Eskom	Standard	Transmission System Operator Operations Performance

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Content

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Figures

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1. Introduction

The process followed from the time the need for doing a setting is identified, until the setting is eventually issued, involves many stakeholders and interfaces. This document details all the steps in the process necessary to ensure that high quality settings are produced consistently and that these settings are stored securely.

2. Supporting Clauses

2.1 Scope

2.1.1 Purpose

The purpose of the document is to guide Protection Settings staff regarding the process to follow in the execution of their duties as well as to document the roles and responsibilities of all other role players influencing the successful completion, issuing and implementation of protection settings.

2.1.2 Applicability

This document shall apply to all Eskom Holding Limited Groups that interface with the Protection Settings Section of the Operations Performance Department of the System Operator in the Transmission Group.

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] ISO 9001 Quality Management Systems.
[2] ESKPVAAA0 Eskom Corporate Documentation
[3] SOPMN0073 System Operations List of Records

2.2.2 Informative

[1] 240-56364481 Rev 2: Protection Settings Philosophy For EHV and HV Networks

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2.3 Definitions

Definition	Explanation
Protection Settings Section	The section within the Operations Performance department of the System Operator in the Transmission Group, responsible for the calculating and issuing of protection settings for the Transmission and Sub-Transmission networks.
Fault Investigations Section	The section within the Operations Performance department of the System Operator in the Transmission Group, responsible for investigating protection performance during abnormal incidents on the Transmission and Sub-Transmission networks.
Doer	Any person, in the employ of the Protection Settings section who is tasked with calculating protection settings. This also includes any person temporarily seconded or assisting the protection settings section, and delivering such outputs.
Checker	Any person, in the employ of the Protection Settings section who is tasked with checking protection settings. This also includes any person temporarily seconded or assisting the protection settings section, and delivering such outputs.
Template Creator	Any person, in the employ of the Protection Settings Section who is tasked with creating a template used for calculating settings for a new protection scheme.
Template Checker	Any person, in the employ of the Protection Settings Section who is tasked with checking the correctness of a new or revised template used for calculating settings for a new protection scheme.
Protection Settings Chief Engineer/Technologist (PSCE)	Any person, in the employ of the Protection Settings Section who is tasked to be the Head Of The Protection Setting Section.
Project manager (PM)	Any person in the employ of Eskom, responsible for the management and execution of projects.
Protection Settings Database Administrator (Database Administrator)	Any person, in the employ of the Protection Settings section responsible for maintaining the protection settings database.
Power System Simulation Tool Administrator (Digsilent Administrator)	Any person, in the employ of the Protection Settings section responsible for maintaining the power system simulation package database.
Grids	ESKOM Transmission Grids.
Secondary Plant Manager (SPM)	Any person, in the employ of the Eskom Transmission Group responsible for secondary plant in the relevant Grid.
Protection Applications Personnel	Any person in the employ of Eskom, responsible for development of application drawings.
Recovery Manager	Any person, in the employ of the Eskom Transmission Group, appointed by the relevant Grid Manager or Senior Management, to coordinate recovery during incidents that have led to loss of supply or that compromises system security.

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Definition	Explanation
Contingency Settings	Protection settings calculated beforehand, and are applicable only during a certain known contingency.
Emergency Settings	Protection settings calculated urgently, for an abnormal network condition which has occurred.
Revised Settings	Protection settings calculated in order to improve the performance of a protection scheme, or calculated due to retrofitting a failed/obsolete relay with a newer relay.
Setting Request Form (SRF)	A form that is to be completed and returned to the Protection Settings Section when requesting either a project related setting or an operational related setting. The form contains fields detailing the information required to perform a setting calculation, and these must be completed correctly.
SAP Work Order (SAP W/O)	An electronic work instruction created in the SAP PM Database. This work order will refer specifically to the implementation of protection settings.
HYPERWAVE	Document management system on which copies of settings are saved

2.4 Abbreviations

Abbreviation	Explanation
DA	Database Administrator
LAN	Local Area Network server on which copies of settings are saved.
PM	Project Manager
PSCE	Protection Settings Chief Engineer/Technologist
SRF	Settings Request Form
SPM	Secondary Plant Manager

2.5 Roles and Responsibilities

In order to deliver its outputs, the Protection Settings Section interfaces with various stakeholders. The responsibilities of all stakeholders involved are listed below.

2.5.1 The Protection Settings Section

The Protection Settings Section is responsible for the following:

- Development of settings templates required for the calculation of protection settings.
- Calculation and issuing of protection settings.
- Maintenance and control of the protection settings database.
- Maintenance and control of the power system simulation package database.

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2.5.2 Project Managers

Project Managers are responsible for the following:

- Requesting project-related settings, by completing a Settings Request Form (SRF), via e-mail from the Protection Settings Section, as per project schedule submitted to the Protection Settings Chief Engineer/Technologist (PSCE).
- Providing the PSCE with copies of the relevant asset specification/scope of work documents, a project schedule detailing exactly when settings will be required for each bay, minutes of all project meetings and source any information required for the calculation of protection settings as specified on the SRF.
- For new or replacement transformers, providing the PSCE with copies of the transformer test report containing the positive and zero sequence impedances of the transformers.
- For new lines provide the PSCE with a line design document detailing the line length, type of phase and earth conductors and tower types.
- For modifications to existing lines, providing the necessary details to the PSCE.
- For all other equipment, providing the relevant electrical parameters required to model the equipment in the power system simulation package to the PSCE.
- Should there be any changes to the project schedule, providing the PSCE with an updated schedule.

There is a **minimum** six week lead time for project settings.

2.5.3 Protection Design

The Protection Design departments are responsible the following:

- Providing training and supporting documentation on all new protection schemes.
- Providing relay configuration on those schemes where configuration is not determined by settings.
- Providing the latest version of relay proprietary software and associated licences.
- Providing technical instructions for scheme design changes

2.5.4 Protection Applications

The protection application departments are responsible for the following:

- For project-related settings, providing correct application drawings to the PSCE at least 6 weeks before the settings are required according to the project schedule provided by PM.
- For non-project-related settings such as relay retrofits and replacement of failed/obsolete relays, the relevant Protection Applications department is responsible for providing updated application drawings to the PSCE as per the schedule agreed on between themselves, relevant Transmission Grid and the PSCE.

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2.5.5 Secondary Plant Managers

Secondary plant managers are responsible for ensuring that:

- Settings are correctly implemented thereby ensuring that all settings on the panel match the latest setting document.
- Must ensure that secondary plant personnel inform the Protection Settings Section if there are any problems in applying settings.
- No changes are made to any protection relay settings on site without consultation of the Protection Settings Section.
- A signed implementation sheet is sent to the DA to the e-mail address specified on the implementation sheet no later than one week after application of the settings to the relays on the panels of a specific bay.
- Informing the Protection Settings Section if there is primary equipment being changed or replaced because there may be setting changes and databases must be updated.
- Requests for non-project settings are made directly to the PSCE by e-mailing a completed SRF. The PSCE allocates the non-project settings according to the resources available.
- Requests for after hour emergency settings be made by contacting the standby Settings Engineer on the dedicated standby cell phone number.
- All SAP Work Orders are executed and correctly closed out on the SAP system within the specified time frames.

2.5.6 Recovery Managers

Recovery managers are responsible the following:

- Contacting the PSCE at the onset of a network emergency that would require emergency settings to be calculated.
- Sourcing all relevant information required to calculate the emergency settings.
- Updating the PSCE about any changes to the recovery plan.

2.6 Process for Monitoring

The monitoring process is described in Section 3.13

2.7 Related/Supporting Documents

This document is supported by the list of documents shown below:

[2] 240-56364481 Rev 2: PROTECTION SETTINGS PHILOSOPHY FOR EHV AND HV NETWORKS

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3. Document Content

3.1 Prioritising Settings Work

Settings are prioritized, calculated and issued according to the project schedules provided by PM together with any Operational or Emergency request from other Stakeholders. The prioritizing of settings work is the responsibility and accountability of the Operations Performance Department within the System Operator.

- Setting priority is quantified into four categories: Urgent, High, Medium, Low
- Typically, settings in the Urgent and High categories are unplanned for, and are accommodated as they arise within a given month.
- This implies that other scheduled settings will be delayed, depending on these priorities and resource constraints.

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Priority Ranking

No	**URGENT PRIORITY** **(1 Week)**	**HIGH PRIORITY** **(1 Month)**	**MEDIUM PRIORITY** **(3 Months)**	**LOW PRIORITY** **(12 Months)**
1	Operational / System Risk that may result in Interruption or System performance Index (SPI)		Setting revision done as part of the Revision Program. These relate to an incorrect operation that occurred on the system	
2	Plant or personnel at risk of failure or injury respectively			
3			Revisions as a result of Grading studies undertaken	Setting revision for which no Setting Documentation existed
4		Engineering Instruction whose impact is considered High Risk	Engineering Instruction whose impact is considered Medium Risk	
5	Emergency network re-configuration			Settings for which mitigation has already been effected on site
6	Settings for which line parameters have changed > 20%. As an interim measure, an email may be issued to pull back zone 1 reach	Setting for which line parameters have changed > 10% but < 20%. As an interim measure, an email may be issued to pull back zone 1 reach		Settings for which line parameters have changed < 10%
7			Projects: Network expansion/ refurbishment settings	Optimization setting revisions

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3.2 Triggers for Setting Revisions

The need to revise protection settings is identified in a number of ways as indicated below:

- Network incident investigations highlighting inadequate settings
- Network parameter changes as a result of network reconfiguration
- Setting philosophy changes
- Engineering Instructions that impact settings
- Network fault level changes

3.3 Co-ordination of Project Settings

- Requests for project settings are received via e-mail by the PSCE from PM
- PM provide the PSCE with copies of asset specification documents, scope of work documents and a project schedule detailing when settings are required and adds the PSCE to distribution list of project meetings and correspondence.
- The PSCE uses asset specification and scope of work documents to determine the details of the projects.
- The PSCE uses the project schedules received from PM to arrange all the required settings in the chronological order in which settings are required in a project management tool.
- The PSCE allocates project settings to a Doer and Checker according to identified priorities.
- The PSCE updates the project management tool accordingly.
- The SRF is captured in a Database by the DA.

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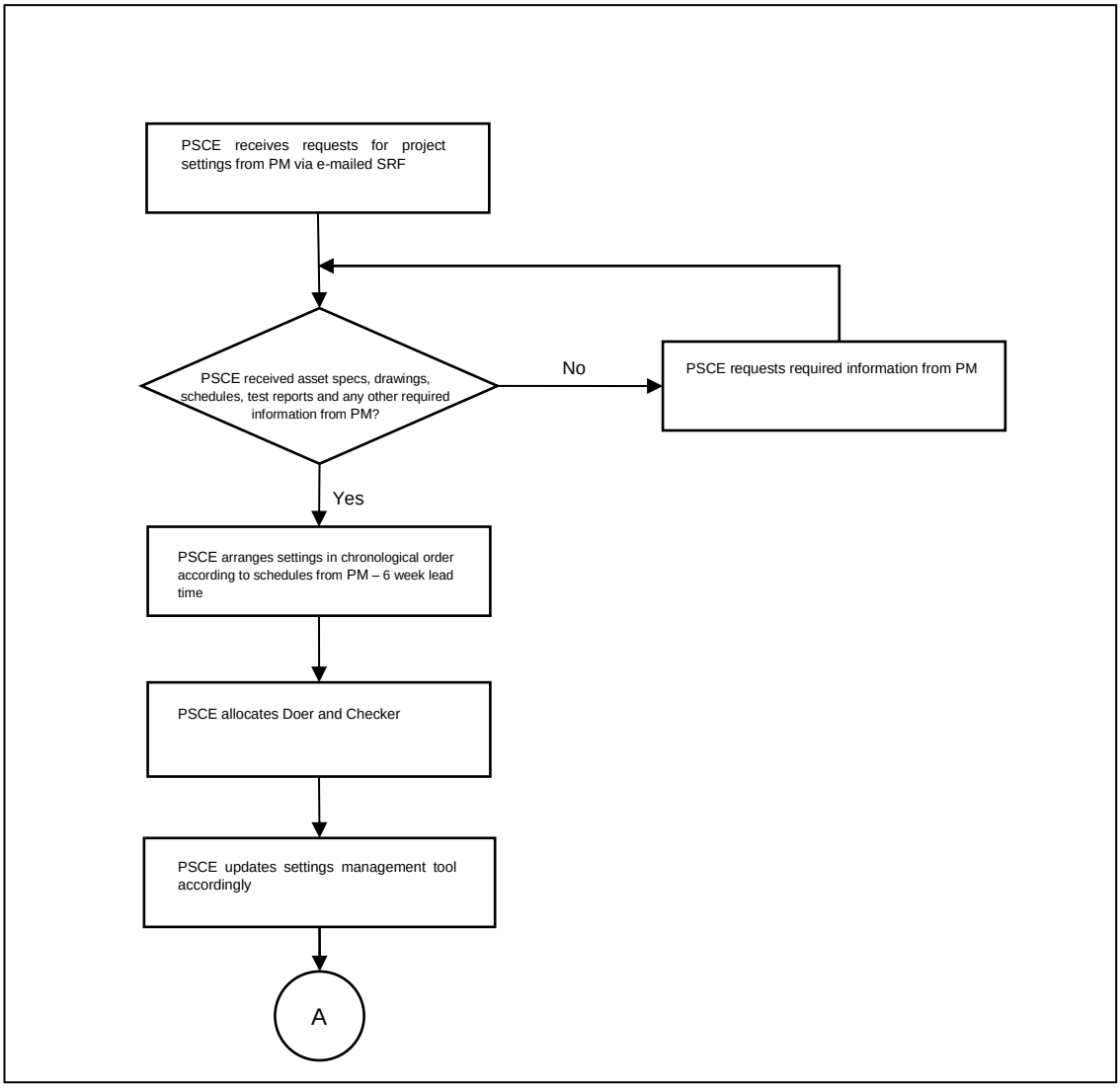

Figure 1 : Flowchart for coordination of project settings

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3.4 Co-ordination of Non-project Settings

- Requests for non-project settings are received via an e-mailed SRF from staff in the Grids by the PSCE.
- The PSCE assesses the urgency of the request and either allocates a Doer and Checker immediately or adds the request to a schedule for future allocation.
- The SRF is captured in a Database by the DA.

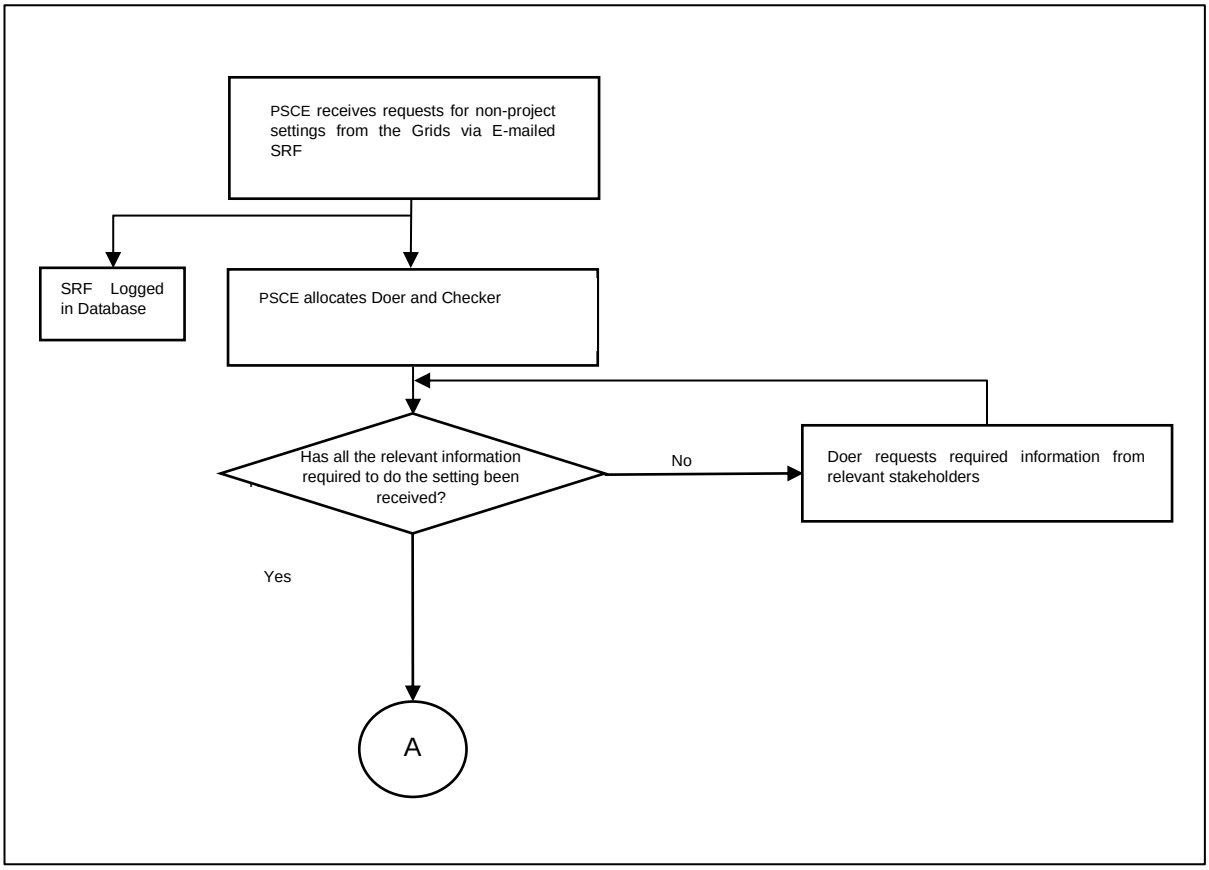

Figure 2 : Flowchart for coordination of non-project settings

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3.5 Overcurrent and Earth Fault Co-ordination

- After a setting has been allocated, the Doer checks whether overcurrent and earth fault coordination needs to be done by checking if there is a completed coordination sheet available on the LAN.
- If no coordination sheet is available, the Doer verifies the correctness of the Digsilent models of relevant plant such as transformers, lines etc. as defined in Section 3.4 and arranges with the Digsilent DA to correct the models where necessary.
- The Doer calculates overcurrent and earth fault coordination settings using the latest overcurrent and earth fault template on the LAN as well as the latest settings document for each circuit.
- Unavailable settings are requested from the SPM of the particular grid.
- The Doer then completes the overcurrent and earth fault coordination and requests that it be checked by the Checker allocated by the PSCE.
- If any changes to the existing overcurrent and earth fault settings are deemed necessary, the Doer updates the settings documents of each of the affected circuits accordingly.
- The Checker verifies the changes for correctness and forwards the corrected setting via e-mail to the DA for issuing.
- At the same time the Checker also forwards the completed overcurrent and earth fault coordination sheet, signed by both the Doer and the Checker to the DA for storage on the LAN and Hyperwave. A copy of the sheet containing signatures of the doer and checker should be stored in Hyperwave.

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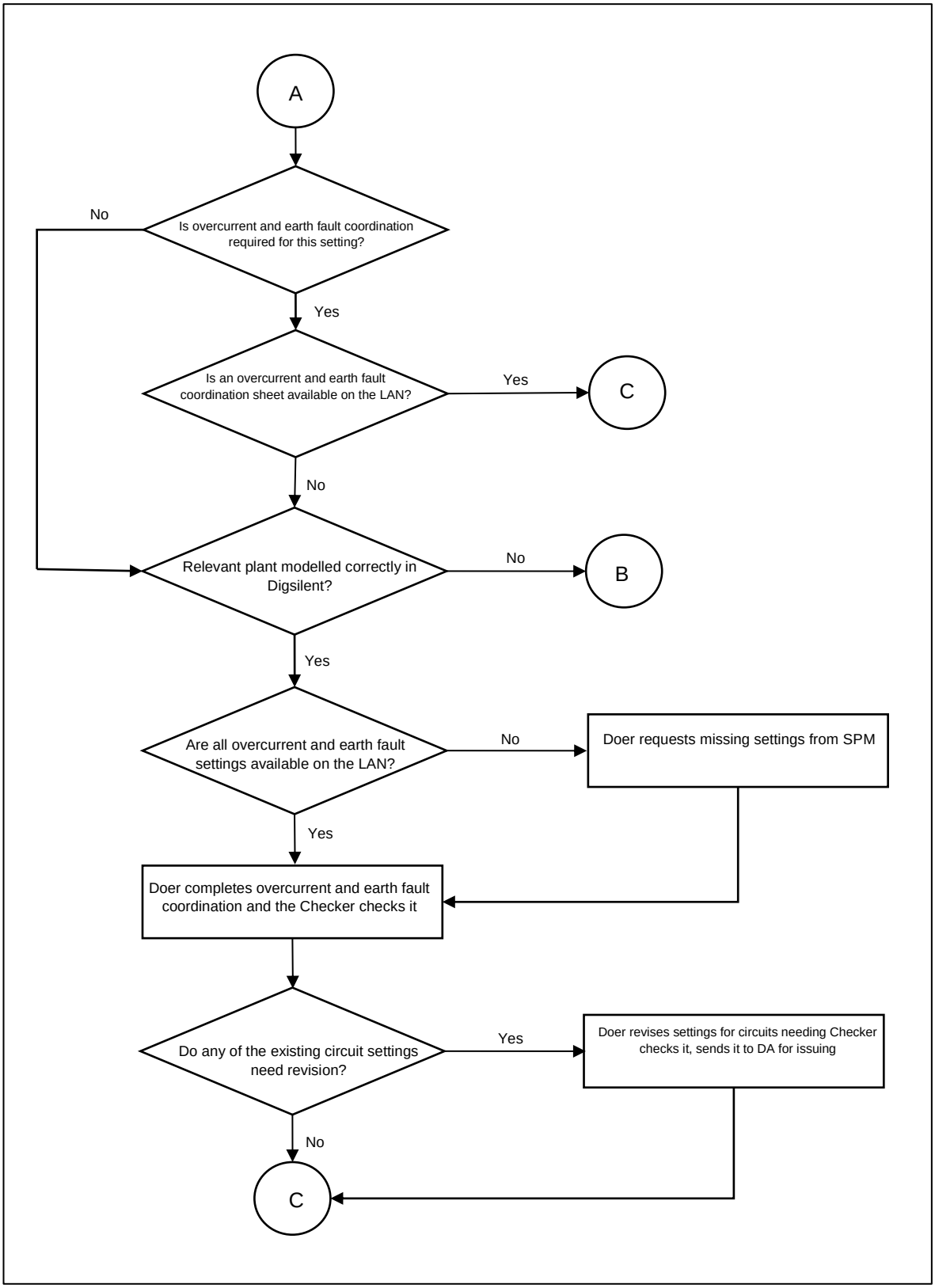

Figure 3 : Flowchart for overcurrent and earth fault coordination

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3.6 Verification of Equipment Models in Digsilent

- Before commencing with the calculation of a setting, the Settings Engineer verifies the correctness of the models of the relevant plant data in Digsilent.
- Where discrepancies are found, the Doer provides the Digsilent Administrator with details of the discrepancies and the correct data.
- When more than one line shares the same servitude, the Doer must ensure that mutual coupling is catered for.
- The Digsilent Administrator corrects the models and provides the Doer with an updated Digsilent file.
- The Doer checks the corrections made by the Digsilent Administrator and sends an e-mail to the Digsilent Administrator confirming the accuracy of the changes.
- The TXSIS website is the official source of parameters for existing Transmission lines
- For new Transmission lines not yet populated on TXSIS, PM provide the Digsilent Administrator with a line design document and the line is modelled accordingly.
- Transformers and reactors are verified from manufacturers test reports. If not indicated on the transformer test report, zero sequence impedances are estimated at 85% of the positive sequence impedances.
- The names of the verifier and checker of the transformer, NEC/NECRT or reactor model, together with the date of verification and the details of the test sheets used, is entered into the DESCRIPTION tab of the transformer Digsilent model by the Digsilent DA.
- If no manufacturers test reports are available then an Eskom test report may be used.

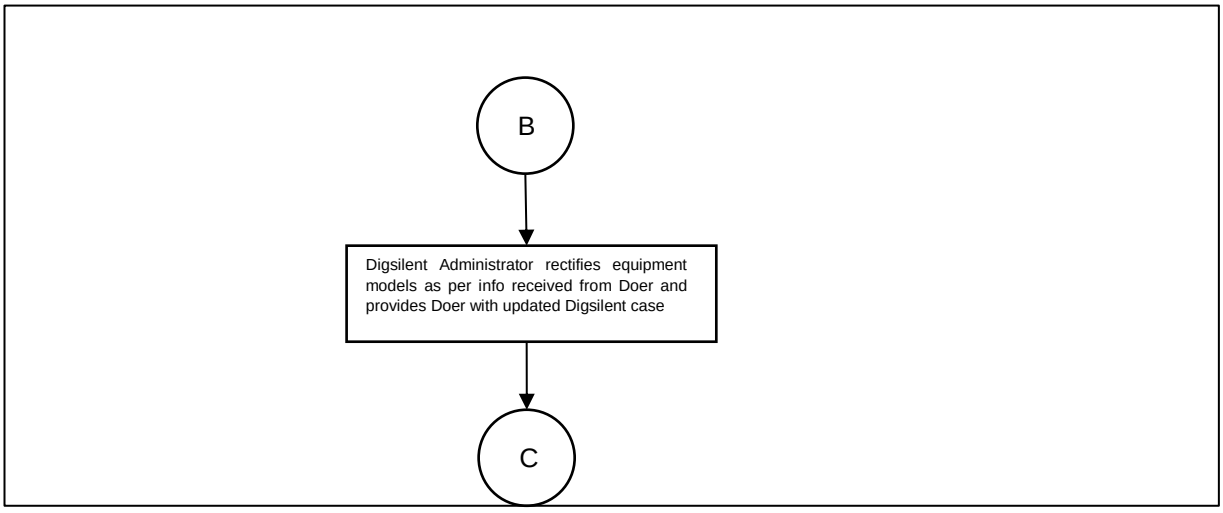

Figure 4 : Flowchart for verification of equipment models in Digsilent

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3.7 Calculation of Project Settings

- After verification of equipment models in Digsilent, the Doer verifies whether or not the application drawings are correct insofar as it affects the calculation of protection settings.
- If the drawings are incorrect, the relevant Applications Department is notified with a request to correct the drawings
- If the nature of the mistakes prevent the Doer from continuing with the setting the Doer stops doing the setting and waits for corrected application drawings
- If the mistakes are of a minor nature, the Doer commences with the calculation of relay settings using the latest official template available and applying the latest settings philosophy. However, settings are only issued once corrected application drawings have been received from the Applications Department
- Fault studies are done using the latest official Digsilent case file including any changes as described in Section 3.4.
- Where applicable, EMT studies must be performed.
- For all EHV lines, the distance relays can optionally be modelled in Digsilent and checks performed to ensure correct relay operation.
- Settings for most equipment are completed using the latest available Excel setting template.
- However, low impedance bus zone settings are done using the relay manufacturer's software. The correct version of the relay manufacturer's software must be used. For some low impedance bus zone settings, the generic bay allocations are already pre-configured in a template using the relay manufacturers' software. In such cases the correct software template must be used.
- Once the setting has been completed, the Doer arranges for the setting to be checked by the Checker allocated by the PSCE.

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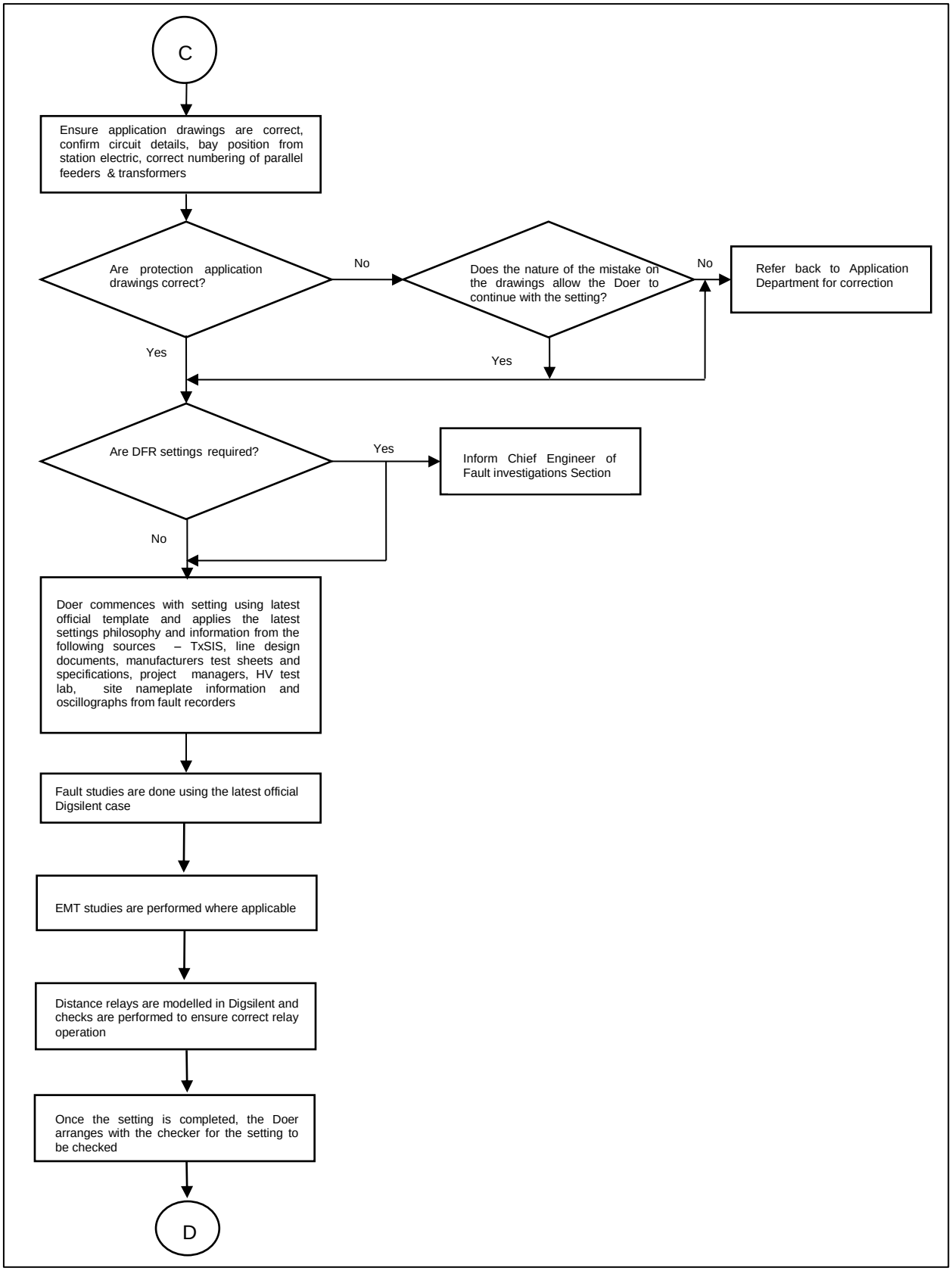

Figure 5 : Flowchart for calculation of project settings

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3.8 Calculation of Non-project Settings

- For complete settings revisions, the process is essentially the same as described in Section 3.5.
- For partial settings revisions, depending on the nature of the revision, the relevant existing settings document is modified to indicate the required changes.
- For all low impedance bus zone settings revisions, the existing downloaded site specific relay configuration must be obtained and modified to reflect the required changes.
- Once the setting has been completed, the Doer arranges for the setting to be checked by the Checker allocated by the PSCE.

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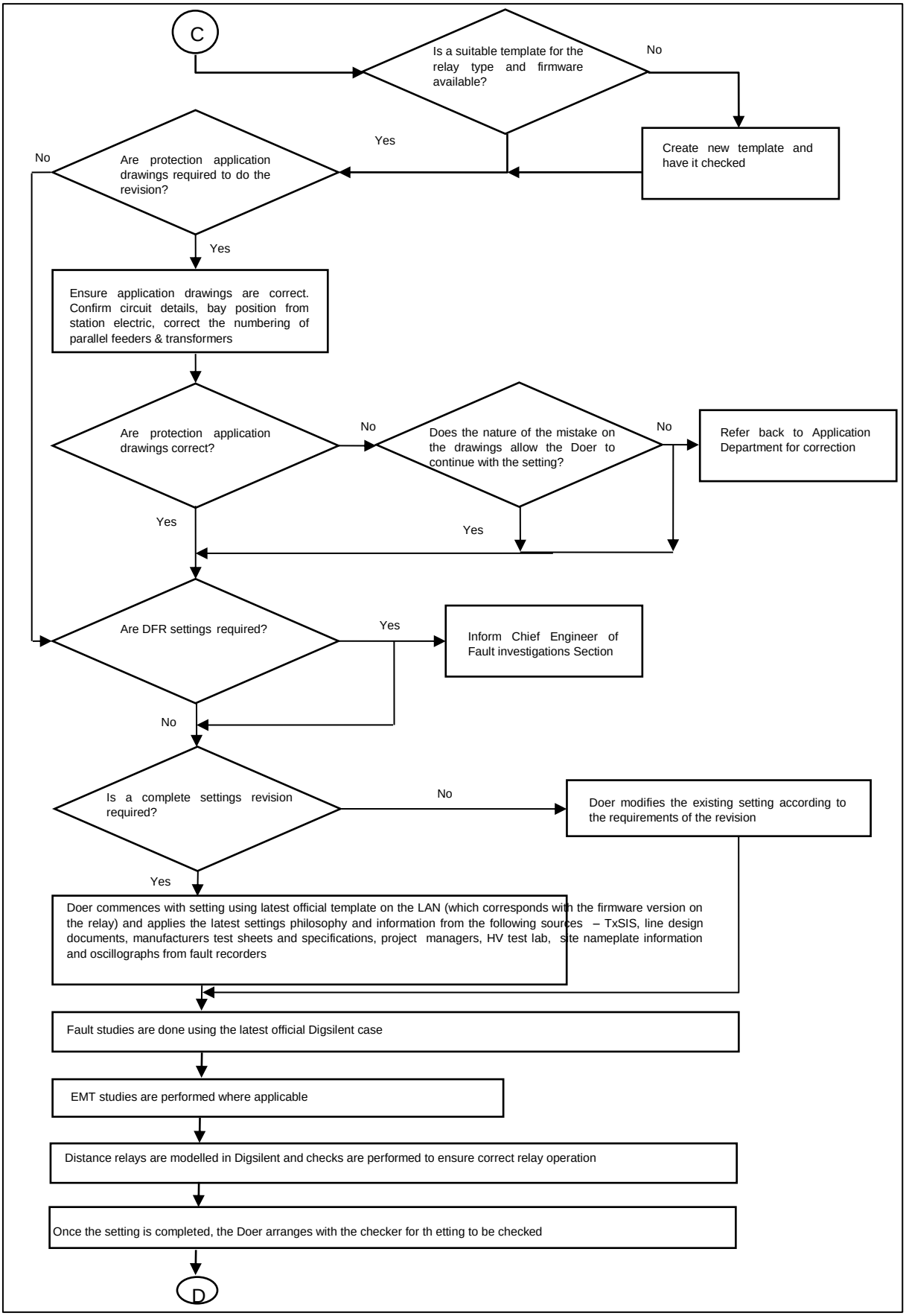

Figure 6 : Flowchart for calculation of non-project settings

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3.9 Checking of Settings

- Settings that have been completed by the Doer are submitted to the Checker for checking.
- The checker ensures that the correct template was used to calculate the settings, verifies that the Digsilent models are correct in the latest official Digsilent case file, checks fault calculations, checks EMT studies (where applicable), checks relay models (where applicable) and ensures that the settings are correct according to the latest settings philosophy.
- The checker also ensures that all equipment parameter data is entered correctly in the setting data sheet.
- From the application drawings, the checker ensures that the protection application is correct, all CT star point orientations are correct, all CT polarities are correct and all connections to the relays are correct.
- For low impedance bus zone settings, the checker ensures that the correct version of the relay software, the correct relay configuration, the latest station electric diagram and application drawings were used. The checker uses this information to ensure that the bay allocations, CT polarities, CT ratios etc. are correct.
- Once the checking process is completed, the setting is signed by both the Doer and the Checker and the Checker sends the settings to the Administrator for conversion to PDF format and issuing.
- Where applicable an electronic copy of the settings, in a format readable by the relays, should also be sent to the DA to be stored in Hyperwave and issued for implementation.
- Once the checking is completed on a low impedance bus zone setting, the electronic setting in relay manufactures software together with supporting documentation in Excel format is sent to the DA who converts the supporting documentation into PDF format.

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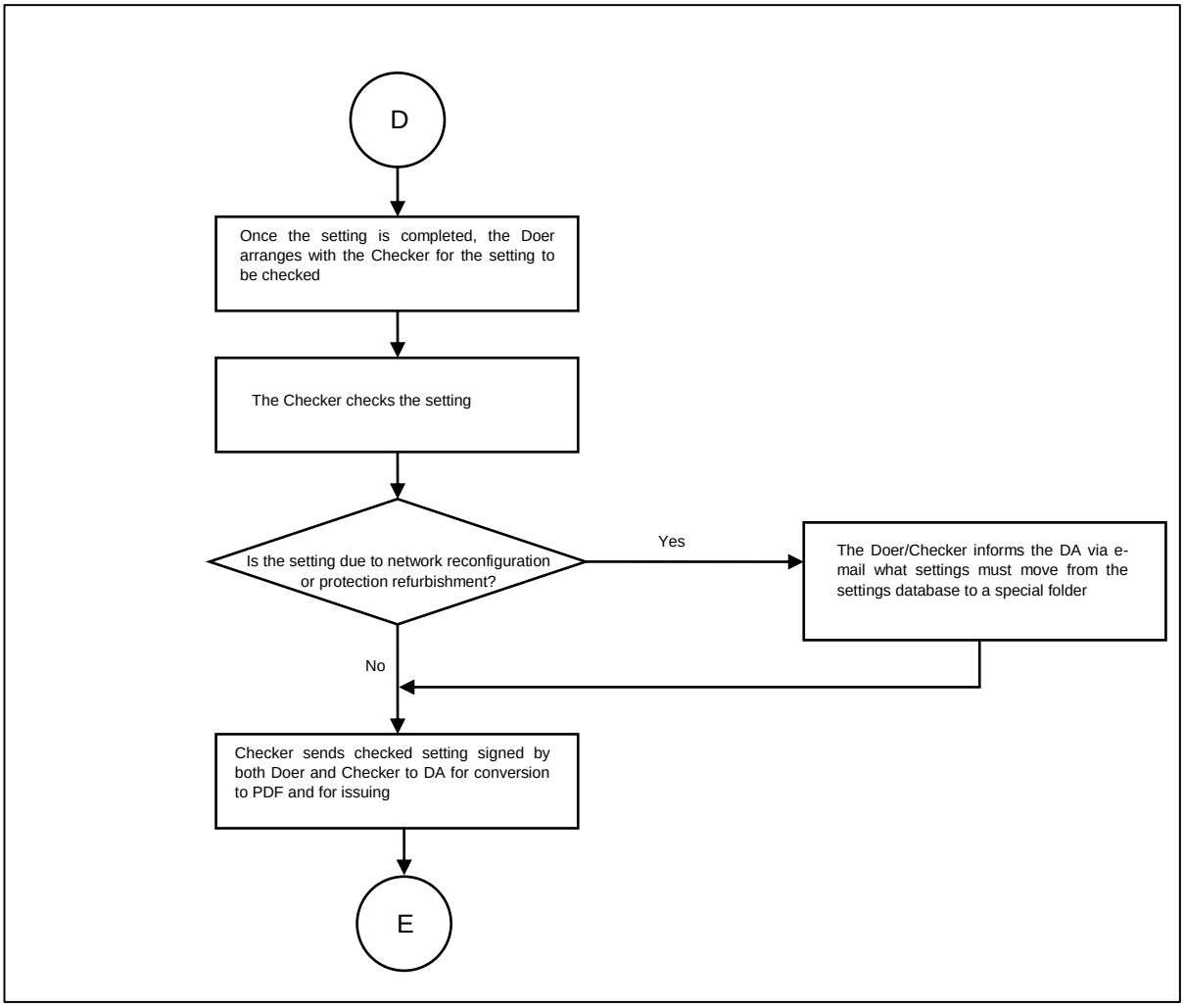

Figure 7 : Flowchart for checking of settings

3.10 Emergency Setting Procedure

- An emergency service is provided for assistance with settings due to emergencies occurring after normal working hours.
- All Settings Senior and Chief Engineers are on standby on a rotational basis and can be contacted on a dedicated standby cell phone.
- During after hour emergencies, the standby engineer is allowed to issue unchecked settings after consulting other senior settings personnel if required.
- Each of such settings must clearly state the conditions under which they are applicable.
- The settings have to be checked during the next working day and reissued if necessary.
- In cases where the system is at risk and a sudden setting change needs to be made, such a change may be communicated verbally, telephonically or in writing, for example using e-mail. Revised setting documents containing those changes must follow as soon as possible.

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3.11 Issuing of Settings

- The DA receives the checked setting in Excel format from the Checker with signatures of both the Doer and Checker.
- When the setting is in electronic format readable by relays, the DA receives the electronic file and supporting documentation in Excel format from the Checker with signatures of both the Doer and Checker.
- The DA converts the setting or supporting documentation to PDF format and sends it, together with a quality assessment form, via e-mail to the Doer and Checker.
- The Doer verifies the accuracy of the PDF version of the setting or supporting documentation, and sends an e-mail to this effect to the DA. The Checker completes the settings quality assessment form and sends it to the DA via e-mail. The DA does not issue a setting unless a completed settings quality assessment form is received.
- The DA saves a copy of the Excel format and the PDF format of the checked setting and where applicable the checked setting in relay manufacturer's format, in the appropriate folder on the LAN. The DA also saves a copy of the PDF format of the checked setting, and where applicable a copy of the settings in an electronic format readable by the relay, on Hyperwave.
- Before issuing a checked setting, the DA creates a SAP Works Order Number that is used to track the implementation of the settings.
- The DA issues the PDF version of the checked setting, and where applicable a copy of the settings in an electronic format readable by the relay, together with the SAP Works Order Number, to the SPM of the relevant Grid via e-mail and copies the PSCE, the Doer and the Checker.
- If settings revisions are issued due to overcurrent and earth fault grading, the DA shall also attach the cover letter, addressed to the SPM, detailing all the grading changes
- Should the DA be unavailable, the PSCE will ensure that settings are issued as described above. Where both the PSCE and the DA are not available, then the Checker of the setting may issue the setting to the SPM – this is however an exception.
- In all cases where settings are not issued by the DA, the issuer of the settings must ensure that the DA issues all the necessary settings file so that the settings can officially be issued and stored following the normal approved process.

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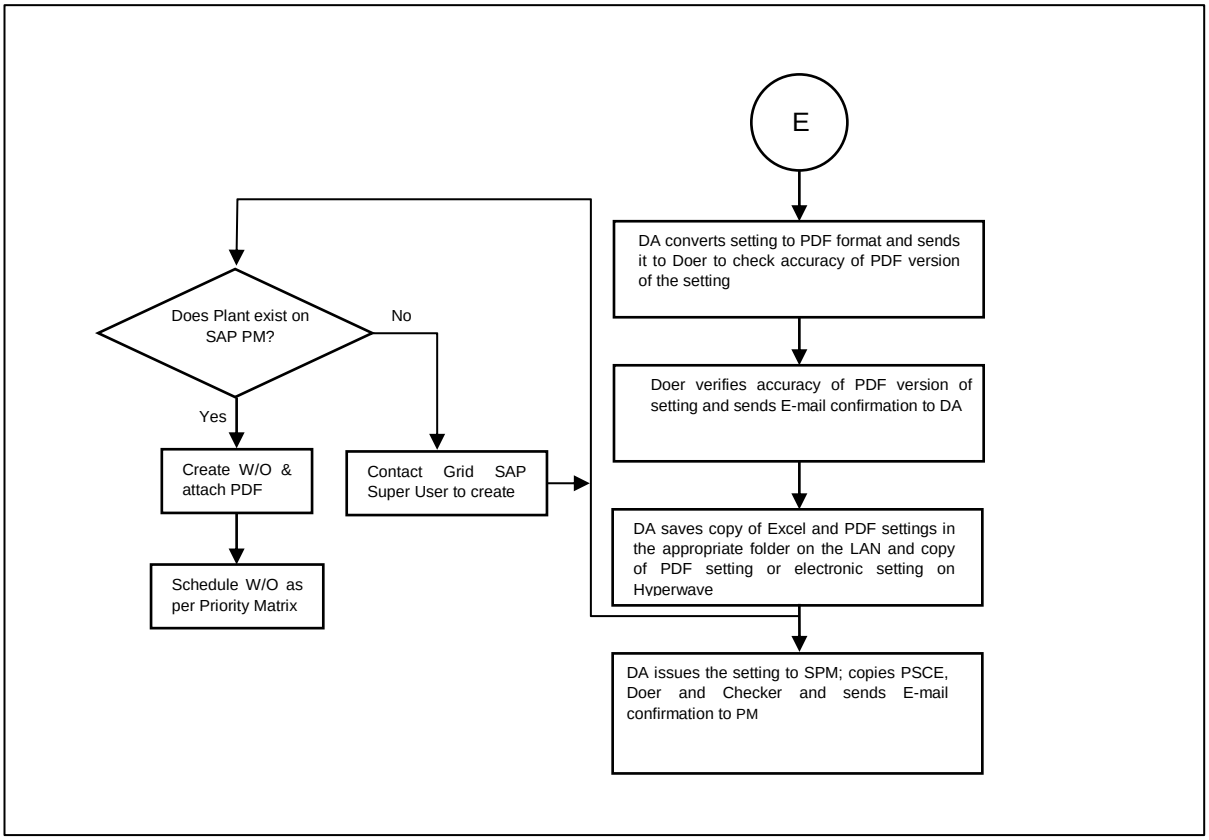

Figure 8 : Flowchart for issuing of settings

3.12 Protection Settings SAP Work Orders

- The DA checks in the SAP PM system to see if the Protection Scheme plant information is populated in the database.
- If no plant information (new plant) is populated, the Grids SAP Super User is contacted and requested to update SAP accordingly.
- If the required plant information is available on the SAP PM system, then a Protection Setting SAP Work Order is created for the setting implementation.
- A PDF copy of the setting is attached to the SAP Work Order.
- The SAP Work Order implementation date (scheduled date) is determined from a Priority Matrix. The Priority Matrix allows for Work Orders to be categorised as:
    - Urgent (to be implemented within 1 week)
    - High (to be implemented within 1 month)
    - Medium (to be implemented within 3 months)
    - Low (to be implemented within 12 months)
    - Project (to be implemented within 24 months)

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- The SAP Work Order is issued for implementation.
- Upon completion of the work, the setting is to be verified by senior Grid protection personnel and the Work Order closed off in the SAP PM system.

3.13 Storage and Management of Settings

- The DA is responsible for managing the settings database on the LAN and on Hyperwave.
- Only the DA and the PSCE and the Department Manager have write access to the settings folder on the LAN. All other Protection Settings Section and Fault Investigation Section personnel have read-only access.
- Excel settings, and settings in electronic format readable by the relays, are stored in specific folders on the LAN. These folders contain all the revisions of the settings for a specific bay. Where relay settings are issued in an electronic format readable by the relays, these files are the official settings records. Otherwise the signed PDF documents on Hyperwave are the official setting records.
- Settings for legacy protection schemes that have been replaced due to refurbishment are removed from the folder for that bay and are stored in a special folder.
- Settings that become obsolete due to a new loop – in loop- out station, are removed from the folder for that bay and are stored in a special folder.
- The DA backs up the settings database to a portable hard drive once a month.
- The DA stores completed implementation sheets in the folder containing the applicable setting.
- In addition to storage of the settings documents in Excel and PDF format on the LAN, protection relay information is stored per bay in a MS Access database that is maintained and updated by the DA. This database allows various queries to be run to extract and compare protection setting data to assist with verification of protection performance during power system incidents.

3.14 Management of Settings Templates

Standard templates for all schemes are stored in a separate folder on the LAN

The Operations Performance Department grants write access to this folder to selected personnel, all other personnel have read only access.

All templates shall have the following:

- A cover sheet
- A covering letter
- An implementation sheet

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- A revision information sheet
- Network diagram sheet
- Sheets showing the settings together with all necessary calculations for all relays on the panels of that specific bay
- Sheets containing the setting calculations and settings.
- Settings summary sheets (if applicable)
- Sketches of protection cards (where required)
- Link and switch positions
- Plots of characteristics for impedance relays
- EMT study results (if applicable)
- Where applicable, a macro to convert the settings in the summary sheet into a format readable by the relays

New templates are managed as follows:

- As soon as a new protection scheme design becomes available, the Operations Performance Manager requests the development of a new settings template.
- New templates are created by a Template Creator and checked by a Template Checker, both allocated by the Operations Performance Manager.
- The Template Creator and the Template Checker attend relay - specific training provided by the vendor of the protection scheme for which the template is being created.
- The Template Creator uses the knowledge gained to create a template in Excel format.
- The Template Checker shadows the Template Creator during the process of template creation and checks the template at predetermined intervals.
- The Template creator also periodically presents progress on template development to the Operations Performance Technical Review Forum. This forum is used to ensure that entire document adheres to the latest settings philosophy.
- Once the template is complete, the entire template is presented to and approved by the Operations Performance Technical Review Forum.
- Once the template is complete the Template Creator and Template Checker becomes the Doer and Checker of the first setting using the new template and the template is stored on the LAN.
- The Template creator provides training to protection settings personnel.

Existing templates are modified as issues are identified and the revision history is tracked on the revision information sheet that is part of the template.

All changes made to existing templates must be presented to and approved by the Operations Performance Technical Review Forum.

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Minor changes can be checked by one member of the Operations Performance Technical Review Forum but feedback must still be given to the forum.

3.15 Implementation Sheet Management

- Settings issued include an implementation sheet that is signed and dated by the Doer and Checker.
- At the top of the setting sheet is the detail of the plant, the revision number and date to which the implementation sheet is applicable.
- This sheet is only applicable for this specific setting and cannot be used for the implementation of settings on any other plant.
- Grid personnel responsible for the implementation and verification of the setting must complete the implementation sheet only once the settings have been applied on the relays.
- The implementation sheet must be signed and dated once the setting has been implemented.
- The comment field on the implementation sheet is only used to make notes relating to a specific setting field or application and NOT as notification for the changing of settings by Grid personnel.
- This form must then be e-mailed to the e-mail address indicated on the implementation sheet within 1 working day of the setting being implemented.
- Settings are to be implemented as soon as possible after being issued to the SPM.
- The PSCE will report monthly on the number of settings issued as well as the number of implementation sheets received and outstanding.
- The implementation sheets will be archived together with the applicable setting to which it is related to.
- All implementation reports (as compiled by the PSCE) are to be issued to the Grid SPM for information and action as well as to the System Operator Management for information.
- SPM are to ensure that implementation sheets are managed within the Grids and that feedback relating to settings not implemented is provided.
- Sometimes a request is made by SPM for an extension to the due date for implementation of a setting. In such cases the PSCE will evaluate the risk associated with delayed implementation and decide whether or not to grant an extension.

3.16 Process Monitoring

Process monitoring is considered to be an on-going operational requirement where any non-compliance to the documented process, once identified needs to be analysed and either the process changed or adapted or corrective actions implemented.

While not explicitly defining how such measures are to be done or carried out, it would be prudent to ensure that at least the following areas are monitored:

- Implementation Sheet Management
- Settings Issued
- Digsilent case file management
- Data storage and archiving
- Overcurrent and earth fault coordination

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- Relay modelling (where applicable)
- SAP Work Order Management

4. Acceptance

This document has been seen and accepted by:

Name	Designation
Comfort Masike	Technical Operations Manager - Operations Performance, System Operator
Anita Oommen	Operations Performance Manager - Operations Performance, System Operator
Luyanda Mfeya	Chief Technologist – Operations Performance, System Operator
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Selby Mudau	Secondary Plant Manager – Northern Grid, Transmission
Bosaletse Mpesi	Secondary Plant Manager – Free State Grid, Transmission
David Sehloho	Secondary Plant Manager – Eastern Grid, Transmission
Regi George	Secondary Plant Manager – Northern Cape Grid, Transmission
Nelson Luthuli	Secondary Plant Manager – North West Grid, Transmission
Paul Grobler	Chief Engineer – Works Planning & Centralised Services, Transmission
Richard Mccurrach	Senior Manager – PTM&C, Engineering, Group Technology
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5. Revisions

Date	Rev.	Compiler	Remarks
January 2010	0	S Klein	This document was created to combine the four documents mentioned in Section 2.8 into one document. To replace TRMPVAET2.
January 2014	1	G King	Inclusion of SRF and SAP W/O definitions. Minor changes made throughout document Section 3.9 Added action issuing of setting by Doer. Section 3.10 Protection Setting SAP Work Orders added to document. Numbering changed. Section 3.11 Added Access Database administration.
September 2017	2	L.Mfeya	Section 2.3 Changed some definitions and added some additional definitions Section 2.4 Added some abbreviations Section 3.1 Added an additional section, “Prioritising settings work”. Section 3.2 Added an additional section, “Triggers for setting revisions”. Section 3.7 Added some additional checks to be performed by the Checker Section 3.9 Added a reference to settings in electronic format readable by relays Section 3.11 Added reference to storage of settings on Hyperwave Section 3.12 Added “Network diagram sheet” as a requirement for templates

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6. Development Team

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

- Luyanda Mfeya
- Sheldon Klein
- Anita Oommen

7. Acknowledgements

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