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1. Introduction

This Work Instruction outlines the detailed defect management process to be followed at the Kusile Power Station Project from the time defects are identified, reported and rectified throughout the project life cycle (mainly after Safety Clearance to end of the Inherent Defect Notification Period).

2. Supporting Clauses

2.1 Scope

This document covers the defect management process, the roles and responsibilities for the management of defects at Kusile Power Station Project.

2.1.1 Purpose and objective

To detail the process to be followed when managing defective works, as well as associated roles and responsibilities of key stakeholders to determine action required.

The objective of this Work Instruction is to provide an administrative and managerial framework to be implemented by the Contractors, Engineers/Project Managers and Generation in pursuit of fulfilling the obligations arising in the respective Contractual Agreements.

2.1.2 Applicability

This document shall be applicable to the Contractors, Engineers/ Project Manager and Generation at Kusile Power Station involved in the contractual defect management process.

2.1.3 Effective date

This document shall be effective from date of authorisation.

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] FIDIC and NEC Contracts as applicable to Kusile Power Station Project

[2] 240-129703805 Handover Process Work Instruction

[3] 240-85495283 Commissioning and Handover Management Procedure

[4] 240-125815990 Commissioning and Completion of Kusile Power Station Project

[5] 240-152122699 Defect Management Process Flow

[6] 240-124499000 Kusile Project Records Control Work Instruction

[7] 240-124499452 Kusile Project Document Management Work Instruction

2.2.2 Informative

[8] 240-131634789 Kusile Project Quality Plan

[9] ISO 9001:2015 Quality Management Systems

2.3 Definitions

Term	Definition
Contractor	A person or firm that undertakes a contract to provide construction activities for the Kusile Power Station Project
Defect	A part of the works which is not in accordance with the User Requirements Specification (URS), Standards, Specifications, Codes, Contractual Requirements, Project Requirements etc. from CTO until end of Inherent Defect Notification period: • **KKS Defect:** Any defect associated with plant labelling or coding. • **General Defect:** Any defect other than a KKS Defect and should be issued before expiry of the Defect Notification Period. • **Commissioning Defects (Punch Items):** Any defect arises after safety clearance and prior issuance of Taking-Over Certificate • **Latent Defect:** Any defect that arises after expiry of the Defect Notification Period, issuance of Performance Certificate. Latent defect should be issued and corrected within time period as stipulated within the specific Contract • **Inherent Defect:** Any defect that arises after expiry of the Latent Defect Notification Period and should be corrected within time period as stipulated within the specific Contract
Defect Notification Period (FIDIC)/ Defect Correction Period (NEC)	FIDIC Contracts: The time period as defined in the contract data of a specific contract, within which the Contractor makes good of notified defects, calculated after the Taking-Over Certificate NEC Contracts: Any defect notified until the defects date is made good within the defects correction period. The defect correction period begins at the completion for defects notified before completion and when a defect date is notified for other defects.
Defect Management Tool	A tool that enables the reporting and monitoring of defects. Defect Notification and Clearance Form (240-124861234), Kusile Defect Management Register (240-151699757) supported by Power BI on SharePoint.

Term	Definition
Hand-Over	The process of handing over the responsibility for all, or part of the project, or its deliverables from the Engineer/Project Manager to Generation. It is also the handover of the statutory accountability of the plant and equipment, including all relevant documentation required to operate and maintain the plant. Typically this takes place shortly after the issuance of the Taking-Over Certificate. Handing over should not be confused with the NEC requirements or FIDIC for Taking Over nor the completion and guarantees between the Project Manager and the Contractor. Hand over will be done according to a combination of P & ID systems (functional group), including documentation package information as per Kusile User Requirements Specification (URS).
Kusile Defects Management Register	Project official register to be used by all responsible parties as discussed herein (240-151699757).
Inherent Defects Notification Period	A period for notifying Inherent Defects in the works or a section. Inherent defects should be issued after the expiration of Latent Defect Notification Period and are to be corrected within a time period as stipulated within the specific Contract.
Latent Defect Notification Period	A period for notifying Latent Defects. Latent Defects are issued after expiration of the Defect Notification Period, issuance of Performance Certificate. Latent defects should be issued and corrected within a time period as stipulated within the specific Contract.
Non-Conformance Report	A report detailing non-fulfilment of a requirement (Contract requirements, statutory and regulatory requirements and any other requirement stated by the Project). A Non-Conformance Report (NCR) is raised during construction. Any existing NCR's at the time of take over shall be converted into defects and listed as outstanding defects on the Taking-Over Certificate
Root Cause Analysis (RCA)	Is a systematic process for identifying root cause of problems or events and an approach to responding to them. An RCA requires that the root cause of failure is identified, identify corrective action(s) to correct the failure and preventative action(s) to prevent re-occurrence are identified Not all defects will require root cause analysis e.g., outstanding works at the time of Take Over/Handover, punch list items that are converted to defects. The LDE should indicate on each defect notification whether RCA is required or not

Term	Definition
Punch List Items (Construction Defects)	Work not in accordance to contractual requirements identified during construction and before issuance of the Safety Clearance Certificate
Performance Certificate (FIDIC)/ Defect Certificate (NEC)	FIDIC Contracts: Certificate issued to the Contractor after Defect Notification Period and in accordance with the respective Contract Conditions. NEC Contracts: Defect Certificate issued by the Supervisor at the latter of the defects date and the end of the last defects correction period.
Engineer/ Project Manager	The person appointed as the Engineer (FIDIC) or the Project Manager (NEC).
Safety Clearance Certificate	A certificate issued by the Engineer/Project Manager to the Contractor that is mutually agreed with Generation and the Contractor's Representatives that from the time and date stated the specified machinery, equipment or section of plant is under the Engineer's/Project Manager's control and can be energized. Further access to machinery, equipment or section of plant is only permissible through the Engineer/Project Manager plant / work permit system
SharePoint	A web-based collaborative platform that integrates with Microsoft Office

2.4 Abbreviations

Abbreviation	Explanation
BMH	Bulk Material Handling
BOP	Balance Of Plant
CIM	Communication Interface Memorandum
CTO	Construction Turn Over
DC	Document Controller
DNP	Defect Notification Period
EDMS	Electronic Document Management System
FIDIC	Federation Internationale des Ingenieurs – Conseils (International Federation of Consulting Engineers)
GCD	Group Capital Division
Gx	Generation
OMAC	Oversight Management Assurance and Compliance
KET	Kusile Execution Team
KKS	Kraftwerk-Kennzeichen System
LDE	Lead Discipline Engineer
NCR	Non Conformance Report
NEC	New Engineering Contract
Power BI	A business analytics service providing interactive visualizations and business intelligence capabilities with an interface simple enough for end users to create own reports and dashboards
RFI	Request For Inspection
RCA	Root Cause Analysis
SPO	Smart Plant Owner Operator
TOC	Take Over Certificate
URS	User Requirement Specification

2.5 Roles and Responsibilities

Roles	Responsibilities
Commissioning Department	• Ensures that the defects are rectified within the reasonable time/whenever opportunity arises. • Keeps comprehensive list of defects which cannot be corrected while plant is in operation. These defects shall be corrected during the next outage opportunity. • Conducts plant walk downs with the Engineer/Project Manager and the Contractor in order to verify rectified defects. • Ensures that remaining punch list items are converted to defects and appended to the Take-Over Certificate. • Monitors plant performance after rectification of the defect. • Retains copy of the defect notification form in the Construction Turn-Over (CTO) file.
Contractor	• Acknowledges receipt of the defect and proposes disposition including root cause and preventative actions in accordance with the Contract, • Rectifies notified Defects and provides rectification report to Contracts Manager through the official communication. • Conducts plant walk downs with the Engineer/Project Manager and Generation in order to verify rectified defects. • If a Contractor disputes the issued defect then Contract Management Processes shall be followed.
Contracts Management	• Reviews and validates the defect notification form before being administered or registered by Quality Department. • Issues instruction to Document Control Management to transmit defects to responsible Contractor. • Issues applicable contractual notices as per the FIDIC or NEC to the Contractor. • Issues Take-Over Certificate (TOC) to the Contractor with the list of outstanding defects whenever applicable. • Monitors the implementation of the defect resolution within the agreed timelines • Acknowledges the defect clearance form after the defect has been rectified.
Document Controller	• Processes all defects on Smart Plant Owner Operator (SPO) System. • Ensures that the defects are transmitted to the Contractor using a transmittal form. • Ensures that defects are communicated through official communication channel using Communication Interface Memorandum (CIM).

Roles	Responsibilities
Lead Discipline Engineer (LDE)/ Engineering Department	• Verifies the validity of defects before they are issued to the Contractor. • Ensures that the section on whether the RCA is required or not is marked on the defect notification form • Reviews the Contractor's proposed disposition and root cause analysis. • Conducts plant walk downs with the relevant parties and the Contractor in order to verify rectified defects.
Quality Department (Quality Assurance)	• Ensures the compliance and implementation of the Defect Management Work Instruction • Communicates the completed and registered defect form to the responsible Contracts Manager, Unit/BMH/BOP Delivery Manager, Project Engineering Manager, Commissioning Management and Initiator. • Ensures completeness and accuracy of the Kusile Defect Management Register. • Ensures that defects are tracked on the Kusile Defect Management Register. • Produces monthly/weekly defects reports. • Ensures storage, retrieval and preservation of defect records
System Engineer (Gx)	• Raises defects as identified during the Defect Notification Period and Latent Defect Notification Period in accordance with the Contract. • Indicate whether RCA is required or not on the defect notification form • Conducts reviews in conjunction with the Engineer / Project Manager on the proposed disposition and root cause, where it affects commercialized units, or as and when required. • Allows reasonable access to the plant to allow Contractor(s) to rectify defects after Taking-Over. • Conducts plant walk downs with the Engineer/Project Manager and the Contractor in order to verify rectified defects.
Unit/BMH/BOP Delivery Manager	• Ensures that the defects are rectified within the reasonable time/whenever opportunity arises by the responsible Contractor. • Maintains a comprehensive list of defects which cannot be corrected while plant is in operation. These defects shall be corrected during the next outage opportunity. • Conducts plant walk downs with the Engineer/Project Manager and the Contractor in order to verify rectified defects.

2.6 Process for Monitoring

Adherence and compliance to this document shall be monitored by the process owner (Quality Department). This document will be subjected to both internal and external audits as dictated by the project risk and the audit schedule.

The Defect Management tool shall be utilised for monitoring and tracking of defect status (raised/closed), timeline trend (age analysis) and responsible package. Data is reported weekly for OMAC and monthly for GCD Quality Dashboard.

Quality Management shall perform audits and assessments as informed by the Kusile Project Quality Plan (240-131634789). The document will be updated as and when required or whenever there is a change in the project execution strategy.

2.7 Related/Supporting Documents

[10] 240-124861234	Defect Notification/Clearance Form
[11] 240-124877157	Request For Inspection
[12] 240-151699757	Kusile Defect Management Register
[13] 240-132036925	SPO Document and Records Processing Guideline
[14] 240-131639382	Kusile Communication Interface Memorandum (CIM)
[15] 240-43898815	Document Transmittal Form
[16] 240-132156363	Non-Conformance Process

3. Defect Management Process

3.1 Defects Identification

All defects identified post safety clearance shall be documented on the Defect Notification/Clearance Form (240-124861234).This shall be done by the Initiator of the defect.

3.2 Defects Prioritization

The identified defect shall be prioritized according to its priority as prescribed by the Initiator. All newly identified remedial work will be prioritised based on the following criteria:

3.2.1 Safety Impact

If a safety risk is identified, this means that the nature of the problem may result in an injury to person(s) if action is not taken immediately, the work will be coded as Priority 1. An emergency risk assessment will be done to determine the actions that need to be taken to ensure safety of plant and personnel. The treatment plan will carry on non-stop until the work is finished or the immediate safety risk is mitigated.

3.2.2 Legal Impact

This is the effect of the plant condition and/or operating condition on legal requirements whereby the contravention of the legal requirement(s) is already occurring and requires action, as the failure to meet the legal requirements cannot be justified.

3.2.3 Production Impact

This pertains to defects that will have an impact on the optimisation, testing and/or production process. This will be determined based upon nature of the problem to be resolved.

3.2.4 Cost Impact

The consequential cost impact is relative to the situation and will be determined by the relevant stakeholders. The actions to be taken will be determined based upon nature of the problem to be resolved.

Priority	Description	System Impact	Action to be Taken
Priority 1	System or equipment cannot be operated safely	Major impact on safety, production, legal contravention and/or cost	The treatment plan will carry on non-stop until the work is finished or the immediate safety risk is mitigated.
Priority 2	Must be completed before operational acceptance	Significant impact on safety, production, legal contravention and/or cost	If work cannot be performed online, an unplanned outage to start at the earliest possible time after the risk has been identified, needs to be requested. This work will commence and carry on during this outage working hours until the work is finished.
Priority 3	Must be completed prior to Client Acceptance	Minor impact on safety, production, legal contravention and/or cost.	The identified work will be taken up into the routine work management process and will be scheduled by the planner.
Priority 4	Cosmetic Issues	Insignificant impact on safety, production, legal contravention and cost.	The identified work will commence on the scheduled time and will carry on during normal working hours until finished.
Priority 5	Plant Enhancements / Items in Dispute		

3.3 Defects Verification

The defect shall be verified by the Lead Disciple Engineer (LDE).

3.4 Defect Validation

The Initiator shall ensure that Contracts Manager has reviewed and accepted the defect prior to administration of the defect by the Quality Department.

In the event of the Contracts Manager contractually rejecting the defect, the reason for rejection shall be stated and communicated to the Initiator and LDE. Alternative methods of rectifying the defect shall be investigated by Contracts Manager.

3.5 Defect Administration

The Initiator must ensure that the defect form is fully completed with the relevant information before submitting to Quality Department for processing.

The Initiator shall forward the defect form to Quality Department for completeness review and allocation of a defect number.

The Quality Department shall update the Kusile Defect Management Register (240-151699757) and forward the completed defect form with the allocated defect number to the Document Controller (DC) for processing into SPO.

A live and controlled Kusile Defect Management Register shall be kept on a web-based collaborative platform – SharePoint capturing all the information on the defect form and more, as required.

The electronic copy of the registered defect shall be stored on SPO by DC and maintained electronically by Quality Department.

Quality Department shall forward the registered defect to the responsible Contracts Manager, Unit/BMH/BOP Delivery Manager, Project Engineering Manager, Commissioning Manager and Initiator.

3.6 Defect Communication/Distribution

The Contracts Manager through the DC shall communicate the defect in accordance to the Communication Interface Memorandum (CIM) (240-131639382)

DC shall distribute the defect to the relevant Contractor in accordance to the Kusile Project Document Work Instruction (240-124499452), using a Document Transmittal Form (240-43898815).

The Contractor's responses and or communications shall be done through agreed formal communication procedures.

3.7 Defect Resolution

3.7.1 Defect Acknowledgement by Contractor

The Contractor shall acknowledge the receipt of the defect within the timelines specified on the Contract.

3.7.2 Contractor Response to the Defect

The Contractor's formal response to the defect shall contain, as a minimum, the proposed disposition, root cause analysis, defect repair timeline and an indication whether an outage is required or not. The contractor shall submit a formal response and attach it to the Defect Notification/Clearance Form (240-124861234).

3.7.3 Review of Contractor's Response to the Defect

The review and acceptance of the Contractor's response shall be conducted by the LDE. Thereafter the Contractor can implement the proposed solution.

The outcome of the review of the Contractor's response shall be updated on the Kusile Defect Management Register by the Quality Department and the records kept in the relevant Electronic Document Management system (EDMS).

3.7.4 Verification of Defect Resolution

The verification of the implemented corrective action shall follow the Kusile Request for Inspection (RFI) process (240-124877157). A signed RFI report shall be used as record for defect closure as per 3.8 below.

3.8 Defect Close out

Upon implementation of the corrective action, the defect form (240-124861234) shall be signed off by all relevant parties for closure. The signed off defect certificate with supporting documentation shall be returned to the Quality Department for the update of the Kusile Defect Management Register (240-151699757).

3.9 Document and Records Management

The primary storage of defect records shall be kept on SPO, for daily management of defects the Quality Department shall retain records in accordance to the Kusile Project Records Control Work Instruction (240-124499000)

3.10 Defect Monitoring and Reporting

The Unit/BMH/BOP Delivery Manager and Commissioning Manager shall ensure and manage the consistent defect capturing, monitoring and resolution progress.

The Unit/BMH/BOP Delivery Managers shall obtain reports from the Quality Department for accurate reporting of their relevant areas of responsibility.

3.11 NCR's and Punch list (Construction Defects) items remaining during Taking-Over

Any remaining Non-Conformance Reports (NCRs) and Construction defects identified during the construction and commissioning phase overlapping into the Taking-Over phase shall be converted to defects and shall follow the process as stipulated in this Work Instruction

The Unit/BMH/BOP Delivery Manager and the Contracts Manager shall ensure that Taking-Over Certificates are not issued for any plant area where priority 1 and 2 punch items are still open.

NCR's shall be converted to defects by closing the NCR through the Non-Conformance Process (240-132156363). The defect number shall be referenced on the closed NCR.

3.12 Transfer of Punch List (Construction Defects) Items or Defects between Packages

Construction defects or defects that are identified as belonging to a different package than that to which it was originally raised, will be first verified by the Unit/BMH/BOP Delivery Manager before it can be transferred.

Punch list items or defects that are transferred from one package to another will be closed for the original package (initial to which it was raised) by referencing the new allocated defect number. A new number shall be allocated to the punch list item or defect now raised to the transferred package.

3.13 Defects without Packages

Defects without existing Contracts (Packages) shall be allocated to the relevant Unit/BMH/BOP Delivery Manager to action and close.

The registration of new defects shall follow the process as stipulated in this Work Instruction

3.14 Defects Identified After Completion/Performance Certificate

Defect identified after the issuance of the Completion/Performance Certificate shall be rectified by Generation unless if proven to be a Latent Defect or Inherent Defect.

Latent or Inherent Defects shall be issued within the time periods as stipulated within the specific Contract and shall be accompanied with a Root Cause Analysis (RCA) or any form of investigation. The process as stipulated in this Work Instruction shall be followed during the issuance of the Latent or Inherent Defect.

4. Acceptance

This document has been seen and accepted by:

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5. Revisions

Date	Rev.	Compiler	Remarks
December 2019	1	Thulani Silenge	First issue
September 2020	2	Thulani Silenge	Changes made to align Work Instruction with corrective actions emanating from an audit NCR raised by Sustainability. Audit ref QMS-IA-GX-KCP-005/2020 References to Work Prioritization Procedure (240-44948953) removed
August 2022	3	Nonhlanhla Sikhosana	Addition of RCA requirements

6. Development Team

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