Eskom	PROCEDURE	NUCLEAR ENGINEERING

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Compiled by	Functional Responsibility	Authorized by
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1. Introduction

This document is necessary to ensure that design changes to the plant, plant structures or plant operating parameters that affect the design or operation of Koeberg Operating Unit are compiled, reviewed and approved in a systematic and controlled manner and to ensure that all design related configuration and quality requirements are met.

2. Supporting Clauses

2.1 Scope

This procedure is applicable to design changes to structures, systems and components at Koeberg Operating Unit and to off-site plant and structures affecting the safety and operation of Koeberg Operating Unit.

2.1.1 Purpose

2.1.1 To describe the responsibilities and processes for design changes to plant, plant structures or plant operating parameters that affect the design or operation of Koeberg Operating Unit.

2.1.2 To ensure that design change packages are compiled, reviewed, and approved in a systematic and controlled manner.

2.1.3 To ensure that all design related configuration and quality requirements are met.

2.1.2 Applicability

2.2.1 This document is applicable to:

2.2.2.1 Design changes to plant or plant structures.

2.2.2.2 Operating parameter changes such as trip points, alarm points, pressure, temperature, flow, or control system settings that are limited by the plant design.

2.2.2.3 Temporary alteration and equivalency reviews.

2.2.2.4 Design changes to the physical security systems which change the design intent.

2.2.2.5 Design changes of any packaging for the transport of radioactive material.

2.2.2.6 Design changes to software or software systems related to the plant.

2.2.2 This document is NOT applicable to:

2.2.2.1 New facilities and changes to facilities that are not plant structures.

2.2.2.2 Modifications to off-site plant and structures that do not affect the safety and operation of Koeberg Operating Unit.

2.2.2.3 Plant changes governed by other procedures.

2.2.2.4 Changes to operational parameters that are within the analysed design limits.

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2.1.3 Effective date

This procedure shall be effective from authorisation date.

2.2 Normative/Informative References

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative

[1] 331-2: Quality Management Manual for Nuclear Engineering

[2] 286-6: KOU Documentation and Records Management Standard

[3] 331-3: Nuclear Engineering Documentation and Records Management Work Instruction

[4] 331-83: Standard for Plant Changes Affecting the Design of Koeberg Nuclear Power Station

[5] 331-313: Design Field Changes

[6] DSG 318-087: Quality Requirement of Assets, Goods and Services

[7] KAA-500: The Process for Controlled Procedures

[8] KAA-648: Administration and Responsibilities for Requalification Testing

[9] 240-102714621 (KAA-717): Management Review Board Constitution

[10] KAB-018: The Operating Department Procedure Change Process

[11] KFA-002: Project Engineering Work Plan Form

[12] KFA-006: Testing Procedure for Plant Modifications

[13] 240-119520512 (KFU-013): Client User Requirement Specification

[14] KGA-018: Safety Case Preparation

[15] KGA-067: Safety, Health and Environmental Risk Assessment Guide

[16] 331-94 (KLA-001): Importance Category Classification Listing

[17] KSA-011: The Requirements for Controlled Documents

[18] KSA-085: Requirements for the Safety, Health and Environmental Management System

[19] KSA-913: Maintenance Basis Determination, Documentation and Change Control

[20] KSU-008: Nuclear Design Standard for Koeberg Nuclear Power Station

[20] LD-1012: Requirements in Respect of Proposed Modifications to the Koeberg Nuclear Power Station

2.2.2 Informative

[21] 331-84: Modifications To Software On The KIT System

[21] 331-85: The Control of Plant Documents as a Result of a Plant Design Change, Plant Anomaly or Document Anomaly

[22] 331-87: Design Engineering Guide

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[23] 331-88: Temporary Alterations to Plant, Plant Structures or Operating Parameters that Affect the Design Base
[24] 331-91: Control Of Equipment And Software Classifications
[25] 331-93: Guide For Classification Of Plant Components, Structures And Parts
[26] 331-143: The Equivalency Process to Change Plant
[27] 331-212: Document Change Identification Form
[28] KAA-501: Project Management Process for Koeberg Nuclear Power Station Modifications
[29] 240-85520008 (KAA-503): Modifications To Simulator
[30] KAA-690: Operability Determinations
[31] KAA-709: Process for Performing Safety Evaluations, Screenings and Safety Justifications
[32] 240-86502715 (KAA-803): Processing Minor Modifications
[33] 331-187 (KAA-834): Environmental Qualification Preservation Programme Process and Responsibilities
[34] KBA0000G00032: Equipment Identification System
[35] KBA0000G00036: List of Systems
[36] KFA-006: Testing Procedure for Plant Modifications
[37] 331-433 (KFU-026): Detailed Design Review Report
[38] 240-119523820 (KFU-027): Project Team Review Report
[39] 240-119528368 (KFU-028): ALARA Checklist
[40] KFU-PE-004: Construction Status Certificate (CSC)
[41] KGA-025: Screening And Safety Evaluation Guide
[42] KGA-042: Software Classifications
[43] KGU-023: Guide For Component Engineers
[44] 240-89294359 (KSA-010): Nuclear Safety, Seismic, Environmental Quality And Importance Classification
[45] 331-165 (KSA-016): Preparation Of Engineering Technical Specifications
[46] 240-143809978: Detailed Design Template

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2.3 Definitions

2.3.1 Acceptance Review – Performed by any person assigned by Eskom Holdings Ltd. Only externally compiled and reviewed designs are subject to acceptance reviews. The scope of the acceptance review may be identical to a full independent review as described in the relevant procedure.

2.3.2 Classification – Generic term encompassing safety, seismic, quality, environmental and importance level, or, the process of assigning these designations.

2.3.3 Configuration Management – Is the effective control of the as-built configuration and operation of Koeberg to ensure compliance with the approved and/or accepted technical requirements and other governing criteria.

2.3.4 Configuration Management File – A record of all the plant documentation that will be revised, withdrawn or superseded as a result of a plant design change and shall be included in a design change package as a configuration management file or recorded on a document change identification form or DCIF.

2.3.5 Critical Operating Parameter – A component, system, software logic, radiation level, alarm or control setting that, if modified, will place the plant in an unanalysed condition that is not within the analysed plant design basis envelope which has been demonstrated to be safe.

2.3.6 Design Bases – Information which identifies the specific function to be performed by a structure, system or component of a facility, and the specific values or ranges of values chosen for controlling parameters as reference bounds for design.

2.3.7 Design Engineer – The engineer assigned to the project with the prime responsibility for the technical integrity of the project.

2.3.8 Design Field Change – A change to a design change package during the implementation phase of a modification that does not change or have an impact on the design intent.

2.3.9 Design Inputs – Design objectives, all data, loading, parameters, calculation models, calculation algorithms, assumptions or other information that could affect the design.

2.3.10 Design Outputs – The design document, calculations, drawings, computer printouts, parameters or other documentary information produced.

2.3.11 Design Revision Change – A change to a design before or during the implementation phase of a modification where there are changes to the design intent.

2.3.12 Discrepancy Report – A notification raised for an externally compiled design change package when a deviation from the Eskom approved design change package is identified during installation.

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2.3.13 Document User – Any person or group that will be using the specific output document, compiled in accordance with this process, as an input into their process or activity.

2.3.14 Document User Validation – A review of the output document against the requirements of the Document Users internal processes. The validation is considered complete when the Document User is satisfied that they can perform their activities in accordance with the output document requirements without violation of their internal requirements.

2.3.15 Eskom Reviewer – Any person assigned by Eskom Holdings Ltd. To perform an Independent review on behalf of Eskom Holdings Ltd.

2.3.16 Field Tunable Operating Parameter – A component, system, software logic, radiation level, alarm or control setting that, if modified, remains within its safe, accepted, analysed, design basis operating range and does not place the plant in a state where it falls outside the safe, accepted, analysed plant design basis.

2.3.17 Independent Review – A complete review of an internally or externally compiled design in accordance with the appropriate review procedure.

2.3.18 Modification – Any change to, removal of, or addition to structures, systems, or components or part thereof, or changes to operating parameters that affect the design or operation of Koeberg Operating Unit.

2.3.19 Project Stakeholders – Individuals or groups that are actively involved in the project or whose interest may be positively or negatively affected as a result of project execution. They may also exert influence over the project and its outcomes.

2.3.20 Project Team Acceptance Review – Performed by each member of the project team, who review the design for impact on their specific areas of interest/expertise on the plant.

2.4 Abbreviations

Abbreviation	Description
AR	Availability Related
COC	Certificate of Compliance in accordance with SANS 10142 for Electrical Installations
CMG	Configuration Management Group
CSC	Construction Status Certificate
CSR	Critical Safety Related
DCIF	Document Change Identification Form
DR	Discrepancy Report
EOP	Emergency Operating Procedure
ECMC TOR	Engineering Change Management Committee Terms Of Reference
EIA	Environmental Impact Assessment
EWR	Engineering Work Request
FMEA	Failure Modes and Effects Analysis

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Abbreviation	Description
FRS	Functional Requirements Specification
HFE	Human Factors Engineering
HSI	Human-System Interface
MEC	Modification Evaluation Committee
MRB	Management Review Board
NEM	Nuclear Engineering Manager
NNR	National Nuclear Regulator
NPM	Nuclear Project Management
NSA	Non-nuclear Safety and Availability Related
OEM	Original Equipment Manufacturer
OH&S	Occupational Health and Safety
PEWA	Project Engineering Works Authorisation
RP	Radiation Protection
SAP	Systems, Applications and Products
SAR	Safety Analysis Report
DE	Design Engineering
SOW	Statement of Work
SR	Safety Related
SSC	Systems, Structures and Components
TAF	Temporary Alteration Form
TD&RM	Technical Documentation and Records Management
TRS	Technical Requirement Specification
URS	User Requirement Specification

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2.5 Roles and Responsibilities

2.5.1 The Design Engineering manager is responsible for correctly implementing and maintaining the process described in this procedure.

2.5.2 Document Users shall validate output documents produced in accordance with this procedure. The Document User shall sign the output document to indicate completion of their validation.

2.5.3 Project team members' responsibilities are defined in KAA-501.

2.5.4 Companies compiling designs for Koeberg shall ensure that the designs have been reviewed in accordance with Section G prior to submitting the design package for an acceptance review.

2.5.5 Eskom (Design Engineering Manager and Nuclear Project Manager) shall maintain sufficient and competent staff and resources to specify, set standards, manage and evaluate all work carried out by contractors or vendors during the plant change processes.

2.6 Process for Monitoring

2.6.1 Detailed Process

2.6.1.1 The Work Flow Responsibility Matrix (Appendix A) consists of:

A – Problem Resolution Strategy

B – Design Processing

C – Preparation of a Feasibility Study

D – Preparation of a Detailed Design

E – Design Field Changes

F – Review of a Temporary Alteration

G – Design Review Process

H – Configuration Control

3. Acceptance

This document has been seen and accepted by:

Name	Designation
N Mtoko	Nuclear Technical Plan Manager (DE)
R Goldstein	Design Engineering Manager
B Mashele	Koeberg Engineering
N Mahlangu	Operating Procedures Group
S Pemba	Nuclear Project Management
A Holland	Configuration Management Group

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4. Revisions

Date	Rev.	Compiler	Remarks
November 2018	2	S Saban	Full revision. Updated network location of detailed design template and document reference number in accordance with CR 103659 – 001CA.
December 2015	1	S Saban	Revised in accordance with CR 90910
April 2014	0	M Williams	Document compiled to address CA 31525 (update document to address the objectives of NNR letter k10000663N, *Eskom Modification Process: Updated Regulatory Requirements*), CA 30055 and to convert KAA-815 to the new document format.

5. Development Team

The following people were involved in the development of this document:

- S Saban
- N Mtoko

6. Acknowledgements

N/A

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7. Attachments

Appendix A – Work Flow Responsibility Matrix

WORK FLOW RESPONSIBILITY MATRIX — **APPENDIX A PROBLEM RESOLUTION STRATEGY**

R – Responsible
A – Approve
F – File
• – Outside Matrix Scope
Y/N or N/Y – Decision
C – Concur
I – Informed
S – Service
[ ] – Mandatory Requirement
( ) – As Appropriate/Required
Flow Path:
Main Flow ⟷ Secondary Flow

ORGANISATION / FUNCTION

	1	2 OWNER / CLIENT	3 DESIGN ENGINEERING MANAGEMENT	4 SYSTEM ENGINEERING	5	6 DOCUMENT USER	7	8	9	10	11	12	**NOTES & REFERENCES**
ACTIVITIES													
A. PROBLEM RESOLUTION STRATEGY													
1. Enter this procedure through a suitable plant change process.		[R]											Applicable entry procedures are KAA-501, 331-143, 331-88, KAA-560 and KAA-803.
2. Is this an equivalency review?		N/Y →											For equivalency design reviews, go to 331-143.
3. Is this a temporary alteration review?		N/Y											Use Section F.
4. Is this a document(s) or procedure(s) requiring referencing, revision, withdrawal and/or new documents to be placed in the system?		N/Y											Contact DE, use SECTION H, affected document(s) to be processed in accordance with KAA-560.
5. Does this involve a change to a critical operating parameter?			N/Y										DE to compile a design, in accordance with SECTION D.
6. Does this involve a change to a field tunable operating parameter?			N/Y	[R]									The system engineer can process the change and ensure that the relevant documentation is updated in accordance with KAA-560.
7. Is this a review of a design change package, internally or externally compiled?		N/Y											Contact DE, use SECTION G.
8. Is this an initial or revised classification?		N/Y											Contact DE, use 331-93, KSA-010 and 331-91. Software classification in accordance with KGA-042.
9. Is this a design field change?		N/Y											Contact DE, use SECTION E.

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WORK FLOW RESPONSIBILITY MATRIX

APPENDIX A
PROBLEM RESOLUTION STRATEGY

R – Responsible
A – Approve
F – File
• – Outside Matrix Scope
Y/N or N/Y – Decision
C – Concur
I – Informed
S – Service
[ ] – Mandatory Requirement
( ) – As Appropriate/Required
Flow Path:
Main Flow Secondary Flow

ORGANISATION / FUNCTION

		1	2	3	4	5	6	7	8	9	10	11	12	
			OWNER / CLIENT	ESIGN ENGINEERING MANAGEMENT	SYSTEM ENGINEERING		DOCUMENT USER							**NOTES & REFERENCES**
ACTIVITIES														
10.	Is this a permanent plant modification?		N/Y											
11.	Exit this process		[•]		[I]									Consult your supervisor or group head regarding the process to be used for your application.
12.	Obtain approval for the modification.		(S)		[R]		(S)							In accordance with KAA-501 KAA-717 and ECMC TOR.

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WORK FLOW RESPONSIBILITY MATRIX

APPENDIX A
DESIGN PROCESSING

R – Responsible
A – Approve
F – File
• – Outside Matrix Scope
Y/N or N/Y – Decision
C – Concur
I – Informed
S – Service
[ ] – Mandatory Requirement
( ) – As Appropriate/Required
Flow Path:
Main Flow — Secondary Flow

ORGANISATION / FUNCTION

	1 PROJECT MANAGER	2 OWNER / CLIENT	3 PLANT ENGINEERING	4 DESIGN ENGINEER (COMPILER)	5 DESIGN ENGINEER (REVIEWER)	6 DESIGN MANAGER	7 DOCUMENT USERS	8	9	10	11	12	**NOTES & REFERENCES**
ACTIVITIES													
B. DESIGN PROCESSING													
1. Is the Pre-feasibility study and/or Feasibility Study required?						Y/N →							Sufficient justification for not performing a feasibility study shall be provided in the Detailed Design.
2. Will external resources be used for this feasibility study?						Y/N							The need for external resources will be determined by the Design Engineering Manager.
3. Prepare the Technical User Requirement Specification				[R]	[S]	[A]							This defines the scope of the engineering/design work related to the feasibility study. Use the TRS template (331-32).
4. Prepare a Feasibility Study.				[R]	[S]	[A]							Refer to SECTION C. Step initiated by KAA-501. Upon completion return to KAA-501 and continue. Pre-Feasibility Study or Feasibility Study Template (331-340).
5. Are the Feasibility Study results accepted?	(I)		(R)			Y/N →							Notify the owner and Nuclear Project Management in writing of the rejection.
6. Will external resources be used for compilation of the detailed design change?						Y/N							The need for external resources will be determined by the Design Engineering Manager.
7. Prepare the Technical User Requirement Specification.	[S]			[R]	[S]	[A]							This defines the scope of the engineering/design work related to the compilation of a detailed design change package.
8. Prepare the Detailed Design	[S]			[R]			(S)						Refer to SECTION D. Step initiated by KAA-501. Upon completion return to KAA-501 and continue.

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WORK FLOW RESPONSIBILITY MATRIX	**APPENDIX A DESIGN PROCESSING**												
R – Responsible A – Approve F – File • – Outside Matrix Scope Y/N or N/Y – Decision C – Concur I – Informed S – Service [ ] – Mandatory Requirement ( ) – As Appropriate/Required Flow Path: Main Flow Secondary Flow	**ORGANISATION / FUNCTION**												**NOTES & REFERENCES**
	PROJECT MANAGER	OWNER / CLIENT	PLANT ENGINEERING	DESIGN ENGINEER (COMPILER)	DESIGN ENGINEER (REVIEWER)	DESIGN MANAGER	DOCUMENT USERS						
ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
9. Process the Configuration Management changes.	[S]			[R]			(S)						Refer to SECTION H. This step relates to ensuring that all documentation updates have been identified and are being processed.
10. Forward complete Detailed Design Package for Design Review, Concurrence Reviews and Authorisation.	[S]		[S]	[R]	[S]	[A]	[S]						Concurrence reviewers review for impact on their departments and also concur that the necessary documents requiring change have been identified in the design. The Design Review is performed in accordance with SECTION G.
11. An Eskom technical respresentative to verify that the requirements specification has been met before any manufactured goods leave the factory.				[R]									This applies to whole components only (e.g. transformer, turbine generator, computer CPU).
12. Provide design support during installation of the design package.	(S)			[R]									On-site design support as required by the Project Manager. This includes providing the technical input required to complete KFA-006. No changes may be made to an already authorised KFA-006 without a DE review.
13. Designer inspects and formally accepts the completed installation.	(S)			[R]									The designer should consider the installation to be in compliance with the requirements of the design prior to accepting the installation. The designer shall also sign KFU-PE-004, the CSC.

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WORK FLOW RESPONSIBILITY MATRIX	**APPENDIX A DESIGN PROCESSING**												
R – Responsible A – Approve F – File • – Outside Matrix Scope Y/N or N/Y – Decision C – Concur I – Informed S – Service [ ] – Mandatory Requirement ( ) – As Appropriate/Required Flow Path: Main Flow Secondary Flow	**ORGANISATION / FUNCTION**												**NOTES & REFERENCES**
	PROJECT MANAGER	OWNER / CLIENT	PLANT ENGINEERING	DESIGN ENGINEER (COMPILER)	DESIGN ENGINEER (REVIEWER)	DESIGN MANAGER	DOCUMENT USERS						
ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
14. Provide design support during testing and commissioning of the design package.	(S)			[R]									
15. Designer accepts the testing and commissioning.	(S)			[R]									The designer shall be confident that the testing/commissioning requirements have been met prior to final hand over.
16. Verify the “as-built” status of the plant installation drawings.	(S)			[R]									
17. Close out Configuration Management File after successful commissioning.	[R]			[S]									Submit the complete Configuration Management File to the Project Manager for close out of the modification package in accordance with KAA-501.

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WORK FLOW RESPONSIBILITY MATRIX	APPENDIX A PREPARATION OF A FEASIBILITY STUDY											
R – Responsible A – Approve F – File • – Outside Matrix Scope Y/N or N/Y – Decision C – Concur I – Informed S – Service [ ] – Mandatory Requirement ( ) – As Appropriate/Required Flow Path: Main Flow ⟷ Secondary Flow	ORGANISATION / FUNCTION											NOTES & REFERENCES
	DESIGN ENGINEER (COMPILER)	DESIGN ENGINEER (REVIEWER)	DESIGN ENGINEERING MANAGER	PROJECT MANAGER	PROJECT TEAM	MAINTENANCE REPRESENTATIVES	OPERATING REPRESENTATIVE	PLANT ENGINEERING REPRESENTATIVE				
ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
C. PREPARATION OF A FEASIBILITY STUDY													
1. Assess the Client URS or SOW.	[R]												Assessment performed to gain an understanding of the client requirements, problem statement and existing design.
2. Compile the list of design, installation, test and documentation requirements for this change.	[R]												Refer to plant System DSE, SAR, Setpoint Manuals, Accident Analysis Manuals, System Operating Procedures, Maintenance Bases, etc.
3. Was a Feasibility Study performed previously?	N/Y →												Review to gain an understanding of what alternative approaches to resolving the problem have been considered and what the recommended and/or selected approach is. Establish why another feasibility study is required.
4. Compile a list of alternatives that would resolve the root cause.	[R]			(S)		(S)	(S)	(S)					
5. Filter the list of alternatives.	[R]			(S)		(S)	(S)	(S)					
6. Evaluate each filtered alternative technically.	[R]												
7. Compile a FMEA for each alternative.	[R]			(S)		(S)	(S)	(S)					
8. Compile a bill of materials for each alternative with budget costs.	[R]												Each alternative should be accompanied by a rough sketch indicating how the option will interface with the plant and how the alternative will work with

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WORK FLOW RESPONSIBILITY MATRIX	**APPENDIX A** **PREPARATION OF A FEASIBILITY STUDY**

R – Responsible
A – Approve
F – File
• – Outside Matrix Scope
Y/N or N/Y – Decision
C – Concur
I – Informed
S – Service
[ ] – Mandatory Requirement
( ) – As Appropriate/Required
Flow Path:
Main Flow ←→ Secondary Flow

ACTIVITIES	**ORGANISATION / FUNCTION**												**NOTES & REFERENCES**
	DESIGN ENGINEER (COMPILER)	DESIGN ENGINEER (REVIEWER)	DESIGN ENGINEERING MANAGER	PROJECT MANAGER	PROJECT TEAM	MAINTENANCE REPRESENTATIVES	OPERATING REPRESENTATIVE	PLANT ENGINEERING REPRESENTATIVE					
	1	2	3	4	5	6	7	8	9	10	11	12	
													equipment needed.
9. Determine the process costs associated for each alternative.	[R]			(S)									Refer to 331-87 for various costs incurred as a result of a design change.
10. Determine the associated configuration management costs of each alternative.	[R]			(S)									The configuration management costs are introduced as a result of procedure changes, SAR changes, OTS changes, etc identified in the Client URS or Technical URS.
11. Compile a total cost for each alternative.	[R]			(S)									This amount will be the total capital cost of the project if the option is selected.
12. Compile a benefits analysis for each alternative	[R]			(S)									Refer to 331-87. This should provide you with the potential income stream from this alternative annually.
13. Determine the Present Value for each alternative.	[R]			(S)									Refer to 331-87. Perform a discounted cash flow for each alternative over the remaining life of plant and associated benefit costs
14. Determine the Net Present Value for each alternative	[R]			(S)									This is performed to determine which alternative is most suitable.
15. Recommend an alternative to resolve the problem.	[R]												The project with the highest NPV, highest IRR or lowest payback period is usually selected provided it offers the best reliability.
16 Determine whether an EIA is required for the recommended solution. If required perform or	[R]												

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WORK FLOW RESPONSIBILITY MATRIX	**APPENDIX A** **PREPARATION OF A FEASIBILITY STUDY**												
R – Responsible A – Approve F – File • – Outside Matrix Scope Y/N or N/Y – Decision C – Concur I – Informed S – Service [ ] – Mandatory Requirement ( ) – As Appropriate/Required Flow Path: Main Flow ⟷ Secondary Flow	**ORGANISATION / FUNCTION**												**NOTES & REFERENCES**
	DESIGN ENGINEER (COMPILER)	DESIGN ENGINEER (REVIEWER)	DESIGN ENGINEERING MANAGER	PROJECT MANAGER	PROJECT TEAM	MAINTENANCE REPRESENTATIVES	OPERATING REPRESENTATIVE	PLANT ENGINEERING REPRESENTATIVE					
ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
initiate request for the EIA.													
16. Compile a preliminary safety screening for the recommended alternative.	[R]												Performed in accordance with KAA-709 and KGA-025.
17. Compile an executive summary for the recommended alternative.	[R]												The summary should be description of the problem, selected solution and associated results in paragraph format.
18. Complete the Feasibility Study Template.	[R]												Use the template 331-340.
19. Compile a set of conceptual drawings and attach to the feasibility study.	[R]												These can be official drawings completed by the drawing office and/or sketches of the conceptual design.
20. Compile the reference list for your document compilation.	[R]												Update the Configuration Management File.
21. Review your document for editorial compliance.	[R]												
22. Submit your compilation for independent review.	[R]	[S]		[I]	[I]	[I]	[I]	[I]					
													See SECTION C, Activities 23 to 44.
23. Review the relevant preceding documentation.		[R]		[S]	[S]	[S]	[S]	[S]					Read the following documents to gain an understanding of the intended change being addressed: • SOW

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WORK FLOW RESPONSIBILITY MATRIX

APPENDIX A
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Flow Path:
Main Flow ⟷ Secondary Flow

ORGANISATION / FUNCTION

ACTIVITIES	1 DESIGN ENGINEER (COMPILER)	2 DESIGN ENGINEER (REVIEWER)	3 DESIGN ENGINEERING MANAGER	4 PROJECT MANAGER	5 PROJECT TEAM	6 MAINTENANCE REPRESENTATIVES	7 OPERATING REPRESENTATIVE	8 PLANT ENGINEERING REPRESENTATIVE	9	10	11	12	**NOTES & REFERENCES**
													• Client URS • FRS • Feasibility Study • Technical URS (if available)
24. Review the alternative solutions considered.		[R]			[S]								Determine whether the alternatives list is complete and all encompassing.
25. Review the technical criteria used to filter the alternatives.		[R]			[S]								Determine if the technical criteria used were all encompassing and whether sound judgement has been used to eliminate options to the specified criteria.
26. Review the concepts of each filtered alternative.		[R]			[S]								Determine whether concepts selected were credible solutions.
27. Review the technical assessment of each alternative.		[R]			[S]								Determine whether the technical assessments were conclusive, that the FMEA results were adequate and that the outputs were reasonable when compared to the inputs.
28. Review the cost assessments of each alternative.		[R]			[S]								Determine whether the costs are verifiable and that the results are within acceptable limits
29. Review the financial analysis performed for each alternative.		[R]			[S]								Determine whether the financial results are repeatable, that correct assumptions were used and that the methodology used is sound.
30. Review the recommended solution and executive summary.		[R]			[S]								Determine whether the recommended option selected is correct and is justified.

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Flow Path:
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	ORGANISATION / FUNCTION												
	DESIGN ENGINEER (COMPILER)	DESIGN ENGINEER (REVIEWER)	DESIGN ENGINEERING MANAGER	PROJECT MANAGER	PROJECT TEAM	MAINTENANCE REPRESENTATIVES	OPERATING REPRESENTATIVE	PLANT ENGINEERING REPRESENTATIVE					**NOTES & REFERENCES**
ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
31. Review the nuclear safety screening.		[R]			[S]								In accordance with KAA-709 and KGA-025.
32. Review the recommended solution against the design requirements.		[R]		[S]	[S]	[S]	[S]	[S]					
33. Review the selected design for conventional safety impact.		[R]			[S]								This is performed taking into account the OH&S Act and Regulations.
34. Review the feasibility study for editorial compliance.		[R]			[S]								
35. Compile a detailed set of review comments.		[R]			[S]								
36. Schedule a review meeting.	[S]	[I]	[I]	[R]	[I]	[I]	[I]	[I]					The review meeting shall be scheduled by the Project Manager. The design compiler attends this meeting.
37. Collate all the review comments from the integrated review team members.		[R]		[S]	(I)								
38. Table all review comments raised.		[R]			[S]								This is to allow for a common understanding of the concerns raised in the review comments and to allow the compiler to defend the package contents.
39. Compile a review report consisting of a single list of review comments.		[R]			[S]								

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	DESIGN ENGINEER (COMPILER)	DESIGN ENGINEER (REVIEWER)	DESIGN ENGINEERING MANAGER	PROJECT MANAGER	PROJECT TEAM	MAINTENANCE REPRESENTATIVES	OPERATING REPRESENTATIVE	PLANT ENGINEERING REPRESENTATIVE					
ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
40. Review the design review comments and incorporate into the package.	[R]												
41. Verify comments incorporated into the Feasibility Study Package.		[R]			[S]	[S]	[S]	[S]					The compiler has one of two actions on review comments: • Incorporate into the design document • Do not incorporate with justification. For each comment indicate specific action taken in the review report.
AUTHORISE THE FEASIBILITY STUDY													
42. Sign the concurrence section of the document.		[R]		[S]	[S]	[S]	[S]	[S]					The design reviewer will verify that the actions taken are adequate and sign the concurrence section.
43. Authorise the Feasibility Study.		[R]	[A]	[I]	[I]								
44. Forward the Feasibility Study to the Project Manager.	[R]												
	[R]												Step into KAA-501 relevant section.

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	DESIGN ENIGNEER (COMPILER)	DESIGN ENGINEER (REVIEWER)	DEISGN ENGINEERING MANAGER	CLIENT	SYSTEM ENGINEERING	COMPONENT ENGINEERING	TRAINING GROUP	ENGINEERING PROGRAMS	OPERATING REPRESENTATIVE	MAINTENANCE REPRESENTATIVES	PROJECT MANAGER		
ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
D. PREPARATION OF THE DETAILED DESIGN													
1. Assess the Client URS	[R]			(S)	(S)								The assessment should include a review of the root cause analysis and the matching output requirements.
2. Start or continue with the Configuration Management File.	[R]												The configuration management file should contain all the referenced documentation to allow for an easier review of the compilation as well as identifying documents that may require updating at a later stage of the plant change. The intent is that this document should grow as the project matures. No specific format is prescribed except that it should contain references to documents and procedures, the section and paragraphs reviewed for the modification.
3. Assess the URS (if any) to determine the minimum requirements that the plant design change must comply with.	[R]			(C)	(C)								The URS is one of the more important design change input documents. If no URS exists then request that System Engineering complete this for the design change.
4. Review all the Feasibility Studies performed (if any).	[R]												Gain an understanding of the alternatives considered. If a feasibility was not performed then discuss the reasons for this in the design.
5. Compile a detailed but concise description of the current plant design, the anomalies that the design change must address and the specific design solution that the detailed design	[R]												The Client URS should contain the majority of the information you need to compile these statements.

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Flow Path:
Main Flow Secondary Flow

ACTIVITIES	**ORGANISATION / FUNCTION**												**NOTES & REFERENCES**
	DESIGN ENIGNEER (COMPILER)	DESIGN ENGINEER (REVIEWER)	DEISGN ENGINEERING MANAGER	CLIENT	SYSTEM ENGINEERING	COMPONENT ENGINEERING	TRAINING GROUP	ENGINEERING PROGRAMS	OPERATING REPRESENTATIVE	MAINTENANCE REPRESENTATIVES	PROJECT MANAGER		
	1	2	3	4	5	6	7	8	9	10	11	12	
document must address.													
6. Determine the engineering methodology that you will use to resolve this problem.	[R]												Your methodology should account for the general engineering approach you will use to resolve this problem and the calculations that you will need to perform to justify your arguments.
7. Determine the level of analysis you will require for each section of the report.	[R]												This can be performed with the aid of a graded approach that considers the complexity and importance of the plant change.
8. Using the Design Input Consideration Checklist, determine the input considerations for the detailed design change.	[R]												Further consideration for the selected option must be performed to enable a complete input consideration. See 331-211.
9. Determine the effect of Human Factors Engineering on the design and the effect of the design on the control room.	[R]												Refer to 331-87 for relevant guides on Human Factors Engineering.
10. Determine what design assumptions you require for the specific design	[R]												The list in the Technical URS will be the minimum requirements and are by no means exhaustive. Assumptions must be verifiable.
11. Determine the boundaries of your detailed design change.	[R]												Evaluate the impact of the design change on interfacing equipment and challenges associated with moving to newer HSI technologies.
12. Determine design bases of the existing plant that will be changed and compile a bases for your design	[R]												Consider design basis documents such as the DSE, SAR, OTS, Set point manual and drawings.

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	DESIGN ENIGNEER (COMPILER)	DESIGN ENGINEER (REVIEWER)	DEISGN ENGINEERING MANAGER	CLIENT	SYSTEM ENGINEERING	COMPONENT ENGINEERING	TRAINING GROUP	ENGINEERING PROGRAMS	OPERATING REPRESENTATIVE	MAINTENANCE REPRESENTATIVES	PROJECT MANAGER		
ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
change.													
13. Determine the design codes, standards, regulatory guides, licensing requirements and other specifications that your design must adhere to.	[R]												You should consider the applicable system DSEs and SAR applicable references which may contain the information. Reference the exact the code edition and applicable sections used in the design.
14. Determine the normal operating and transient conditions your equipment will be subjected to.	[R]								(S)				This information is generally available in the applicable plant system DSEs. Ensure the EQ requirements have been met in accordance with KAA-834.
15. Determine the classification of the design.	[R]												The classification of all Eskom Koeberg plant changes (permanent or temporary) including computer systems hardware and software changes, shall be based on the deterministic importance category of the most constraining component/system (highest safety classification) as determined in the safety review of the plant change (KAA-709). The modification shall not allow for downgrades of the modification classification.
16. Determine the classification requirements for the equipment you will be using in the detailed design.	[R]												The classification must be based on the requirements your design must satisfy.
17. Compile rough sketches illustrating the operating philosophy of your design.	[R]												Rough sketches must be converted into detailed drawings. Mark-ups must be produced to show changes to the existing plant.

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ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
18. Determine if there are any spatial and environmental limitations for the installation of this design.	[R]				(S)				(S)	(S)	(S)		This is performed through a plant walk down and in-situ site inspection as well as rigorous review of existing plant drawings.
19. Determine what equipment you will need to be able to perform the intended operation and their specification.	[R]			(S)	(S)	(S)			(S)	(S)			Refer to the requirements related to capacity, performance, reliability, quality, nuclear plant specifics, availability, etc. Equipment selected will need a classification and an associated engineering specification. NOTE: The design compiler is responsible for selecting and/or compiling any new trigrammes, specifications or classifications as well as identifying any existing specifications that are appropriate. KBA 0000 G00 032, KBA 0000 G00 036 and 331-93 should be used. The designer is responsible for obtaining a trigramme letter and assigning classifications, the Eskom reviewer will be responsible for signing both documents for externally compiled design change packages. Ensure that both units are assigned the same trigramme for identical plant. The designer shall compile a hardware breakdown structure listing all the components within the system which shall be included in the design.
20. Consider the long term health of new components to be installed.	[R]												A comprehensive maintenance and inspection programme for all components installed during

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ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
													a plant change must be provided to the NNR as part of the modification proposal. Where new plant components have been assigned safety functions by the design, Eskom must submit its functional testing programme to the NNR as part of the modification proposal.
21. Determine what standard plant stock (equipment) can be used in this design.	[R]				(S)	(S)				[S]	[I]		Non-standard equipment will require additional spares and obsolescence considerations.
22. Determine the impact of your design on available design and operating safety margins.	[R]								(S)				Refer to system DSE, Accident Analysis Studies, Protection Files 1-9, SAR, EOP's, Setpoint Manuals and SAMG's.
23. Perform the required calculations to ensure that the design will perform as intended. You must clearly state the objectives of your calculations and appropriate references.	[R]												Normal and transient conditions must be analysed. Care should be taken to include effects on existing plant interfaces and the associated impact on these SSCs.
24. Compile the FMEA for your design when applicable.	[R]				(S)	(S)							The Failure Modes and Effects Analysis methodology is found in KGU-023. Credible failures must be accompanied with mitigative actions to reduce the risks associated with the respective failure modes. Depending on the complexity of the design and the system importance category, an FMEA might be required in the scheme design or Part A of the design template.

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ACTIVITIES	1 DESIGN ENIGNEER (COMPILER)	2 DESIGN ENGINEER (REVIEWER)	3 DEISGN ENGINEERING MANAGER	4 CLIENT	5 SYSTEM ENGINEERING	6 COMPONENT ENGINEERING	7 TRAINING GROUP	8 ENGINEERING PROGRAMS	9 OPERATING REPRESENTATIVE	10 MAINTENANCE REPRESENTATIVES	11 PROJECT MANAGER	12	NOTES & REFERENCES
25. Determine the impact of your design installation, testing and operation on nuclear safety.	[R]								(S)	(S)			This step does not infer the compilation of the safety screening or evaluation.
26. Determine the impact of your design on the environment.	[R]												Analysis should include pollution (noise, waste, etc) and hazardous materials used or produced in the installation, testing, operation and decommissioning of the design. ALARA principles should be considered (where applicable), complete KFU-028, forward to ALARA for review and include as an attachment to the design.
27. Determine the impact of your design installation, testing and operation on conventional plant safety.	[R]									(S)			Refer to the requirements of the OH&S regulations. Consider and discuss safety during the installation, operation and maintenance of the equipment.
28. Determine the impact of your design on the simulator, any KIT inputs and secondary heat balance programs.	[R]										(S)		Should your design document require any modifications to the simulator or to KIT, raise the required change proposal using KAA-503 and 331-84. Discuss your changes with the Process Computing Group. Note that a new KIT system has been installed and KAA-503 and 331-84 may no longer be in use. Contact DE for any changes to the new KIT system.
29. Determine whether training will be required for the operation and	[R]						[S]				(S)		This can be performed by discussing your changes with the Operating Training Group,

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ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
maintenance of your new design equipment and to address the challenges associated with acquiring new HSI technologies.													and Maintenance trainers. Raise the relevant change notices when the relevant procedures and training manuals have been identified. Consider if any engineering training might be required.
30. Determine the quality assurance requirements for your design.	[R]												These include documentation, training, handling and shipping requirements, etc. Clearly list all the required QC/QA witness/hold points. NOTE: Be explicit on QA measures, i.e. if ASME III is applicable, list the specific quality standards such as, e.g., ASME NA-3700, ASME NCA-3800 and any other relevant standard. **Be aware that the standard QA programme requirements (Q1, Q2, etc) typically called up in the design might not cover the specific QA product requirements and it is necessary to explicitly state all the applicable QA measures in the design.**
31. Determine the interface requirements for your	[R]				(S)				(S)	(S)			The impact of your design on the existing plant interfaces

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ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
design with the existing plant. Determine if HSI's are adequately designed, meet utility needs and increase plant performance.													must be considered. Indicate in the design what was considered and attach all relevant supplemental information used in the analysis to the design.
32. Perform a risk assessment.	[R]			[S]	[S]	[S]		(S)	(S)	[S]	[S]		The risk assessment shall identify risks to the successful implementation and operation of the design change and identify the actions to be taken in mitigation of the risks. Include in the design package.

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Flow Path:
Main Flow Secondary Flow

ACTIVITIES	DESIGN ENIGNEER (COMPILER) 1	DESIGN ENGINEER (REVIEWER) 2	DEISGN ENGINEERING MANAGER 3	CLIENT 4	SYSTEM ENGINEERING 5	COMPONENT ENGINEERING 6	TRAINING GROUP 7	ENGINEERING PROGRAMS 8	OPERATING REPRESENTATIVE 9	MAINTENANCE REPRESENTATIVES 10	PROJECT MANAGER 11	12	**NOTES & REFERENCES**
33. Complete the Detailed Design Template.	[R]												This includes the creation of any new drawings. **NOTE:** If existing drawings are being redrawn entirely, ensure that the new drawings clearly show what is new as a result of the modification and what will remain unchanged. Changes to plant documents shall be made in accordance with Activities 1 to 8 of SECTION H. The design document format, as it exists in Detailed Design Template (240-143890978), shall be followed regardless of whether the design is compiled as one or several packages. The section headings shall be used and the designer is required to provide the necessary information under each section heading. The detailed design package can be presented in one of two formats, one complete package made up of Parts A, B, C & D or the package may consist of separate parts, i.e. the Scheme Design, an Installation Specification, a Commissioning Requirements Report and a Configuration Management File. See 331-87 for a discussion of two types of detailed design package. Detailed testing and commissioning requirements shall be provided in the detailed design. **NOTE:** The testing information provided in the design will be transferred onto KFA-006, therefore ensure that detailed testing and commissioning instructions are provided in the design.

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WORK FLOW RESPONSIBILITY MATRIX	**APPENDIX A** **PREPARATION OF THE DETAILED DESIGN**												
R – Responsible A – Approve F – File • – Outside Matrix Scope Y/N or N/Y – Decision C – Concur I – Informed S – Service [ ] – Mandatory Requirement ( ) – As Appropriate/Required Flow Path: Main Flow Secondary Flow	**ORGANISATION / FUNCTION**												**NOTES & REFERENCES**
	DESIGN ENIGNEER (COMPILER)	DESIGN ENGINEER (REVIEWER)	DEISGN ENGINEERING MANAGER	CLIENT	SYSTEM ENGINEERING	COMPONENT ENGINEERING	TRAINING GROUP	ENGINEERING PROGRAMS	OPERATING REPRESENTATIVE	MAINTENANCE REPRESENTATIVES	PROJECT MANAGER		
ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
34. Submit the Detailed Design document for independent review.	[R]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]	[S]		Submit completed document to the project manager for distribution to acceptance reviewers in accordance with SECTION G. Outside companies qualified according to DSG 318-087 shall be responsible for the review of their own designs. However, their designs are still subject to acceptance by the DE Manager who will appoint an Eskom reviewer to perform an acceptance review. Designs performed by outside companies are to be supplied to Koeberg both in hardcopy and electronic format. Package to be submitted to specialist reviewers and independent design reviewer at the same time. This review step includes submission for concurrence reviews. It would be advantageous, especially for complicated designs, to obtain concurrence on the scheme design or Part A prior to commencing with the detailed installation and procurement specifications. Note: Review of designs which are split into separate time based deliverables creates error traps such as missing, conflicting or incorrect information in one or more of the deliverables. Note that the reviewer may not approve the complete design change until he has been able to assess all relevant aspects of the deliverable. For example, it

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WORK FLOW RESPONSIBILITY MATRIX	APPENDIX A PREPARATION OF THE DETAILED DESIGN												
R – Responsible A – Approve F – File • – Outside Matrix Scope Y/N or N/Y – Decision C – Concur I – Informed S – Service [ ] – Mandatory Requirement ( ) – As Appropriate/Required Flow Path: Main Flow Secondary Flow	ORGANISATION / FUNCTION												NOTES & REFERENCES
	DESIGN ENIGNEER (COMPILER)	DESIGN ENGINEER (REVIEWER)	DEISGN ENGINEERING MANAGER	CLIENT	SYSTEM ENGINEERING	COMPONENT ENGINEERING	TRAINING GROUP	ENGINEERING PROGRAMS	OPERATING REPRESENTATIVE	MAINTENANCE REPRESENTATIVES	PROJECT MANAGER		
ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
													may be necessary to review parts of the configuration file in conjunction with the installation design or additional schematics describing the new system as a whole might be required before the reviewer can complete the review.
35. Submit all safety related modifications to the Regulator for approval.	[R]												Modifications classified as non-safety related that may incur radioactive dose to the public or personnel either during implementation or operation or are implemented in order to provide a mitigation function or that impact on a mitigation function during beyond design accidents shall be submitted to the Regulator for approval. The Regulator shall be informed of all non-safety related modifications at latest 3 months prior to implementation.
36. Submit the Review Report for Authorisation	[R]	[S]	[A]	(I)	(I)	(I)		(I)	(I)	(I)	(I)		The authorised Review Report becomes part of the design change package. The DE Manager shall be responsible for final acceptance. Provision shall therefore be made on the front cover of the design for additional signatures, the Eskom reviewer and DE Manager, in the case of an externally compiled design. The design shall only be considered complete and accepted by Koeberg once all the above has been adhered to. Controlled copies of the completed design shall be

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	DESIGN ENIGNEER (COMPILER)	DESIGN ENGINEER (REVIEWER)	DEISGN ENGINEERING MANAGER	CLIENT	SYSTEM ENGINEERING	COMPONENT ENGINEERING	TRAINING GROUP	ENGINEERING PROGRAMS	OPERATING REPRESENTATIVE	MAINTENANCE REPRESENTATIVES	PROJECT MANAGER		
ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
													made by KNPS.
37. Authorise the Detailed Design.	[R]		[A]										
38. Forward the Detailed Design document.	[R]												Original to CMG with copies to NPM only on request and control copy to DE.
													Step back into KAA-501.

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WORK FLOW RESPONSIBILITY MATRIX

APPENDIX A
DESIGN FIELD CHANGES

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S – Service
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Flow Path:
Main Flow ←→ Secondary Flow

ACTIVITIES	1 DESIGN ENGINEER (COMPILER)	2 DESIGN ENGINEER (REVIEWER)	3 DESIGN ENGINEERING MANAGEMENT	4 CLIENT	5 SYSTEM ENGINEERING	6 COMPONENT ENGINEERING	7 TRAINING GROUP	8 ENGINEERING PROGRAMS	9 OPERATING PROCEDURES GROUP	10 MAINTENANCE REPRESENTATIVES	11 PROJECT MANAGER	12 CONFIGURATION MANAGEMENT GROUP	NOTES & REFERENCES
E. DESIGN FIELD CHANGES													
1. Establish that there is or will be deviation from the design documents or drawings during the modification installation phase.	[I]	(I)		(I)							[R]		For internally compiled designs, initiate the Design Field Change Request by completing form 331-313. For externally compiled designs, raise a DR as notification and complete 331-313 for the change.
2. Describe the proposed change on 331-313 and forward to the designer.	(S)	(I)									[R]		The project manager will complete the relevant section of 331-313 describing the proposed change.
3. Designer completes 331-313 and forwards to Design Engineering Management for evaluation.	[R]	[I]											The Eskom Project Manager is responsible for presenting a completed 331-313 for review with externally compiled design change packages but the external designer shall provide the necessary technical input required to complete 331-313.
4. Design Engineering Manager or delegate will evaluate the change and concur if it falls within the scope of a design field change.			[R]										Design Engineering Group Management or delegate evaluates the change to determine if it falls within the scope of a design field change.
5. Does the change fall within the scope of a design field change?	(I)	(I)	Y/N										Exit this section and compile a full design change package revision, proceed to Section D.
6. Compile the required document revisions, PCRs and DDRs for the evaluated design field change. Inform the training department of the changes to the modification via TCR.	[R]	[I]			[I]	[I]	[I]		[I]			[I]	Use the appropriate change processes for DDRs and PCRs. If a new revision of an authorised design documents in the design package are required, follow that specific design document type review

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Flow Path:
Main Flow ⟷ Secondary Flow

ACTIVITIES	1 DESIGN ENGINEER (COMPILER)	2 DESIGN ENGINEER (REVIEWER)	3 DESIGN ENGINEERING MANAGEMENT	4 CLIENT	5 SYSTEM ENGINEERING	6 COMPONENT ENGINEERING	7 TRAINING GROUP	8 ENGINEERING PROGRAMS	9 OPERATING PROCEDURES GROUP	10 MAINTENANCE REPRESENTATIVES	11 PROJECT MANAGER	12 CONFIGURATION MANAGEMENT GROUP	NOTES & REFERENCES
													and authorisation process.
7. Submit your document and/or drawing compilations to the appointed reviewer.	[R]												Compilations should only be submitted when the compiler has determined that the documents are flawless.
8. Review and authorise the compilation.	[S]	[R]	[A]	[I]							[I]		Review performed in accordance with the appropriate design document section/appendix review and approval requirements for the design reviewer.
9. Record the approved document reference numbers and approved documents in the Configuration Management File.	[R]												Record the information in the Configuration Management File.
10. Submit original DFC to Configuration Management Group (CMG).	[R]			[S]								[I]	Controlled copies of DFCs must be submitted to SDE and Nuclear Project Management. Note: In the event of CMG not being available, the DE Manager may provide Nuclear Project Management with a provisional copy to continue work. The process of original document submissions must however be completed as soon as CMG is available.
11. Submit the Design Field Change to the Regulator.	(R)												For modifications where the detailed design was subject to Regulatory approval, field changes shall be submitted to the Regulator for information prior to restarting the plant.
12. Implement the Design Field Change.	[I]										[R]		

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WORK FLOW RESPONSIBILITY MATRIX	**APPENDIX A DESIGN FIELD CHANGES**												
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	DESIGN ENGINEER (COMPILER)	DESIGN ENGINEER (REVIEWER)	DESIGN ENGINEERING MANAGEMENT	CLIENT	SYSTEM ENGINEERING	COMPONENT ENGINEERING	TRAINING GROUP	ENGINEERING PROGRAMS	OPERATING PROCEDURES GROUP	MAINTENANCE REPRESENTATIVES	PROJECT MANAGER	CONFIGURATION MANAGEMENT GROUP	
ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
13. Exit this process.											[•]		

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WORK FLOW RESPONSIBILITY MATRIX	**APPENDIX A** **REVIEW OF A TEMPORARY ALTERATION**

R – Responsible A – Approve F – File • – Outside Matrix Scope Y/N or N/Y – Decision C – Concur I – Informed S – Service [ ] – Mandatory Requirement ( ) – As Appropriate/Required Flow Path: Main Flow Secondary Flow	**ORGANISATION / FUNCTION**												**NOTES & REFERENCES**
	TAF COMPILER	DESIGN ENGINEERING REVIEWER	DESIGN ENGINEERING MANAGER	COMPONENT ENGINEERING	OPERATING REPRESENTATIVE	MAINTENANCE REPRESENTATIVE	OPERATING PROCEDURES GROUP	TRAINING GROUP					
ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
F. REVIEW OF A TEMPORARY ALTERATION													
1. Review the current plant design requiring alteration.		[R]											Review plant system DSE with respect to the specific alteration request to gain an understanding of the system requirements and interfaces.
2. Review the justifications for alteration.		[R]											TAFs should only be raised as a last option to maintenance interventions and modifications. Should you find another solution then discuss with the responsible lead.
3. Review the Design Input Consideration Checklist, Independent Review and other DCP checklists.		[R]											Have all the inputs been correctly selected and is the list complete? If you agree, sign off the Input Consideration Checklist.
4. Determine whether a detailed design package is required for this temporary alteration.		N/Y →											If a detailed design is required for this temporary alteration then exit this process and enter SECTION D.
5. Verify that integration/ interface of the temporary alteration into the existing plant been considered.		[R]											TAF must contain discussions on the interfaces of the alteration on existing plant.
6. Review the Nuclear Safety Screening, Evaluation and Justification.		[R]											Verify that the impact on nuclear safety, accident analysis and SAR has been adequately identified, considered and evaluated in accordance with KAA-709 and KGA-025.

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WORK FLOW RESPONSIBILITY MATRIX

APPENDIX A
REVIEW OF A TEMPORARY ALTERATION

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Flow Path:
Main Flow ⟷ Secondary Flow

ACTIVITIES	1 TAF COMPILER	2 DESIGN ENGINEERING REVIEWER	3 DESIGN ENGINEERING MANAGER	4 COMPONENT ENGINEERING	5 OPERATING REPRESENTATIVE	6 MAINTENANCE REPRESENTATIVE	7 OPERATING PROCEDURES GROUP	8 TRAINING GROUP	9	10	11	12	NOTES & REFERENCES
7. Verify that the Functional Description is complete and adequate.		[R]											
8. Verify that the Operational Requirements are complete and technically adequate.		[R]			(S)								
9. Verify that the equipment classification of SSCS is correct.		[R]											Verify that temporary equipment meets the minimum classification requirements.
10. Verify the design calculation objectives, calculation methodology and summaries are adequate. Ensure that the assumptions for calculations are aligned to the overall document assumptions.		[R]											Determine whether appropriate engineering methodology was used to perform the calculations. If possible, using alternative methods of calculation, verify the correctness of the results. **NOTE: IF REQUIRED ONLY**
11. Verify that the available plant margins have not been reduced without the required analysis and justifications.		[R]											The plant margins are the available margins relative to plant operational set points and design set points. Available margin should be documented and referenced in the calculation summaries.
12. Verify (where applicable) that the maintenance requirements have been identified and are adequately addressed.		[R]		(S)		(S)							Verify that Component Engineering was involved in the review of the compilation.
13. Verify that Conventional Safety Requirements have been considered and were addressed.		[R]			(S)								Have OH&S requirements been considered? The temporary change should not introduce risks to the plant or personnel without mitigating

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[ ] – Mandatory Requirement
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Flow Path:
Main Flow ←→ Secondary Flow

ACTIVITIES	1 TAF COMPILER	2 DESIGN ENGINEERING REVIEWER	3 DESIGN ENGINEERING MANAGER	4 COMPONENT ENGINEERING	5 OPERATING REPRESENTATIVE	6 MAINTENANCE REPRESENTATIVE	7 OPERATING PROCEDURES GROUP	8 TRAINING GROUP	9	10	11	12	NOTES & REFERENCES
													actions in place.
14. Review the installation methodology of the temporary alteration package.		[R]			(S)	(S)							This is performed to determine what installation activities will require testing to verify adequacy.
15. Verify (if applicable) that the training requirements have been identified and TCRs raised.		[R]						[S]					Verify that Operating and Maintenance Training Groups are processing training updates in accordance with your understanding of the plant change.
16. Review the drawings (if applicable) in relation to the implementation plan contained in the TAF.		[R]											The TAF drawings should permit implementation of the design by any artisan.
17. Determine whether the referenced implementation procedures are adequate.		[R]				(S)	(S)						The procedures listed in the package must be inclusive of all the procedures required to implement this temporary alteration.
18. Verify that proper isolations have been specified for the installation of the temporary alteration?		[R]			(S)	(S)							Review the isolation points specified to ensure that all the required isolations have been included.
19. Verify that requirements to enter into an OTS LCO as a result of this implementation design has been addressed?		[R]											Ensure that KAA-690 supporting documentation has been compiled and is acceptable for use when needed. This step is only applicable for non-NNR approved or non-

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WORK FLOW RESPONSIBILITY MATRIX	**APPENDIX A REVIEW OF A TEMPORARY ALTERATION**												
R – Responsible A – Approve F – File • – Outside Matrix Scope Y/N or N/Y – Decision C – Concur I – Informed S – Service [ ] – Mandatory Requirement ( ) – As Appropriate/Required Flow Path: Main Flow Secondary Flow	**ORGANISATION / FUNCTION**												**NOTES & REFERENCES**
	TAF COMPILER	DESIGN ENGINEERING REVIEWER	DESIGN ENGINEERING MANAGER	COMPONENT ENGINEERING	OPERATING REPRESENTATIVE	MAINTENANCE REPRESENTATIVE	OPERATING PROCEDURES GROUP	TRAINING GROUP					
ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
													Outage temporary alterations.
20. Verify that proper methodology has been prescribed to de-energise the isolated section?		[R]											Proper methodology must be provided to ensure the system is de-energised prior to work being conducted.
21. Verify that temporary alterations assumptions requiring verification through testing have been included in the commission and testing of the temporary alteration.		[R]											The verification should include system interfaces.
22. Are the test procedures specified and compiled (if any) adequate to ensure that testing will meet the specified test objectives?		[R]			(S)								Determine if any other procedures are required or may be applied to the tests being conducted. Determine the usability of the specified documents to conduct the test.
23. Verify that the static testing (if applicable) adequately verifies the installation integrity?		[R]											This is primarily workmanship testing.
24. Verify that the dynamic testing adequately verifies the operational and functional characteristics of the design?		[R]			(S)	(S)							This is performed to verify that the design meets the client output requirements.
25. Compile your review comments into a review		[R]											Review comments must be addressed by the TAF

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Flow Path:
Main Flow Secondary Flow

ACTIVITIES	1 TAF COMPILER	2 DESIGN ENGINEERING REVIEWER	3 DESIGN ENGINEERING MANAGER	4 COMPONENT ENGINEERING	5 OPERATING REPRESENTATIVE	6 MAINTENANCE REPRESENTATIVE	7 OPERATING PROCEDURES GROUP	8 TRAINING GROUP	9	10	11	12	NOTES & REFERENCES
comments sheet and re-submit the document to the TAF compiler.													compiler prior to the TAF sign-off by the Design Engineer.
26. Verify that all comments have been incorporated into the temporary alteration package.		N/Y											The independent reviewer will complete the TAF Independent Review Checklist and sign both the checklist and TAF cover sheet.
27. Return to temporary alteration package compiler.	[R]												**All** review comments must be resolved by the compiler prior to authorisation.
28. Authorise the TAF.	(I)	[R]	[A]										Return to the relevant 331-88 section.

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WORK FLOW RESPONSIBILITY MATRIX	**APPENDIX A** **REVIEW OF A TEMPORARY ALTERATION**

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	DESIGN PACKAGE COMPILER	PROJECT MANAGER	REVIEWERS	SYSTEM ENGINEER	OPERATING SUPPORT	DESIGN ENGINEERING MANAGER							
ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
G. DESIGN REVIEW PROCESS													Entry into this procedure is via SECTION D.
1. Submit the detailed design package to the project manager for distribution to the acceptance reviewers.	[R]	(I)											For externally compiled design change packages, the design must be reviewed and approved by the external reviewer prior to submission to Eskom. For internal designs, the detailed design must be complete.
2. Distributes the detailed design package to the Design Engineering works controller and respective acceptance reviewers.		[R]											Project manager stipulates both date and time for the review comments meeting, normally 3-5 days prior to the end of the contractually agreed response time frame.
3. Review the detailed design package and compile review comments as appropriate. Review comments must be provided on KFU-026 for the lead reviewer and KFU-027 for members of the project team. The detailed design must be reviewed for HFE specific changes if applicable.			[R]										Reviews are performed in accordance with the requirements as stipulated in the review report. The reviewer documents the review performed in the review report and any design deficiencies in the review comments sheets. Changes to plant documents to be reviewed in accordance with SECTION H, Steps 9 to 20. Refer to 331-87 for relevant guides on reviewing Human Factors Engineering aspects of a design.
4. Review comments are collated at review comments meeting and discussed amongst	[S]	[R]	[S]	[S]	[S]	[S]							Reviewers attend the review comments meeting to discuss their findings. The project manager collates the reviewer

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Main Flow ⟷ Secondary Flow ⟷

	ORGANISATION / FUNCTION												**NOTES & REFERENCES**
	DESIGN PACKAGE COMPILER	PROJECT MANAGER	REVIEWERS	SYSTEM ENGINEER	OPERATING SUPPORT	DESIGN ENGINEERING MANAGER							
ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
detailed design package reviewers. A single set of review comments are submitted to the design compiler.													comments sheets. The design engineer (reviewer) compiles the single coherent set of review comments. Quorum for the meeting is Design Engineering, System Engineering, Project Manager and Operating Support representation.
5. Presentation of the collated review comments to the design compiler.	[S]	[R]											Project manager and design engineer (reviewer) discuss review comments with the design compiler.
6. Address the review comments.	[R]												The design compiler will address review comments in one of two manners: • Update the design package to address review comments. • Provide a written justification for not addressing the review comments.
7. Submit the revised detailed design package to the project manager.	[R]	[I]											
8. Distribute the submission to the respective reviewers for concurrence.		[R]	[S]										
9. Have the respective review comments been adequately addressed or justified.			Y/N										If review comments have not been addressed or justified, the project manager and Design Engineering manager is notified. The reviewer does not sign the review sheet.

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ACTIVITIES	1 DESIGN PACKAGE COMPILER	2 PROJECT MANAGER	3 REVIEWERS	4 SYSTEM ENGINEER	5 OPERATING SUPPORT	6 DESIGN ENGINEERING MANAGER	7	8	9	10	11	12	NOTES & REFERENCES
	ORGANISATION / FUNCTION												
10. Sign the review comments sheet, complete the review report discussion section and submit to the project manager.			[R]										The review report discussion section should contain a discussion on the actions taken by the respective reviewers to ensure compliance to the requirements of the specific topic under review.
11. Sign the review report and attach the review comments sheets as an attachment to the review report.	[S]	[S]	[R]	[S]	[S]	[S]							The reviewers of the detailed design package signs the review report to indicate that the detailed design package is acceptable and their review is complete.
12. Submit the signed review report to the Design Engineering manager for final approval	[R]												
13. Approve the review report and the detailed design package.						[A]							
14. Distribute the approved review report and detailed design package.	[R]												The approved review report is submitted to project manager for filing with modification package. A copy is kept at Design Engineering. The project manager will ensure that the relevant contractor/s receive a copy. In cases where NNR approval is required, the project manager shall ensure it is submitted for approval.

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WORK FLOW RESPONSIBILITY MATRIX	**APPENDIX A DESIGN REVIEW PROCESS**												
R – Responsible A – Approve F – File • – Outside Matrix Scope Y/N or N/Y – Decision C – Concur I – Informed S – Service [ ] – Mandatory Requirement ( ) – As Appropriate/Required Flow Path: Main Flow Secondary Flow	**ORGANISATION / FUNCTION**												**NOTES & REFERENCES**
	DESIGN PACKAGE COMPILER	PROJECT MANAGER	REVIEWERS	SYSTEM ENGINEER	OPERATING SUPPORT	DESIGN ENGINEERING MANAGER							
ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	
H. CONFIGURATION CONTROL													
1. Determine the scope of document types that will be impacted by your change.	[R]												Use the DCIF (documents to be considered) checklist to determine the full suite of document types that may be impacted by your change. Contact the training department to determine whether there will be an impact on their training documentation.
2. Determine what documents (procedures and other) will be impacted using electronic tools such as Excalibur and Pigo.	[R]												Koeberg Free Text Retrieval (Excalibur) is available on the NAL. Use system trigrams and unique identifiers for your plant change to enhance the search. Drawings can be searched on Pigo or Excalibur.
3. Determine whether your change will have an impact on design base documentation.	[R]												This will normally be evident from your KAA-709 screenings and evaluations. Documents will include the SAR, EOP'S, System DSEs, OTS, etc.
4. Determine the consequential impact of your document changes on referenced documents.	[R]												Documents to be considered in this step are referenced in the Applicable Documents section of procedures. Determine the impact of your changes on the documents listed in the of Referenced Documents section of the procedure requiring change.

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WORK FLOW RESPONSIBILITY MATRIX

APPENDIX A
REVIEW OF A TEMPORARY ALTERATION

R – Responsible
A – Approve
F – File
• – Outside Matrix Scope
Y/N or N/Y – Decision
C – Concur
I – Informed
S – Service
[ ] – Mandatory Requirement
( ) – As Appropriate/Required
Flow Path:
Main Flow ←→ Secondary Flow

ACTIVITIES	1 DESIGN PACKAGE COMPILER	2 PROJECT MANAGER	3 REVIEWERS	4 SYSTEM ENGINEER	5 OPERATING SUPPORT	6 DESIGN ENGINEERING MANAGER	7	8	9	10	11	12	NOTES & REFERENCES
5. Mark-up the required changes to the documents in accordance with applicable approved procedures. Complete the required sections in compilation.	[R]												Procedures to be marked-up in accordance with KAA-500. Drawings, DSEs and other documents changes to be marked-up in accordance with 38-185.
6. Review the marked-up changes for editorial standard compliance.	[R]												
7. Complete the DCIF checklist	[R]												
8. Submit the compilation for review.	[R]	[S]		[I]									Package compilations should only be submitted when the compiler has determined that the package is flawless.
9. Review the plant change documents compiled to date. Document Users only review their specific speciality documents.		[R]	[S]	[S]									Scope Study Report, Technical URS, Detailed Design, Installation Specification, Commissioning Requirement Report, etc.
10. Review the DCIF (documents to be considered) checklist selection. Document Users only review their specific speciality documents.		[R]	[S]	[S]									Review the checklist and determine whether all affected document types have been considered.
11. Review the marked-up documents.		[R]	[S]	[S]									Determine whether the correct process was followed, that the process requirements have been followed and that the document changes reflect the applicable plant changes appropriately.

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ACTIVITIES	1 DESIGN PACKAGE COMPILER	2 PROJECT MANAGER	3 REVIEWERS	4 SYSTEM ENGINEER	5 OPERATING SUPPORT	6 DESIGN ENGINEERING MANAGER	7	8	9	10	11	12	NOTES & REFERENCES
12. Review the marked-up documents for editorial compliance.		[R]	[S]	[S]									
13. Determine whether the full suite of affected documents has been identified.		[R]	[S]										Any omissions must be highlighted for the compilers attention.
14. Compile a detailed set of review comments in the form of Review Comments Sheets.		[R]											All the reviewers of the documents will compile their own individual review comments for their respective area of expertise.
15. Schedule a review meeting	[S]	[R]	[I]	[I]									The Project Manager shall schedule the review meeting. The design compiler attends this meeting.
16. Collate all the review comments from the document users.		[R]		[S]									
17. Table all review comments raised.		[R]		[S]									This is to allow for a common understanding of the concern raised in the review comment and to allow the compiler to defend the package contents.

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WORK FLOW RESPONSIBILITY MATRIX	**APPENDIX A** **REVIEW OF A TEMPORARY ALTERATION**

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ACTIVITIES	**ORGANISATION / FUNCTION**												**NOTES & REFERENCES**
	DESIGN PACKAGE COMPILER	PROJECT MANAGER	REVIEWERS	SYSTEM ENGINEER	OPERATING SUPPORT	DESIGN ENGINEERING MANAGER							
	1	2	3	4	5	6	7	8	9	10	11	12	
18. Review the design review comments and incorporate into the package.	[R]												The compiler has one of two actions on review comments: • Incorporate into the design document • Do not incorporate with justification. For each comment indicate specific action taken in the review report.
19. Verify comments have been incorporated into all the identified documents and Authorise changes to the identified documents.			[R]										The design compiler will countersign all comments to indicate that actions taken in accordance with the review comments. The design reviewer will verify that the actions taken are adequate.
20. Approve the identified documents.		[A]											Original to CMG Controlled copies to Design Engineering and Nuclear Project Management. **NOTE:** Classifications originals are submitted toDE and controlled copies to CMG. The changes will be processed in accordance with 38-185.

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