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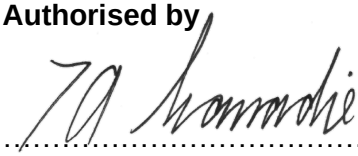

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1. INTRODUCTION

The control and execution of engineering changes on existing assets is critical in ensuring sustainable performance. All Engineering Changes (ECs) must be correctly prepared, motivated, reviewed, approved, and controlled.

This procedure defines a standardised process for all Generation assets operated by Generation or an external party, that shall be followed for the review, classification, and implementation of an engineering change. The procedure ensures oversight of the design process as well as controlling configuration changes.

2. SUPPORTING CLAUSES

2.1 SCOPE

The need for an engineering change on an existing Generation asset must be captured through SAP Engineering Change Management (ECM) and follow due process for resolution. This procedure provides for the registration of engineering changes and for reporting on the status while the actual engineering design work is processed outside of SAP ECM using Eskom engineering governance practices [20] and the Eskom Holdings Value Chain [22].

The approach for design reviews shall provide assurance that the systematic evaluation of proposed solutions adheres to project, regulatory, client, and quality standards and requirements as stipulated in the design review procedure [4].

2.1.1 Purpose

The overriding purpose for this procedure is to ensure that Generation assets shall be managed in such a way as to enable sustainable achievement of its business goals. It must be adopted in order to provide an effective process for controlling changes to plant, plant structures or technical documentation, and to manage any changes to a baseline in a controlled manner. Any proposed changes shall be traced – thereby controlling the integrity of the configuration and demonstrating compliance with auditable traceability.

2.1.2 Applicability

This procedure shall apply to all personnel involved in engineering changes executed on Generation operational assets and/or assets intended to be handed over to Generation (excluding the Generation Nuclear environment). All parties interfacing with or working on Generation assets are required to comply.

Note:

The Eskom Project Life-Cycle Model (PLCM) [20] stage gates apply, in conjunction with this procedure, and must be considered for all projects (application thereof to be decided after the execution route selection).

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] 240-4332798, Engineering Policy

[2] 240-59266984, Engineering Change Management Central Change Control Committee – Generation Terms of Reference

[3] 240-59266979, Engineering Change Management Site Change Control Committee – Generation Terms of Reference

[4] 240-53113685, Design Review Procedure

[5] 240-53114026, Project Engineering Change Management Procedure.

[6] 474-10631, Design Base Specification for Eskom Coal Fired Power Stations

2.2.2 Informative

[7] 240-51093273, Process Control Manual – Control Configuration Changes

[8] 240-68604731, Design Base Standard

[9] 240-49104739, Registration Procedure for Engineering Work

[10] 240-65695140, Work Instruction: Delegation to Perform Engineering Work

[11] 240-72273656, Power Generation Asset Criticality Classification Standard

[12] 240-84086324, Estimate of the Engineering Effort for Small Plant Generation Projects

[13] 240-72343609, Engineering Issue Management and Escalation Works Instruction

[14] 240-43761495, Generation Temporary Operating Instruction

[15] 240-43761012, Generation Out of Normal Conditions

[16] 240-43761598, Generation Specific Instruction Request

[17] 36-1535, Management of Plant Simulations

[18] 32-1155, Eskom standard project life-cycle model policy

[19] 240-43170220, Process Control Manual for Technical Assurance

[20] PLCM-SS-1306-, Generation Project Life-Cycle Model (see Generation PLCM Subset)

[21] 240-84045193, Risk Based Inspection (RBI) Manual

[22] Eskom Holdings Value Chain (http://eskomvc.eskom.co.za/models/HTML%20-%20Model/index.html)

2.3 DEFINITIONS

1. **Approver:** The Functional Responsible Person (manager, supervisor, subject matter specialist or process owner) that shall:
   - Ensure that the document does not duplicate/conflict an existing document content,
   - Consider the impact and relevance of referenced documents in the case of amending a document,
   - Facilitate the documentation of critical business processes within Generation,
   - Have the responsibility to approve the document, and
   - Perform the final review of the document, including the technical accuracy and compliance to requirements.

   The functional responsible person determines if the document is fit for purpose and approves the document content and therefore takes responsibility and functional accountability for the document content.

2. **Asset/Plant:** Machinery, property, buildings, vehicles and other items and related systems that have a distinct and quantifiable business function or service.

3. **Authorise:** The Document Authoriser is a duly delegated person with the responsibility to review the document for:
   - Alignment to business strategy, policy, objectives, requirements, and
   - The impact of implementing the document in the area of applicability.

   The Document Authoriser shall authorise the release and application of the document and is accountable for the document implementation within the business.

4. **Baseline:** A baseline is a consistent set of plant configuration information or documentation at an established point in time. This would have been formally reviewed and agreed upon and that would henceforth serve as the basis for further development that can only be changed through formal change control procedures (engineering change management and project engineering change management [5])

5. **Configuration Management:** Configuration Management (CM) is a systems engineering process for establishing and maintaining consistency of a product's performance, functional, and physical attributes with its requirements, design, and operational information throughout its life. Configuration Management ensures we capture and maintain engineering information that consists of functional and physical attributes; design and operational information throughout the life-cycle of Generation's assets.

6. **Design Base:** The design base of an asset is the combination of those key design outputs that define the functions, capabilities, capacities, physical sizes and dimensions (physical base), limits and set points, shutdown and start-up sequences, normal and out of normal operations (operating technical specification) and maintenance elements (maintenance base), that are required for the asset to meet its required performance, reliability and availability within the limits of the external constraints.

7. **Emergency Change:** Any permanent or temporary change that needs to be evaluated or assessed and requires immediate response. The change must be implemented immediately (<1 week) in order to prevent imminent system failure, safety, environmental or regulatory risk and needs to be introduced to prevent system disruptions or return of Power Station (PS) unit.

8. **Engineering Change:** Any change, deletion or addition to system, structures, equipment or components including:
   - Permanent/temporary changes to protection set points
   - Permanent changes to operating set points (outside the specified boundaries e.g. OTS and operating procedures)
   - Permanent changes to control set points, software and technical documentation
   - Replacement of system, structure and components with equivalent components of a **different make or type** which will result in any deviation from the established design base.

9. **Engineering Change Classification:** The categorisation of an engineering change is dependent on the level to which it affects safety, the environment, reliability, availability and costs. The classification is completed using [11] and classification guideline (see 2.7).

10. **Engineering Change Management:** Engineering Change Management ensures all engineering changes are correctly prepared, motivated, reviewed, approved, controlled and recorded.

11. **Engineering Change Prioritisation:** Selection criteria as part of the engineering change process that will guide the engineer and the change control committees on the priority of the engineering change into different levels (see prioritisation guideline section 2.7).

12. **Out of Normal:** An out of normal is a formal notice to operating personnel in order to communicate a condition or situation that exists or may arise on the power plant which poses a risk to people, plant, production or material.

13. **Permanent Engineering Change:** A change to an item's fit, form, or function that will be implemented without a pre-determined time limit/expiration, i.e. being designed or planned to stand or continue indefinitely.

14. **Simulation:** A temporary non-existent physical condition applied to plant or equipment to satisfy specific plant operating requirements. This shall include all forms of hardwired, software, plant applied simulations and gagging of final control elements (e.g. valves, dampers, etc.).

15. **Technical Documents:** Documents containing product-related data and information that are used and stored. They cover data and information pertaining to: product definition and specification; design; manufacturing; quality assurance; product liability; product presentation; description of features, functions and interfaces; safe and correct use; service and repair of a technical product as well as its safe disposal.

16. **Temporary Engineering Change:** A change to an item's fit, form, or function that will be implemented with a pre-determined time limit/expiration, i.e. intended to be used/ implemented for a limited amount of time.

17. **Temporary Operating Instruction (TOI):** Can only be issued as a result of an out of normal plant condition. When an out of normal plant condition exists that requires plant to be operated outside standard operating procedures and philosophy then the mitigating activities should be defined in a TOI until the situation normalises or a formal procedure is put in place.

2.4 ABBREVIATIONS

Abbreviation	Description
CC	Change Coordinator
CCCC	Central Change Control Committee
CRA	Concept Release Approval
DMS	Document Management System
DRA	Definition Release Approval
DRC	Design Review Committee
EC(s)	Engineering Change(s)
ECM	Engineering Change Management
ECN	Engineering Change Notification

Abbreviation	Description
ECO	Engineering Change Order
ECR	Engineering Change Request
ECSA	Engineering Council of South Africa
EDWL	Engineering Design Work Lead
EHVC	Eskom High Value Chain
EMAP	Engineering Management Plan
ERA	Execution Release Approval
FRA	Finalisation Release Approval
GMMS	General Manager Master Specialist
GMR2	General Machinery Regulation 2
L1, L2, L3	Level 1, Level 2, Level 3
LDE	Lead Discipline Engineer
LoPP	Life of Plant Plan
MoM	Minutes of Meeting
O&M	Operating and Maintenance
PCM	Process Control Manual
PECA	Plant Engineering Change Authority
PEIC	Production Engineering Integration Coal
PLCM	Project Life-Cycle Model
PM	Plant Maintenance
PPM	Project Portfolio Management
PRE	Pre-Project Approval
PS	Power Station
PSEM	Power Station Engineering Manager
PTE	Plan Technical Effort
RACI	Responsible, Accountable, Consulted, Informed
RBI	Risk Based Inspection
ROC	Required Operational Capability
SCCC	Site Change Control Committee
SE	System Engineer/Plant Engineer
SM	Senior Manager
SPO	Smart Plant Enterprise for Owner Operator
SRD	Stakeholder Requirements Definition
SWAC	Site Work Allocation Centre
TDET	Test/Drawing/Equivalency/Technical information
TOI	Temporary Operating Instruction
ToR	Terms of Reference

2.5 ROLES AND RESPONSIBILITIES

Role	Responsibility
Central Change Control Committee (CCCC)	A committee/individual appointed by the Senior General Manager Engineering to oversee all changes to the design base (i.e. ECM and PDD projects). Their responsibilities include: a. Ensure the process/procedure and tools used for engineering changes and change management across all plants/sites are standardised. b. Ensure a consistent approach is used for the classification of all engineering changes. c. Authorise that there is an alignment to the process/procedure that were used for the design of Level 1 engineering changes. d. Confirm the engineering change impact (classification, environmental assessment, risk ranking, priority and technical content, etc.). e. Provide oversight that the proposed technical solution is suitable f. Ensure that: • The engineering change process was followed. • The engineering design was performed by a competent person. • The design was reviewed by suitably competent individuals who are registered with ECSA. • The change is in line with the Life of Plant Plan (LOPP), technical plan and strategic reports (in most cases). • Where there is a dispute or conflict, this committee shall interpret the engineering change management principles governing such an eventuality and make the most appropriate decision. The accountability and responsibility of execution of the decision remains within the particular line function. This conflict resolution role should only be used in very specific circumstances and should not be used for line function operational decisions. g. Review recommendations for improvement, corrective actions agreed and taken, and overall state of the engineering changes across engineering and facilitate the exchange of information. h. Perform periodic reviews of the SCCC performance. i. Perform periodic reviews to ensure that emergency change process is adhered to and that the process is used only for unforeseeable events in line with the intent of the process. j. Perform periodic reviews on Level 2 and Level 3 engineering changes from SCCC.
Change Coordinator (CC)	The person(s) in charge of managing the permanent or temporary configuration changes to structures, systems, components or technical content of prescriptive or descriptive documentation that form part of the design and/or asset base and updating SAP ECM to reflect the latest status of an EC. The site and central CC must ensure the minutes/decisions made by the SCCC and CCCC (respectively) are recorded on the system and stored in a central location. All decision documents should be linked to the ECR on SAP ECM and stored on an appropriate Document Management System (DMS). The responsibility to update status changes on SAP ECM will be plant specific (i.e. conducted by the CC for that station).
Plant Engineering Change Authority (PECA)	The ECSA professionally registered person (engineer/technologist) with the authority to approve emergency change requests that arise outside the normal Engineering Change process. This person ensures that proper engineering practices and

	technical governance, irrespective of the discipline, are followed in this process. This authority may be delegated to the Power Station Engineering Manager (PSEM) who may further delegate the responsibility to another individual in certain instances (e.g. if the PSEM is not registered).
Design Review Committee (DRC)	The members of this Committee responsibilities include: • Concurrence with the design review procedure [4] and processes applied to the engineering design or engineering change. • Ensuring that all design input has been adequately considered. In particular to ensure that the engineering change has been adequately reviewed with regard to interface issues between various disciplines, contractors etc. • Ensuring that all review cycles have been complied to. • Making recommendations regarding EC approval. • The nomination of additional independent reviewers if considered necessary. ***Note:*** *Ensure DRC properly constituted, and representative of all relevant stakeholders as required per End-of-Phase design review and ensure implementation and compliance to the design review procedure [4].* *The Design Review Committee (DRC) members will be appointed based on the subject matter and disciplines affected and will typically be the LDEs on the specific project. The Site Work Allocation Centre (SWAC) will facilitate the delegation of the EDWL; and the identification of the resources for DRC will be the responsibility of the EDWL (multi-disciplinary) and the LDE (single discipline) as per Design Review Procedure [4]. The DRC must include the relevant SE, as well as the site project engineer(s) who will be responsible for the implementation.*
Engineering Design Work Lead (EDWL)	An appropriate ECSA professionally registered person (typically engineer/ technologist) who is designated through the work allocation process who is delegated with the authority to perform the following functions: • Ensures compliance to procedure. • Performs a further technical review, if required, of the feasibility study and/or the engineering change package. • Co-ordinates and leads the engineering team, that is responsible for ensuring that classified Engineering Change Requests (ECRs) have been subjected to the appropriate review cycles and are acceptable for implementation. The team may have, as its members, specialists and/or external consultant personnel on an ad hoc basis. The Engineering Design Work Lead (EDWL) will ensure that all end-of-phase design reviews are identified and executed as per [4]. • Coordinates conceptual, basic and detail design (if applicable). • Coordinates compilation of a design report including all the necessary supporting documents for loading onto the Document Management System (DMS). • Engages with the relevant SE, to gain information related to the design base, the root cause analysis and Required Operational Capability (ROC). ***Note:*** *If the EDWL is not ECSA professionally registered, the assigned EDWL may complete the design under the supervision of an ECSA professionally registered person. The registered person will be accountable for all tasks to be completed by EDWL.*
Lead Discipline Engineer (LDE)	An appropriate ECSA professionally registered person (typically engineer/ technologist) who is designated through the work allocation process. The LDE is delegated with the authority to perform the following functions:

	• Accountable for the management of the interfaces within their specific engineering domain. • Accountable for the technical integrity for the design within their specific engineering domain. • Member of the Design Review Committee (DRC). • To engage with the relevant SE, to gain information related to the design base, the root cause analysis and ROC. ***Note:*** *If the LDE is not ECSA professionally registered, the assigned LDE may complete the design under the supervision of an ECSA professionally registered person. The registered person will be accountable for all tasks to be completed by the LDE.*
Site Change Control Committee (SCCC)	A committee/individual at an Generation plant appointed by the Power Station Manager to: a. Be accountable for providing the criteria for ensuring the technical integrity on engineering changes of Generation operational assets. b. Ratify/complete (SCCC to challenge and interrogate) the priority and classification of the engineering change impact; consider the regulatory or environmental impact; risk ranking; whether a change is temporary or permanent; and technical content (RBI requirements, etc.). c. Approve the continuation of all Level 1, 2 and 3 engineering changes to design phases. d. Route the Engineering Work Request and associated documents to the appropriate and authorised Site Work Allocation Centre (SWAC) in line with delegation to perform Engineering work (refer to Work Instruction: Delegation to Perform Engineering Work [10]. e. Ensure Level 1 ECs are submitted to CCCC for authorisation. f. Ensure periodic reviews of Level 1, Level 2 and Level 3 Engineering Changes (ECs) and advise on further actions required and compliance to the relevant procedures. g. Set the execution route for performing the engineering work required. h. Authorise approved engineering changes for implementation on site. i. Approve the close of Level 1, 2, 3 ECs that have been finalised. j. Review cancellation of ECs and approve (where applicable/previously authorised). k. Ensure the effective management of all ECs to increase plant reliability and availability over the full life-cycle of the asset and to reduce risk. l. Ensure that: • The engineering change process was followed. • The engineering design was performed by a competent person. • The design was reviewed by suitably competent individuals who are registered with the Engineering Council of South Africa (ECSA). • The change is in line with the LOPP, technical plan and strategic reports (in most cases). m. Where there is a dispute or conflict, this committee shall interpret the engineering change management principles governing such an eventuality and make decision based on the principles listed above. The following must be considered: • The accountability and responsibility of execution of the decision remains within the particular line function.

	• This conflict resolution role should only be used in very specific circumstances and should not be used for line function operational decisions. • Where a resolution cannot be attained (or where SCCC is unable to decide on appropriate way forward) the dispute or conflict shall be forwarded to the CCCC for final resolution. n. Review recommendations for improvement, corrective actions agreed and taken, and overall state of the engineering changes across engineering and facilitate the exchange of information. o. Ensure the integrity of the engineering change management register and log (i.e. the SAP and SCCC database/information). p. Provide oversight to ensure that emergency change process is adhered to and that the process is used only for unforeseeable events in line with the intent of the process. q. Review all emergency engineering changes and decide on appropriate execution route (post implementation). r. Review all TDET change and approve where applicable. s. Review and provide oversight on relevant exemption forms to ensure the skipping of design phases does not compromise the quality of the design.
System Engineer / Plant Engineer	A competent and qualified site/plant-based discipline or System/ Plant Engineer, who has the training, technical qualification and expert knowledge of the plant or systems affected by the engineering change. His/her function is to: • Prepare the engineering change • Prepare an engineering change report (e.g. root cause analysis/investigation report/assessment report etc.), and ROC • Serve as member of the Design Review Committee • Be accountable for the design base and any changes thereof • Engage with the appointed persons for the EC, provide information related to the design base, the root cause analysis and ROC. ***Note:*** *The responsibilities of the EDWL or LDE shall be delegated to the System/ Plant Engineer.*
Site Work Allocation Centre	Their responsibilities include: • Facilitate delegation of EDWL and Lead Discipline Engineers (LDE) as per [10]. • Facilitate the delegation of specific stakeholders required for the evaluation of Engineering Changes (where required). • Resource allocation tracking and monitoring. • This is typically a function carried out under the Design and Specifications team. ***Note:*** *Engineering Work Delivery Unit must ensure all delegations are completed as per the Work Instruction: Delegation to Perform Engineering Work [10]*
Configuration Lead	Is accountable for ensuring that the engineering documentation, engineering systems and databases are correctly configured. As part of this role, the configuration practitioner is responsible for the development of the configuration management plan; configuration and management of the PBS and the management of plant item tags.

2.5.2 Committee Roles

All Committees must operate in accordance with the Terms of Reference (ToR) applicable to them [2] [3].

2.6 PROCESS FOR MONITORING

- Compliance to SAP ECM process will be compulsory for all Generation sites/plants.
- All engineering changes will originate and be tracked through SAP ECM. The responsibility to update status changes on SAP ECM will be plant specific.
- Each plant needs to provide and maintain an engineering change folder in an approved document management database (document management system) that contains the engineering change notification/request to be reviewed locally and centrally. All relevant documentation will be linked to the ECR on SAP ECM.
- A report of all engineering changes shall be visible to and managed by the Site Control Change Committee (SCCC) to facilitate the exchange of information.
- Periodically, Level 2 and 3 changes authorized by the Site Change Control Committee (SCCC) will be reviewed by the CCCC.
- All designs shall be executed and reviewed according to the responsibility matrix as stipulated in the design review procedure [4].
- The CCCC will monitor adherence to this procedure.

2.7 RELATED/SUPPORTING DOCUMENTS

All templates can be accessed via DRM system links as applicable, the complete list for reference is shown in Appendix E.

3. ENGINEERING CHANGE MANAGEMENT PROCEDURE

3.1 OBJECTIVES

The objectives are to:

1. Ensure the effective management of all engineering changes to increase plant reliability and availability over the full life-cycle of the asset and to reduce business risk.
2. Ensure a consistent approach is used for the classification and prioritisation of all engineering changes.
3. Ensure the process/procedure and tools (SAP ECM) used for plant engineering changes and change management across all plant is standardised.

3.2 ENGINEERING CHANGE MANAGEMENT (ECM) PROCESS OVERVIEW

The activities to be followed during the ECM process are shown in the overview process in Figure 1 below. The numbers in the figure relate to the section below that provide the details of the overview steps.

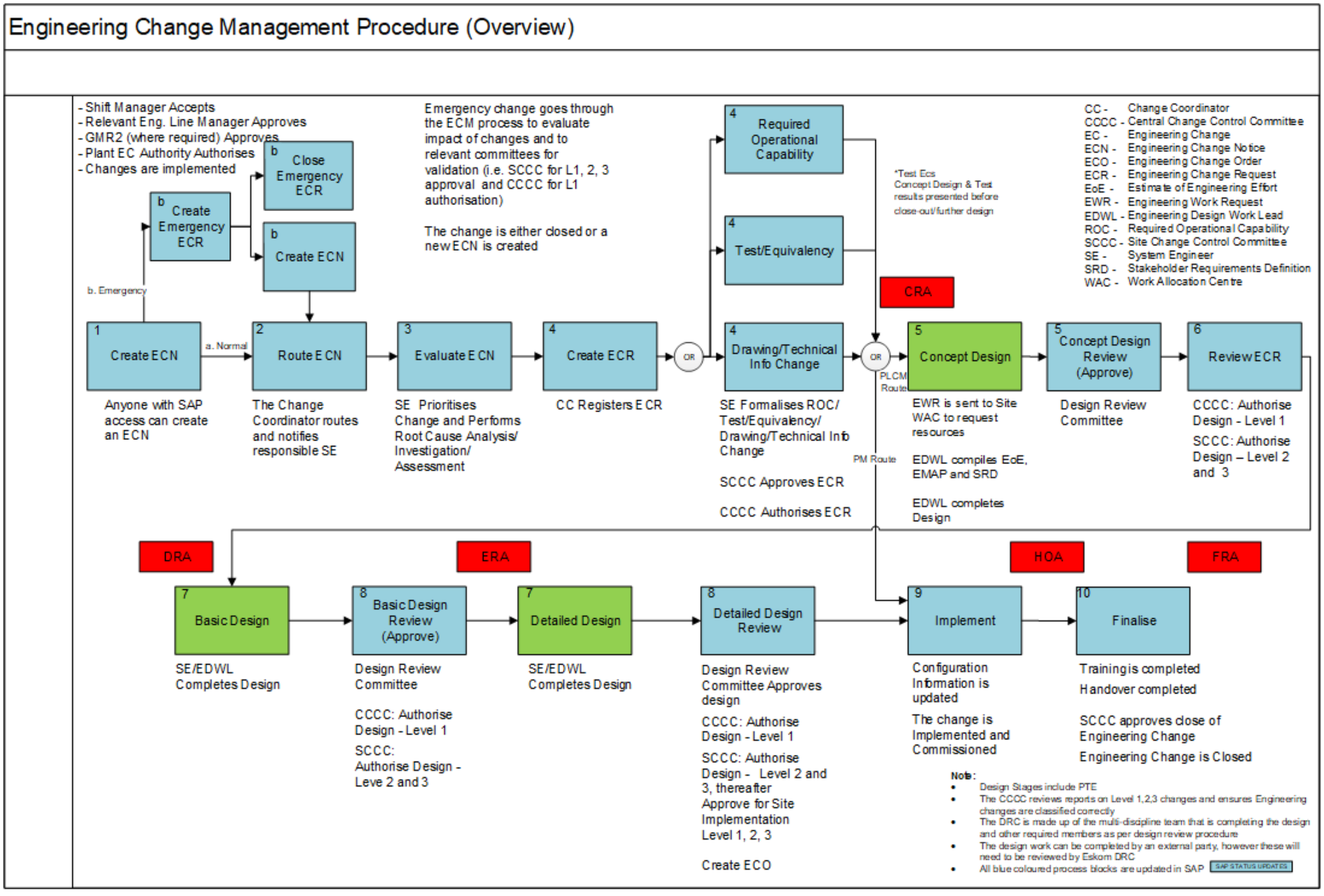

Figure 1 – Engineering Change Management Procedure (Overview)

The description of Figure 1 is summarised below:

1. Any authorised Generation employee (e.g. engineering, operating or maintenance personnel etc.) with SAP ECM access (or FLIP) can create an Engineering Change Notification (ECN). There are two types of engineering changes:
   a. Normal engineering change - Follows the process as illustrated in Figure 1**.**
   b. Emergency engineering change - Accepted by the shift manager, approved by the relevant engineering line manager and the GMR2 (where required) and authorised by the Plant Engineering Change Authority (PECA), after which, it follows the normal engineering change process as illustrated in Figure 1 (where required). D & S Engineering must be notified prior to the change being implemented, the change form must be shared with all signatories and D&S management on mail., The impact of the change is evaluated and the execution route selected (see section 3.3.1.4 for guidance on what needs to be completed in the normal route).
2. The Change Coordinator (CC) enters the employee unique number and department of the responsible person (System/Plant Engineer) by updating the Engineering Change Notification (ECN) in SAP ECM. The CC then notifies the SE of the ECN.
3. The System/Plant Engineer evaluates the ECN by performing a validity check and completing an evaluation (i.e. root cause analysis/investigation report/impact assessment report/Risk Based Analysis (RBI) or as a result of Issue Management etc. – select as applicable). The evaluation must be in the form of an **approved report.**

   This may have been completed prior to the engineering change being loaded on SAP ECM. The System/Plant Engineer will ensure the information is incorporated on SAP ECM. The ECN is then updated with these findings, priority and the basic information required to create the ECR (i.e. title, reason for change, and preliminarily classification i.e. Level 1, 2, or 3 according to plant classification - SAP ABC indicator and classification guideline [12]).
4. The CC registers an ECR by entering the ECR information provided in the ECN (with information stated in point 3 above).

   The System/Plant Engineer then defines and completes the Required Operational Capability (ROC) and/or SRD or the Test/Drawing/Equivalency/Technical information (TDET) change form.

   Note: *If the compiler of the ROC and the SRD are the same individual, the SCCC can decide that only the SRD is required).*

   The SCCC will need to decide on the execution route (see section 3.4.6).

   The SCCC approves/rejects the ECR (Level 1, 2 and 3); if approved they will:

   - Ratify the priority and classification
   - Indicate regulatory and environmental impact
   - Set the execution Indicate whether it is a temporary or permanent change route (PLCM/PM)
   - Review Emergency ECs
   - Review Evaluation/Investigation reports
   - Review Cancelation/Rejections (where applicable/previously authorised).

   Should the PM route be selected the change can be implemented after the configuration updates have been completed. TDET ECs must be classified and evaluated prior to being presented at SCCC and/or CCCC. For Test ECs the change will need to be accompanied by an evaluation (*i.e. root cause analysis/ investigation report/ impact assessment report/ Risk Based Analysis (RBI) or as a result of Issue Management etc. – select as applicable)*, concept design, concept-design-review report and

test results before close-out, implementation or further design work. Where the test requires further design work the PLCM route is selected, and the steps below must be followed.

5. The EDWL and LDEs complete the Engineering Management Plan (EMAP) and thereafter the Stakeholder Requirements Definition (SRD) document. The EDWL also plans and coordinates the concept design. The concept design is presented to the Design Review Committee (DRC) who then approves the design.
6. The CCCC (Level 1) and the SCCC (Level 2 and 3) reviews the ECR, concept design and the supporting documentation and authorises to proceed to basic/detail design.
7. The SE/EDWL plans and coordinates the basic, and/or detail design.
8. After completion the DRC reviews the basic and/or detail design.

   The CCCC authorise the Level 1 detail designs prior to the SCCC authorising Level 2 and Level 3 detail designs and Level 1, 2, 3 ECR's for implementation.
9. Configuration information is verified and corrected, and the design base is updated to ensure it accurately reflects the existing plant after which the change is implemented and commissioned.
10. Operations and Maintenance (O&M) staff are made aware of and trained on the changes to the affected plant. The SCCC approves the close of the engineering change and the engineering change is closed.

Note: *All manual activities for each phase must be completed in accordance with the Project Life-Cycle Model (PLCM) [18]. The numbers above, directly correlate to the numbered blocks in Figure 1.*

3.3 ENGINEERING CHANGE MANAGEMENT PROCEDURE (DETAILED)

The ECM procedure consists of originating, processing, implementing, and close engineering changes.

3.3.1 Originate Engineering Change

The process for originating an engineering change consists of the following four sub-systems: create ECN, route ECN, evaluate ECN, and create ECR as shown in Figure 2**.**

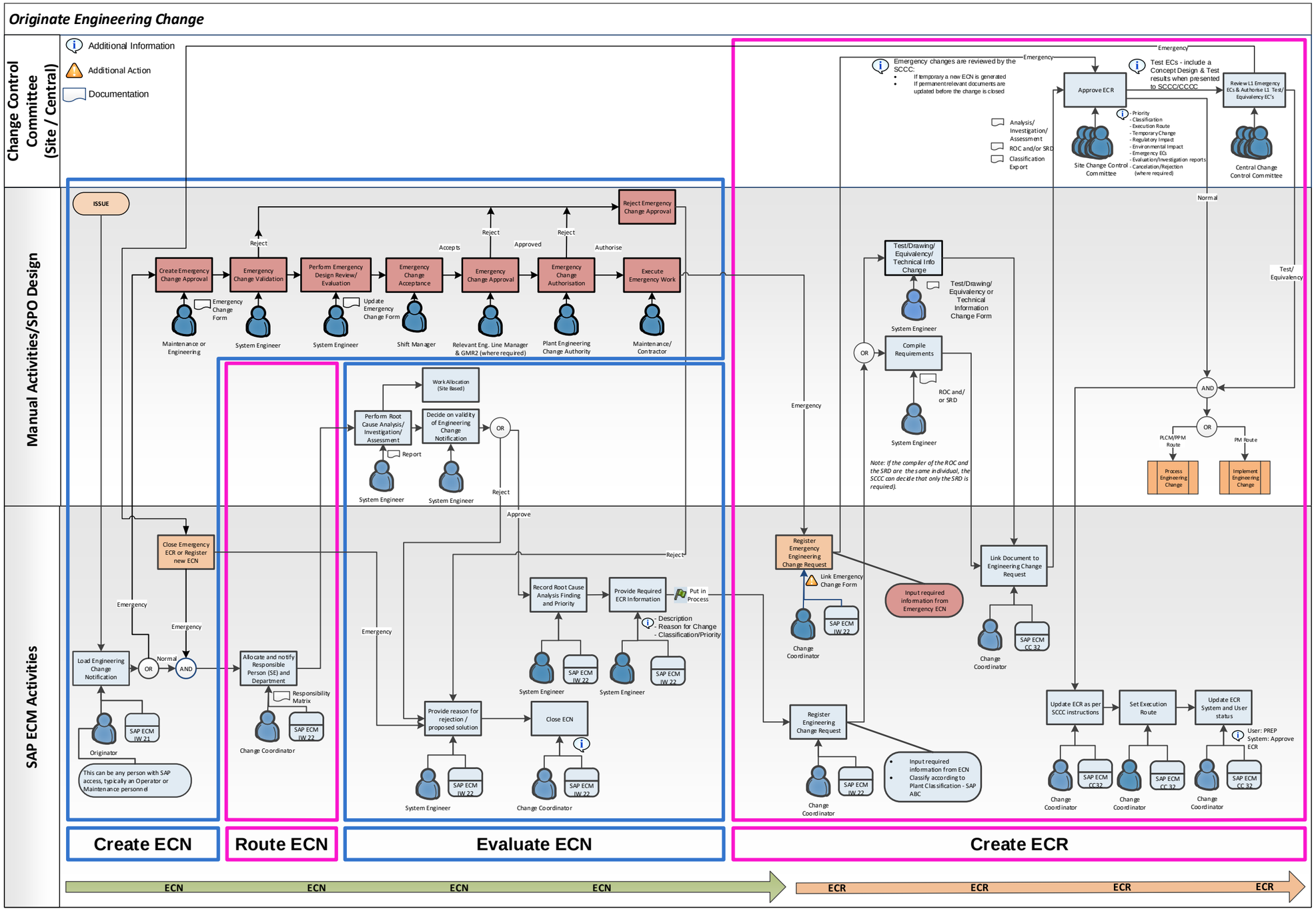

Figure 2 – Originate Engineering Change

3.3.1.1 Create ECN

There are two types of engineering changes, these are:

1. Normal engineering change
2. Emergency engineering change (see section 3.3.1.5)

Any authorised Generation employee (engineering, operating, maintenance etc.) with SAP (or FLIP) access can create an ECN (Originator) which can be as a result of the operating process, incident and occurrence (issue management), maintenance process etc.

3.3.1.2 Route ECN

The Change Coordinator (CC) will view all new ECNs and update the ECNs by selecting the responsible department and System/Plant Engineer per ECN according to the responsibility matrix. The CC will then notify the responsible person of the allocation.

3.3.1.3 Evaluate ECN

The System/Plant Engineer must accept the SAP EC notification and evaluate the validity of the ECN. In order to evaluate the validity, the SE must perform/complete an evaluation of the change (i.e. RCA/investigation/assessment/RBI etc.) with the necessary stakeholders. This evaluation must be in the form of an **approved report** and the report must be attached on SAP ECM. The change/EWR can also be routed to the WAC where support is required for completion of these studies. The evaluation report outcomes must then be completed on SAP and once the evaluation is completed, the ECN is either approved or rejected.

If approved (as a normal change) the System/Plant Engineer must:

- Set the user status to approved and prioritise the ECN (see section 3.4.2)
- A message will be sent via workflow to notify the Originator of the status of the ECN
- Provide required ECR information to the CC (title/ECR description, reason for change, and preliminarily classification i.e. Level 1, 2, or 3 according to plant classification (SAP ABC indicator, classification procedure [11], classification guideline (see 2.7))

The SE then must put the ECN in process.

For TDET change (see 2.7) the System/Plant Engineer and CC must complete the points as mentioned above and submit the form to the SCCC for approval for implementation.

If rejected:

- The SE must set the user status to rejected
- A message will be sent via workflow to notify the Originator of the status of the ECN
- The SE must provide a reason for rejection/proposed solution
- SAP ECM automatically workflows the originator the rejection status (should the originator dispute the rejection he/she can flag to SCCC).

3.3.1.4 Create ECR

The CC registers and makes active an ECR on SAP ECM with the information (ECR description, reason for change and classification (Level 1, 2, 3) according to plant classification guideline [11]. The System/Plant Engineer will need to select whether an ROC or TDET is required.

Where the ROC is required, the System/Plant Engineer compiles the ROC document, and the CC attaches this ROC and associated documentation to the newly created ECR.

Note: *If the compiler of the ROC and the SRD are the same individual, the SCCC can decide that only the SRD is required). If accepted by SCCC, the SRD will then be compiled at this stage by the SE.*

The System/Plant Engineer presents the ECR for authorisation to the SCCC where the:

- Priority and classification are ratified
- Temporary or permanent change indicated
- Regulatory and environmental impact indicated
- Execution route (PLCM/PM) is set (see section 3.4.5)
- Emergency ECs are reviewed
- Evaluation/Investigation reports are reviewed.
- Cancelation/Rejections are reviewed (where applicable/previously authorised).

For a TDET change if approved, the System/Plant Engineer must submit the TDET change to the SCCC for approval. The System/Plant Engineer presents the ECR for authorisation to the SCCC where the committee will ratify the information as listed above.

L1 TDET ECs are to be presented to the CCCC for authorisation before implementation.

Important to note:

1. *TDET ECs must be classified and evaluated prior to being presented at SCCC and/or CCCC* (see section 3.4.5).
2. *For tests, the test parameters must be defined as well as the test period. The change should be accompanied by a TOI should it be for the periods as specified in [14]*
3. *Test ECs must include the evaluation (i.e. root cause analysis/ investigation report/ impact assessment report/ Risk Based Analysis (RBI) or as a result of Issue Management etc. – select as applicable), concept design, concept-design-review report and test results before close-out, implementation or further design work. Where the test requires further design work the PLCM route is selected, and the required steps completed. The test may then require further design work, or the test can be implemented.*
4. *If the temporary change is going to be in place for long period of time, then the operating and temporary instructions etc. must be written for this change.*
5. *Changes of a different make or type are regarded as a change unless the station has a full list of items that have been evaluated and are deemed to be equivalent. Where the evaluation has been completed the PM route can be followed. These types of changes should be governed by the maintenance procedure with input from authorised list.*

6. *Equivalency Engineering changes of a different make or type must include an evaluation (i.e. root cause analysis/ investigation report/impact assessment report/ Risk Based Analysis (RBI) or as a result of Issue Management etc. – select as applicable).*
7. *The evaluation (root cause, investigation etc.) must be in the form of an approved report. Corporate specialists, where available in the specific plant areas, can be involved in the evaluation process.*
8. *The CC will then update ECR statuses as follows:*

- User status:
  - Status: PRE 'Pre-Project Approval'
- System status: 'Check ECR', 'ECR Checked' and 'ECR Approved'

3.3.1.5 Emergency Engineering Change

In the case of an emergency engineering change notification:

1. An emergency change form is completed and the ECN number, generated in SAP ECM, is recorded on the emergency change form.
2. The originator must submit the emergency change form to the CC. The originator will load an ECN with notification type EC and clearly state the notification is for an emergency change (by selecting breakdown on the ECN in SAP). Prior to the implementation, the SE updates the emergency change form with the design details and relevant stakeholders who have been involved or have reviewed the design to evaluate the impact of the emergency change. The evaluation must include a design review/ risk assessment/ environmental assessment etc. with all impacted disciplines.
3. This emergency change form and design review/ risk assessment/ environmental assessment etc. is accepted by the shift manager, approved by the relevant engineering line manager and the GMR2 (where required) and authorised by the Plant Engineering Change Authority (PECA) and then immediately implemented by the relevant team. It is recommended that the GMR2.1 be involved on all emergency changes and signs as an approver on the emergency change form. PECA must inform the CC after sign-off of the emergency change form.
4. The System/Plant Engineer must ensure that the change form is sent to the CC by close of business of the next working day and confirm that the emergency change form is scanned and attached to the ECR on SAP ECM.
5. After implementation, the change follows the normal engineering change process. The impact of the change is evaluated, and the execution route selected (see section 3.3.1.5 for guidance on what needs to be completed in the normal route).
6. The SE may complete an engineering report (root cause analysis/ investigation/ impact assessment) to further evaluate the impact of the emergency change (if required). The evaluation must include a design review with all impacted disciplines, indicate whether the change is permanent or temporary, and identify any safety, configuration, operating and maintenance or environmental impact. The evaluation must be in the form of an **approved report.**
7. Once the relevant emergency change documentation is attached to the ECR and the emergency change is presented at the SCCC, a decision should be made by the SCCC committee as to what the period is to finalise the change. This decision should be made within one week of the change being implemented. The SCCC will also review the emergency EC and advise on what execution route must be followed in order to close the change.

8. The quarterly status (out of normal, normal process followed etc.) report of L1, 2, 3 EC's must be presented at the SCCC quarterly by the relevant site representative. The SCCC will review the status of L1, 2, 3 emergency changes and advise on any further action required.
9. There are 2 possible execution routes for this change, see section 3.3.4, where the change is closed or a new change is created (detailed below).

Where design work is required, a new change is created, and the normal engineering change notification process must be followed to ensure the change is properly evaluated and monitored. This process involves the following activities:

1. The CC will register a new ECN and ensure that the emergency ECR information is attached and/or referred to in the new ECN
2. The CC will route the ECN to the System Engineer who performed the initial validation. The CC will notify the SE of the allocation.
3. The SE records the findings on SAP ECM and attaches any relevant documentation.
4. The SE provides the CC with the required ECR information. The CC registers the ECR and links the relevant documentation.

   The normal process will be followed through to finalisation.

Important to note:

1. *The CCCC can conduct a review of the L1, L2, L3 normal/ emergency/ test/ equivalency etc. ECs at any time.*
2. *L1 L2, L3 emergency EC's must be presented at the SCCC quarterly by the relevant site representative. The quarterly status (out of normal, normal process followed etc.) report of L1 EC's must be presented at the SCCC quarterly by the relevant site representative. The SCCC will review the status of L1 L2, L3 emergency changes and advise on any further action required.*
3. *The SCCC will continuously review cancellation/rejections for ECs for authorisation prior to the close of the change, where required/previously authorised).*
4. *The SCCC will continuously review Emergency ECs prior to the close of the change.*

3.3.2 Process Engineering Change

The process for processing an engineering change consists of the following three sub-systems: concept design, review ECR, and design as shown in Figure 3.

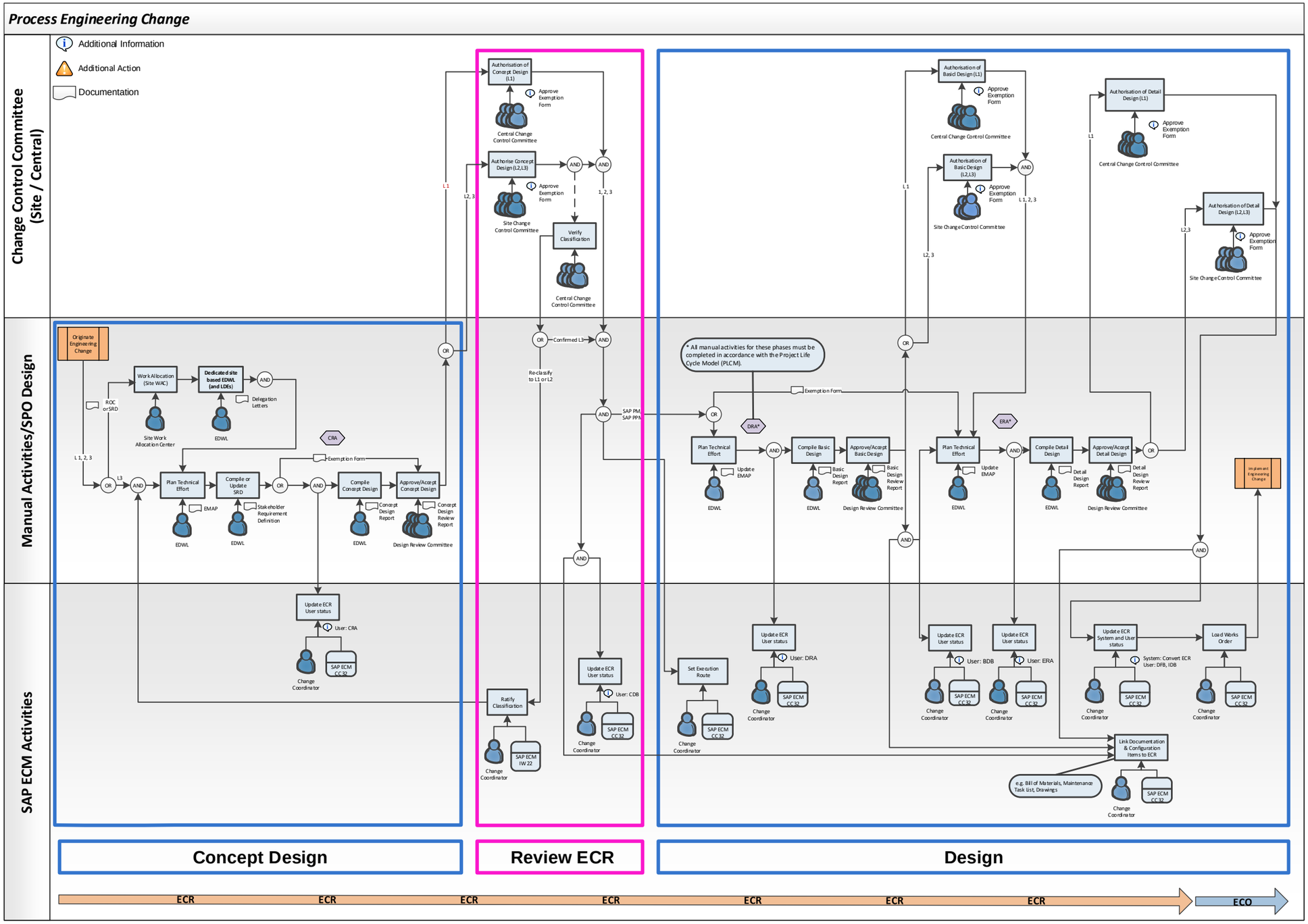

Figure 3 – Process Engineering Change

3.3.2.1 Concept Design

The process to follow is dependent on the complexity of the ECR. In some cases, the EC is non-complex and is repeatable. In these cases where there is no value-add to complete a specific design phase, an exemption form can be used to skip phases (i.e. financial gates and design work, see section 3.4.4). The exemption does not include the exemption of requirements documents such as the SRD. The EDWL will need to present to the SCCC/CCCC during the concept phases to gain approval to by-pass phases.

The CC/SE must send the ROC to the site WAC department who will route the work to an appropriate EDWL and facilitate the appointment of resources. The resources will all have a delegation letter indicating the expectations for the specific role allocated.

Where the operating unit/relevant manager have the necessary delegation as per [10] may manage their own appointments (for the specific level of ECs delegated).

The design must be reviewed by a DRC, after which it will be sent to the SCCC/CCCC for ratification of the classification and approval that the governance process has been followed.

The Engineering Design Work Lead (EDWL) will ensure that all end-of-phase design reviews are identified and executed as per [4]. The Design Review Committee (DRC) members will be appointed based on the subject matter and disciplines affected and will typically be the LDEs on the specific project. The Site Work Allocation Centre (WAC) will facilitate the delegation of the EDWL; and the identification of the resources for DRC will be the responsibility of the EDWL (multi-disciplinary) and the LDE (single discipline) as per Design Review Procedure [4]. The DRC must comply with the design review procedure [4] and include the relevant SE, as well as the site project engineer(s) who will be responsible for the implementation.

The appointed EDWL will need to plan the technical effort for the concept design and establish the Engineering Management Plan (where required) and the Stakeholder Requirement Definition (SRD). The Engineering Management Plan must prescribe which Design reviews need to take place and highlight any exemptions required for the project. These documents must be baselined in accordance with the Design Review Procedure [4].

Funding for the concept phase of the project is obtained from an investment authority by means of a Concept Release Approval (CRA). Once received, the CC will then update ECR statuses as follows:

- User status: ‘CRA Concept Release Approval’

The System/Plant Engineer assists in making the following design base documentation available:

- Operating and maintenance manuals
- Technical drawings
- List of previous ECs on the system/component

The concept design is then compiled and reviewed in accordance with the design review procedure [4] and the engineering change is re-evaluated at the relevant committee.

3.3.2.2 Review ECR (Conceptual Design)

The CCCC is responsible for authorising all Level 1 ECR designs to proceed to basic and/or detail design.

Once the concept design is approved or accepted by the DRC and authorised by the SCCC/CCCC, the CC updates the ECR statuses as follows:

- User status:
    - Baseline Status: 'CDB Concept Design Baseline'

The CC must then link all concept design documentation and committee Minutes of Meeting (MoM's) to the ECR. The site CC will complete the linking and status update if the submission is to the SCCC and the central CC will complete the linking and status update if the submission is to the CCCC.

The SCCC/CCCC also evaluates and may update the execution route; if an update is required the relevant CC must update the execution route on SAP ECM to reflect this decision.

The CCCC will periodically review audit reports (or SAP reports) on changes classified as level 2 and 3 by the various SCCC's and may reclassify a Level 2 or 3 to a Level 1 change at any time, in which case the change must be brought before the CCCC for the approval of the concept design. The central CC will request a report from each site CC on Level 2 and 3 engineering changes on a quarterly basis.

3.3.2.3 Design

Based on the complexity of the required design work, and recommendation from the Committees, the EDWL can progress straight to Basic (or Detail) Design (see section 3.4.4). Where an exemption is required the EDWL will need to present to the SCCC/CCCC to gain approval to by-pass relevant design phases. The EDWL will plan the Basic Design and present for DRA. Funding for the definition phase of the project is obtained from an investment authority by means of a Definition Release Approval (DRA).

The CC then updates the ECR statuses as follows:

- User status:
    - Status: 'DRA Definition Release Approval'

On completion of the Basic Design, a DRC reviews the design.

Once the basic design is approved or accepted by the DRC, the relevant committee will authorise the basic design (CCCC - Level 1, SCCC – Level 2 and 3)

Once approved/accepted and authorised, the CC attaches all design documentation and updates the ECR statuses as follows:

- User status:
    - Baseline Status: 'BDB Basic Design Baseline'

'ARB' Acquisition Requirements Baseline' *

Note: *The acquisition requirements baseline can be completed at any time and is dependent on when a contractor is required.*

The EDWL will plan the detail design and funding for the definition phase of the project is obtained from an investment authority by means of an Execution Release Approval (ERA).

The CC then updates the ECR statuses as follows:

- User status:
  - Status: ‘ERA Execution Release Approval’

The EDWL will then complete the detail design after which the DRC reviews the design. Once approved or accepted, the relevant committee will authorise the detail design (CCCC - Level 1, SCCC – Level 2 and 3). Once authorised, the CC attaches all design documentation and updates the ECR statuses as follows:

- User status:
  - Baseline Status: ‘CAB Contract Award Baseline’*
    ‘DFB Design Freeze Baseline’
    ‘IDB Integrated Design Baseline’

***Note:** the contract award baseline can be completed at any time and is dependent on when a contractor is required.*

- System Status: ‘Approve ECR’ and ‘Convert ECR’

3.3.3 Implement Engineering Change

The process for implementing an engineering change is shown in Figure 4.

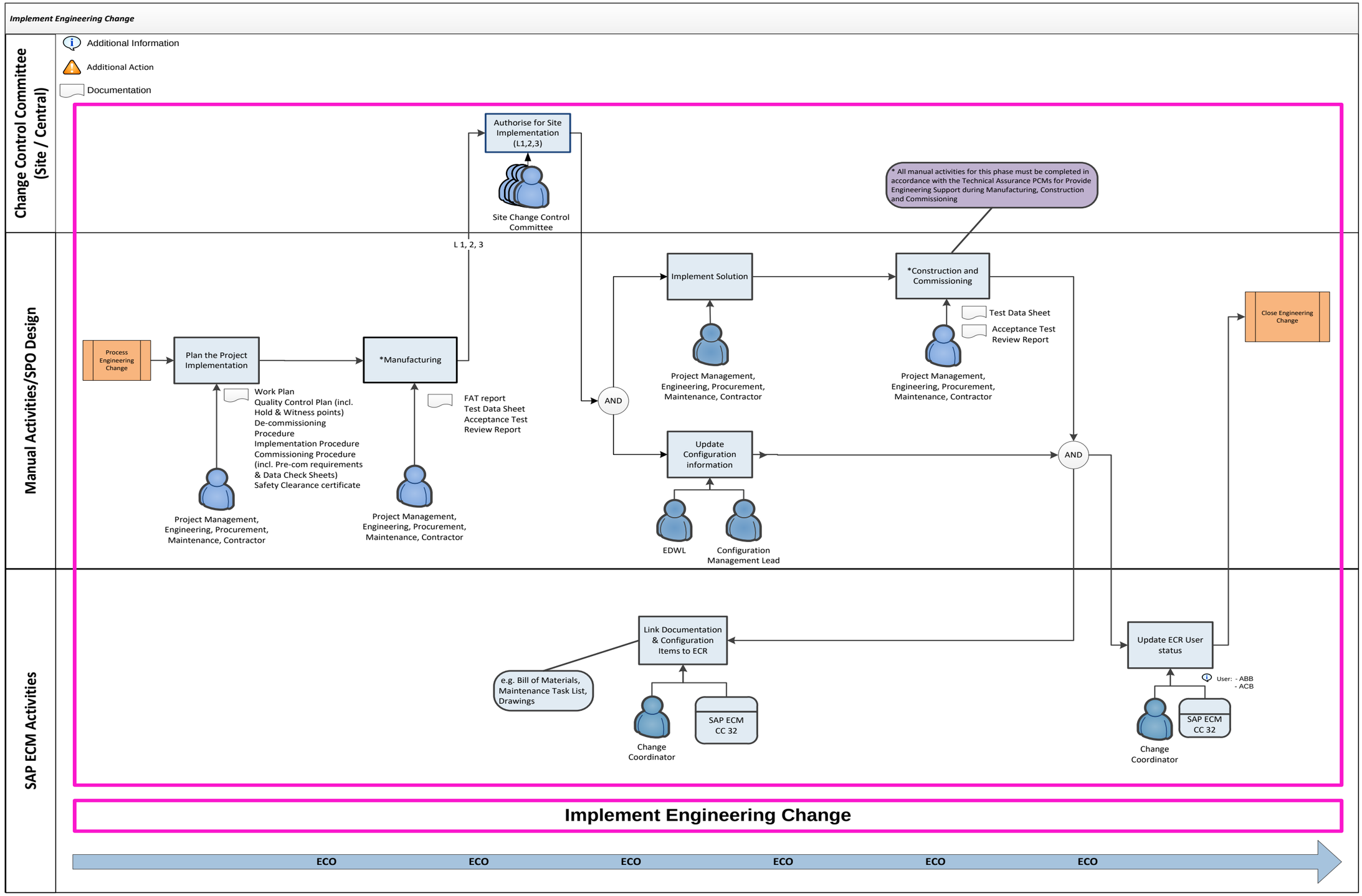

Figure 4 – Implement Engineering Change

3.3.3.1 Implement Engineering Change

After the approval of the designs (and prior to the commencement of commissioning) the EDWL and Configuration Lead/Design and Specification (D&S) Manager must ensure all configuration information is up to date, available and ready for implementation. The package is then submitted to SCCC for the authorisation for site implementation by the SE who is supported by the EDWL (see documentation as noted on Figure 4).

The CC then loads a Works Order onto SAP ECM.

Once authorisation is received, the solution is then implemented (manufactured and constructed) after which commissioning may commence.

The CC updates the ECR statuses as follows:

- User status:
    - Baseline Status: 'ABB As-Built Baseline'

      'ACB As-Commissioned Baseline'

Note:

1. *During the implementation stage, it may be determined that the baselined detailed design requires an engineering change/s. When this occurs, the project engineering change procedure [5] will be followed to manage the change.*
2. *During the implementation of an engineering change the technical assurance Process Control Manuals (PCMs) for provide engineering support during manufacturing, construction and commissioning should be referenced.*
3. *Use checklists in the design review reports to ensure pack is complete (applicable for all design phases).*
4. *On initiation of the change, an appointment should be done for the individuals who will lead the implementation of the change. A formal handover should be completed by the relevant persons when there is a change in the responsibilities.*
5. *Typically engineering will support and projects will lead commissioning proceedings. (Projects need to inform D&S and Engineering as they progress through the implementation).*

3.3.4 Finalise Engineering Change

The process for finalisation an engineering change consists of either the close (Figure 5) or close-out (cancellation/rejection) of an engineering change (Figure 6).

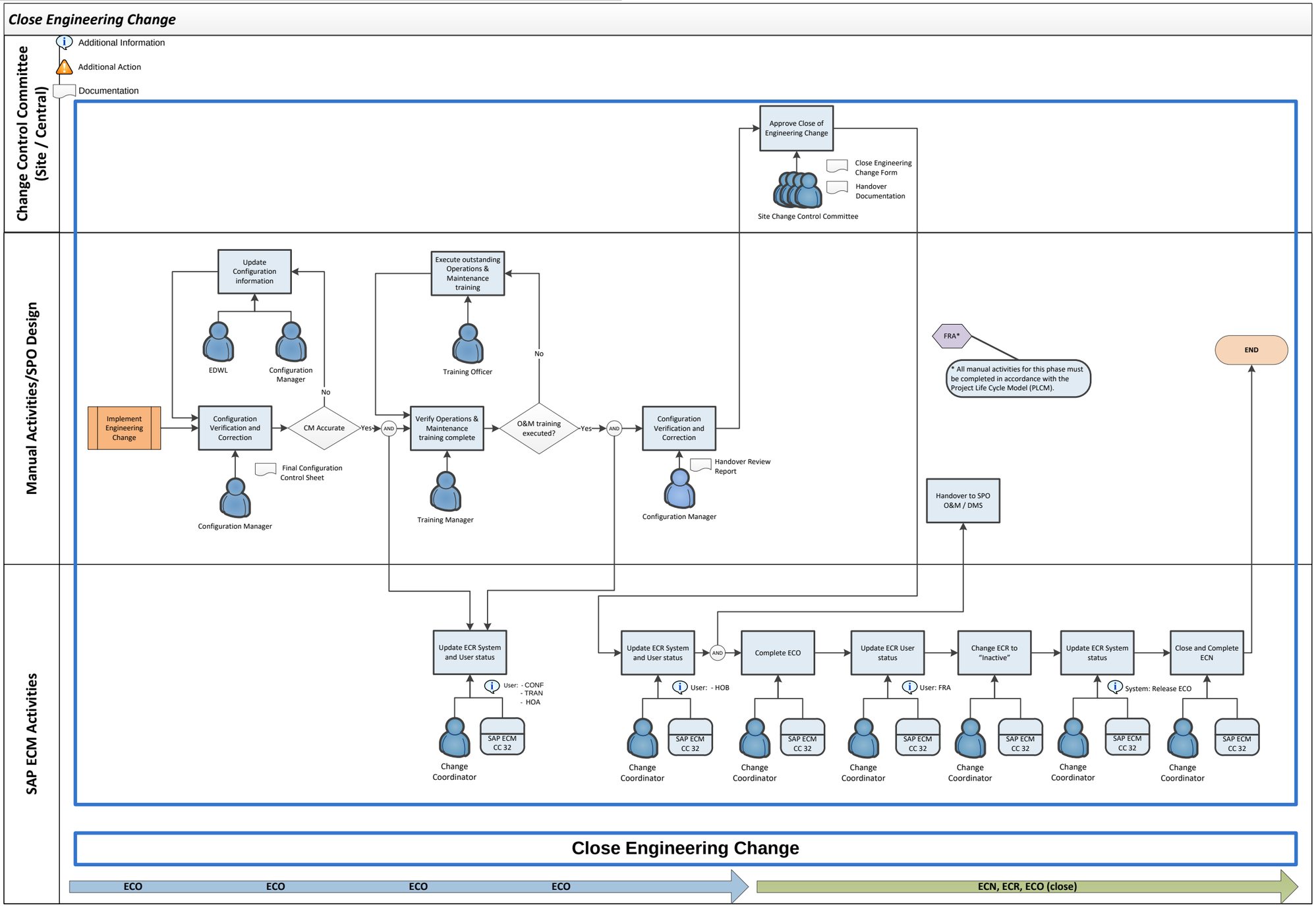

Figure 5 – Close Engineering Change

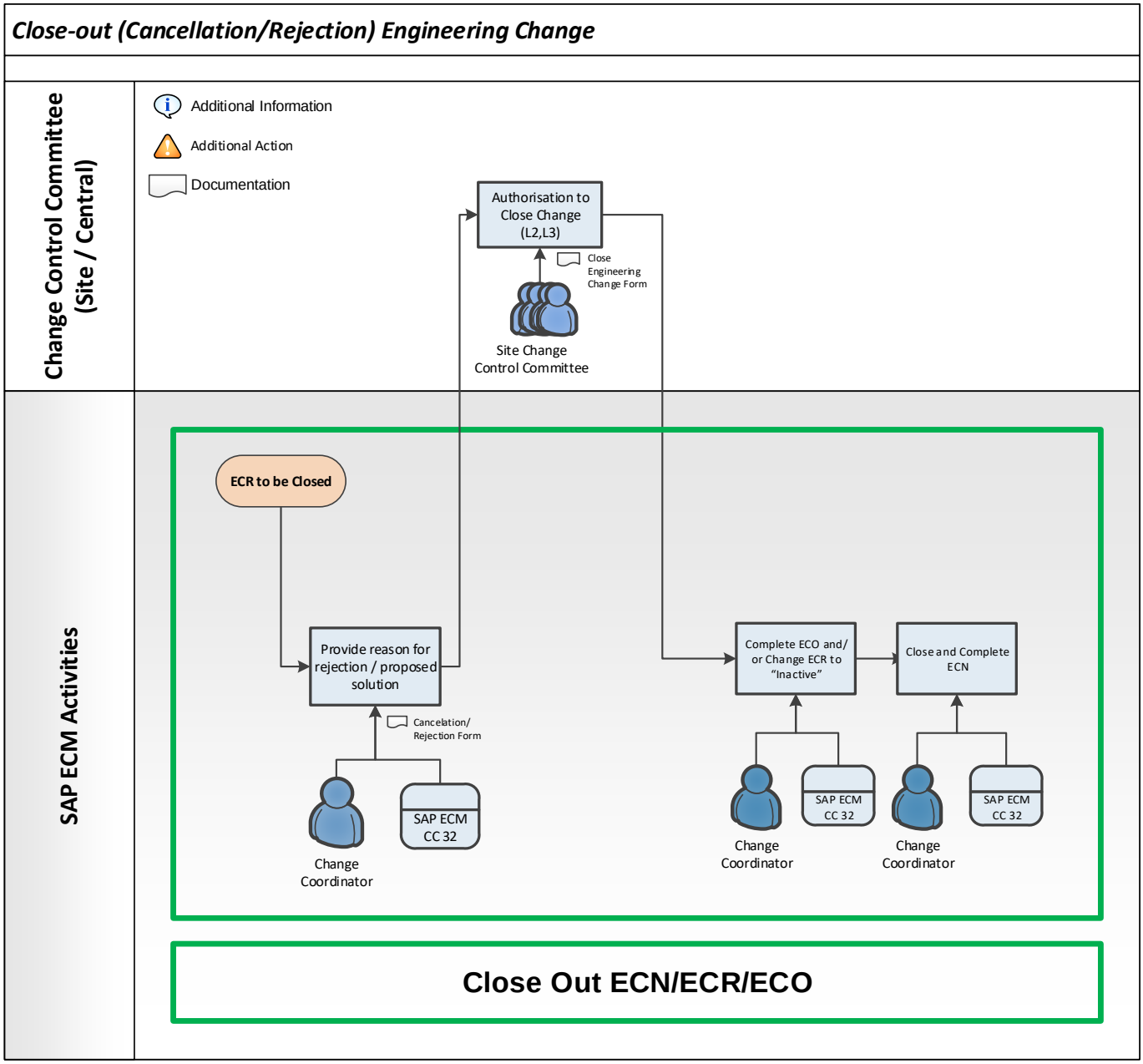

Figure 6 – Close out (Cancellation/Rejection) Engineering Change

3.3.4.1 Close Engineering Change

The close engineering change process ensures that the design base is updated by ensuring that the configuration information is verified and corrected. The configuration management lead must assist in the verification of the configuration information until all information is as required.

The process also ensures that the operations and maintenance staff are aware of the change and are trained to operate and maintain the effected plant.

The engineering change close out form is presented to the SCCC with all handover documentation submitted (refer to Appendix C) and the close of the engineering change is approved. The configuration management control sheet is used as a measure to evaluate whether an ECN can be closed. At this point the SCCC will check that all the required steps have been followed and the design base is up to date, after which they will give handover approval.

On completion of these tasks, the CC can:

- Update the ECR statuses as follows:
  - User status:
    - Baseline Status: ‘CONF Config. Data Updated’
      ‘TRAN Oper. & Main. Training completed’
    - Status: ‘HOA Hand Over Approval’
    - Baseline Status: ‘HOB Handover Baseline’
  - User status:
    - Status: ‘FRA Finalisation Release Approval’
  - Makes the ECR ‘Inactive’
  - System status: ‘Close ECO’
  - Complete the ECO on SAP ECM, and update statuses to:
    - System status: ‘Release ECO’

3.3.4.2 Close out (Cancellation/Rejection)

At any stage during the ECM process, the SE/PE, SCCC, or CCCC, can reject the ECR/ECO. Once the decision has been made to reject the ECR/ECO (after the SCCC has approved at the originate stage):

1. The EDWL/SE/PE completes the cancellation/rejection form, must record reason/s for the rejection, proposed solutions on SAP ECM
2. The EDWL/SE/PE gets approval from their managers. Where required the cancelation/ rejection is submitted to the SCCC for authorisation (typically where the change was previously approved by the SCCC).
3. The CC will update SAP accordingly and attach the form to the ECN/ECR/ECO.

3.4 DECISION CRITERIA

Throughout the ECM process several key decisions need to be made, these include: the classification and prioritisation of the engineering change, committee criteria to review for approval or rejection, engineering change phase exemption, the execution routing to effect the change i.e. SAP PM/ SAP PPM/ SAP PLCM (i.e. TDET change type changes, emergency changes, normal or design changes, out of normal applications).

To ensure consistency all key decisions will be based on the standardised criteria discussed in the sections below.

3.4.1 Engineering Change Classification

The classification of engineering changes shall be consistently implemented in accordance with the classification standard [11] for systems, components, structures and parts according to the classification categories (Level 1, 2 and 3) as below. The classification standard [11] and classification guideline (see section 2.7) are both used to determine the level classification.

Engineering change classification is divided into three levels on the SAP ECM drop down menu and will be used to indicate the classification.

The classifications and related descriptions provide a guideline for the classification of an Engineering Change as follows (extracted from [11]):

- **Level 1**

Should the change fail, it will have major impact, i.e. unit trip, major equipment damage, environmental breach, and compromises personnel safety.

- **Level 2**

Should the change fail, it will results in a decreased plant availability and reliability.

- **Level 3**

All changes which do not meet the criteria for Level 1 or Level 2.

Components within a system shall be classified with respect to the safety function they fulfil and these may be different from the overall system or equipment classification. Components with multiple functions shall be classified according to the function that gives the highest safety classification.

Level 1 plant shall be subjected to more stringent specifications and processes than Level 2 and subsequently Level 3 plant to ensure that the processes applied are in line with the plant criticality level.

3.4.2 Engineering Change Prioritisation

Every engineering change will be prioritised according to the following prioritisation categories (high, medium and low). The Prioritisation Guideline (see section 2.7) assists in prioritising the changes based on finance/execution impact, statutory requirements, plant availability impact and projects escalation requirements.

- **High**

These are projects (typically scoring between 4 and 5 based on prioritisation guideline) which have an approved cost allocation other than the technical plan, an expected execution time of 3 months or less, serious impact on plant availability, significant impact on statutory requirements and are escalated by the station for urgent attention.

- **Medium**

These are projects (typically scoring between 2 and 4 based on prioritisation guideline) which have an approved budget in the technical plan, an expected execution time of 6 to 18 months, moderate impact on plant availability and/or statutory requirements.

- **Low**

These are projects (typically scoring between 1 and 2 based on prioritisation guideline) which typically have no funding and are not on technical plan, an extended execution time, minor impact on plant availability and/or on statutory requirements.

Note: *The above criteria should be used as a guideline to assist in prioritising projects.*

3.4.3 Committee Review Criteria

In order to ensure the various committees are consistent in their review of ECR's it is imperative that the correct information be provided. The committee ensures that proper governance has been followed and the engineering change package has sufficient data for the informed decision to be made. As a minimum the package should contain the following:

1. A clearly described summary of the problem/deficiency.
2. Insight into the alternative solutions that were considered and an explanation of the alternative that was selected.
3. The impact of the modification as well as the risks that were identified.
4. Present evidence that the design was approved and has been reviewed by the DRC according to the design review procedure [4].
5. All assumptions made during the design, irrespective of the stage of the design.
6. All applicable documentation that was identified and updated or deleted for the purpose of the EC.
7. Copies of the decision record (i.e. executive summary) that contains the required signatures of the relevant power station.

The information above is documented in an executive summary (with a checklist that can be used to provide guidance on the requirements).

3.4.4 Engineering Change Phase Exemption

Exemptions can be granted to skip the relevant design phases by using the relevant exemption form. The exemption form should motivate why a design phase (or specific elements of a phase) are not required for the project. Engineering Change Phase Exemptions may be identified by the SE at ECR authorisation where they can present to SCCC for support. However, the appointed EDWL must agree and can revert back to SCCC should he/she not agree. EDWL should advise on phase exemptions for the project life-cycle when evaluating the technical effort and compiling the Engineering Management Plan.

The following should be considered when applying for an exemption:

1. Describe the reason for why the engineering change does not require these phases.
2. Reference any data/documentation that can support the request.
3. All the stakeholders that support the bypassing of these phases.
4. Advise if any safety or cost impact will be incurred by bypassing of these phases.
5. Define if there will be an impact due to incorrect/poor requirements definition (by skipping design phase(s)) leading to wasteful effort/expenditure in the execution phase.
6. Detail if there will be an impact on Technology selection by skipping the concept phase.

3.4.5 Engineering Change Execution Routes

Each site is to develop and populate its own RACI matrix to enable the CC to correctly route ECN's to its respective System/Plant Engineer.

The CC will use this RACI matrix to identify the System/Plant Engineer within whose system the ECN falls.

The SCCC decides on the execution route of an EC according to the decision criteria in Appendix B: Execution Route Decision Criteria.

There are three routes a change can follow, namely:

1. Routine work (SAP PM)
2. Non-routine Work (SAP PLCM)
3. Programme and portfolio (SAP PPM)

All changes will follow one of the 3 routes mentioned above.

3.4.5.1 Test/Drawing/ Equivalency/Technical Information Change type changes

Where the EC is a test modification, a drawing, an equivalency change **(i.e. with different make or type)** or technical information change, the change follows the normal route. Once the SE has evaluated and completed the TDET change form (see section 2.7) he/she presents to the SCCC who then decide on the execution route. L1 Equivalency and Test ECs are to be presented to the CCCC for authorisation before implementation. After the implementation is authorised, the following must be considered for execution routes:

- If change does not impact the design base or technical documentation/drawings (i.e. component is the same make or type) follow the SAP PM route and exit the ECM process.

- If change is to only technical documentation/drawings, the change will follow the SAP PM route. The SE/PE must present TDET change form to SCCC. Once approved the technical documentation must be updated after which the change can be implemented.
- If change affects technical documentation and design work is required follow the PLCM route. The design must be completed in alignment to ECM Process and PLCM [20] and can be implemented thereafter.
- If the change impacts the operating/protection/control set points, software or technical documentation, this TDET form can be used to note the change and impacts thereof. The changes to set points must be evaluated where the change is outside the design boundaries. If the change is evaluated and is outside the set boundaries with risk of high impact to plant, the full process is to be followed.

Note:

1. *TDET ECs must be classified and evaluated prior to being presented at SCCC and/or CCCC.*
2. *For tests, the test parameters must be defined as well as the test period. The change should be accompanied by a TOI should it be for the periods as specified in [14].*
3. *Test Engineering changes must include the evaluation (i.e. root cause analysis/ investigation report/ impact assessment report/ Risk Based Analysis (RBI) or as a result of Issue Management etc. – select as applicable), concept design, concept-design-review report and test results before close-out, implementation or further design work. Where the test requires further design work the PLCM route is selected, and the required steps completed. The test may then require further design work, or the test can be implemented.*
4. *If the temporary change is going to be in place for a long period of time, then the operating and temporary instructions etc. must be written for this change.*
5. *Changes of a different make or type are regarded as a change unless the station has a full list of items that have been evaluated and are deemed to be equivalent. Where the evaluation has been completed the PM route can be followed. These types of changes should be governed by the maintenance procedure with input from authorised list.*
6. *Equivalency Engineering changes of a different make or type must include an evaluation (i.e. root cause analysis/ investigation report/ impact assessment report/ Risk Based Analysis (RBI) or as a result of Issue Management etc. – select as applicable).*
7. *The evaluation (root cause, investigation etc.) must be in the form of an approved report.*
8. *PEIC (including other required SMEs/stakeholders) shall be included in the evaluation process.*

3.4.5.2 Emergency changes

Initially, the emergency change will be evaluated and implemented. Thereafter, the emergency change is further evaluated by the SE and reviewed by SCCC where the execution route is determined based on whether the change is deemed permanent or temporary:

1. Where the emergency change is permanent and does require further design work, the emergency change is closed and a new ECN is registered to complete the design work.
2. Where the emergency change is permanent and does not require further design work, the TDET change form is completed and the relevant technical documents to be updated are noted. Once these documents have been updated, the SCCC can advise that the change can be closed. (e.g. similar make or type, evaluation shows minor or no impact to design base). L1 emergency

EC's must be presented at the CCCC quarterly by the relevant site representative. The CCCC will review the status of L1 emergency changes and advise on any further action required.

3. Where the change is temporary and changes to design are required, the emergency change is closed and a new ECN is registered to complete the design work.

***Note**:*

1. *The CCCC can conduct a review of the L1, L2, L3 normal/emergency/test/equivalency etc. ECs at any time.*
2. *L1 emergency EC's must be presented at the CCCC quarterly by the relevant EDWL. The quarterly status (out of normal, normal process followed etc.) report of L1 EC's must be presented at the CCCC quarterly by the relevant EDWL or D&S manager. The CCCC will review the status of L1 emergency changes and advise on any further action required.*
3. *The SCCC will continuously review cancellation/rejections for ECs for authorisation prior to the close of the change, where required/previously authorised.*
4. *The SCCC will continuously review Emergency ECs prior to the close of the change.*

3.4.5.3 Normal or design changes

- PLCM route (managed by Engineering) or
- PPM Route (managed by Projects Management)

3.4.5.4 Simulations

As defined in [17]36-1535, Management of Plant Simulations standard

3.4.5.5 Out of Normal Applications

As defined in:

[14] 240-43761495, Generation Temporary Operating Instruction

[15] 240-43761012, Generation Out of Normal Conditions

[16] 240-43761598, Generation Specific Instruction Request

3.4.6 Appeals Process

If at any stage during the ECM process an ECN is rejected and the Originator/SE feels this is a valid ECN, the Originator/SE can escalate to relevant discipline manager and thereafter SCCC. For further guidance (see engineering issue management and escalation works instruction [13]).

4. AUTHORISATION

This document has been seen and accepted by:

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5. REVISIONS

Date	Rev	Compiler	Remarks
October 2012	1	G Olukune	First Issue
January 2013	1.1	S. Jagjiwan/ D. Fransman	Updates from initial roll-out for Comments Review
August 2013	2	S. Jagjiwan	Updates from the system changes and process clarifications, Final Rev 2 Document for Authorisation

August 2015	2.1	S. Jagjiwan	Updates to:
			• Normative and Informative references
			• Simulation, out of normal, temporary operating instruction
			• Roles and Responsibilities
			  ○ CCCC and SCCC updated
			  ○ Plant Engineering Design Work Lead (EDWL) added
			  ○ LDE added
			• Plant EDWL added as a member to SCCC
			• Figure 1 – 6 updated
			• Decision criteria
			  ○ Engineering Change Phase Exemption
			  ○ Project (PPM) or Work Instruction (PM) Decision Criteria
			  ○ Test/Drawing/ Equivalency/Technical Information Change type changes
			  ○ Emergency changes
			  ○ Normal or design changes
			  ○ Simulations
			• Appendix A –C updated/added

March 2016	3	S. Jagjiwan	Final Document for Authorisation and Publication (Rev 3)
February 2017	3.1	S. Jagjiwan	Updates to include link to Artefacts referenced on the Final Document for Authorisation and Publication
March 2017	3.2	S. Jagjiwan	Final Draft prepared after Review
March 2017	4	S. Jagjiwan	Final Document Rev 4 for Authorisation and Publication
October 2022	4.1	S. Jagjiwan	Updates post re-linking i.e. 1. Removal of references to CoE 2. Update of Plant EDWL to EDWL 3. CCCC updated to focus on Level 1 changes and SCCC to focus on Level 2 and 3 4. Removal of reference to committee members, reference directly to ToR 5. Removal on PM templates through ECM, this will now be through MSMW 6. Removal of Estimate of Effort, Engineering Work Request form
January 2023	4.2	S. Jagjiwan	Final Draft prepared after Review Process
January 2023	4.3	S. Jagjiwan	Additional updates completed final Draft
January 2023	4.3, 4.4, 4.5	S. Jagjiwan	Additional updates completed, final Draft
January 2023	5	S. Jagjiwan	Final Document Rev 5 for Authorisation and Publication

6. DEVELOPMENT TEAM

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

- Shamita Jagjiwan
- Hanneke de Beer
- Mpumi Shongwe

7. ACKNOWLEDGEMENTS

I would like to acknowledge the site-specific Design and Specification Managers, Change Co-ordinators and the Asset Management for their constant support to the continuous improvement of the change management process.

APPENDIX A: TEMPORARY ECM DOCUMENTATION

All documentation related to the Engineering Change Management process is stored on Hyperwave, at the following link:

https://hyperwave.eskom.co.za/0x936e3246_0x038938a6

(Please note: it has been communicated that Eskom may move to a new DRM software platform OpenText, should any Hyperwave related links not work in the future please contact D&S manager to share the latest link to templates. Procedure update will follow thereafter

Links to all templates can be accessed via the Eskom DRM system or applicable links for a list refer to **Appendix E**

For further details on the templates refer to the relevant PCMs.

APPENDIX B: EXECUTION ROUTE DECISION CRITERIA

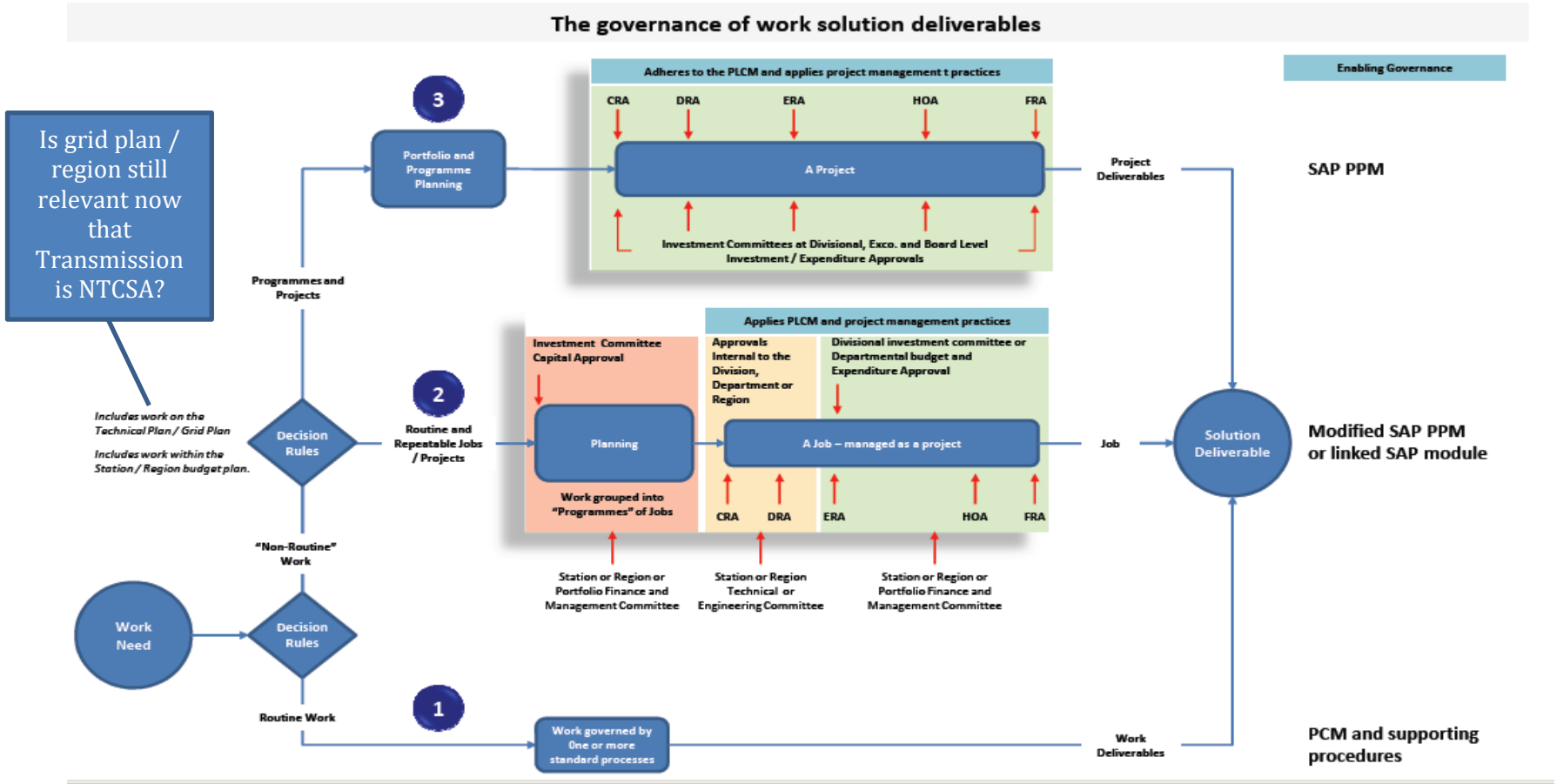


Figure 7 – Execution Route Decision Criteria

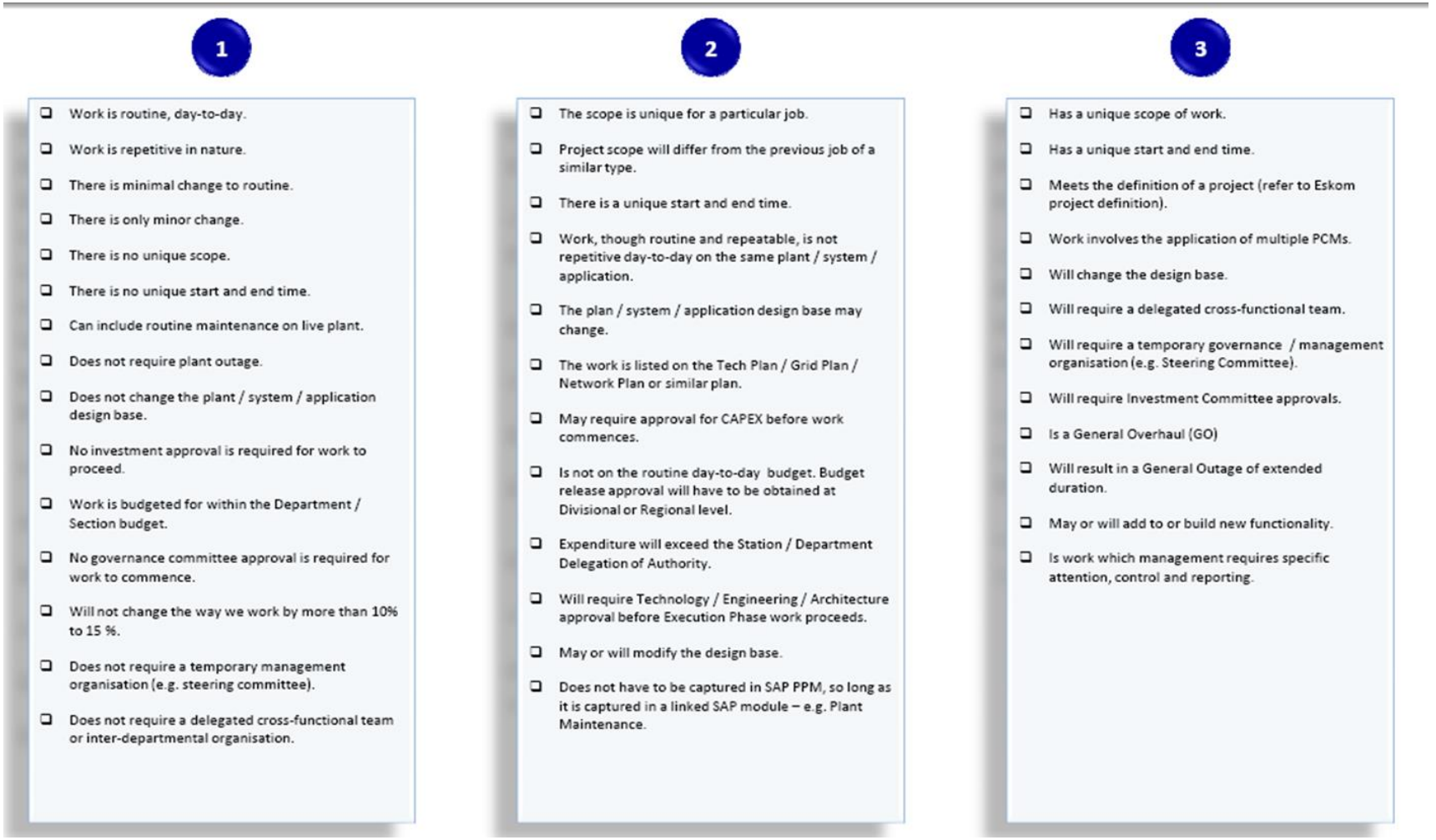


Figure 8 – Execution Route Decision Criteria (2)

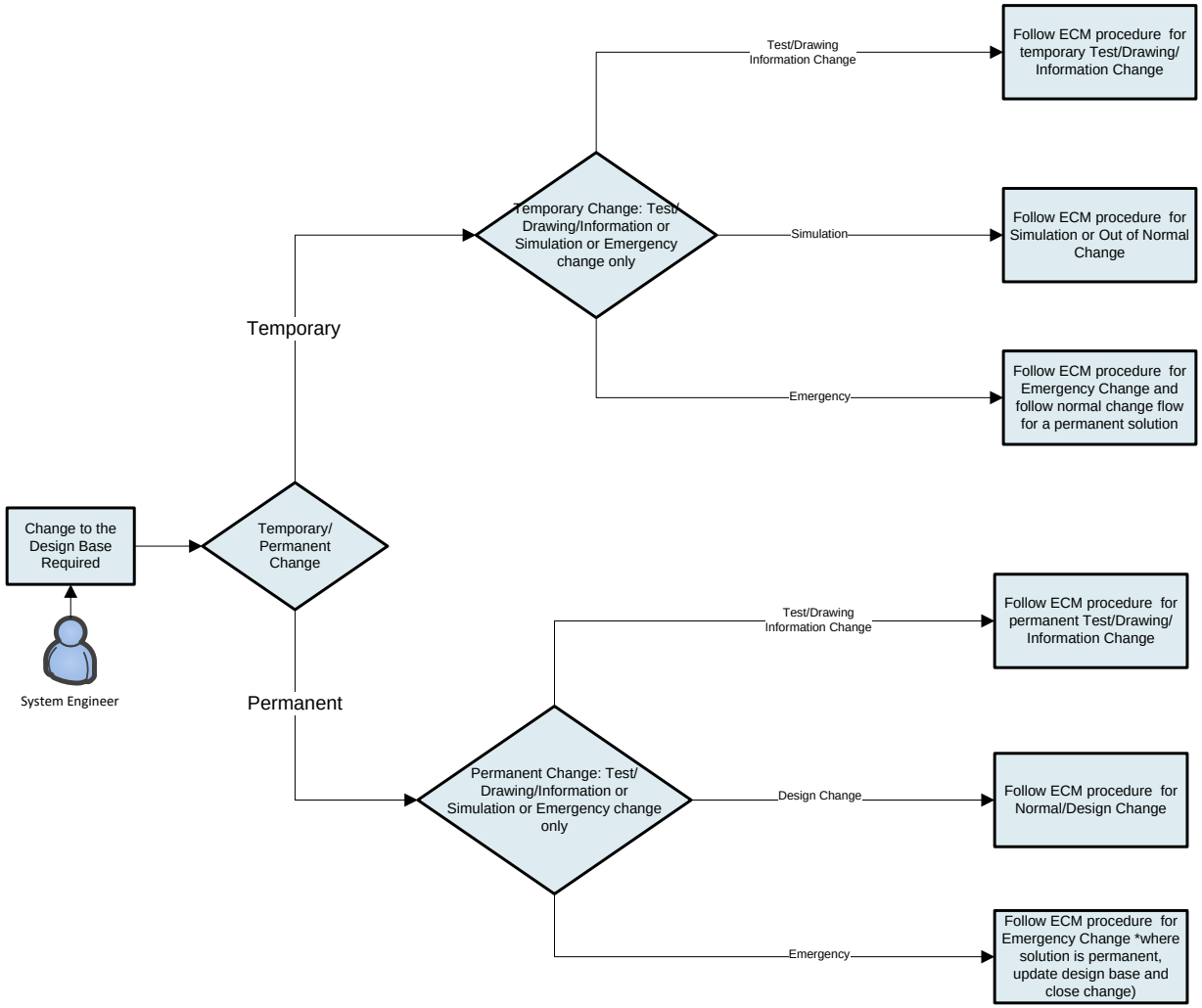


Figure 9 – Execution Route Decision Criteria (3)

APPENDIX C: COMMITTEE SUBMISSIONS

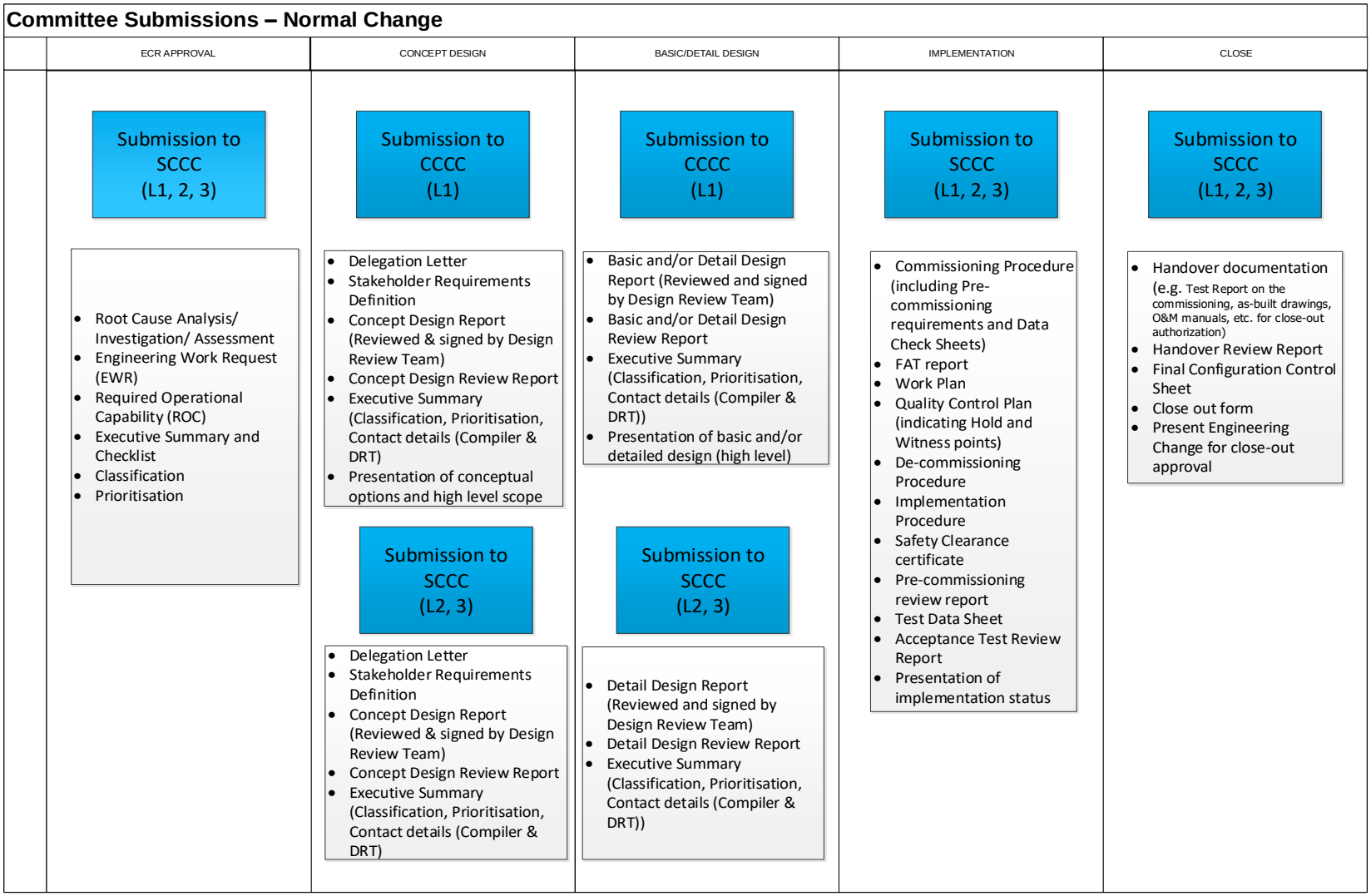


Figure 10 – Committee Submissions (Normal Change)

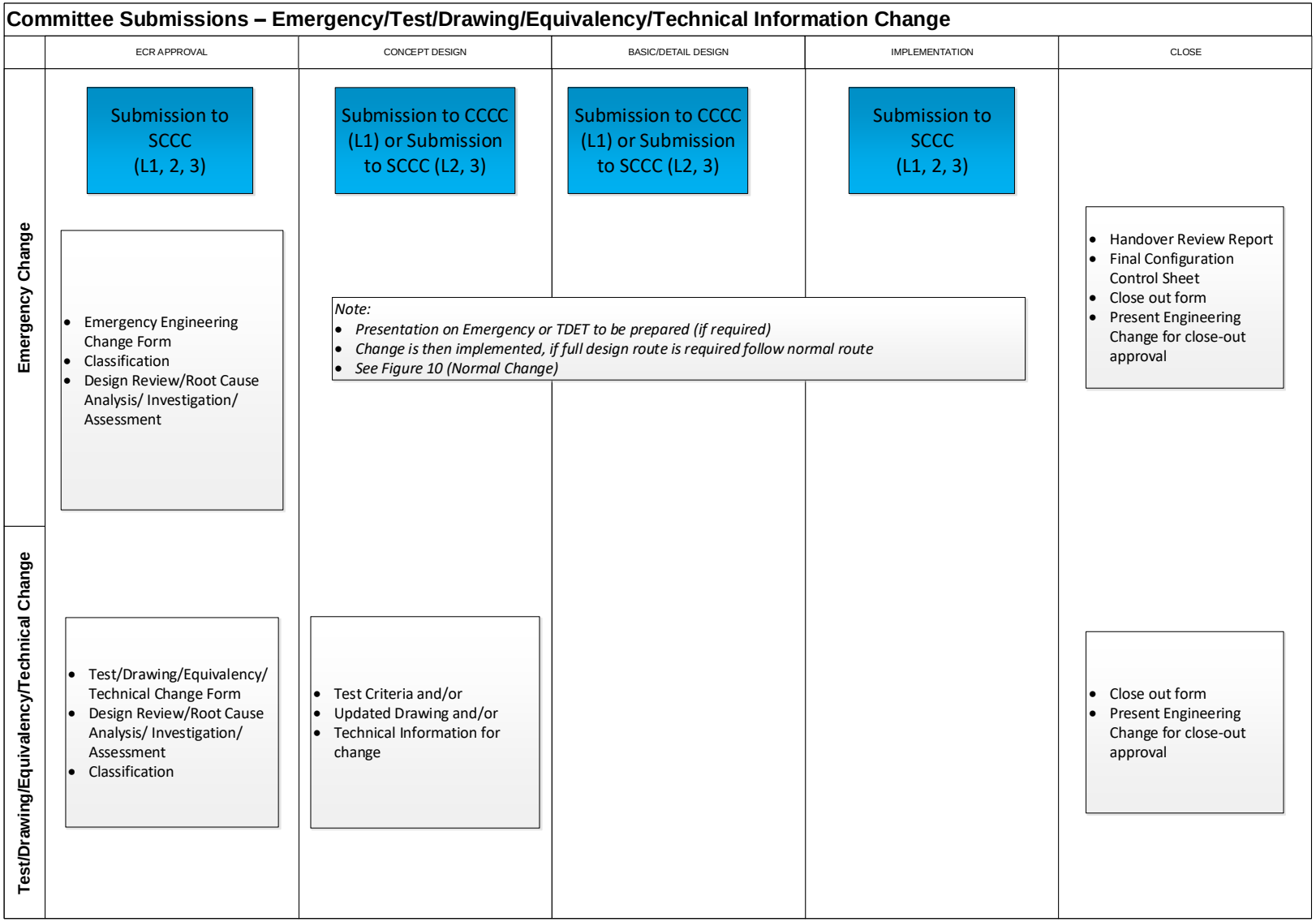
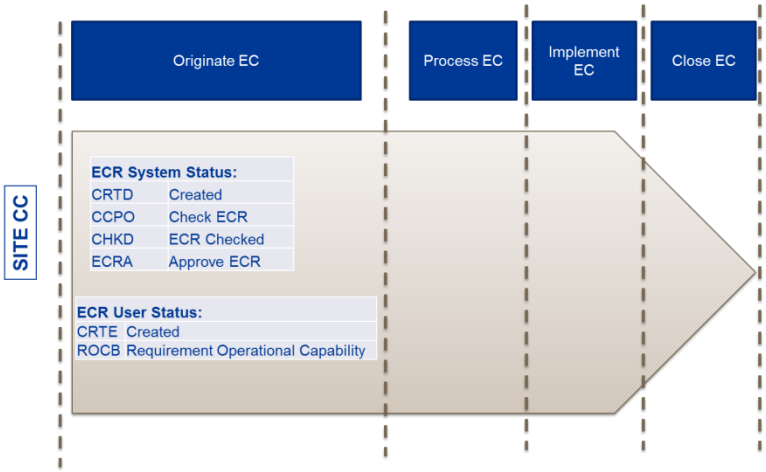
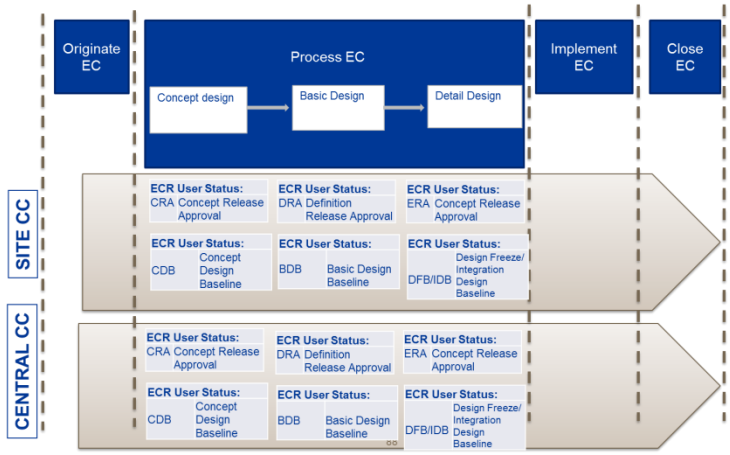
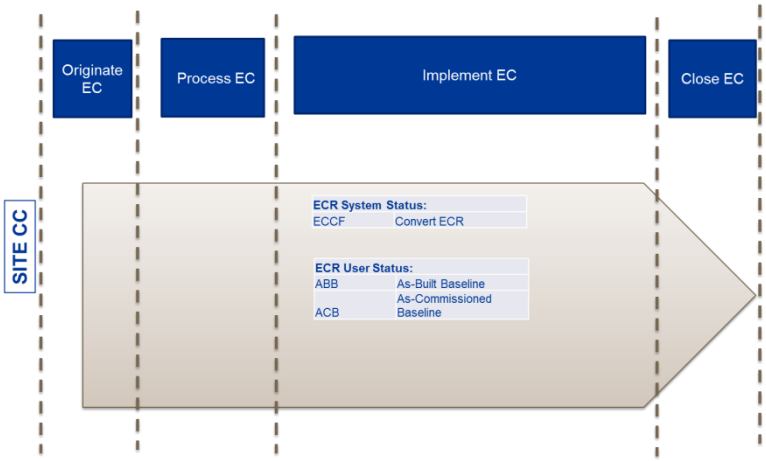


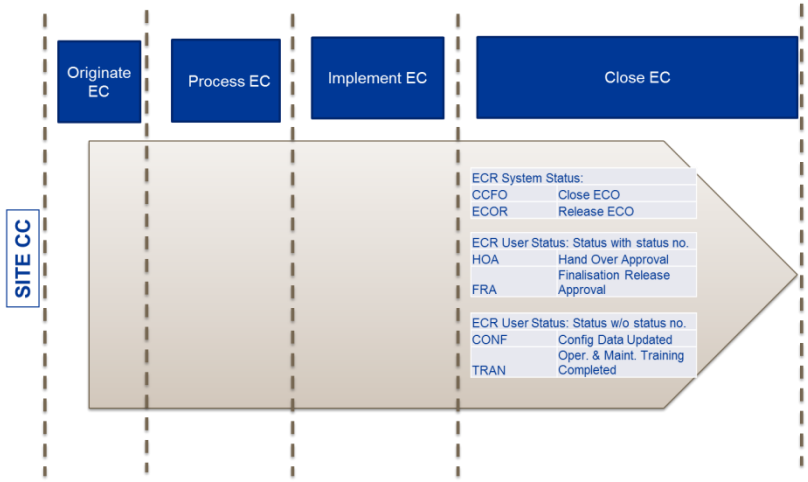
Figure 11 – Committee Submissions (Emergency/Test/Drawing/Equivalency/Technical Info Change)

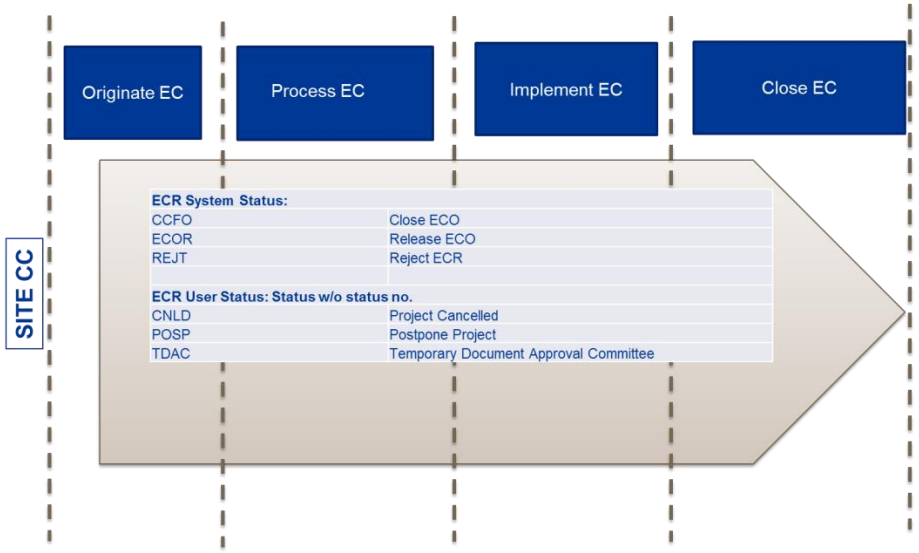
APPENDIX D: SAP STATUS UPDATES











APPENDIX E: RELATED SUPPORTING DOCUMENTS AND TEMPLATES

Engineering Change Management Procedure		
Doc Type	**Doc Number**	**Doc Name**
Procedure		
Procedure	240-53114002	Engineering Change Management Procedure
Engineering Management Plan		
Template	240-49910616	Engineering Management Plan
Requirements Templates		
Template	240-49910693	Stakeholder Requirement Definition Template
Template	240-58479576	Required Operational Capability Template
Emergency Change Approval		
Template	240-51017657	Emergency Engineering Change Approval Form
Exemption Form		
Template	240-77476531	Exemption To Produce CRA And DRA Forms Template
Test/Drawing/Equivalency/Technical Information Change form		
Template	240-98693154	Test/Drawing/Equivalency/Technical Information Change form
Root Cause Analysis/Investigation/Assessment		
Template	240-74231235	Engineering Change Root Cause Analysis/Investigation/Assessment report
Classification and Prioritisation Guidelines		
Template	240-98693284	Engineering Change Classification Guideline
Template	240-98691094	Engineering Change Prioritisation Guideline
Concept, Basic and Detail Design Report		
Template	240-49910679	Concept Design Report Template
Template	240-49910705	Basic Design Report Template
Template	240-49910707	Detail Design Report Template
Design Review Report Template		
Template	240-57934588	Design Review Report Template
Implementation and Finalisation Templates		
Template	240-74232147	Engineering Change Commissioning Procedure Templates
Template	240-74231323	Engineering Change Safety clearance certificate
Template	240-74231257	Engineering Change Test Data Sheet
Template	240-74231357	Engineering Change Final Configuration and Control sheet
Close/Cancel/Reject Engineering Change Forms		
Template	240-70976470	Engineering change management Cancelation/Rejection form
Template	240-70976454	Close engineering change form
Work Allocation Centre - Engineering Work Request and Delegation Letters		
Template	240-49104822	Engineering Work Request Template
Template	240-65905976	Delegation Letter for Engineering Design Work Lead (EDWL) Template
Template	240-65906580	Delegation Letter for Lead Discipline Engineer (LDE) Template
Committee Terms of Reference		
TOR	240-59266984	Central Change Control Committee -TOR
TOR	240-59266979	Site Change Control Committee -TOR
Committee Submission Documents		
Template	240-61531239	Central Change Control Committee (CCCC) Executive Summary
Template	240-61530956	Central Change Control Committee (CCCC) Comment Form
Template	240-61531111	Central Change Control Committee (CCCC) Feedback Form
Template	240-107264779	Site Change Control Committee (SCCC) Executive Summary
Template	240-101576440	Site Change Control Committee (SCCC) Comment Form
Template	240-101576852	Site Change Control Committee (SCCC) Feedback Form
Project Engineering Change Procedure		
Doc Type	**Doc Number**	**Doc Name**
Procedure & Template		
Procedure	240-53114026	Project Engineering Change Procedure
Template	240-70976432	Engineering Change Proposal Template
Other Documentation For Your Information		
Doc Type	**Doc Number**	**Doc Name**
Instruction	240-65695140	Work Instruction for Delegation to Perform Engineering Design Work
Procedure	240-49104739	Registration Procedure for Engineering Work
Procedure	240-53113685	Design Review Procedure
PCM	240-51093273	Process Control Manual (PCM) – Control Configuration Changes
Policy	240-43327398	Engineering Policy