

Master Plan For Responsible Advanced Nuclear Development in New York:

Siting Study

NEW YORK STATE

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Notice

The Siting Study is one of a collection of supporting studies prepared to inform the Master Plan for Responsible Advanced Nuclear Development in New York (Master Plan). The Master Plan and its supporting studies can be found at nyserda.ny.gov/advanced-nuclear.

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Summary

"Siting" is the process of selecting a suitable location for a nuclear facility. Selecting and evaluating a nuclear plant site is an important process that can significantly affect public acceptance, timely licensing and permitting, construction time, and project costs. The selection of a site requires consideration of regulatory requirements established by the U.S. Nuclear Regulatory Commission (NRC), as well as factors that may not present regulatory barriers but may increase project costs and other criteria that may be important for permitting, including at the State level.

Facility Siting Processes

Initial interest in developing nuclear may stem from a need for new power generation or broader interests such as economic development. A project sponsor must then enter the site identification and evaluation phase. The activities and types of analyses in this phase depend on the starting point of the project sponsor, particularly whether sites of interest have already been identified.

Different types of analysis suit different contexts and come in stages of successive complexity and cost. An Initial Site Screening Analysis provides preliminary, high-level evaluations of site suitability for a known set of specific sites, typically focused on key regulatory criteria. A Site Feasibility Study can further evaluate one or multiple sites with greater rigor and incorporate a broader set of NRC siting criteria as well as factors that also affect costs and project timelines. Lastly, a Site Selection Study is an option for project sponsors that have not identified any specific site(s) but instead have selected a larger area or region of interest and want a systematic approach to narrowing options.

Once a site for nuclear development has been selected, the next step is to transition to site characterization. Site characterization includes extensive analysis and onsite data collection to draft key reports and documents required for licensing and permitting. As site characterization is especially costly, it is vital that the earlier phases of siting evaluation described above lead to the selection of a site that minimizes the risks of project failure and maximizes project success.

Nuclear Siting Requirements

A key step in site evaluation is distinguishing between conditions that would rule out a site and conditions that may still allow development but add cost, complexity, or project risk. Under that framework, exclusionary factors are conditions that make development infeasible (e.g. insurmountable violations of NRC siting criteria); avoidance factors identify areas that are technically feasible but generally less desirable (e.g. regulatory, timeline, or cost risks); and suitability factors are characteristics that positively or negatively affect the relative cost of project development or the environmental/engineering suitability of a site (e.g. transmission access).

While conclusions are subject to change in the future as the NRC undertakes major regulatory changes aimed at streamlining siting decisions, exclusionary conditions include high seismic hazards or active faulting, flood risks that cannot be reasonably mitigated, population conditions that would not support adequate emergency planning zones, insufficient cooling water supply, significant external hazards (e.g. proximity to a chemical plant or refinery), unsuitable geotechnical conditions, and proximity to protected areas. Suitability factors that are most impactful on costs and project timeline include those related to infrastructure, such as transmission interconnection, transportation access, construction support, and engineering requirements. Small modular reactors and microreactors offer greater siting flexibility than large light-water reactors because they require less land, cooling water, and supporting infrastructure, while generally presenting fewer exclusionary conditions, particularly concerning population density, but they generate less power.

Policy Landscape

Some states have launched active programs to identify, evaluate, and support early site development for future nuclear deployments. Those in Kentucky and Nebraska are the most advanced efforts nationally at this stage and are the focus of two case studies. These programs aim to achieve two key objectives: 1) establish collaboration-based and community-centered processes to identify and evaluate potential sites, and 2) address challenges around project development and financing that arise leading up to the Final Investment Decision (FID), when projects can unlock the sources of finance needed for construction. As noted in the Advanced Nuclear Policy Options Paper, pre-FID finance needs can amount to hundreds of millions of dollars for a gigawatt-scale project, which raises the need to consider whether government intervention is needed to reduce risk and increase project confidence.

Kentucky's program includes $75 million in funding to offset early site and construction permits. Locations that host awarded projects must obtain the state's nuclear-ready community designation, which requires demonstrations of community education and support, as well as site evaluation. Nebraska's program includes a two-phase study to identify and evaluate potential sites while actively engaging communities, ultimately arriving at the top four preferred communities based on a scoring matrix consisting of key exclusionary, avoidance, and suitability factors, as well as community input.

Applying a structured and community-centered approach to site identification, evaluation, and early site development is likely to yield the most suitable sites that incorporate community interests, lower overall project costs, and reduce project risks. Emerging processes described above, along with New York State's experience with other energy project siting processes, provide real-world examples of critical program elements, including mechanisms to engage the local community, demonstrate public support, determine preferred sites, and incentivize project sponsor interest through potential state contributions to future permitting and licensing activities.

In June of 2025, Governor Hochul called upon the New York Power Authority to build at least 1 GW of advanced nuclear generation in upstate New York. That site identification process is already underway, including through a Request for Information (RFI) process that gauged interest from communities to be considered to host this project.

Further site identification and evaluation will be needed to deliver subsequent projects toward the Nuclear Reliability Backbone goal. A siting readiness program in New York can play a vital role in supporting a pipeline of projects beyond the New York Power Authority (NYPA) project already underway. Kentucky and Nebraska provide examples of critical program elements, including demonstrating public support for future nuclear deployments to reinforce readiness to developers, methods of determining preferred sites, and the types of pre-FID activities that may qualify for support. Such a program could support activities at the early-to-mid planning stage of site development outlined in the study for communities that are interested in hosting advanced nuclear.

Findings

A Community-based approach is essential: A community-centered approach to initial site identification, evaluation, and early site development is likely to yield the most suitable sites that incorporate community interests, lower overall project costs, and reduce project risks. Emerging

processes across the nation, in addition to New York State's experience with other energy project siting processes, provide real-world examples of critical program elements, including mechanisms to engage the local community, demonstrate public support, methods of determining preferred sites, and incentivizing project sponsor interest through potential State contributions to future permitting/licensing activities. Siting decisions should balance community needs with key technical, environmental, infrastructure, and regulatory factors.

Site evaluation is a phased process: The site evaluation process often begins with a preliminary study focused on identifying any immediate issues that would make a site unviable. More detailed evaluations follow and incorporate more NRC siting criteria and factors that may affect overall site readiness. These evaluations can start from a broader geographical area rather than a single preferred site or set of potential sites.

Site characterization is a significant effort and is critical for future licensing or permitting: Once a preferred site is identified and secured, site characterization can proceed with extensive on-site collection of detailed environmental, geological, meteorological, and technical information necessary to support NRC licensing and federal and State permitting decisions. These activities can require a significant investment, with site characterization costs estimated at approximately $8 million to $13 million. Early Site Permits (ESPs) include additional activities that can increase these costs. The cost and complexity of these activities underscore the importance of conducting thorough early evaluations to identify the most viable sites and host communities before advancing to later stages of development.

Brownfield sites may offer cost advantages over greenfield sites: As noted in the Advanced Nuclear Policy Options Paper, brownfield development could significantly reduce overall project costs and minimize risk of significant environmental impacts. This is largely attributable to lower capital costs and shorter development timelines, which depend in large part on the sufficiency of existing infrastructure accessible to the brownfield site, e.g. transmission capacity and remediation costs. The Zero by 40 Technoeconomic Assessment found that the opportunity may be highest at former coal sites. Development of brownfield sites would be subject to the same siting evaluations that consider a range of technical, environmental, infrastructure, regulatory, and community factors.

Conclusion

- **Identify communities interested in hosting nuclear deployment and support both communities and partnering developers in evaluating suitable sites (such as fossil brownfields), including through co-funding of ESPs or site characterization.**

1. Introduction

This Siting Study is one of a collection of studies prepared by the New York State Energy Research and Development Authority (NYSERDA) and the Department of Public Service (DPS) as part of the "Master Plan for Responsible Advanced Nuclear Development in New York" (Master Plan). Collectively, these studies examine the technical, economic, workforce, supply chain, regulatory, environmental, community, and infrastructure considerations associated with the deploying advanced nuclear technologies in New York State. Each study addresses a distinct topic area and offers analysis, findings and conclusions to contribute to a comprehensive roadmap for advanced nuclear development in New York.

NYSERDA and DPS acknowledge the contributions of Sargent & Lundy, working as a subcontractor to The Brattle Group, in preparing this study.

This Siting Study provides an overview of nuclear siting processes and activities from initial project conception through the acquisition of construction permits, including local, state, and federal permits. As such, it offers key considerations for siting advanced nuclear generation. The Siting Study also includes case studies of policies in other states focused on identifying, evaluating, and supporting early site development for future nuclear deployments.

The Siting Study addresses advanced nuclear energy technologies that are currently available or in late stages of development, for the commercial production and use of electric power and thermal energy. The Siting Study addresses available or expected sizes ranging from microreactors and non-water technologies to large light-water reactors (LLWRs). As such, the Siting Study does not address non-energy production nuclear facilities, such as fuel-cycle facilities, spent fuel management facilities, research reactors, or fusion technologies.

The process to identify a site for The New York Power Authority's (NYPA) project is already underway including through an RFI process that enabled communities to be considered to host this project. This study considers further site identification and evaluation needed to enable advanced nuclear deployment and deliver the Nuclear Reliability Backbone goal.

The Siting Study includes the following sections:

- **Section 2, Facility Siting Processes,** provides an overview of the nuclear siting process from initial consideration up to the start of construction of a federally licensed facility. This includes identifying and evaluating potential sites, selecting preferred and alternate

sites, site acquisition, preparing environmental and safety site characterization studies, and obtaining relevant construction permits.

- **Section 3, Nuclear Siting Requirements,** describes the technical and engineering characteristics of a successful host site for nuclear generation, including a discussion of criteria that would exclude a site from consideration as compared to those that would make a site less desirable. Section 3 also discusses differences in siting needs and characteristics across the range of nuclear technologies under consideration in the Master Plan.
- **Section 4, Policy Landscape,** examines the policy environment relevant to nuclear siting, focusing on policies that identify and evaluate sites and support early site development. This includes consideration of programs in other states that may inform New York State's efforts to identify, evaluate, and support early site development for future nuclear deployments.

The Siting Study does not provide a comprehensive assessment of federal and State regulatory pathways and timelines. See the Master Plan's Regulatory Issues and Safety Study for this information.

2. Facility Siting Processes

This section provides an overview of the nuclear siting process and the broader considerations that determine whether a project can progress from concept to a licensed site ready for construction. It describes how project needs are defined, how siting options are evaluated, and how early site characterization and licensing pathways fit into overall project planning. Together, these topics provide a practical framework for understanding how nuclear projects move from initial interest to a structured, defensible approach for site selection, development, and regulatory review.

2.1 Background

Siting is the process of selecting a suitable location for a nuclear facility. Selecting and evaluating a nuclear plant site is an important process that can significantly affect public acceptance, timely licensing and permitting, construction time and project costs.

In the U.S., project sponsors of new commercial nuclear energy generation facilities must obtain approval for siting, construction, and operation from the U.S. Nuclear Regulatory Commission (NRC), the federal nuclear regulatory authority. In New York State, some project sponsors may need approval from state agencies, including the New York State Department of State (DOS), New York State Department of Environmental Conservation (DEC), and DPS. Project sponsors must select a site before preparing the required NRC applications for the plant.

The selection of a site requires consideration of NRC regulatory requirements as well as factors that may not present regulatory barriers but may increase project costs and other criteria that may be important for permitting, including at the State level. The cornerstone of NRC siting regulation is 10 Code of Federal Regulations (CFR) Part 100, which establishes the fundamental criteria for evaluating proposed reactor sites. The regulation applies to applications for site approval to construct and operate stationary power and testing reactors under both 10 CFR Parts 50 and 52, which are summarized later in this section but detailed in full in the Regulatory Issues and Safety Study. Additionally, the NRC has finalized or is finalizing new rules specific to advanced reactors and microreactors, which are detailed in the Regulatory Issues and Safety Study.

The nuclear plant siting process generally includes identifying and surveying potentially suitable sites; conducting preliminary evaluations and eventually more rigorous feasibility studies; selecting one or more preferred sites based on various criteria and prior stages of evaluation;

and then thoroughly characterizing the selected site and alternate sites when included, to support licensing and permitting. These activities confirm site suitability and establish the key plant engineering and design bases. Early stages of the process focused on siting evaluations are crucial, because the final stages of the siting process that support licensing and permitting are especially costly, which makes it vital that earlier phases of siting evaluation result in site selection that minimizes the risks of project failure.

2.2 Project Developers and Sponsors

Traditionally, public and private electric utility companies have owned and operated commercial nuclear generating plants. These companies financed, sited, licensed, and constructed the facilities. Siting activities are usually focused on the utility company's service territory and existing power transmission infrastructure.

As of 2026, interest in nuclear power and decisions over financing, siting, and other activities are broadening. For one, companies outside the utility sector are investing in the nuclear power industry and are participating in the financing, siting, licensing, construction, and ultimate ownership of commercial nuclear power plants. These companies include traditional electric utilities, independent power producers (IPPs), industrial and technology companies seeking self-generation facilities, nuclear technology owners and vendors, dedicated nuclear development companies, engineering firms, and investment firms.

There is also a history of, and growing interest in, direct community involvement in developing energy and industrial projects, including nuclear power. This interest coincides with growing opportunities for communities to engage directly in siting advanced reactors as siting requirements become more flexible, particularly for small modular reactors (SMRs) and other advanced reactors. Municipalities, industrial development entities, regional business development agencies, regional planning agencies, and other government or quasi-governmental groups that represent a community’s interests may increasingly play active roles in developing sites for nuclear generation. Accordingly, unless indicated otherwise, this study uses the term “project sponsor” to refer to all entities interested in developing or hosting nuclear generation.

2.3 Siting Process

The siting process provides the framework for moving a nuclear project from initial interest selecting and characterizing a suitable site for licensing and development. The following

sections describe the major activities in that process, including defining project needs, considering siting options, evaluating siting options, and beginning the work needed to support licensing. The overall process is intended to reduce risk, support informed decision-making, and establish a defensible basis for future project development. The siting process will balance community needs and site considerations, including consideration of significant ecological impacts.

2.3.1 Site Identification and Evaluation

For many projects, the earliest stage of project planning begins when a project sponsor identifies a need, which can often be either for new power generation in a particular area or interest to pursue economic development opportunities in the area. Either of these may in turn also be driven by a statewide need (e.g. the Nuclear Reliability Backbone goal). The initial step may come from an electric utility, a state planning agency, a municipal or regional business development agency, an industrial manufacturer seeking a reliable energy source for its operations, or a dedicated project development company, among other possibilities.

Once the need for power or interest in nuclear generation has been established, the next step is to determine where a new nuclear facility could be located. A project sponsor may enter the siting process in several ways, and that starting point often determines the most appropriate type of site evaluation. Although the underlying siting considerations are generally similar across types of site studies, the evaluation method can differ depending on whether project sponsors have identified a specific site, several sites, or only a broader geographic region.

One common starting point is when a project sponsor already has a specific site of interest for nuclear development. For example, an electric utility may own a large parcel of land that appears suitable for future generation, or an industrial manufacturer may want a reactor located adjacent to an existing campus so that the facility can support both electricity needs and steam off-take requirements, or a municipality may seek to use a site that the previous occupant no longer uses. In other instances, the parties interested in developing nuclear generation may have multiple sites in mind that must be evaluated against one another for their relative merits. Finally, in some instances a project sponsor might have a general area of interest, such as an entire county or broader region. This section outlines types of evaluation that could be used in all the instances above. The types of evaluation are first described briefly and then in greater detail in dedicated sections.

2.3.1.1 Exclusionary, Avoidance, and Suitability Criteria

A key step in site evaluation is distinguishing between conditions that would rule out a site and conditions that may still allow development but add cost, complexity, or risk. NRC regulations and guidance focus on whether site conditions would make development infeasible, highly undesirable, or less suitable. These considerations affect not only overall feasibility, but also regulatory risk, plant design flexibility, engineering complexity, and project cost. Siting studies often organize these considerations into exclusionary, avoidance, and suitability factors. Under that framework, exclusionary factors are conditions that make development infeasible, avoidance factors identify areas that are technically feasible but generally less desirable, and suitability factors compare sites that remain under consideration.

The processes for the screening and evaluation of sites determine whether any site conditions would make development infeasible or highly undesirable, including nuclear licensing factors such as proximity to population centers. The Electric Power Research Institute (EPRI) Siting Guide uses a staged process in which sites are screened and then comparatively ranked using exclusionary, avoidance, and suitability factors. Specific criteria may be exclusionary in early screening, avoidance-based in siting optimization, and suitability-based in comparative ranking of sites.

The following definitions are adapted from the EPRI 2022 Siting Guide.[1]

- Exclusionary criteria are factors that preclude nuclear plant development. Examples include site characteristics that would not support the plant design requirements such as cooling water and seismic conditions; national parks; and high population densities. Exclusionary criteria eliminate geographic areas or potential sites from further consideration.
- Avoidance criteria are used to identify sites or regions with less favorable conditions for a nuclear plant. Avoidance criteria have the same effect as exclusionary factors in the screening step, e.g. elimination of a site or region from further consideration but are more flexible in their application.
- Suitability criteria are characteristics that positively or negatively affect the relative cost of nuclear plant development or the environmental and engineering suitability of a site. Examples of suitability factors include site constructability, transportation routes, potential environmental effects, and the site's location relative to the load center.

Exclusionary conditions include:

- High seismic hazard or active faulting beyond acceptable design limits

- Flood risk that cannot be reasonably mitigated (e.g., coastal storm surge, dam failure inundation areas)
- Population conditions that would not support adequate emergency planning zones
- Significant external hazards near the site (e.g., chemical plants, refineries, munitions storage)
- Cooling water supply that is insufficient or unreliable
- Geotechnical conditions that are unsuitable for safe construction
- Protected or restricted lands are within or adjacent to the site (e.g., national or state parks, military areas, certain Indigenous Nations land)

Avoidance conditions include:

- Moderate seismicity that would require enhanced design.
- Limited or seasonal water availability
- Nearby population centers that require complex emergency planning
- Challenging topography or subsurface conditions
- Limited transmission capacity or infrastructure access
- Nearby industrial or transportation activities that introduce additional hazard considerations.
- Ecological or cultural resource impacts that may be costly or impossible to adequately mitigate.

The examples above appear in the description of types of evaluation that follows in this section. Section 3 provides a more detailed analysis of these criteria. Together, exclusionary, avoidance, and suitability factors provide a practical framework for distinguishing between flaws that totally prevent development and site conditions that may still permit development but with added cost, complexity, or risk. The significance of a given condition depends on evaluation stage and how well it can be addressed through design, mitigation, or operational controls. This framework applies to all reactor types, including microreactors, but not all criteria may apply to all reactor types or may not apply equally to all reactor types. A high-level discussion of differences across reactor types is provided in Section 3.

2.3.1.2 Summary of Types of Siting Evaluations

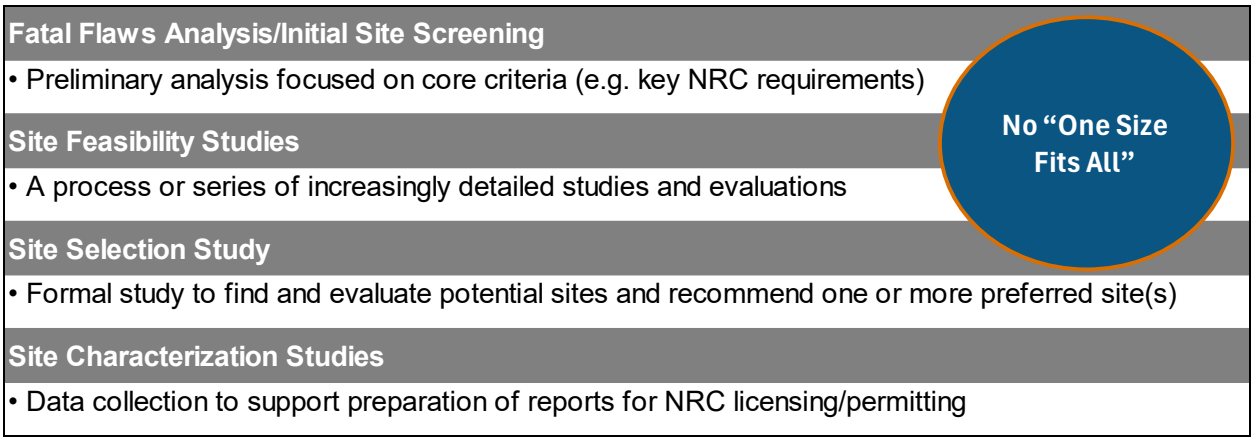
Formal site development is typically preceded by extensive site evaluation that increases in costs as it grows progressively more complex, since it aims to evaluate both NRC regulations and project viability. A project sponsor may consider several types of siting studies and multiple paths. This section summarizes the types of siting evaluations, and the sections that directly

follow provide a more detailed understanding. Figure 1 identifies the basic types. The studies discussed here are not mandatory; selection of the type of study or studies to be undertaken will be based on the specific goals or needs of the project sponsor. An effective siting process is usually iterative and graded process, successively identifying and evaluating sites with increasingly firm data and conclusions.

Often, the starting point for determining which approach to site studies is appropriate is identifying whether the project sponsor has specific sites of interest or only a region of interest with no specific sites.

Figure 1. Types of Siting Studies

This figure illustrates several types of siting studies and how they can advance a potential nuclear generating project.



The Initial Site Screening (also sometimes referred to as "Red Flags Analysis" or "Fatal Flaw Analysis") is a preliminary evaluation of site suitability that can be applied to one or many specific sites. Therefore, having one or more specific sites already in mind is often a starting point, although region-wide screenings can serve as a starting point. The first objective of the Initial Site Screening is to eliminate clearly unsuitable sites and thereby identify potentially feasible sites. The second objective is to determine the scope of studies needed to confirm the potential site's suitability. A potential third objective is to compare sites against one another using a consistent set of siting criteria, but only on a preliminary basis. These analyses can serve as a predecessor to a more thorough Site Feasibility Study.

A Site Feasibility Study can evaluate one or more sites with greater rigor than the Initial Site Screening. A Site Feasibility Study is typically a process or series of increasingly detailed studies and evaluations, limited to a small number (one to five) of potential sites. The objectives of a Site Feasibility Study are to confirm the technical acceptability of the site(s), evaluate site-specific

concerns affecting project cost and schedule, and identify potential mitigation measures. The Site Feasibility Study should also determine the scope of Site Characterization studies needed for eventual licensing and permitting. The study should be customized for the specific needs of the project sponsor and should address the requirements of NRC Regulatory Guide 4.7 "General Site Suitability Criteria for Nuclear Power Stations," other applicable NRC requirements and guidelines, applicable state and federal environmental permitting requirements, and specific owner requirements. Figure 2 provides a complete list of the categories of factors that should be considered during a Site Feasibility Study.

Figure 2. Site Feasibility Study Evaluation Criteria Categories

Site studies should be customized for the specific needs of the project sponsor(s). This figure identifies the types of evaluation criteria to consider when designing a Site Feasibility Study.



A Site Selection Study is another option for project sponsors who have not identified any specific site(s) but have instead selected a larger area or region where they would like to pursue nuclear development. A Site Selection study combines elements of Initial Site Screening with a Site Feasibility Study. This type of study follows an iterative screening process that begins with a broad geographic area and progressively narrows the available land by applying increasingly restrictive criteria. Over time, this process identifies large areas, then specific sites, and ultimately the locations that appear most favorable for development within the region based on an extensive analysis on par with a Site Feasibility Study. The Site Selection Study process is also sometimes used to comply with federal and State regulations that require formal consideration

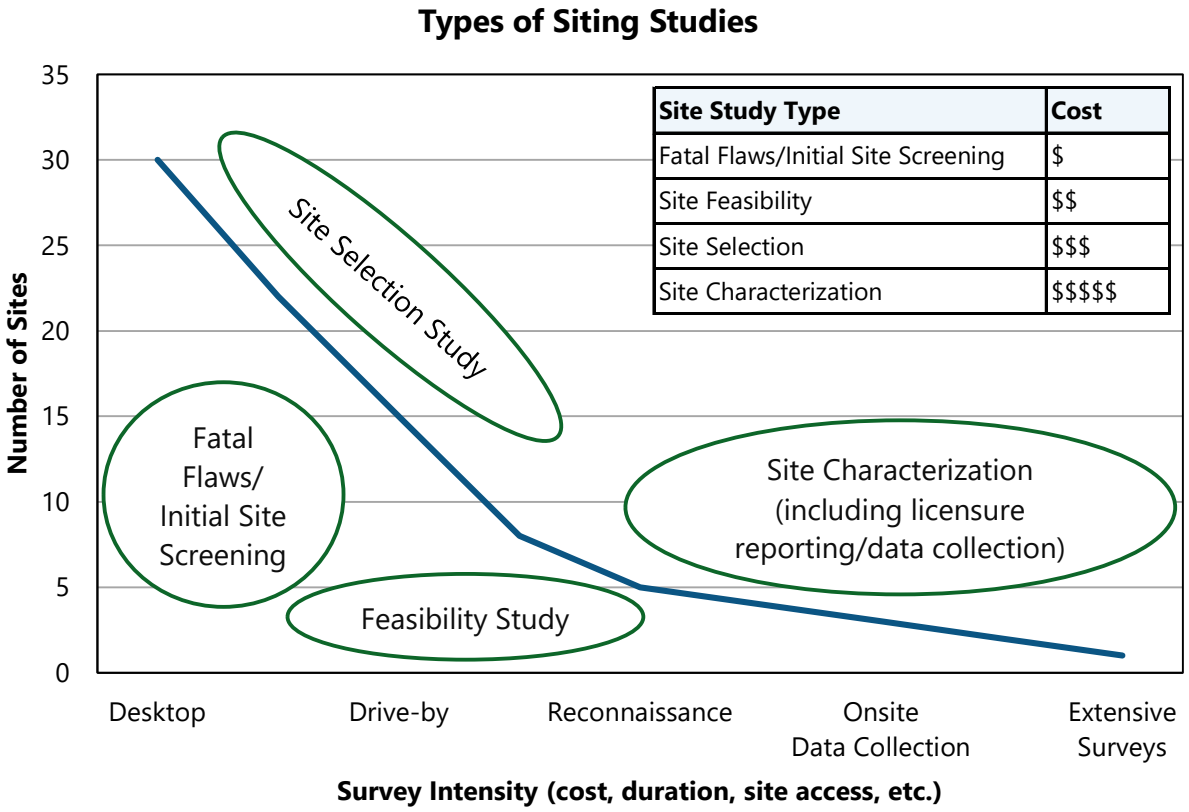
of alternative sites and applies a systematic, industry-accepted approach with flexible, defensible, and quantitative methods.

Site Characterization studies are designed and implemented to collect all the site-specific information the NRC requires for permitting and licensing. Because these studies support licensing after a site has been selected, they are covered separately in a later section.

Figure 3 illustrates the relationship between the different types of siting studies described above and further detailed in the sections below in terms of their breadth and intensity. A particular project will not need to perform all of the study types. The appropriate study type depends on the number of sites considered, available site access, available time, and cost.

Figure 3. Types of Siting Studies

This figure illustrates the relationship and use of several types of siting studies.



2.3.1.3 Initial Site Screening

An Initial Site Screening is a desktop evaluation used to determine whether a site appears fundamentally capable of supporting nuclear plant development or to compare multiple sites against one another on a consistent basis. The purpose of these types of studies is to identify

any major issues that could significantly complicate or preclude development at the site or to narrow down the number of prospective sites for a future Site Feasibility Study.

Because this type of review relies primarily on existing information rather than field investigation, the study's quality depends heavily on the amount and quality of available site data. Information provided by the interested party, such as prior environmental studies, real estate records, geotechnical data, or other site-specific documentation, can significantly improve the analysis. In general, the more clearly the site's physical and functional characteristics are defined, along with the proposed project's requirements, the more conclusive and valuable the assessment will be.

The study typically includes a thorough review of relevant public sources for the site and surrounding area. Depending on the site and the information available, interviewing site personnel, engineers, environmental specialists, or others familiar with the property may be useful. These discussions can provide important context on site history, legacy issues, preferred development areas, and known concerns that may not be fully captured in published records. There are existing third-party tools that perform Initial Site Screening.

The aspects evaluated in these types of studies generally focus on exclusionary or avoidance siting criteria that would make a project infeasible. In the list below, for instance, this includes distance to adequate water supply, flooding potential, proximity to population, and seismology factors. However, such analyses may also include suitability factors at a high level, such as nearby transmission lines. A Site Feasibility Study would typically be required for a deeper examination of suitability factors.

The following are criteria that are commonly included in Initial Site Screening:

1. **Buildable Area:** Adequate buildable acreage to accommodate construction of a nuclear facility.
2. **Distance to Adequate Water Supply:** Distance to potential water sources and high-level consideration of available flow statistics.
3. **Flooding Potential:** Screening-level consideration of flood-related constraints that could affect site suitability.
4. **Geology and Seismology Factors:** Screening-level consideration of geologic and seismic characteristics that may affect development feasibility.
5. **Terrain Slopes:** Ground slopes evaluated to help minimize grading needs and associated earthwork.

6. **Transportation Routes (Marine Highway, Rail, Road Access):** Proximity to transportation infrastructure needed to access and support the site.
7. **Nearby Transmission Lines:** Proximity to transmission infrastructure and potential points of interconnection.
8. **Potential Environmental Impacts:** Wetlands, waterbodies, critical habitats, other natural resources, and designated areas, including impacts on coastal areas and significant coastal fish and wildlife habitats that could complicate development.
9. **Potential Land Use Impacts:** Land use compatibility, including zoning, protected or sensitive agricultural lands and designated coastal areas, historic and cultural resources, and nearby sensitive receptors.
10. **Proximity to Population:** Nearby population centers, population density, and special populations such as environmental justice areas, disadvantaged communities, Indigenous Nations, hospitals, schools, and correctional facilities.
11. **Proximity to Hazards:** Nearby hazards such as airports, airways, pipelines, military facilities, and similar features.
12. **Water Availability:** High-level evaluation of the amount of water available near each site.

New York State-specific datasets may be used as supplemental analyses by identifying State-specific considerations that may affect a site's suitability or require additional review as a project advances. These are datasets that do not inform NRC licensing but may be used for non-NRC licensed nuclear facilities (<25 MW reactors). These specific datasets and permit conditions are further discussed in the Master Plan Regulatory Issues and Safety Study.

Tools Available for Site Screenings

There are tools available to project sponsors to conduct preliminary evaluations. The Siting Tool for Advanced Nuclear Development (STAND), is a web-based application created to support users as they move through stages of advanced nuclear siting.[1] Developed by the National Reactor Innovation Center in partnership with Oak Ridge National Laboratory (ORNL), Argonne National Laboratory (ANL), and the University of Michigan, the tool is intended to help users identify, investigate, and compare potential sites across the contiguous United States. It is publicly available at no cost.

Rather than serving as a final site-selection platform, STAND is meant to inform decision-making by organizing key socioeconomic, infrastructure, safety, proximity, and regulatory information in one place. It also allows for customization of siting preferences to rank counties and generate downloadable reports for locations of interest.

Other tools for screenings and deeper analysis exist or are emerging. Oak Ridge Siting Analysis for Power Generation Expansion (OR-SAGE) is a geographic information system (GIS)-based screening tool designed to identify areas within the contiguous United States that may be more or less favorable for advanced nuclear development. [1] However, the tool is operated by its developer, Oak Ridge National Laboratory, and not available to the general public. Other tools including from commercial providers that provide screenings, feasibility studies and support for licensing are becoming more widely available as interest in advanced nuclear continues to grow.

It should be noted that the underlying data in siting tools may not be the best available for New York State in all circumstances and they may not represent the full range of New York State-specific considerations, which may require further analysis to reflect regional or local sensitivities or conditions.

2.3.1.4 Site Feasibility Study

A Site Feasibility Study typically draws on subject matter experts from multiple disciplines to evaluate the site from several perspectives. Generally, the objectives of a Site Feasibility Study are to determine the overall feasibility of developing a nuclear generating plant at the site based on a wide set of exclusionary, avoidance, and suitability factors that together provide a full view of factors likely to affect a project's cost and timeline. As a Site Feasibility Study evaluates a broader set of criteria in greater depth than preliminary analyses, it typically takes significantly longer and comes with higher costs. Factors include technical and engineering feasibility, nuclear licensing, environmental permitting, and community acceptance factors. As noted earlier, the types of study or studies carried out by a project depend on project needs and

circumstances; a Site Feasibility Study may not always be needed – for instance it may not be needed in case of development at a site that already hosts nuclear generation.

Areas of evaluation include the following:

1. **Acreage:** Whether the site contains sufficient land to accommodate one or more reactors and associated support facilities.
2. **Ownership:** Land rights, acquisition needs, emergency planning considerations, and security-related land control requirements.
3. **Construction-Related Considerations:** Availability of the workforce needed to support construction activities.
4. **Operations-Related Considerations:** Availability of the long-term workforce needed to support plant operations.
5. **Cooling Water Supply:** Whether an adequate cooling water source is available to support the proposed facility.
6. **Water Rights and Regulation:** Potential permitting, regulatory, and legal constraints associated with water use.
7. **Water Pumping Requirements:** Technical and economic considerations associated with withdrawing and conveying water to the site.
8. **Nearby Hazardous Land Uses:** Whether nearby hazards could affect plant safety or whether the plant could create compatibility concerns with surrounding uses.
9. **Extreme Weather Conditions:** Weather-related conditions that may affect plant design, resilience, and overall feasibility.
10. **Seismic Conditions:** Seismic characteristics of the site and the resulting implications for plant design and project complexity.
11. **Population:** Population size and proximity to the site, including implications for emergency planning and licensing.
12. **Environmental Resources:** Critical habitats, significant coastal fish and wildlife habitats, protected lands, wetlands, waterbodies, water and groundwater quality, and the potential for impacts to important plant and animal species.
13. **Land Use:** Potential disturbance near historic or cultural resources, along with possible effects on nearby residents, public access, scenic areas, parks, and community features, among other things.
14. **Infrastructure:** Access to transmission, roads, rail, port facilities, and other infrastructure that may affect constructability and cost.
15. **Socioeconomic Conditions:** Local and regional economic and social conditions that may influence project implementation.

16. **Environmental Justice:** Potential community impacts and benefits, including alignment with goals related to economic development, clean air, carbon reduction, and reliable regional power supply. This should include safety and ecological risks as well as whether the site is located in a disadvantaged community.
17. **Flooding:** Flood-related hazards, including probable maximum flood conditions and flooding that could result from dam failures.
18. **Atmospheric Conditions Affecting Dispersion:** Meteorological and atmospheric conditions relevant to plant siting and potential dispersion analyses.
19. **Geology:** Site characteristics such as liquefaction, subsidence, and landslide potential.

2.3.1.5 Site Selection Study

A final option for initial exploration of sites is a Site Selection Study. This type of study is most appropriate when a large area has been identified for potential nuclear plant deployment, but no specific sites have yet been selected. While a Site Selection Study combines elements of preliminary evaluation and a Site Feasibility Study, it is distinct in that it moves systematically from a broad geographic area to a smaller set of preferred site options and is closely tied to the regulatory framework for nuclear plant licensing, which is why several specific technical terms are commonly associated with the process.

Because of this, a Site Selection Study is sometimes used to satisfy regulatory requirements for consideration of alternative sites. These NRC documents provide guidance on acceptable site selection methods: NUREG 1555; ISG-026; Regulatory Guide 4.2, and Regulatory Guide 4.7 "General Site Suitability Criteria for Nuclear Power Stations."[2] The EPRI Siting Guide provides additional guidance on an industry accepted approach.[3]

A Site Selection Study begins by defining the Region of Interest (ROI). The ROI is the geographic area considered when searching for potential nuclear plant sites. Depending on the project, the ROI could be a utility service territory, a state boundary, a county, or another large planning area. Once the study establishes the ROI, it identifies candidate areas. "Candidate areas" are the portions of the ROI that remain after removing clearly unsuitable land based on screening criteria such as high population density, insufficient water availability, or proximity to fault lines. At this stage, the goal is to reduce the search area to the portions of the region most likely to support nuclear development.

After candidate areas have been identified, the next step is to select Potential Sites. Potential sites are individual locations within the candidate areas that are identified for preliminary

evaluation as possible nuclear plant sites. At this stage, the list is often narrowed to a manageable group, typically 7 to 10 sites. These potential sites are then screened using a more detailed set of comparative criteria so that they can be assessed consistently against one another.

Following that comparison, the most favorable sites are selected as candidate sites. "Candidate sites are those potential sites within the ROI that are considered among the best locations that can reasonably be identified for nuclear plant siting. In many cases, this step narrows the field to approximately four or five sites. These candidate sites are then evaluated using still more detailed criteria to identify the locations with the strongest overall characteristics for development. By the end of the process, the decision-maker is positioned to identify a preferred site for the project.

This siting approach is especially useful for a project sponsor without a specific site in mind, because it provides a structured method for moving from a large region to a defensible site selection decision. It also supports regulatory expectations for nuclear licensing by producing a systematic, transparent, and quantitative evaluation of alternatives.

2.3.2 Site Characterization

Once down-selection has been completed and a site for nuclear development has been selected, the next step is to transition from siting into licensing. This assumes the project sponsor controls the site or has acquired rights to build on the site, because site characterization cannot proceed without site acquisition. Site acquisition is covered in Section 2.4. At this stage in the siting process, community-sponsored projects would likely need to partner with a developer that can commit financial resources and expertise to site characterization and NRC licensing.

Site characterization includes the activities needed to support a licensing application to the NRC, which is covered in the sections below. These activities are intended to develop a sufficient understanding of site conditions so that the site can be evaluated appropriately within the licensing process (see the supporting study, Regulatory Issues and Safety Study, for a full breakdown of applicable requirements). Site characterization generally includes permitting activities and field investigations, each described in the following sections. Although these activities are often performed as part of licensing, some project sponsors may choose to begin portions of this work earlier, before they are prepared to commence formal license application development. Starting selected site characterization activities early can reduce uncertainty,

identify potential issues earlier, and better position a project for a more efficient licensing process.

Figure 4 provides information on the types of studies that may be needed for site characterization. The scope and cost of these activities vary widely, based on multiple factors. The required environmental, meteorological, and geotechnical data collection is highly site-specific and can vary significantly. Site characterization studies include often very rigorous analyses of groundwater flows, potential flood hazards, aircraft, pipelines and other offsite hazards, seismic activities, and additional analyses. For this reason, site characterization is more costly than preliminary analysis and Site Feasibility Studies. Site characterization costs are estimated at approximately $8 million to $13 million. The high costs of site characterization underscore the importance of earlier and less costly phases of siting evaluation to arrive at the most optimal among site options that minimizes licensing, permitting, and timeline risks.

Figure 4. Onsite Data Collection Programs

This figure lists the initial onsite data collection programs, procedures, and documents typically required for NRC licensing. Additional activities may be indicated based on the results of the initial activities. For example, the initial archeological studies may indicate the need for additional archeological studies and data recovery, or the ecology surveys may indicate the need for additional species-specific surveys. Further information on these activities is provided in the sections below.

- **Standard Operation Procedure (SOP)**
  - Onsite data collection plans
- **Quality Assurance Program Document (QAPD)**
- **Health and Safety Program Document (HASP**
- **Ground water Sampling**
- **Safety Related Ground Water Well Installation Plan**
  - Safety Related Ground Water Sampling Plan
- **Geotechnical**
  - Safety Related Geotechnical Boring Plan
  - Safety Related Geotechnical Laboratory Analysis/Testing Plan
- **Meteorological Tower per Reg. Guide 1.23**
- **All Data Collection Programs are Documented in Technical Reports**
  - Groundwater Sampling and Analysis (one year of data, typically 4 quarterly quality samples and 12 monthly groundwater levels
  - Terrestrial Ecological Survey (one year, typically 4 seasonal surveys)
  - Aquatic Ecological Survey (one year, typically 4 seasonal surveys)
  - Surface Water Quality Sampling and Analysis (one year, typically 4 seasonal surveys)
  - Wetland Delineation and Jurisdictional Determination (one-time survey)
  - Cultural Resources Phase I Archeological Survey (one-time survey)
  - Cultural Resources Historical Properties Survey (one-time survey)
  - Meteorological Data Report
  - Background Noise Survey (one-time survey)

2.3.2.1 Permitting Requirements

Site characterization activities should ideally be designed to satisfy both NRC requirements and any applicable state and federal permit requirements. Permitting is an important part of project success and meeting project timelines. A nuclear power plant project typically requires a wide range of permits to support planning, site characterization, construction, and implementation activities. These permits may address stormwater management, wetland and other environmental resource protections, and historic or cultural resource preservation. Because permitting obligations can affect both project timing and the sequence of field and development activities, they should be identified and planned for as early as possible.

Detail on both federal and state permitting requirements and processes is provided in the supporting study, Regulatory Issues and Safety Study, and briefly summarized in the sections below.

Community and agency engagement is also an important part of this process. At this stage, early coordination is often needed for whichever activities are planned first. Depending on the nature and location of the work, engagement may be required with local permitting and zoning bodies, State agencies, and federal agencies.

2.3.2.2 Field Activities

Figure 4 above provides a list of activities that directly support nuclear licensing with the NRC, many of which require field work during the site characterization step. The following are key field activities used to help characterize a nuclear site for licensing:

- **Geotechnical Borings:** Collect subsurface soil and rock data to support site suitability evaluations, with the level of detail generally increasing as a project moves from preliminary licensing analyses toward more site-specific safety and design documentation.
- **Seismic Wave Analysis:** Define sub-surface conditions and seismic response characteristics needed to evaluate earthquake effects on the site and plant design.
- **Groundwater Quality Monitoring—1 Year of Data:** Establish baseline groundwater conditions over time so potential project-related impacts can be assessed during licensing and environmental review.
- **Surface Water Quality Monitoring—1 Year of Data:** Document baseline water quality conditions in nearby rivers, lakes, streams, or other water bodies that could be affected by the project.
- **Cultural Resources Survey**: Identify archaeological sites, historic properties, and other protected cultural resources that may need to be avoided or addressed during project development.
- **Phase 1 Environmental Site Assessment:** Reviews current and historical site conditions to identify the potential presence of recognized environmental contamination concerns.
- **Wetland Delineation:** Identify the location and extent of wetlands and other jurisdictional waters that may affect site layout, permitting, and environmental compliance.
- **Site Optimization Layout:** Evaluate how plant features and supporting infrastructure can be preliminarily arranged on the property to improve constructability, safety, environmental compatibility, and operational efficiency.

- **Ecological Survey:** Document habitat conditions and the presence of plant and animal species that may be relevant to environmental permitting and licensing.
- **Noise Survey:** Establish existing ambient sound conditions so potential project-related noise impacts can be evaluated.
- **Traffic Survey**: Characterize existing roadway conditions and traffic patterns to help assess the transportation effects of construction and operations.
- **Meteorological Data Collection—2 Years of Data:** Collect site-specific weather data over an extended period to support dispersion modeling, safety analyses, and plant design inputs.

2.3.3 Project Licensing

After selecting a site and preparing the project for licensing, the project can follow one of several licensing pathways. All nuclear power plant applications must undergo NRC safety, environmental, and antitrust reviews. The NRC issues several types of permits, licenses, certifications, and authorizations for commercial nuclear power plants under either 10 CFR Part 50 or 10 CFR Part 52.

All currently operating nuclear power plants, except Vogtle Units 3 and 4, were licensed under the NRC two-step process established under 10 CFR Part 50 (Vogtle Units 3 and 4 were issued a combined license, described below). The two-step process requires a construction permit and an operating license.

The NRC established several alternative licensing processes under 10 CFR Part 52 in 1989. An early site permit (ESP) is issued to approve a reactor site without specifying the design of the reactor(s) that would be built there. It does not authorize any actual construction activities. Part 52 also allows the NRC to issue a combined license (COL) that provides both a construction permit and an operating license with conditions for plant operation. The COL may be issued with reference to previously issued Early Site Permit (ESP) or design certification.

The NRC can also issue a design certification (DC) under Part 52 for a certified standard plant design. The DC is issued independently of any specific site or proposed project and can be used as pre-approved design for a construction permit, operating license, or COL. The NRC has certified seven reactor designs.

Lastly, the NRC may authorize a licensee to perform certain activities at the site before issuing a construction permit, ESP, or COL with a limited-work authorization (LWA). The LWA excludes any

nuclear safety-related activities, and the licensee must restore the site if the construction permit, ESP, or COL is rejected.

At the State level, the following list provides an overview of permits that may be required for the construction and operation of a nuclear facility in the State. Requirements may differ whether a project is above or below 25 MW, with those above the threshold considered part of the Public Service Law Article 10 siting process, which preempts all other state and local procedural requirements for nuclear facilities. In an Article 10 process agencies that would ordinarily exercise permitting authority can raise concerns as participants in the proceeding, and environmental considerations are required of an applicant for an Article 10 Certificate of Environmental Compatibility and Public Need. Siting studies should generally include consideration of relevant permits and related environmental requirements.

- Public Service Law Article 10 Certificate of Environmental Compatibility and Public Need
- Public Service Law Section 68 Certificate of Public Convenience and Necessity (if applicable)
- Public Service Law Article VIII Major Electric Transmission Facility Siting Permit (if necessary for siting of interconnection transmission facilities)
- Clean Water Act Section 401 Water Quality Certification
- A federal consistency review consistent with the federal Coastal Zone Management Act Federal Consistency Review
- NYS Department of Transportation
- State Pollution Discharge Elimination System Permits
- Air Quality Permits
- Incidental Take
- Title V Air Permit
- State Facility Permit
- Transportation and Disposal of Low-Level Radioactive Waste
- Water Withdrawal Permit

The following sections provide greater detail on the licensing pathways described above. Because the NRC is currently engaged in a number of regulatory actions to enhance the regulatory framework for advanced reactors, the application and preparation times noted for NRC review may change in the future. The supporting study, Regulatory Issues and Safety Study, covers these changes in detail.

2.3.3.1 Early Site Permit

An ESP is a licensing option that allows the NRC to approve a reactor site independent of a specific nuclear technology. As noted above, an ESP can be referenced in a later construction permit or COL. Applicants may choose the ESP path when they want to establish site suitability early, preserve flexibility on reactor technology selection, reduce later licensing uncertainty, or position a site for future development before they are ready to submit a full plant application. Under NRC regulations, an ESP is valid for 10 to 20 years and may be renewed for an additional 10 to 20 years. An ESP typically takes 2 years to prepare and an additional 2 years for NRC review. The total costs of an ESP may well exceed the approximately $8-13 million cited earlier for site characterization, as an ESP also entails costs to prepare an application, potentially gather additional data, and fees to compensate the NRC for time spent reviewing the application, which can total millions of dollars.

2.3.3.2 Construction Permit

A construction permit is the first step in the NRC's traditional two-step licensing process under Title 10 of the Code of Federal Regulations Part 50. A construction permit authorizes an applicant to construct a nuclear facility, but it does not authorize operation; the applicant must obtain a separate operating license before the facility can begin operating. Applicants may choose the construction permit path when they want to proceed under the established Part 50 framework, begin construction before all final operating details are fixed, or retain flexibility to refine aspects of the plant design as the project advances toward the operating stage. Generally, applicant preparation and subsequent NRC review of the construction permit each take between 1.5 to 2 years.

2.3.3.3 Operating License

An operating license is the second step in the NRC's traditional two-step licensing process under 10 CFR Part 50. An operating license authorizes a nuclear facility to load fuel and begin operation after the NRC has reviewed the final plant design, the completed facility, and the applicant's operating and emergency procedures. Applicants may choose the operating license path as part of the broader Part 50 framework when they want to maintain flexibility between the construction permit stage and the plant's final operating configuration. Unlike a construction permit, an operating license is focused on whether the completed facility can operate safely, and any hearing opportunity at this stage depends on whether interested parties request one after the NRC notices acceptance of the application. Similarly to the construction permit, the

operating license applicant preparation and subsequent NRC review each take between 1.5 to 2 years.

2.3.3.4 Combined Construction and Operating License

A COL is the integrated licensing option available under 10 CFR Part 52. A COL authorizes the construction and operation of a nuclear power facility within a single licensing framework, subject to conditions for operation and verification that the required inspections, tests, analyses, and acceptance criteria have been completed. Applicants may choose the COL path when they want a more integrated and predictable licensing process that resolves major safety and environmental issues earlier, particularly when they can reference an ESP, a certified design, or both. In general, a COL application includes essentially the same information required for an operating license application under Part 50, while also identifying the inspections, tests, analyses, and acceptance criteria used to confirm the plant has been built and will operate as approved. Although this approach can reduce uncertainty by addressing more issues up front, it also generally requires more complete information earlier in the project and can provide less flexibility for later design changes during construction. Without supporting documentation such as an ESP or a Design Control Document from a technology vendor, application development can require 3 years with a consistent NRC review timeline.

2.3.3.5 Environmental and Safety Review Documents

Licensing will also require preparation of environmental and safety review documents, much of the analysis for which should be developed during the previous site characterization step. Applicants must submit a Safety Analysis Report (SAR) to the NRC with their application under either 10 CFR Parts 50, 52, or 53. A SAR submitted with a construction permit application is known as a Preliminary SAR (PSAR); a SAR submitted with an operating license application is known as a Final SAR (FSAR); and a SAR submitted with an ESP application is known as a Site SAR (SSAR). Depending on the type, the SAR includes design information and criteria for the proposed reactor, and/or comprehensive data for the proposed site. It also discusses hypothetical accident scenarios and the plant's safety features that would prevent accidents or lessen their effects.

The NRC reviews the applicant's SAR and summarizes its review in a Safety Evaluation Report (SER). The NRC issues a Site Safety Evaluation Report (SSER) for an ESP, a Preliminary SER for a construction permit, and a Final SER for an operating license or COL. The NRC, under its environmental regulations published at 10 CFR Part 51, has required a full environmental impact

statement (EIS) for the issuance of a construction permit, operating license, ESP, COL, or LWA. An application for an NRC permit or license must include a comprehensive assessment of the proposed plant's environmental impact in the form of an Environmental Report.[4]

The NRC, pursuant to the National Environmental Policy Act (NEPA), reviews the Environmental Report and evaluates the potential environmental impacts and benefits of a proposed plant.[5] The NRC developed the new reactor Generic Environmental Impact Statement (GEIS), NUREG-2249, to address environmental issues that are common across many new reactor technologies and sites. The NRC indicates that this technology-neutral framework is intended to improve the efficiency and consistency of future reactor environmental reviews while allowing project-specific reviews to focus on site-specific environmental conditions and community characteristics. The NRC issued the final GEIS on April 24, 2026. The GEIS establishes generic analyses for environmental issues that can be addressed without site-specific information, while requiring supplemental, project-specific review for issues that depend on site conditions or other factors that cannot be resolved generically.

The NRC is also considering additional revisions to 10 CFR Part 51 as part of ongoing efforts to implement recent changes to NEPA and federal requirements. Based on the proposed rules, these changes may impact public input opportunities and environmental review of proposed projects. Given federal preemption and the allocation of jurisdictional authority between federal and state agencies, the extent to which states may incorporate environmental and environmental justice review requirements into nuclear project siting processes remains to be determined once these regulations are finalized. New York State has submitted formal comments to the NRC through these rulemaking processes supporting continued environmental review of future projects and public engagement in project siting and decision-making.

2.3.3.6 State Siting and Community Aspects

Article 10 of the Public Service Law, enacted in 2011, created a centralized permitting process for electric generating facilities with a capacity of 25 MW or more. This process emphasizes coordinated interagency review, public participation, and considerations of environmental and community impacts. Although commercial nuclear reactors are subject primarily to federal licensing by the NRC, Article 10 illustrates New York's longstanding emphasis on coordinated interagency review and public participation during major energy infrastructure siting decisions.

Although siting criteria are primarily technical in nature, many have direct implications for host and surrounding communities. Factors such as population characteristics, water resources,

transportation infrastructure, emergency planning, land use, and transmission access influence how project benefits and potential impacts may be experienced by nearby residents.

Indigenous Nation participants interviewed for the Environmental and Climate Justice Study expressed that some Indigenous Nation communities have limited ability to relocate, particularly where cultural identity, treaty-protected rights, and longstanding relationships with ancestral lands and natural resources are involved. Therefore, beyond traditional technical siting considerations, project planning approaches may also be warranted for transportation corridors, downstream communities, sacred sites and ancestral lands, treaty-protected cultural and natural resources, and other areas where project activities could affect Indigenous Nations or surrounding communities over the facility lifecycle.

Consideration of Indigenous rights and interests within the assessment of natural resources impacts is an important component of procedural and distributive justice. International Indigenous rights frameworks, including the United Nations Declaration on the Rights of Indigenous Peoples, recognize the importance of Indigenous peoples' relationships to lands, territories, waters, sacred sites, and natural resources, as well as their right to participate in decisions affecting those ecosystems, geographies, and resources. For communities with cultural, spiritual, subsistence, or historical ties to potentially affected landscapes, changes to ecological resources may represent impacts on traditional practices and community identity.

Indigenous perspectives on stewardship encompass a broad range of environmental, economic, public health, spiritual, and cultural considerations extending beyond management of spent fuel. Indigenous Nations' feedback highlighted the importance of considering advanced nuclear energy's potential impacts on water resources, air quality, sacred geographies, culturally significant landscapes, hunting, fishing, gathering practices, protected species, and other natural resources that support cultural continuity across generations.

2.4 Site Acquisition and Development

Site acquisition and development activities bridge the gap between identifying a potentially suitable location and advancing toward a developable nuclear site. As noted earlier, site acquisition must occur before site characterization, especially since it requires extensive access to the site. At this stage, the focus shifts from broad siting questions to the practical steps needed to establish site control, refine the site layout, and align development activities with the project's anticipated licensing path. Although the exact sequence may vary by project, this

progression generally moves through early-stage planning, mid-stage planning, and later-stage planning as project certainty increases. Table 1 summarizes the development planning stages.

Traditional project development by electric utilities often begins with a region of interest and the identification of potential sites that are not already owned but would need to be acquired. However, both traditional developers and community-based project sponsors may acquire the site earlier in the process. They may already own specific sites that they want to evaluate for a nuclear plant (e.g. retired power plant sites or vacant land within a community or region). For traditional developers, working directly with a community interested in hosting advanced nuclear could help with site acquisition, because the community may already control the site. Table 1 summarizes the activities that typically characterize each stage of project development. As with the siting stages described earlier, some activities or topics may not neatly fit into a single stage. For instance, the parties developing a site may already have ownership control of it at the early stages of planning.

Table 1. Summary of Site Acquisition and Development

Planning Stage	Major Features	Conditions and requirements	Key Activities
Early	Site evaluation, from basic (e.g. Initial Site Screening) to more advanced (e.g. Feasibility Study)	• No site control • Conceptual layout • No technology selection needed	• Desktop studies • Site reconnaissance visits • Site acquisition (final step before mid-stage)
Mid	Site characterization and ESP application	• Site control established • Detailed site layout • No technology selection needed	• Site characterization borings • Environmental field studies • Meteorological monitoring • Relevant agency coordination
Late	Licensing and permitting, including construction permit or COL application	• Site control established • Detailed, engineered site plan • Technology selected • Construction firm engaged	• Reactor centerline borings • Permit acquisition • Construction planning

2.4.1 Early-Stage Activities

In the early stage of planning, the project typically focuses on site selection and site evaluation, as covered above. At this point, the project team may not yet have formal control of the site and development activities generally focus on evaluating potential locations, identifying major risks, and determining whether the site can support nuclear development. Because the project is still relatively conceptual, site layouts developed during this stage are typically high-level and intended to test whether a facility and its supporting infrastructure could reasonably fit within the available area.

2.4.2 Mid-Stage Activities

In the mid-stage of planning, the project has generally advanced to the point where site control has been established and more detailed development activities can begin. This stage often involves preparing an ESP application or a similar effort to more formally establish site suitability. At this point, the site layout is typically developed in greater detail than in the early stage, with more attention given to land use, environmental constraints, site access, and the placement of major plant features. However, a final technology selection may still not be required, allowing the project to continue preserving flexibility while further reducing siting and licensing uncertainty.

2.4.3 Late-Stage Activities

In the later stage of planning, the project moves into development activities associated with a construction permit application or more advanced licensing efforts. By this stage, the project is expected to have both site control and a selected technology, allowing the site plan to be developed as a detailed, engineered layout that reflects the chosen facility's specific design and operational needs. This stage typically includes the level of planning needed to support final engineering, licensing, constructability evaluation, and long-term site development. In this way, site acquisition and development planning provide a roadmap for moving a project from a conceptual siting effort to a site ready for detailed licensing and implementation.

2.5 Findings

Site evaluation is a phased process: Formal site development is typically preceded by extensive site evaluation that increases in costs as it grows progressively more complex because it aims to evaluate both NRC regulations and project viability. An Initial Site Screening is focused on critical regulatory factors that make a site infeasible is often the first stage, followed

by evaluations that incorporate an increasingly broad range of NRC siting criteria and factors that may affect a project's overall costs and timeline. These evaluations may start from a broad geographical area rather than a single preferred site or set of potential sites.

Site characterization is a significant effort and supports future licensing or permitting: Once a preferred site is identified and secured, site characterization can proceed with extensive on-site collection of detailed environmental, geological, meteorological, and technical information necessary to support NRC licensing and federal and State permitting decisions. These activities can require a significant investment, with site characterization costs estimated at approximately $8 million to $13 million. ESPs include additional activities that can increase these costs. The cost and complexity of these activities underscore the importance of conducting thorough early evaluations to identify the most viable sites and host communities before advancing to later stages of development.

3. Nuclear Siting Requirements

3.1 Introduction

To be considered suitable, a nuclear site should demonstrate acceptable characteristics related to public health and safety, geologic and seismic stability, manageable external hazards, adequate land area and control, access to transmission infrastructure, and access to adequate water supply.[6] Some of these characteristics are addressed directly in NRC regulations, while others are evaluated using NRC guidance and project specific siting studies, as discussed in Section 2. In the U.S., some of these requirements are more stringent for nuclear generation than for renewable and fossil fuel generation because nuclear facilities must demonstrate the ability to safely control radiological hazards, protect nearby populations, and maintain safety functions during normal, shutdown, and accident conditions. This is a pragmatic and important distinction; the US nuclear fleet's lack of major incidences and continuous, multi-decade safe operation is a testament to such requirements.

This section draws particularly on NRC documents and the EPRI Siting Guide to provide a more detailed discussion of key exclusionary, avoidance, and suitability criteria, which were first defined in Section 2. This section does not comprehensively evaluate all siting criteria but rather focuses on factors that most directly influence licensing feasibility, project risk, and overall site suitability. While the conclusions concerning siting criteria in this section reflect longstanding NRC practices and the latest NRC siting criteria, such conclusions are subject to change in the future as the NRC undertakes major regulatory changes aimed at streamlining siting decisions.

First published in 2002, the EPRI Siting Guide provides industry guidance and best practices for meeting applicable NRC expectations for site selection. Project sponsors may, at their discretion, follow the EPRI Siting Guide to implement a detailed siting plan for any region of the country and for any nuclear plant. EPRI updated the Siting Guide in 2015 to include considerations for light water small modular reactors (lwSMRs) and again in 2022 to address advanced reactors beyond lwSMRs and gigawatt (GW)-scale light water reactors, new reactor missions beyond baseload electricity generation, and the potential reuse of existing sites and facilities, such as coal plants.

The EPRI Siting Guide provides a long-standing reference and planning tool that helps the industry make technically sound, well-documented siting decisions and support eventual licensing applications. The EPRI Siting Guide is a practical guide to how an organization should

choose and compare possible locations for a new nuclear energy facility before filing for regulatory approval.

3.2 Site Parameters Relative to Reactor Types

The overall framework for nuclear siting discussed in Section 2 remains the same across all reactor technologies, but the relative importance of individual siting factors varies by technology. In all cases, project proponents evaluate the same broad categories of site characteristics, including water availability, topography, transportation access, land use, geotechnical conditions, environmental sensitivity, population, nearby hazards, and public and political acceptance.[7]

One of the earliest and most important siting considerations is the proposed project's size and layout. This may occur at the beginning of a project and defines the target plant output based on the region's energy needs, the broader electricity system, or the end use. That output, together with the anticipated reactor technology and cooling approach, establishes the upper-bound land and water needs used in early site selection.

When a specific reactor design has not yet been selected, these early screening assumptions are typically captured in a plant parameter envelope (PPE). A PPE is a conservative set of plant parameters that establishes the upper bounds for one or more candidate technology designs; it is used to identify sites capable of supporting those designs. A PPE includes design-related parameters, such as water demand, construction equipment requirements, and workforce needs, as well as site-related parameters that define the minimum site conditions necessary to support the project.

Regardless of reactor technology, a candidate site must still meet fundamental regulatory and project requirements. These include acceptable geologic and seismic conditions; adequate hydrologic characteristics; manageable external hazards, acceptable population-related siting characteristics; and the ability to support emergency planning, transportation access, and transmission interconnection or other planned energy delivery arrangements.[8] The key difference among reactor technologies is not whether these categories must be considered, but how they are reflected in the PPE and how heavily they are weighted during site selection.

Technology-specific differences are most evident in parameters such as site area, cooling and water demand, proximity to infrastructure or end users, population-related siting flexibility, and tolerance for nearby hazards or co-located industrial uses. The following subsections describe

how these reactor-specific siting considerations and key requirements vary across LLWRs, ARs, SMRs, and microreactors.

3.2.1 Large Light Water Reactors

Traditional commercial nuclear plants in the U.S. use LLWRs. They include both pressurized water reactors (PWRs) and boiling water reactors (BWRs), both of which use ordinary water for the primary coolant and neutron moderation. The latest available technologies typically generate about 1,000 megawatts of electricity. Because of their large output and conventional plant configuration, LLWRs generally require substantial site area; dependable cooling-water sources such as rivers, lakes, or coastal access; and strong transmission interconnections.

Among reactor technologies, LLWRs generally have the most demanding siting requirements because of their size, water needs, and long-established regulatory framework. They are typically better suited for sites with lower surrounding population density, abundant cooling water availability, and enough land to accommodate plant systems, safety margins, and security boundaries. For these reasons, LLWRs often serve as the baseline case against which alternative reactor technologies are compared when assessing whether different siting approaches are feasible.

LLWRs represent the conventional model and baseline case for nuclear siting against which newer reactor types are compared when evaluating possible new siting approaches. Core siting requirements are the same as any nuclear facility: the site must support protection of public health and safety, security, emergency preparedness, environmental compliance, and safe plant operation. Evaluators must assess factors such as population distribution, cooling water availability, geologic and seismic conditions, flooding and severe weather risks, nearby industrial and transportation hazards, land use, and grid access.

3.2.2 Small Modular Reactors

SMRs are designed to produce less power than traditional large reactors, typically about 50 to 300 MW for light-water designs. They are intended to be deployed in a more modular and potentially standardized manner, and many designs simplify plant layout by integrating major components such as the reactor vessel and steam generators within a compact structure. In addition to producing electricity, some SMRs may also support district heating, desalination, hydrogen production, or industrial process heat applications.

Compared with LLWRs, SMRs may offer greater siting flexibility because they generally require less land, less cooling water, and less supporting infrastructure. Many designs also emphasize passive safety, relying more on natural forces such as gravity, natural circulation, convection, or stored water rather than active equipment or operator action during an accident. These features may make SMRs better candidates for sites such as industrial campuses, retired fossil plant sites, or locations closer to where electricity or heat will be used. Some SMR designs may also support smaller emergency planning zones or plant layouts that keep key safety and planning boundaries largely within the site boundary, although that depends on the specific technology and site analysis.

The SMR technologies still require full evaluation of whether a site can support safe construction and operation. A proposed site must continue to address public health and safety, security, emergency planning, environmental impacts, nearby natural and human-caused hazards, land use compatibility, and community considerations. In other words, SMRs may change how those issues are analyzed and what conclusions are possible, but they do not eliminate the underlying siting requirements.

3.2.3 Microreactors

Microreactors are designed to provide relatively small amounts of electricity and/or heat from a compact facility. Compared with large nuclear plants, they typically have a much smaller physical footprint and much smaller source term, and many designs are being developed for factory fabrication, transport, and rapid deployment. Potential applications include remote communities, industrial facilities, and military installations where a large conventional plant would not be practical.

Microreactors may offer the greatest siting flexibility of the reactor types discussed here because of their compact size, reduced infrastructure needs, and intended deployment model. They may suit remote locations, existing industrial properties, certain brownfield sites, or other areas where a large reactor would not be feasible. Depending on the design and safety case, some microreactors may also support smaller emergency planning areas, potentially limited to the site boundary rather than extending far beyond it. Their transportable or repeat-deployment concepts may also make them attractive for applications with small, isolated, or temporary energy demand.

Despite that flexibility, under the proposed federal Part 57, "Licensing Requirements for Microreactors and Other Reactors With Comparable Risk Profiles," microreactors are not exempt

from careful siting review. Any proposed site must still demonstrate protection of public health and safety and compliance with applicable environmental and regulatory requirements. That includes evaluating nearby population, land use, geology, flooding and extreme weather risks, transportation access, environmental impacts, nearby industrial or natural hazards, security, and community acceptance. In addition, because some microreactors are intended to be transportable or deployed at multiple locations, project proponents may also need to address how the reactor is fueled, tested, transported, licensed, and operated safely at each site. As with all reactor technologies, the fundamental question remains whether the specific design can be safely and acceptably deployed at the specific location.

3.3 Exclusionary and Avoidance Criteria

The sub-sections that follow evaluate key exclusionary and avoidance criteria, which are most likely to impact future permitting and licensing. Key exclusionary conditions include high seismic hazards or active faulting, flood risks that cannot be reasonably mitigated, population conditions that would not support adequate emergency planning zones, insufficient cooling water supply, significant external hazards (e.g. proximity to a chemical plant or refinery), unsuitable geotechnical conditions, and proximity to protected or restricted lands. Factors that function only as suitability criteria that impact the relative costs of different siting options are taken up in sub-sections after exclusionary and avoidance criteria.

3.3.1 Population-Related Siting Considerations

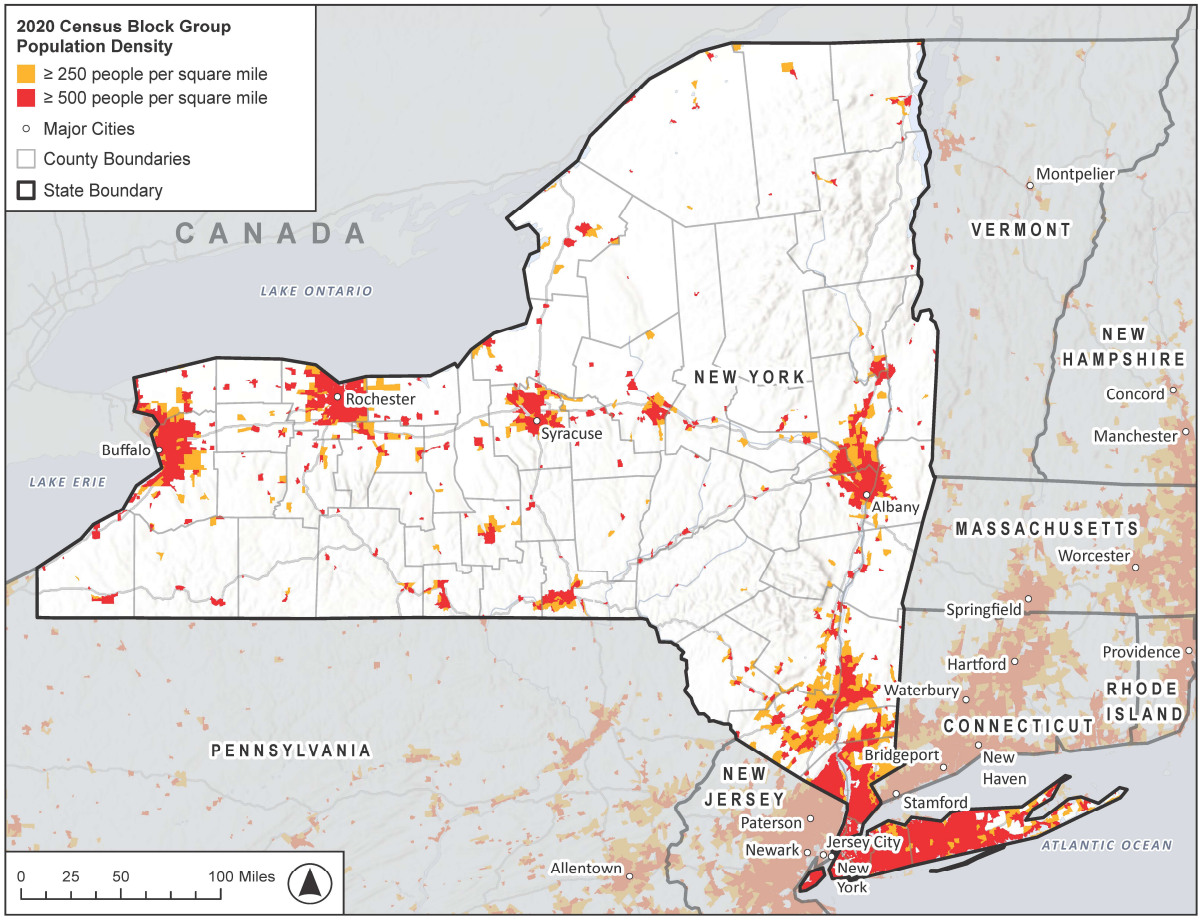
When evaluating a new nuclear plant site, a key consideration is how many people live nearby and whether those people could be protected in a serious accident. NRC requirements call for enough distance between the plant and surrounding communities to support emergency response and limit potential public exposure. This includes defining areas around the plant where protective actions such as sheltering or evacuation could be carried out more easily if needed.

10 CFR Part 100 requires each reactor site to include two key areas around the plant. The first is the exclusion area boundary (EAB), which is the area immediately around the plant where the plant operator can control access. The second is the low population zone (LPZ), which is the area just beyond the EAB where the number and distribution of residents must allow protective actions, such as sheltering or evacuation, to be carried out if needed. The NRC also requires that the edge of a population center with about 25,000 or more people be at least 1 to 1.5 times farther from the center than the outer edge of the LPZ.[9]

The NRC has had a long-standing preference to avoid very densely populated areas for traditional LLWRs that is reflected in the NRC's Regulatory Guide 4.7, Revision 4, "General Site Suitability Criteria for Nuclear Power Stations." It states that, at the time a plant is first approved and for about five years afterward, the average population density within 20 miles of the site should not exceed 500 people per square mile, including temporary populations.[10] For early screening, the EPRI Siting Guide uses a more conservative population-density value of 300 people per square mile as a practical way to identify areas that may be less suitable before more detailed studies are performed. Figure 5 provides a map of New York State and the Census Block Groups that exceeded 250 people per square mile and 500 people per square mile in the 2020 federal census. Sites located in or near these census block groups should be carefully screened for compliance with NRC regulations and population-density guidance applicable to the specific technologies under consideration (e.g. LLWs, SMRS, or microreactors).

Figure 5. Population Density Map

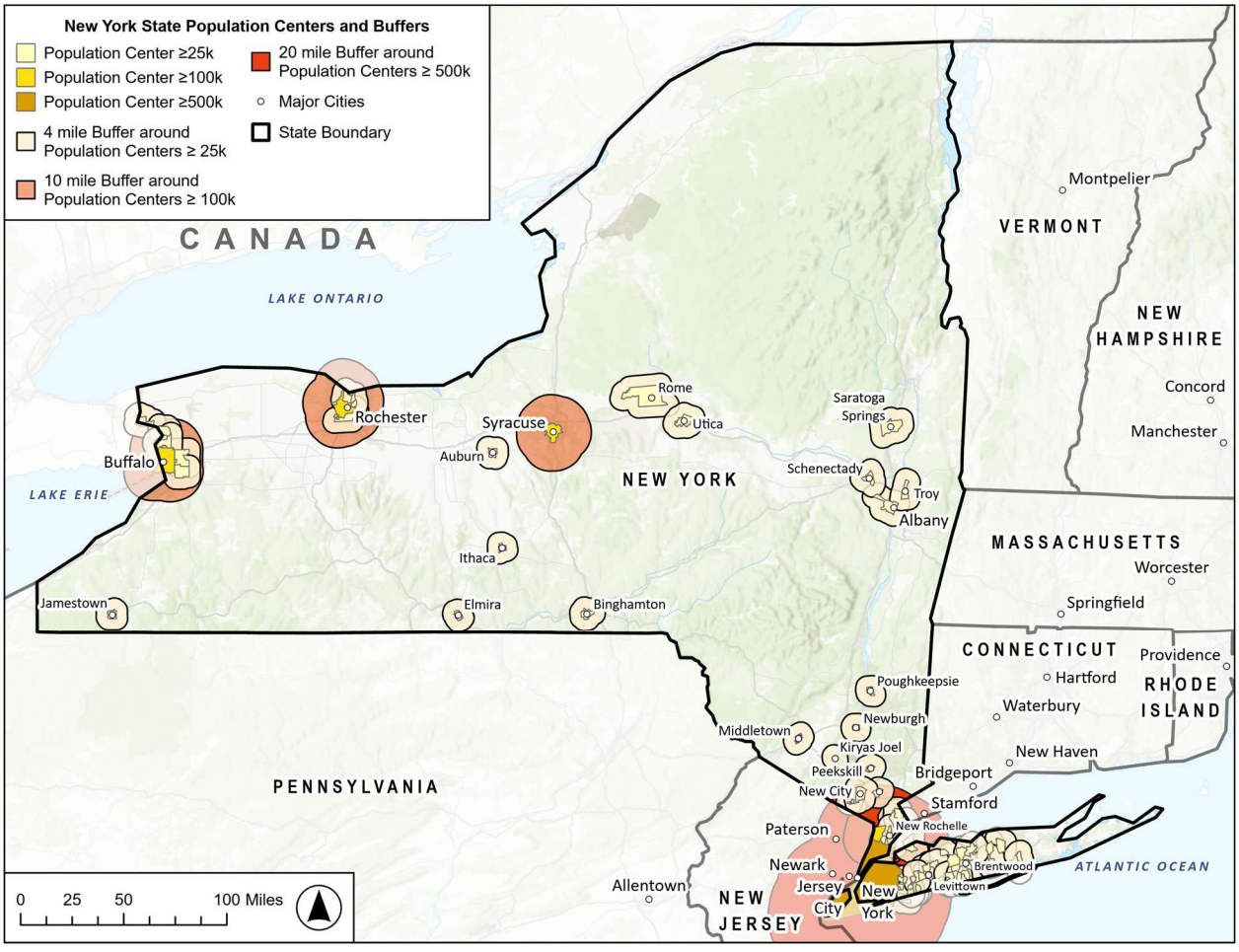
Source: Created by S&L in ArcGIS using U.S. Census Bureau data



The population criterion is an exclusion factor for the densest population areas and an avoidance criterion for less dense population areas. The EPRI Siting Guide also uses simple screening distances for nearby cities: a population center of about 25,000 people should generally be at least about 4 miles away, a city of about 100,000 people should generally be at least about 10 miles away, and a city of about 500,000 people should generally be at least about 20 miles away. The simple 4-, 10-, and 20-mile population-center screening distances are often used as exclusionary or avoidance areas in early siting studies.[11] Figure 6 provides a map of New York State showing these population centers and the 4-, 10-, and 20-mile screening distances. Sites located in areas should be carefully screened for compliance with NRC regulations and guidance related to population density that would be applicable to the specific technologies under consideration (e.g. LLWs, SMRS, or microreactors).

Figure 6. Map of Population Centers and Buffer Zones

Source: Created by S&L in ArcGIS using U.S. Census Bureau data



For SMRs and some other advanced reactors, the NRC has recognized that traditional population-based screening criteria developed for LLWRs may be more restrictive than necessary for newer designs. Newer designs may have smaller potential radioactive releases, so the NRC has considered a more flexible approach that links population reviews more directly to the actual risk and potential offsite effects of the specific reactor design. In other words, instead of relying only on a fixed 20-mile population screen, the review can be tied more closely to how far a serious accident could realistically affect people offsite.

Therefore, the 2026 10 CFR Part 53 and Regulatory Guide 4.7 provide an alternative, performance-based approach under which applicants may demonstrate acceptability by showing that population density does not exceed 500 persons per square mile out to a distance equal to twice the distance at which a hypothetical individual could receive a calculated dose of 1 rem over 1 month following postulated accidents. This approach ties population-related siting more directly to design-specific offsite dose consequences rather than relying solely on the traditional fixed 20-mile population-density screen.[12]

Even with these newer approaches, the core principle remains unchanged: a suitable nuclear site must provide adequate separation from nearby populations to support public safety, emergency preparedness, and effective protective actions. Advanced reactor technologies may justify smaller or site-boundary EABs, LPZs, or emergency planning zones (EPZs) in some cases, but avoiding densely populated areas remains a fundamental NRC siting consideration.

3.3.2 Water Usage and Supply Considerations

Reliable heat removal is a fundamental requirement for nuclear safety. Safely removing heat away from the reactor fuel and other safety-related systems so that temperatures remain within safe limits during operation, shutdown, and accident conditions is essential. NRC regulations and guidance require license applicants to demonstrate that the facility can remove heat safely during normal operation, after shutdown, and during accident conditions, including through a reliable ultimate heat sink where applicable.[13]

A minimum level of available water is established as an exclusionary factor. Higher levels of water are often a suitability factor. All nuclear plants require some water for normal operation. Some nuclear plants, however, require significantly larger amounts of water for cooling during normal operations or for shutdown. Cooling water requirements for normal operation depend on nuclear reactor technology and plant size (e.g. number of reactors, steam turbines, etc.), as

well as on the plant's cooling technology, such as mechanical draft cooling towers, hybrid cooling towers or dry cooling.

Most LLWR nuclear plants require continuous access to substantial water supplies for both normal operation and post-shutdown cooling. They require large, reliable cooling-water sources such as rivers, lakes, or coastal access. While some advanced reactors reduce water dependence and may not require water for safe-shutdown cooling, project proponents must still demonstrate long-term cooling capability under all conditions.

Water rights and water laws vary by state. New York State follows a riparian rights system. Riparian rights are granted to the owners of land bordering a watercourse or water body, such as a river, lake or pond, or the Great Lakes. A riparian landowner's water withdrawal and usage must be "reasonable" and not unreasonably interfere with other riparian owners' uses. Excessively large and permanent withdrawals are "unreasonable." The water must generally be used on the riparian property and not diverted by pipeline to non-riparian properties.

The New York Water Resources Law[14] and implementing regulations[15] require a DEC permit for any non-agricultural withdrawal of surface water or groundwater of more than 100,000 gallons per day (gpd). Inter-basin diversions greater than 1 million gpd must be registered with DEC in accordance with 6 NYCRR Part 601.18.

In some New York watersheds, including the Susquehanna, Delaware, St. Lawrence, and Great Lakes Basins, multi-state or international commissions also regulate water use. These agencies protect water users and the environment by reviewing and approving proposed water withdrawals. Diversions of any quantity from the Great Lakes-St. Lawrence River Basin are prohibited by the Great Lakes-St. Lawrence River Basin Water Resources Compact as enacted in Environmental Conservation Law (ECL) Article 21 Title 10 (6 NYCRR Part 601.10(n)). The Compact may allow for new diversions under certain conditions. The Delaware River Basin Commission (DRBC) and the Susquehanna River Basin Commission regulate water withdrawals in the Delaware and Susquehanna basins, respectively.

From a siting perspective, water supply, anticipated withdrawals, and infrastructure upgrades can easily become critical to site feasibility, community acceptance, and regulatory reviews. Project proponents should prioritize this in early assessments and look for locations that can support a reliable long-term cooling water supply and an ultimate heat sink without creating undue strains on other needs (e.g., drinking water, agriculture, industry, recreation). This includes evaluating whether sufficient surface and groundwater quantity and

quality will remain available during prolonged drought, high-temperature conditions, low-flow periods, and other extreme events that could impact the region long-term and reduce cooling capacity when it is needed most. In addition, site evaluation must consider other safety-related factors, including flooding and wildlife risks, site stability, proximity to transportation corridors or industrial facilities, and whether the surrounding area can support adequate emergency planning and protective actions.[16] This evaluation should be as comprehensive as possible, assessing cumulative and growth-inducing effects from new or upgraded nuclear facilities, particularly as workforce needs, populations, manufacturing, and other regional development may change and affect water use. Consultations with potential host communities and resource agencies are also an imperative early step to understanding both historic conditions and long-term trends. A suitable site must not only provide an adequate water supply but also accommodate community needs and satisfy broader safety and emergency preparedness considerations.

Project proponents should also consider the cost implications of water supply and cooling system design, including intake and discharge infrastructure, reservoirs or cooling towers, water treatment needs, competing water demands, and any measures needed to ensure long-term reliability. Site characteristics, such as distance to an adequate water source, can materially affect construction complexity, cooling-water infrastructure, transmission length, access to labor and transportation, environmental mitigation needs, and ultimately project schedule and total capital cost.

Water supply and usage for reliable heat removal is a fundamental safety requirement, and therefore a key siting consideration for nuclear facilities and potential host communities. A suitable candidate site must be capable of supporting dependable, long-term cooling under a wide range of conditions while also meeting broader safety, environmental, emergency planning, and economic criteria. As a result, evaluation of cooling water availability and ultimate heat sink reliability should be a vital component of early site screening and project development.

3.3.3 Environmental Criteria

Multiple environmental resources can be considered a siting criterion that can either be an avoidance or exclusionary factor depending on the applicable federal or New York State environmental laws and the project sponsor’s risk tolerance, as it regards the likelihood of successfully obtaining permits and authorizations. These include, but are not limited to, freshwater and tidal wetlands, protected streams and other waterbodies, threatened and endangered species, coastal erosion hazard areas, and air quality, among others. Consideration

of defining a resource as either an avoidance or exclusionary factor should take into account that such resource should first be avoided, and where avoidance is not feasible, impacts minimized to the greatest extent practicable, and then mitigated for. Avoidance, minimization, and mitigation measures will likely require more from a project in terms of State authorization timelines, work schedule changes, and cost, all of which can factor into a project's viability.

It is possible that certain environmental and cultural resource criteria considered avoidance factors can rise to becoming exclusionary factors. One such example is the known presence of plant or animal species listed on the New York State List of Endangered, Threatened, and Special Concern Fish & Wildlife Species (6 NYCRR 182.5), or of federally listed threatened and endangered species or critical habitats. This includes terrestrial and aquatic species at the project site or proximally impacted, such as by the project's cooling water intake and discharge. If such a site is not excluded, it will likely require an Incidental Take permit from the U.S. Fish and Wildlife Service and/or DEC. Where a project requires extensive mitigation, its viability can be called into question. This example of criteria escalating to exclusionary factors can be modeled for other environmental and cultural resources where avoidance, minimization, and mitigation are required.

As noted in Section 2, projects above 25 MW are subject to the Public Service Law Article 10 siting process. Nuclear facilities that would fall under Article 10 jurisdiction are generally preempted from State procedural requirements such as environmental permits. However, environmental considerations are required of an applicant for an Article 10 Certificate of Environmental Compatibility and Public Need.

3.3.4 Seismic and Geotechnical Hazards

The NRC siting regulations in 10 CFR Part 100 and supporting NRC guidance documents require a thorough evaluation of seismic and geotechnical hazards. These typically include the following: seismic acceleration, proximity to capable faults, mining activity and fracking, karst, sinkholes, and subsidence, liquefaction potential, and volcanism. An understanding of a site's potential seismic environment affects construction cost, permitting, and site safety.

Seismological criteria are a common exclusionary factor. Areas or sites where the U.S. Geological Survey (USGS) National Seismic Hazard Model or similar hazard mapping show that the peak ground acceleration (PGA) exceeds the reactor vendor's design requirement for a Safe Shutdown Earthquake (SSE), or the PPE SSE requirements, are typically excluded from further consideration.

The SSE is the vibratory ground motion for which certain structures, systems, and components (SSC) are designed to remain functional. Traditionally, a PGA of 0.3g has been used for LLWRs for exclusion. Advanced reactors are often designed for higher seismic ground motions, in the range of 0.3g to 0.6g. A typical approach for advanced reactor site evaluation criteria is to set 0.6g as an exclusionary threshold, and 0.3g as an avoidance threshold. Sites with a mapped PGA less than 0.3g are highly suitable. Typically, sites that have a PGA less than 0.2 g are most favorable. Sites with a PGA greater than 0.6 g are considered unfavorable. Sites with a PGA between 0.2 g and 0.6 g may require more robust engineered protection for the safety-related SSCs. PGA values are specified as a function of probability of exceedance. Typically, for nuclear reactor sites, a stringent relative probability is required, e.g. a 2% probability of exceedance in 50 years. This is much more stringent than most building codes.

Other geological hazards or seismic factors may also be exclusionary. For example, geologically recent or active faults at or near the site should likely be considered exclusionary.[17]

New York State has no active volcanoes and is centrally located on a stable tectonic plate; therefore, volcanism is of low concern. The remaining criteria, except for seismic acceleration, are generally site-specific and evaluated on a case-by-case basis. Seismic acceleration is discussed more below.

Error! Reference source not found. below provides a map of New York State with PGA values from the USGS 2023 National Seismic Hazard Model for the United States. The PGA values shown represent peak horizontal acceleration with a 2% probability of exceedance in 50 years (an approximate mean recurrence interval of about 2,500 years). They are for the National Earthquake Hazards Reduction Program (NEHRP) site class D (V_{S30} = 260 m/s), where V_{s30} is the NEHRP shear wave velocity, a standard measurement used in civil engineering and building codes to classify the upper 30 meters of a site's soil and bedrock.

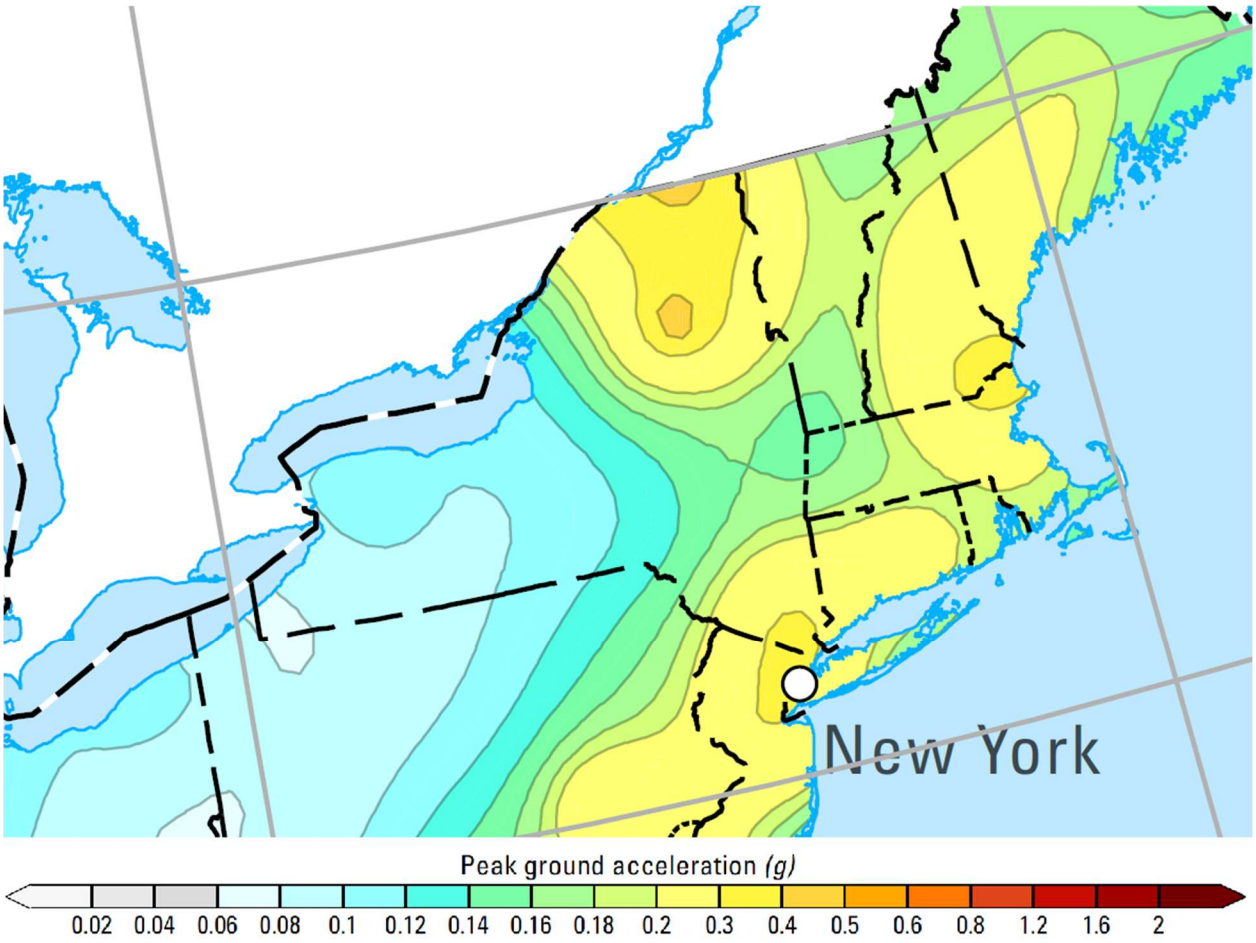
The 2%/50-yr recurrence data for site class D is provided because it most closely approximates the design values that an Appendix S analysis will derive. These PGA values are likely higher than most local or state building code design requirements for seismic acceleration.

Figure 7 shows that the State has PGA values ranging from a low of 0.06 g to a maximum of 0.5 g. PGA values greater than 0.4 g occur only in the Adirondack region of northeast New York. Most parts of the State, except for the northeast and southeast regions, have a PGA less than 0.2 g and are considered favorable.

Figure 7. New York State PGA Values

Peak horizontal acceleration with a 2% probability of exceedance in 50 years for NEHRP site class D (V_{S30} = 260 m/s)

Source: USGS "National Seismic Hazard Model for the United States," 2023.



3.3.5 Flood Hazards

Flood hazard is an important siting issue for any large power plant, including nuclear facilities. A plant must be located where important buildings, equipment, and access routes can remain safe during extreme water events. For nuclear plants, this issue receives especially close attention because the site must continue to protect public health and safety during rare but severe natural events.

Flood hazards include more than river flooding alone. For nuclear siting, project proponents need to consider flooding from rivers and streams, local intense rainfall, storm surge, seiches, tsunamis, dam failures, and other water-related events that could affect the site. NRC regulations require the physical characteristics of a site, including non-seismic floods and

seismically induced floods and water waves, to be evaluated and used to establish site parameters.[18] These site characteristics help determine whether a site is suitable for a nuclear power station, and design-basis flood conditions must be established to evaluate facilities at the site.

The required flood hazard analyses are site-specific, time-consuming, and costly, and cannot be performed comprehensively during the siting evaluation process. They are usually performed during the site characterization stage for a single site to identify a site-specific flood hazard (e.g. the depth of inundation) for use in detailed engineering of the facility's flood protection structures and mitigation features. The indicated flood protection structures may not be practical or financially feasible for a given site even if the site is not automatically excluded. While a site with significant flood exposure may still be technically workable, it could require major grading, flood protection features, drainage improvements, higher plant elevations, or other costly design measures. Therefore, the potential flood hazard is typically an exclusionary factor if the analysis is likely to show high levels of inundation, and an avoidance factor for lower levels of inundation. This may require a conservative, high-level evaluation of the potential flood hazard.

While comprehensive flood risk review is not typically possible before site characterization, early review is valuable because it helps project proponents identify major constraints before spending time and money on advanced site work. Sites in mapped floodplains, below potential dam-failure inundation areas, near poorly drained low ground, or in locations exposed to severe coastal flooding may face greater challenges. Screening tools such as Federal Emergency Management Agency (FEMA) flood hazard mapping can help identify obvious constraints, including whether a site is located within a 100- or 500-year floodplain. Sites outside mapped or otherwise known FEMA flood-hazard areas are generally preferred, but the presence of flood risk is not always treated as an automatic exclusion.

As noted above, early siting studies usually do not include the full licensing-level flood analysis. Instead, they use available topographic, hydrologic, dam, and flood map information to flag potential problems and compare candidate sites at a screening level. That work supports better site selection decisions, focuses attention on sites with more favorable elevations, drainage, and surrounding hydrologic conditions, and helps identify where additional data collection will be needed.

As a project moves through the siting study process and a fewer preferred sites are identified, the flood analysis becomes more detailed. NRC guidance points project proponents to more

detailed flood analysis methods for estimating design-basis floods and describes how the NRC staff evaluates flood mechanisms at reactor sites.[19] These later-stage reviews can include probable maximum flood conditions on rivers and streams, runoff and drainage across the site, and the effects of wave action, erosion, and sedimentation where those hazards are relevant.

During the later stages of the siting process, project proponents can perform site-specific hydrologic and hydraulic studies to define the controlling flood mechanisms, estimate design-basis flood levels, and determine what plant layout or protective features may be required. Starting the flood review early helps avoid surprises later in licensing and design.

The NRC requires analysis of several potential flooding scenarios, including the probable maximum flood (PMF) on streams and rivers, potential dam failure, probable maximum storm surge and seiche, and local intense precipitation (LIP). The PMF is a concept similar to the more familiar Federal Insurance Rate Map (FIRM) 100-year and 500-year flood hazard, but with a significantly higher return period and correspondingly higher flood flows and water levels. The PMF needs to be determined on a site-specific basis and is especially important for sites located near, or just slightly higher than, FIRM-mapped flood zones. Such sites should estimate the PMF as early as possible in the siting analysis. The LIP is also evaluated on a site-specific basis and is used to check the sufficiency of a plant's engineered storm water runoff facilities. The LIP is evaluated as part of detailed engineering and design of a specific facility.

The probable maximum storm surge, seiche, and tsunami are of concern for the coastal regions of the State. However, siting nuclear generation is only under consideration in Upstate New York (North and West of the Lower Hudson Valley).

The flood hazards from the failure of a dam located upstream of a possible site is a very important consideration within the context of the State. Ultimately, a site-specific evaluation is required, but the map in Figure 8 indicates the widespread geographical nature of this concern. The analysis of the dam failure flood may often present the greatest flood risk for inland sites and is discussed further here.

The U.S. Army Corps of Engineers (USACE) National Inventory of Dams (NID) provides the following hazard classifications for existing dams:

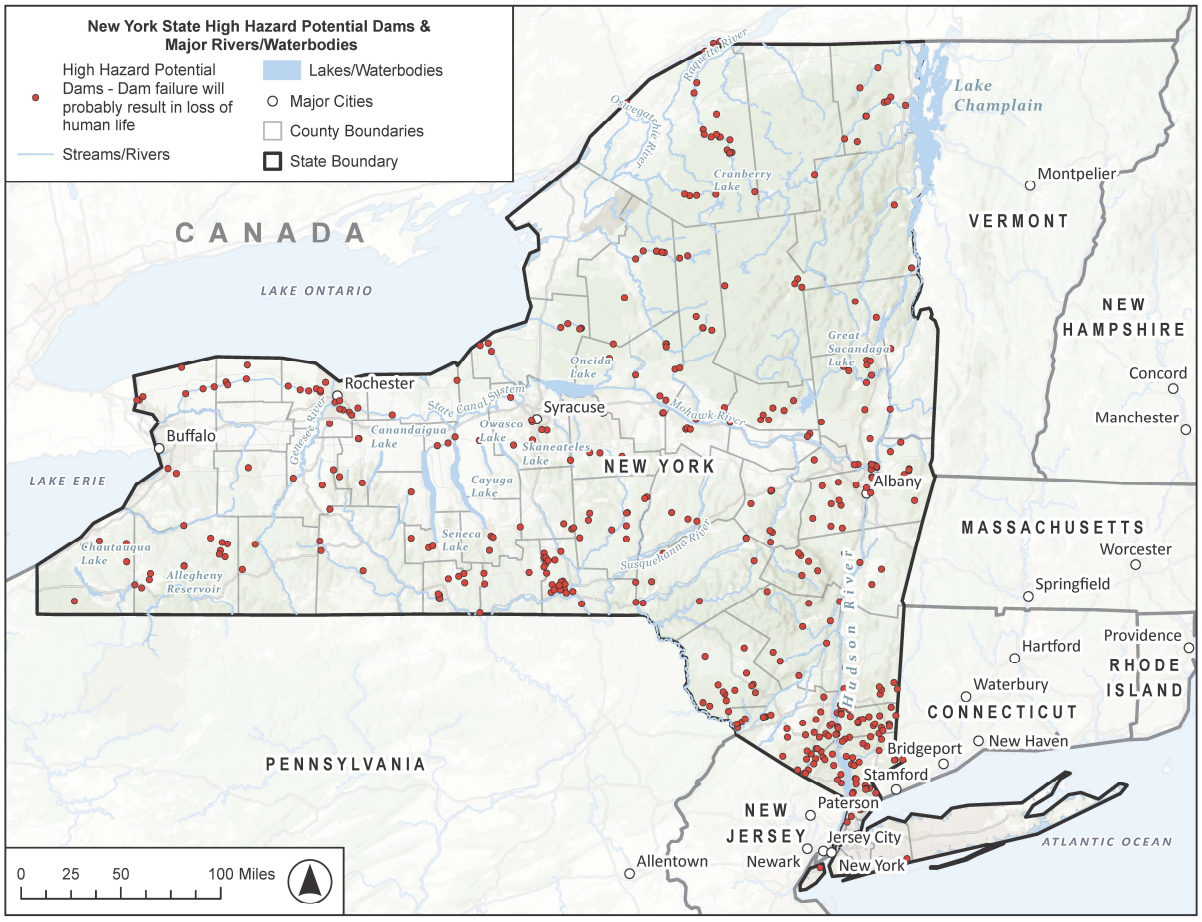
- Low Hazard Potential: Dams in this category are those where failure or mis-operation would likely cause no loss of human life and low economic or environmental losses, primarily limited to the owner's property.

- Significant Hazard Potential: Dams in this category are those where failure or mis-operation could cause economic loss, environmental damage, or disruption of lifeline facilities, but not likely loss of human life.
- High Hazard Potential: Dams in this category are those where failure or mis-operation is likely to cause loss of human life.

The map of New York State shown in **Error! Reference source not found.** provides the location of High Hazard Potential dams. Early in the siting process, project developers should carefully evaluate site suitability for any location downstream of or within the same watershed as these dams due to the potential flood hazards.

Figure 8. High Hazard Potential Dams in New York State

Source: USACE National Inventory of Dams (NID)



3.3.6 Evaluation of Offsite Hazards

Offsite hazard analysis is an important part of early nuclear siting. A project proponent must understand not only the conditions on the site itself, but also the nearby features and activities that could affect plant safety, security, emergency planning, or long-term project viability.

The NRC requires a broad review of nearby hazards, including industrial facilities, transportation corridors, airports, pipelines, dams, military activities, and natural events that could affect the plant. The purpose is to determine whether those nearby hazards can be addressed in the site selection, plant design, or mitigation measures, or whether they create too much risk for the site to be a practical choice.

Offsite hazards should be evaluated early in the siting process because nearby hazards can affect both licensing risk and project cost. Depending on their nature and proximity, nearby hazardous facilities and activities may function as exclusionary, avoidance, or suitability factors. A site may be technically feasible if it is close to a chemical facility, major highway, rail line, navigable waterway, airport, or other hazard source, but if it is too close, additional studies, protective design features, traffic control arrangements, or other mitigation measures may be required. For example, a large natural gas pipeline less than a half mile from the site could be used to exclude that site from further consideration. More distant hazards can be avoidance factors. The specific factors vary with the type of hazards and the type of nuclear reactor technology being considered for the site.

For nuclear plants, offsite hazard review is grounded in regulatory requirements to evaluate natural and human-made hazards. The type and proximity of human-built hazards such as airports, dams, transportation routes, military facilities, and chemical facilities must be evaluated to establish site characteristics and determine whether the plant design can accommodate commonly occurring hazards and whether the risk of other hazards is low. The regulations also require that hazards associated with nearby transportation routes, industrial facilities, and military facilities pose no undue risk to the proposed plant.[20]

During site selection, NRC guidance says that nearby natural and human-built features should not prevent the development of adequate security plans or interfere with safe plant operation. It also notes that transportation routes such as highways, railroads, and waterways may cross or approach a site only if they are not so close that they interfere with plant operation and if appropriate arrangements can control traffic during an emergency.[21]

Offsite hazard analysis also helps identify issues that are not always obvious from a simple map review. For example, a nearby industrial facility may store hazardous chemicals, a rail corridor may carry flammable or toxic materials, or an airport or military flight path may pose aircraft risk that needs closer review. These issues may not automatically eliminate a site, but they can make licensing more complex and may require the plant to show added protection or separation from the hazard source.

External and offsite hazards are part of the staged siting process outlined in Section 2 in which potential sites are screened, compared, and refined over time. In that framework, early screening identifies major risks and potential cost or licensing challenges before the project commits to more detailed site work. A candidate site should ultimately be credible as a site that could reasonably support licensing, which makes early review of nearby hazards especially important.[22]

Therefore, early siting studies usually review available information on nearby land uses, industrial operations, transportation corridors, airports, dams, and other hazard sources to identify obvious concerns. Although not considered exclusionary or avoidance criteria, this screening-level work helps project proponents focus on sites with more favorable surroundings and avoid spending time and money on locations that may later prove difficult to license or protect.

More detailed hazard analysis is typically completed after a smaller number of preferred sites has been identified. At that stage, site-specific evaluations of blast effects, chemical releases, transportation accident risk, aircraft hazards, and other nearby threats determine whether the plant can meet NRC requirements with acceptable margins. Starting this work early helps reduce surprises later in licensing, design, and project development.

3.3.7 Aircraft Hazards

Aircraft hazards are a subset of the broader offsite hazard review discussed above and should be evaluated within the same screening-to-detailed analysis framework. Current NRC siting regulations require consideration of nearby transportation, industrial, and military facilities as part of site characterization, including whether such external hazards could pose undue risk to the proposed plant.

For aircraft specifically, a siting study should identify nearby airports, federal airways, military training routes, military flight training areas, holding patterns, and approach/departure paths and then consider whether aircraft traffic near the site could increase safety or licensing risk. In early-stage screening, the EPRI Siting Guide treats these as part of the broader review of nearby

hazardous land uses and notes that airports and military installations are among the most common human-made hazards identified during site selection.

As with other offsite hazards, proximity to significant aircraft activity does not necessarily preclude development, but it can increase analysis needs, licensing complexity, and project cost. Aircraft hazards are therefore best addressed during early offsite hazard screening, when preliminary screening preferences can help identify clearly less favorable sites before substantial project resources are committed. An example of a screening preference would be locating sites more than 10 miles from major airports. These benchmarks are useful for early screening, but they are not NRC pass/fail thresholds; sites carried forward may still require more detailed evaluation of accident frequency and consequences and, if necessary, additional design features, operational controls, or comparison against lower-risk alternatives, with final acceptability depending on the full hazard evaluation and the plant being proposed.

3.3.8 Wastewater and Cooling Water Discharge Considerations

Nuclear power plants, like fossil fuel power plants, use large volumes of water to remove heat during operation of the plant. As that water moves through the cooling system, it becomes warmer. In a nuclear plant, some wastewater may also contain small amounts of radioactive material, so it is treated and filtered to remove radionuclides before it is stored or discharged to a river, lake, reservoir, or other receiving waterbody. While not considered an exclusionary criterion, wastewater and cooling water discharge is included in this section because it has implications for permitting.

A thermal discharge is the release of heated cooling water back into a river, lake, reservoir, or other waterbody. For new nuclear projects, thermal discharge is an important siting issue. A project proponent must show that the plant can take in and return cooling water without causing unacceptable effects on water quality, fish and other aquatic life, or nearby environmental resources. Detailed studies to show how heated water will mix with the receiving water body are required as part of the NRC's broader environmental review process.

Cooling water withdrawals and thermal discharges also have broader implications for surrounding communities and ecosystems. Thermal discharge of heated cooling water back into rivers, lakes, reservoirs, or other waterbodies can have implications on drinking water supplies, recreation, fisheries, cultural or spiritual practices, and habitats that are important to nearby communities, including Indigenous Nations. Thermal discharges are generally evaluated based

on their potential effects on receiving water bodies and aquatic resources. Key considerations include the presence of sensitive habitats or species, existing environmental conditions, and the capacity of the receiving water body to absorb and dissipate heat without causing adverse environmental impacts. Sites with limited water availability, sensitive aquatic ecosystems, existing environmental stressors, or competing water uses may require additional study and mitigation measures.

For new reactors, the NRC reviews site-specific environmental impacts under NEPA and 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions." As part of that review, applicants must describe the proposed cooling system and evaluate its environmental effects. NRC environmental review guidance, including Regulatory Guide 4.2 and Regulatory Guide 4.7, directs project proponents to consider whether other cooling methods, such as closed-cycle cooling or cooling towers, could reduce impacts on aquatic resources. In areas with existing wastewater discharges or other water quality concerns, permitting may be more difficult.[23]

Thermal discharge limits are generally handled through federal Clean Water Act (CWA) and State permits. The DEC issues State Pollutant Discharge Elimination System (SPDES) permits under Article 17 of the State's Environmental Conservation Law and the federal CWA. New York's thermal discharge standards are provided in 6 NYCRR Part 704, "Criteria Governing Thermal Discharges." Depending on the site, a project may need to meet State temperature standards and demonstrate compliance with Section 316(a) as implemented via the SPDES permit showing that the discharge will protect aquatic life.[24] In addition, effects on coastal resources and uses from thermal discharges into a waterbody in the coastal area are evaluated for consistency with the state coastal policies in the state's Coastal Management Program, as administered by the Department of State.

New York also requires cooling water intake structures associated with thermal discharges to reflect the "best technology available" for minimizing adverse environmental impacts under 6 NYCRR §704.5 and related Clean Water Act requirements found in sections 316(a) and (b). DEC Commissioner Policy-52 identifies closed-cycle cooling, or technologies and/or operational measures providing equivalent reductions in fish impingement and entrainment as the preferred approach for minimizing adverse environmental impacts on ecosystems from large cooling-water withdrawals.

Thermal discharge is not usually treated as an exclusionary or avoidance factor during site selection. Instead, it is evaluated based on the potential effect it could have on the receiving

water body. Two key considerations are whether sensitive species or habitats are present and whether the receiving water body is large enough to assimilate the heated discharge. In general, larger rivers, lakes, or reservoirs with greater flow or volume are more favorable because they are more likely to meet water-quality-based limits. This same ability to demonstrate compliance is also important when considering surface water pathways for trace radioactive substances in discharges.[25] The SPDES permit will regulate the non-radiological pollutants and the total pollutant load, while the NRC's radiation protection program will regulate the radioactive content and ensure it meets dose and release limits.

Public exposure to radiation from surface water discharges is another siting consideration for new nuclear plants. Potential dose through this pathway depends mainly on the amount of radioactive material in the discharge and on how much the receiving water body can dilute it. Because this can only be confirmed through detailed, site-specific study, screening-level site evaluations often use simpler indicators as a stand-in for full dose analysis. In general, surface water pathway characteristics are also not treated as exclusionary or avoidance factors. The main factors considered are dilution capacity, existing background loadings, and how close the discharge is to downstream water users.[26]

Project proponents should consider thermal discharge early in site selection. Sites with limited receiving water, high seasonal water temperatures, low streamflow, sensitive aquatic habitat, or strict state temperature standards can be harder to permit. These conditions may require more expensive cooling system designs, additional environmental studies, or operating limits during hot weather. More detailed work, such as thermal plume modeling, baseline water quality studies, and coordination with state and federal agencies, is typically completed after a preferred site is selected. This work helps confirm whether the site can support the planned cooling approach and whether additional design or permitting measures will be needed.

3.4 Suitability Criteria

As suitability criteria affect the relative cost of a site, the most crucial factors concern available infrastructure and engineering. This sub-section therefore focuses on those aspects of site evaluation. It also includes other factors that are relevant to site layout and design.

3.4.1 Required Infrastructure

A suitable nuclear site must have, or be capable of developing, the infrastructure needed to support safe, long-term plant operation. Under NRC guidance, transportation access and other

site-support features are considered during site selection because they can affect public health, safety, and environmental suitability.[27] These features are typically used as suitability siting considerations rather than exclusionary or avoidance criteria. It is important to determine whether the infrastructure already exists or can reasonably be developed, as it can strongly affect cost, schedule, and feasibility. A viable nuclear site must have, or be capable of supporting, the following infrastructure.[28]

- **Transportation access for heavy components (road, rail, or waterway and barge):** Access to heavy-haul transportation routes is important because large reactor modules, heavy equipment, and construction materials may require routes with adequate load-bearing capacity, turning radii, and clearances. If suitable access does not exist, substantial offsite improvements may be required, increasing cost and risk of delays. Heavy haul routes are discussed in more depth in a later sub-section.
- **Construction support infrastructure:** A suitable site must also be able to accommodate construction support infrastructure, including laydown areas, worker access, temporary facilities, and other constructability needs associated with large, multi-year construction programs.
- **Security perimeters and controlled access:** Nuclear sites must provide sufficient land area and site control to establish security perimeters, controlled access, and other protected areas needed for nuclear safety and security functions. Controlled and protected areas are discussed in depth in a later section.
- **Onsite power systems for safety-related loads:** Nuclear development requires onsite power systems capable of supporting safety-related loads and essential plant functions under normal, shutdown, and accident conditions, making electrical infrastructure expectations more stringent than for most non-nuclear generation projects. Transmission interconnection is discussed in more depth below.
- **Potential industrial integration for steam or heat applications:** For some AR, SMR, and microreactor applications, site infrastructure may additionally need to support industrial integration, such as direct delivery of steam, process heat, or behind-the-meter power to an adjacent host facility, while maintaining appropriate safety boundaries and managing interaction hazards between nuclear and non-nuclear operations.

Overall, these infrastructure requirements are more prescriptive and safety-driven than for other types of energy projects because nuclear facilities must demonstrate compatibility with regulatory siting criteria, emergency planning, security, and long-term operational reliability from the outset. The availability, adequacy, or need for upgrades to transportation access, site support systems, electrical infrastructure, and other required facilities can materially affect project cost and schedule, because infrastructure deficiencies may require added mitigation,

design changes, offsite improvements, longer review timelines, and more complex construction planning.

3.4.1.1 Transmission Interconnection

Transmission interconnection is a critical nuclear siting consideration because a site must have a reliable offsite power arrangement and a grid connection capable of supporting the plant's electrical output. Although transmission access is not typically treated as an exclusionary or avoidance criterion like population or hazard criteria, it remains an important suitability factor in site selection because it can affect licensing, cost, and long-term operation. Evaluating transmission access requires consideration of the site's proximity to major transmission corridors, potential interconnection routes, and the cost and complexity of any new line construction needed to establish a viable point of interconnection.

Because nuclear plants are designed to provide substantial amounts of firm, continuous generation, nearby transmission infrastructure does not necessarily make a site suitable. Interconnection studies may identify thermal, voltage, short-circuit, or dynamic stability constraints that necessitate major system upgrades, new substations, additional right-of-way, or lengthy study, permitting, and approval processes. Brownfield sites may offer advantages such as existing transmission infrastructure, compatible industrial land use, and community familiarity with large energy facilities; however, these benefits do not eliminate the need for detailed interconnection analysis.

Connecting a large nuclear plant to a strong high-voltage transmission network helps maximize its system value by enabling reliable delivery of its output and allowing its inertia, voltage support, and other stability benefits to strengthen the wider bulk power system. Access to sufficient existing bulk transmission capacity, or the ability to develop new high voltage transmission to connect the plant to the bulk power system, is therefore a central consideration in nuclear siting.

3.4.1.2 Heavy Haul Routes

As discussed previously, access to suitable transportation infrastructure is an important consideration for siting a new nuclear facility. A site's proximity to transportation and heavy-haul infrastructure, including rail lines, barge terminals, and highway access, can significantly affect its overall suitability.

For nuclear plants, this consideration is particularly important because large reactor vessels, steam generators, modules, transformers, and other oversized components often cannot be transported via standard freight routes. Instead, delivery may require specialized heavy-haul corridors with sufficient load-bearing capacity, turning radii, bridge ratings, vertical clearances, and site access geometry to accommodate safe transport.

Heavy haul infrastructure access is not generally treated as exclusion or avoidance criteria in early stages of siting; rather, it is used later in the siting process as a suitability criterion evaluated based on proximity to and adequacy of barge, rail, and highway heavy-haul infrastructure. Heavy haul access should be evaluated based on the expected delivery methods for major components and, in some cases, may be consolidated into a single heavy-haul access criterion that considers all viable transportation options. This evaluation may include the distance to the nearest existing barge terminal or rail access point, the adequacy of the heavy-haul route between that access point and the site, and whether new infrastructure, such as a barge terminal or haul road, would be required.

Sites that lack suitable heavy-haul access may require substantial offsite and onsite infrastructure improvements, such as road widening, bridge reinforcement, intersection modifications, new haul roads, or terminal construction. These upgrades can materially increase project costs, complicate permitting and stakeholder coordination, and introduce additional schedule risk during both construction and future major component replacement activities.

3.4.2 Engineering and Cost-Related Criteria

Engineering and cost-related criteria generally refer to technical design viability, construction feasibility, and the construction and likely future operational costs associated with both. Detailed cost estimates are not usually possible at the site evaluation stage because the project is not yet defined, detailed engineering and design are incomplete, and vendor costs are unknown. However, considering these criteria allows the site selection process to account for important site-related cost differentials.

Normally, these criteria are fundamentally discretionary (e.g. avoidance or suitability factors) but may relate to the cost of managing an exclusionary criterion. For example, if the cooling water source is so far from the site that long-term pumping costs over the life of the plant are too high to support the project's financial model. A project sponsor may set a threshold for certain features to be categorized as an exclusionary factor if the financial model is no longer viable.

3.4.3 Spent Fuel Storage Needs

Nuclear facilities must have safe, secure places to store both new fuel and used fuel. Facilities typically store new fuel in protected areas before loading it into the reactor. After fuel is used in the reactor, it stays highly radioactive and hot, so it must first be cooled in a spent fuel pool and is often later moved to dry cask storage on site for longer-term storage. NRC regulations treat this as a major design and licensing issue, with specific requirements for spent fuel storage.

In many other power technologies, waste handling is a smaller support function. In the nuclear sector, fuel storage is part of the core site plan from the beginning because the plant owner may need to manage used fuel safely on site for a long time. New plants generally should not assume offsite storage will be available and instead should plan for an onsite storage capacity for the life of the plant (e.g. 40 years), such as an independent spent fuel storage installation (ISFSI).[29]

A nuclear site must have enough land not only for the reactor and support buildings, but also for future used fuel storage areas, security setbacks, heavy-load handling paths, and supporting facilities associated with fuel storage. The storage of spent fuel is not considered an exclusionary or avoidance criterion; however, during site selection, conceptual site layouts should include the location of a future ISFSI, and the PPE should assume an onsite storage installation that is large enough to hold all fuel generated during plant operations.[30] Onsite storage will remain a local responsibility for new sites until the federal government determines a permanent or consolidated interim solution. The supporting study, Regulatory Issues and Safety Study, covers these changes in detail.

Security is also a major factor. Fuel storage areas must be protected as part of the plant's overall physical security and safety basis, and the storage systems themselves must meet strict design, operational, and licensing requirements. For dry cask storage, the NRC uses approved cask designs and certificates of compliance, and the storage system must allow fuel to be received, handled, stored, and retrieved without undue risk to public health and safety.

3.5 Greenfield Versus Brownfield Development

Choosing between a greenfield and brownfield site is a strategic siting decision that can significantly affect licensing complexity, cost, schedule, and overall project risk. While brownfield redevelopment, particularly at fossil fuel sites, has gained attention as a pathway for nuclear development, it is not necessarily easier than greenfield development due to the unique safety

and regulatory requirements of nuclear facilities, as well as environmental justice considerations when siting facilities in areas that have been historically disinvested or blighted.

Greenfield sites are in previously undeveloped locations that offer flexibility in design and layout, safety buffer zones, and infrastructure design. This flexibility is valuable for nuclear projects but likely will require development of supporting infrastructure and may face greater permitting uncertainty. Greenfield sites have the following advantages and challenges.[31]

- Advantages
    - Full control over the site layout, which allows optimal placement of safety-related structures, exclusion zones, and security boundaries.
    - Ability to avoid legacy constraints such as contamination, incompatible subsurface conditions, or pre-existing infrastructure.
    - Greater flexibility to site facilities relative to natural hazards, such as placing critical structures above flood elevations or away from fault zones.
- Challenges
    - Likely requires development of supporting infrastructure.
    - More extensive environmental review and permitting under federal and state regulations.
    - Potential for longer development timelines due to need for comprehensive baseline environmental and geotechnical characterization.

Brownfield sites, such as retired or retiring fossil plants or industrial facilities, offer potential advantages due to existing transmission access, industrial zoning, and community familiarity, which may support more streamlined licensing and development. However, they may present challenges such as soil and water contamination, space constraints, or incompatibility with nuclear safety requirements. Brownfield sites have the following advantages and challenges[32]:

- Advantages
    - Existing transmission interconnection infrastructure sized for large baseload generation. This advantage may apply to both former fossil-fueled generating plants, and, in some cases, former industrial facilities with large power demand that were interconnected to the grid.
    - Established transportation access.
    - Industrial zoning and community familiarity with energy facilities, which may reduce opposition.
    - Potential workforce transition opportunities from retiring fossil fuel facilities.

    - Minimized risk of significant environmental impacts.
- Challenges
    - Site suitability may not meet nuclear siting criteria.
    - Space constraints for exclusion areas, protected areas, and security buffers.
    - Legacy soil and groundwater contamination may require cleanup and mitigation, which could complicate licensing.
    - Existing cooling water systems may not meet nuclear safety or reliability requirements.
    - Existing permits or site history do not significantly reduce NRC requirements.
    - Existing transmission capacity may require upgrades.

The Advanced Nuclear Policy Options Paper found that brownfield development could reduce overall project costs by up to 19% compared to greenfield sites.[33] The primary driver of this reduction is the lower initial capital cost of brownfield deployment. Brownfield deployment can also shorten development and construction timelines, enabling earlier commercial operations, lower labor cost, and lower financing carrying cost. As noted in NYSERDA's Zero by 40 Technoeconomic Assessment, the degree of the cost reduction will depend on the sufficiency of existing infrastructure to which the brownfield site has access, e.g. available transmission capacity that avoids or reduces the need for transmission upgrades. Site remediation costs, including the cleanup of legacy contamination, will also directly affect the cost savings of brownfield development.

DEC has implemented several programs to facilitate the cleanup of brownfield sites, including: the Brownfield Cleanup Program (BCP), which encourages private-sector cleanups of brownfields and to promote their redevelopment as a means to revitalize economically blighted areas; and the State Superfund (SSF) Program, which is an enforcement program whose goal is to identify and characterize suspected inactive hazardous waste disposal sites and to ensure that those sites which pose a significant threat to public health or the environment are properly addressed.

The State also offers incentives for brownfield cleanup and redevelopment. Incentives such as technical oversight, tax credits, and liability relief help project sponsors complete cleanup projects. The State programs, including the Environmental Restoration Program, have helped return hundreds of contaminated sites to productive use.

Furthermore, DOS provides financial and technical assistance to municipalities and community-based organizations under the Brownfield Opportunity Areas (BOA) Program. The BOA Program

supports community-driven, area-wide planning to redevelop brownfields and other vacant, abandoned and underutilized properties while addressing environmental justice concerns and promoting environmental equity in areas burdened by negative environmental conditions. Funding can support site assessments, pre-development activities, and the completion of revitalization plans and implementation strategies.

3.6 Findings

Key exclusionary, avoidance, and suitability criteria: While conclusions are subject to change in the future as the NRC undertakes major regulatory changes aimed at streamlining siting decisions, exclusionary conditions include high seismic hazards or active faulting, flood risks that cannot be reasonably mitigated, population conditions that would not support adequate emergency planning zones, insufficient cooling water supply, significant external hazards (e.g. proximity to a chemical plant or refinery), unsuitable geotechnical conditions, and proximity to protected or restricted lands. Suitability factors that are most impactful on costs and project timeline include those related to infrastructure, such as transmission interconnection, transportation access, construction support, and engineering requirements.

Brownfield sites may offer cost advantages over greenfield sites: As noted in the Advanced Nuclear Policy Options Paper, brownfield development could significantly reduce overall project costs and therefore the need for public financing. This is largely attributable to lower capital costs and shorter development timelines, which depend largely on the sufficiency of existing infrastructure accessible to the brownfield site (e.g. transmission capacity) and remediation costs. The "Zero by 40 Technoeconomic Assessment" found that the opportunity may be highest at former coal sites. Development of brownfield sites would be subject to the same siting evaluations that consider a range of technical, environmental, infrastructure, regulatory, and community factors.

4. Policy Landscape

This section assesses the current state policy initiatives to identify, evaluate, and support the early development of sites for hosting nuclear generation. It focuses on case studies in Nebraska and Kentucky.

4.1 State-Level Siting Policies & Programs

Across the country, some states have started to take actions specifically on identifying, evaluating, and supporting the early development of sites for hosting nuclear generation. Those in Kentucky and Nebraska are the most advanced efforts nationally at this stage and are the focus of two case studies below. These programs aim to achieve two key objectives: 1) establish collaboration-based and community-centered processes to identify and evaluate potential sites, and 2) address challenges around project development and financing that arise leading up to the Final Investment Decision (FID), when projects can unlock the sources of finance needed for construction. As noted in the Advanced Nuclear Policy Options Paper, pre-FID finance needs can amount to hundreds of millions of dollars for a gigawatt-scale project, which raises the question of whether government intervention is needed to match project sponsor investment in order to reduce risk. Most of the key pre-FID phases are described in Section 2 of this report.

4.1.1 Kentucky Approach

Kentucky has established a mechanism for pre-FID funding that relies on a collaboration-based process the state had already developed to establish community interest and readiness for early site support. On April 8, 2026, Kentucky Governor Andy Beshear signed Senate Bill 57 into law, establishing a Nuclear Reactor Site Readiness Pilot Program.[34] The Kentucky Nuclear Energy Development Authority (KNEDA) will be responsible for recommending projects to the legislature for awards of up to $25 million in grant support to offset early site and construction permits. The initiative will have $75 million in funding available and serve as the key source of state-led, pre-FID support.

The legislation also establishes a process for directing pre-FID site support that evaluates site suitability, economic impact, additional finance that project sponsors can commit, and other factors. This demonstrates an approach toward determining eligibility for limited state pre-FID resources. KNEDA will determine eligibility and evaluate each grant application, in consultation

with the Energy and Environment Cabinet's Office of Energy Policy and the Cabinet for Economic Development.

Separately, Kentucky had already established a process for community hosts to establish their interest and demonstrate readiness to receive pre-FID funding under the Nuclear Reactor Site Readiness Pilot Program. This allows for a consent-based and community-driven approach to early site development. Previous legislation from the Kentucky General Assembly led to a process established in Kentucky Revised Statute 164.2804 for any county – acting in coordination with its constituent cities – to proactively seek designation as a "Nuclear-Ready Community" and become eligible for state support through KNEDA. The designation requires communities host public educational meetings and demonstrate support through resolutions from affected municipalities or a county-wide ballot initiative.

4.1.2 Nebraska Approach

Nebraska has also initiated processes to identify community interest in hosting advanced nuclear and provide pre-FID support. Nebraska also demonstrates an approach to systematically determine preferred sites that could receive future pre-FID support.

Nebraska's approach focuses on state support for site evaluation. In 2022, the Nebraska Legislature allocated $1 million of federal funding toward preliminary analysis and feasibility studies, led by the Nebraska Public Power District (NPPD). The evaluation consisted of two phases: the first aimed to provide preliminary, state-wide screening, while the second was designed to narrow the pool of candidates to four preferred sites based on deeper feasibility analysis and community engagement. Phase 1 evaluations scored candidate communities across a weighted matrix of 20 criteria across 6 categories, including water supply, transmission, health and safety (e.g. distance to population centers, downstream water usage), site development/permitting, and environmental (e.g. wetlands, environmental justice, archaeological and cultural resource risk).[35]

After identifying 32 communities state-wide, the scoring matrix yielded the top 16 communities to be assessed in Phase 2. While Phase 1 of the study was intended to identify the top potential sites based on data, it also recommends that NPPD engage with each of those communities to assess support, receive feedback, and build deeper community relationships in Phase 2. These activities helped further evaluate community support and readiness, furthering a collaboration-based and community-driven approach to siting future advanced nuclear deployments.

The second phase of the study consisted of nine more detailed tasks that informed further evaluation of the 16 communities identified in Phase 1, including community engagement with in-person community town halls, a detailed community evaluation based on EPRI and NRC guidelines, and more detailed transmission analysis.

The evaluation criteria in Phase 2 include a wider set of exclusionary, avoidance, and suitability factors, some of which are discussed in the previous section. This includes a broad set of health and safety factors and water availability factors, as well as avoidance or suitability factors that may impact a project's overall costs and social feasibility, including engineering factors (e.g. more detailed transmission cost estimates such as network upgrade costs), workforce availability, and community input.

Weighted composite scores were generated for each of the top 16 communities, yielding a ranking that NPPD can use to identify the top communities for future nuclear project development activities. The communities themselves will play a significant role in dictating how and if they move forward in the process.

4.2 Potential New York Approach

A siting readiness program in New York could potentially play a vital role in supporting a pipeline of projects beyond the new nuclear capacity that New York Power Authority (NYPA) is pursuing through an ongoing solicitation, reinforcing New York's Nuclear Reliability Backbone and Governor Hochul's determination that nuclear should only be deployed in communities that want it. An advanced nuclear siting readiness program could also play a role in advancing other initiatives in the State to accelerate clean energy deployment, including DPS' proposed Clean Energy Zones to better coordinate planning of and investment in large-scale generation.

An advanced nuclear siting readiness program in New York State could similarly focus on the key objectives noted earlier: 1) establishing community-centered processes to identify and evaluate potential sites, and 2) providing crucial pre-FID funding support to sites with the highest potential and greater degree of community support. Kentucky and Nebraska provide examples of critical program elements, including demonstrating public support for future nuclear deployments to reinforce readiness to developers, methods of determining preferred sites, and the types of pre-FID activities that may qualify for support.

A New York State program could include site identification, site screening, and site evaluation as a critical component of determining preferred sites. The State could support communities in

identifying sites and provide access to site-screening tools and/or expertise to evaluate site screenings. Once a smaller number of potential candidate sites has been determined based on initial site screenings and other criteria, the State could support more rigorous feasibility analyses and comparison of the sites to identify the best sites for further development.

A rigorous approach to determining preferred sites through any future New York siting program would be crucial. The State may choose to conduct the evaluation following the methodologies provided in the EPRI Siting Guidelines, tailored to meet the needs of the State and its communities. For evaluated sites, the State should develop an objective approach to determining preferred sites for potential pre-FID support, such as co-funding of ESP applications or site characterization activities. New York State should prioritize only the most suitable candidate sites for co-investment.

Initial funding for a siting readiness program and pre-FID support has already been identified. The State has allocated $100 million in proceeds from the Regional Greenhouse Gas Initiative (RGGI) toward investments to support large-scale electricity generation in New York. As specified in the 2026 RGGI Operating Plan Amendment, this could include early nuclear project development activities, such as nuclear siting evaluation, ESPs, and site characterization.

4.3 Findings and Conclusion

Community-based approach is essential: Applying a community-centered approach to initial site identification, evaluation, and early site development is likely to yield the most suitable sites that incorporate community interests, lower overall project costs, and reduce project risks. Emerging processes across the nation, in addition to New York's experience with other energy project siting processes, provide real-world examples of critical program elements, including mechanisms to engage the local community, demonstrate public support, methods of determining preferred sites, and incentivizing project sponsor interest through potential state contributions to future permitting/licensing activities. Siting decisions should balance community needs with key technical, environmental, infrastructure, and regulatory factors.

Conclusion:

- **Identify communities interested in hosting nuclear deployment and support both communities and partnering developers in evaluating suitable sites (such as fossil brownfields), including through co-funding of ESPs or site characterization.**

Acronyms and Abbreviations

BCP	Brownfield Cleanup Program
BOA	Brownfield Opportunity Areas
BWR	boiling water reactor
CFR	Code of Federal Regulations
COL	combined license
CWA	Clean Water Act
DEC	New York State Department of Environmental Conservation
DOS	New York State Department of State
DPS	New York State Department of Public Service
DRBC	Delaware River Basin Commission
EAB	exclusion area boundary
ECL	Environmental Conservation Law
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
EPZ	emergency planning zone
ESP	early site permit
FEMA	Federal Emergency Management Agency
FIRM	Federal Insurance Rate Map
FSAR	Final Safety Analysis Report
GIS	geographic information system
GEIS	Generic Environmental Impact Statement
HASP	Health and Safety Program
IPP	independent power producer
ISFSI	independent spent fuel storage installation
KNEDA	Kentucky Nuclear Energy Development Authority
LIP	local intense precipitation
LLWR	large light-water reactor
LPZ	low population zone
LWA	limited work authorization

lwSMR	light water small modular reactor
Master Plan	"Master Plan for Responsible Advanced Nuclear Development in New York"
NEHRP	National Earthquake Hazards Reduction Program
NEPA	National Environmental Policy Act
NID	National Inventory of Dams
NPPD	Nebraska Public Power District
NRC	U.S. Nuclear Regulatory Commission
NYPA	New York Power Authority
NYSERDA	New York State Energy Research and Development Authority
ORNL	Oak Ridge National Laboratory
OR-SAGE	Oak Ridge Siting Analysis for Power Generation Expansion
PGA	peak ground acceleration
PMF	probable maximum flood
PPE	Plant Parameter Envelope
PSAR	Preliminary Safety Analysis Report
PWR	pressurized water reactor
RFI	Request for Information
RGGI	Regional Greenhouse Gas Initiative
ROI	Region of Interest
SAR	Safety Analysis Report
SER	Safety Evaluation Report
SMR	small modular reactor
SPDES	State Pollutant Discharge Elimination System
SSAR	Site Safety Analysis Report
SSC	structures, systems, and components
SSE	Safe Shutdown Earthquake
SSER	Site Safety Evaluation Report
SSF	State Superfund
STAND	Siting Tool for Advanced Nuclear Development
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey

Endnotes

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[30] EPRI, *Siting Guide—2022 Revision*, 4-18, table 4-3 ("Used fuel storage").

[31] EPRI, *Siting Guide—2022 Revision*; NRC, *General Site Suitability Criteria*, Regulatory Guide 4.7.

[32] EPRI, *Siting Guide—2022 Revision*; NRC, *General Site Suitability Criteria*, Regulatory Guide 4.7; NRC, *Preparation of Environmental Reports*, Regulatory Guide 4.2

[33] New York State Energy Research and Development Authority and New York State Department of Public Service, *Advanced Nuclear Policy Options Paper* (June 12, 2026), https://www.nyserda.ny.gov/-/media/Project/Nyserda/Files/Programs/Advanced-Nuclear/2026-NY-Advanced-Nuclear-Policy-Options-Paper.pdf.

[34] Kentucky General Assembly, 2026 Ky. Acts ch. 56 (S.B. 57), https://apps.legislature.ky.gov/law/acts/26RS/documents/0056.pdf.

[35] 1898 & Co., *SMR Siting Technical Screening Study: Phase 1*, prepared for Nebraska Public Power District (2024), https://nextgennuclearne.com/wp-content/uploads/FINAL-NPPD-SMR-Siting-Technical-Screening-Study-Phase-1-08.05.2024.pdf.



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