, may affect other defence facilities and operations.
- Assess whether and how the project, including potential unwanted incidents, may affect Norway's resilience.
- Assess whether and how the safe operation of the facility may be influenced by military activity during peace, crisis, or war.

Method:
The Norwegian Armed Forces, the Norwegian Defence Estates Agency, and the Norwegian Defence Research Establishment shall be contacted as part of the impact assessment process.

18.2 Other Infrastructure

The developer shall:

- Describe the need for marking aviation obstacles in accordance with the regulation on reporting, registration, and marking of aviation obstacles.
- Assess whether and how the project may affect communication, navigation, radar, and surveillance systems related to civil aviation.
- Assess whether and how the project may affect road traffic, including pedestrian and bicycle paths and school routes for children.
- Assess whether and how the project may affect electronic communications.
- Assess whether and how the project may affect safe, environmentally friendly, and efficient navigation in the Trondheimsleia waterway.
- Assess the need for safety measures related to infrastructure in connection with the risk of unwanted incidents, based on the assessment of such incidents.

Method:
Avinor, the Norwegian Defence Estates Agency, and the Civil Aviation Authority shall be contacted for an assessment of the project's potential impacts on aviation. The Norwegian Public Roads Administration, county authorities, and host municipalities shall be contacted for an assessment of potential impacts on road traffic. The Norwegian Coastal Administration shall be contacted for an assessment of impacts on maritime navigation.

18.3 Agriculture

The developer shall:

- Describe agricultural land and activities within the planning and influence area.
- Assess impacts on agriculture and forestry, including operational disadvantages, loss of cultivated and cultivable land, grazing areas, types of forest affected, and effects on production.
- Evaluate local, regional, and national impacts on agriculture resulting from potential unwanted incidents related to the project.
- Assess impacts on reindeer husbandry resulting from potential unwanted incidents related to the project.
- Assess whether and how the agricultural sector may be indirectly affected, for example through import restrictions, reduced demand, or specific documentation requirements.
- Describe the need for monitoring and contingency plans to safeguard agricultural interests.

Method:
Agricultural authorities in the host municipalities and at the County Governor's office shall be contacted for assessment of the project's potential impacts on agriculture. The assessment shall include potential impacts from the planned use of surplus heat, if relevant, cf. Chapter 11.2.

18.4 Mineral Resources

The developer shall:

- Describe all registered mineral deposits within the planning and influence area, including active extraction sites and areas with extraction rights. This information shall be presented on maps.
- Assess potential impacts on future extraction of mineral resources.

Method:
Updated databases for gravel and crushed stone, industrial minerals, natural stone, and metals shall be used to investigate whether the project affects known mineral deposits, registrations, prospects, or provinces.

Datasets from the Directorate of Mining (DMF) shall be used to determine whether the project affects mass extraction sites, mining rights, or abandoned mines. DMF also provides datasets with exploration reports that may offer supplementary information about mineral resources in the area.

When assessing the potential for mineral resource discoveries, it shall be considered whether the existing knowledge base is sufficient to identify potential conflicts with mineral resources without conducting further geological investigations.

In areas with rights under Chapter 4 (exploration rights) and Chapter 6 (extraction rights) of the Minerals Act, the rights holder shall be contacted for information and assessment of the need for adjustments. In areas with active extraction, the operator shall be contacted. In areas with abandoned mining operations, landowners and DMF should be contacted for relevant information.

18.5 Aquaculture and Fisheries

The developer shall:

- Describe the aquaculture and fisheries industries within the project's influence area.
- Assess whether and how the project may have direct impacts on existing and future aquaculture and fisheries during both construction and operational phases.
- Assess whether and how the project may have indirect impacts on existing and future aquaculture and fisheries, for example through import restrictions, reduced demand in sensitive markets, or specific documentation requirements.
- Assess whether and how the project may affect fish health and welfare.
- Describe the need for monitoring and contingency plans to safeguard the interests of the aquaculture and fisheries industries.

Method:
The assessment shall be conducted in accordance with guidance available on the Arealplaner website (Norwegian Directorate of Fisheries), and the Yggdrasil mapping tool shall be used.

Representatives from the aquaculture and fisheries sectors, including local and regional fishermen's associations, aquaculture companies, and other relevant industry organizations, shall be involved in the assessment process. The assessment shall include potential impacts from the planned use of surplus heat, if relevant, cf. Chapter 11.2.

Sensitive markets refer to markets with very low tolerance for risks associated with nuclear facilities. This includes, among others, certain markets in Asia.

18.6 Local and Regional Business and Host Municipalities' Economy

The developer shall:

- Describe local and regional employment related to the project during both construction and operational phases.
- Describe the anticipated need for local and regional goods and services, including new jobs, during construction and operation.
- Describe the existing capacity of relevant services in the host municipalities.

- Assess whether and how local and regional businesses can supply sufficient goods and services to meet the project's needs.
- Assess impacts on local and regional tourism, including both direct effects and indirect effects related to, for example, the area's attractiveness to tourists. The assessment shall also consider whether activity at the nuclear facility may have positive effects for local tourism businesses through increased demand for goods and services.
- Assess whether and how the project may affect operations at Tjeldbergodden, for example through safety requirements or safety zones.
- Assess other impacts on local and regional businesses, including other actors in the Taftøy industrial park.
- Describe factors that affect the host municipalities' revenues and expenditures (e.g. property tax).
- Assess the demands the project places on private and municipal services and new municipal infrastructure, excluding emergency preparedness.

Method:
Local and regional authorities, local/regional businesses, and regional tourism organizations shall be contacted to gather information about the current situation and planned activities/developments. Municipal expenses related to emergency preparedness shall be assessed under the section *Nuclear Emergency Preparedness and Other Preparedness*, cf. Chapter 10. The assessment shall include potential impacts from the planned use of surplus heat, if relevant, cf. Chapter 11.2.

Appendix 1

IAEA Requirements, Recommendations and Guides relevant for constructing and operating a nuclear power plant

GSR Part 1 (Rev. 1)	Governmental, Legal and Regulatory Framework for Safety	SSG-16 (Rev. 1) Establishing the Safety Infrastructure for a Nuclear Power Programme SSG-12 Licensing Process for Nuclear Installations
GSR Part 2	Leadership and Management for Safety	GS-G-3.5 The Management System for Nuclear Installations SSG-72 The Operating Organization for Nuclear Power Plants SSG-75 Recruitment, Qualification and Training of Personnel for Nuclear Power Plants
GSR Part 3	Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards	GSG-7 Occupational Radiation Protection GSG-8 Radiation Protection of the Public and the Environment **GSG-10 Prospective Radiological Environmental Impact Assessment for Facilities and Activities** RS-G-1.8 Environmental and Source Monitoring for Purposes of Radiation Protection*
GSR Part 4 (Rev. 1)	Safety Assessment for Facilities and Activities	SSG-61 Format and Content of the Safety Analysis Report for Nuclear Power Plants SSG-2 (Rev. 1) Deterministic Safety Analysis for Nuclear Power Plants SSG-3 (Rev. 1) Development and Application of Level 1 Probabilistic Safety Assessment for Nuclear Power Plants SSG-4 Development and Application of Level 2 Probabilistic Safety Assessment for Nuclear Power Plants* SSG-25 Periodic Safety Review for Nuclear Power Plants SSG-30 Safety Classification of Structures, Systems and Components in Nuclear Power Plants SSG-89 Evaluation of Seismic Safety for Nuclear Installations
GSR Part 5	Predisposal Management of Radioactive Waste	GSG-1 Classification of Radioactive Waste SSG-40 Predisposal Management of Radioactive Waste from Nuclear Power Plants and Research Reactors GSG-3 The Safety Case and Safety Assessment for the Predisposal Management of Radioactive Waste WS-G-6.1 Storage of Radioactive Waste
GSR Part 6	Decommissioning of Facilities	SSG-47 Decommissioning of Nuclear Power Plants, Research Reactors and Other Nuclear Fuel Cycle Facilities WS-G-5.2 Safety Assessment for the Decommissioning of Facilities Using Radioactive Material
GSR Part 7	Preparedness and Response for a Nuclear or Radiological Emergency	**GS-G-2.1 Arrangements for Preparedness for a Nuclear or Radiological Emergency** GSG-2 Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency SSG-65 Preparedness and Response for a Nuclear or Radiological Emergency Involving the Transport of Radioactive Material
SSR-1	Site Evaluation for Nuclear Installations	**SSG-35 Site Survey and Site Selection for Nuclear Installations** **NS-G-3.6 Geotechnical Aspects of Site Evaluation and Foundations for Nuclear Power Plants*** **SSG-9 (Rev. 1) Seismic Hazards in Site Evaluation for Nuclear Installations** **SSG-18 Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations** **SSG-21 Volcanic Hazards in Site Evaluation for Nuclear Installations** **SSG-79 Hazards Associated with Human Induced External Events in Site Evaluation for Nuclear Installations** **NS-G-3.2 Dispersion of Radioactive Material in Air and Water and Consideration of Population Distribution in Site Evaluation for Nuclear Power Plants***
SSR-2/1 (Rev. 1)	Safety of Nuclear Power Plants: Design	SSG-27 (Rev. 1) Criticality Safety in the Handling of Fissile Material SSG-64 Protection against Internal Hazards in the Design of Nuclear Power Plants SSG-88 Design Extension Conditions and the Concept of Practical Elimination in the Design of Nuclear Power Plants SSG-90 Radiation Protection Aspects of Design for Nuclear Power Plants SSG-67 Seismic Design for Nuclear Installations SSG-68 Design of Nuclear Installations Against External Events Excluding Earthquakes SSG-52 Design of the Reactor Core for Nuclear Power Plants SSG-56 Design of the Reactor Coolant System and Associated Systems for Nuclear Power Plants SSG-34 Design of Electrical Power Systems for Nuclear Power Plants SSG-39 Design of Instrumentation and Control Systems for Nuclear Power Plants SSG-51 Human Factors Engineering in the Design of Nuclear Power Plants SSG-53 Design of the Reactor Containment and Associated Systems for Nuclear Power Plants SSG-62 Design of Auxiliary Systems and Supporting Systems for Nuclear Power Plants SSG-63 Design of Fuel Handling and Storage System for Nuclear Power Plants SSG-69 Equipment Qualification for Nuclear Installations
SSR-2/2 (Rev. 1)	Safety of Nuclear Power Plants: Commissioning and Operation	SSG-38 Construction for Nuclear Installations SSG-28 Commissioning for Nuclear Power Plants SSG-76 Conduct of Operations at Nuclear Power Plants SSG-73 Core Management and Fuel Handling for Nuclear Power Plants SSG-77 Protection Against Internal and External Hazards in the Operation of Nuclear Power Plants

		SSG-13 (Rev. 1) Chemistry Programme for Water Cooled Nuclear Power Plants SSG-15 (Rev. 1) Storage of Spent Nuclear Fuel SSG-50 Operating Experience Feedback for Nuclear Installations SSG-74 Maintenance, Testing, Surveillance and Inspection in Nuclear Power Plants SSG-48 Ageing Management and Development of a Programme for Long Term Operation of Nuclear Power Plants SSG-54 Accident Management Programmes for Nuclear Power Plants SSG-70 Operational Limits and Conditions and Operating Procedures for Nuclear Power Plants SSG-71 Modifications to Nuclear Power Plants
SSR-6 (Rev. 1)	Regulations for the Safe Transport of Radioactive Material (2018 Edition)*	SSG-26 (Rev. 1) Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material (2018 Edition) SSG-86 Radiation Protection Programmes for the Transport of Radioactive Material
NSS No. 20	Objective and Essential Elements of a State's Nuclear Security Regime	NSS No. 19 Establishing the Nuclear Security Infrastructure for a Nuclear Power Programme
NSS No. 13	Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5)	**NSS No. 27-G Physical Protection of Nuclear Material and Nuclear Facilities (Implementation of INFCIRC/225/Revision 5)** **NSS No. 35-G Security during the Lifetime of a Nuclear Facility** NSS No. 7 Nuclear Security Culture NSS No. 8-G (Rev. 1) Preventive and Protective Measures Against Insider Threats NSS No. 26-G Security of Nuclear Material in Transport NSS No. 23-G Security of Nuclear Information NSS No. 42-G Computer Security for Nuclear Security NSS No. 33-T Computer Security of Instrumentation and Control Systems at Nuclear Facilities NSS No. 48-T Identification and Categorization of Sabotage Targets, and Identification of Vital Areas at Nuclear Facilities

Titles in **bold** indicate Guides that may be particularly relevant at early stages of evaluating the potential suitability of sites for nuclear power plants, including impact assessment.

Guides are listed in relation to Requirements or Recommendations to which they are most relevant, but some Guides may refer to a number of different higher-level publications. The order in which Guides are listed is intended to be broadly thematic, but does not indicate the relative importance of the different Guides.

* IAEA standards and guidance are updated periodically, and many of the publications listed (especially Guides) are currently in various stages of revision. Titles marked with an asterisk indicate publications for which revised versions are expected to be published in the near future.