

# ENGINEERING PLAYBOOK – SOLAR POWER PROJECT

**Comprehensive Engineering Guide for Solar Project Execution**



Part 3/6 | Playbook Series for Project Nav Saksham  
*Developed for Torrent Power*

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## Abstract

This playbook serves as a comprehensive guide to the engineering phase of solar projects at Torrent Power. Its primary objective is to standardize, streamline, and optimize the engineering process, ensuring seamless execution as the organization scales up its RE portfolio.

The playbook provides a structured framework for each stage of the engineering process—from developing the basic engineering design during bid submission to creating detailed engineering designs post-project award and addressing engineering-related challenges during execution.

Each chapter outlines clear process steps, process maps, RACI matrices, and KPIs to enhance operational efficiency, ensuring consistency across projects.

By implementing standardized operating procedures (SOPs) and integrating industry best practices, this playbook will enable Torrent Power to scale solar projects efficiently while maintaining high standards of quality, compliance, and performance.

## Objectives

- **Establish a Standardized Approach** – Provide a unified, repeatable methodology for engineering function, ensuring consistency across all solar projects
- **Streamline Engineering Processes** – Optimize key stages through well-defined steps and roles, enabling efficient project execution
- **Monitor and Improve Performance** – Track and analyze progress using KPIs and RACI matrices, identifying bottlenecks and enhancing accountability
- **Support Scalable Growth** – Facilitate Torrent Power's expansion in solar energy by developing a robust engineering 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 structured approach to engineering function for solar projects at Torrent Power. The scope includes:

- **Process Steps** – Detailed guidelines for each phase of the engineering process, from developing the basic engineering design during bid submission to creating detailed engineering designs post-project award and addressing engineering-related challenges during execution. This ensures that all engineering activities are consistent, systematic, and aligned with the overall project goals
- **Process Maps** – Visual representations of the key workflows and steps involved in the engineering stages. These maps help to clarify the sequence of activities, decision points, and dependencies, facilitating seamless understanding of cross-team collaboration

- **KPIs** – Clearly defined metrics for tracking team performance throughout the engineering stages. These KPIs facilitate efficient monitoring and help identify potential bottlenecks, ensuring timely intervention to optimize project flow.
- **RACI** – Clear RACI matrices that define roles and responsibilities for each step of engineering process. This ensures accountability and transparency, clarifying who is responsible for each task and who needs to be consulted or informed at each step.

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

## Coverage

### **Chapter 1 – Basic Engineering Design Preparation**

Outlines the process for developing the Basic Engineering Design, Guaranteed Technical Particulars (GTP), and preliminary Bill of Quantities (BoQ) and Bill of Services (BoS) to ensure technically feasible bid submissions

### **Chapter 2.1 – Owner’s Engineer Finalization**

Elaborates on a structured approach for determining Owner’s Engineer (OE) requirements and coordinating the process of hiring OE for the project to ensure effective engineering designs validation for the project

### **Chapter 2.2 – Preliminary Works Execution**

Defines the systematic process for initiating and overseeing preliminary works, defining requirements, procuring Site Survey Consultants, and ensuring timely deliverable submission to support Detailed Engineering Design preparation.

### **Chapter 3 – Detailed Engineering Design Preparation**

Outlines the process of preparing Detailed Engineering Design by defining expected deliverables, assigning responsibilities, and facilitating coordination between EPC Contractor, Project Engineering Managers, and Lead PEM to meet project timelines.

### **Chapter 4 – Sign-Off for Detailed Engineering Design**

Outlines the structured and collaborative verification process for Detailed Engineering Designs, BoQ, and BoS by facilitating alignment between Project Engineering Managers (EMs) and Owner’s Engineer (OE), resolving disagreements, and securing final approvals

### **Chapter 5 – Issue Resolution for Detailed Engineering Design**

Establish a systematic approach for assessing and resolving engineering challenges encountered during project execution, ensuring minimal disruption to overall project schedule

## **Chapter 6 – Owner’s Engineer and External Consultants Management**

Outlines the process for evaluating and empaneling new vendors based on the Annual Growth Outlook, ensuring adequate vendor availability in target regions

### **Who is this playbook for?**

- **Engineering Team** – Team directly responsible for the engineering functions. The playbook provides a structured approach across processes, enhancing process consistency, efficiency, and clarity
- **Cross-Functional Teams** – Departments involved in the engineering process, such as BD team, project team, procurement team etc. The playbook helps align each team’s contributions, clarifies roles and responsibilities through RACI, and ensures seamless coordination during the engineering stages

# Chapter 1 – Basic Engineering Design Preparation

## 1.1 Process Steps

#	Activity	#	Inputs	#	Outputs	Timeline (in weeks)
S	– Bid Incharge <sup>1</sup> shares Bid Summary <sup>2</sup> with Solar Engineering Head (SEH) and requests them to develop Basic Engineering Design, which is to be included in the bid submission					-
P1	– SEH assigns the Engineering Manager (EM) to develop Basic Engineering Design. SEH shares the Bid Summary with the EM					-
P2	– EM analyzes the Bid Summary to define the basic engineering design requirements based on – – shortlisted land parcel specifications, – target solar energy output, and – feasibility of grid interconnection	I1	Bid Summary	O1	Basic Engineering Design Requirement (Template Provided)	0.5
P3	– EM develops the bid-specific Basic Engineering Design based on the requirements defined in P2 and leverage the Basic Engineering Design Library	I2	Basic Engineering Design Library <sup>3</sup>	O2	Basic Engineering Design	0.5
		I3	Basic Engineering Design Requirement			
P4	– EM defines the Guaranteed Technical Particulars <sup>4</sup> (GTP) based on the Basic Engineering Design for the project	I4	Basic Engineering Design	O3	Guaranteed Technical Particulars (GTP)	0.5
P5	– EM develops preliminary Bill of Quantities (BoQ) and Bill of Services (BoS) leveraging GTP and Basic Engineering Design for the project	I5	Basic Engineering Design	O4	Preliminary BoQ	0.5
		I6	GTP	O5	Preliminary BoS	
KEY - S: Start   P: Process Steps   I: Input   O: Output   E: End   ●: Detailed in cross-functional playbooks						

<sup>1</sup> Bid incharge is responsible for overseeing end to end bid submission.

<sup>2</sup> Bid Summary is to be created by bidding team, and it should capture all relevant details from the tender document. Bid summary to aid the functional departments to create their respective plans and outputs, required during bid submission

<sup>3</sup> Basic Engineering Design Library is a centralized archive of all basic engineering designs submitted for past bid submissions. It serves as a ready-to-use resource for preparing and submitting future bids efficiently

<sup>4</sup> GTP defines the required technical specifications and performance parameters for the materials and services to be procured

#	Activity	#	Inputs	#	Outputs	Timeline (in weeks)
<b>P6</b>	<ul style="list-style-type: none"> <li>EM seeks review and approval from SEH on the following outputs –</li> <li>Basic Engineering Design</li> <li>GTP</li> <li>Preliminary BoQ and BoS</li> </ul>					0.5
<b>P7</b>	<ul style="list-style-type: none"> <li>SEH reviews the outputs (Basic Engineering Design, GTP and Preliminary BoQ and BoS) –</li> <li>If modifications are required, SEH recommends changes</li> <li>If modifications are not required, SEH grants approval</li> </ul>	<b>I7</b>	Basic Engineering Design	<b>O6</b>	Basic Engineering Modifications (Template Provided)	0.5
		<b>I8</b>	GTP			
		<b>I9</b>	Preliminary BoQ			
		<b>I10</b>	Preliminary BoS			
<b>P8</b>	<ul style="list-style-type: none"> <li>If SEH recommends any modifications to the outputs shared, EM incorporates those and reshapes the outputs for approval</li> </ul>	<b>I11</b>	Basic Engineering Modifications			0.5
<b>P9</b>	<ul style="list-style-type: none"> <li>SEH seeks further review and approval from MD on the outputs (<i>Basic Engineering Design, GTP and Preliminary BoQ and BoS</i>)</li> </ul>					0.5
<b>P10</b>	<ul style="list-style-type: none"> <li>If MD recommends any modifications, SEH notifies the same to EM, who incorporates those and shares the finalized outputs with SEH</li> </ul>					
<b>P11</b>	<ul style="list-style-type: none"> <li>SEH shares the Basic Engineering Design, GTP, Preliminary BoQ, and BoS with Bid Incharge for bid submission</li> <li>SEH shares the preliminary BoQ and BoS with the Procurement Lead for procurement cost estimation, for the commercial bid</li> </ul>					-
<b>E</b>	<ul style="list-style-type: none"> <li>SEH adds the finalized Basic Engineering Design Document to the Basic Engineering Design library for future reference</li> </ul>					<b>Total – 4 – 5 weeks</b>

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End | •: Detailed in cross-functional playbooks



## 1.2 RACI

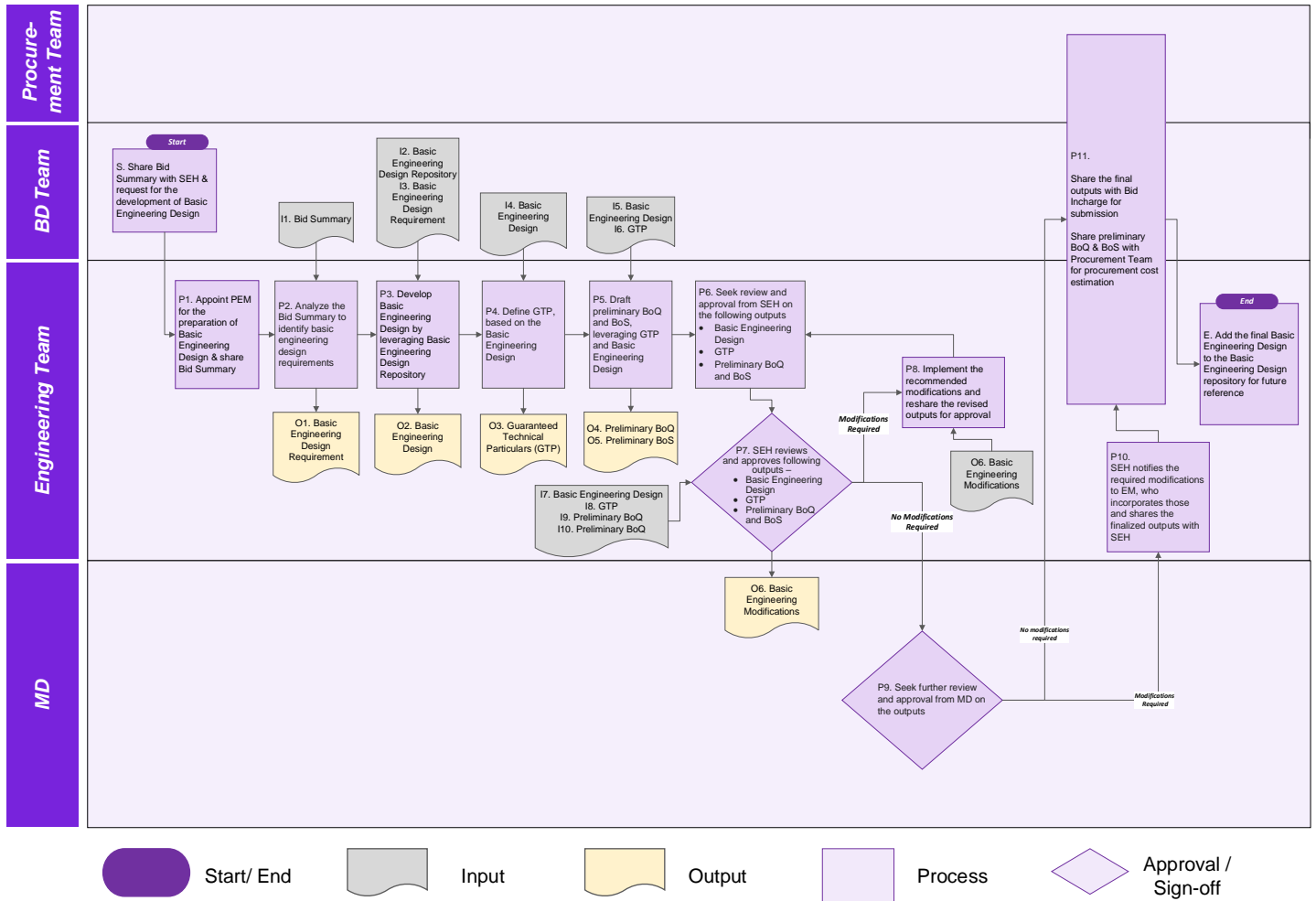
#	Key Task	Responsible	Accountable	Consulted	Informed
<b>S</b>	Share Bid Summary with Solar Engineering Head (SEH) & request for the development of Basic Engineering Design	Bid Incharge	Bid Incharge		SEH
<b>P1</b>	Appoint Engineering Manager (EM) for the preparation of Basic Engineering Design & share Bid Summary	SEH	SEH		EM
<b>P2</b>	Analyze Bid Summary to define basic engineering design requirements	EM	EM		
<b>P3</b>	Develop Basic Engineering Design by leveraging Basic Engineering Design Library	EM	EM		SEH
<b>P4</b>	Define Guaranteed Technical Particulars (GTP)	EM			SEH
<b>P5</b>	Draft preliminary Bill of Quantities (BoQ) & Bill of Services (BoS)	EM			SEH
<b>P6</b>	Submit the prepared outputs ( <i>Basic Engineering Design, GTP and Preliminary BoQ and BoS</i> ) to SEH for review and approval	EM	EM		SEH
<b>P7</b>	Review the outputs received and recommend modifications or approve	SEH	SEH		EM
<b>P8</b>	Implement the recommended modifications and reshare the revised outputs for approval	EM	EM		SEH
<b>P9</b>	Seek further review and approval from MD on the outputs	SEH	SEH	MD	MD
<b>P10</b>	If MD recommends any modifications, notify the required changes to EM	SEH	SEH		EM
	Incorporate the changes recommended by MD and share the finalized outputs with SEH	EM	EM		SEH

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

#	Key Task	Responsible	Accountable	Consulted	Informed
P11	Share the final outputs with Bid Incharge for submission	SEH	SEH	Bid Incharge	
	Share preliminary BoQ & BoS with Procurement Lead for procurement cost estimation	SEH	SEH	Procurement Lead	
E	Archive final design documents in Engineering Library	SEH	SEH		

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

## 1.3 Process Map



## 1.4 Templates for Input/ Output

### 1. Basic Engineering Design Requirement

S. No.	Drawing / Document Title	Description / Scope	Prepared By	Reference from Past Bids
1	Module Mounting Structure (MMS) GA Drawing	General arrangement drawing showing MMS structure design (typical)	Engineering Manager	Bid ABC, dated 03-Feb-2024
2	Single Line Diagram (SLD) – Power Evacuation	Basic electrical SLD from inverter to grid interconnection point	Electrical Engineer	Bid PQR, dated 22-Jul-2023

### 2. Basic Engineering Modifications

S. No.	Drawing / Document Title	Modification Required	Reason for Change
1	SLD – Power Evacuation	Add earthing for transformer secondary side	Safety compliance
2	Cable Routing Plan	Reroute AC cable away from water channel	Site drainage plan updated
3			
4			

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<sup>1</sup> **Map Glossary** – BP: Bid Planner | PFR: Preliminary Feasibility Report

## Chapter 2.1 – Owner’s Engineer Finalization

### 2.1.1 Process Steps

#	Activity	#	Inputs	#	Outputs	Timeline (in weeks)
<b>S</b>	<ul style="list-style-type: none"> <li>Chief Business Development notifies the Solar Engineering Head (SEH) about bids won</li> </ul>					-
<b>P1</b>	<ul style="list-style-type: none"> <li>SEH appoints Project Engineering Manager(s) (PEMs) for the project</li> <li>SEH may appoint separate PEMs for civil, electrical, and plant design engineering</li> </ul>					-
<b>P2</b>	<ul style="list-style-type: none"> <li>SEH designates a Lead PEM to facilitate cross-functional coordination and external communication</li> <li>If multiple PEMs are appointed, one is designated as the Lead PEM</li> <li>If only one PEM is appointed, they automatically assume the role of Lead PEM</li> </ul>					-
<b>P3</b>	<ul style="list-style-type: none"> <li>Lead PEM drafts the Owner’s Engineer (OE) Requirements List, leveraging –</li> <li><u>Basic Engineering Design to determine:</u> <ul style="list-style-type: none"> <li>Capability Requirements: Expertise, qualifications, and software skills required</li> <li>Staffing Requirements: Number of engineers required</li> </ul> </li> <li><u>Final L1 Plan to identify:</u> <ul style="list-style-type: none"> <li>Engagement Duration: Estimated duration for which OE is required</li> <li>Design Verification Turnaround: Expected turnaround for design verification, aligned with the project schedule</li> </ul> </li> </ul>	<b>I1</b>	Basic Engineering Design	<b>O1</b>	OE Requirement List ( <i>draft</i> )	0.5
		<b>I2</b>	Final L1 Plan			
<b>P4</b>	<ul style="list-style-type: none"> <li>Lead PEM conducts a joint discussion with other PEM(s) to review the OE Requirement List, to ensure completeness and address any specific needs</li> <li>Lead PEM amends the OE Requirement List, if required</li> </ul>	<b>I3</b>	OE Requirement List ( <i>draft</i> )	<b>O2</b>	OE Requirement List ( <i>final</i> ) ( <i>Template Provided</i> )	0.5
KEY - S: Start   P: Process Steps   I: Input   O: Output   E: End						

#	Activity	#	Inputs	#	Outputs	Timeline (in weeks)
P5	– Lead PEM shares the OE Requirement List with the Procurement Lead to initiate the RFQ process and obtain technical details from empaneled OEs					-
P6	– Procurement Lead conducts the RFQ process, and shares the responses with Lead PEM for technical evaluation	I4	OE Requirement List <i>(final)</i>	O3	RFP Responses for OE	•
P7	– Lead PEM conducts technical evaluation of the responses and shortlists OEs – For specific requirements incorporated in P4, Lead PEM conducts a joint discussion with other PEMs for evaluation	I5	RFP Responses for OE	O4	Shortlist of OE <i>(Template Provided)</i>	1 <i>(for up to 5 OE responses)</i>
P8	– Lead PEM shares the Shortlist of OEs with the Procurement Lead					-
P9	– Procurement Lead assesses the shortlisted responses based on appropriate evaluation criteria and hires OE	I6	Shortlist of OE			•
P10	– Procurement Lead notifies <i>(via email)</i> Lead PEM of the hired OE					-
P11	– Lead PEM communicates <i>(via email)</i> the appointment of OE to other PEM(s) and SEH					-
E	– Lead PEM conducts a kick-off discussion with OE to discuss detailed project requirements, scope, and deliverables timeline <i>(as detailed in OE Requirement List (final))</i>  <i>Other PEM(s) shall also be invited to the kick-off discussion</i>					<b>Total – 1.5 – 2 weeks</b>

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End | •: Detailed in cross-functional playbooks

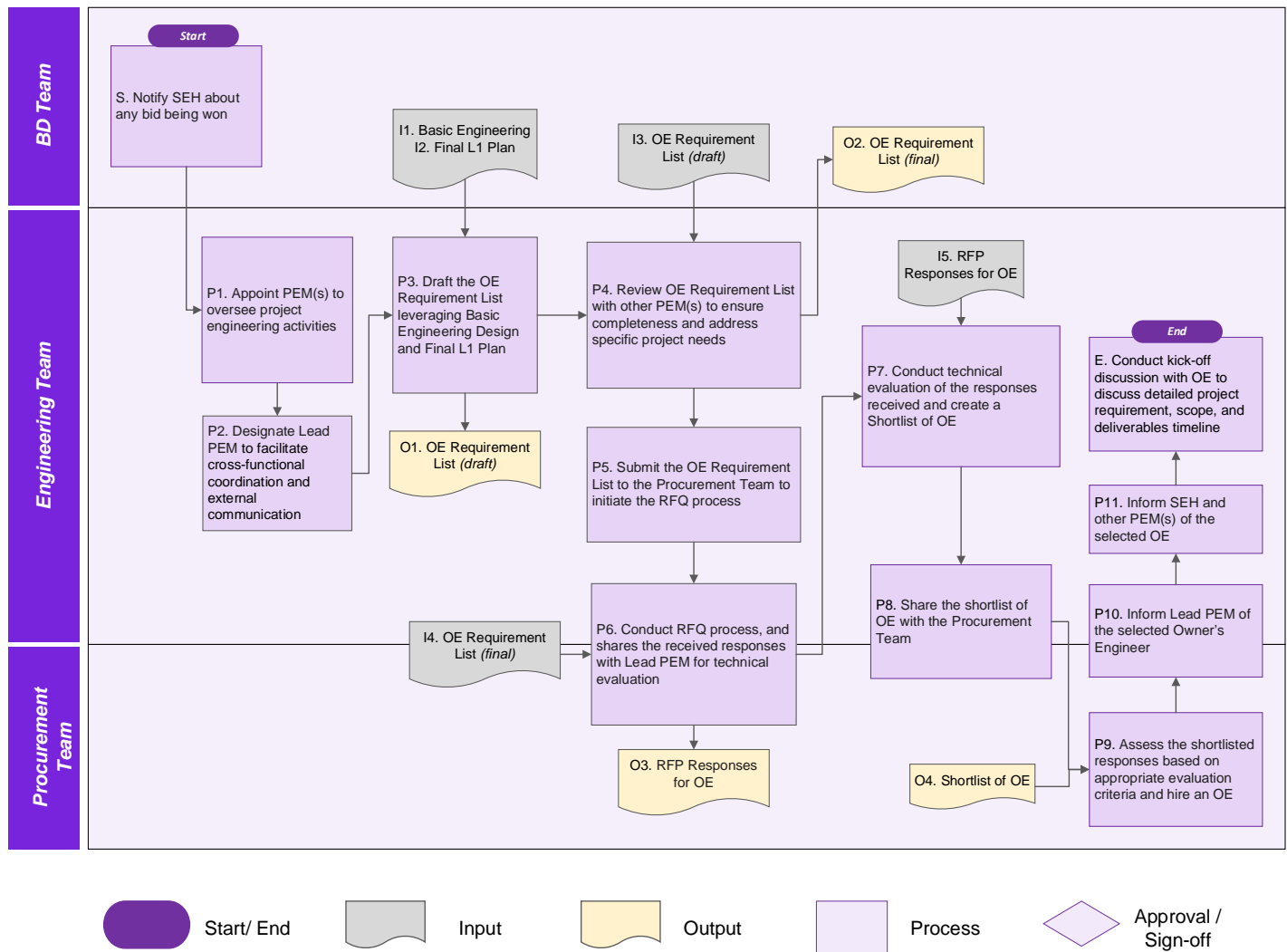
## 2.1.1.2 RACI

#	Key Task	Responsible	Accountable	Consulted	Informed
<b>S</b>	Notify the Solar Engineering Head when a bid is won	BD Team	BD Team		SEH
<b>P1</b>	Appoint Project Engineering Manager(s) to oversee project engineering activities.	SEH	SEH		PEM(s)
<b>P2</b>	Designate a Lead PEM for cross-functional coordination and external communication	SEH	SEH		Lead PEM
<b>P3</b>	Draft the Owner's Engineer Requirement List leveraging Basic Engineering Design and Final L1 Plan	Lead PEM	Lead PEM		SEH
<b>P4</b>	Review the Owner's Engineer Requirement List with other Project Engineering Manager(s) to ensure completeness and address specific project needs	Lead PEM	Lead PEM	Other PEM(s)	
<b>P5</b>	Submit the Owner's Engineer Requirement List to the Procurement Lead to initiate the RFQ process and obtain technical details from empaneled Owner's Engineer	Lead PEM	SEH		Procurement Lead
<b>P6</b>	Conduct the RFQ process and shares received responses with the Lead PEM for technical evaluation	Procurement Lead	Procurement Lead		Lead PEM
<b>P7</b>	Conducts technical evaluation of the responses received and create a Shortlist of Owner's Engineers	Lead PEM	Lead PEM	Other PEMs	SEH
<b>P8</b>	Share the shortlist of Owner's Engineers with the Procurement Lead	Lead PEM			Procurement Lead
<b>P9</b>	Assess the shortlisted responses based on appropriate evaluation criteria and hire an OE	Procurement Lead	Procurement Lead		
KEY - S: Start   P: Process Steps   I: Input   O: Output   E: End					

#	Key Task	Responsible	Accountable	Consulted	Informed
<b>P10</b>	Notify Lead PEM of the selected Owner's Engineer	Procurement Lead			Lead PEM
<b>P11</b>	Inform Solar Engineering Head and other PEM(s) of the selected Owner's Engineer	Lead PEM			SEH Other PEM(s)
<b>E</b>	Conduct kick-off meeting with OE to align on scope, timelines, and deliverables	Lead PEM	Lead PEM	Other PEMs	SEH
KEY - S: Start   P: Process Steps   I: Input   O: Output   E: End					



## 2.1.3 Process Map



## 2.1.4 Templates for Input/ Output

### 1. Owner's Engineer Requirement List

S. No.	Discipline / Area	Capability Requirements (Expertise, Certifications, Software)	Staffing Requirements (No. of Engineers / Roles)	Engagement Duration (Start-End / Months)	Design Verification Turnaround (Per Submission)	Comments / Notes
1	Civil – MMS Foundation Design	Experience in STAAD Pro, IS456 / IS800 codes	1 Sr. Civil Engineer 1 Civil CAD Technician	Aug 2025 – Jan 2026	5 working days	Foundation type may vary by site
2	Electrical – SLD & Cabling					
3	Plant Layout / Drainage					
4	Structural Design Review					
5	QA/QC Engineering Review					

### 2. Shortlist of OE

OE Name	PQC Compliance	Technical Competency	Previous Project Engagements	Compliance with OE Requirements	Shortlisted/ Rejected	Reason

## Chapter 2.2A – Site Survey Consultant Finalization

### 2.2A.1 Process Steps

#	Activity	#	Inputs	#	Outputs	Timeline (in weeks)
<b>S</b>	<ul style="list-style-type: none"> <li>Project Manager notifies Solar Engineering Head (SEH) about the finalized Land Parcels for the project, and shares Land Demarcation Summary<sup>1</sup> for conducting Preliminary Works</li> </ul> <p><i>The process shall commence only after finalization of the land parcel. Land Manager is responsible for notifying the Project Manager upon land finalization (detailed chapters in Pre-Development playbook chapter 4.3)</i></p>					-
<b>P1</b>	<ul style="list-style-type: none"> <li>SEH shares the Land Demarcation Summary with Lead PEM and directs them to commence preliminary works</li> </ul>					-
<b>P2</b>	<ul style="list-style-type: none"> <li>Lead PEM prepares the Preliminary Works Requirement Document, which specifies –               <ul style="list-style-type: none"> <li>List of tests/surveys<sup>2</sup> to be conducted</li> <li>Number of blocks for testing</li> <li>Standard block size as defined in Basic Engineering Design</li> <li>other pertinent technical requirements (e.g., software), and</li> <li>deliverable timeline, as aligned in Engineering Execution Plan<sup>3</sup></li> </ul> </li> </ul>	<b>I1</b>	Land Demarcation Summary	<b>O1</b>	Preliminary Works Requirement Document (Template Provided)	0.5
<b>P3</b>	<ul style="list-style-type: none"> <li>Lead PEM shares the Preliminary Works Requirement Document with the Procurement Lead, requesting them to initiate the RFQ process and obtain technical details from empaneled Site Survey Consultants (SSC)</li> </ul>					-
KEY - S: Start   P: Process Steps   I: Input   O: Output   E: End   •-: Detailed in cross-functional playbooks						

<sup>1</sup> The *Land Demarcation Summary* is a key document prepared during the physical demarcation of the identified land parcel. It captures essential details such as geographical coordinates, total area, site address, and other relevant land-specific information. The format and required data fields for this document are outlined in Chapter 4.2 – Land Demarcation & Handover of the Pre-Development Playbook.

<sup>2</sup> List of tests/surveys includes Geotechnical & Topographical Survey, Pile load Testing etc.

<sup>3</sup> Engineering Execution Plan, detailed in Chapter 1.4 of the Planning Playbook, is a comprehensive document prepared by the Engineering Team, outlining all engineering deliverables and their corresponding project timelines

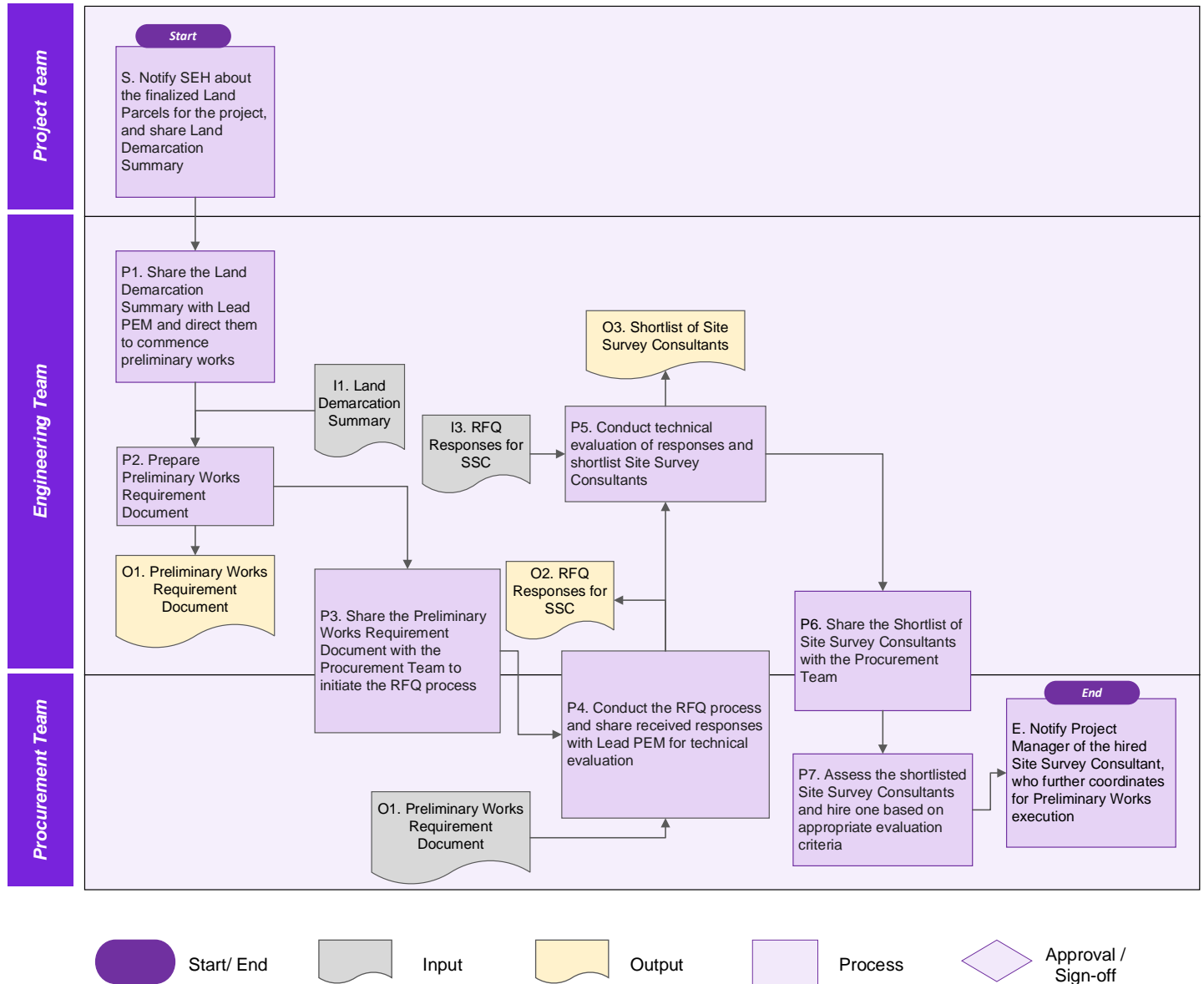
#	Activity	#	Inputs	#	Outputs	Timeline (in weeks)
<b>P4</b>	– Procurement Lead conducts the RFQ process, and shares the vendor responses with Lead PEM for technical evaluation	<b>I2</b>	Preliminary Works Requirement Document	<b>O2</b>	RFQ Responses for SSC	•
<b>P5</b>	– Lead PEM conducts technical evaluation of the responses and creates a Shortlist of SSC	<b>I3</b>	RFQ Responses for SSC	<b>O3</b>	Shortlist of SSC	0.5
<b>P6</b>	– Lead PEM shares the SSC Shortlist with the Procurement Lead					-
<b>P7</b>	– Procurement Lead assesses the shortlisted SSC and hires one based on appropriate evaluation criteria					•
<b>E</b>	– Procurement Lead informs Project Manager of the hired SSC, who further coordinates with SSC for Preliminary Works execution					<b>Total – 1 – 1.5 weeks</b>

**KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End | •: Detailed in cross-functional playbooks**

## 2.2A.2 RACI

#	Key Task	Responsible	Accountable	Consulted	Informed
<b>S</b>	Notify Solar Engineering Head about the finalized Land Parcels for the project, and share Land Demarcation Summary	Project Manager	Project Manager		SEH
<b>P1</b>	Share Land Demarcation Summary with Lead PEM and direct initiation of preliminary works	SEH	SEH		Lead PEM
<b>P2</b>	Prepare the Preliminary Works Requirement Document	Lead PEM	Lead PEM		SEH
<b>P3</b>	Share the Preliminary Works Requirement Document with the Procurement Lead to initiate the RFQ process	Lead PEM	Lead PEM		Procurement Lead
<b>P4</b>	Conduct RFQ process and share received responses with Lead PEM for technical evaluation	Procurement Lead	Procurement Lead		Lead PEM
<b>P5</b>	Conduct technical evaluation of responses and shortlist Site Survey Consultants	Lead PEM	Lead PEM		
<b>P6</b>	Share the Shortlist of Site Survey Consultants with the Procurement Lead	Lead PEM	Lead PEM		Procurement Lead
<b>P7</b>	Assess the shortlisted Site Survey Consultants and hire one based on appropriate evaluation criteria	Procurement Lead	Procurement Lead		
<b>E</b>	Notify Project Manager of the hired Site Survey Consultant	Procurement Lead	Procurement Lead		Project Manager
KEY - S: Start   P: Process Steps   I: Input   O: Output   E: End					

## 2.2A.3 Process Map



## 2.2A.4 Templates for Input/ Output

### 1. Preliminary Works Requirement Document

Test Name	Description	Number of Blocks for Testing	Standard Block Size	Test Methodology	Timeline for Completion	Remarks, if any
<b>Soil Testing</b>	Testing soil composition and stability					
<b>Geotechnical Survey</b>	Survey for subsurface conditions					
<b>Environmental Impact Assessment</b>	Assess environmental factors and impacts					
<b>Topographical Survey</b>	Mapping the land surface features					
<b>Hydrological Study</b>	Assessment of water-related factors					
<b>Seismic Survey</b>	Evaluation of seismic risks					
<b>Soil Permeability Test</b>	Determining soil permeability for drainage					
....						

## Chapter 2.2B – Preliminary Works Execution

### 2.2B.1 Process Steps

#	Activity	#	Inputs	#	Outputs	Timeline (in weeks)
S	<ul style="list-style-type: none"><li>Procurement Lead informs Project Manager of the hired SSC</li></ul>					-
P1	<ul style="list-style-type: none"><li>Project Manager, in consultation with Lead PEM, conducts a meeting with the hired SSC to discuss detailed requirements (as detailed in Preliminary Works Requirement Document) and shares following inputs for conducting Preliminary Works –<ul style="list-style-type: none"><li>Detailed Feasibility Report of Land Parcel<sup>1</sup></li><li>Land Demarcation Summary<sup>2</sup></li></ul></li></ul>	I1	Preliminary Works Requirement Document			0.5
P2	<ul style="list-style-type: none"><li>Project Manager liaises with the hired SSC to ensure timely submission of all deliverables, as detailed in Preliminary Works Requirement Document</li><li>Project Manager facilitates the provision of any additional inputs/ data required to conduct the assessments</li></ul> <p>If Site Survey Consultants delay deliverables, Project Manager escalates to Procurement Lead, which follows up and evaluates whether the delay warrants any remuneration deductions as per the contractual terms</p>					1.5
P3	<ul style="list-style-type: none"><li>Project Manager receives preliminary works deliverables from SSC</li></ul>			O1	Preliminary Works Deliverables	
P4	<ul style="list-style-type: none"><li>Project Manager consolidates preliminary works deliverables received from the SSC</li></ul>	I2	Preliminary Works Deliverables	O2	Preliminary Works Deliverables Compilation	
KEY - S: Start   P: Process Steps   I: Input   O: Output   E: End   ●: Detailed in cross-functional playbooks						

<sup>1</sup> Detailed Feasibility Report of the land parcel is created by technical consultants to assess the feasibility of land parcel for setting up Solar Power Plant. The document is covered in Pre-Development Playbook Chapter 1.2

<sup>2</sup> Land Demarcation Summary is the document prepared during the physical demarcation of the land parcel. The details of the template are covered in Pre-Development Playbook in Chapter 4.2 – Land Demarcation & Handover



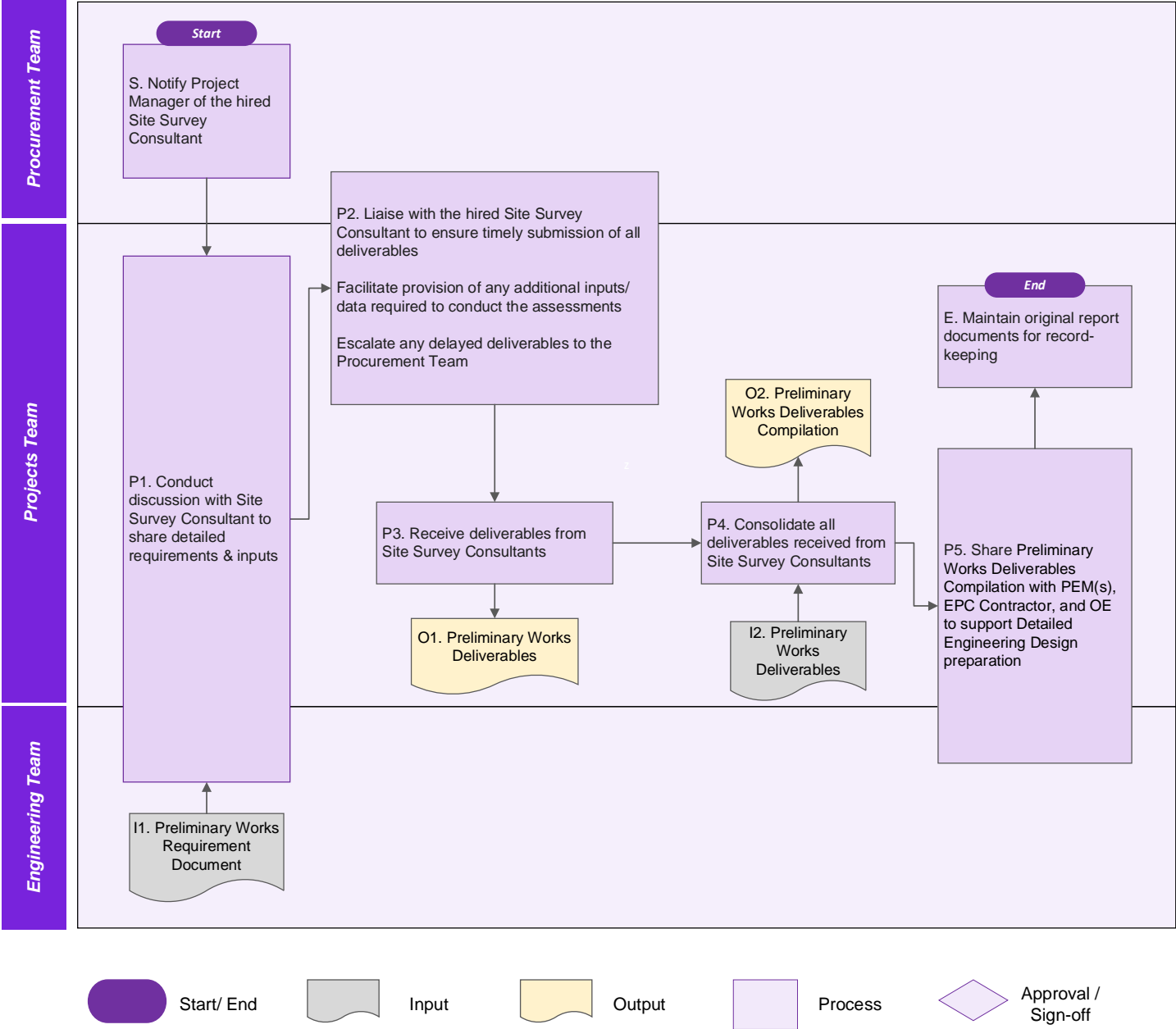
#	Activity	#	Inputs	#	Outputs	Timeline (in weeks)
P5	– Project Manager shares a copy of Preliminary Works Deliverables Compilation with EPC Contractor, Owner’s Engineer (OE), and Project Engineering Managers(s) to support Detailed Engineering Design preparation					-
E	– Project Manager maintains all original report documents of Preliminary Works Deliverables Compilation with themselves for record-keeping					<b>Total – 2 – 2.5 weeks</b>
KEY - S: Start   P: Process Steps   I: Input   O: Output   E: End   ●: Detailed in cross-functional playbooks						

## 2.2B.2 RACI

#	Key Task	Responsible	Accountable	Consulted	Informed
<b>S</b>	Notify Project Manager of the hired Site Survey Consultant	Procurement Lead	Procurement Lead		Project Manager
<b>P1</b>	Conduct discussion with Site Survey Consultant to share detailed requirements & inputs	Project Manager	Project Manager	Lead PEM	
<b>P2</b>	Liaise with the hired Site Survey Consultant to ensure timely submission of all deliverables	Project Manager	Project Manager		
	Facilitate provision of any additional inputs/ data required to conduct the assessments				
	Escalate any delayed deliverables to the Procurement Lead	Project Manager	Project Manager		Procurement Lead
<b>P3</b>	Receive deliverables from Site Survey Consultants	Project Manager	Project Manager		
<b>P4</b>	Consolidate all deliverables received from Site Survey Consultants into one compilation	Project Manager	Project Manager		
<b>P5</b>	Consolidate all deliverables & share with EPC, OE, and PEM(s)	Project Manager	Project Manager		PEM(s)
<b>E</b>	Archive original preliminary works reports for record-keeping	Project Manager	Project Manager		

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

2.2B.3 Process Map



# Chapter 3 – Detailed Engineering Design Preparation

## 3.1 Process Steps

#	Activity	#	Inputs	#	Outputs	Timeline (in weeks)
S	<ul style="list-style-type: none"><li>Lead PEM consolidates all deliverables received from the Site Survey Consultants and concludes Preliminary Works</li></ul>					-
P1	<ul style="list-style-type: none"><li>Lead PEM reviews the Engineering Execution Plan<sup>1</sup> (EEP) to identify<ul style="list-style-type: none"><li>list of all engineering deliverables<sup>2</sup> to be executed throughout the project,</li><li>along with its associated timelines, and execution strategy i.e. whether the designs will be created by EPC Contractor or Engineering Team</li></ul></li></ul>	I1	Engineering Execution Plan (EEP)			0.5
P2	Lead PEM informs the EPC Contractor and PEM(s) <sup>3</sup> about the expected deliverables and timelines as defined EEP Expected deliverables include: Detailed Engineering Design, <ul style="list-style-type: none"><li>and their associated Bill of Quantities (BoQ), and Bill of Services (BoS)</li></ul>					0.5
P3	Lead PEM provides the necessary inputs to PEM(s) and the EPC Contractor for developing the expected deliverables. These include – Basic Engineering Design Guaranteed Technical Particulars (GTP) Preliminary BoQ and BoS Preliminary Works Reports Compilation Deliverables timeline, based on EEP Project Execution Approach (for referencing the Value Engineering Target)					
KEY - S: Start   P: Process Steps   I: Input   O: Output   E: End   ●: Detailed in cross-functional playbooks						

<sup>1</sup> EEP is the plan made by Engineering Team during Planning Stage. The plan details list of all engineering deliverables to be executed throughout the project, its associated timelines, and execution strategy for all engineering design-related activities. The plan is detailed in section 1.4 of Planning Chapters

<sup>2</sup> Engineering deliverables include Engineering Design and 3D Modelling

<sup>3</sup> If packages are divided before hiring EPC contractor, Procurement Leads to become PoC for respective packages.

#	Activity	#	Inputs	#	Outputs	Timeline (in weeks)
<b>P4A</b>	<b><u>For deliverables allocated to EPC Contractor</u></b>					12 – 15 <sup>1</sup>
	Lead PEM coordinates with the EPC Contractor to provide any additional inputs required for drafting deliverables					
<b>P4B</b>	<b><u>For deliverables allocated to PEMs</u></b> – PEMs develop their respective deliverables They coordinate with Lead PEM for any additional data inputs required They refer the Detailed Engineering Design Library <sup>2</sup> to leverage the designs created for past projects	<b>I2</b>	Basic Engineering Design			
		<b>I3</b>	GTP			
		<b>I4</b>	Preliminary BoQ & BoS			
		<b>I5</b>	Preliminary Works Reports Compilation			
<b>P5</b>	– Lead PEM coordinates with PEMs and the EPC Contractor to monitor progress, ensuring adherence to EEP timelines					
<b>P6</b>	– Lead PEM receives Detailed Engineering Design, BoQ, and BoS on a rolling basis from EPC Contractor and PEM(s) (i.e., deliverables are to be submitted progressively upon completion, rather than waiting to finalize all before submission)			<b>O1</b>	Detailed Engineering Design	
				<b>O2</b>	BoQ & BoS	
<b>P7</b>	– Lead PEM compiles deliverables from the EPC Contractor and PEM(s)	<b>I6</b>	Detailed Engineering Design	<b>O3</b>	Detailed Engineering Deliverables Compilation	-
		<b>I7</b>	BoQ & BoS			
<b>E</b>	– Lead PEM initiates the sign-off and verification process of Detailed Engineering Deliverables Compilation					<b>Total – 13 – 16 weeks</b>
KEY - S: Start   P: Process Steps   I: Input   O: Output   E: End   •: Detailed in cross-functional playbooks						

<sup>1</sup> subject to 100% land availability; timelines may vary if land acquisition is incomplete

<sup>2</sup> Detail Engineering Design Library is a centralized archive of all detail engineering designs created for past projects. It serves as a ready-to-use resource for preparing and finalizing designs for future projects efficiently.

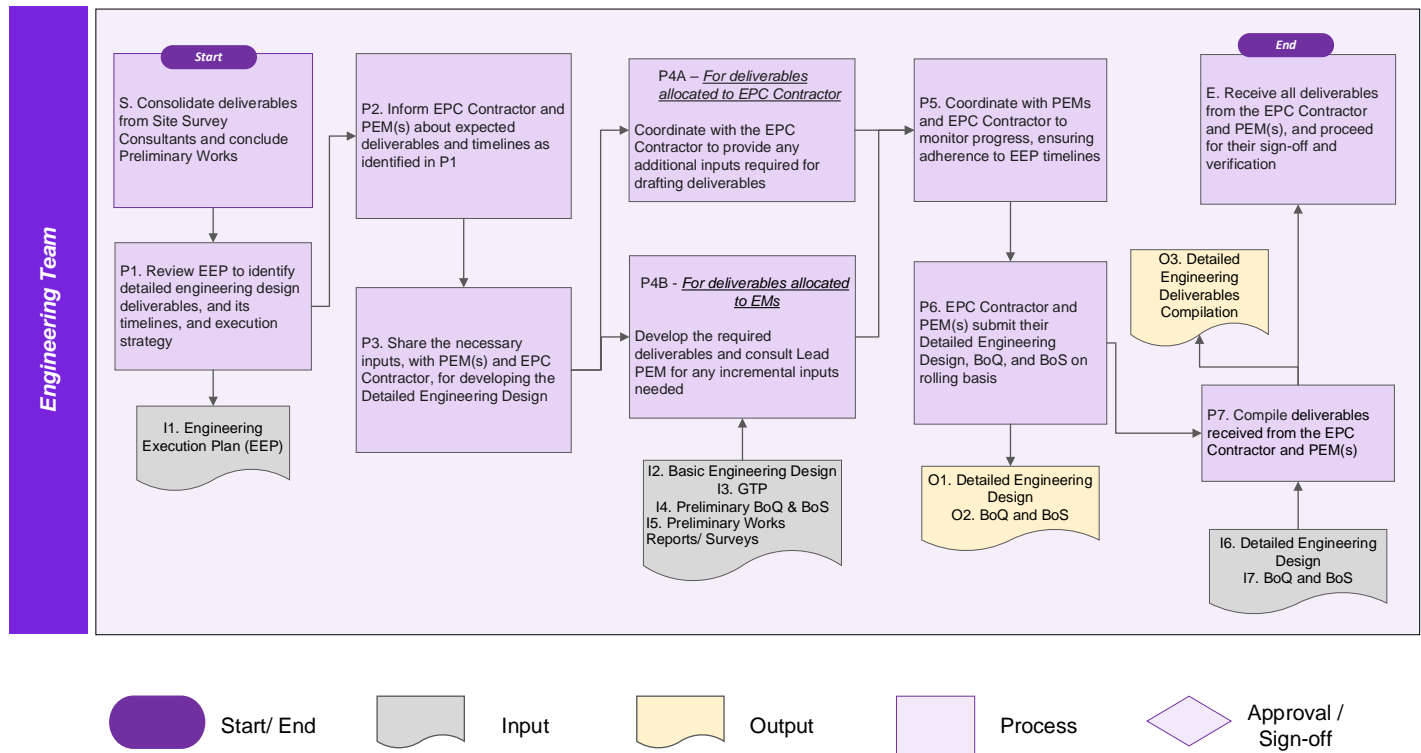
### 3.2 RACI

#	Key Task	Responsible	Accountable	Consulted	Informed
<b>S</b>	Consolidate deliverables from Site Survey Consultants and conclude Preliminary Works	Lead PEM	Lead PEM		
<b>P1</b>	Review Engineering Execution Plan (EEP) to identify detailed engineering design deliverables, and its timelines, and execution strategy	Lead PEM	Lead PEM		
<b>P2</b>	Inform EPC Contractor and PEM(s) about expected deliverables and timelines as identified in P1	Lead PEM	Lead PEM		PEM(s)
<b>P3</b>	Share the necessary inputs to PEM(s) and the EPC Contractor for developing the Detailed Engineering Design	Lead PEM	Lead PEM		PEM(s)
<b>P4A</b>	<b><i>Deliverables by EPC Contractor</i></b> Coordinate with the EPC Contractor to provide any additional inputs required for drafting deliverables	Lead PEM	Lead PEM		
<b>P4B</b>	<b><i>Deliverables by PEMs</i></b> Develop the required deliverables and consult Lead PEM for any incremental inputs needed	PEM(s)	PEM(s)	Lead PEM	
<b>P5</b>	Monitor progress of EPC Contractor and PEMs to ensure adherence to EEP	Lead PEM	Lead PEM		
<b>P6</b>	Receive rolling submissions of deliverables (Designs, BoQ, BoS) from EPC Contractor and PEMs	Lead PEM	Lead PEM		
KEY - S: Start   P: Process Steps   I: Input   O: Output   E: End					

#	Key Task	Responsible	Accountable	Consulted	Informed
<b>P7</b>	Compile deliverables received from EPC Contractor and PEMs	Lead PEM	Lead PEM		
<b>E</b>	Receive all deliverables from EPC Contractor and PEM(s) and proceed with sign-off and verification process	Lead PEM	Lead PEM		

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

### 3.3 Process Map





## Chapter 4 – Sign-Off for Detailed Engineering Design

### 4.1 Process Steps

#	Activity	#	Inputs	#	Outputs	Timeline (in weeks)
S	– Lead PEM compiles Detailed Engineering Deliverables Compilation ( <i>Engineering Designs, BoS and BoQ</i> )					-
P1	– Lead PEM shares the received Detailed Engineering deliverables Compilation with Owner's Engineer (OE) for review – For the deliverables submitted by EPC Contractor, respective Project Engineering Managers (PEMs) also receive the compilation for review					-
P2	– PEMs and OE independently review the compilation, preparing a list of proposed modifications, along with detailed justifications for each proposed modification	I1	Detailed Engineering Deliverables Compilation <sup>1</sup>	O1	OE's List of Modification ( <i>Template Provided</i> )	0.5
				O2	PEM's List of Modification ( <i>Template Provided</i> )	
KEY - S: Start   P: Process Steps   I: Input   O: Output   E: End   ●: Detailed in cross-functional playbooks						

<sup>1</sup> Detailed Engineering Deliverables Compilation includes Detailed Engineering Designs, along with their respective BoQ and BoS

#	Activity	#	Inputs	#	Outputs	Timeline (in weeks)
<b>P3</b>	<ul style="list-style-type: none"> <li>Lead PEM facilitates discussions between the OE and PEM to collaboratively deliberate on their respective lists of proposed modifications</li> <li>During the discussion, PEM(s) categorizes the proposed modifications into two lists: <ul style="list-style-type: none"> <li>Aligned Modifications List – Modifications where both the PEM and OE are in agreement</li> <li>Unaligned Modifications List – Modifications where the PEMs and OE have differing viewpoints</li> </ul> </li> </ul>	<b>I2</b>	OE's List of Modification	<b>O3</b>	Aligned Modifications Lists <sup>1</sup> (Template Provided)	1
	<p><i>Pre-meeting Preparation: To ensure structured and efficient discussions, PEMs and the OE independently review the designs and compile their modification lists in advance, as detailed in P2</i></p> <p><i>Three separate discussions are to be facilitated between the OE and PEMs, one for Civil, Electrical, and Plant Design respectively</i></p> <p><i>PEMs prepare the aforementioned lists for their respective Engineering Designs</i></p>	<b>I3</b>	PEM's List of Modification	<b>O4</b>	Unaligned Modifications Lists <sup>1</sup> (Template Provided)	
<b>P4</b>	<ul style="list-style-type: none"> <li>Lead PEM facilitates a discussion between respective PEMs, OE, and Solar Engineering Head (SEH) to discuss the unaligned modifications</li> <li>PEM(s) update their Aligned Modifications list to incorporate the modifications that reach consensus during the discussion</li> <li>SEH makes the final decision during the discussion</li> </ul>	<b>I4</b>	Unaligned Modifications List	<b>O5</b>	Final Modifications Lists (Template Provided)	0.5
<b>P5</b>	<ul style="list-style-type: none"> <li>PEM(s) share their respective Final Modifications List with Lead PEM</li> </ul>					0.5
<b>P6</b>	<ul style="list-style-type: none"> <li>Lead PEM shares the Final Modifications Lists to the EPC Contractor, for the designs created by them</li> </ul>					

**KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End | •: Detailed in cross-functional playbooks**

<sup>1</sup> Separate lists to be prepared for Civil, Electrical and Plant Design

#	Activity	#	Inputs	#	Outputs	Timeline (in weeks)
<b>P7</b>	<ul style="list-style-type: none"> <li>– PEM(s)/ EPC Contractor review the modifications requested, incorporate changes and submit the modified Detailed Engineering Deliverables to the Lead PEM</li> </ul>	<b>I5</b>	Final Modification Lists	<b>O6</b>	Modified Detailed Engineering Deliverables <sup>1</sup>	1
<b>P8</b>	<ul style="list-style-type: none"> <li>– Lead PEM shares the modified Detailed Engineering Deliverables with OE for review</li> <li>– If the modified designs were submitted by EPC Contractor, the respective PEMs also receive these documents for review</li> </ul>					-
<b>P9</b>	<ul style="list-style-type: none"> <li>– OE and PEMs sign off the Detailed Engineering Deliverables marking their approval (<i>OE to mark its verification stamp on every approved design</i>)</li> </ul> <p><i>If disagreements persist between OE and PEMs, steps P3 to P8 are repeated until alignment and sign-off on the final Detailed Engineering Designs are achieved</i></p>	<b>I6</b>	Modified Detailed Engineering Deliverables <sup>1</sup>	<b>O7</b>	Approved Detailed Engineering Deliverables <sup>1</sup>	0.5
<b>P10</b>	<ul style="list-style-type: none"> <li>– Lead PEM shares the Approved Detailed Engineering Deliverables with –</li> <li>– Procurement Lead and EPC contractor to facilitate subsequent procurement related activities</li> <li>– Project Manager and EPC contractor to commence subsequent construction and commissioning related activities</li> </ul>					-
<b>E</b>	<ul style="list-style-type: none"> <li>– Lead PEM adds the Approved Detail Engineering Deliverables to the Detail Engineering Design library for future reference</li> </ul>					<b>Total – 3.5 – 4 weeks</b>

**KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End | •: Detailed in cross-functional playbooks**

<sup>1</sup> Detailed Engineering Deliverables includes Detailed Engineering Designs, along with their associated BoQ and BoS

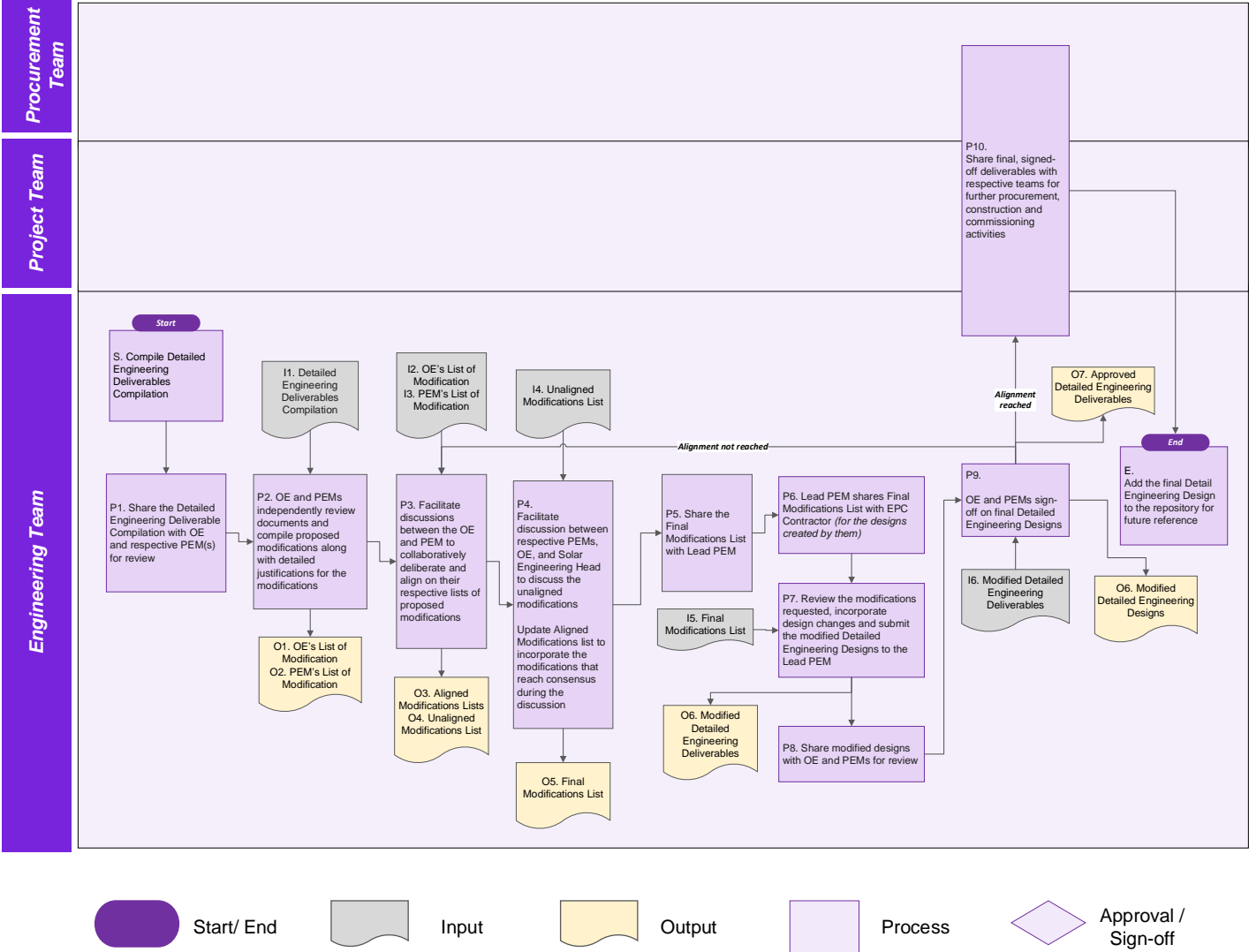
## 4.2 RACI

#	Key Task	Responsible	Accountable	Consulted	Informed
<b>S</b>	Compile Detailed Engineering Deliverables (Engineering Designs, BoS, and BoQ) received from EPC Contractor/PEMs	Lead PEM	Lead PEM	PEM(s)	
<b>P1</b>	Share the deliverables (Detailed Engineering Designs, BoS, and BoQ) with OE and respective PEM(s) for review	Lead PEM	Lead PEM		PEM(s)
<b>P2</b>	Independently review compilation and prepare proposed modifications with justifications	PEM(s)	PEM(s)		Lead PEM
<b>P3</b>	Facilitate discussions between the OE and PEM to collaboratively deliberate and align on their respective lists of proposed modifications	Lead PEM		PEM(s)	SEH
<b>P4</b>	Facilitate discussion between respective PEMs, OE, and Solar Engineering Head to discuss the unaligned modifications	Lead PEM		PEM(s) SEH	
	Update Aligned Modifications list to incorporate the modifications that reach consensus during the discussion	PEM(s)	PEM(s)	SEH	
<b>P5</b>	Share the Final Modifications List with Lead PEM	PEM(s)	PEM(s)		Lead PEM
<b>P6</b>	Share the Final Modifications List with EPC Contractor (for the designs created by them)	Lead PEM	Lead PEM		
KEY - S: Start   P: Process Steps   I: Input   O: Output   E: End					

#	Key Task	Responsible	Accountable	Consulted	Informed
<b>P7</b>	Review the modifications requested, incorporate changes, and submit the modified Deliverables to the Lead PEM	PEM(s)	PEM(s) - for designs created by them Lead PEM - for designs created by EPC Contractor		Lead PEM
<b>P8</b>	Share modified designs with OE and PEMs for review	Lead PEM	Lead PEM	PEM(s)	SEH
<b>P9</b>	Sign-off on final Detailed Engineering Designs	PEM(s)	Lead PEM		Lead PEM
<b>P10</b>	Share approved deliverables with respective teams for further procurement, construction and commissioning activities	Lead PEM	Lead PEM		Procurement Team / Project Team
<b>E</b>	Archive final signed-off deliverables in the Detailed Engineering Design library	Lead PEM	Lead PEM		

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

4.3 Process Map



4.4 Templates for Input/ Output

1. OE’s List of Modification

Modification #	Discipline (Civil, electrical, plant design)	Deliverable / Drawing Name	Proposed Modification	Justification	Date of Submission

2. PEM’s List of Modification

Modification #	Discipline (Civil, electrical, plant design)	Deliverable / Drawing Name	Proposed Modification	Justification	Date of Submission

3. Aligned Modifications List

Modification #	Discipline (Civil, electrical, plant design)	Deliverable / Drawing Name	Proposed Modification	Justification	Modification Suggested by (OE/PEM)

4. Unaligned Modifications List

Modification #	Discipline (Civil, electrical, plant design)	Deliverable / Drawing Name	Proposed Modification	Justification	Modification Suggested by (OE/PEM)	Reason for disagreement

5. Final Modifications Lists

Modification #	Discipline (Civil, electrical, plant design)	Deliverable / Drawing Name	Proposed Modification	Justification	Revised Design to be submitted by	Remarks, if any



# Chapter 5 – Issue Resolution for Detailed Engineering Design

## 5.1 Process Steps

#	Activity		Inputs		Outputs	Timeline (in weeks)
<b>S</b>	<ul style="list-style-type: none"> <li>Project Manager or Procurement Lead sends Engineering Issue Form to Lead Project Engineering Manager (Lead PEM)</li> </ul> <p><i>Engineering Issue Form is a standardized document that records engineering challenges encountered during project execution. It categorizes each issue under one of three domains: Electrical, Civil, or Plant Design</i></p>					-
<b>P1</b>	<ul style="list-style-type: none"> <li>Lead PEM notifies the respective Project Engineering Manager (PEM) based on the issue type (<i>Electrical, Civil, or Plant Design</i>) and shares the Engineering Issue Form with them</li> </ul>					-
<b>P2</b>	<ul style="list-style-type: none"> <li>PEM reviews the Engineering Issue Form to assess the challenge and classifies it as one of the following:               <ul style="list-style-type: none"> <li><b>Case 1</b> - Component/Material related issue</li> <li><b>Case 2</b> - Engineering design related issue</li> </ul> </li> </ul>	<b>I1</b>	Engineering Issue Form (Template Provided)			0.5
<b>Case 1 - Component/Material related issue</b>						
<b>P3</b>	<ul style="list-style-type: none"> <li>PEM implements control measures by notifying the Procurement Lead/ Project Manager to suspend procurement of the affected component/material and related items until further notice</li> </ul>					-
<b>KEY - S: Start   P: Process Steps   I: Input   O: Output   E: End   •: Detailed in cross-functional playbooks</b>						

#	Activity		Inputs		Outputs	Timeline (in weeks)
P4	<ul style="list-style-type: none"> <li>– PEM, in consultation with the EPC Contractor, conducts a comprehensive assessment to determine the most effective corrective action<sup>1</sup>, while minimizing disruptions to project timelines and execution</li> <li>– PEM refers to the Issue Log to identify similar challenges from past projects and the resolutions implemented</li> </ul>	I2	Engineering Issue Form	O1	Corrective Action (Template Provided)	1
P5	<ul style="list-style-type: none"> <li>– PEM updates the product specifications and quantities in the BoQ to reflect the revised requirements, based on the identified corrective action</li> </ul>	I3	Corrective Action	O2	Updated BoQ	0.5
P6	<ul style="list-style-type: none"> <li>– PEM informs the Procurement Lead to initiate procurement coordination in alignment with the updated BoQ</li> </ul>					-
P7	<ul style="list-style-type: none"> <li>– PEM formally communicates the resolution to the submitter of the Engineering Issue Form by sharing the Engineering Issue Resolution Form, outlining the actions taken to address the reported issue</li> </ul>			O3	Engineering Issue Resolution Form (Template Provided)	0.5
E	<ul style="list-style-type: none"> <li>– PEM adds the Engineering Issue Form and Engineering Issue Resolution Form to the Issue Log for future reference</li> </ul>					-

#### Case 2 - Engineering design related issue

P3	<ul style="list-style-type: none"> <li>– PEM undertakes control measures, by requesting Project Team to suspend construction and commissioning activities related to the concerned engineering design until further notice</li> </ul>					-
P4	<ul style="list-style-type: none"> <li>– PEM identifies the Design Owner of the engineering design (<i>EPC Contractor or the Engineering Team</i>) for the escalated issue and shares the Engineering Issue Form with the Design Owner</li> </ul>					-

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End | ●: Detailed in cross-functional playbooks

<sup>1</sup> Corrective action may involve –

- Requesting the supplier of the component to change specifications, quantity or contract terms, or
- Replacing the vendor for concerned item to accommodate for revised requirements

#	Activity		Inputs		Outputs	Timeline (in weeks)
P5	<ul style="list-style-type: none"> <li>Design Owner conducts detailed assessment, and amends the engineering design to resolve the issue, while also trying to minimize disruptions to project timelines and execution</li> <li>They may leverage the Issue Log to identify similar issues faced in past projects and the resolution undertaken</li> </ul>	I2	Engineering Issue Form	O1	Modified Detailed Engineering Design	2.5
P6	<ul style="list-style-type: none"> <li>Design Owner shares the Modified Detailed Engineering Designs with Lead PEM</li> </ul>					0.5
P7	<ul style="list-style-type: none"> <li>Lead PEM initiates the sign-off and verification process for these designs <i>(as outlined in Chapter 4)</i></li> </ul>	I3	Modified Detailed Engineering Design			-
P8	<ul style="list-style-type: none"> <li>Lead PEM submits the Approved Modified Detailed Engineering Designs to the EPC Contractor and Project Team to proceed with construction and commissioning activities</li> </ul>			O2	Approved Modified Detailed Engineering Design	0.5
P9	<ul style="list-style-type: none"> <li>Lead PEM formally communicates the resolution to the submitter of the Engineering Issue Form by providing the Engineering Issue Resolution Form, outlining the actions taken to address the reported issue</li> </ul>			O3	Engineering Issue Resolution Form	0.5
E	<ul style="list-style-type: none"> <li>Lead PEM adds the Engineering Issue Form and Engineering Issue Resolution Form to the Issue Log for future reference</li> </ul>					<b>Total – 3 – 8 weeks<sup>1</sup></b>
KEY - S: Start   P: Process Steps   I: Input   O: Output   E: End   •: Detailed in cross-functional playbooks						

<sup>1</sup> Total duration varies by issue type – case 1 is expected to resolve within 4 weeks, while case 2 may take up to 8 weeks

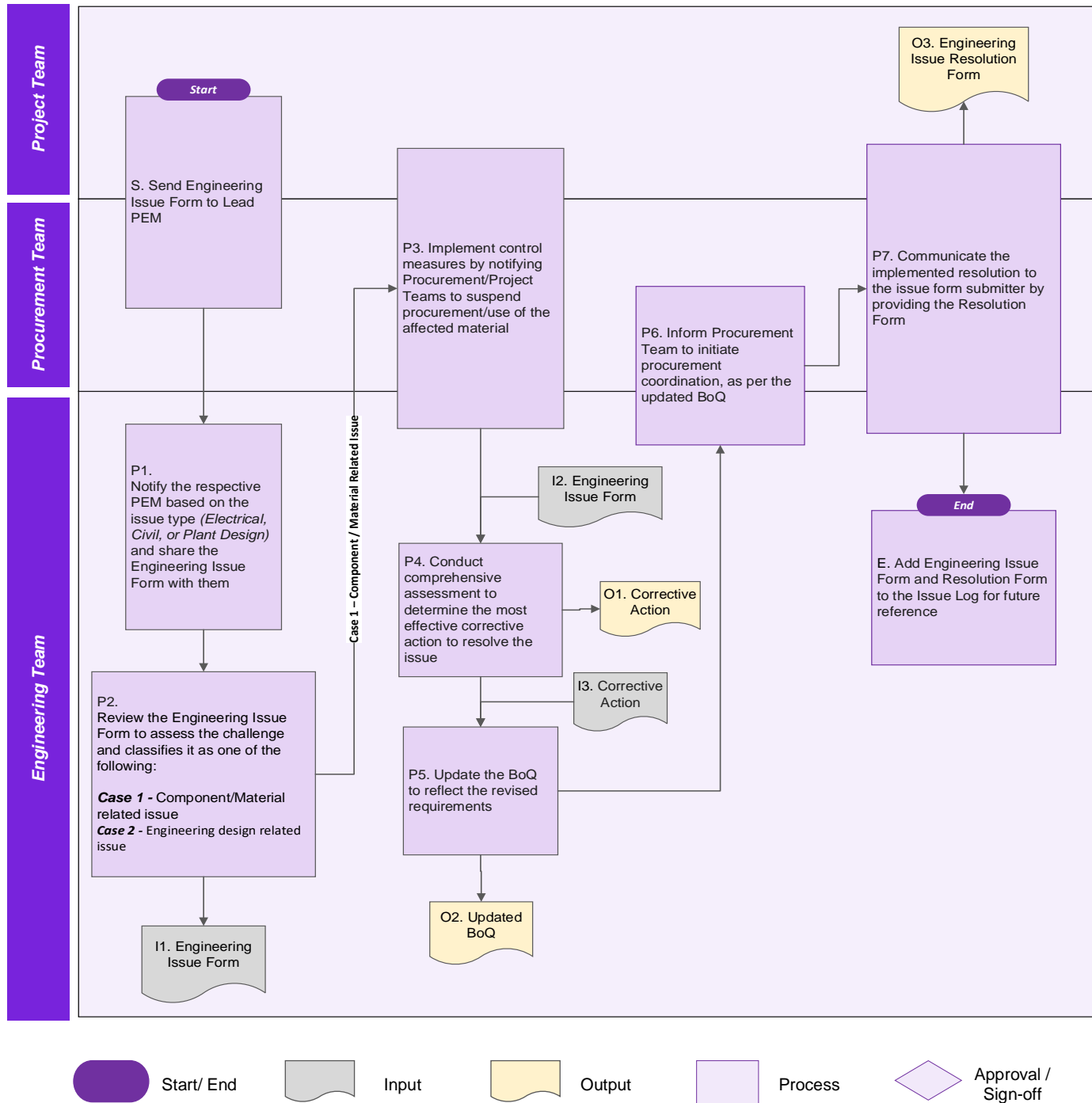
## 5.2 RACI

#	Key Task	Responsible	Accountable	Consulted	Informed
<b>S</b>	Send the Engineering Issue Form to Lead PEM	Procurement Lead or Project Team	Procurement Lead or Project Team		Lead PEM
<b>P1</b>	Notify the respective PEM based on issue type and share the Engineering Issue Form	Lead PEM	Lead PEM		PEM
<b>P2</b>	Review the issue and classify it as component/material-related or engineering design-related issue	PEM	PEM		
<b>Case 1 - Component/Material related issue</b>					
<b>P3</b>	Implement control measures by notifying Procurement/Project Teams to suspend procurement/use of the affected material	PEM	PEM		Procurement Lead Project Team
<b>P4</b>	Conduct comprehensive assessment to determine the most effective corrective action to resolve the issue	PEM	PEM	EPC Contractor	
<b>P5</b>	Update the BoQ to reflect the revised requirements	PEM	PEM		SEH
<b>P6</b>	Inform Procurement Lead to initiate procurement coordination, as per the updated BoQ	PEM	PEM		Procurement Lead
<b>P7</b>	Communicate the implemented resolution to the issue form submitter by providing the Resolution Form	PEM	PEM		Procurement Lead Project Team ( <i>whoever submitted the issue form</i> )
<b>E</b>	Add Engineering Issue Form and Resolution Form to the Issue Log for future reference	PEM	PEM		
<b>KEY - S: Start   P: Process Steps   I: Input   O: Output   E: End</b>					

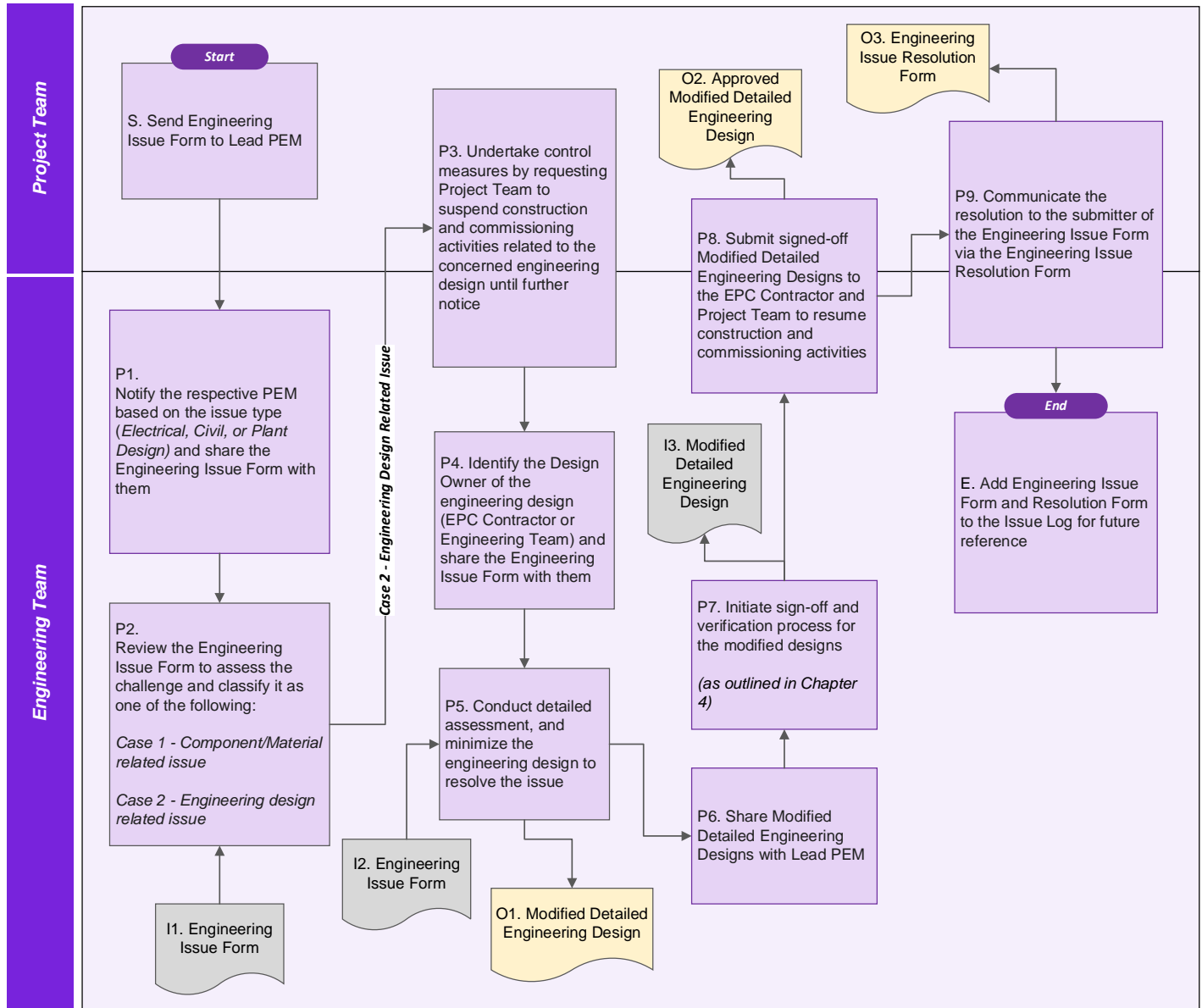
#	Key Task	Responsible	Accountable	Consulted	Informed
Case 2 - Engineering design related issue					
P3	Implement control measures by requesting Project Team to suspend construction and commissioning activities for the affected engineering design	PEM	PEM		Project Team
P4	Identify the Design Owner of the engineering design (EPC Contractor or Engineering Team) and share the Engineering Issue Form with them	PEM	PEM		Design Owner (EPC Contractor or Engineering Team)
P5	Conduct detailed assessment, and amends the engineering design to resolve the issue	Design Owner	Design Owner		PEM
P6	Share Modified Detailed Engineering Designs with Lead PEM	Design Owner	Design Owner		Lead PEM
P7	Initiate sign-off and verification process for the modified designs	Lead PEM	Lead PEM		SEH
P8	Submit signed-off Modified Detailed Engineering Designs to the EPC Contractor and Project Team to resume construction and commissioning	Lead PEM	Lead PEM		Project Team
P9	Communicate the implemented resolution to the issue form submitter via Resolution Form	PEM	PEM		Project Team (or whoever submitted the issue form)
E	Add Engineering Issue Form and Resolution Form to the Issue Log for future reference	PEM	PEM		
KEY - S: Start   P: Process Steps   I: Input   O: Output   E: End					

## 5.3 Process Map

### **Case 1 - Component/Material related issue**



## Case 2 - Component/Material related issue



## 5.4 Templates for Input/ Output

### 1. Engineering Issue Form

Field	Details
<b>Issue ID</b>	Auto-generated or assigned manually
<b>Date of Submission</b>	DD/MM/YYYY
<b>Submitted By</b>	Name – Project Manager / Procurement Lead
<b>Submitting Function</b>	Project / Procurement
<b>Project Name</b>	Name of the project
<b>Package/Section</b>	e.g., Inverter area, Switchyard, MMS, Cable Sizing, etc.
<b>Discipline</b>	Civil / Electrical / Plant Design
<b>Type of Document</b>	Engineering Drawing / BoQ / Other
<b>Document Name &amp; Number</b>	Exact name and reference number of the drawing or BoQ in question
<b>Issue Description</b>	Clear articulation of the issue observed – inconsistency, omission, etc.
<b>Potential Implication</b>	Optional – If known, impact on procurement, construction, or schedule
<b>Submitted To (Engineering)</b>	Name of Lead PEM / Engineering Team POC
<b>Remarks (optional)</b>	Any additional observations or context

### 2. Corrective Action Plan

Field	Details
<b>Corrective Action Report ID</b>	Auto-generated or assigned manually
<b>Linked Engineering Issue ID</b>	Reference ID from Engineering Issue Form
<b>Date of Report</b>	DD/MM/YYYY
<b>Reported By</b>	Name of PEM
<b>Engineering Discipline</b>	Civil / Electrical / Plant Design
<b>Package/Component Affected</b>	e.g., MMS, Cable Trays, Inverter, Switchgear
<b>Description of Issue</b>	Summary of issue reported
<b>Category of Issue</b>	Component / Material related issue Engineering design related issue
<b>Procurement/ Construction Hold Notification Sent To</b>	Procurement Lead / Project Manager name
<b>Date of Procurement/ Construction Hold</b>	DD/MM/YYYY
<b>Assessment Conducted With EPC?</b>	Yes / No – Include meeting date if applicable
<b>Assessment Summary</b>	Key observations and considerations discussed with EPC
<b>Reference to Similar Past Issues</b>	Yes / No – Mention Issue ID from Issue Log if applicable
<b>Proposed Corrective Action</b>	e.g., Replace with alternate spec, Upgrade material, Reconfirm specification
<b>Impact on Design / BoQ</b>	Description of required modifications
<b>Updated BoQ Version</b>	Version number or date
<b>Date of Update Completion</b>	DD/MM/YYYY
<b>Remarks</b>	Any additional comments or follow-ups needed



### 3. Engineering Issue Resolution Form

Field	Details
Resolution Form ID	Auto-generated or assigned manually
Linked Engineering Issue ID	Reference ID from the original Engineering Issue Form
Date of Resolution Submission	DD/MM/YYYY
Submitted To	Name of Project Manager / Procurement Lead who raised the issue
Submitted By	Name of Lead PEM
Engineering Discipline	Civil / Electrical / Plant Design
Package / Section Affected	e.g., Switchyard, Inverter, MMS, Cable Sizing
Summary of Reported Issue	Brief recap of issue description from original form
Assessment Summary	Key findings from the engineering team's review
Category of Issue	Component / Material issue Engineering Design issue
Corrective Action Taken	Steps implemented to resolve the issue – redesign, spec revision, etc.
Changes Made	List of documents modified – BoQ, Drawings, Specs, with version numbers
Procurement / Execution Impact	Summary of any implications or changes required from their end
Updated Documents Attached	List of attached updated files if applicable
Resolution Completion Date	DD/MM/YYYY
Additional Remarks (if any)	Optional – Any further clarifications, precautions, or notes

## Chapter 6 – Assessment of OE Empanelment Requirements

### 6.1 Process Steps

*Process to be initiated on a bi-annual basis*

#	Activity	#	Inputs	#	Outputs	Timeline (in weeks)
<b>S</b>	– Chief Business Development shares the Annual Growth Outlook <sup>1</sup> (and its subsequent quarterly updates) with the Solar Engineering Head (SEH)					-
<b>P1</b>	– SEH designates an Engineering Manager (EM) to evaluate the requirement for empaneling new OE – SEH shares the Annual Growth Outlook with the appointed EM to aid evaluation					0.5
<b>P2</b>	– EM analyzes the Annual Growth Outlook to identify target regions and assess the demand for empaneling OE in each region	<b>I1</b>	Annual Growth Outlook			0.5
<b>P3</b>	– EM requests the Procurement Leads to share the Vendor Scorecard <sup>2</sup> for the empaneled OE					0.5
<b>P4</b>	– Procurement Leads shares the requested vendor scorecards with the EM					
<b>P5</b>	– For each target region, EM assesses the adequacy of empaneled OE based on their – – Number in each region – Competence and work quality, based on Engineering Team's feedback in the Vendor Scorecard	<b>I2</b>	Vendor Scorecard			1
<b>P6</b>	– EM creates a Gap Assessment Summary, identifying regions where the empaneled vendors are insufficient to meet the projected demand			<b>O1</b>	Gap Assessment Summary (Template Provided)	

**KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End | ●: Detailed in cross-functional playbooks**

<sup>1</sup> Annual Growth Outlook is prepared based on the overall growth strategy in Renewable Energy. It outlines projected evacuation and land requirements, based on market trends, Torrent's current market standing and growth projections, and central and state-level renewable energy policies. The document covers locations to focus on (states/regions), target capacity for each location and other critical details

<sup>2</sup> Vendor Scorecard tracks feedback on service vendors from past engagements and is maintained by the Procurement Lead

#	Activity	#	Inputs	#	Outputs	Timeline (in weeks)
P7	– EM shares OE Gap Assessment Summary with Procurement Lead and requests them to initiate RFI for empaneling the required OE					-
P8	<ul style="list-style-type: none"> <li>– EM supports the Procurement Lead in preparing the RFIs</li> <li>– EM defines the Pre-Qualification Criteria (PQC) and drafts technical assessment section<sup>1</sup> of the RFI</li> <li>– Procurement Lead drafts all other sections<sup>2</sup> of the RFIs (<i>detailed in Procurement Playbook</i>)</li> </ul>			O2	RFI (PQC and Technical Assessment sections)	0.5
P9	– Procurement Lead publishes the RFI, collates and shares responses with EM for technical evaluation			O3	RFI Responses	•
P10	– EM evaluates the PQCs and technical assessment section of the RFI responses, and creates the List of feasible OEs	I3	RFI Responses	O4	List of Feasible OEs (Template Provided)	0.5
P11	– EM seeks review and approval from SEH on the List of Feasible OEs					0.5
P12	– If changes are required, EM incorporates the feedback and reshapes with SEH for approval, to finalize the List of Feasible OEs					
P13	– EM shares the List of Feasible OEs with the Procurement Lead					-
P14	<ul style="list-style-type: none"> <li>– Procurement Lead evaluates feasible OEs and finalizes those to be empaneled based on appropriate criteria</li> <li>– Procurement Lead shares the list of Empaneled OEs with EM</li> </ul>	I4	List of Feasible OEs	O5	Empaneled OEs (Template Provided)	•

KEY - S: Start | P: Process Steps | I: Input | O: Output | E: End | •: Detailed in cross-functional playbooks

<sup>1</sup> PQC includes pre-requisites (e.g., minimum 10 years in land aggregation), and required capabilities

<sup>2</sup> RFI Overview & Objectives, Submission Guidelines, Evaluation Process, Commercial Terms, Compliance & Legal Requirements, Confidentiality & Disclosures

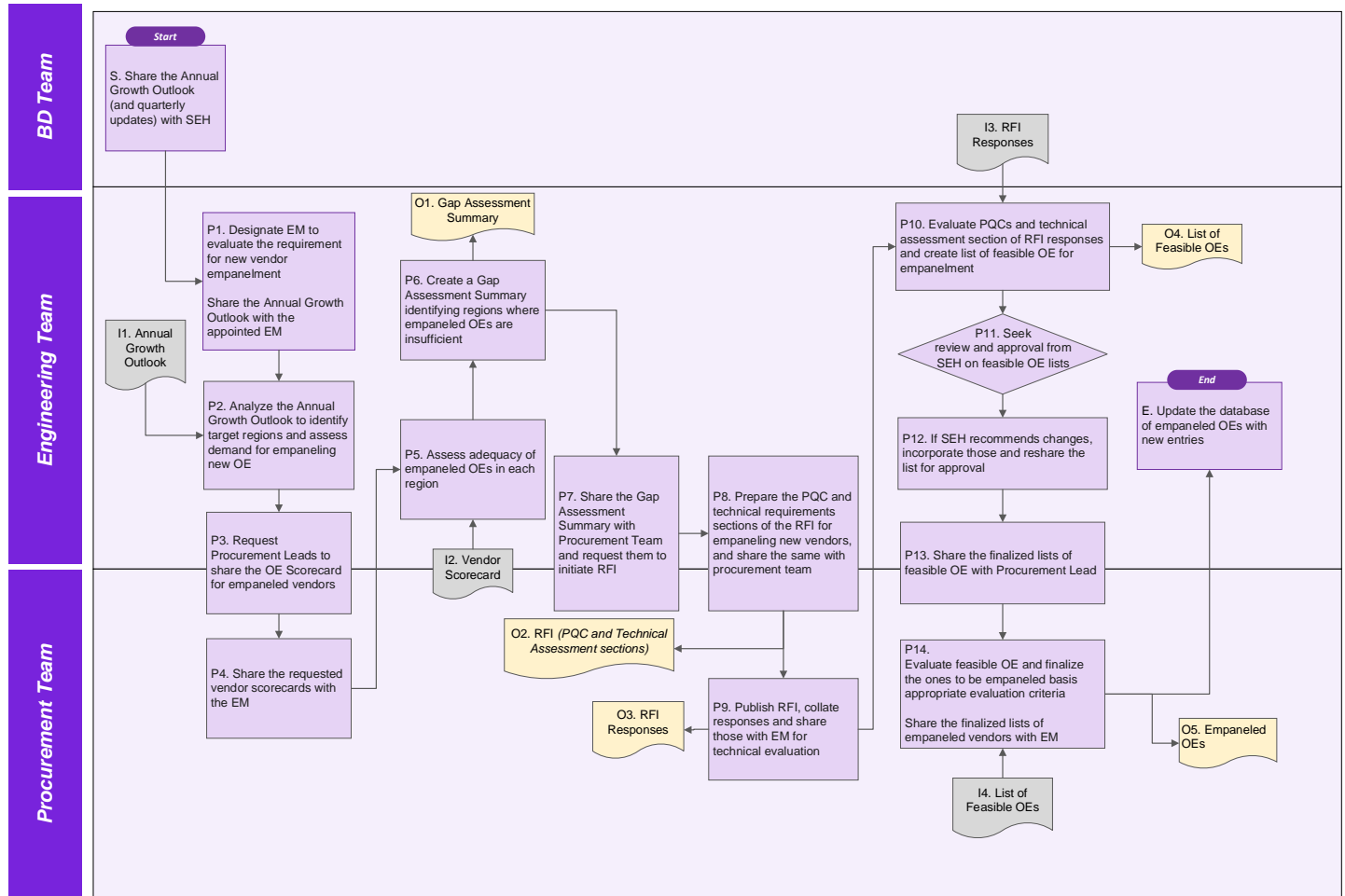
#	Activity	#	Inputs	#	Outputs	Timeline (in weeks)
E	– EM updates their database of Empaneled Vendors with new entries as shared by Procurement Lead					<b>Total –</b> 4 – 5 weeks
KEY - S: Start   P: Process Steps   I: Input   O: Output   E: End   ●: Detailed in cross-functional playbooks						

## 6.2 RACI

#	Key Task	Responsible	Accountable	Consulted	Informed
<b>S</b>	Share the Annual Growth Outlook (and quarterly updates) with the Solar Engineering Head (SEH)	Chief Business Development	Chief Business Development		SEH
<b>P1</b>	Designate Engineering Manager (EM) to evaluate the requirement for new OE empanelment	SEH	SEH		EM
	Share the Annual Growth Outlook with the appointed EM	SEH			EM
<b>P2</b>	Analyze the Annual Growth Outlook to identify target regions and assess demand for empaneling new OE	EM	EM		SEH
<b>P3</b>	Request the Procurement Lead to share the Vendor Scorecard for empaneled OE	EM			Procurement Lead
<b>P4</b>	Share the requested OE Scorecards with the EM	Procurement Lead			EM
<b>P5</b>	Assess adequacy of empaneled OE in each region	EM	EM		
<b>P6</b>	Create OE Gap Assessment Summary, identifying regions where empaneled OE are insufficient	EM	EM		SEH
<b>P7</b>	Share the OE Gap Assessment Summary with Procurement Lead and request them to initiate RFI process	EM			Procurement Lead
<b>P8</b>	Prepare the PQC and technical requirements sections of the RFI for empaneling new OE, and share the same with Procurement Lead	EM	EM		Procurement Lead
<b>P9</b>	Publish RFI, collate responses and share those with EM for technical evaluation	Procurement Lead	Procurement Lead		EM
KEY - S: Start   P: Process Steps   I: Input   O: Output   E: End					

#	Key Task	Responsible	Accountable	Consulted	Informed
<b>P10</b>	Evaluate RFI responses (focusing on PQC's and technical response) and create lists of feasible OE	EM	EM		
<b>P11</b>	Seek review and approval from SEH on feasible OE lists from SEH	EM	EM	SEH	
<b>P12</b>	If SEH recommends changes, incorporate those and reshare the lists for approval	EM	EM	SEH	
<b>P13</b>	Share the finalized lists of feasible OE with the Procurement Lead	EM	EM		Procurement Lead
<b>P14</b>	Evaluate the feasible OEs and finalize those to be empaneled based on appropriate evaluation criteria	Procurement Lead	Procurement Lead		
	Share the lists of empaneled OE with EM	Procurement Lead			EM
<b>E</b>	Update the database of empaneled OE with newly approved entries	EM			
KEY - S: Start   P: Process Steps   I: Input   O: Output   E: End					

## 6.3 Process Map



## 6.4 Templates for Input/ Output

### 1. Gap Assessment Summary

Region	Projected Demand for OE	Available Empaneled OE	Quality of Available OE (High / Medium / Low)	Adequacy Status (Adequate / Inadequate)	New OE to be Empaneled	Remarks / Action Plan
Gujarat	5	2	Medium	Inadequate	2 – 4	Onboard at least 2 new OE; initiate empanelment process by June
Maharashtra	4	3	High	Adequate	0	None required

### 2. List of Feasible OE

OE Name	Region(s) Covered	PQC Compliance	Technical Suitability	Experience (Years)	Previous Engagements	Feedback from Engineering Team	Action Required	Reason for Shortlist / Reject
OE 1	Maha-rashtra, Gujarat	Yes	High	10	5 Solar Projects of 100+ MW	Positive	Shortlist	Meets PQC, high industry experience
OE 2	Maha-rashtra, Gujarat	No	Low	7	1 Solar Projects of 100+ MW	Negative	Reject	Does not meet PQC

### 3. List of Empaneled Land Aggregators

OE Name	Region(s) Covered	Empaneled Date
OE 1	Maharashtra, Gujarat	15/07/2025
OE 2	Rajasthan, MP	15/07/2025



## Key Performance Indicators

Following KPIs are to be tracked for Engineering Function to measure the effectiveness of processes and identify areas for improvement

Metric	Definition	How to Calculate
<b>Project Delay Attributable to in-house Engineering deliverable delay</b> <i>(calculated in weeks)</i>	Delay in the overall project timeline caused by delays in timely submission of in-house engineering deliverable	Calculated as the difference between the planned and actual submission dates of in-house engineering deliverables, for cases where the delay caused a shift in the overall project timeline, i.e. impacted the dependent activities in the critical path
<b>Average Issue Resolution days</b> <i>(calculated in days)</i>	Measures the median days taken to resolve engineering issues	Calculated as the median days taken to resolve issues (difference between the date the Engineering Issue Form was received and the date the Engineering Issue Resolution Form was sent)
<b>Total number of Issue Forms raised</b> <i>(calculated as absolute number)</i>	Tracks the total number of issues faced by other teams during project execution	Count of all Engineering Issue Forms raised for a particular project

## Glossary

Abbreviation	Full Form
<b>BD</b>	Business Development
<b>BoQ</b>	Bill of Quantities
<b>BoS</b>	Bill of Services
<b>EEP</b>	Engineering Execution Plan
<b>EM</b>	Engineering Manager
<b>EPC</b>	Engineering, Procurement, and Construction
<b>GTP</b>	Guaranteed Technical Particulars
<b>L1 Plan</b>	Level 1 Project Plan
<b>OE</b>	Owner's Engineer
<b>PEM</b>	Project Engineering Manager
<b>PQC</b>	Pre-Qualification Criteria
<b>RFI</b>	Request for Information
<b>RFQ</b>	Request for Quotation
<b>SEH</b>	Solar Engineering Head
<b>Lead</b>	Single Point of Contact
<b>TPI</b>	Third-Party Inspection