SPESS F
Document Preparation Profile (DPP)
Version 2.0 dated 31 March 2025

1. IDENTIFICATION

Document Category: Specific Safety Guides

Working ID: **DS559**

Proposed Title: **Site Survey and Site Selection for Nuclear Installations**

Proposed Action: **Revision of Specific Safety Guide SSG-35, Site Survey and Site Selection for Nuclear Installations (2015)**

Review Committee(s) or Group: **NUSSC, RASSC, EPReSC, WASSC, NSGC**

Technical Officer(s): **Zeynep Gulerce, Hyun Woo Lee (EESS/NSNI)**

2. BACKGROUND

Surveying for and selecting a suitable site for a nuclear installation are crucial as these processes can significantly affect the safety, costs, and public acceptance of the installation over its lifetime. Poor planning and execution, and lack of information on the safety aspects and related safety standards could lead to faulty decision making and cause major delays, either at the construction stage or at the operational stage of the nuclear installation. If the site related design parameters are changed during the operational stage, re-evaluation of, and upgrades to the installation during operation may consequently be necessary, possibly necessitating extended shutdown periods and causing considerable delays. The IAEA Safety Standards Series No. SSR-1, Site Evaluation for Nuclear Installations, underlines the importance of site selection in Requirement 4 as:

> **"The suitability of the site shall be assessed at an early stage of the site evaluation and shall be confirmed for the lifetime of the planned nuclear installation."**

IAEA Safety Standards Series No. SSG-35, Site Survey and Site Selection for Nuclear Installations, was published in 2015 to provide recommendations and guidance on meeting the requirements of the IAEA Safety Standards Series No. NS-R-3, Site Evaluation for Nuclear Installations (2003) regarding the criteria and approaches for identifying suitable sites for nuclear installations. NS-R-3 was partially revised to take the issues highlighted after the Fukushima Daiichi accident into account and published in 2016 as NS-R-3 (Rev.1). NS-R-3 (Rev.1) was superseded by SSR-1 in 2019. As the site selection is included in the site evaluation process and partially overlaps with the site characterization stage, SSG-35 is closely connected with the Safety Guides that provides recommendations for seismic, meteorological and hydrological, volcanic, geotechnical, and human induced hazards (IAEA Specific Safety Guides No. SSG-9 Rev.1 (published in 2022), SSG-18 (DS541), SSG-21, NS-G-3.6 (DS531), and SSG-79 (published in 2023), respectively). These Safety Guides were also revised since the publication of SSG-35 in 2015 or currently are in the process of revision.

SSG-35 has been extensively used in IAEA safety review services since its publication. Twenty-five Site and External Events Design (SEED) missions have been conducted since 2015, to review the site survey and site selection processes of different Member States based on the recommendations given in SSG-35. In these missions, numerous recommendations were provided for site suitability evaluations and site selection, and significant experience has accumulated on these processes. In addition, results of the European Stress Tests for post-Fukushima improvements provided valuable lessons on the criteria used in site survey and site selection,

particularly on issues related to: the feasibility of the implementation of the emergency plan; flooding; and tsunami. Recent advances in incorporating the effects of climate change in meteorological and hydrological hazard assessment is expected to modify the discretionary criteria used in site survey and site selection as well.

Conversely, the landscape for site survey and site selection changed significantly over the last decade. New reactor types and sizes, such as small modular reactors (SMRs) and microreactors are being considered in an increasing pace by Member States, calling for adaptation in the current requirements and guidance that were developed mostly considering large, land-based water-cooled reactors. Because of increased reliance on passive and inherent safety features and often reduced size considerations (as presented in IAEA Safety Report Series No. 123), new reactor designs may bring in many new opportunities in siting of nuclear installations, including reduced land area, possibility of siting near densely populated areas, siting at brownfield locations, reduced emergency planning zones, and the possibility of needing fewer water resources. In addition, recent advances in remote sensing technologies may reduce the load of fieldwork, by helping the Member States to make conscious and justifiable decisions particularly in the site survey stage.

3. JUSTIFICATION FOR THE PRODUCTION OF THE PUBLICATION

This revision aims to update SSG-35 for compatibility with the updated Safety Requirements (SSR-1 in particular), and interfacing Safety Guides and technical documents listed in Section 6. It is noted that the SSR-1 is currently under revision (DS557) and the update of SSG-35 is planned to progress in parallel with that to ensure the consistency. The update is also recommended by the Nuclear Safety Standards Committee (NUSSC) and added to the medium term plan as a priority (for details please refer to the Feedback Analysis Report provided in the Annex). Revision of this Safety Guide will be timely to keep up with the pace of the changes in processes for site selection due to new reactor technologies, possible alternatives for brownfield sites (e.g. potential reuse of decommissioned nuclear sites or the coal-to-nuclear initiative), considerations related to climate change, and technological developments in the tools used for site survey (e.g. remote sensing technologies and geographical information systems applications). The revision will also take into consideration the feedback from existing experience, technical safety review services, advisory services, and the state-of-the-practice in Member States. Accumulated experience and lessons-learned from SEED missions between 2015 and 2024 on site survey and site selection were used to identify the areas requiring revisions and improvements. A draft plan for possible revisions is provided in the Feedback Analysis Report given in the Annex, which will be reviewed by expert teams tasked with revising SSG-35.

4. OBJECTIVE

The objective of SSG-35 (Rev. 1) is to provide recommendations on meeting the requirements established in SSR-1 (DS557) for the consideration of safety in the siting process for a nuclear installation in order to meet the fundamental safety objective of IAEA Safety Standards Series No. SF-1, Fundamental Safety Principles. Recommendations would be provided for criteria and approaches for surveying for and selection of suitable sites for nuclear installations that comply with established safety requirements. This Safety Guide would also provide recommendations on establishing a systematic process for site survey and site selection for a number of preferred candidate sites, from which one could be selected by making an informed and justifiable decision for the construction and operation of a nuclear installation.

This Safety Guide is intended for use by organizations with an interest in the siting process, including government bodies, technical support organizations, future licensees (generally the operating organizations), and vendor companies. This Safety Guide also has an informative role for the regulatory body as, in some States, site selection is a non-regulated process and does not require regulatory actions; however, the regulatory body will likely be involved in the process immediately after the site is selected.

5. SCOPE

The current version of SSG-35 addresses the consideration of safety in the site survey and site selection processes for nuclear installations. It is recognized that there are other important factors typically considered in these processes, possibly regarding both safety and non-safety issues, such as security considerations, technology, economics, land use planning, availability of cooling water, non-radiological environmental impacts, and socioeconomic impacts, as well as the opinion of interested parties, including the public. Both safety-related and non-safety related criteria are typically used in the site survey and site selection processes for a nuclear installation. As the site survey and site selection processes progress, more and more sites are screened out. For the few potential sites that remain, safety considerations will become more pronounced.

The difference between the investigation processes of site survey and site evaluation may not be very distinct and will depend on the methodology and technology used. There is a transition between these two stages of assessment. SSG-35 covers the process that eventually terminates in the site selection for one or more nuclear installations. It covers site evaluation only to the extent necessary for understanding the context. This Safety Guide will not provide recommendations on site characterization and will not establish an assessment of site hazards for use in a design evaluation for licensing purposes. The guidelines for final site characterization or re-evaluation as part of a periodic safety review are given in related Safety Guides (listed in Section 6).

This revision is not intended to significantly change the scope of the Specific Safety Guide. The updated publication will cover both new and existing nuclear installations as defined in the IAEA Nuclear Safety and Security Glossary, 2022 (Interim) Edition: Terminology Used in Nuclear Safety, Nuclear Security, Radiation Protection and Emergency Preparedness and Response. In accordance with the definition of 'nuclear installation' in the IAEA Nuclear Safety and Security Glossary, this includes consideration of safety in the siting process for 'storage facilities for spent fuel' and 'facilities for the predisposal management of radioactive waste arising from nuclear fuel cycle' and excludes 'disposal facilities for radioactive waste".

This Safety Guide will refer to but not provide recommendations on considerations relating to nuclear security. Nuclear security is covered in the IAEA Nuclear Security Series publications.

6. PLACE IN THE OVERALL STRUCTURE OF THE RELEVANT SERIES AND INTERFACES WITH EXISTING AND/OR PLANNED PUBLICATIONS

This Safety Guide falls within the thematic area of Site Evaluation and will interface with the following IAEA Safety Standards and other publications (this is not, and cannot be, regarded as an exclusive or exhaustive list):

1. EUROPEAN ATOMIC ENERGY COMMUNITY, FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL LABOUR ORGANIZATION, INTERNATIONAL MARITIME ORGANIZATION, OECD NUCLEAR ENERGY AGENCY, PAN AMERICAN HEALTH ORGANIZATION, UNITED NATIONS ENVIRONMENT PROGRAMME, WORLD HEALTH ORGANIZATION, Fundamental Safety Principles, IAEA Safety Standards Series No. SF-1, IAEA, Vienna (2006), https://doi.org/10.61092/iaea.hmxn-vw0a

2. INTERNATIONAL ATOMIC ENERGY AGENCY, Leadership and Management for Safety, IAEA Safety Standards Series No. GSR Part 2, IAEA, Vienna (2016), https://doi.org/10.61092/iaea.cq1k-j5z3

3. INTERNATIONAL ATOMIC ENERGY AGENCY, Safety Assessment for Facilities and Activities, IAEA Safety Standards Series No. GSR Part 4 (Rev. 1), IAEA, Vienna (2016)

4. FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL CIVIL AVIATION ORGANIZATION, INTERNATIONAL LABOUR ORGANIZATION, INTERNATIONAL MARITIME ORGANIZATION, INTERPOL, OECD NUCLEAR ENERGY AGENCY, PAN AMERICAN HEALTH ORGANIZATION, PREPARATORY COMMISSION FOR THE COMPREHENSIVE NUCLEAR-TEST-BAN TREATY ORGANIZATION, UNITED NATIONS ENVIRONMENT PROGRAMME, UNITED NATIONS OFFICE FOR THE COORDINATION OF HUMANITARIAN AFFAIRS, WORLD HEALTH ORGANIZATION,

WORLD METEOROLOGICAL ORGANIZATION, Preparedness and Response for a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GSR Part 7, IAEA, Vienna (2015), https://doi.org/10.61092/iaea.3dbe-055p

5. INTERNATIONAL ATOMIC ENERGY AGENCY, Site Evaluation for Nuclear Installations, IAEA Safety Standards Series No. SSR-1, IAEA, Vienna (2019).

6. INTERNATIONAL ATOMIC ENERGY AGENCY, Safety of Nuclear Power Plants: Design, IAEA Safety Standards Series No. SSR-2/1 (Rev. 1), IAEA, Vienna (2016).

7. INTERNATIONAL ATOMIC ENERGY AGENCY, Safety of Nuclear Power Plants: Commissioning and Operation, IAEA Safety Standards Series No. SSR-2/2 (Rev. 1), IAEA, Vienna (2016).

8. INTERNATIONAL ATOMIC ENERGY AGENCY, Safety of Research Reactors, IAEA Safety Standards Series No. SSR-3, IAEA, Vienna (2016).

9. INTERNATIONAL ATOMIC ENERGY AGENCY, Safety of Nuclear Fuel Cycle Facilities, IAEA Safety Standards Series No. SSR-4, IAEA, Vienna (2017).

10. INTERNATIONAL ATOMIC ENERGY AGENCY, Seismic Hazards in Site Evaluation for Nuclear Installations, IAEA Safety Standards Series No. SSG-9 (Rev. 1) (2022).

11. INTERNATIONAL ATOMIC ENERGY AGENCY, Meteorological and Hydrological Hazards in Site Evaluation for Nuclear Installations, IAEA Safety Standards Series No. SSG-18 (DS541), IAEA, Vienna (2011).

12. INTERNATIONAL ATOMIC ENERGY AGENCY, Volcanic Hazards in Site Evaluation for Nuclear Installations, IAEA Safety Standards Series No. SSG-21 (2012).

13. INTERNATIONAL ATOMIC ENERGY AGENCY, Hazards Associated with Human Induced External Events in Site Evaluation for Nuclear Installations, IAEA Safety Standards Series No. SSG-79 (2023).

14. INTERNATIONAL ATOMIC ENERGY AGENCY, Investigation of Site Characteristics and Evaluation of Radiation Risks to the Public and the Environment in Site Evaluation for Nuclear Installations, IAEA Safety Standards Series No. NS-G-3.2 (2002) (DS529, 2025).

15. INTERNATIONAL ATOMIC ENERGY AGENCY, Geotechnical Aspects in Site Evaluation and Design of Nuclear Installations, IAEA Safety Standards Series No. NS-G-3.6 (2005) (DS531, 2025).

16. INTERNATIONAL ATOMIC ENERGY AGENCY, Evaluation of the Status of National Nuclear Infrastructure Development (Rev. 2), IAEA Nuclear Energy Series No. NG-T-3.2 (Rev. 2), IAEA, Vienna (2022)

17. FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL LABOUR OFFICE, PAN AMERICAN HEALTH ORGANIZATION, WORLD HEALTH ORGANIZATION, Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GSG-2, IAEA, Vienna (2011)

18. INTERNATIONAL ATOMIC ENERGY AGENCY, Managing Siting Activities for Nuclear Power Plants, IAEA Nuclear Energy Series No. NG-T-3.7, IAEA, Vienna (2012)

19. INTERNATIONAL ATOMIC ENERGY AGENCY, Management of Site Investigations for Radioactive Waste Disposal Facilities, IAEA Nuclear Energy Series No. NW-T-1.40, IAEA, Vienna (2024), https://doi.org/10.61092/iaea.jy3v-m5p4

All sections of NSNI including the Operational Safety Section (OSS), Regulatory Activities Section (RAS), Research Reactor Safety Section (RRSS) and Safety Assessment Section (SAS) were consulted for the development of this DPP. These sections and Nuclear Infrastructure Development Section will also be consulted as part of the drafting process.

7. OVERVIEW

The planned table of contents includes the following sections:

1. Introduction
    a. Background
    b. Objective
    c. Scope
    d. Structure
2. Description of the Site Survey and the Site Evaluation Processes for Nuclear Installations
3. Generic Recommendations for the Siting Process for Nuclear Installations
    a. Siting process
    b. Siting criteria
    c. General basis for screening criteria
    d. Specific screening criteria
    e. Basis for ranking criteria
    f. Siting of new nuclear installations at existing sites
4. Classification of Siting Criteria for Nuclear Installations
    a. Safety related criteria
    b. Criteria relating to nuclear security
    c. Non-safety-related criteria
5. Data Necessary at Different Stages of the Siting Process for Nuclear Installations
6. Siting for Nuclear Installations Other Than Nuclear Power Plants
7. Application of the Management System for the Siting of Nuclear Installations

APPENDIX: Database For the Siting Process for Nuclear Installations

References

ANNEX I: Tables to Be Used in the Siting Process for Nuclear Installations

ANNEX II: Examples of Criteria for the Siting Process for Nuclear Power Plants

ANNEX III (new): Examples of Criteria for the Siting Process for Nuclear Installations Other Than Nuclear Power Plants

The planned revision for each section is provided in the Feedback Analysis Report attached as an Annex.

8. PRODUCTION SCHEDULE:

Provisional schedule for preparation of the publication, outlining realistic expected dates for each step:

	A*
STEP 1: Preparing a DPP	DONE
STEP 2: Internal review of the DPP (Approval by the Coordination Committee)	Q1 2025
STEP 3: Review of the DPP by the review Committee(s) (Approval by review Committee(s))	Q2 2025
STEP 4: Review of the DPP by the CSS (approval by CSS) or information of the CSS on the DPP	Q4 2025
STEP 5: Preparing the draft publication	Q1 2026 – Q1 2027
STEP 6: First internal review of the draft publication (Approval by the Coordination Committee)	Q2 2027
STEP 7: First review of the draft publication by the review Committee(s) (Approval for submission to Member States for comments)	Q4 2027
STEP 8: Soliciting comments by Member States	Q2 2028
STEP 9: Addressing comments by Member States	Q3 2028
STEP 10: Second internal review of the draft publication (Approval by the Coordination Committee)	Q3 2028
STEP 11: Second review of the draft publication by the review Committee(s) (Approval of the draft)	Q4 2028

STEP 12: (For Safety Standards) Editing of the draft publication in MTCD and endorsement of the draft publication by the CSS (For nuclear security guidance) DDG's decision on whether additional consultation is needed, establishment by the Publications Committee and editing	Q2 2029
STEP 13: Approval by the Board of Governors (for SF and SR only)	-
STEP 14: Target publication date	Q2 2030

9. RESOURCES

The resources needed for proposed publication are estimated as follows:

- Four consultancy meetings (Q1 – 2026, Q3 – 2026, Q1 – 2027, Q4 – 2028) with 8 experts each: 36 person-weeks;
- 20 weeks by selected experts after the consultancy meetings (including home-based assignment and cost-free experts);
- Secretariat: 30-person weeks by IAEA staff.

ANNEX: FEEDBACK ANALYSIS REPORT

The Nuclear Safety Standards Committee (NUSSC) formed an e-Working Group (e-WG) to collect inputs from the NUSSC members to create its medium-term plan during the 57th NUSSC meeting. The e-WG, in assistance with the NUSSC Secretariat, circulated a survey questionnaire to the NUSSC members and collected 31 responses, which were reported and discussed during the 57th NUSSC meeting to develop the medium-term plan. Survey results indicated that NUSSC members believe that SSG-35 needs revision in the next five years, and the e-WG report listed it as one of the priorities of the medium-term plan. Potential topics to be addressed during the revision were listed as: latest requirements and guidelines, including those for risk-informed approaches, siting studies, external events, etc., and recent siting and construction experience.

Updates of the guidance regarding the site survey and site selection is also a priority of the international nuclear community. In 2022, the Electric Power Research Institute (EPRI) updated the siting guidance to reflect significant changes in the landscape for new nuclear plant deployment; update references, data sources, and lessons learned; and review for completeness with respect to social, economic, and environmental justice considerations. This revision emphasized the considerations of advanced reactors and gigawatt-scale light water reactors, new reactor missions beyond baseload electricity generation, and the potential reuse of existing sites and facilities such as decommissioned nuclear facilities and coal plants. These aspects are in-line with the recommendations of the NUSSC members for the update of SSG-35 and will be considered during the drafting phase.

The External Events Safety Section (EESS) had reviewed all the Site and External Events Design (SEED) missions that were implemented between years 2015 and 2024 by utilizing the TOSMA tool in terms of lessons learned, suggestions for improvement and feedback from the Member States. According to the statistical information provided in the TOSMA system, EESS had conducted 25 SEED missions where SSG-35 was utilized. The main areas that need improvements or revisions based on the feedback from these SEED missions are: (1) missing guidance for the preparation of a well-documented site selection report as this may not be a regulated process in every Member State, (2) understanding of the differences in criteria to prevent the misuse of exclusionary criteria in ranking, (3) compilation of no site-specific data during the site selection stage and performing only the desktop study, (4) clarification of the differences in site survey and site selection stages, (5) not defining project objectives and roles and responsibilities for all parties, and (6) implementing criteria that depends on size and technology (land use, emergency plan, etc.) before the describing the details of the project.

Table A.1 given below summarizes the existing gaps and possible revisions in each section of current SSG-35 (2015), based on the feedback collected through the SEED missions, recent changes in the international siting guidelines, and due to the scientific and technological progress in the field (this is not, and cannot be, regarded as an exclusive or exhaustive list).

Table A.1. Existing gaps and possible revisions in each section

Section #	Section Title	Existing gaps and possible revisions
1	Introduction	— Contents will be updated (especially the background and objectives). — Links to the new and updated Safety publications will be provided. — Definition of ”nuclear installations” and the applicability to nuclear installations other than nuclear power plants will be clarified in the scope of the document.
2	General Description of the Siting and the Site Evaluation Processes	— Stages in siting and site evaluation processes will be updated and clarified, based on lessons learned from SEED review missions. — Envelopes for site and plant parameters will be described to enable a risk-informed site selection process, by taking uncertainties into account.

		— The role of the regulatory body in the process will be clarified.
3	General Recommendations for the Siting Process	— How the plant size and selected technology can affect the land area needed for siting will be discussed. — Section related to siting of new nuclear installations at existing sites will be reviewed for potential reuse of decommissioned nuclear sites or the coal-to-nuclear initiative.
4	Classification of Siting Criteria	Discussions related to all criteria will be updated, according to the changes in the related safety guide for: — Site evaluation (seismic, volcanic, geotechnical, meteorological, hydrological, human-induced events, etc.) — Potential impacts of nuclear installations to the region (e.g. DS529, 2025) — Feasibility of implementing emergency plan (e.g. PAZ and UPZ in GSR Part 7 and GS-G-2.1)
5	Data Necessary at Different Stages of the Siting Process	— This section will be updated, based on the improvements in geographical information systems, satellite imagery, and remote sensing technologies. — The difference between on-site or site-specific studies to support the site selection for the preferred site from list of candidate sites will be clarified. — Data collection vs. use of available data for brownfield sites will be discussed.
6	Siting for Nuclear Installations Other Than Nuclear Power Plants	— New opportunities for siting, e.g. reduced land area, reduced emergency planning zone, siting in densely populated areas, etc. due to new and advanced reactor technologies will be included. — Review and reporting of the owner/operator the discretionary criteria for their relationship with the particular design or technology (and addition of new criteria if needed) will be included. — This section will be updated, according to new siting documents on advanced and small modular reactors as needed.
7	Application of the Management System for Siting Process	— This section will be reviewed and updated as necessary, establishing consistency with SSR-1. Roles and responsibilities for individuals or groups in the project may be clarified. — The need for a well-documented site selection report will be included.
Appendix	Database For the Siting Process	— This Appendix will be updated based on the changes in Section 5.
Annex I	Tables to Be Used in the Siting Process	— This Annex will be reviewed and updated as necessary.
Annex II	Examples of Criteria for the Siting Process for Nuclear Power Plants	— This Annex will be reviewed and updated as necessary based on the changes in Section 4 (e.g. GS-G-2.1 vs. Annex II-4).
NEW Annex III	Examples of Criteria for the Siting Process for Advanced Reactors	New (in connection with Section 6).