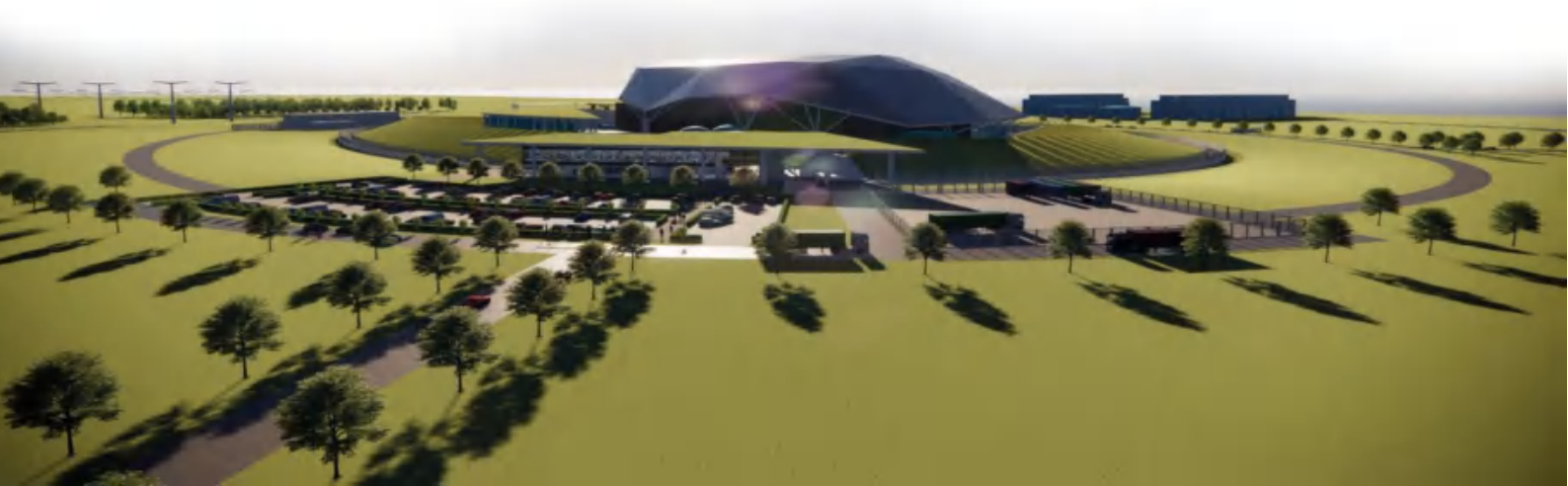
Environment, Safety, Security and Safeguards Case Version 2, Tier 1, Chapter 25: Detailed Information about the Design



Record of Change

Date	Revision Number	Status	Reason for Change
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Executive Summary

This report constitutes Chapter 25 of the environment, safety, security and safeguards (E3S) case for the Rolls-Royce Small Modular Reactor (RR SMR) and outlines where environmental requirements are detailed. The chapter:

- Identifies key plants, systems and processes which have a bearing on radioactive waste (solid, liquid and gaseous) generation, treatment, measurement, assessment and disposal, and provides signposts to chapters of the RR SMR E3S case where the associated technical descriptions are presented
- Identifies key plant, systems and processes which have a bearing on radiological and conventional environmental impacts and provides signposts to chapters of the RR SMR where the associated technical descriptions are presented
- Outlines key selected principles, philosophies, policies, strategies, plans, methodologies, codes and standards that have a bearing on the environment case and the chapters of the E3S case where these are described.

The maturity of the detailed technical information provided in this chapter may vary between systems as the Rolls-Royce SMR design progresses. The E3S case is developing alongside the design and future iterations will continuously increase the provided detail of the relevant environmental systems.

Contents

25.0 Introduction to Chapter

25.0.1 Introduction

This report comprises chapter 25 of the Rolls-Royce small modular reactor (RR SMR) environment, safety and safeguards (E3S) case. It identifies the key 'plant, systems and processes' within the RR SMR that have a bearing on the environment and points to the chapters of the E3S case where the detailed technical descriptions of these plants and systems can be found.

The term 'plant, systems and processes' is used within the Environment Agency (EA) generic design assessment (GDA) guidance [1] and, for the purposes of this chapter, this is taken to encompass multiple items of equipment providing a combined purpose. The descriptions of the RR SMR plants, systems and processes are provided within the individual E3S chapters, as outlined in section 25.1.2. The term 'structures, systems and components (SSCs)' is also used here and elsewhere in the E3S case and is used when considering systems important from a safety or environmental perspective and may receive a designation as an SSC in line with recommended nuclear safety case methodology and nomenclature.

25.0.2 Scope and maturity

This chapter is a signposting document to sections of the E3S case where detailed technical descriptions are presented of plant, systems and processes that have a bearing on the generation and management of radioactive waste and on radiological and conventional environmental impacts. The individual chapters (and supporting tier 2 and 3 documents) contain information on the associated philosophies, principles, strategies and plans used to develop, substantiate and specify the RR SMR design.

The RR SMR is a maturing design, and the information presented is largely based on the design definition at a design reference point (DRP) 1 level of design maturity. The level of information available on the individual SSCs is variable, and Version 2 of the E3S case does not provide detailed descriptions for all of the systems listed. Where the information is not yet available "to be determined (TBD)" notations have been used within the tabular information in section 25.2. Such information will be included in future iterations of the case when those systems have achieved sufficient design definition.

This chapter focuses on SSCs relevant to environmental protection under normal operating conditions. Details of SSCs designed to prevent the occurrence, control the progression or mitigate the effects of nuclear faults and accidents can be found in chapters 6 and 15, and are not discussed further in this chapter.

25.0.3 Claims, arguments and evidence route map

The generic E3S Case objective at Version 2 is 'to provide confidence that the RR SMR design will be capable of delivering the E3S fundamental objective as it developed from a concept design into a detailed design' [2]. This confidence is built through development and underpinning of top-level claims across each chapter of the E3S Case, through supporting arguments and evidence.

The chapter level claim for E3S case Version 2, Tier 1 Chapter 25 is:

Claim 25: SSCs key to the environment are conservatively designed and verified to deliver E3S functions through-life, in accordance with the E3S design principles, to reduce risks to ALARP, apply BAT and in line with Secure-by-Design and Safeguards-by-Design.

This chapter provides evidence toward the claim above by providing a summary of systems which have a bearing on the environment. The document signposts to other chapters of the E3S case where technical descriptions of the plants, systems and processes are provided. A summary of the SSCs which are key in providing environmental protection functions, in relation to waste systems, is provided, with a complete list to be provided in individual chapters in future versions of the E3S case. No further claims, arguments and evidence is provided within this chapter.

25.0.4 Applicable regulations, codes and standards

Design of the RR SMR is underpinned by a set of fundamental principles, derived from established relevant good practice (RGP) and UK regulatory precepts. These principles are detailed in [3], [4] and [5] and highlighted in chapters 1 and 3 of the E3S case.

Information on other philosophies, plans, policies, strategies, methodologies, codes and standards, and related considerations applicable to the RR SMR design are presented in the relevant chapters of the E3S case, and these are translated to requirements within the requirements database (DOORS). Table 25.0-1 identifies a selection of key environmental protection philosophies, plans, and policies informing the design of the RR SMR and provides a signpost to E3S case chapters where they are presented. The list is not exhaustive.

Table 25.0-1 Key Environmental Protection Principles, Policies, Strategies.

RR SMR Topic	Philosophies, Plans, Strategies	References
Source term and dose management	SMR Radioactive Source Term Policy SMR Dose Management Policy Normal Operation Source Term Strategy Normal Operation Source Term Radionuclide Selection RR SMR Power Station Operating Philosophy	Chapter 13 Chapter 16 Chapter 20 Chapter 29 [6]
Radioactive waste management	Integrated Waste Strategy - Waste Hierarchy Decommissioning Strategy Decommissioning Waste Management Plan Disposability Assessment	Chapter 11 Chapter 21 [4] [5]
Environmental radiation protection	Quantification of Radiological Discharges for: Reactor Island Waste Systems During Normal Operations – HVAC and CARS Review of Postulated RR SMR Expected Events Environmental Dose assessments	Chapter 12 Chapter 29 Chapter 30 [7] [8] [9] [10]
Discharge monitoring	Liquid Effluent Sampling & Monitoring Philosophy Gaseous Effluent Sampling & Monitoring Philosophy	Chapter 28 [11] [12]

RR SMR Topic	Philosophies, Plans, Strategies	References
Conventional environmental impact	Water abstraction topic report Water Balance summary Combustion topic report COMAH topic report (TBD)	Chapter 31 [13] [14] [15]
Application of BAT	RR SMR BAT guidance and methodology Dose management policy (see above)	Chapters 27 to 31 [5]
Sustainability	Sustainability Policy Sustainability Strategy Materiality Assessment Lifecycle Assessment Cabon Reduction Plan	Chapter 26 Others TBD

25.1 Facility Overview

25.1.1 Plant overview

The RR SMR design is based on an optimised and enhanced use of proven technology, with a single unit, three-loop pressurised water reactor (PWR) providing a target power output of 470 MW_e.

The following provides an overview of the design, including a brief summary of each of the 'islands' that comprise the power station.

Reactor Island

The reactor island [R01] includes the systems that form the reactor, transfer, and storage of new and used fuel, and any associated nuclear auxiliary systems. The purpose of reactor island is to use the heat from a controlled nuclear fission reaction to generate steam, which is then passed to the turbine island [T01]. [R01] includes the reactor plant [J], handling of nuclear equipment [F] and nuclear auxiliary systems [K].

Turbine Island

The turbine island [T01] provides the link between the reactor island [R01] where steam is generated, and the electrical connections where generated electricity is provided to the power grid. The primary equipment in TI is the steam turbine and generator arrangement, where the mechanical energy of steam is converted into electrical energy. [T01] includes the steam, water, condensate system [L] and main turbine generator system [M].

Cooling Water Island

Cooling water island [C01] provides the primary means of removing heat from the power station, passing it to the ultimate heat sink, relying on the external environment to provide a means of cooling. The design aim is to provide a standardised product that can operate on a wide range of sites through minimal adaption and optimisation of a single design, where such sites potentially include inland, lake, river, estuarine and coastal locations. An indirect system at a coastal site has been selected as the baseline design, noting the final solution will be site-specific.

Balance of Plant

The balance of plant [B01] systems support the availability of the power station by providing a range of support functions to the rest of the plant, which are of low safety significance but important to maximising output and plant efficiency and minimising environmental impacts. This includes the provision of chemicals, utilities, water and sampling services, and general storage areas.

Electrical, Control and Instrumentation

Electrical, control and instrumentation (EC&I) systems [E01] include systems relating to grid connection and intra-site electrical distribution, including the grid transmission system [A], electrical power system [B], generator transmission main connection [MS] and earthing and lightning protection system [XF].

The electrical power system [B] includes the provision of emergency power supplies, which incorporates significant defence in depth to provide backup power in the event of loss of offsite power and station blackout faults.

Civil, Structural and Architectural

Civil, structural and architectural systems [CIV] provide the physical structures which house, support and protect all other systems across the power station. This includes the base isolation system delivered by the aseismic bearings, and the hazard shield providing protection from external hazards.

25.1.2 Detailed design description

Chapter 25 draws upon the information presented in other chapters of the E3S case (and the associated support documentation), and in particular chapter 1 provides an outline of the structure of the E3S case and an overview of the plant layout and description. A summary of each of the chapter contents is provided below and more detailed facility descriptions can be found on review of the individual chapters.

Chapter 1 Introduction [2]: Outlines the structure of the E3S Case and provides overview of the plant layout and description.

Chapter 2 Generic site characteristics [16]: Presents the site bounding characteristics and parameters within which the RR SMR is designed, and a summary of the Generic Site Description (GSD) which environmental assessments are based on.

Chapter 3 E3S Objectives and Design Rules for SSCs [17]: Presents the key aspects that provide the framework for the RR SMR to achieve its E3S objectives.

Chapter 4 Reactor (Fuel and Core) [18]: Describes the fuel and core design, including its composition and configuration of fuel, control rods, etc. and associated operational parameters.

Chapter 5 Reactor Coolant System and Associated Systems [19]: Describes the reactor coolant system (RCS) and associated systems, which include the reactor pressure vessel (RPV) and the primary coolant circuit components.

Chapter 6 Engineered Safety Features [20]: Describes the systems which deliver the safety functions in response to fault and accident conditions in the reactor.

Chapter 7 Instrumentation and Control [21]: Describes the instrumentation and control (I&C) systems which support delivery of the safety functions.

Chapter 8 Electrical Power [22]: Describes the electrical power systems which supply power to systems during both normal and fault conditions.

Chapter 9A Auxiliary Systems [23]: Describes the auxiliary systems, including the fuel handling and storage systems, water supply systems, and ventilation systems.

Chapter 9B Civil Engineering Works and Structures [24]: Describes the civil and structural design aspects, including the hazard shield and the base isolation system for protection against external hazards.

Chapter 10 Steam and Power Conversion Systems [25]: Describes the steam and power conversion systems that are primarily located in turbine island (noting some aspects cross the boundary into reactor island.

Chapter 11 Management of Radioactive Waste [26]: Summarises the sources of solid, liquid, and gaseous waste streams and the associated the waste management arrangements, including solid waste quantities, and an overview of waste minimisation with focus on disposability and optimised disposal routes.

Chapter 12 Radiation Protection [27]: Evaluates design features to ensure control of radiation doses to onsite workers and members of the public will be controlled during normal operations.

Chapter 13 Conduct of Operations [28]: Presents how the design and operational documentation will facilitate a future permit / dutyholder / licensee to fulfil its prime responsibility to implement E3S requirements in operation.

Chapter 14 Plant Construction and Commissioning [29]: Presents a high-level overview of the proposed build and installation approach and programme, and an overview of the proposed commissioning programme and associated strategies.

Chapter 15 Safety Analysis [30]: Presents the methods and outputs of the safety analysis that evaluates the design against relevant criteria, including the deterministic analysis of faults and accidents, probabilistic analysis, and internal and external hazard assessment.

Chapter 16 Operational Limits & Conditions [31]: Presents the processes to define the operational limits and conditions (OLCs) in the design and safety analysis, to ensure they are successfully transferred into operational documentation.

Chapter 17 Management for E3S Case and Quality Assurance [32]: Presents the management and organisational arrangements including the processes and systems in place to ensure quality assurance and quality management of the design and E3S Case production.

Chapter 18 Human Factors Engineering [33]: Provides the demonstration that human factors (HF) is fully integrated into the facility design and substantiation processes.

Chapter 19 Emergency Preparedness & Response [34]: Presents the UK and international regulations and good practice relating to emergency preparedness and response, and the design features and arrangements that facilitate compliance.

Chapter 20 Chemistry [35]: Presents the definition and justification of the chemistry regime, chemistry specification for systems, and the design substantiation to meet chemistry specifications.

Chapter 21 Decommissioning and End-of-life Aspects [36]: Presents the decommissioning and waste strategies, and the provisions within the design to facilitate safe decommissioning.

Chapter 22 Conventional and Fire Safety [37]: Presents the strategies for implementation of conventional and fire safety into the design, including construction design and management (CDM).

Chapter 23 Structural Integrity [38]: Presents the demonstration of structural integrity for safety-classified metallic pressure boundary components and their supports.

Chapter 24 ALARP Summary [39]: Presents the overarching summary of how the nuclear and conventional safety risks are reduced to ALARP through the lifecycle of the facility.

Chapter 25 Detailed Information about the Design [40]: Provides a summary of the facility's main plants, systems and processes which have a bearing on radioactive waste and provides signposts to other chapters and documents which provide further detail.

Chapter 26 Sustainability [41]: Describes the sustainability aspects of both Rolls-Royce SMR Limited and the RR SMR design.

Chapter 27 Demonstration of BAT [4]: Presents a summary of how BAT methodology has been applied in the design of the facility, in addition to the BAT claims for the RR SMR and a summary of the overall BAT demonstration.

Chapter 28 Sampling Arrangements, Techniques and Systems [42]: Presents the sampling and monitoring arrangements for in-process and final discharge monitoring.

Chapter 29 Quantification of Radioactive Effluent Discharges and Proposed Limits [43]: Presents an assessment of potential discharges of aqueous and gaseous radioactive effluent from the plant to the environment under normal operating conditions.

Chapter 30 Prospective Radiological Assessment at the Proposed Limits for Discharges and for any On-Site Incineration [44]: Presents the radiological assessment of doses to members of the public and non-human species. It describes the method used to calculate doses and justifies why the model's data and assumptions used are appropriate.

Chapter 31 Conventional Impact Assessment [45]: Presents conventional environmental aspects associated with RR SMR and how impacts are being managed to minimise taking into consideration legal requirements and RGP.

Chapter 32 Generic Security Report [46]: Presents the demonstration of Security in the design of the RR SMR, covering measures to ensure protection from sabotage, protection from theft, cyber security and information assurance, and to ensure Security-by-Design.

Chapter 33 Safeguards [47]: Presents the demonstration that the design of RR SMR facilitates safeguards through material accountability, and containment and surveillance.

As the E3S case develops further, the intention is to ensure the environmental SSCs are included within the individual chapters such that environmental considerations become fully integrated within the E3S case.

25.2 Key Systems

25.2.1 Key systems with a bearing on the environment

A list of selected key systems with a bearing on the environment was formulated considering the principles in [2], and is presented in Table 25.2 1. The information provided comprises the names of relevant SSCs, the system and island codes, and the E3S Chapter where details of the system are presented. For legibility, the SSCs are identified at Levels 2 and 3 of the reference design system for power plants (RDS-PP) code, which correspond to the plants and systems, respectively, with plants identified by bold text. Further details of the RDS-PP coding are presented in chapter 1 of the E3S Case [2].

The list of systems and associated sub-systems is not complete at this stage of development of the RR SMR design, and further sub-systems will be added as improved system definition becomes available.

Table 25.2-1 also provides a summary of the high-level environmental aspects associated with each of the plant systems and as these develop the relevant BAT claims that the system supports will also be highlighted.

Table 25.2-1 Plant Systems and related E3S Chapter

Plant / System name	System Code	Sub-systems	Environmental Aspect
Reactor Island – R01			
Handling of Nuclear Equipment	**F**	**Chapter 9A: Auxiliary Systems**	
Internal fuel storage	FA	Spent fuel pool [FAB] Refuelling cavity [FAE] Refuelling pool [FAF] Fuel pool cooling system [FAK] Fuel pool purification system [FAL] Component cleaning system [FAM] Fuel pool supply system [FAT] Fuel transfer channel [FCK]	Reducing public / non-human species (NHS) dose resulting from spent fuel (SF), via containment, segregation, and interim and / or decay storage. Minimise radwaste arisings through removal of corrosion products.
Handling of fuel assemblies and other reactor core internals	FB	Fuel cleaning station (including reflector assemblies) [FBC]	Removes and contains crud / corrosion products from partially spent fuel, optimising core

Plant / System name	System Code	Sub-systems	Environmental Aspect
			performance and prevention of fuel damage.
External storage of spent fuel	FD	Dry storage of filled casks [FDB] (within Auxiliary Building)	Decay storage of SF reduces potential dose to public / environment. Prevents cross contamination of waste streams.
Decontamination system (wastes)	FK	Decontamination system [FKA] Chemical supply [FKA10] Decontamination booth [FKA20] Immersion tanks [FKA30] Effluent Buffer Tank [FKA40]	Reduces activity allowing waste items to meet lower waste classification for disposal and or to ensure optimal disposal route. Reduces item activity for re-use / recycle.
Reactor Plant	**J**	**Chapter 4: Reactor (Fuel & Core)** **Chapter 5: Reactor Coolant System and Associated Systems** **Chapter 6: Engineered Safety Features** **Chapter 7: Instrumentation and Control**	
Reactor system	JA	Reactor pressure vessel (RPV) [PT108] Closure head and integrated head package [PT158, PT159] Reactor internals [PT110] including Fuel Assemblies [PT164] and Neutron Sources [PT165] Control rod assemblies [PT190]	Provides containment and controls / reduces potential loss of radioactivity to environment, dose to public and NHS.
Reactor coolant system	JE	Steam generation system [JEA] (acts as main process duty heat sink) Reactor coolant pressure Relief System [JEG]	Systems provide containment and reduce potential loss of radioactivity to environment, dose to public (from coolant).
Reactor core with appurtenances	JK	Failed fuel assemblies detection system for detecting cladding tube damage [JKU]	Warning of potential loss of radioactivity to environment, dose to public.
Reactor plant containment systems	JM	Containment structure [JMA] Fuel transfer channel [JMD]	System reduces potential loss of containment of radioactivity to environment, dose to public

Plant / System name	System Code	Sub-systems	Environmental Aspect
Reactor heat removal systems	JN	Cold shutdown cooling system (decay heat removal) [JNA] Automatic depressurisation system [JNF] (blowdown of coolant to refuelling pool)	System reduces potential for accident scenarios resulting in loss of radioactivity to environment, dose to public.
Reactor plant control and monitoring system	JS	Reactor protection system [JSA] and reactor monitoring system {JSS]	Controls reaction and fuel burnup, which effects energy output and rate of fuel changeover (minimises waste generation, improves efficiency).
Reactor control and protection system	JY	System provides chemical dosing control and indication of key system parameters for [KB]	Enables effluent recycling and reduces discharges to environment.
Nuclear Auxiliary Systems	**K**	**Chapter 5: Reactor Coolant System and Associated Systems** **Chapter 9A: Auxiliary Systems** **Chapter 11: Management of Radioactive Waste** **Chapter 29: Gaseous Radioactive Discharges**	
Chemical and volume control system	KB	Level and volume control System [KBA] Chemistry control system [KBD] Coolant purification system [KBE]	Chemical monitoring & control of primary coolant, make-up water and blowdown to aqueous environment.
Heating, Ventilation and Air Conditioning (HVAC) Systems in Controlled Areas and Exclusion Areas	KL	[KLA] Primary Containment [KLB] Interspace system [KLC] Controlled Areas [KLE] Uncontrolled Areas [KLF] Waste Processing Areas [KLL] Fuel Storage and Handling Areas [KLR] Control Rooms HVAC Extract Discharge System [KLS]	System reduces normal radioactive aerial discharges to environment / dose to public and NHS.
Solid radioactive waste processing systems	KM	Processing and Treatment System for Solid Radioactive Waste [KMA]	Reduce dose to public via decay storage, passivation and packaging of ILW and LLW.

Plant / System name	System Code	Sub-systems	Environmental Aspect
		Storage System for Radioactive Waste [KME]	Enables implementation of waste hierarchy.
Liquid radioactive effluent processing system	KN	Processing and treatment system for primary liquid effluent [KNF10] Processing and treatment system for spent liquid effluent [KNF20] Liquid effluent monitoring and discharge system [KNF30]	Treats radioactive liquid effluents to enable re-use. Reduces radioactive liquid discharges, and associated doses to public and NHS.
Gaseous radioactive waste processing system	KP	Gaseous radioactive effluent treatment system [KPL]	Treatment and monitoring of gases from primary circuit reducing radioactive aerial discharges, and associated doses to public and NHS.
Collection and drainage systems for liquid media and vent systems in controlled and exclusion area	KT	Reactor island collection and drainage system [KTA] Reactant coolant drains [KTA10] Active process and floor drains [KTA20] Active chemical drains [KTA30] Non-active drains [KTA40] Fuel pools leak detection and collection system [KTQ]	Collection and containment of effluents from RI for treatment before discharge to aqueous environment.
Reactor Island Sampling System	KU	Weak active sampling system [KUA] Auxiliary sampling system [KUB] Process and emissions radiation monitoring system [KUK]	Measurement and monitoring of key discharge streams to environment. Includes process radiation monitoring system.
Balance of Plant [B01]			
Water Supply-Disposal and Treatment System	**G**	**Chapter 9A: Auxiliary Systems.** **Chapter 28: Sampling and Monitoring.**	
Water supply system	GA	*TBD*	Supplies potable water to safety systems including ESWS.

Plant / System name	System Code	Sub-systems	Environmental Aspect
Demineralization treatment system	GC	*To supply R01, T01 and B01 – TBD*	Provision of demineralised water to prevent activated corrosion products / degradation of safety systems.
Wastewater drainage and treatment systems	GM	*Wastewater Treatment system [GMM]* *Non-active drains from R01, T01, CWI – TBD*	Collection and treatment of low activity effluents to allow re-use / discharge.
Auxiliary Systems	**Q**		
Chemical supply system	QC	*Water treatment chemicals storage and supply – TBD*	Raw material usage, containment of hazardous chemicals.
Back-up power supply	QH	*Auxiliary Boilers [QHA], [QHR] - TBD*	Fuel usage, off-gas discharges.
Gas supply system	QJ	*Bottled gas storage and supply - TBD*	Raw material usage.
Auxiliary Non-nuclear sampling system	QU	*TBD*	Sampling of aqueous discharges to environment.
Turbine Island [T01]			
Steam Water Condensate System	**L**	**Chapter 10: Steam & Power Conversion Systems**	
Feedwater system	LA	Deaerator and feedwater storage system [LAA]	Supplies coolant to steam generators for removal of heat from reactor core, ensures correct water purity preventing fouling and corrosion.
Condensate System	LC	Turbine island drains [LCM]. *Auxiliary condensate system [LCN] - TBD* Steam generator blowdown system (SGBS) [LCQ]	Chemistry control of impurities within secondary coolant recycled via liquid effluent treatment system. Containment and recycle of condensate liquors.
Condensate polishing system	LD	*TBD*	
Auxiliary feedwater system	LJ	*TBD*	System reduces potential for accident scenarios resulting

Plant / System name	System Code	Sub-systems	Environmental Aspect
			in loss of radioactivity to environment / dose to public
Main Turbine Generator System	**M**	**Chapter 10: Steam & Power Conversion Systems**	
Steam turbine system	MA	Condensing system [MAG] Air removal and evacuation system [MAJ] Drain and vent system [MAL] Vent system [MAQ] - *TBD*	Minimise water usage, drainage collection and recycle. Reduces discharge of heat and water vapour. Venting of non-rad gases to environment (other than in case of SG tube leak).
Generator system	MK	Exhaust Gas System [MKQ] Generator vent system [MKA]	Discharge of generator off-gas to environment.
Cooling Water Island C01			
Cooling Water Systems	**P**	**Chapter 9A: Auxiliary Systems.** **Chapter 31 Conventional**	
Main cooling water system	PA	*Cooling towers* *Cooling tower basin* *Drift eliminators - TBD*	To discharge heat removed from turbines to ultimate heat sink. To control discharge of blowdown to aqueous environment.
Essential Service Water System	PB	*Cooling towers* *Cooling tower basin* *Drift eliminators - TBD*	Removes heat from [KAA] reactor component cooling and release to heat sink (environment).
Auxiliary Cooling and Make-up System	PE	*Intake system [PEA].* *Fish and debris recovery.* *Fish filtration and return system.* *Sea outfall - TBD*	Provides measures to reduce impact of cooling water abstraction from and return to aqueous environment.
Common systems for the cooling water systems.	PU	Biocide treatment of cooling water system [PUL] Anti-scalant treatment of cooling water System [PUQ] Corrosion inhibitor treatment of cooling water system [PUT]	Reduces water use and effluent generation via use of water quality dosing systems. Optimises heat exchange efficiency.
Civil Structures – CIV			

Plant / System name	System Code	Sub-systems	Environmental Aspect
Structures and Systems inside of the Power Plant Process	**U**	**Chapter 9B: Civil Engineering Works & Structures**	
Structures for electrical auxiliary power supply system	UB	Back-up generation structures [UBM]	Allows continued function of safety and environmental abatement systems on power outage.
Structures for cooling water systems	UP	Cooling water structures: Intake [UPD10] Forebay [UPD90] Filtration Structure [UPE10] Fish Recovery and Return Line [UPE60] Outfall Pond [UPK20] Cooling water basin [UPG]	Minimises environmental impact due to water abstraction and return.
Chemicals Store	UP	*Chemical Store [UPN] - TBD*	Reduce potential for leakage of hazardous chemicals to aqueous environment.
Structures for reactor auxiliary systems	UK	Structure for air exhaust [UKH] Structure for radioactive waste storage [UKT] - *TBD*	Discharge stack releases radioactive aerial effluents to the environment.

25.2.2 Key systems for waste generation, management and monitoring

Detailed information regarding the sources of waste generation is provided in [26] and the following tables provide a high-level overview of the current designated treatment routes, and monitoring systems, and provides sign posting to more detailed information sources. It is noted that waste resulting from decommissioning operations is expected within all categories and so is not specifically listed.

Table 25.2-2 Solid waste management systems

Waste generation process	Waste management process	Waste measurement / monitoring	Reference
Spent Fuel SF			
Spent Nuclear Fuel [FA] Failed fuel assemblies [JK]	Spent fuel pool [FAB10] Fuel pool cooling system [FAK] Fuel pool purification system [FAL] Fuel pool supply system [FAT] Fuel transfer channel [FCK] Refuelling pool [FAF] Refuelling cavity [FAE] SF cask loading pit [FAB20] (placement and sealing within metal lined concrete casks) Dry storage of filled casks [FDB] before transfer to GDF for disposal	Testing system for fuel assemblies [FBA] Detection system for detecting cladding damage [JKU] [KUA] system for sampling of fuel storage pool cooling system [FAL] Radiation monitoring of fuel systems [KUK] including SF dry storage area	[48] [23] [49]
Dry solid boundary HLW / ILW			
Non-fuel Core Components [JS]	HLW follows SF treatment route as above (cooling / interim storage) including size reduction, segregation where necessary ILW follows dry solid ILW treatment route, as below	As above	[50]
Dry solid ILW			
Maintenance operations on R01 Non-fuel core components [JS]	Solid radioactive waste management system [KM] Decontamination system [FKA] Processing and treatment system for ILW [KMA20]	Sampling of [KM] is undertaken by [KUB] [KUB] system includes sampling / monitoring of solids prior to	[51] [43] [50] [49]

Waste generation process	Waste management process	Waste measurement / monitoring	Reference
Primary reactor circuit, reactor internals (RVI), shielding [JA [JE] [JM]	(includes ILW encapsulation equipment) Temporary storage of ILW in shielded containers [KME20] ILW Store [KME30] for longer term storage for processed ILW	encapsulation, plus provision for inspection and monitoring of dummy package	
Dry solid boundary ILW/LLW			
Removable cartridge filters [KBE] [KNF] [FAL] Reverse osmosis membranes [KNF] Dry active waste	Processing and Treatment System [KMA] Temporary Storage for LLW [KME10] Processing and Dispatch System for LLW [KMA10] If ILW, Package in robust shielded containers [KME10] If ILW Decay Storage in [KME30] Component Decontamination System [FKA]	Sampling of [KM] is undertaken by [KUB]	[51] [43] [50] [49]
Wet ILW and boundary ILW/ LLW solids			
Spent Fuel Pool Purification and Cooling system [FAK, FAL, FAM] Ion exchange resins from [KNF] [KBE] [FAL] Filter solids from [KNF] [KBE] [FAL] Solids from Reactor Coolant treatment (part of CVCS)	Solid Radioactive Waste Management [KM] system immobilises, stores and dispatches ILW & LLW [KMA, KME] Decay storage in Resins Storage Tanks [KME20] Decay storage and settlement in Filter Solids Tanks [KME20] Decay storage and settlement in Concentrate Storage Tanks [KME20] Wet ILW encapsulation [KMA20] Wet LLW encapsulation [KMA10]	[KUB] system includes sampling of solids prior to encapsulation, plus provision for inspection and monitoring of dummy package	[23] [26] [50] [51]
Dry solid LLW			
Air Filters [KL], Pool skimmers, contaminated maintenance waste and LLW	Treatment / disposal through standard [KM] LLW routes after segregation, size reduction, decontamination	Standard LLW article monitors within [KMA]	[50] [26] [52] [51]

Waste generation process	Waste management process	Waste measurement / monitoring	Reference
elements of RPV shielding material Maintenance wastes. metallic, electrical equipment	Processing and Treatment System [KMA] Processing and Dispatch System for LLW [KMA10] Temporary Storage for LLW [KME10] Component Decontamination System [FKA]		
Wet LLW			
Oils and solvents from maintenance operations	Processing and Dispatch System for LLW [KMA10]	Standard LLW article monitors within [KMA]	[50] [26]

Table 25.2-3 Liquid waste management systems

Waste generation process	Waste management process	Waste measurement / monitoring	Reference
Low activity effluent			
Reactor coolant letdown [KB] Reactor coolant drains tank [KTA10] Spent liquid effluents [KTA20] Chemical drains and samples [KTA30] Fuel handling, cleaning and decontamination [FA] [FB] [FK]	Liquid Radioactive Effluent Treatment System [KNF] Storage and treatment of primary effluent [KNF10], spent effluent [KNF20] and treated effluents [KNF30]	Treated effluents transferred to KNF30 for sampling and sentencing [KUA] Sampling and monitoring of final discharges from outfall pond [QU]	[19] [50] [43] [53] [54] [55]
Conventional liquid effluents			
Steam generator (SG) blowdown [LCQ] ESWS Blowdown [PBD] Demineralisation plant effluent [GCF]	Non-Active Wastewater Drainage and Treatment System [GM]	Sampling of steam generator systems [LCQ] and [LBA] as part of Auxiliary Sampling system [KUB10] Monitoring, sampling of final discharges [QU]	[53]
Surface Water Drainage System [ZZT]	Oil interceptors and attenuation basins [ZZT]	Monitoring and sampling at outfall pond [QU]	[53]
Sewage System [ZZU]	Foul water treatment plant [ZXH]	Monitoring and sampling at outfall pond [QU]	[53]

Table 25.2-4 Gaseous waste management systems

Waste generation process	Waste management process	Waste measurement / monitoring	Reference
Radioactive Gaseous Effluents			
Dissolved gases from KNL system and the RCDT [KDT10] tank Radioactive aerosols from primary circuit. storage tanks [KNF], [KBE], [FAL]	Gaseous radioactive effluent treatment system [KPL], including charcoal delay beds, moisture removal and catalytic recombination	Main stack exhaust system [KLS] provided with main extract stack exhaust sampling system [KUK10]	[56] [42]
HVAC systems: [KLA] [KLB] [KLC] [KLE] [KLF] [KLL] [KLR]	Systems include filtration, (HEPA, carbon, panel and bag filters), moisture removal	HVAC sampling [KUK20] discharge via stack [KLS]	[57] [23]
Turbine condensate system [LC]	Turbine condenser air removal and evacuation system [MAJ] extracts and vents to vent discharge system [MAQ]	Vent discharge system [MAQ] (potential for radiological discharge in case of SG tube leak)	[25] [42]
Conventional Gaseous Effluents			
Standby AC Generators [BDV]	Detailed design not required or available (for GDA purposes)	MCERTS emissions monitoring system	[14]
Auxiliary Steam Boilers [QH]	Detailed design not required or available (for GDA purposes)	MCERTS emissions monitoring system	
Turbine Condensate System [LC]	Turbine condenser air removal and evacuation System [MAJ] extracts and vents to vent discharge system [MAQ]	Vent discharge system [MAQ]	[25] [42]
Cooling towers discharge	Drift eliminators for [PA] and [PB]	*Process for sampling for legionella TBD*	[13]
Steam dump from Steam Generators [LBK50]		*Monitoring for activity TBD*	

25.3 Conclusion

25.3.1 ALARP, BAT, Secure by Design, Safeguards by Design

The RR SMR is being designed in accordance with policies and principles which have a bearing on radioactive waste generation and management, as well as conventional environmental impacts, are based on UK and international RGP and OPEX and incorporate the principles of ALARP. These policies are embedded into the design through the application of the design decision-making process and through specification of requirements onto the design. Evidence of the application of these processes at DRP1 is demonstrated in the design features presented in this report and in related chapters.

The SSCs identified are at different stages of design maturity and so the level of design information presented reflects the maturity of SSCs at this stage. Future iterations of the E3S Case will provide more consistent coverage and technical descriptions of the listed SSCs as the RR SMR achieves greater design definition.

25.3.2 Assumptions and commitments on future dutyholder

None currently identified.

25.3.3 Conclusions and forward look

Preliminary evidence is provided to support the high-level claim that SSCs key to the environment are conservatively designed and verified to deliver E3S functions through-life, in accordance with the E3S design principles, to reduce risks to ALARP, apply BAT and in line with Secure-by-Design and Safeguards-by-Design.

This chapter provides evidence toward the claim above by addressing the requirements identified in Table 25.0 1, which are consistent with the Environment Agency's 'GDA Guidance for Requesting Parties' [1]. The document signposts to other chapters of the E3S case where technical descriptions of the plant, systems and processes with a bearing on the environment are provided, in addition to a summary of those SSCs which are key in providing environmental protection functions. No further claims, arguments and evidence is provided within this chapter.

The RR SMR is a maturing design, and the information presented is largely based on the design definition at a design reference point (DRP) 1 level of design maturity. The level of information available on the individual SSCs is variable, and Version 2 of the E3S case does not provide detailed descriptions for all of the systems listed. Where the information is not yet available "to be determined (TBD)" notations have been used within the tabular information in section 25.2. Such information will be included in future iterations of the case when those systems have achieved sufficient design definition.

Example tables of environmental protection measures (EPM) relating to waste management are provided in Appendix A, taken from [26]. Similar tables will be provided within the individual E3S case chapters to include the SSCs identified within the chapter and these will continue to be updated in conjunction with system design development.

Forward actions, which need to be completed to support the development of the E3S case and this chapter are captured in Table 25.0-1 below.

Table 25.3-1 Forward actions for chapter 25

Action reference	Action description	Date
FA25.01	To provide further design system information to complete environmental systems tables, within the appropriate section of individual E3S chapters	On-going
FA25.02	To identify all relevant environmental SSCs in tables within the appropriate section of the individual E3S chapters	On-going

25.4 References

[1] Environment Agency, “Guidance, New nuclear power plants: Generic Design Assessment guidance for Requesting Parties,” October 2019. [Online]. Available: https://www.gov.uk/government/publications/new-nuclear-power-plants-generic-design-assessment-guidance-for-requesting-parties/new-nuclear-power-plants-generic-design-assessment-guidance-for-requesting-parties. [Accessed July 2022].

[2] Rolls Royce SMR SMR0004294 Issue 3, E3S Case Version 2, Tier 1 Chapter 1: Introduction, May 2024.

[3] Rolls-Royce SMR SMR0001603 Issue 1, Environment, Safety, Security and Safeguards Design Principles, 2022.

[4] Rolls Royce SMR SMR0008113 Issue 3, “E3S Case Version 2 Tier 1 Chapter 27 Demonstration of BAT,” 2024.

[5] Rolls Royce SMR SMR0004683 Issue 3, “Approach for Optimisation through the Application of BAT,” 2024.

[6] Rolls Royce SMR SMR0000635 Issue 1, “SMR Dose Management Policy,” 2023.

[7] Rolls Royce SMR SMR0006974 Issue 1, “Quantification of Radiological Discharges – Reactor Island Waste Systems,” 2023.

[8] Rolls Royce SMR SMR0009249 Issue 1, “Quantification of Radiological Discharges During Normal Operations,” 2023.

[9] Rolls Royce SMR SMR0009430 Issue 1, “Review of Postulated RR SMR Expected Events,” 2023.

[10] Rolls Royce SMR SMR0009532 Issue 1, “Environmental Radiological Dose Assessment,” 2024.

[11] Rolls Royce SMR SMR0006496 Issue 1, “Liquid Effluent Sampling and Monitoring Philosophy,” 2024.

[12] Rolls Royce SMR SMR0010686 Issue 1, “Gaseous Effluent Sampling and Monitoring Philosophy,” 2024.

[13] Rolls Royce SMR SMR0009088 Issue 1, “Water Use and Abstraction Topic Report,” 2023.

[14] Rolls Royce SMR SMR0008674 Issue 1, “Combustion Activity Topic Report,” 2023.

[15] Assystem, “SMR0008724 Small Modular Reactor High Level Water Balance,” 2023.

[16] Rolls Royce SMR SMR0004542 Issue 3, “E3S Case Version 2 Tier 1 Chapter 2 Generic Site Characteristics,” 2024.

[17] Rolls Royce SMR SMR0004589 Issue 3, “E3S Case Version 2 Tier 1 Chapter 3 E3S Objectives and Design Rules for Structures Systems and Components,” 2024.

[18] Rolls Royce SMR SMR0004363 Issue 3, “E3S Case Version 2 Tier 1 Chapter 4 Reactor (Fuel and Core),” 2024.

[19] Rolls Royce SMR SMR0003984 Issue 3, “E3S Case Version 2 Tier 1 Chapter 5 Reactor Coolant System and Associated Systems,” 2024.

[20] Rolls Royce SMR SMR0003771 Issue 3, “E3S Case Version 2 Tier 1 Chapter 6 Engineered Safety Features,” 2024.

[21] Rolls Royce SMR SMR0003929 Issue 3, “E3S Case Version 2 Tier 1 Chapter 7 Instrumentation and Control,” 2024.

[22] Rolls Royce SMR SMR0004010 Issue 3, “E3S Case Version 2 Tier 1 Chapter 8 Electrical Power,” 2024.

[23] Rolls Royce SMR SMR0003863 Issue 3, "E3S Case Version 2 Tier 1 Chapter 9A Auxiliary Systems," 2024.
[24] Rolls Royce SMR SMR0003778 Issue 3, "E3S Case Version 2 Tier 1 Chapter 9B Civil Engineering Works and Structures," 2024.
[25] Rolls Royce SMR SMR0003880 Issue 3, "E3S Case Version 2 Tier 1 Chapter 10 Steam and Power Conversion Systems," 2024.
[26] Rolls Royce SMR SMR0004502 Issue 3, "E3S Case Version 2 Tier 1 Chapter 11 Management of Radioactive Waste," 2024.
[27] Rolls Royce SMR SMR0004139 Issue 3, "E3S Case Version 2 Tier 1 Chapter 12 Radiation Protection," 2024.
[28] Rolls Royce SMR SMR0004247 Issue 3, "E3S Case Version 2 Tier 1 Chapter 13 Conduct of Operations," 2024.
[29] Rolls Royce SMR SMR0004289 Issue 3, "E3S Case Version 2 Tier 1 Chapter 14 Plant Construction and Commissioning," 2024.
[30] Rolls Royce SMR SMR0003977 Issue 3, "E3S Case Version 2 Tier 1 Chapter 15 Safety Analysis," 2024.
[31] Rolls Royce SMR SMR0004555 Issue 3, "E3S Case Version 2 Tier 1 Chapter 16 Operational Limits and Conditions," 2024.
[32] Rolls Royce SMR SMR0004334 Issue 3, "E3S Case Version 2 Tier 1 Chapter 17 Management for E3S Case & Quality Assurance," 2024.
[33] Rolls Royce SMR SMR0004363 Issue 3, "E3S Case Version 2 Tier 1 Chapter 18 Human Factors Engineering," 2024.
[34] Rolls Royce SMR SMR0004571 Issue 3, "E3S Case Version 2 Tier 1 Chapter 19 Emergency Preparedness & Response," 2024.
[35] Rolls Royce SMR SMR0004982 Issue 3, "E3S Case Version 2 Tier 1 Chapter 20 Chemistry," 2024.
[36] Rolls Royce SMR SMR0004599 Issue 3, "E3S Case Version 2 Tier 1 Chapter 21 Decommissioning and End-of-life Aspects," 2024.
[37] Rolls Royce SMR SMR0004367 Issue 1, "E3S Case Version 2 Tier 1 Chapter 22 Conventional and Fire Safety," 2024.
[38] Rolls Royce SMR SMR0004363 Issue 3, "E3S Case Version 2 Tier 1 Chapter 23 Structural Integrity," 2024.
[39] Rolls Royce SMR SMR0004487 Issue 3, "E3S Case Version 2 Tier 1 Chapter 24 Alarp Summary," 2024.
[40] Rolls Royce SMR SMR0010327 Issue 2, "E3S Case Version 2 Tier 1 Chapter 25 Environmental Equipment," 2024.
[41] Rolls Royce SMR SMR0010322 Issue 2, "E3S Case Version 2 Tier 1 Chapter 26 Sustainability," 2024.
[42] Rolls Royce SMR SMR0010323 Issue 2, "E3S Case Version 2 Tier 1 Chapter 28 Sampling Arrangements, Techniques and Systems," 2024.
[43] Rolls Royce SMR SMR0004486 Issue 3, "E3S Case Version 2 Tier 1 Chapter 29 Quantification of Radioactive Effluent Discharges and Proposed Limits," 2024.
[44] Rolls Royce SMR SMR0004490 Issue 3, "E3S Case Version 2 Tier 1 Chapter 30 Prospective Radiological Assessment at the Proposed Limits for Discharges," 2024.
[45] Rolls Royce SMR SMR0004514 Issue 3, "E3S Case Version 2 Tier 1 Chapter 31 Conventional Impact Assessment," 2024.

[46] Rolls Royce SMR SMR0004682 Issue 3, “E3S Case Version 2 Tier 1 Chapter 32 Generic Security Report,” 2024.

[47] Rolls Royce SMR SMR0004293 Issue 3, “E3S Case Version 2 Tier 1 Chapter 33 Safeguards,” 2024.

[48] Rolls Royce SMR SMR0000983 Issue 2, “System Outline Description for the Handling of Nuclear Equipment [F] System,” 2023.

[49] Rolls Royce SMR SMR0007665 Issue 1, “Disposability Case Report,” 2023.

[50] Rolls Royce SMR SMR0002131 Issue 2, “Integrated Waste Strategy,” 2023.

[51] Rolls Royce SMR SMR0001123 Issue 2, “System Design Description for the Solid Radioactive Waste Processing System [KM],” 2023.

[52] Rolls Royce SMR SMR0007007 Issue 1, “Waste Facilities Basis of Design,” 2023.

[53] Rolls Royce SMR SMR0006562 Issue 1, “Process Flow Diagram: Liquid Effluent Environmental Discharges,” 2023.

[54] Rolls Royce SMR SMR0000631 Issue 2, “System Design Description for Liquid Radioactive Effluent Processing System [KNF],” 2023.

[55] Rolls Royce SMR SMR0004646 Issue 1, “Reactor Island Component Decontamination [FKA] System Design Description,” 2023.

[56] Rolls Royce SMR SMR0000746 Issue 2, “System Design Description for Gaseous Radioactive Effluent Treatment System [KPL],” 2023.

[57] Rolls Royce SMR SMR0004702 Issue 1, “System Design Description for the HVAC Systems serving Controlled and Uncoltrolled Areas of Reactor Island [KL],” 2023.

[58] Rolls Royce SMR SMR0005548 Issue 1, “Identification of Environmental Functions and Environmental Measures,” 2023.

25.5 Appendix A

25.5.1 Environmentally significant SSCs

A summary of the significant systems relating to management of wastes is provided in the tables below [26].

Table 25.5-1 Environmentally significant SSCs within [KNF] and [KTA]

System	SSC	Environmental function	Description
[KNF10]	Primary liquid effluent transfer pump suction line	Waste treatment & abatement	To remove accumulated solid particulates.
[KNF10]	Vacuum degasser column	Waste treatment & abatement	Removal of dissolved radioactive gases (xenon, krypton) and hydrogen from the reactor coolant.
[KNF20]	Process drains	Waste treatment & abatement	To keep process drain effluent segregated from other effluent categories.
[KNF20]	Chemical drains	Waste treatment & abatement	To keep chemical drain effluent segregated from other effluent categories.
[KNF20]	Floor drains	Waste treatment & abatement	To keep floor drain effluent segregated from other effluent categories.
[KNF20]	Pre-filters	Waste treatment & abatement	To remove total suspended solids from effluent streams.
[KNF20]	RO system	Waste treatment & abatement	To remove total dissolved solids from the effluent streams.
[KNF20]	IX resin beds	Waste treatment & abatement	To remove further contaminants from the effluent streams.
[KNF20]	Post-filters	Waste treatment & abatement	To remove further solids from the effluent streams.
[KNF20]	Waste evaporator column	Waste treatment & abatement	To treat spent liquid effluent of relatively high chemical contamination.
[KNF20]	[KNF20] Tanks recirculation line	Sampling & monitoring	To enable a representative sample to be taken.

System	SSC	Environmental function	Description
[KNF20]	Pump suction line	Waste treatment & abatement	To remove accumulated solids.
[KNF30]	[KNF30] Tanks recirculation line	Sampling & monitoring	To enable a representative sample to be taken.
[KNF30]	Pump suction line	Waste treatment & abatement	To remove accumulated solids.
[KTA10]	Reactor coolant drainage tank heat exchanger	Waste treatment & abatement	To reduce the amount of gaseous discharge to the gaseous radioactive effluent treatment system [KPL].
[KTA10]	Reactor coolant drainage tank heat transfer pumps	Waste treatment & abatement	To help cool primary coolant and reduce the amount of gaseous discharge to the gaseous radioactive effluent treatment system [KPL].
[KTA20]	[KTA20] tanks, sumps and pipework	Waste treatment & abatement	To keep process and floor drain effluent segregated from other effluent categories.
[KTA20]	Transfer pumps / recirculation line	Sampling & monitoring	To promote homogenous mixing to allow enable a representative sample to be taken.
[KTA20]	TBC: A solution to remove oil contamination in [KTA20]	Waste treatment & abatement	To remove any oil present in the effluent prior to downstream management.
[KTA30]	[KTA30] tanks, sumps and pipework	Waste treatment & abatement	To keep chemical drain effluent segregated from other effluent categories.
[KTA30]	Transfer pumps / recirculation line	Sampling & monitoring	To promote homogenous mixing to allow enable a representative sample to be taken.

Table 25.5-2 Environmentally significant SSCs within [KPL] and [KL]

System	SSC	Environmental function	Description
[KPL]	Recombiner	Treatment and abatement	Optimal performance of the recombiner will minimise the use of resources i.e. hydrogen and oxygen gases.
[KPL]	Gas compressors	Treatment & abatement	To maximise the amount of gaseous effluent that can be recycled as cover gas and minimise the use of resources.
[KPL]	Charcoal delay beds	Treatment & abatement	To provide hold-up and decay of xenon and krypton, prior to release to the stack via the HVAC systems in processing building for radioactive waste [KLF].
[KPL]	Dryer package and guard bed	Treatment & abatement	A dryer equipment package (a dedicated chiller unit) is proposed for chilling the effluent stream and draining the excess moisture. A guard bed of activated charcoal acts as a sacrificial bed to protect the delay beds from contaminants or moisture carryover.
[KPL]	Exhaust	Containment Treatment & abatement	The exhaust is crucial to ensure that [KPL] discharges are routed to an authorised discharge point to the environment. Helps provide required dispersion to minimise environmental impact.
[KPL]	In-process monitoring equipment e.g. gas concentrations, pressure, temperature,	Sampling & monitoring	To provide relevant information on in-process performance of [KPL] and resource consumption e.g. the cooled effluent stream is also sampled

System	SSC	Environmental function	Description
	flowrate, moisture, and levels.		downstream to monitor the recombiner performance.
[KPL]	Alarm and warning equipment	Sampling & monitoring	To support the safe operation and control of the gaseous radioactive effluent treatment system [KPL].
[KLA]	Carbon filter	Treatment & abatement	To remove gaseous contamination from primary containment.
[KLA] [KLB] [KLC] [KLF] [KLL]	Primary HEPA filters	Treatment & abatement	To remove particulate contamination from the exhaust air before discharge to the environment.
[KLA] [KLB] [KLC] [KLF] [KLL]	Secondary HEPA filters	Treatment & abatement	To remove particulate contamination from the exhaust air before discharge to the environment in case of perforation of the primary HEPA filter.
[KLA]	Carbon filter DP monitor	Sampling & monitoring	To provide information on the performance of the carbon filter.
[KLA] [KLB] [KLC] [KLF] [KLL]	HEPA filter DP monitors	Sampling & monitoring	To provide information on the performance of the HEPA filter.

Table 25.5-3 Environmentally significant SSCs within [KM]

System	SSC	Environmental function	Description
[KMA10]	Low-force compactor	Treatment & abatement	To minimise the volume of LLW prior to transfer to other premises.
[KMA10]	LLW grouting plant	Treatment & abatement	To condition waste in such a way to facilitate disposal.
[KMA20]	ILW grouting plant	Treatment & abatement	To condition waste in such a way to facilitate disposal.
[KME10]	Waste storage cages	Treatment & abatement	Used for the appropriate segregation of solid wastes to facilitate optimised waste management routes.
[KME20]	Concentrate tanks	Treatment & abatement	To hold sufficient capacity to allow for optimised treatment of concentrates and to be designed in such a way as to prevent accumulation of solids.
[KME20]	Filter solid tanks	Treatment & abatement	To hold sufficient capacity to allow for optimised treatment of filter solids and to be designed in such a way as to prevent accumulation of solids.
[KME20]	Resins tanks	Treatment & abatement	To hold sufficient capacity to allow for optimised treatment of resins and to be designed in such a way as to prevent accumulation of solids.
[KME20]	Concentrate tanks recirculation line	Sampling & monitoring	To allow a representative sample to be taken.
[KME20]	Concentrate tanks draw-off sump	Treatment & abatement	To allow the removal of accumulated particulate.
[KME20]	Resin tanks recirculation line	Sampling & monitoring	To allow a representative sample to be taken.
[KME20]	Resin tanks draw-off sump	Treatment & abatement	To allow the removal of accumulated particulate.
[KME20]	Pipework flushing supply points	Treatment & abatement	To allow adequate flushing of pipework and prevent the build-up of solids.

25.6 Glossary of Terms and Abbreviations

ALARP	As Low As Reasonably Practicable
BAT	Best Available Techniques
BoP	Balance of Plant
CDOIF	Chemical and Downstream Oil Industries Forum
CIV	Civil, Structural and Architectural Systems
CWI	Cooling Water Island
DRP	Design Reference Point
E3S	Environment, Safety, Security and Safeguards
EC&I	Electrical Control and Instrumentation
EPM	Environmental Protection Measures
ESWS	Essential Services Water System
GDA	Generic Design Assessment
HEPA	High Efficiency Particulate Air
HVAC	Heating, Ventilation and Air Conditioning
ILW	Intermediate Level Waste
LLW	Low Level Waste
MCERTS	Monitoring Certification Scheme
NHS	Non-Human Species
PWR	Pressurised Water Reactor
RDS-PP	Reference Design System for Power Plants

RGP	Relevant Good Practice
RPV	Reactor Pressure Vessel
RR SMR	Rolls-Royce Small Modular Reactor
SF	Spent Fuel
SG	Steam Generator
SSCs	Structures, Systems and Components
TBD	To Be Determined