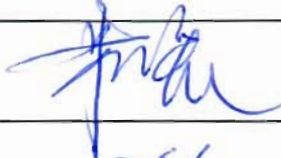



Revision	Approved by	Number of Pages
000		9
Approval Date	26/10-17	
 General Nuclear System Ltd.		
UK HPR1000 GDA Project		
Document Reference:	HPR/GDA/PSR/0003	
Preliminary Safety Report Chapter 3 Generic Site Characteristics		
<p>This document has been prepared on behalf of General Nuclear System Limited (GNS) with the support of China General Nuclear Power Corporation (CGN) and Électricité de France S.A. (EDF).</p> <p>Although due care has been taken in compiling the content of this document, neither GNS, CGN, EDF nor any of their respective affiliates accept any liability in respect to any errors, omissions or inaccuracies contained or referred to in it.</p>		

DISTRIBUTION LIST

Recipients	Cross Box
GNS Executive	<input type="checkbox"/>
GNS all staff	<input type="checkbox"/>
GNS and BRB all staff	<input checked="" type="checkbox"/>
CGN	<input checked="" type="checkbox"/>
EDF	<input checked="" type="checkbox"/>
Regulators	<input checked="" type="checkbox"/>
Public	<input type="checkbox"/>

SENSITIVE INFORMATION RECORD

Section Number	Section Title	Page	Content	Category

UK HPR1000 GDA	Preliminary Safety Report Chapter 3 Generic Site Characteristics	UK Protective Marking: Not Protectively Marked	
		Rev: 000	Page: 4 / 9

Table of Contents

3.1	List of Abbreviations and Acronyms	5
3.2	Introduction	6
3.3	Regulatory Context	6
3.4	Generic Site Characteristics	6
3.4.1	Site Parameters	6
3.4.2	Grid Connection.....	7
3.4.3	Heat Sink.....	8
3.4.4	External Hazards.....	8
3.4.5	Density and Distribution of Local Population.....	8
3.5	Conclusion.....	8
3.6	References	8

UK HPR1000 GDA	Preliminary Safety Report Chapter 3 Generic Site Characteristics	UK Protective Marking: Not Protectively Marked	
		Rev: 000	Page: 5 / 9

3.1 List of Abbreviations and Acronyms

DBC	Design Basis Conditions
DEC	Design Extension Condition
EA	Environment Agency
ECS	Extra Cooling System [ECS]
FCG Unit 3	Fangchenggang Nuclear Power Plant Unit 3
GDA	Generic Design Assessment
HPR1000 (FCG3)	Hua-long Pressurized Reactor under construction at Fangchenggang nuclear power plant unit 3
ONR	Office for Nuclear Regulation
RP	Requesting Party
SEC	Essential Service Water System [ESWS]
SSE	Safe Shutdown Earthquake
UHS	Ultimate Heat Sink
UK	United Kingdom of Great Britain and Northern Ireland
UK HPR1000	The UK version of the Hua-long Pressurized Reactor

System codes (XXX) and system abbreviations (YYY) are provided for completeness in the format (XXX [YYY]), e.g. Extra Cooling System (ECS [ECS]).

UK HPR1000 GDA	Preliminary Safety Report Chapter 3 Generic Site Characteristics	UK Protective Marking: Not Protectively Marked	
		Rev: 000	Page: 6 / 9

3.2 Introduction

This chapter presents a summary of site parameters used for the developing GDA design. It takes into account external natural and man-made hazards, the heat sink capacity, grid connections, density and distribution of local population. Some of these parameters can only be determined when the site is specified.

This chapter supports the following high level objective: the design characteristics of the UK HPR1000 reflect a generic UK site that bounds suitable locations.

This chapter will support the following, which will be demonstrated in subsequent stage:

- The generic site characteristics for suitable UK sites will be identified.
- The design will be shown to be suited to the generic site characteristics.

3.3 Regulatory Context

The siting criteria developed by the Requesting Party (RP) will follow both the Office for Nuclear Regulation (ONR) and Environment Agency (EA) regulatory guidance on siting. The site parameters will be mindful of UK National Policy Statement for Nuclear Power Generation EN-6 in Reference [1]. Account will be taken of factors that might affect the protection of people and the environment and will be kept under review in Reference [2]. Details of environmental considerations (e.g. dose levels) can be found in chapter 26.

3.4 Generic Site Characteristics

The generic site characteristics need to be specified for GDA. This sub-chapter presents the information on site characteristics used in HPR1000 (FCG3) and the considerations for UK HPR1000. According to the References [3] and [4], the following aspects are taken into account:

- a) Site Parameters;
- b) Grid Connection;
- c) Heat Sink;
- d) External Hazards;
- e) Density and Distribution of Local Population.

3.4.1 Site Parameters

The site parameters used in the design of FCG Unit 3 is summarized in Table 3.4-1. The developing UK HPR1000 generic site characteristics will be determined in subsequent GDA stage.

T-3.4-1 Site Parameters of HPR1000 (FCG3)

Parameter	Unit	FCG Unit 3 Site	FCG Unit 3 design
Air Temperature	°C		
Max safety		36.1dry/30.3wet	36.1dry/30.3wet
Min safety		3.7dry/3.2wet	3.7dry/3.2wet
Wind	m/s		
Max		40.2	50
Extreme (1 in 100 years)		64.3	80
Tornado		75	89
Heat sink water temperature	°C		
Max		38	38
Min		8.9	8.9
Seismic	g		
Safe Shutdown Earthquake (SSE) Response spectra, Reference [5]		0.16 Site specific response spectrum	0.3 RG1.60 response spectrum
Soil (bearing)		MPa	3.5
Tornado missile, Reference [6]	m/s	26.3	34
Flood	m	8.8	8.8
Rain	mm	82.1 (10min)	82.1 (10min)
		326 (1hr)	326 (1hr)
		1320 (24hr)	1320 (24hr)
Snow	---	None	none
Lightning, Reference [7]	d/a	93.2	93.2

3.4.2 Grid Connection

In HPR1000 (FCG3), the unit is connected to the external grid at two voltage levels, 500kV main grid and 220kV standby grid.

In UK HPR1000, the unit will be connected to the external grid through a main connection and an auxiliary connection, details of which is given in chapter 9. However, it is noticed that the grid parameters in UK are different from those in China. The

UK HPR1000 GDA	Preliminary Safety Report Chapter 3 Generic Site Characteristics	UK Protective Marking: Not Protectively Marked	
		Rev: 000	Page: 8 / 9

assumptions about the type and reliability of grid connections will be identified, taking account of the grid code to be satisfied in subsequent stages.

3.4.3 Heat Sink

There are two types of Ultimate Heat Sinks (UHS) in the safety design of HPR1000 (FCG 3).

Water is used to cool the components by the Essential Service Water System (SEC [ESWS]) in Design Basis Conditions (DBC). While the ECS [ECS], by means of the mechanical draft cooling towers, removes the core residual heat and the decay heat from the spent fuel pool under Design Extension Conditions (DEC).

The heat sink for UK HPR1000 will be defined during GDA process.

3.4.4 External Hazards

External hazards are described in chapter 18, including the natural and man-made external hazards. For HPR1000 (FCG3), the design basis of external hazard has been given.

In UK HPR1000, values for design basis external hazards are given in chapter 18. Natural hazards are subject to climate change and appropriate adjustments will be made in Reference [8].

3.4.5 Density and Distribution of Local Population

The data on the density and distribution of the local population might affect the protection of individuals and populations from radiological risk. HPR1000 (FCG3) obtained the population data based on the result of site investigation. For GDA, most UK sites specified in EN-6 in Reference [1] are specified as semi-urban. The design basis parameters for a specific site will be confirmed once appropriate site specific studies have been performed.

3.5 Conclusion

The design characteristics of the UK HPR1000 will be conservatively chosen and will reflect a generic UK site that bounds suitable locations. Generic site characteristics will be given through GDA process.

3.6 References

- [1] Department of Energy and Climate Change, National Policy Statement for Nuclear Power Generation (EN-6), Vol 1&2, 2011.
- [2] Environment Agency, Radioactive Substances Regulation - Environmental Principles, Version 2.0. April 2010.
- [3] ONR, New nuclear reactors: Generic Design Assessment Guidance to Requesting Parties, ONR-GDA-GD-001, Revision 3, September 2016.

UK HPR1000 GDA	Preliminary Safety Report Chapter 3 Generic Site Characteristics	UK Protective Marking: Not Protectively Marked	
		Rev: 000	Page: 9 / 9

- [4] Environment Agency. Process and Information Document for Generic Assessment of Candidate Nuclear Power Plant Designs, Version 3. October 2016.
- [5] NRC, Design response spectra for seismic design of nuclear power plants, RG1.60, Reversion 2, 2014.
- [6] NRC, Design-basis tornado and tornado missiles for nuclear power plants, RG1.76, Reversion 1, 2007.
- [7] IEC, Protection Against Lightning, IEC 62305, 2010 edition, 2010
- [8] ONR, Safety Assessment Principles for Nuclear Facilities, Revision 0, November 2014.