

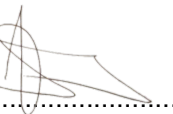

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CHAPTER 2: LEGAL AND REGULATORY BASIS			
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AMENDMENT RECORD			
Rev	Draft	Date	Description
0		04 June 2015	New chapter, replacing KSSR Rev 0
1		27 September 2021	Chapter updated to reflect the latest information on the legal and regulatory basis (changes to regulations and regulatory requirements), address NNR comments on DSSR Rev 0 and to align with the latest template on structure and layout of Site Safety Reports.
1a		13 March 2024	Chapter updated to reflect the latest standards.

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EXECUTIVE SUMMARY

This chapter of the Duynefontyn Site Safety Report (DSSR) presents the legal and regulatory basis for the evaluation of the site in support of Koeberg Nuclear Power Station' continued operation and licensability and the development of a new nuclear installation(s) on the Duynefontyn site.


The main statutes regulating nuclear matters in South Africa are the Nuclear Energy Act, 1999 (Act No. 46 of 1999) (Republic of South Africa, 1999a), the National Nuclear Regulator Act, 1999 (Act No. 47 of 1999) (NNRA) (Republic of South Africa, 1999b) and the Radioactive Waste Disposal Institute Act, 2008 (Act No. 53 of 2008) (Republic of South Africa, 2008a). The NNRA (Republic of South Africa, 1999b) is the central legislation governing the siting, construction, operation, decontamination and decommissioning of nuclear installations.

Other relevant Acts taken into consideration include:

- National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998) (Republic of South Africa, 1998a). NEMA is also supported by other acts, viz.:
 - National Environmental Management: Protected Areas Act, 2003 (Act No 57 of 2003) (Republic of South Africa, 2003)
 - National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (Republic of South Africa, 2004a);
 - National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (Republic of South Africa, 2004b);
 - National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008) (Republic of South Africa, 2008b)
 - National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (Republic of South Africa, 2008c)
- National Water Act, 1998 (Act No. 36 of 1998) (Republic of South Africa, 1998b);
- National Key Points Act, 1980 (Act No. 102 of 1980) (Republic of South Africa, 1980b);
- National Heritage Resources Act, 1999 (Act No. 25 of 1999) (Republic of South Africa, 1999c);
- Hazardous Substances Act, 1973 (Act No. 15 of 1973) (Republic of South Africa, 1973);

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- Municipal Systems Act, 2000 (Act No. 32 of 2000) (Republic of South Africa, 2000);
- Occupational Health and Safety Act, 1993 (Act No 85 of 1993) (Republic of South Africa, 1993).

These and other relevant Acts that apply and are considered in the development of this Site Safety Report (SSR) are presented and discussed in detail in the relevant chapters and sections of this SSR.

Of particular importance for site approval are the Regulations on Licensing of Sites for New Nuclear Installations, Regulation R.927 (Department of Energy, 2011) as they establish requirements for applications for nuclear installation site licences (NISLs) for new nuclear installations.

In accordance with Regulation R.927 any person wishing to site a nuclear installation in terms of section 21(1) of the NNRA must lodge an application for a NISL with the Chief Executive Officer of the NNR and such an application must be supported by a Site Safety Report.

A NISL, when granted, is effectively a statement that the relevant siting factors (including external hazards) have been appropriately characterised, and the site parameter envelope quantified considering the impact and risk to the public and environment from all nuclear facilities planned for the site and in the vicinity of the site. The site would therefore be acceptable for future siting, construction and operation of nuclear facilities conforming to the range of technologies specified in the application and other conditions specified in the licence.

In order to comply with the requirements of the NNRA (Republic of South Africa, 1999b) and the Regulation of Licensing of Sites (Department of Energy, 2011) this SSR has been developed for submission to the NNR in support of the authorisation of the site as suitable for the generation of nuclear power, hence in support of a NISL application for new nuclear installation(s).

This SSR also forms part of the safety case for long term operation for Koeberg, in accordance with the Regulation R.266, Regulations on the Long Term Operation of Nuclear Installations (Department of Mineral Resources and Energy, 2021).

In addition to local regulatory requirements, account is taken of relevant international safety standards and recommendations, as well as lessons learned and best practice from countries with experience in site evaluations and development of new nuclear installations. These are also applied when there are no specific national requirements.

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2 LEGAL AND REGULATORY BASIS

This chapter presents an overview of the legal and regulatory basis for evaluation of the site from a nuclear safety perspective for the existing Koeberg Nuclear Power Station (Koeberg) and development of a new nuclear installation(s) on the Duynefontyn site (the site).

2.1 Purpose

The purpose of this chapter is to present the legal and regulatory requirements and criteria that have been complied with to characterise the site in support of Koeberg's continued operation and the suitability of the site for location of a new nuclear installation(s).

2.2 Regulatory Framework

The legislative requirements for nuclear facilities in South Africa are extensive. The main requirements related to nuclear siting activities are summarised below.

The list of other relevant legislation (Acts and regulations), the specific requirements and criteria for site characterisation together with the approaches applied for demonstration of compliance and good practice are presented in each relevant chapters and sections of this SSR.


2.2.1 Acts

2.2.1.1 Nuclear Acts

The main statutes regulating nuclear matters in South Africa are the Nuclear Energy Act, 1999 (Act No. 46 of 1999) (Republic of South Africa, 1999a), the National Nuclear Regulator Act (NNRA), 1999 (Act No. 47 of 1999) (Republic of South Africa, 1999b) and the National Radioactive Waste Disposal Institute Act, 2008 (Act No. 53 of 2008) (Republic of South Africa, 2008a).

The Nuclear Energy Act provide for the establishment of the South African Nuclear Energy Corporation Limited (Necsa), a public company wholly owned by the State and provides for the implementation and application of South Africa's safeguards agreement and any additional protocols entered into by the Republic and the International Atomic Energy Agency (IAEA) in support of the Nuclear Non-Proliferation Treaty acceded to by the Republic. It regulates the acquisition and possession of nuclear fuel, nuclear and related material and related equipment, as well as the import and export of that fuel, material and equipment; prescribe measures regarding the discarding of radioactive waste and

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the storage of irradiated nuclear fuel and provide for incidental matters. This Act is of relevance to the operation of a nuclear installation but of no relevance to site evaluation.

The NNRA (Republic of South Africa, 1999b) is the central legislation governing the siting, construction, operation, decontamination and decommissioning of nuclear installations.

The NNRA establishes the NNR to regulate nuclear activities. The main objective of the NNR is to provide for the protection of persons, property and the environment against nuclear damage through the establishment of safety standards and regulatory practices and to exercise regulatory control related to safety of the siting of a nuclear installation(s).

The NNRA, [Sections 2(1), 5(b), 20(1), 21(1), 23(2) and 47(1)], is applicable to the siting of new nuclear installations and it states, *inter alia*, the following:

"2(1) Subject to subsection (2), this Act applies to, (a) the siting, design, construction, operation, decontamination, decommissioning and closure of any nuclear installation.

5(b) grants the NNR the power to, amongst others, exercise regulatory control related to safety over siting, design, construction, operation, manufacture of component parts, decontamination, decommissioning and closure of nuclear installations, through the issuing of nuclear authorisations.


20(1) No person may site, construct, operate, decontaminate or decommission a nuclear installation, except under the authority of a nuclear installation licence.

21(1) Any person wishing to site, construct, operate, decontaminate or decommission a nuclear installation may apply in the prescribed format to the chief executive officer for a nuclear installation licence and must furnish such information as the board requires.

23(2) The Chief Executive Officer may, subject to subsection (3), impose any condition in a nuclear installation or vessel licence or certificate of registration which (a) is necessary for the protection of persons, property and the environment against nuclear damage; or (b) provides for the rehabilitation of the site.

47(1) The Minister may, after consultation with the board and by notice in the Gazette, make regulations as to any matter: (a) required or permitted to be prescribed in terms of this Act; (b) necessary for the effective administration of this Act."

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Therefore, in accordance with the NNRA, the siting, design, construction, operation, decontamination and decommissioning of a nuclear installation must be done under the regulatory control of the NNR. Taking full cognisance of its mandate, and depending on the application, the following types of authorisations for nuclear installations could be issued by the NNR:

- (a) Nuclear Installation Licence (NIL) to site, construct and/or operate and decommission or decontaminate the installation, or
- (b) Nuclear Installation Site Licence (NISL) for new nuclear installations.

Applications for a NISL and a NIL initiate separate but similar licensing processes.

In terms of a NIL, the applicant has two options to pursue, viz:

- (i) A multi-stage approach to licensing for the various stages or combinations of stages of the nuclear authorisation may be adopted. Each stage requires a safety assessment to address the aspects that have an impact on the safety of the proposed installation. In accordance with NNR Position Paper PP-0009 (National Nuclear Regulator, 2012a) the various stages of site development are as presented in Table 2-1 below.

Table 2-1: Nuclear Sites Developmental Stages

Stage	Activity	Nuclear Authorisation
1(a)	Site establishment	Permit
1(b)	Early site activities	NISL / NIL to site
1(c)	Early construction activities	NIL to site via Licence Change Request (LCR)
2(a)	Design (Optional)	Authorisation to Design/Design Certification
2(b)	Manufacturing (Long Lead Time Items)	Authorisation to Manufacture
3(a)	Construction	NIL to Construct a Nuclear Installation (LCR)
3(b)	Fuel to/on site	NIL via LCR

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Stage	Activity	Nuclear Authorisation
3(c)	Fuel loading and commissioning	NIL via LCR
4	Plant operation	NIL via LCR
5	Decontamination and Decommissioning	NIL via LCR

(ii) Authorisation for a combined licence covering siting, construction and operation may be obtained. For this the safety assessment submitted in support of the application must cover the full scope of design, siting, construction, manufacturing, operation and decommissioning stages. The NNR assessment and inspection processes cover the same.

A NISL on the other hand may be issued as part of the process of regulatory control over siting of nuclear installations pursuant to Section 5 of the NNRA and in accordance with Regulation R.927 on Licensing of sites for new nuclear installations (Department of Energy, 2011).

The National Radioactive Waste Disposal Institute Act (NRWDIA), 2008 (Act No. 53 of 2008) (Republic of South Africa, 2008a) provides for the establishment of the National Radioactive Waste Disposal Institute (NRWDI) in order to manage radioactive waste disposal.

Chapter 3 of the NRWDIA regulates the application process for the disposal of radioactive waste. Section 23 therein requires any person wishing to dispose of radioactive waste to apply to the CEO of the Institute in the prescribed format and furnish such information as the Institute's board may require.

Section 24 relates to the generators of radioactive waste and stipulates that such parties are responsible for the technical, financial and administrative management of such waste at their premises and when such waste is transported to an authorised waste disposal facility.

Furthermore, in terms of Section 25(3) the "generators of radioactive waste remain responsible for all liabilities in connection with such radioactive waste under their control until such time as the radioactive waste had been received and accepted in writing by the Institute, following an inspection, at which time liability shall pass to the Institute.

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2.2.2 Policy and Planning Context

Nuclear Energy Policy for the Republic of South Africa

The Nuclear Energy Policy for the Republic of South Africa (Department of Minerals and Energy, 2008b) represents South Africa's vision for the coordinated development of the nuclear energy sector. The vision is premised on article IV of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) which affirms South Africa's inalienable right to research, develop, produce and use nuclear energy for peaceful purposes.

In terms of siting, Section 15.8 states that Government, through Eskom shall identify, acquire and licence under the NNR Act potential nuclear sites to ensure a strategic reserve of nuclear sites.

Radioactive Waste Management Policy and Strategy

The Radioactive Waste Management Policy and Strategy for the Republic of South Africa (Department of Minerals and Energy, 2005) establishes a national radioactive waste policy framework setting out the principles for management. It further provides for the necessary management structures for radioactive waste management. The policy is underpinned by the "polluter pays principle" which states that the financial burden for the management of radioactive waste shall be borne by the generator of that waste.


2.2.3 Environmental and supporting Acts

Other key relevant Acts that govern nuclear activities in South Africa include:

1. National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) (Republic of South Africa, 1998a).

NEMA is the primary South African legislation governing environmental management. The Act provides for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment and provide for institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state. It also provides for administration and enforcement of other environmental laws and, in a sense, acts as an umbrella statute for environmental aspects.

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Of significant importance are the principles contained in Section 2 of NEMA. These principles act as guidelines for not only decision makers but also serve as a general framework within which environmental management and implementation plans must be formulated. These include:

- environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interest equitably;
- development must be socially, environmentally and economically sustainable;
- sustainable development requires the consideration of all relevant factors including:
 - that the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
 - that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
 - that the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or, where it cannot be altogether avoided, is minimised and remedied;
 - that waste is avoided, or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner;
 - that the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;
 - that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised;
 - that a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the

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consequence of decisions and actions; and

- that negative impacts on the environment and on people's environmental rights be anticipated and prevent, and where they cannot be altogether prevented, are minimised and remedied;
- environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option;
- environmental justice must be pursued so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons;
- responsibility for the environmental health and safety consequences of a project or activity exists throughout its life cycle;
- the participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured;
- the social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment;
- decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the law;
- there must be intergovernmental co-ordination and harmonisation of policies, legislation and actions relating to the environment;
- global and international responsibilities relating to the environment must be discharged in the national interest;
- the environment is held in public trust for the people, the beneficial

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use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage;

- the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment; and
- sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.


Further aspects of NEMA are found in Section 28, the Duty of Care provisions (and the effect of these), and section 24, which provides for the identification of certain activities, which require environmental authorisation, such as the construction of a nuclear reactor.

Section 28 provides that, "Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment".

NEMA and the NNRA both provide for the protection of people and the environment, therefore a shared responsibility between the NNR and Environmental Authorities with respect to issues of radiological impacts on people and the environment exists. A co-operative agreement was signed and legislated between the NNR and DEA (Department of Minerals and Energy, 2008a) to manage their respective responsibilities and avoid duplication of regulatory oversight.

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NEMA is also supported by other acts, viz.:

- National Environmental Management: Protected Areas Act, 2003 (Act No 57 of 2003) (Republic of South Africa, 2003).

Provides for the protection and conservation of ecologically viable areas representative of South Africa's biodiversity and its natural landscapes and seascapes in order to:

- Protect areas with significant natural features or biodiversity;
 - Protect areas in need of long-term protection for the provision of environmental goods and services; and
 - Provide for sustainable flow of natural products and services to meet the needs of local community; involvement of private landowners.
- National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (Republic of South Africa, 2004a).

It creates a framework to *"reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development"*.

- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (Republic of South Africa, 2004b).

It provides the framework for biodiversity management and planning. It provides for the listing of threatened (critically endangered, endangered or vulnerable) and protected ecosystems (of high conservation value or of high national or provincial importance although not listed as threatened) and for activities or processes within those ecosystems to be listed as "threatening processes", thus triggering the need to comply with NEMA EIA regulations.

- National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008) (Republic of South Africa, 2008b).

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This Act is dedicated to managing the coastline in an integrated fashion and ensuring the sustainable use of the coast's natural resources. The Act was assented to on 11 February 2009, and certain sections of the Act became effective on 1 December 2009. The Act is implemented in a phased approach. The Act will eventually repeal both the Sea-shore Act, 1935 (Act No. 21 of 1935) (Republic of South Africa, 1935) and the Dumping at Sea Control Act (Republic of South Africa, 1980a), once the repeals section becomes effective.

The Act expressly refers to the anticipated rise in sea-level by establishing a coastal buffer zone inland of the high-water mark, within which activities will be controlled and certain activities will be prohibited. A further measure to respond to sea-level rise, is the establishment of so-called coastal set-back lines. These measures provide government with the power to prevent development that is too close to the sea-shore and will therefore mitigate the effects of possible sea-level rise.

In terms of Section 69 of the Act which states that "no person may discharge effluent that originates from a source on land into coastal waters except in terms of a general authorisation ... or a coastal waters discharge permit (CWDP)", Eskom applied for a CWDP for the discharge emanating from Koeberg. The discharge activity is associated with the operation of Koeberg which utilises large volumes of seawater for cooling purposes. In addition to the cooling water discharge, industrial and domestic effluent is produced and is discharged along with cooling water via the Koeberg cooling water outlet basin.

- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (Republic of South Africa, 2008c).

The purpose of this Act is to reform the law regulating waste management in South Africa by providing measures aimed at the prevention of pollution and ecological degradation and for securing ecologically sustainable development. This Act does not apply to Radioactive waste that is regulated by the Hazardous Substance Act, 1973 (Act No. 15 of 1973) (Republic of South Africa, 1973), the National Nuclear Regulator Act, 1999 (Act No. 47 of 1999) (Republic of South Africa, 1999b), and the Nuclear Energy Act, 1999 (Act No. 46 of 1999) (Republic of South Africa, 1999a).

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2. National Water Act, 1998 (Act No. 36 of 1998) (NWA) (Republic of South Africa, 1998b).

The NWA, *inter alia*, provides for the use and management of water, as well as the protection of water. The NWA provides that certain uses of water require a water use licence. These water uses not only affect the construction and operation of the nuclear installation but also the suitability of the site for a nuclear installation.

3. National Key Points Act, 1980 (Act No. 102 of 1980) NKPA (Republic of South Africa, 1980b).

In terms of the NKPA, a “National Key Point” is any place or area which has been so declared under section 2 of this Act, if it appears at any time that any place or area is so important that its loss, damage, disruption or immobilisation may prejudice the Republic, or whenever the Minister considers it necessary or expedient for the safety of the Republic or in the public interest he may declare that place or area a National Key Point.

The NKPA places certain duties on the owner of such a Key Point, and requires the owner to take steps at his/her own expense to the satisfaction of the Minister in respect of the security of the said Key Point.

4. National Heritage Resources Act, 1999 (Act No. 25 of 1999) (Republic of South Africa, 1999c).

This Act aims to introduce an integrated and interactive system for the management of the national heritage resources and promote good governance at all levels. In so doing, it endeavours to empower civil society to nurture and conserve their heritage resources so that they may be bequeathed to future generations.

The South African Heritage Resources Agency is also established under the Act together with its Council to co-ordinate and promote the management of heritage resources at national level. Within this framework, the provincial heritage authorities are created which must adopt powers to protect and manage certain categories of heritage resources, and local authorities are given responsibility to protect and manage conservation-worthy places and areas. The Act also aims to control the export of nationally significant heritage objects and the import into South Africa of cultural property illegally exported from foreign countries.

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5. Hazardous Substances Act, 1973 (Act No. 15 of 1973) (Republic of South Africa, 1973).

This Act provides measures for the control of substances and certain electronic products which may be toxic, corrosive, irritant, strongly sensitising or flammable in nature which may cause injury or ill-health to or death of humans. This Act divides the substances or products into groups in relation to the degree of danger and makes provision for the prohibition and control of the importation, manufacture, sale, use, operation, application, modification, disposal or dumping of such substances and products.

6. Municipal Systems Act, 2000 (Act No. 32 of 2000) (Republic of South Africa, 2000).

This Act specifies that municipalities must draw up an Integrated Development Plan (IDP) as a single, inclusive and strategic development plan that must be aligned with other municipalities and other spheres of government.

Section 26 of the Act specifies that certain requirements must be adhered to, including that an IDP must reflect:


- the vision for the long term development of the municipality with special emphasis on the municipality's most critical development and internal transformation needs;
- the council's development strategies which must be aligned with any national or provincial sectoral plans and planning requirements binding on the municipality in terms of legislation; and
- applicable disaster management plans.

7. Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) (Republic of South Africa, 1993).

The OHS Act provides for the health and safety of persons at work as well as the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work.

There is a veritable myriad of regulations promulgated under the OHS Act, in particular, in regard to safe working conditions. They include the General Administrative Regulations; General Safety

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Regulations; Construction Regulations and the Environmental Regulations for Workplaces.

The importance of the OHS Act further relates to the Major Hazard Installations Regulations (Department of Labour, 2001) which have been promulgated under the OHS Act. In this regard, a major hazardous installation is defined as “an installation – (a) where more than the prescribed quantity of any substance is or may be kept, whether permanently or temporarily; or (b) where any substance is produced, processed, used, handled or stored in such a form and quantity that it has the potential to cause a major incident which is an “occurrence of catastrophic proportions.”

Other relevant Acts that apply and are considered in the development of this SSR are presented and discussed in each relevant chapter/section of this SSR.


2.2.4 Regulations

Siting of new nuclear installations in South Africa must comply with applicable national nuclear regulations and the requirements and criteria for the protection of persons, property and the environment against nuclear damage. Below is a list of regulations applicable to the siting of nuclear installations:

- Regulation R.388: Safety Standards and Regulatory Practices (Department of Minerals and Energy, 2006);
- Regulation R.927: The Regulations on Licensing of Sites for New Nuclear Installations (Department of Energy, 2011);
- Regulation GN1219: Regulations on the Format for the Application for a Nuclear Installation Licence or a Certificate of Registration or a Certificate of Exemption (Department of Minerals and Energy, 2007); and
- Regulations R.266, Regulations on the Long Term Operation of Nuclear Installations (Department of Mineral Resources and Energy, 2021).

Of particular importance for site approval are the Regulations on Licensing of Sites for New Nuclear Installations, Regulation R.927 (Department of Energy, 2011) as they establish requirements for applications for nuclear installation site licences.

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In accordance with Regulation R.927 any person wishing to site a nuclear installation in terms of section 21(1) of the NNRA must lodge an application for a NISL with the Chief Executive Officer of the NNR and that such an application must be supported by a Site Safety Report addressing the following key aspects:

- The proposed nuclear installation design(s), and the characteristics specific to the site must be presented. New nuclear installations must reflect through their design, construction and operation an acceptably low probability of postulated events that could result in release of quantities of radioactive material.
- The site location and the enveloping characteristics of all nuclear installations proposed to be built on the site, included as safety measures against the hazardous consequences of postulated events, must ensure an acceptably low risk of public exposure.
- The site must be such that radiological doses and risks from normal operation and postulated events associated with all nuclear installations in the vicinity will be acceptably low.
- Natural phenomena and potential man-made hazards must be appropriately accounted for.
- Adequate emergency plans and nuclear security measures must be developed.
- The cumulative radiological impact of all nuclear installations and actions in the vicinity must be considered.

A NISL, when granted, is effectively a statement that the relevant siting factors (including external hazards) have been appropriately characterised and the site parameter envelope quantified, considering the impact and risk to the public and environment from all nuclear facilities planned for the site and in the vicinity of the site. The site would therefore be acceptable for future siting, construction and operation of nuclear facilities conforming to the range of technologies specified in the application and other conditions specified in the licence.

In order to comply with the requirements of the NNRA (Republic of South Africa, 1999b) and the Regulation of Licensing of Sites (Department of Energy, 2011) this SSR has been developed for submission to the NNR in support of the authorisation of the site as suitable for the generation of nuclear power, hence in support of a NISL application for new nuclear installation(s).

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It also forms part of the safety case that will be submitted to the NNR in support of life extension application for Koeberg in accordance with the Regulation R.266, Regulations on the Long Term Operation of Nuclear Installations (Department of Mineral Resources and Energy, 2021).


2.2.5 Regulatory Requirements and Guidance

In addition to national nuclear Acts and regulations applicable to siting, relevant NNR requirements and guidance have been applied in the development of this SSR, viz:

- RD-014, Emergency Preparedness and Response Requirements for Nuclear Installations (National Nuclear Regulator, 2005);
- RD-0022, Radiation Dose Limitation at Koeberg Nuclear Power Station (National Nuclear Regulator, 2008a);
- RD-0024, Requirements on Risk Assessment and Compliance with Principal Safety Criteria for Nuclear Installations (National Nuclear Regulator, 2008b);
- RD-0034, Quality and Safety Management Requirements for Nuclear Installations (National Nuclear Regulator, 2008c);
- RG-0011, Interim Guidance on the Siting of Nuclear Facilities (National Nuclear Regulator, 2016a);
- RG-0016, Guidance on the Verification and Validation of Evaluation and Calculation Models used in Safety and Design Analyses (National Nuclear Regulator, 2016b);
- RG-0019, Guidance on the Safety Assessments of Nuclear Facilities (National Nuclear Regulator, 2018);
- RG-0027, Interim Regulatory Guide on Ageing Management and Long Term Operations of Nuclear Power Plants (National Nuclear Regulator, 2019a);
- RG-0028, Interim Regulatory Guide: Periodic Safety Review of Nuclear Power Plants (National Nuclear Regulator, 2019b)
- PP-0009, Authorisations for Nuclear Installations (National Nuclear Regulator, 2012a)
- PP-0014, Consideration of External Events for Nuclear Installations

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(National Nuclear Regulator , 2014);

- PP-0015, Emergency Plan Technical Basis for New Nuclear Installations (National Nuclear Regulator, 2012b).

2.3 Consideration of International Standards, Experience and Best Practice

The site evaluation and development of this SSR have also taken into account the relevant international safety standards and recommendations, as well as the lessons learned and best practice from countries with experience in the field of site evaluation and development of new nuclear installations. Specific references are made in the relevant chapters and sections of this SSR, of which the main sources of information can be summarised as follows (see also **Appendix A** for details):

- IAEA e.g. Safety Fundamentals No. SF-1 (International Atomic Energy Agency, 2006), Safety Requirements No. SSR-1 (International Atomic Energy Agency, 2019), Specific Safety Guides No. SSG-79 (International Atomic Energy Agency, 2023), No. SSG-9 (International Atomic Energy Agency, 2022), No. SSG-68 (International Atomic Energy Agency, 2021c), No. SSG-67 (International Atomic Energy Agency, 2021b), No. SSG-61 (International Atomic Energy Agency, 2021a), No. SSG-21 (International Atomic Energy Agency, 2012), No. SSG-18 (International Atomic Energy Agency, 2011), and Safety Guides No. No. NS-G-3.6 (International Atomic Energy Agency, 2004), No. NS-G-3.2 (International Atomic Energy Agency, 2002).
- United States Nuclear Regulatory Commission, e.g. Regulatory Guide 1.102 (United States Nuclear Regulatory Commission, 1976); 10 CFR Part 100 (United States Nuclear Regulatory Commission, 1997); NUREG-0800 (United States Nuclear Regulatory Commission , 2007); 10 CFR Part 52 (United States Nuclear Regulatory Commission, 2009); Regulatory Guide 1.132 (United States Nuclear Regulatory Commission, 2003); Regulatory Guide 4.7 (United States Nuclear Regulatory Commission, 2014); NUREG-2213 (United States Nuclear Regulatory Commission, 2018).
- Electric Power Research Institute Siting Guide (Electric Power Research Institute, 2015);
- International Standards Organisation (e.g. ISO 9001, (International Organisation for Standardisation , 2015);

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- International Commission on Radiological Protection e.g. Publication 60 (International Commission on Radiological Protection, 1990), Publication 63 (International Commission on Radiological Protection, 1991); Publication 103 (International Commission on Radiological Protection, 2007) and Publication 108 (International Commission on Radiological Protection, 2008);
- American Nuclear Standards Institute (American National Standards Institute/American Nuclear Society, 2007);
- American Society of Mechanical Engineers [e.g. (American Society of Mechanical Engineers, 2008)];
- European Utility Requirements for Light Water Reactor Nuclear Power Plants (European Utility Requirements Organisation, 2001).

Generally, international standards and recommendations were applied when there were no specific national requirements, or this practice contributed to demonstration of compliance with specific regulatory requirements or criteria and/or the demonstration of good practice.

2.4 Demonstration of Compliance with Regulatory Requirements

This section describes conformance to the applicable nuclear regulatory requirements. This SSR demonstrates:

- compliance with the NNR safety criteria on dose and risk related to safety of the public and the environment (**Chapter 7** – Potential Radiological Impact on the Public and the Environment; **Chapter 8** – Emergency Planning);
- an adequate characterisation of the site and understanding of any associated uncertainties (**Chapter 5** – Site Characteristics; **Chapter 6** – Evaluation of External Events; **Chapter 7** – PRIPE; **Chapter 8** – Emergency Planning and **Chapter 9** – Physical Protection and Security);
- that site related external hazards (natural and human induced) are well defined and understood so that they can be appropriately accounted for in the nuclear installation design and the site characteristics are such that adequate security measures to protect the nuclear installation can be developed (**Chapter 5** - Site Characteristics, **Chapter 6** – Evaluation of External Events and **Chapter 9** – Physical Protection and Security);

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- the feasibility of developing and implementing emergency measures (**Chapter 8** – Emergency Planning);
- the feasibility of developing and implementing adequate nuclear security measures (**Chapter 9** – Physical Protection and Security).

Further demonstration of compliance with regulatory requirements is provided in **Appendix B**.

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35. *National Nuclear Regulator, 2012b.* PP-0015: Position Paper on Emergency Planning Technical Basis for New Nuclear Installations. Rev. 0. *Centurion: National Nuclear Regulator.*
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Appendix A: Main International Standards and Recommendations Used in this SSR

IAEA Safety Fundamentals

Safety Fundamental Principles No. SF -1, IAEA, Vienna (2006).

IAEA Safety Requirements

Site Evaluation for Nuclear Installations. No. SSR-1. (2019).

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Seismic Hazards in Site Evaluation for Nuclear Installations, Specific Safety Guide No. SSG-9 Rev. 1 (2022).

Design of Nuclear Installations Against External Events Excluding Earthquakes, Specific Safety Guide No. SSG-68 (2021).

Seismic Design for Nuclear Installations, Specific Safety Guide No SSG-67 (2021).

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Design of the Reactor Coolant System and Associated Systems in Nuclear Power Plants, No. SSG-56 (2020).

Site Survey and Site Selection for Nuclear Installations, Safety Guide No. SSG-35 (2015).

Volcanic Hazard in Site Evaluation for Nuclear Installations, No. SSG-21 (2012).

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Technical Approach to Probabilistic Safety Assessment of Multiple Reactor Units. Safety Report Series No. 96 (2019).

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Country Specific Regulations and Recommendations

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Appendix B: Regulatory Compliance Matrix

Act/Regulation	Section/Regulation	Requirements/Issue	Chapter/Section
National Nuclear Regulator Act, 1999 (Republic of South Africa, 1999b)	Section 2(1)(a)	Site authorisation to construct and operate nuclear installations	The whole SSR
	Section 5(b)	Power granted to the NNR to exercise regulatory control related to safety over siting ,... through the issuing of nuclear authorisations.	The whole SSR
	Section 20(1)	Siting, construction, operation, etc. can only take place under a nuclear installation authorisation.	The whole SSR
	Section 21(1)	In order to site an application for a nuclear installation licence must be made in the prescribed format and information such as the board requires must be furnished.	The whole SSR
	Section 23(2)	Conditions to be imposed by the CEO of the NNR which is necessary for the protection of persons, property and the environment against nuclear damage or for the rehabilitation of the site.	5.2 Monitoring Monitoring Programmes for the site

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Act/Regulation	Section/Regulation	Requirements/Issue	Chapter/Section
Regulations on the Licensing of Sites for New Nuclear Installations (Department of Energy, 2011)	Regulation 4(1)	Factors relating to all nuclear installations in the vicinity.	3.0 Overview of Planned Activities 4.0 Site Investigation Approach 5.0 Site Characteristics
	Regulation 4(2)	The proposed NI and characteristics must reflect an acceptably low probability of postulated events.	1.0 Introduction 5.0 Site Characteristics 6.0 Evaluation of External Events
	Regulation 4(3)	Site location and engineered safety features must ensure an acceptably low risk of public exposure.	4.0 Site Investigation Approach 5.0 Site Characteristics 6.0 Evaluation of External Events 7.0 Potential Impact on the Public and the Environment 8.0 Emergency Planning 9.0 Physical Protection and Security

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Act/Regulation	Section/Regulation	Requirements/Issue	Chapter/Section
	Regulation 4(4)	Radiological doses and risk from normal operation and postulated events will be acceptably low	6.0 Evaluation of External Events 7.0 Potential Impact on the Public and the Environment 8.0 Emergency Planning
	Regulation 4(5)	Natural phenomena and potential man-made hazards must be accounted for in the design and that adequate emergency plans and nuclear security measures can be developed	5.0 Site Characteristics 6.0 Evaluation of External Events 8.0 Emergency Planning 9.0 Physical Protection and Security
	Regulation 4(6)	Cumulative radiological impact of all installations and actions	7.0 Potential Impact on the Public and the Environment
	Regulation 5(1)	Motivation for the choice of site to ensure a low risk of public exposure from the operation of the nuclear installation(s).	4.0 Site Investigation Approach 5.0 Site Characteristics
	Regulation 5(2)	Proposed use of site in terms of technologies and	1.0 Introduction [including Source Term and

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		plant designs	Plant Parameter Envelope (PPE] 3.0 Overview of Planned Activities
	Regulation 5(3)	Characteristics of the site relevant to design assessment, risk and dose	5.0 Site Characteristics 6.0 Evaluation of External Events 7.0 Potential Impact on the Public and the Environment 8.0 Emergency Planning 9.0 Physical Protection and Security
	Regulation 5(4)	Source term analysis	1.0 Introduction (including Source Term and PPE) 7.0 Potential Impact on the Public and the Environment
	Regulation 5(5)	Probabilistic Risk Assessment to demonstrate compliance with probabilistic risk limits.	1.0 Introduction (including Source Term and PPE) 5.0 Site Characteristics

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			6.0 Evaluation of External Events 7.0 Potential Impact on the Public and the Environment 8.0 Emergency Planning
	Regulation 5(6)	Analysis of the impact on the public to demonstrate compliance with dose limits.	1.0 Introduction (including Source term and PPE) 3.0 Overview of Planned Activities 7.0 Potential Impact on the Public and the Environment
	Regulation 5(7)	Identification and determination of emergency planning zones.	1.0 Introduction (Source term and PPE) 5.0 Site Characteristics 6.0 Evaluation of External Events 7.0 Potential Impact on the Public and the Environment 8.0 Emergency Planning

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	Regulation 5(8)	An analysis to demonstrate the viability of an emergency plan taking into account site characteristics and disaster management infrastructure. It must be shown that risks to the public, as well as financial consequences are as low as reasonably achievable.	5.0 Site Characteristics 8.0 Emergency Planning
	Regulation 5(9)	Assessment of site from a nuclear security perspective.	1.0 Introduction 5.7 Nearby Transportation, Industrial and Military Facilities 9.0 Physical Protection and Security
RG-0011 (National Nuclear Regulator, 2016a)	Section 6.1(1)	(a) Effects of external events occurring in the region of the particular site (natural or human induced) should be considered.	5.7 Nearby Transportation, Industrial and Military Facilities 5.8 Meteorology 5.9 Oceanography and Coastal Engineering 5.10 Hydrology and Hydraulics 5.13 Geology 5.14 Seismic Hazard

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			5.15 Geotechnical Characterisation 6.0 Evaluation of External Events
		(b) Characteristics of the site and its environment which could influence the transfer of released radioactive material to persons.	5.3 Ecology 5.4 Demography 5.5 Land and Water Use 5.6 Adjacent Sea Use 5.8 Meteorology 5.10 Hydrology and Hydraulics 5.11 Geohydrology 5.12 Fresh Water Supply 7.0 Potential Impact on the Public and the Environment
		(c) Population density and distribution, as well as other characteristics in relation to the possibility of implementing emergency measures and the need to evaluate the risk	5.4 Demography 5.5 Land and Water Use

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		to individuals and the population.	5.6 Adjacent Sea Use 5.7 Nearby Transportation 5.8 Meteorology 5.11 Geohydrology 5.12 Fresh Water Supply 7.0 Potential Impact on the Public and the Environment 8.0 Emergency Planning
	Section 6.1(4)	Site characteristics that may affect the safety of the nuclear facility should be investigated and addressed. Characteristics of the natural environment in the region that may be affected by potential radiological impacts in operational states and accident conditions should be investigated.	5.0 Site Characteristics 6.0 Evaluation of External Events 7.0 Potential Impact on the Public and the Environment 8.0 Emergency Planning
	Section 6.1(5)	Quality management programme to control effectiveness ...covering all activities that may influence safety or the derivation of parameters	10.0 Management System

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		for the design basis.	
	Section 7	Assessment of hazards associated with external natural and human-induced events.	5.0 Site Characteristics 6.0 Evaluation of External Events
	Section 7.2.1	Seismic and geological considerations	5.9 Oceanography and Coastal Engineering 5.13 Geology 5.14 Seismic Hazard 5.15 Geotechnical Characterisation 6.0 Evaluation of External Events
	Section 7.2.2	Meteorological events	5.8 Meteorology 6.0 Evaluation of External Events
	Section 7.2.3	Flooding	5.8 Meteorology 5.9 Oceanography and Coastal Engineering

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			5.10 Hydrology and Hydraulics 6.0 Evaluation of External Events
	Section 7.2.4	Geotechnical hazards	5.15 Geotechnical Characterisation 5.13 Geology 5.14 Seismic Hazard 6.0 Evaluation of External Events
	Section 7.3	External human-induced events	5.7 Nearby Transportation 6.0 Evaluation of External Events
	Section 8	Potential radiological impacts of the nuclear facility	5.3 Ecology 5.4 Demography 5.5 Land and Water Use 5.6 Adjacent Sea Use 5.8 Meteorology

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			5.9 Oceanography and Coastal Engineering 5.11 Geohydrology 7.0 Potential Impact on the Public and the Environment
	Section 9	Assessment of regional conditions for zoning and emergency planning	1.0 Introduction (Source Term and PPE) 5.4 Demography 5.5 Land and Water Use 5.6 Adjacent Sea Use 5.7 Nearby Transportation 8.0 Emergency Planning
	Section 10	Physical security arrangements	1.0 Introduction 3.0 Overview of Planned Activities 5.7 Nearby Transportation 9.0 Physical Protection and Security

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