COMMISSIONING PLAYBOOK – WIND POWER PROJECT

Comprehensive Commissioning Guide for Wind Project Execution

Revision	Date	Purpose of Issue	Prepared by	Reviewed by	Approved by

Part 6/6 | Playbook Series for Project Nav Saksham

Developed for Torrent Power

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Abstract

This playbook is a comprehensive guide to the Commissioning of wind projects at Torrent Power. Its primary objective is to standardize, streamline, and optimize Commissioning activities, ensuring continued execution excellence as the organization scales up the RE portfolio.

Each chapter outlines clear process steps, process maps, RACI matrices, and KPIs to further streamline operations, ensuring consistency and efficiency across projects. By establishing standardized operating procedures (SoPs) and integrating best practices, this playbook will support Torrent Power in scaling its wind projects more effectively, while maintaining high standards of quality and performance.

Objectives

- **Establish a Standardized Approach –** Provide a unified, repeatable methodology for the Commissioning function, ensuring consistency across all wind projects
- **Streamline Commissioning Processes** – Optimize key stages through well-defined steps and roles, enabling efficient project execution
- **Support Scalable Growth** – Facilitate Torrent Power's expansion in wind energy by developing a robust Commissioning framework that adapts to increasing project complexity
- **Enhance Collaboration** – Foster seamless communication and decision-making by clearly defining processes, roles, and stakeholder expectations

Scope

This playbook outlines the structured approach to Commissioning of wind projects at Torrent Power. The scope includes:

- **Process Steps –** Detailed guidelines for each stage of the Commissioning process, from visual inspections to equipment testing to first-time charging and commercial operation. These steps ensure a standardized, systematic approach to Commissioning activities, aligning with project objectives and timelines.
- **Process Maps –** Visual representations of key commissioning steps, illustrating the sequence of activities, approval stages, and decision points. These maps enhance clarity, improve cross-functional collaboration, and ensure alignment across teams.
- **KPIs** – Defined metrics to track performance throughout the commissioning process, covering areas such as pre-commissioning testing, approval success and timelines, and performance testing.
- **RACI –** Clear RACI matrices that define roles and responsibilities for each step of the Commissioning process. This fosters accountability and transparency, ensuring each stakeholder understands their involvement at every step, from grid compliance check to commercial operation.

This playbook serves as the foundation for establishing consistent and efficient Commissioning practices, supporting the successful execution of future wind projects at Torrent Power.

Coverage

The document covers the processes that make up the Commissioning stage. It is structured as follows –

- **Chapter 1 – Construction and Erection Inspection –** Outlines the procedure that ensures all infrastructure is physically complete and verified through joint inspections before moving to the pre-commissioning tests.

- **Chapter 2 – Pre-commissioning Testing –** Describes the process that validates the functionality and safety of installed equipment through structured testing and certification by respective contractor.

- **Chapter 3 – Approvals for First-time Charging**

    - **Chapter 3.1 – RLDC User Registration –** Describes the process that registers the project with the Regional Load Dispatch Centre.
    - **Chapter 3.2 – CEIG Approval and FTC Intimation to RLDC –** Describes the process that secures regulatory approvals required to energize the system for the first time and begin commercial operation.

- **Chapter 4 – First-time Charging and Commercial Operation –** Describes the process that facilitates the energization and testing of system components, leading to issuance of successful trial and COD certificates.

- **Chapter 5 – Reliability Run Test & PCVT –** Describes the processes that take place post successful trial run, namely, the reliability run test and power curve validation tests conducted by the OEM.

- **Chapters 6.1 and 6.2 – Project Handover to O&M Team –** Describes the process that ensures the formal transfer of operational responsibility that follows successful testing, and consists of O&M team training, and contractual compliance checks.

Who is this playbook for?

- **Project Team** – Coordinates overall execution, defines testing procedures, and ensures compliance with project timelines and technical requirements. Verifies and signs off at key commissioning stages.

- **Regulatory Team** – Ensures all regulatory, safety, and contractual obligations are met during commissioning. Supports dispute resolution and prepares necessary legal documentation for COD and HOTO.

- **OEM Team** – Oversees infrastructure completion, engages third-party testers, and resolves commissioning issues. Provides technical documentation, testing certifications, and supports fault resolution.

- **O&M Team** – Assumes responsibility for plant operation post-commissioning, participates in testing, and reviews equipment handover, ensuring smooth transition into long-term operations.

- **Commercial Team** – Tracks COD milestones, and ensures commercial terms align with project progress. Supports financial approvals tied to commissioning and performance.

Chapter 1 – Construction and Erection Inspection

1.1 Process Steps

#	Activity	#	Inputs	#	Outputs	Timeline *(in weeks)*
S	– Contractor SPOC informs the Project Manager (PM) that the erection of at least 'N'[1] WTGs and respective Balance of Plant (BOP)[2] has been completed, along with the Pooling Sub-station (PSS)					-
P1	– PM requests Chief O&M to appoint an O&M Engineer as the on-site Commissioning POC (CPOC) – PM directs Site Manager (SM) to conduct the inspection of the completed construction *CPOC is appointed once, at the time of commissioning of the first cluster of WTGs*					-
P2	– SM directs the Site QHSSE and CPOC to conduct an inspection of the BOP, for erected WTGs *Inspection of the PSS will take place in parallel*					-
P3	– Site QHSSE requests Contractor SPOC to individually appoint respective Mechanical, Civil and Electrical engineers for the inspection					0.5
P4	– Contractor SPOC appoints Mechanical, Civil and Electrical engineers for the inspection					
P5	– Site QHSSE requests Site Mechanical, Civil and Electrical Heads, and CPOC, to accompany him for the respective inspection					

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End

[1] N will be defined in the PPA as the minimum number of WTGs (in MW) that can be commissioned together. The following timelines are for a single WTG, with BOP.
[2] BOP consists of WTG Foundation, USS, 33 kV line. PSS is commissioned with the first cluster of WTGs.

#	Activity	#	Inputs	#	Outputs	Timeline *(in weeks)*
P6	– Site QHSSE leads the inspection, and logs all the deviations in a punch point list – *Construction checklist is checked to ensure open observations / NCRs have been closed*			**O1**	Punch Point List	1
P7	– Site QHSSE ensures signatures on the punch point list from the Contractor SPOC and respective Site Functional[1] Head *Commissioning POC has an observatory role at this stage*					
P8	– Contractor SPOC closes all the critical punch points and prepares the compliance report			**O2**	Compliance Report	1
P9	– Contractor SPOC shares the compliance report with the Site QHSSE for approval					0.5
P10	– Site QHSSE provides feedback and requests Contractor SPOC to re-share for approval					
P11	– Site QHSSE signs off on the compliance report and issues the Mechanical Clearance Certificate (MCC)[2] to the Contractor SPOC			**O3**	Mechanical Clearance Certificate	
E	– Site QHSSE notifies the PM and SM that MCC has been issued					***Total –*** *3 – 4 weeks*
KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End						

[1] Mechanical, Civil or Electrical.
[2] Contractor provides HOTO to Site Team before MCC is released

1.2 – RACI

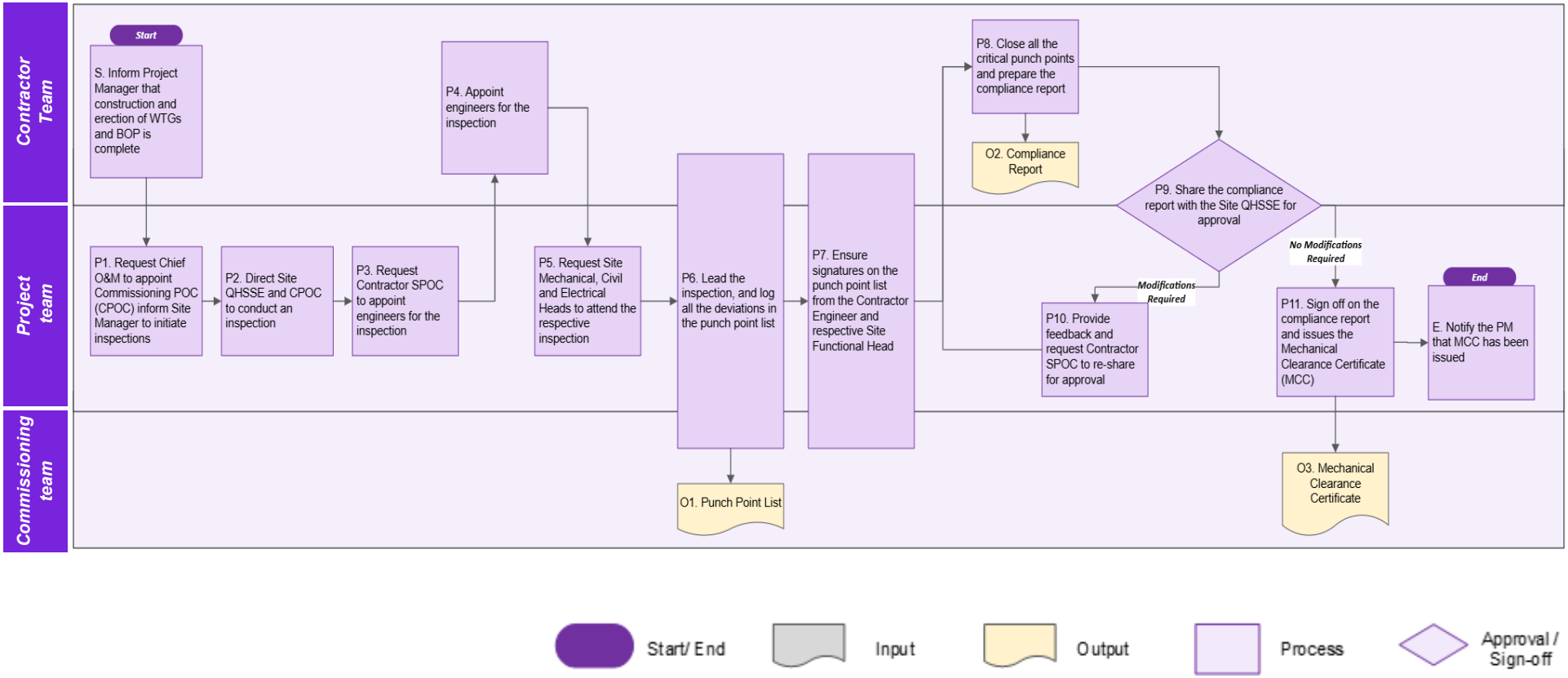
#	Key Task	Responsible	Accountable	Consulted	Informed
S	Inform Project Manager (PM) that construction and erection of WTGs and BOP is complete	Contractor SPOC			Project Manager
P1	Request Chief O&M for Commissioning POC appointment and inform Site Manager to initiate inspections	Project Manager			Chief O&M, Site Manager
P2	Direct Site QHSSE and Commissioning POC to conduct an inspection of the BOP	Site Manager			Site QHSSE, CPOC
P3	Request Contractor SPOC to appoint engineers for the inspection	Site QHSSE			Contractor SPOC
P4	Appoint Mechanical, Civil and Electrical engineers for the inspection	Contractor SPOC			Contractor Engineers
P5	Request Site Mechanical, Civil and Electrical Leads and CPOC to attend the respective inspection	Site QHSSE			Site Mechanical, Civil, Electrical Lead, CPOC
P6	Lead the inspection of the block, and log all the deviations in a punch point list	Site QHSSE		Contractor Engineers, Site Mechanical, Civil, Electrical Lead, CPOC	
P7	Ensure signatures on the punch point list from the Contractor SPOC and respective Site Functional[1] Head	Site QHSSE		Contractor SPOC, Site Mechanical, Civil, Electrical Lead, CPOC	
P8	Close all the critical punch points and prepare the compliance report	Contractor SPOC			

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End

[1] Mechanical, Civil or Electrical.

#	Key Task	Responsible	Accountable	Consulted	Informed
P9	Share the compliance report with the Site QHSSE for approval	Contractor SPOC		Site QHSSE	
P10	Provide feedback and request Contractor SPOC to re-share for approval	Site QHSSE			Contractor SPOC
P11	Sign off on the compliance report and issue the Mechanical Clearance Certificate (MCC)	Site QHSSE			Contractor SPOC
E	Notify the PM that MCC has been issued	Site QHSSE			Project Manager, Site Manager
KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End					

1.3 – Process Map



[1] **Map Glossary** – **QHSSE:** Quality, Health, Safety, Security, Environment

Chapter 2 – Pre-commissioning Testing

2.1 Process Steps

#	Activity	#	Inputs	#	Outputs	Timeline *(in weeks)*
S	– Site QHSSE notifies the Project Manager (PM) that MCC has been issued					-
P1	– PM notifies the Contractor SPOC[1] and Commissioning POC (CPOC) to initiate the pre-commissioning tests *For WTG, OEM conducts the tests under supervision of TPL*					-
P2	– Contractor SPOC prepares the Pre-commissioning checklist and shares it with Site Electrical Lead (SEL) for approval			**O1**	Pre-commissioning checklist	0.5
P3	– SEL recommends changes, if required, and provides sign-off on the checklist					
P4	– SEL shares the checklist with CPOC for approval					
P5	– CPOC recommends changes, if required, and provides sign-off on the checklist					0.5
P6	– CPOC shares the approved checklist with the Contractor SPOC					
P7	– Contractor Engineers conducts the requisite tests, in the presence of Contractor SPOC, SEL and CPOC, and documents the results in the checklist	**I1**	Pre-commissioning checklist			1.5
P8	– Contractor SPOC signs the checklist containing the test results and shares it with the CPOC					

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End

[1] This will be OEM SPOC for pre-commissioning testing of WTGs

#	Activity	#	Inputs	#	Outputs	Timeline *(in weeks)*
P9	– CPOC seeks clarifications from the Contractor SPOC, if any, and signs-off on the checklist					0.5
P10	– CPOC shares the checklist with the SEL					-
P11	– SEL seeks clarifications from the Contractor SPOC, if any, and signs-off on the checklist					0.5
E	– SEL shares the approved pre-commissioning test results with the PM and SM					***Total –*** *3 – 4 weeks*
KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End						

2.2 – RACI

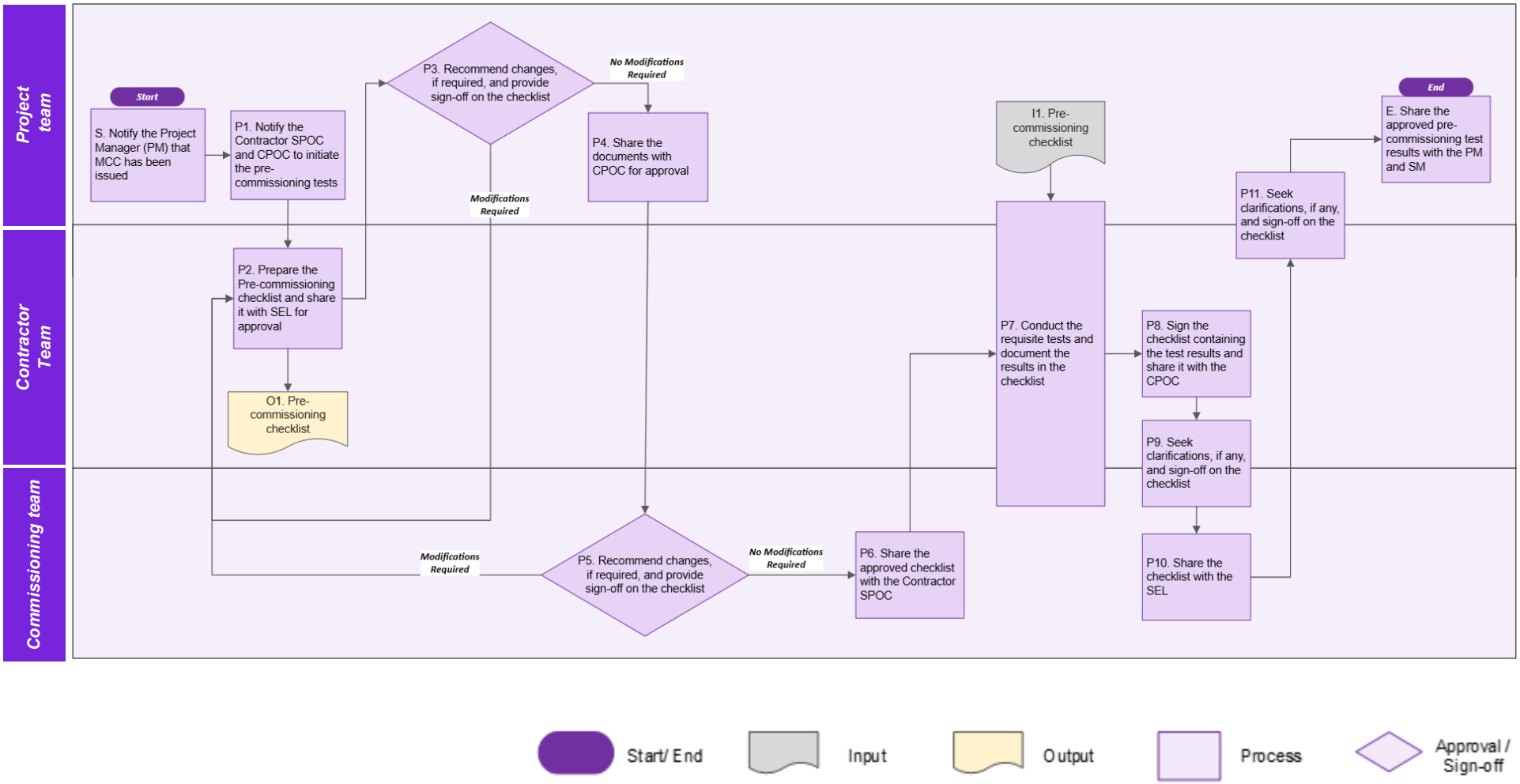
#	Key Task	Responsible	Accountable	Consulted	Informed
S	Notify the Project Manager (PM) that MCC has been issued	Site QHSSE			Project Manager
P1	Notify the Contractor SPOC and Commissioning POC (CPOC) to initiate the pre-commissioning tests	Project Manager			Contractor SPOC, Commissioning POC
P2	Prepare the Pre-commissioning checklist and share it with Site Electrical Lead (SEL) for approval	Contractor SPOC			Site Electrical Lead
P3	Recommend changes, if required, and provide sign-off on the checklist	Site Electrical Lead			
P4	Share the documents with CPOC for approval	Site Electrical Lead			Commissioning POC
P5	Recommend changes, if required, and provide sign-off on the checklist	Commissioning POC			
P6	Share the approved checklist with the Contractor SPOC	Commissioning POC			Contractor SPOC
P7	Conduct the requisite tests and document the results in the checklist	Contractor Engineers		Contractor SPOC, Site Electrical Lead, Commissioning POC	
P8	Sign the checklist containing the test results and share it with the CPOC	Contractor SPOC			Commissioning POC
P9	Seek clarifications if any, and sign-off on the checklist	Commissioning POC		Contractor SPOC	

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End

#	Key Task	Responsible	Accountable	Consulted	Informed
P10	Share the checklist with the SEL	Commissioning POC			Site Electrical Lead
P11	Seek clarifications, if any, and sign-off on the checklist	Site Electrical Lead		Contractor SPOC	
E	Share the approved pre-commissioning test results with the PM and SM	Site Electrical Lead			Project Manager, Site Manager

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End

2.3 – Process Map



[1] **Map Glossary** - **CPOC:** Commissioning POC

Chapter 3 – Approvals for First Time Charging

Chapter 3.1 – RLDC User Registration

3.1.1 Process Steps

#	Activity	#	Inputs	#	Outputs	Timeline *(in weeks)*
S	– Chief Regulatory directs Regulatory Approvals Head (RAH)[1] to initiate the RLDC[2] approval process for First Time Charging (FTC)					-
P1	– RAH initiates collection[3] of documents required for RLDC User Registration *RLDC User Registration requires (i) grid compliance report and (ii) technical and modelling data*					-
P2	– RAH requests the OEM SPOC to prepare the grid code compliance report					-
P3	– OEM SPOC selects and onboards a third-party consultant to prepare the grid code compliance report					0.5
P4	– OEM SPOC ensures the consultant conducts the required simulations – OEM SPOC receives the grid code compliance report from the consultant			**O1**	Grid Code Compliance Report	3
P5	– OEM SPOC shares the Grid Code Compliance Report with the RAH					-
P6	– RAH reviews the report and seeks clarifications if any					-

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End

[1] The RAH's position has been defined in the to-be organizational structure, as part of the regulatory team
[2] RLDC for CTU connectivity and SLDC (State Load Dispatch Centre) for STU connectivity
[3] This typically takes place a year prior to the anticipated FTC date

#	Activity	#	Inputs	#	Outputs	Timeline *(in weeks)*
P7	– OEM SPOC provides answers for any clarifications from the RAH					0.5
P8	– RAH requests Wind Engineering Head (WEH) to provide the necessary technical and modelling data, and shares the relevant annexure templates containing data requirements	**I1**	Data Requirement Annexures			-
P9	– RAH receives the requisite data from WEH and prepares the annexures[1] required for user registration	**I2**	Technical and Modelling Data	**O2**	RLDC User Registration Document	0.5
P10	– RAH shares the RLDC User Registration Document with Chief Regulatory for sign-off					-
P11	– Chief Regulatory signs-off on the RLDC User Registration Document and shares the signed copy with RAH					0.5
P12	– RAH submits the user registration documents with the RLDC					-
P13	– RAH receives queries, if any, from the RLDC – RAH shares answers for the queries with the RLDC					0.5
E	– RAH receives confirmation of User registration from the RLDC, and informs the Chief Regulatory and Project Manager					***Total*** *– 5 – 6 weeks*

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End

[1] This takes place atleast 6 months prior to the anticipated FTC date

3.1.2 – RACI

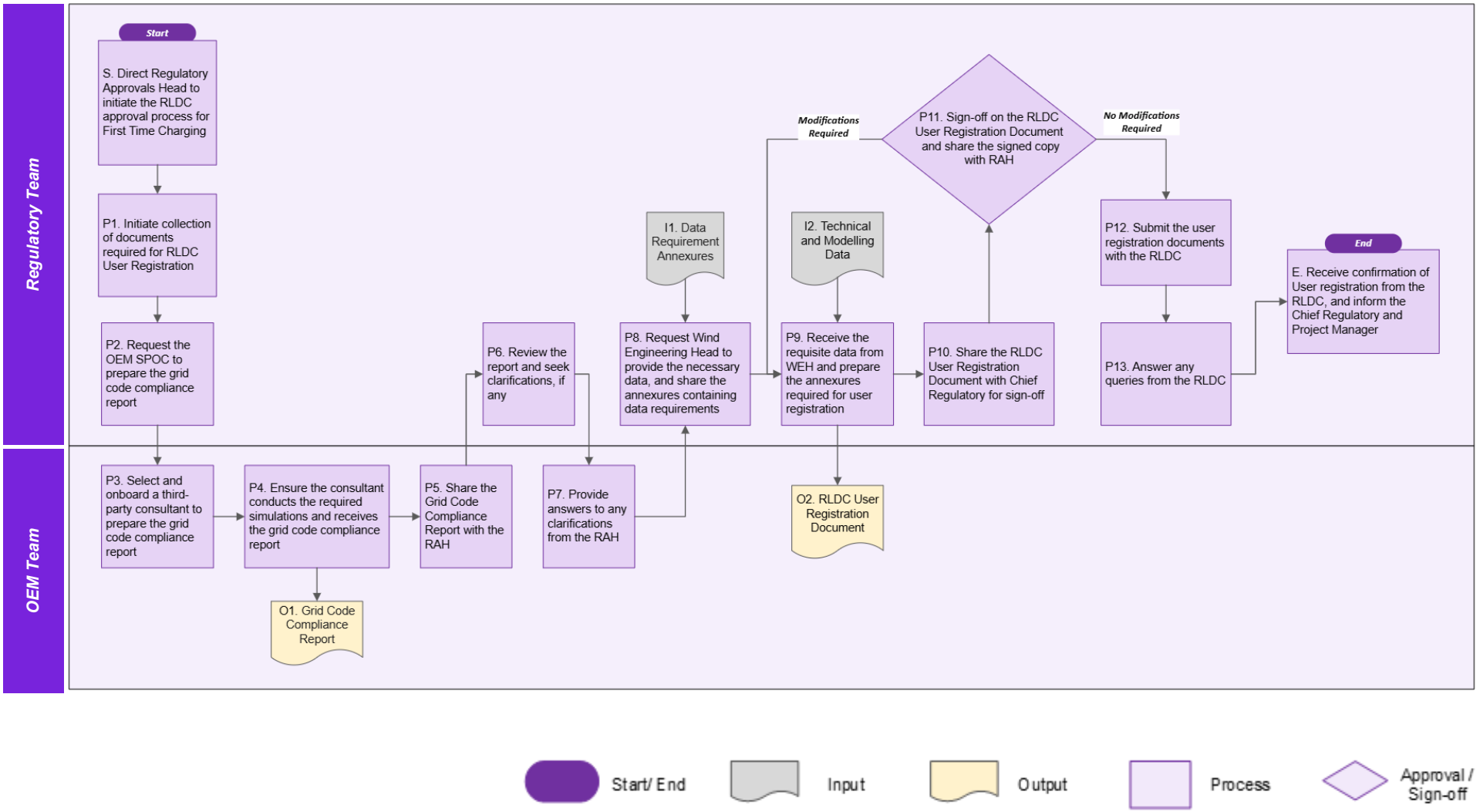
#	Key Task	Responsible	Accountable	Consulted	Informed
S	Direct Regulatory Approvals Head (RAH) to initiate the RLDC approval process for First Time Charging (FTC)	Chief Regulatory			Regulatory Approvals Head
P1	Initiate collection of documents required for RLDC User Registration	Regulatory Approvals Head			
P2	Request the OEM SPOC to prepare the grid code compliance report	Regulatory Approvals Head			OEM SPOC, Project Manager
P3	Select and onboard a third-party consultant to prepare the grid code compliance report	OEM SPOC			Project Manager
P4	Ensure the consultant conducts the required simulations and receives the grid code compliance report	OEM SPOC			
P5	Share the Grid Code Compliance Report with the RAH	OEM SPOC			Regulatory Approvals Head, Project Manager
P6	Review the report and seek clarifications, if any	Regulatory Approvals Head			
P7	Provide answers to any clarifications from the RAH	OEM SPOC			Regulatory Approvals Head
P8	Request Wind Engineering Head (WEH) to provide the necessary technical and modelling data, and share the relevant annexure templates containing data requirements	Regulatory Approvals Head			Wind Engineering Head
P9	Receive the requisite data from WEH and prepare the annexures required for user registration	Regulatory Approvals Head			

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End

#	Key Task	Responsible	Accountable	Consulted	Informed
P10	Share the RLDC User Registration Document with Chief Regulatory for sign-off	Regulatory Approvals Head		Chief Regulatory	
P11	Sign-off on the RLDC User Registration Document and share the signed copy with RAH	Chief Regulatory			Regulatory Approvals Head
P12	Submit the user registration documents with the RLDC	Regulatory Approvals Head			
P13	Answer any queries from the RLDC	Regulatory Approvals Head			
E	Receive confirmation of User registration from the RLDC, and inform the Chief Regulatory and Project Manager	Regulatory Approvals Head			Chief Regulatory, Project Manager

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End

3.1.3 – Process Map



[1] **Map Glossary** - **RLDC:** Regional Load Dispatch Centre, **RAH:** Regulatory Approvals Head

Chapter 3.2 – CEIG Approval & FTC Intimation to RLDC

3.2.1 Process Steps

#	Activity	#	Inputs	#	Outputs	Timeline *(in weeks)*
S	– Project Manager (PM) informs the Regulatory Approvals Head (RAH) that the pre-commissioning tests have been completed *CEIG Approval is required before requesting FTC and trial run approval from the RLDC*					-
P1	– RAH notifies the CEIG (Chief Electrical Inspector to the Government) to approve the plant drawings and conduct an inspection and provide the Electrical Safety Approval (ESA) for first-time charging (FTC)	**I1**	Plant Drawings			1.5
P2	– RAH resolves any queries on the drawings and schedules the CEIG inspection and informs the Site Manager (SM) of the same					
P3	– SM accompanies the CEIG during the ESA inspection					0.5
P4	– Post inspection, RAH receives the order for compliance from the CEIG					
P5	– RAH prepares the compliance report and shares it with CEIG	**I2**	Order for Compliance	**O1**	Compliance Report	
P6	– RAH submits the Compliance Report and receives the ESA certificate from the CEIG[1]	**I3**	Compliance Report	**O2**	ESA Certificate	
KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End						

[1] If approval is denied, RAH requests the PM to make the required changes and schedules another inspection (process repeats from P3)

#	Activity	#	Inputs	#	Outputs	Timeline *(in weeks)*
P7	– RAH intimates the RLDC for pre-data validation of plant, as per approved single-line diagram of plant, at least 10 days before the anticipated FTC date – RAH shares the ESA certificate and requisite data[1] with the RLDC	**I4** **I5**	ESA Certificate Validated data as per SLD	**O3**	RLDC Intimation Notice	1
P8	– RAH receives queries, if there are any, from the RLDC, and resolves them					
P9	– RAH receives confirmation from the RLDC that all the documents are in order					
P10	– RAH submits First-time Charging (FTC) request and trial run notice to the RLDC – RAH submits the requisite documents[2] to the RLDC	**I6**	FTC Undertakings	**O4**	FTC Request Notice	0.5
P11	– RAH receives queries, if any, from the RLDC – RAH shares answers for the queries with the RLDC					
P12	– RAH receives approval for trial run from the RLDC, along with the grid charging code, and shares it with the PM and SM			**O5** **O6**	Trial Run Approval Grid Charge Code	
E	– PM directs the SM, OEM SPOC, Site Electrical Lead and CPOC to prepare for FTC and trial run					***Total –*** *3 – 4 weeks*

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End

[1] SCADA points, energy meters, connection agreement, sire responsibility schedule, and other required data documents
[2] Undertaking in Protection System, Telemetry and Communication, Energy metering, Statutory clearances, Cyber security requirement

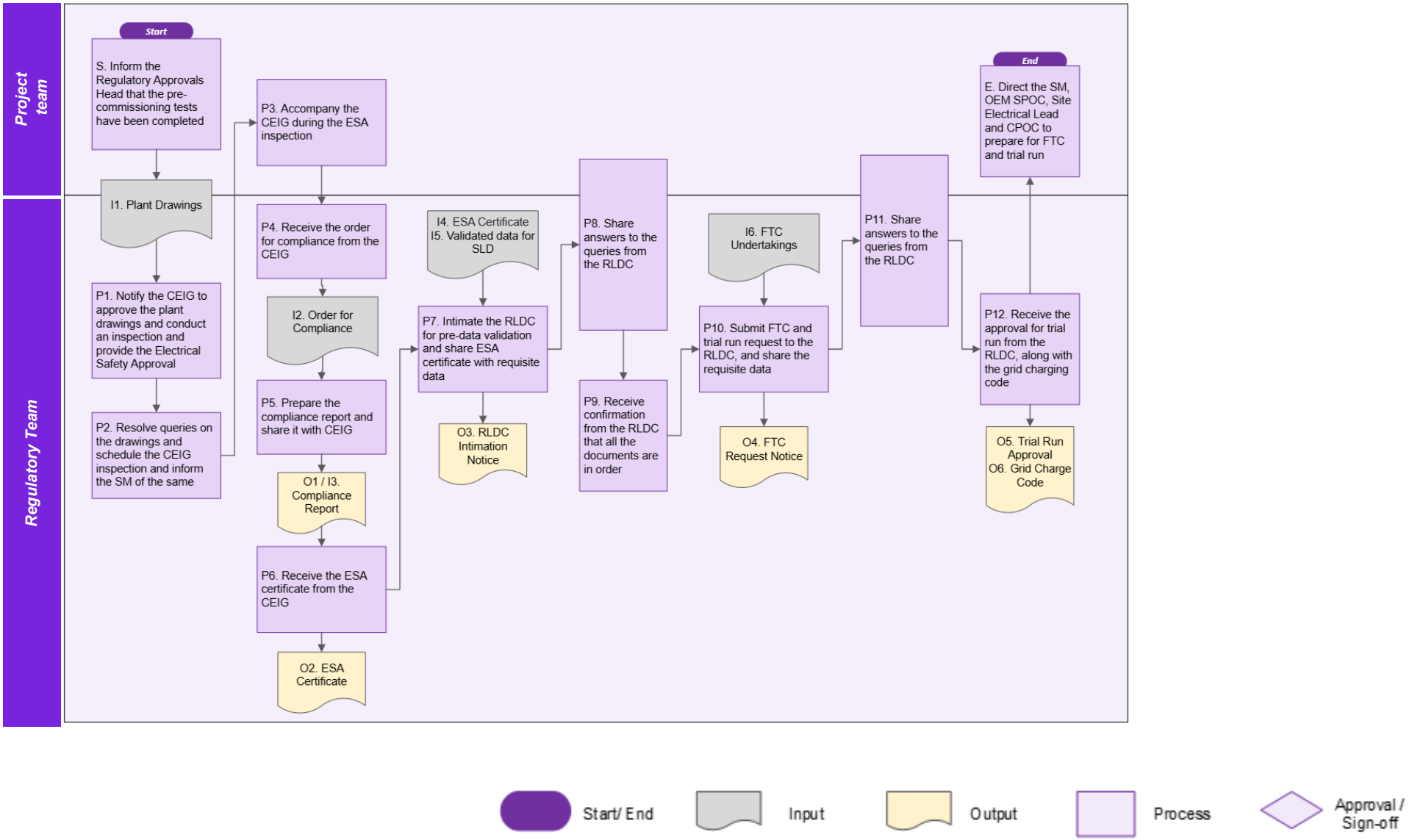
3.2.2 – RACI

#	Key Task	Responsible	Accountable	Consulted	Informed
S	Inform the Regulatory Approvals Head (RAH) that pre-commissioning tests have been completed	Project Manager			Regulatory Approvals Head
P1	Notify the CEIG to approve plant drawings and conduct an inspection and provide the ESA	Regulatory Approvals Head			
P2	Resolve any queries on the drawings and schedule the CEIG inspection	Regulatory Approvals Head		Project Manager	Site Manager
P3	Accompany the CEIG during the ESA inspection	Site Manager			
P4	Receive the order for compliance from the CEIG	Regulatory Approvals Head			
P5	Prepare the compliance report and share it with CEIG	Regulatory Approvals Head		Project Manager	
P6	Receive the ESA certificate from the CEIG	Regulatory Approvals Head			Project Manager
P7	Intimate the RLDC for pre-data validation for FTC and share ESA certificate with requisite data	Regulatory Approvals Head			
P8	Share answers to the queries from the RLDC	Regulatory Approvals Head		Project Manager	

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End

#	Key Task	Responsible	Accountable	Consulted	Informed
P9	Receive confirmation from the RLDC	Regulatory Approvals Head			
P10	Submit FTC and trial run request to the RLDC, and share the requisite data	Regulatory Approvals Head			
P11	Share answers to the queries from the RLDC	Regulatory Approvals Head		Project Manager	
P12	Receive the approval for trial run from the RLDC, along with the grid charging code	Regulatory Approvals Head			Project Manager
E	Direct the Site Manager, OEM SPOC, Site Electrical Lead and CPOC to prepare for FTC and trial run	Project Manager			Site Manager, OEM SPOC, Site Electrical Lead, CPOC
KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End					

3.2.3 – Process Map



[1] **Map Glossary** - **RLDC:** Regional Load Dispatch Centre, **CEIG:** Chief Electrical Inspector to the Government, **FTC**: First Time Charging, **ESA**: Electricity Safety Approval

Chapter 4 – First Time Charging (FTC) & Commercial Operation

4.1 Process Steps

#	Activity	#	Inputs	#	Outputs	Timeline *(in weeks)*
S	– Regulatory Approvals Head (RAH) shares the Grid charge code and approval for FTC with the Project Manager (PM)					-
P1	– PM directs the Site Manager and OEM SPOC to prepare for FTC, and shares the grid charge code with them					0.5
P2	– OEM SPOC initiates back-charging, starting with the Pooling Sub-station, which charges the USS transformer through the 33 kV line	**I1**	Grid Charge Code			
P3	– PM requests the RLDC for the trial run charge code					-
P4	– PM receives the trial run charge code and shares it with the OEM SPOC					-
P5	– OEM SPOC initiates the trial run	**I2**	Trial Run Charge Code			-
P6	– OEM SPOC collects operational data[1] over the duration of the trial run			**O1**	Trial Run Data	-
P7	– OEM SPOC shares the trial run data with the Site Electrical Lead (SEL)					-

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End

[1] SCADA values of active and reactive power flows, interface energy meter readings, numerical relay, disturbance recorder and station event logger, among others

#	Activity	#	Inputs	#	Outputs	Timeline *(in weeks)*
P8	– SEL reviews the trial run data, with CPOC, and seeks clarifications[1] from the OEM SPOC					0.5
P9	– SEL shares the trial run data with the PM, once all clarifications have been received					-
P10	– PM approves and shares the trial run data with the RAH					-
P11	– RAH prepares the trial run data in the requisite format and submits it to the RLDC	**I2**	Trial Run Data	**O2**	Trial Run Data Report	0.5
P12	– RAH receives queries, if any, from the RLDC and resolves them					0.5
P13	– RAH receives the successful trial run certificate and Commercial Operation Date (COD) certificate from the RLDC			**O3** **O4**	Successful Trial Run Certificate COD Certificate	
P14	– RAH notifies the PM, OEM SPOC, Commissioning POC and Chief Commercial Officer of the successful trial run certificate and COD certificate					-
P15	– OEM SPOC releases Commissioning Clearance Certificate (CCC) to the Project Manager			**O5**	Commissioning Clearance Certificate	-
E	– Project Manager shares the CCC with the Order Manager for release of milestone payment					***Total –*** *1– 2 weeks*

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End

[1] Trial run may be conducted multiple times (as permitted by the RLDC) till satisfactory data values are observed

4.2 – RACI

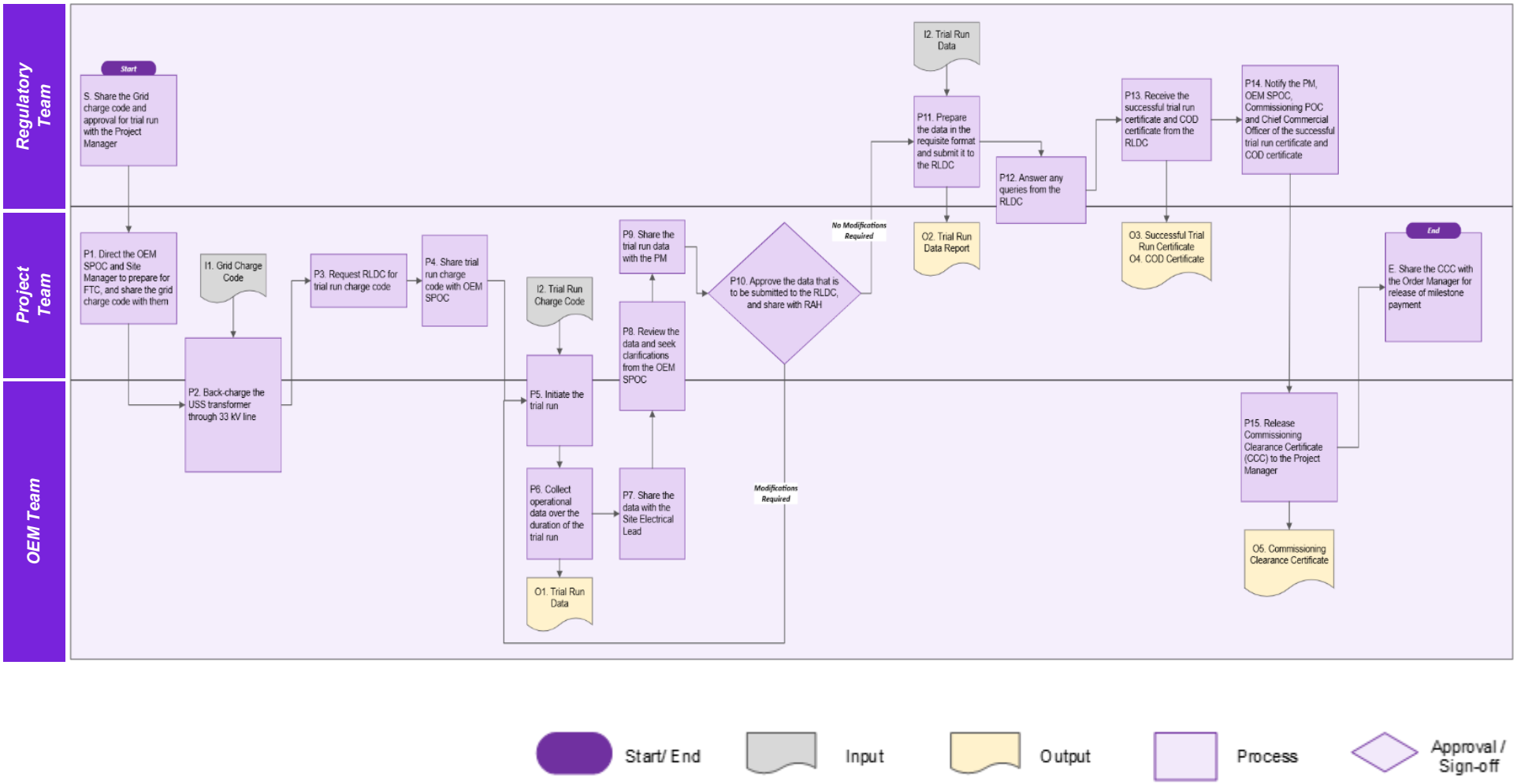
#	Key Task	Responsible	Accountable	Consulted	Informed
S	Share Grid charge code and approval for FTC with the PM	Regulatory Approvals Head			Project Manager
P1	Direct the OEM SPOC and Site Manager to prepare for FTC	Project Manager			OEM SPOC, Site Manager
P2	Back-charge the USS transformer through 33 kV line	OEM SPOC		Site Electrical Lead, PM	
P3	Request RLDC for trial run charge code	Project Manager			
P4	Share trial run charge code with OEM SPOC	Project Manager			OEM SPOC
P5	Initiate the trial run	OEM SPOC		Site Electrical Lead, PM	
P6	Collect operational data over the duration of the trial run	OEM SPOC			
P7	Share the data with the Site Electrical Lead (SEL)	OEM SPOC			
P8	Review the data and seek clarifications from OEM SPOC	Site Electrical Lead		Commissioning POC, OEM SPOC	
P9	Share the trial run data with the PM	Site Electrical Lead			Project Manager
P10	Approve and share the data for submission to the RLDC	Project Manager			Regulatory Approvals Head
P11	Prepare the data in the requisite format and submit it to the RLDC	Regulatory Approvals Head			

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End

#	Key Task	Responsible	Accountable	Consulted	Informed
P12	Answer any queries from the RLDC	Regulatory Approvals Head		Project Manager	
P13	Receive the successful trial run and COD certificate from RLDC	Regulatory Approvals Head			
P14	Notify regarding the trial run certificate and COD certificate	Regulatory Approvals Head			PM, OEM SPOC, CPOC, Chief Commercial Officer
P15	Release Commissioning Clearance Certificate (CCC) to the Project Manager and provide HOTO to the Site Team	OEM SPOC		Site Manager	Project Manager
E	Share the CCC with the Order Manager for release of milestone payment	Project Manager			Order Manager

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End

4.3 – Process Map



[1] **Map Glossary** - **RLDC:** Regional Load Dispatch Centre, **RAH:** Regulatory Approvals Head, **COD**: Commercial Operation Date

Chapter 5 – Reliability Run Test and PCVT

5.1 Process Steps

#	Activity	#	Inputs	#	Outputs	Timeline *(in weeks)*
S	– RAH notifies the Project Manager (PM) of the successful trial run certificate and COD certificate					-
P1	– PM directs the Site QHSSE to ensure closure of all critical punch points					-
P2	– Site QHSSE ensures closure of critical punch points, signs-off on it and takes sign-off from OEM SPOC and Commissioning POC (CPOC) – Site QHSSE shares the punch point list with the SM			**O1**	Punch Point List	1[1]
P3	– PM directs OEM SPOC to initiate the reliability run test / STPT of WTG					-
P4	– OEM SPOC conducts the reliability run test and informs the PM once successfully conducted			**O2**	Reliability Run Test Results	1.5
P5	– Once all WTGs are commissioned[2], PM directs the OEM SPOC to initiate the PCVT (Power Curve Validation Test) *Third Party Consultant is hired to validate the PCVT results*					-
P6	– OEM SPOC conducts the PCVT, in the presence of TP Consultant, PM and CPOC			**O3**	PCVT Results	1.5
P7	– TP Consultant validates the results and shares them with the PM	**I1**	PCVT Results			
E	– PM reviews the test results and shares them with the Order Manager for release of milestone payment					***Total –*** *3 – 4 weeks*

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End

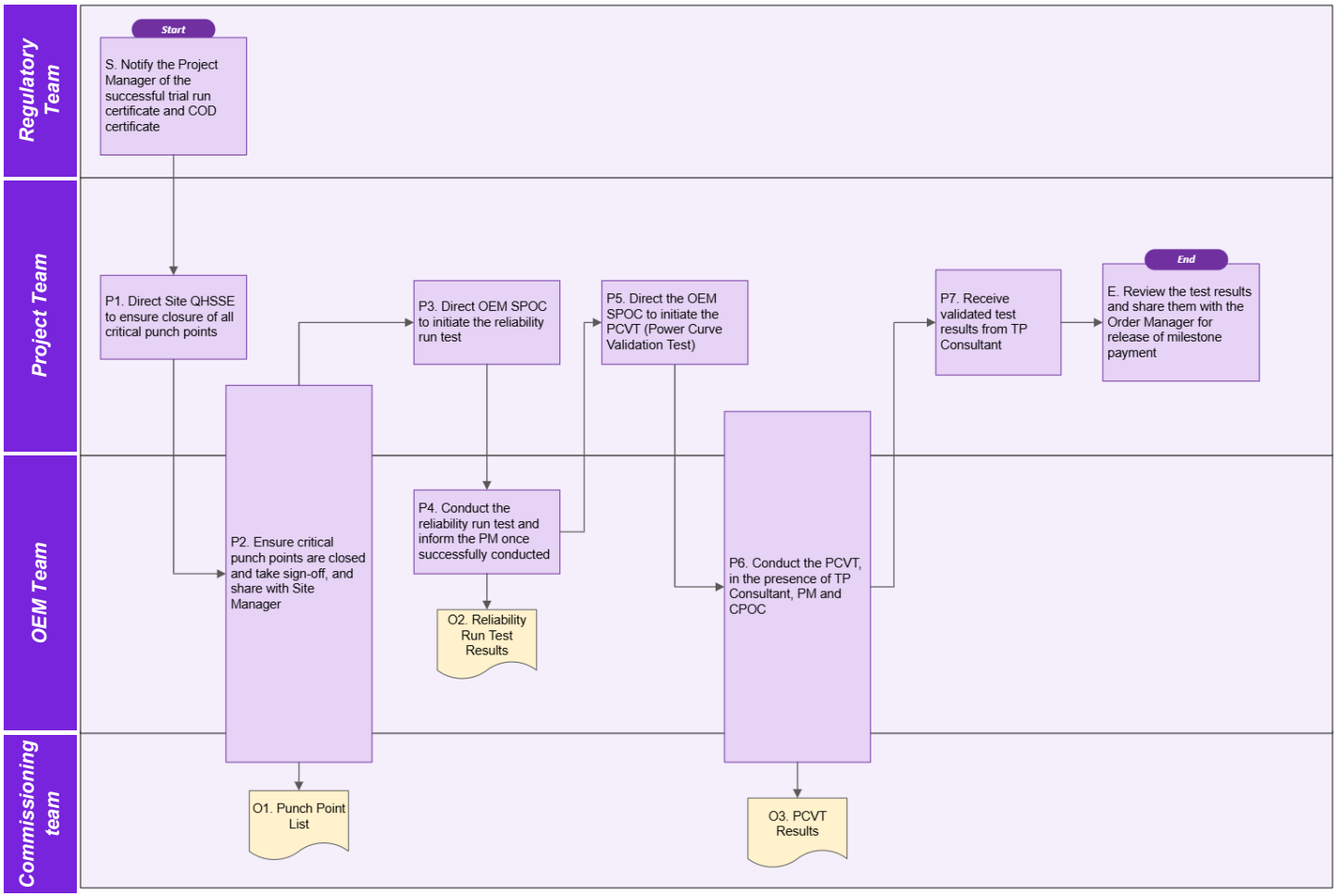
[1] May take longer depending on number of punch points. Timelines for PCVT and STPT will also vary depending on OEM.
[2] There may be a stability period to accommodate commissioning of all WTGs, and favorable high wind conditions.

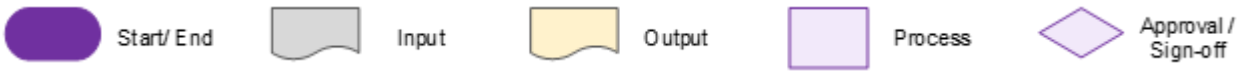
5.2 – RACI

#	Key Task	Responsible	Accountable	Consulted	Informed
S	Notify the Project Manager (PM) of the successful trial run certificate and COD certificate	Regulatory Approvals Head			Project Manager
P1	Direct Site QHSSE to ensure closure of all punch points	Project Manager			Site QHSSE
P2	Ensure punch points are closed and take sign-off	Site QHSSE		OEM SPOC, CPOC	Project Manager, Site Manager
P3	Direct OEM SPOC to initiate the reliability run test of WTG	Project Manager			OEM SPOC
P4	Conduct the reliability run test and inform the PM once successfully conducted	OEM SPOC			Project Manager
P5	Direct the OEM SPOC to initiate the PCVT (Power Curve Validation Test)	Project Manager			OEM SPOC
P6	Conduct the PCVT, in the presence of TP Consultant, PM and CPOC	OEM SPOC		TP Consultant, Project Manager, CPOC	
P7	Receive validated test results from TP Consultant	Project Manager		TP Consultant	
E	Review the test results and share them with the Order Manager for release of milestone payment	Project Manager			Order Manager

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End

5.3 – Process Map





[1] **Map Glossary** - **HOTO**: Handover Takeover, **PCVT:** Power Curve Validation Test

Chapter 6.1 – Balance of Plant HOTO

6.1.1 Process Steps

#	Activity	#	Inputs	#	Outputs	Timeline *(in weeks)*
S	– Site Electrical Lead informs Project Manager that EHV line and 33kV line are charged					-
P1	– Project Manager informs Chief O&M to begin HOTO for Balance of Plant (BOP)[1]					-
P2	– Chief O&M shares the BOP Handover Checklist with the Project Manager			**O1**	BOP Handover Checklist	-
P3	– Project Manager directs Site Manager to initiate BOP HOTO					-
P4	– Site Manager conducts Knowledge Transfer (KT) sessions with the O&M team and provides the HOTO (including spares)					2
P5	– Project Manager requests Wind Engineering Head (WEH) to share the BOP Engineering Documents listed in the BOP Handover Checklist					-
P6	– WEH shares the requested BOP Engineering Documents with the Project Manager	**I1**	BOP Handover Checklist	**O2**	BOP Engineering Documents	0.5
P7	– Project Manager shares the BOP Handover Checklist with the Regulatory Approvals Head (RAH), and requests him to share the BOP approvals and permits					-
P8	– RAH shares the requested BOP permits and approvals with the PM	**I1**	BOP Handover Checklist	**O3**	BOP Permits and Approvals	0.5 (in parallel to P6)

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End

[1] Includes EHV line, Pooling Sub-station and 33kV line

#	Activity	#	Inputs	#	Outputs	Timeline *(in weeks)*
P9	– PM shares the BOP Engineering Documents and Approvals with the Chief O&M, along with the BOP Land and ROW-related[1] documents			**O4**	BOP Land and ROW documents	-
P10	– PM shares the HOTO documents[2], listed in the BOP Handover Checklist			**O5**	BOP HOTO Documents	0.5 (in parallel to P6)
P11	– Chief O&M signs off on the BOP Handover Checklist and shares it with the PM					-
E	– PM informs Chief Wind that the BOP handover to O&M Team is complete					***Total –*** *2 – 3 weeks*

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End

[1] Lease / Purchase agreement, NOC for ROW, 7/12 (wherever applicable), among others
[2] Including but not limited to, Bill of Materials with Make, GTP, Warranty certificates, O&M Manuals, Factory and Field Acceptance Test Results, Supplier Escalation Matrix, Supplier PO Copies, Punch Point List, Work Completion Certificates

6.1.2 – RACI

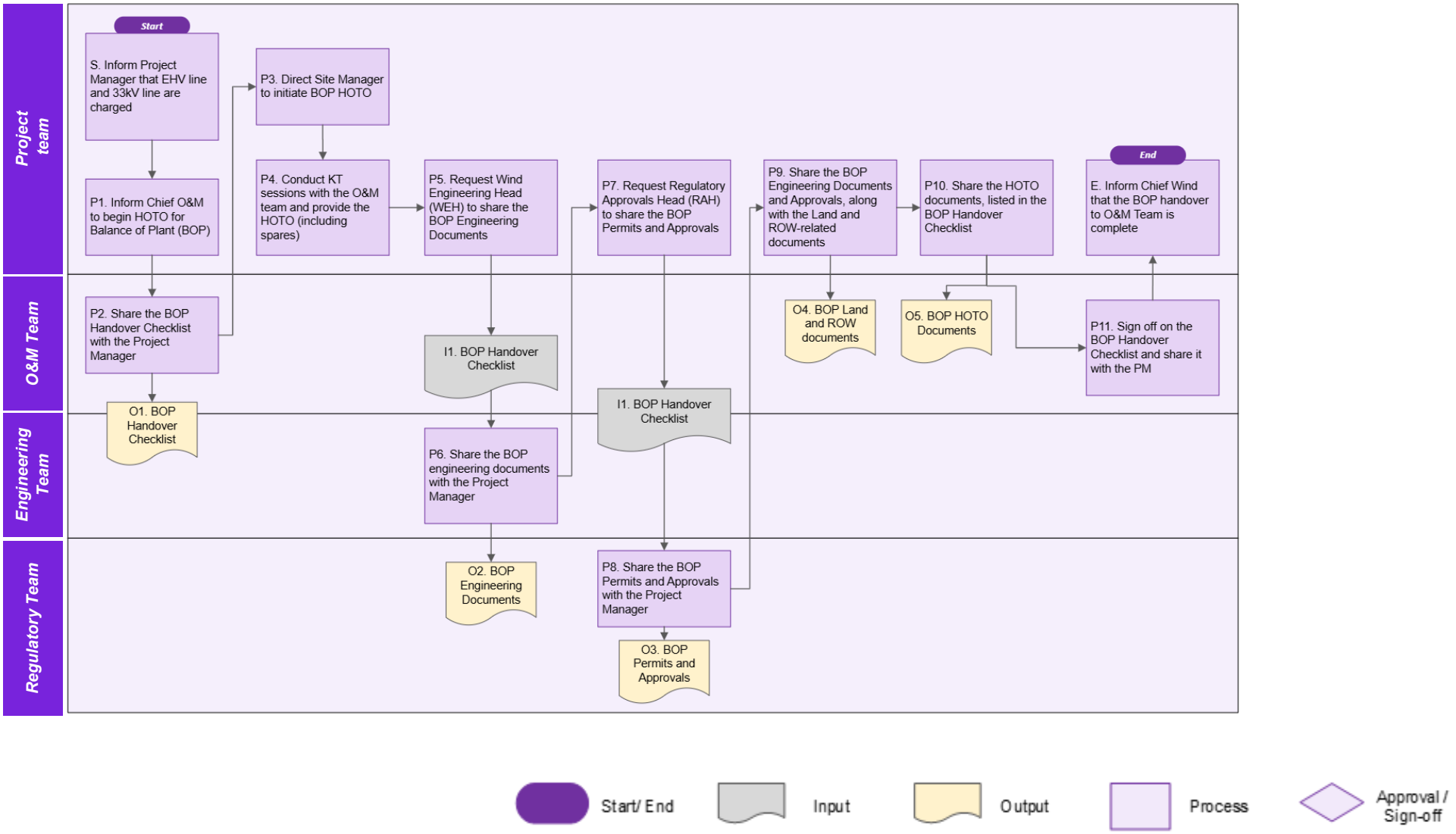
#	Key Task	Responsible	Accountable	Consulted	Informed
S	Inform Project Manager that EHV line and 33kV line are charged	Site Electrical Lead	Site Manager		Project Manager
P1	Inform Chief O&M to begin HOTO for Balance of Plant (BOP)[1]	Project Manager			Chief O&M
P2	Share the BOP Handover Checklist with the Project Manager	Chief O&M			Project Manager
P3	Direct Site Manager to initiate BOP HOTO	Project Manager			Site Manager
P4	Conduct KT sessions with the O&M team and provide the HOTO (including spares)	Site Manager		Site Team	O&M Team
P5	Request Wind Engineering Head (WEH) to share the Engineering Documents	Project Manager			Wind Engineering Head
P6	Share the BOP engineering documents with the Project Manager	Wind Engineering Head		Engineering Team	Project Manager
P7	Request Regulatory Approvals Head (RAH) to share the approvals and permits listed in the BOP Handover Checklist	Project Manager			Regulatory Approvals Head
P8	Share the BOP permits and approvals with the PM	Regulatory Approvals Head		Regulatory Team	Project Manager
KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End					

[1] Includes EHV line, Pooling Sub-station and 33kV line

#	Key Task	Responsible	Accountable	Consulted	Informed
P9	Share the BOP Engineering Documents and Approvals, along with the Land and ROW-related documents	Project Manager		Land Team	Chief O&M
P10	Share the HOTO documents[1], listed in the BOP Handover Checklist	Project Manager		Site Team	Chief O&M
P11	Sign off on the BOP Handover Checklist and share it with the PM	Chief O&M		O&M Team	Project Manager
E	Inform Chief Wind that the BOP handover to O&M Team is complete	Project Manager			Chief Wind
KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End					

[1] Including but not limited to, Bill of Materials with Make, GTP, Warranty certificates, O&M Manuals, Factory and Field Acceptance Test Results, Supplier Escalation Matrix, Supplier PO Copies, Punch Point List, Work Completion Certificates

6.1.3 – Process Map



[1] **Map Glossary** - **ROW:** Right-of-Way, **HOTO**: Handover Takeover

Chapter 6.2 – Wind Turbine Generator HOTO

6.2.1 Process Steps

#	Activity	#	Inputs	#	Outputs	Timeline *(in weeks)*
S	– Project Manager (PM) is notified of the successful trial run certificate and COD certificate, for a given set of WTGs					-
P1	– Project Manager informs Chief O&M to begin HOTO for WTG and respective USS					-
P2	– Chief O&M shares the WTG Handover Checklist with the Project Manager			**O1**	WTG Handover Checklist	-
P3	– Project Manager directs Site Manager to initiate WTG HOTO					-
P4	– Site Manager conducts Knowledge Transfer (KT) sessions with the O&M team and provides the HOTO (including spares)					2
P5	– Project Manager requests Wind Engineering Head (WEH) to share the WTG Engineering Documents listed in the WTG Handover Checklist					-
P6	– WEH shares the requested WTG Engineering Documents with the Project Manager	**I1**	WTG Handover Checklist	**O2**	WTG Engineering Documents	0.5
P7	– Project Manager shares the WTG Handover Checklist with the Regulatory Approvals Head (RAH), and requests him to share the WTG approvals and permits					-
P8	– RAH shares the requested WTG permits and approvals with the PM	**I1**	WTG Handover Checklist	**O3**	BOP Permits and Approvals	0.5 (in parallel to P6)

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End

#	Activity	#	Inputs	#	Outputs	Timeline *(in weeks)*
P9	– PM shares the WTG Engineering Documents and Approvals with the Chief O&M, along with the WTG Land and ROW-related[1] documents			**O4**	WTG Land and ROW documents	-
P10	– PM shares the HOTO documents[2], listed in the WTG Handover Checklist			**O5**	WTG HOTO Documents	0.5 (in parallel to P6)
P11	– Chief O&M signs off on the WTG Handover Checklist and shares it with the PM					-
E	– PM informs Chief Wind that the WTG handover to O&M Team is complete					***Total –*** *2 – 3 weeks*
KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End						

[1] Lease / Purchase agreement, NOC for ROW, 7/12 (wherever applicable), among others
[2] Including but not limited to, Bill of Materials with Make, GTP, Warranty certificates, O&M Manuals, Factory and Field Acceptance Test Results, Supplier Escalation Matrix, Supplier PO Copies, Punch Point List, Work Completion Certificates

6.2.2 – RACI

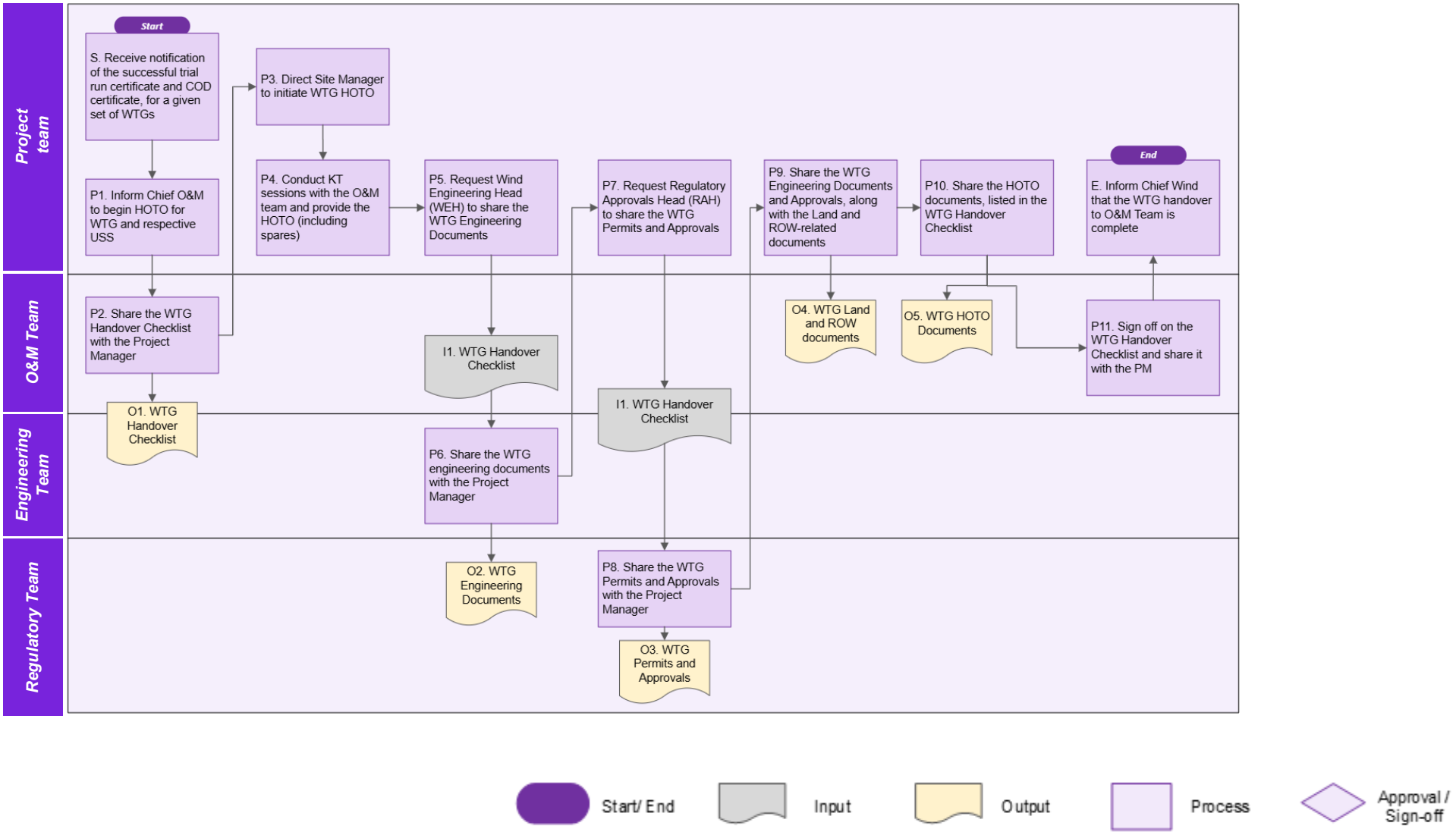
#	Key Task	Responsible	Accountable	Consulted	Informed
S	Receive notification of the successful trial run certificate and COD certificate, for a given set of WTGs	Project Manager			
P1	Inform Chief O&M to begin HOTO for WTG and respective USS	Project Manager			Chief O&M
P2	Share the WTG Handover Checklist with the Project Manager	Chief O&M			Project Manager
P3	Direct Site Manager to initiate WTG HOTO	Project Manager			Site Manager
P4	Conduct KT sessions with the O&M team and provide the HOTO (including spares)	Site Manager		Site Team	O&M Team
P5	Request Wind Engineering Head (WEH) to share the WTG Engineering Documents	Project Manager			Wind Engineering Head
P6	Share the WTG engineering documents with the Project Manager	Wind Engineering Head		Engineering Team	Project Manager
P7	Request Regulatory Approvals Head (RAH) to share the approvals and permits listed in the WTG Handover Checklist	Project Manager			Regulatory Approvals Head
P8	Share the WTG permits and approvals with the PM	Regulatory Approvals Head		Regulatory Team	Project Manager

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End

#	Key Task	Responsible	Accountable	Consulted	Informed
P9	Share the WTG Engineering Documents and Approvals, along with the Land and ROW-related documents	Project Manager		Land Team	Chief O&M
P10	Share the HOTO documents[1], listed in the WTG Handover Checklist	Project Manager		Site Team	Chief O&M
P11	Sign off on the WTG Handover Checklist and share it with the PM	Chief O&M		O&M Team	Project Manager
E	Inform Chief Wind that the WTG handover to O&M Team is complete	Project Manager			Chief Wind
KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End					

[1] Including but not limited to, Bill of Materials with Make, GTP, Warranty certificates, O&M Manuals, Factory and Field Acceptance Test Results, Supplier Escalation Matrix, Supplier PO Copies, Punch Point List, Work Completion Certificates

6.2.3 – Process Map



[1] **Map Glossary** - **RoW:** Right-of-Way, **HOTO**: Handover Takeover

Key Performance Indicators

Metric	Definition	How to Calculate
Commissioning Schedule Variance *(calculated as a %)*	Variance in the actual commissioning schedule, with respect to the planned commissioning schedule.	Calculated as the difference in the actual number of days and the planned number of days for commissioning, divided by the number of planned days, taken as a percentage.
Test Pass Rate *(calculated as a %)*	Ratio of tests passed in the first attempt vs total tests conducted.	Calculated as the number of tests passed divided by the number of tests conducted, taken as a percentage.
Issues per WTG *(calculated as a #)*	Count of quality or safety issues raised during inspections and tests.	Calculated as the number of quality issues, across all WTGs, divided by the number of WTGs.

Glossary

Abbreviation	Expanded
BOP	Balance of Plant
C&P	Contracting and Procurement
CCC	Commissioning Clearance Certificate
CEA	Central Energy Authority
CEIG	Chief Electrical Inspector to the Government
COD	Commercial Operation Date
CTU	Central Transmission Utility
EPC	Engineering, Procurement, Construction
ESA	Electrical Safety Approval
FTC	First-time Charging
HOTO	Handover takeover
MCC	Mechanical Clearance Certificate
OEM	Original Equipment Manufacturer
PM	Project Manager
PPA	Power Purchase Agreement
PR	Performance Ratio
PSS	Pooling Sub-station
QHSSE	Quality, Health, Safety, Security, Environment
RAH	Regulatory Approvals Head
RLDC	Regional Load Dispatch Centre
RoW	Right-of-Way
SCADA	Supervisory Control and Data Acquisition
SEL	Site Electrical Lead
STU	State Transmission Utility
TPT	Third-Party Testing
USS	Unit Sub-station
WEH	Wind Engineering Head
WTG	Wind Turbine Generator

Annexures

WTG and BOP Handover Checklist[1]

Sr. No	Section Name	Handover (Complete / Incomplete)	Remarks (Reason for Incomplete)
1	Engineering Documents	Incomplete	– Drawings not received
2	Permits and Approvals	Complete	
3	Land / ROW Documents	….	….
4	HOTO Documents[2]		

[1] Combined BOP and WTG Handover checklist. Detailed checklists can be accessed in the templates folder
[2] Including but not limited to, Bill of Materials with Make, GTP, Warranty certificates, O&M Manuals, Factory and Field Acceptance Test Results, Supplier Escalation Matrix, Supplier PO Copies, Punch Point List, Work Completion Certificates