TRANSNET

Transnet Projects
Project Lifecycle Process

Pre-feasibility Study Phase Manual

Second Draft - Rev B

SECOND DRAFT

PROJECT LIFECYCLE PROCESS
PRE-FEASIBILITY STUDY PHASE MANUAL

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PROJECT LIFECYCLE PROCESS

PRE-FEASIBILITY STUDY PHASE MANUAL

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Chapter 1

1. OVERVIEW

1.1 Background

There is a need within Transnet to continuously and systematically strive towards improving the level of consistency in the approach to the preparation and management of Capital Investment Projects, and thereby, the reliability of the results achieved. To this end these Project Lifecycle Process Manuals have been developed to provide a standardised, generic Methodology, based on best practices as applied to progressive phases, separated and controlled by a series of Gate Reviews.

The purpose of the Manuals, therefore, is to provide a methodology for the effective management of Capital Investment Projects within Transnet and to ensure that all projects, throughout their Project Lifecycle Study and Execution Phases, are prepared with a consistent approach. This approach being based on agreed, defined scope level, evaluation techniques, and set of deliverables, all executed within the framework of Transnet's minimum requirements for the definition and execution of Capital Investment projects. The Manuals are therefore primarily intended to advise and guide all those directly involved in the development, evaluation and execution of capital intensive engineering projects.

The Project Lifecycle Process Manuals provide a methodology to this process. The manuals are supported by a comprehensive set of procedures, templates and tools, which can be accessed via the Transnet Document Management System.

These manuals are intended to be overview guides to the project team to make them each aware of the functions of all the disciplines that make up a project and their role in this context. These manuals are not references on specific areas of expertise as there are separate reference documents available.

The manuals address Transnet Projects as the engineering, procurement and construction management (EPCM) project organisation with the Transnet Operating Divisions as project Owners or clients. Transnet Projects may employ consulting organisations to assist in the execution of this role.

1.2 Structure

This sub-manual is part of a set of 6 manuals and a Gate Review Guideline, which collectively give an overview of the full Project Lifecycle Process (PLP) and then go on in more detail, through the sub-manuals, to describe the activities and requirements of each separate phase of this Project Lifecycle, as applicable and appropriate to capital projects within Transnet. The six manuals are:

- Overview
- Conceptual study (FEL-1)
- Pre-feasibility study (FEL-2)
- Feasibility study (FEL-3)
- Execution (FEL-4)

- Close-out
- Gate Review Guidelines

The study or Front End Loading (FEL) phases are key to the successful implementation of the execution and finalisation phases. The "Front End Loading" terminology is fairly commonly used to illustrate the value and opportunity that may be realised by doing upfront work in the early study phases of the Project Lifecycle when there is still the potential to influence the successful outcome of the project.

While project management is obviously a key component of the overall Project Lifecycle Process and is the glue that pulls together the various activities that drive successful project outcomes, the PLP manuals do not intend to describe all the traditional Project Management functions and activities that are common to the various project phases. Rather, they sketch the requirements for project delivery within the Transnet environment in a manner that allows a Project Manager (whether experienced or new to this field) to gain an understanding of what is required when dealing with projects in Transnet. These manuals are therefore intended to supplement the project management skills of the Project Manager.

Each phase is broken down into key activities that are relevant to the purpose of the particular phase as depicted in Figure 1-1 below. These activities are complemented by activities relating to project set up, including project controls, and Close-out and can be broadly related to the Project Management Body of Knowledge (PMBOK) process groups of *initiate, plan, execute, measure and control, and close out*.

Each activity has a number of topics that specify a requirement, define this to the reader and describe the mechanics of how the requirement should be achieved. The manual is written in a way that clearly sets out the boundaries for the particular study phase and also describes the inputs to, and the deliverables from, this phase.

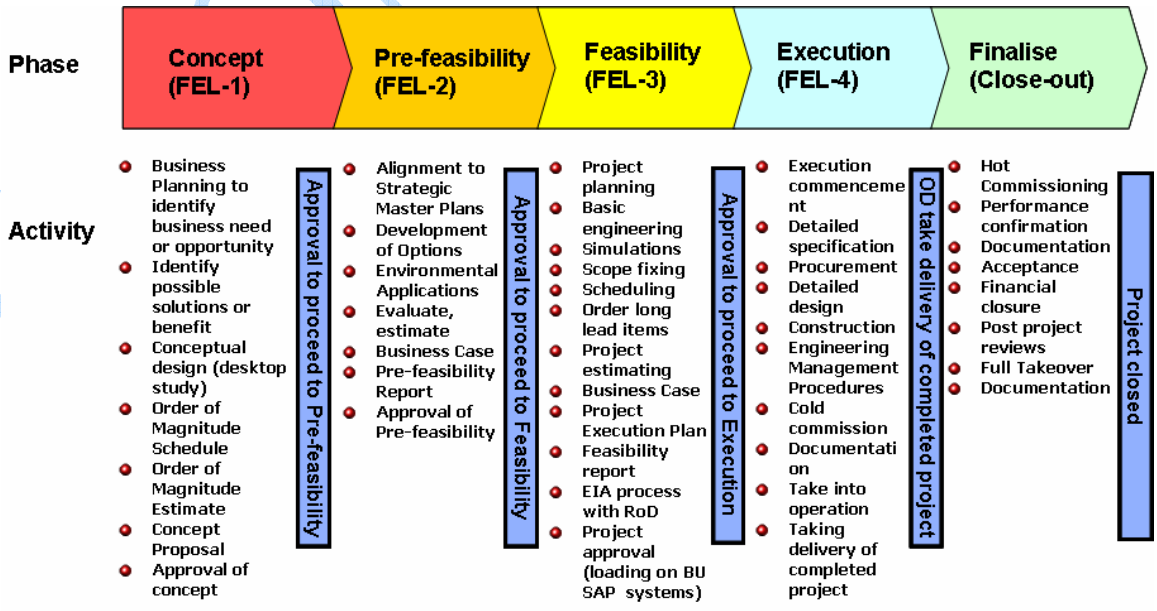

Figure 1-1: Project Lifecycle Process

1.3 Benefits

While being one of a set of six manuals, this particular Sub-Manual can be used independently when dealing with a Pre-feasibility Study, however it would undoubtedly be more beneficial to the reader if read in conjunction with the Overview Manual in order to more fully understand the phase in the context of the entire Lifecycle.

1.4 Project Management Function

1.4.1 Projects

Projects are usually implemented as a means of achieving an organisation's strategic plan and business objectives. Projects differ from operations in that operations are ongoing and repetitive while projects are temporary and unique with a definite beginning and a definite end.

Organisations performing projects will usually divide each project into several *project phases* to improve management control and provide for links to the ongoing operations of the performing organisation. Collectively, the project phases are known as the *Project Lifecycle*.

1.4.2 Project Management Role

Project Management is the application of knowledge, skills, tools, and techniques or procedures to project activities to meet project requirements and includes:

- **Initiating processes** - authorising the project or phase
- **Planning processes** - defining and refining objectives and selecting the best of the alternative courses of action to attain the objectives that the project was undertaken to address
- **Executing processes** - coordinating people and other resources to carry out the plan
- **Controlling or Evaluating processes** - ensuring that project objectives are met
- **Closing processes** - formalising acceptance of the project or phase

Typically Project Management also involves the meticulous management of the following interface environments:

- Competing demands for: **scope, time, cost, and quality**
- Stakeholders with differing needs and expectations
- Specific identified requirements

The project manager is the single point of responsibility and accountability for project performance. The project manager will have the responsibility, upon receipt of project performance criteria or "User Requirements Specifications" from the Owner, to effectively translate these requirements into project development and implementation while providing periodic, accurate reports on safety, progress, budget, status and quality of the work back to the Owner.

In order to be a successful project manager, desirable traits include leadership, communication, decision-making and planning abilities. As projects become larger in scale or become programs (multiple projects associated with a certain Business or Operating Area), acumen for business, contract and commercial management is also desirable in order to take advantage of market opportunities with the potential to positively impact project performance.

In order to provide leadership and management of the PLP, it is important for Project Managers to develop a working knowledge of each of the practices contributing to project execution. It is not a requirement to be competent or a subject matter expert in all of the practices although many project managers will have subject matter expertise in one or more of the practices. Many of the high performing project managers have during their career paths had significant exposure to various project practices and therefore have gained insight into practice working details. The accumulation of that knowledge combined with the ability to integrate the functionality of the individual practices allows project managers to plan and lead the work effort to a successful conclusion.

1.4.3 Project Organisation Development Responsibility

The Project Manager will communicate requirements and provide leadership to a professional project team that will source either from his own organisation or that of a third party organisation. The Project Manager will have the responsibility to develop and implement an organisational structure fully capable of managing and performing all necessary project activities leading to implementation and start-up. Project organisations may be integrated, composed of Owner and Transnet Projects personnel, or monolithic, where Transnet Projects provides a comprehensive project team. Project managers must be effective managers for either of these project organisation structures. Organisationally, the project manager is responsible for assuring roles and responsibilities are fully defined for each of the project participants regardless of origin and for setting the mode and detail of communication and document distribution. An effective project organisation embedded with necessary capabilities, clear authority and reporting lines and skill sets is one of the keys to successful project outcomes.

To this end the Project Manager will also be responsible for and have a leading role to play in the staffing process to select and mobilise suitable personnel to fill the defined organisation structure whilst being mindful of the schedules and budgets for the project. He will also be responsible for the process of training personnel as well as managing them through the project structures as well as monitoring and reporting on their performance. Finally he will be responsible for the process of demobilising the personnel from the project on closure.

The project organisation must be highly communicative and transparent to promote a degree of flexibility and capability to identify obstacles and challenges to project performance and develop and implement short and long-term plans and actions to methodically overcome any of these issues. The Project Manager must cognitively monitor organisational performance and develop and implement team-building events to extract the full measure of performance from the group and eliminate any dysfunctionality.

Project organisations will evolve over the course of the project. In the early stages of the project there is a greater bias towards technical development issues hence there is a preponderance of technical subject matter experts to conceptually develop the scope of the project and assure its compliance with the expected functionality. Later in the project development, the majority of project participants will tend to be experienced planners, engineers and construction personnel as the comprehensive scope of work is defined, fully planned and implemented in a manner that meets the expected quality of workmanship, materials, functionality and start-up criteria. Project managers are required to have the ability and skill sets to operate in all project phases.

1.4.4 *Project Lifecycle Process – The Project Manager's Best Friend*

The Project Lifecycle Process or PLP provides a structured, robust approach to project planning and execution. Organisations such as Independent Project Analysis (IPA) and the Construction Industry Institute (CII) are international in their scope and provide benchmarking and research associated with project execution utilising the Project Lifecycle Process and fully support execution of projects in this manner. The PLP Methodology is the result of project experience gathered over time and distilled to a set of best practices supporting appropriate and successful project outcomes.

The methodology associated with the Project Lifecycle Process facilitates high functioning project teams providing a structured approach to development and execution of the projects. However, the Project Lifecycle Process is neither prescriptive nor rote and requires project management expertise to effectively implement the methodology within the project organisation. The Project Manager must ensure that the fullness of the methodology is implemented defining anticipated deliverables at each phase of the project, performing the required reviews and monitoring and expediting when required.

The most significant aids to a project manager are a valid project execution methodology and experience. The Project Lifecycle Process (PLP) is a robust project execution methodology that utilises an established practice of dividing the project into manageable phases aligned with developing a concept (FEL-1), investigating project options and determining the single, most optimal, option to carry forward to definition (FEL-2), comprehensive project definition and planning (FEL-3) and implementation (FEL-4) and Close-out. This is the subject matter of these documents, providing an Overview Manual describing the various practices associated with the PLP, Sub-Manuals for each of the project phases and Gate Review Guidelines defining the expected deliverables status at the end of each phase. The Project Lifecycle Process is a methodology that has been developed, refined and successfully deployed over a large period of time and applicable to projects of any scale.

All facets of project development and implementation must be considered during execution in order for the project to be successful. The inputs and outputs of each practice must be carefully monitored to ensure conformance with the project goals and objectives and to assure that the each practice facilitates the downstream users by delivering quality work in a timely and comprehensive fashion. For example, engineering deliverables must facilitate the procurement and construction activities in accordance with the project plan and schedule. The project manager must assure this transfer of information occurs as expected and monitors this process for any disruption or delay. To control the work process, each of the practices must be organised into tasks and sub-tasks associated with the way the work will be executed and then monitored on a regular basis to determine the quality, cost and schedule performance of each task. Trending and forecasting is necessary to demonstrate either conformance to the plan or early indication of deviation from the plan in order to proactively take corrective action.

The Overview Manual provides description of a number of key practices necessary during the development of a project. Each of these key practices must be integrated in order for the project to perform well. Each technical or project management and services related group or practice has a set of documents, reports, calculations, inspections, etc. that defines their work by each project phase. These items are termed deliverables. It is important to note that deliverables increase in accuracy from concept through implementations and the level of completion and accuracy of these deliverables is defined by phase to successfully achieve the intent of the phase. The PLP Gate Review Guidelines provide a comprehensive definition of deliverables status by phase.

Deliverables, for example general arrangements and layouts, are dynamic and have appropriate starting points and sequence in the Project Lifecycle Process. All documentation necessary to

implement a project or utilised for planning and decision making have appropriate start and finish dates within the sequence of project development and implementation. Failure to recognise the necessary deliverable requirements by phase or the sequence of production or accuracy or quality necessary at each phase will impart risk into the project that can result in cost overruns or delays. It is important for Project Managers to be completely familiar with the full set of requirements by project phase so that the activities required to produce the work are planned and assigned appropriately.

1.4.5 Project Set-up – First Step or Worst Step

Generally, the determination of whether a project will be successful or not is the quality of project set-up. Once projects are started poorly, it is generally very difficult to recover and place the project back on a solid foundation. It is important to have a clear definition of the scope of work, functionality, and anticipated outcomes at the initiation of the project. Project managers have this sole responsibility and this responsibility includes but is not limited to planning, organisational development, personnel recruiting and development, communication matrix, assessment of necessary skill sets, working knowledge of practices, typical timeframes for completion of the work, etc.

Generally, projects are initiated on a technical basis in accordance with a User Requirement Specification (URS) determined by an Owner (Operating Division) describing the expected project outcome in terms of its functionality and operations. The URS also provides constraints detailed in a Business Case and will be updated as each of the early phases of the project are concluded and better definition becomes available.

Project managers must ensure the project team fully comprehends the starting point and inputs and the scope and accuracy of the project phase output. It is very important these issues are well documented and investigated thoroughly to remove any lack of clarity either to starting point or outcomes. It is also important to note that project teams may or may not proceed to the next phase of work due to any number of reasons. Therefore, it is incumbent upon the project team lead by the Project Manager, to fully document the concluded phase of work in such a manner as to allow a different team of personnel to initiate the next phase of work with clarity and on a firm basis.

Project set-up is required for each phase of the Project Lifecycle Process and becomes more involved and complex with each succeeding phase of the PLP. Obviously, the Feasibility Phase (FEL-3) becomes the most complex in terms of planning and definition and requires significant effort and skill from very diverse technical and managerial personnel.

It is important enough to reiterate that Project Set-up is a critical activity to the success of a project.

1.4.6 Planning – "Failure to Plan is a Plan to Fail"

The three legs of successful projects are Process, Personnel and Planning. The PLP methodology and quality of professional personnel are significant factors in the success of the project. However, without appropriate planning, the methodology and highly skilled personnel will fail to realise their full potential to achieve the expected outcome of a project or program.

Project Managers have the lead role in developing a project plan whether that plan is associated with the execution of each of the PLP phases or specific to the execution of the project once work at the site commences. Each facet of the work must be properly understood in detail, integrated with other activities and provided with appropriate duration of time to allow the work to be completed. Project activities are interdependent and have an appropriate sequence of completion. Planning projects of

significant scale is a complex interactive exercise that should produce doable but challenging completion dates.

Planning begins with the development of the Work Plan (early phases) or Project Execution Plan (at FEL-3 and 4), a document that sets forth the scope, schedule and budget of the project (whether an early phase or the project-specific implementation plan), determines how each practice will progress through their work activities and has a method of determining actual progress, trending and forecasting and expediting.

Key elements of this plan are discussed in the project management procedures including but not limited to safety, quality, project procedures, communication, reporting etc.

1.4.7 Change Management – Safeguard Cost and Schedule

During the early stages of the project development, options are investigated and explored until the most viable of the options is selected for definition and implementation. During these periods the majority of the project development activities are time-based rather than production based. It is expected during FEL-1 and FEL-2 to explore a number of reasonable options and several changes to project scope may occur. When FEL-3 is being developed, only one option as determined during the work of FEL-2 is being fully defined and planned for implementation during FEL-4. If significant options or portions of the work remain partially undefined or under-defined it is appropriate to continue this investigative work until a clear option emerges.

During FEL-3 critical technical documents will be frozen or held firm generally only requiring certified supplier/vendor information for completion. Any significant change to any of these critical documents such as general arrangement, layouts, key process-defining documents, equipment lists etc. will likely introduce delay, cost overruns, reduced functionality or other detrimental issues. At this stage (controlling/ evaluation stage) all should understand the importance of avoiding or resisting change after plans for FEL-4 have been finalised and the work has commenced.

FEL-3 simply put is “Plan the Work”. FEL-4 simply put is “Work the Plan”.

1.4.8 Risk Management

All projects involve risks. Safety, labour, commodity pricing, contractor availability and skill sets, financial, political, environmental and time frames are a few of the many risks that will be encountered on the project.

Risk is any variation from an expected or planned outcome, whether that is negative (threats) or positive (opportunities). The treatment of risks can be mitigation of threats or exploitation of opportunities. The term risk treatment refers to appropriate dealing with either positive or negative risks.

In the complete set of Project Manager Skill sets will be the ability to lead Risk Assessment and Management exercises involving professionals specifically dedicated to this practice. Both Qualitative and Quantitative Risk Workshops will be conducted to identify all of the risk elements, establish treatment plans and ensure sufficient cost and schedule allocation occurs to accommodate the risk element.

Project Managers will conduct risk reviews periodically throughout the project including during the early phases of project development. The early Risk Reviews will allow the project to sufficiently accommodate risk treatment into the planning activities while Risk Reviews in the latter stages of the

project will measure the effectiveness of the planning and take corrective action where and when necessary.

1.4.9 Human Resources

Projects are executed by teams of people led by the Project Manager through an organisational structure. In the setup phase, one of the key functions of the Project Manager is Resource planning for the project. This involves organisational design, and the timing and costs of the needed human resources to meet the schedule and budget. During project execution, the function switches to recruiting and training/developing the project team. This leads into managing the personnel through the project structures while monitoring and controlling the project. Finally the personnel need to be demobilised from the project in accordance with the Resourcing plan for the project.

1.4.10 Communication

A large number of projects fail because communication, whether to the Owner or the Project Team, was overlooked as a key element of success. Project managers must develop a plan for communication and reporting including clarity and transparency in report documents. Communication matrices are required to assure that the appropriate information is delivered in a timely manner and in a format that facilitates rapid access and cognisance of the information. As such, project managers should have significant written and verbal skills.

1.4.11 Project Social Environment

The Project Manager has a tremendous influence over the morale and environment of the project team. The Project Manager is primarily responsible for ensuring discipline, technical quality, safety enforcement, conformance to cost and schedule and, ultimately, project outcome. The ability of the Project Manager to achieve high functioning project teams is a critical aspect of successful projects. The project manager must always demonstrate leadership, maturity, fairness and discipline to all members of the team. In addition, the project atmosphere should be one where personnel have an opportunity to excel, stretch their abilities, and build their career paths. The majority of successful projects have a palpable positive energy where enthusiasm and desire to succeed are highlights. The project manager can create this atmosphere and social environment and, if so, has a significantly better chance of success.

1.5 Business Planning

In order to remain competitive and ensure long term sustainability, Transnet management has to invest in activities that have a positive shareholder return and are acceptable to most stakeholders.

A company's value is strongly determined by its ability to generate cash flow over the long term. Its cash flow generating capability is determined by its long term growth and its ability to generate returns on invested capital that exceeds its cost of capital. When management make major decisions it is therefore necessary to consider the economic impacts of those decisions.

Projects are essentially born out of a strategic imperative, the need or opportunity associated with improving the commercial or investment side of the business. This need or opportunity usually involves capital investment and therefore it is necessary to evaluate the viability of that investment prior to embarking on costly project expenditure. Those responsible for sponsoring the project will wish to test the viability through the study phases by issuing a list of User Requirement Specifications (the project scope or charter) which includes investment related goals, and these will need to be responded to through the Business Case. The Project Manager's role will be to conduct the study

phase in a systematic and accurate manner in accordance with these Project Lifecycle guidelines, produce the most accurate results possible and report these back to the Investment Managers through the Study Reports which will inform the Business Case. The evaluation of the financial results and establishment of viability will usually vest with those who sponsored the project in the first place.

Chapter 2

2. INTRODUCTION TO PRE-FEASIBILITY STUDY

2.1 Purpose

The primary objective of a Pre-feasibility Study (FEL-2) is to further develop the recommended options identified in the Conceptual Study (FEL-1) with the purpose of selecting a single option for project definition. The Pre-feasibility Study Phase (FEL-2) will also validate at a high level whether the selected option is viable against the Business Case and, if immediately apparent that it is not, may result in Project Close-out.

Definition of the level of detail required for a pre-feasibility study may vary from one Owner to another. In general, the Transnet Projects standard for pre-feasibility studies is the preliminary engineering phase, delivering a cost estimate to the ± 20% accuracy level.

2.2 Process

The Pre-feasibility Phase (FEL-2) is driven by the Operating Division, initiated either through Transnet Strategy or any of the operational levels where a specific problem, need or opportunity has been identified. The study may be implemented either within the Operating Division or by Transnet Projects. For clarity, this manual is based on the study being undertaken by Transnet Projects, with the Operating Division as the Owner.

2.3 Terminology

For the purposes of these manuals, each of Transnet's Operating Divisions are referred to as either the "Operating Division" or the "Owner".

The organisation executing the study/project is referred to as Transnet Projects.

Chapter 3

3. KEY ACTIVITIES IN PRE-FEASIBILITY PHASE

The key activities for the Transnet Projects FEL-2 Pre-feasibility Study Phase are listed in Figure 3-1 below. There are similar diagrams for each project phase, each with their own set of activities, deliverables and actions. This document is largely structured in accordance with these sequences and contents.

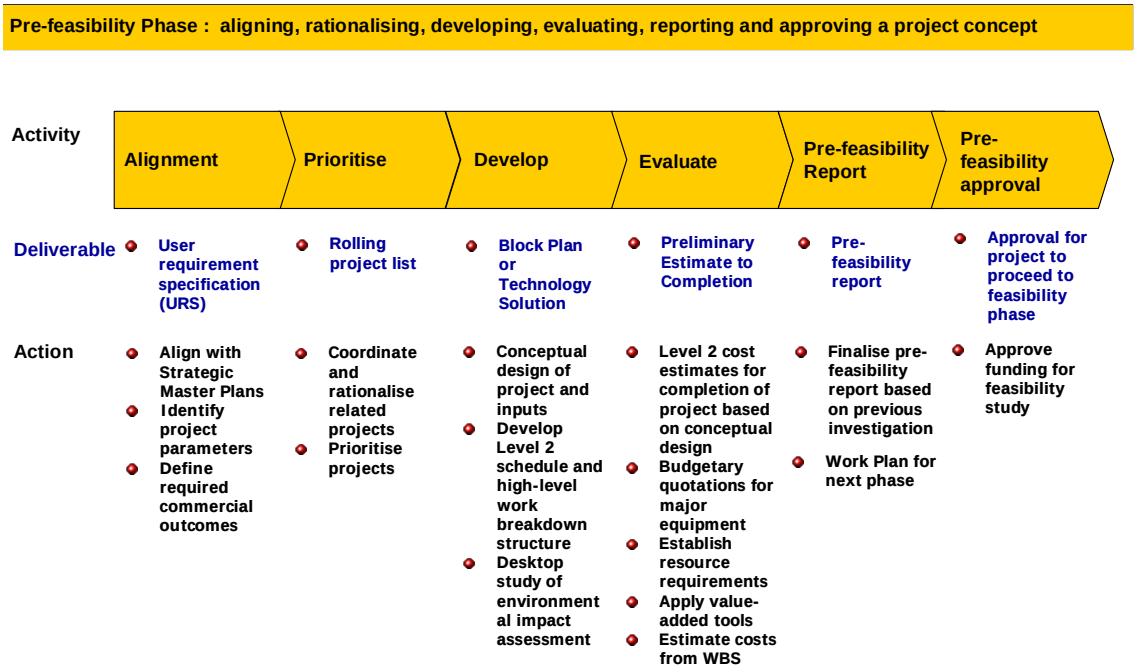

Figure 3-1: Key Activities in Pre-feasibility Phase

Chapter 4

4. STUDY LEADERSHIP

The study begins with the appointment of a person to act as the single point of responsibility to coordinate and manage the project. This appointment should be made at a time that allows the person to be involved in setting the study context and in the development of the execution strategy. Typically a senior manager in Transnet Projects and his counterpart in the Operating Division have already been identified when the specific study was being formulated. The logical sequence of personnel appointments is set out below.

The subsequent activities of "Establish Study Context" and "Study Set Up" will serve to define the wider study organisation and counterpart Owner's Team (if appropriate) requirements.

The relationships between the key roles are illustrated in the generic study organisation chart below, Figure 4-1:

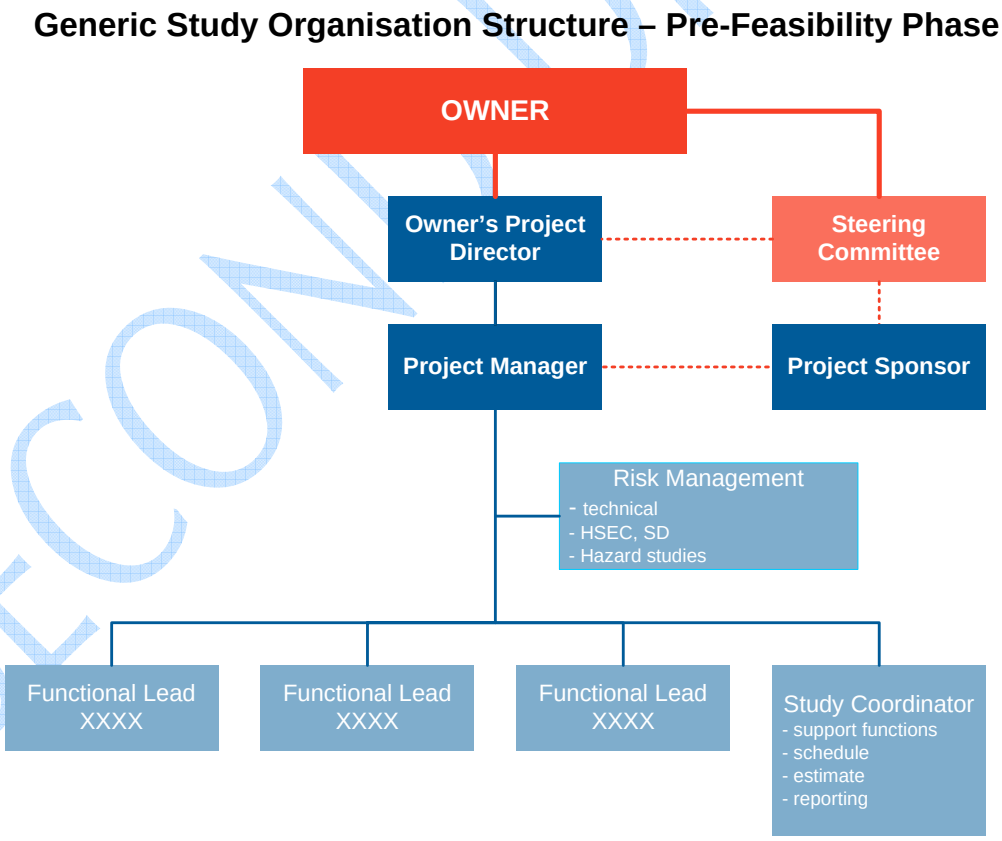

Figure 4-1: Generic Study Organisation Structure - Pre-feasibility Phase

4.1 Project Sponsor

Senior representatives of Transnet Projects identify and appoint a suitable representative to the role of Project Sponsor.

The Project Sponsor provides senior support and direction to the Project/Study Manager and maintains senior management contact with the Owner. The Project Sponsor reports internally to Transnet Projects senior management and to the Owner's management team and participates in the Project Steering Committee.

The Sponsor meets regularly with the Project Manager and with the Owner's Project Director.

4.2 Project Director

Senior representatives of the Owner will appoint a Project Director to act as the Operating Division's responsible person for the execution of the study and to provide a single point of contact for the Project Manager to report to.

4.3 Project Manager

In conjunction with Transnet Projects Senior Leadership, the Project Sponsor identifies and appoints a suitably qualified individual to the position of Project/Study Manager.

The Project Manager is responsible for:

- Define the scope in conjunction with the Project Director
- Managing the study to meet the Owner's goals, objectives and expectations
- Resolves problems and coordinates the final turnover of the study to the Owner
- Managing, coordinating and administering the study
- Supervising the development of budgets and schedules
- Monitors progress and initiates action to assure schedules are met and work is performed within budget
- Managing Transnet Projects business interests, to include: the prime contract, revenues and receivables

Chapter 5

5. ESTABLISH STUDY CONTEXT

The Pre-feasibility Study (FEL-2) Phase of a project is to proceed only upon the project having successfully passed through Concept Approval.

5.1 Confirm Conceptual Study Phase Outputs

The outputs from the Conceptual Study Phase will provide the basis for proceeding into Pre-feasibility, including a Pre-feasibility Study Work Plan and the Owner's original User Requirements Specification.

In the event that these documents are unavailable then the Pre-feasibility Phase is not to be initiated until they have been prepared and all FEL-1 activities – including approval to proceed to FEL-2 – are completed.

5.2 Confirm Required Commercial Outcomes

The business case objectives need to be clearly defined for the Project Team. This should be done by the Owner's team. The vehicle for communicating these objectives is the User Requirements Specification.

The parameters that are to be defined include:

- Deliverable:
  - Business case objectives (contained within User Requirements Specification)
- Action:
  - Identify and define Business Case parameters

5.3 Operational Readiness

5.3.1 Purpose

The objective of the Operational Readiness process is to reduce overall Lifecycle costs whilst maximising start-up effectiveness and subsequent performance. By integrating the technical design and business development activities, the project and operational teams build the appropriate level of business, organisational, operational, sustainability and systems capability required to enable effective start-up and performance.

Various facets need to be considered during the technical development of a project including functions such as the Operating Division's business organisation, operations and maintenance structures, supporting infrastructure and systems, and sustainability criteria. All of these functional areas are interrelated and should ideally be developed throughout the project phases so as to ensure an optimal, integrated design for the operational phase and a resultant new facility that can ramp up quickly to meet and sustain its performance expectations.

The strategy for the operating division, typically defined by the Owner, must be supported by a documented set of future operational requirements (through the User Requirements Specification), functional designs and solutions (identified through the project development process). The project

team needs to actively engage with necessary company (and operational) role players throughout the project to ensure that the technical aspects of the final solution conforms to the future operational need.

The Operational Readiness process occurs progressively throughout each phase of the Project Lifecycle. Given the nature of an FEL-1 study whereby the project is largely focused to determine business case viability, the Operational Readiness workload in this phase is mainly aimed at ensuring that business case considerations have been addressed.

5.3.2 Operational Readiness Plan

An Operational Readiness Plan needs to be developed, considering five areas:

- Enterprise Strategy and Requirements - The project is required to ensure "fit" with the rest of the company in which it operates. (This is generally conducted during the FEL-2 phase)
- Macro Environment - It is important that the operating solution can operate in the larger company and regional community. Stakeholder expectations and management form an integral part of this work stream
- Operational Readiness Effectiveness - Identification of design opportunities that ensure downstream operational supporting systems are effective. Area of influence: Prior to final design, before project implementation
- Operational Preparedness - Ensuring that the project builds in operational supporting functionality. A detailed operational preparedness plan is the deliverable
- Assurance - The key operational readiness deliverables over the various phases need to be defined, monitored and communicated at regular intervals, to the project sponsors and key stakeholders. This communication fosters confidence in the projects success and "fitness"

5.3.3 Strategic Dimensions

Strategic analysis / determination of how the future operation can successfully be supported needs to be addressed in the study findings, ensuring that the investment is sufficiently robust to stand alone.

Strategic dimensions to be considered and documented in the User Requirements Specification may include:

- Cultural Issues
- Business Influence
- Country Values and Norms
- Social Strata, Mobility and Religion
- Natural Infrastructure
- Physical Infrastructure
- Government
- Political System
- Legal and Property Rights
- Legal System

- Bulk Utilities Infrastructure (Water and Electricity)
- Technical Support
- Medical
- Housing and Amenities
- Human Competency and Capacity
- Tolerance of Expatriates
- Training

5.3.4 Responsibilities

The Operational Readiness process is normally the responsibility of the Owner's Team. The Operational Readiness process seeks to align the project team with the Owner's requirements and formalise the Owner's Team role as the Operational Readiness team.

5.3.4.1 Approach

At the start of FEL-1 the Operational Readiness team is convened and is responsible for:

- Scoping and defining the Operational Readiness guidelines for each of the phases of the project
- Ensuring that the tasks defined in the Operational Readiness development guideline are carried out during each of the phases of the project Lifecycle
- Establishing a plan for monitoring the Operational Readiness of the Project through the phases
- Monitoring the Operational Readiness status of the project as described in the plan

5.4 User Requirements Specification

5.4.1 Purpose

The User Requirements Specification (URS) is the vehicle for the Owner to provide the project team with information relevant to the execution of the project that only the Owner, due to an intimate knowledge of the operating plant, may be aware.

The User Requirements Specification is a complete, clear, unambiguous statement of the Owner's requirements in measurable terms, and a key source document in setting the study context and the required commercial outcomes.

A User Requirements Specification nominates the performance targets for the project team to achieve. If these performance targets are not clearly defined and quantified, it is possible that the project team may make incorrect assumptions. As such, the end result may be unsatisfactory to the Owner, or may be far in excess of actual requirements and be wasteful of resources. A well-prepared User Requirements Specification will eliminate these possibilities.

5.4.2 Contents

The User Requirements Specification includes:

- The development context
- Description of the opportunity or challenge
- Demonstration of fit with Strategic and Master Plans

- Business case objectives and benefits (e.g. increased availability, increased service quality, reduction in operating costs, lowering of maintenance costs, improvement in yield, reduction of lost time, etc. – in measurable terms)
- Success factors/evaluation criteria
  - Health, Safety, Environment and Social criteria
  - Financial criteria
  - Physical performance criteria (material types/properties; throughput; operational capacity; operating parameters – hours per day/week/annum; other) – current and future
- Operational Readiness considerations
- Constraints (geographical; physical; technical; existing facilities; operational; community; time; other)
- Limitations (e.g. Owner-mandated constraints: "capacity not to exceed"; "maximum height restriction"
- Assumptions
- Identified potential solution options and outline scopes of work
- Risks (technological, operational security, OHS, industrial, market, environment, consumable, statutory, other)
- Sustainable development objectives and benchmarks (governance, economic, social, ecological)
- Applicable standards (owner and / or other)
- Order of Magnitude investment expectations (capital and operating)
- Time frame for project execution
- Time frame for Conceptual Study completion
- Study deliverables and formats

5.4.3 Deliverables

- User Requirement Specifications

5.4.4 Action

- Owner to develop and issue the User Requirement Specification document to Transnet Projects as a formally approved document

5.5 Commercial Engagement

For the purposes of this manual it is assumed that:

- An invitation to bid for Pre-feasibility Study services has been received from the Owner, accompanied by a User Requirements Specification
- A commercial proposal has been submitted to the Owner, based on the preliminary Pre-feasibility Study Work Plan prepared during the Concept Phase. That plan would have briefly

scoped out the proposed work to be covered by the proposal and described how the work would be executed should the proposal be successful

- The Owner has engaged Transnet Projects (via a purchase order or equivalent commercially binding document)

Chapter 6

6. STUDY SET UP

At the outset of the study, an appropriate governance structure must be set up for the execution of the works. Set up begins with the identification of the key personnel who will provide leadership to the study; followed by the planning process to develop the study Work Plan; within a framework of supporting work processes (risk management, project controls, quality and document management).

Key leadership positions will be assigned at the very start of the project (refer Section 4), prior to establishing the study context. These leads will then drive the execution of subsequent steps in the study process. All the roles for the project team as well as the timing for their mobilisation and demobilisation and associated costs and project employment conditions are defined in the project Resourcing plan.

6.1 Study Organisation

6.1.1 Project Steering Committee

Senior representatives of the Owner and Transnet Projects identify and appoint suitable representatives from both organisations to the Project Steering Committee and nominate one as Chair. Typically there would be 4 members on the Steering committee (although this can vary with project size and criticality): two from the Owner (one of whom is likely to be the eventual "owner" of the operating facility) and two from Transnet Projects (one being the Project Sponsor).

It is the responsibility of this committee to provide high level oversight to the project and provide a mechanism for problem resolution when the project manager and the person to whom he reports on the Owner's side cannot resolve issues.

Meetings are organised on a regular basis in order to oversee the overall execution of the project.

6.1.2 Appoint Owner's Team

The Project Director, in conjunction with the Owner Senior Leadership, identifies an Owner's Team organisation structure suitable to the nature of the project/study and appoints suitably qualified personnel to those roles.

6.1.3 Study Team

The Project Manager, in conjunction with the Project Sponsor and the Discipline Leads, identifies a study team organisation structure suitable to the nature of the project/study and appoints suitably qualified personnel to those roles. Initially the lead positions will be filled. As the Work Plan is prepared the full organisation chart will be defined and the balance of the study team assigned.

6.1.4 Appoint Review Team

The Project Sponsor, in conjunction with the Steering Committee and Transnet's Director – Project Reviews, identifies an appropriate Gate Review team to reflect the nature of the project (size, criticality, technical focus, etc) and ensures that the review process is captured in the study planning.

The Gate Review team leader and the Project Manager agree on the review process, timing and the relevant Gate criteria, as inputs to the study planning step (below).

The process of developing and agreeing the Gate Review criteria is a collaborative process between the Project Manager and the review team leader, intended to build a relationship of continued engagement. The review team leader's role is more one of coach and mentor than judge and jury.

6.2 Gate Review Guidelines

6.2.1 Intent

The Transnet Project Lifecycle Gate Review Guidelines set out the expected standards for deliverables (quality, level of development) at the completion of each Front End Loading Phase. The Gate Review Guidelines are found in the Transnet document management system.

The Gate Review Guidelines are aligned with Transnet's Quality of Estimate Classes (see Estimating Functional Guide to be found in the Transnet document management system) and set out the level of work expected to have been done during a given FEL phase to be confident that the work group have delivered a capital cost estimate of the appropriate quality standard for that FEL phase.

Extracts from the Gate Review Guidelines are presented in Appendix A. Please refer to the Transnet document management system to ensure you are using the current version.

6.2.2 Structure

The Project Lifecycle Gate Review Guidelines have been assembled in two formats within the one document:

- Functional Work Sheets (see example in Appendix A)

  Each functional group (from Health and Safety, Environment and Community, Sustainable Development Design, Civil Engineering, Marine and Rail Engineering, Process Engineering, Mechanical Engineering, etc through to Construction, Commissioning and Value Improvement Practices) has its own dedicated worksheet setting out the deliverables standard to be achieved by that practice/function, and the status by FEL phase. These worksheets typically define the required project phase deliverable status with a single word (e.g. "preliminary", "draft", etc) plus provide a brief description. This one word deliverable status is rolled forward into the FEL Summary Sheets (see below). These functional worksheets provide a mechanism for understanding how each discipline progresses its deliverables from FEL phase to FEL phase.

- FEL Summary Sheets (see example in Appendix A)

  For each FEL phase, the status of the relevant deliverables contributed by each practice/function are extracted from these worksheets and presented in a Summary Table for the specific FEL phase. Each of these Summary Tables may be extracted from the workbook and used as a stand-alone checklist for Gate Reviews.

6.2.3 Use of Guidelines to define Work Plan and Gate Criteria

The Transnet Project's Gate Review Guidelines are used to define the detailed scope of work and defining the Gate 2 requirements. The process is as follows:

- Use a copy of the Gate Review Guidelines for FEL-2 as the working template (see separate Manual)

- The Project Manager and Owner's representative jointly review the deliverables list and deliverables status definitions for FEL-2 and agree which are relevant and necessary to meet the criteria defined in the User Requirements Specification

- They mark up the template to reflect these decisions , thereby creating a profile for the deliverables of the project and sign that off
- They submit the agreed Gate Review Guidelines to the Review team leader for his oversight

These agreed Guidelines provide the basis for:

- The detailed Scope of Work
- The Deliverable List for the study phase
- Defining the required engineering activities, level of effort, cost and duration (schedule) required to complete the study – that is, the Gate Review Criteria
- Developing the Work Plan

This process can be iterative to arrive at a match between time, cost, level of effort and expected estimate confidence (accuracy). However, it must be agreed at kick off between the Project Director, Project Manager and the Gate Review Team so that the study team's performance and the quality of the result can be measured against an agreed basis.

6.3 Gate Review

6.3.1 Purpose

The Project Lifecycle Management Process is a means of effectively controlling a project by breaking it into manageable stages or phases.

The Gate Review process provides a mechanism for management reviews of critical project outputs (engineering definition, capital estimate, schedule, EPCM fees estimate, execution plan, risk management), at the completion of each phase of a project's development to ensure project performance (development and execution) is as per plan. That is, towards the end of the relevant project development phase (FEL-1, FEL-2, FEL-3 or during the Execution Phase).

The purpose of the Gate Review is to ensure the quality of deliverables and completeness of the study.

The Gate Review provides an input to the assessment of the viability of the project.

6.3.2 Gate Description - Gate 2 (end of FEL-2)

The focus of FEL-2 is on identifying the most viable option identified and completing sufficient work to determine the potential for project viability. The framework for the Feasibility Study is established and a decision is required whether to proceed to Feasibility Study (FEL-3) Phase.

6.3.3 Gate Review Process Overview

The Gate Review process broadly comprises the following steps:

- Preparation of documentation prior to the review
- Selection and briefing of the Gate Review team
- Project team internal preparation
- Gate Review workshop

- Quantitative risk workshops and determination of capital cost contingency (may be done as part of the Gate Review process (see agenda) but should preferably be done by the project team prior to a Gate Review
- Operations Division and Transnet Projects Senior Executive(s) review and approval to release documentation
- Gate Review Report

The core of the Gate Review is the review workshop, which will use the PLP Gate Review Guidelines as the basis of the review and the review agenda.

No critical final stage documents (capital estimate, EPCM estimate, schedule, execution plan) and reports are to be formally issued to the Owner prior to the Gate Review.

6.3.4 Gate Review Criteria

Definition of the Gate 2 requirements will take place during the study planning and Work Plan development steps following the process in Section 6.2.3 above.

The intent is to clearly define and agree at the start of the work the criteria to be applied during the Gate Review to assess whether the study has met its objectives.

These criteria must be resolved at the study planning phase to ensure both Transnet Projects and the Owner are aligned on the work that is required to meet the Owner's expectations.

6.3.5 Gate Review Outcomes

The Gate Review team will consolidate their observations and findings regarding the work done during the phase and arrive at an assessment that the work done has achieved one of the following statuses:

6.3.5.1 Approved

- All key deliverables meet the required project phase quality standard
- No further action is required before proceeding to Business Case assessment

6.3.5.2 Hold - Further Minor Verification Required

- Not all key deliverables meet the required project phase quality standard
- Proceed to Business Case assessment but complete certain requirements identified during the review process

6.3.5.3 Fail - Further Major Verification Required

- Insufficient deliverables meet the required project phase quality standard
- Do not proceed to Business Case assessment
- Complete specific requirements identified during the review process, updating previous data and / or reports and re-submitting these for another Gate Review

Note: "Key deliverables" are those that - if not met - pose an impediment to the next project phase. The judgement of the Review Team in determining the overall assessment must be discussed with the Project Team at the time of drawing the conclusion.

Typically the guidelines are not used to "pass" or "fail" a body of work but more to a) focus on what work is lacking and needs to be addressed up before completion, and more particularly to b) understand where the soft parts of the work are and how that needs to be recognised in the estimate and risk assessment/contingency analysis activities.

6.3.6 Plan Gate Reviews

Gate Reviews are to be planned at several stages during the study, depending on the scale and complexity of the study.

As a minimum, there shall be two reviews:

- Interim Gate Review, held mid-way through the study, to confirm that the team is on track to achieve the level of deliverables development agreed at the start of the study. Timing is set to allow sufficient recovery time should this review find serious flaws or obstacles to achieving the targeted standards
- Final FEL-2 Gate Review. Conducted at study completion, to ensure the work has been completed in accordance with the Work Plan, meets the requirements of an FEL-2 study and the Gate Review criteria set at the commencement of the Study Phase, and provides the targeted level of confidence in the outcomes (capital estimate)

6.4 Conduct Study Planning Session/Kick Off Meeting

Once appointed the Project Manager is to hold a planning/ alignment session to launch the study.

The purpose of this session is to ensure that all relevant personnel are aware of the scope of services, liabilities and proposed project plan.

The agenda for this meeting should include the following:

- General Information
- Owner revised User Requirements Specification
- Pre-feasibility Study Work Plan
- Initiate the development of the final Work Plan from the PFS Work Plan developed in the Concept Phase

Planning session participants:

- All relevant functional and discipline leads and key nominated persons
- Owner representation as appropriate
- Other key stakeholders

All key documents are to be available for this meeting, e.g. URS, plot plan, flow diagrams, etc.

The Project Manager will chair this session and ensure that the outcomes are adequately documented.

6.5 Confirm Work Plan for Pre-feasibility Study

The Work Plan developed during the Conceptual Study Phase (FEL-1) will be reviewed to determine that it is compatible with the agreed scope of work and provides a clear baseline of proceeding with the Pre-feasibility study. Any changes will be incorporated into the final plan.

6.5.1 Purpose

A Work Plan is required to guide the study team in terms of focus areas and actions. The term Work Plan is synonymous with Project Execution Plan, and other designations used in the engineering and construction industry to describe how the Project is going to be executed. As the full execution plan is not developed until FEL-3, the term "workplan" is applied to the 3 study phases prior to execution.

The Work Plan should include a specific scope of work for the study including items such as number of options to be considered and statement of the effort to be applied to the analysis of each option. It needs to be detailed enough that the team knows what they need to do and can identify where they are doing more or less work than envisaged in order to be able to drive the change management process.

The development of the Work Plan should be initiated in the FEL-1 study and report and continued in the Planning session and responsibilities and "due dates" assigned in that session.

6.5.2 Input Documents

The critical documents required to develop a pre-feasibility study Work Plan are:

- The draft Pre-feasibility Study Work Plan and the Owner's User Requirements Specification, revised as necessary, both prepared in the Concept Study Phase. It is possible that at the onset of the pre-feasibility project phase that not all these documents are available. It is then recommended to conduct a project planning exercise at the beginning of the project to complete the list of input documents prior to starting any pre-feasibility level activities
- The agreed, signed-off Gate Review Guidelines

6.5.2.1 Deliverable:

- Confirmation of Pre-feasibility Study (FEL-2) inputs from Concept Phase

6.5.2.2 Action:

- Confirm input documents available
- Validate Concept Study (FEL-1) deliverables against status specified in FEL-1 Guidelines

6.5.3 Work Plan Contents

The Work Plan at Pre-feasibility Study Phase should include the following minimum requirements:

- Introduction and Objectives of Study
- User Requirements Specification
- Description of Existing Facilities/ Current Environment
- Scope of Work - Facilities Description
- Scope of Work to be undertaken by the Project Manager, by others
  - Options to be carried forward to the Pre-feasibility Study PFS evaluation

  - Assignment of responsibilities
- PFS deliverables, developed from the Gate Review Guidelines
- A copy of the signed off Gate Review Guidelines
- Resourcing Plan: define study team, responsibilities, locations and mobilisation/demobilisation timing
- Schedule for performing the work scope
- Estimate of costs, workhours and other resources required to complete the work
- Approach and Content
  - Methodology for developing and assessing options (including annotation of the Gate Review Guidelines to define deliverables to be developed for each option)
  - Preliminary engineering approach (packages, inputs, methodologies, outputs) defined
  - Risk management
  - Project controls and reporting
  - Quality management/ reviews
  - Health and safety
  - Environmental management
  - Communications
  - Document/data management
  - Close-out
- Table of Contents of Pre-feasibility Study report

6.6 Approval by Owner

Where the engagement of the Project Manager to undertake this study has not been the subject of a formal, commercially-based bid or proposal cycle - then the completed Work Plan should be submitted for Owner approval and formal advice to proceed (including approval to commit funds on the Owner's behalf) prior to the study proceeding.

6.7 Controls

Prior to commencement of work on the study a framework for controlling the study cost and schedule must be established. This framework should relate directly to the scope of work for the study included in the Work Plan. This framework should be updated on a regular basis as discussed below and a trend/change management program implemented to track, and where appropriate approve, all changes from the baseline including not just scope changes but also adjustments to estimates and assumptions.

6.7.1 *Update Facilities Description and Initial Facility Breakdown Structure (FBS)*

The Facilities Description will be prepared by the engineering team and will describe the selected option or options at a relatively high level of detail. It should address key requirements and materials/ equipment in addition to geographic locations and major layout issues.

An initial FBS should be established to provide the framework for scope definition and project controls. Where the work relates to an existing facility the FBS will typically be tied to the FBS for the existing facility.

6.7.2 *Schedule Management and Progress Measurement*

A schedule should be prepared for the study. This schedule is to manage the scope of the study and is a different schedule to that prepared as part of the study and described in Section 6.5.3. For a pre-feasibility study the schedule will be simple and may even be prepared as a simple bar chart in a spreadsheet, although more normally it would be prepared in MS Project or Primavera. The intent is to ensure that the study is completed within the committed time frame and that any slippages are identified as early as possible in order to allow for a proactive response to correct the slippage or early advice to stakeholders of a delay.

To this end the schedule should be statused either weekly or fortnightly dependant upon the overall study duration and the criticality of the activities. Any activity not completed on schedule must be reviewed to assess the impact on both the study completion and key intermediate dates. It would be expected that the duration of the majority of activities in the schedule should not exceed two times the update frequency.

For a pre-feasibility study, overall study progress will usually be calculated on the schedule (an alternative is to calculate it based on the workhour report). Each activity should be weighted by the expected workhours and the percent complete of the activity updated each update cycle. Actual progress should be reported each time the schedule is updated and compared to the planned progress. The planned progress is calculated based on the baseline schedule and the workhour weightings used in the baseline schedule.

In particular the schedule should identify the due dates for key inputs to, and outputs from, the pre-feasibility study including both internal and external stakeholders. The schedule should allow adequate time for reviews (including Gate Reviews) and consequent update of the study prior to formal issue of the report.

6.7.3 *Cost and Workhour Management*

At the time the Work Plan is prepared an estimate of the workhours required to deliver the study together with associated costs including expenses and third party costs (consultants, test and survey work) will have been prepared. This estimate provides the baseline against which the cost performance of the study is measured.

A cost report will be prepared at least monthly which records actual incurred workhours and costs against this baseline. Each month the estimate will be updated to provide a current forecast of the cost at completion. This forecast will reflect all trends and committed changes to the study including the impact of changes to the schedule.

Workhours will be a major driver (if not the sole driver) of the overall study cost and thus the cost control effort needs to focus on actual versus budget hours. It is also necessary to track and control

the average hourly rate against budget to ensure that changes resulting in differing labour mix (senior vs. junior) or hourly cost are properly captured.

6.7.4 *Change Management*

The scope, cost and schedule for the study are defined in the Work Plan. A change approval process needs to be operated to ensure that work continues in accordance with this scope and execution methodology. For the pre-feasibility study this scope is more defined in terms of objectives and processes rather than physical quantities (e.g. "to select a single option from those options identified in the conceptual study" or "only domestic suppliers will be considered"). Changes to these strategies represent changes to the scope of the study and hence potential impacts on both the study cost and schedule.

In general the intent of the change management process is to prevent change, however if change is demonstrated as beneficial, the intent is to ensure that the change is implemented in a managed fashion with minimum unnecessary impact on the overall study objectives.

6.7.5 *Reporting of Trends*

Trend management is the assessment and reporting of changes to the study estimate and schedule due to the inevitable refinement of the initial baselines as actual costs are incurred. The objective is to identify issues pro-actively together with their full impact on the overall study. Typical issues which would give rise to a trend in a pre-feasibility study include average hourly costs different to those estimated, greater or lesser effort (in terms of workhours) required to perform tasks and delays (or accelerations) in receipt of data from external stakeholders with consequent impact on both schedule and the cost of staff waiting for that data. A process of regular reviews of all actual and potential trends should be established. This may be weekly, fortnightly or monthly dependant upon the nature and scale of the study.

6.7.6 *Document Management*

6.7.6.1 *Purpose*

The primary objective of Documentation Management and document control throughout the Lifecycle of a project is that all documentation / information generated or obtained by or on behalf of the project will be identified and stored (electronically or hardcopy) to ensure:

- Access to all parties involved in the phase
- Traceability and transparency of all decisions taken, and
- Long term historical availability to Transnet
- It is therefore of utmost importance that all documentation, formal or informal, published or just prepared for personal use be made available on the system to establish a complete database for the specific phase of the project

6.7.6.2 *Process*

- Ensure that the project has actually been registered and a project number allocated as this number acts as the main part of the identifier to link all the documentation / information generated throughout the Lifecycle of the project
- Through the National Manager Document Control or the Regional Lead Document Controller obtain access to the database of documentation / information generated during the Concept

Phase of the project in order to familiarise yourself with what has been done during the Concept Phase

- As a project moves through the various phases of its Lifecycle the documentation generated during the phase will increase exponentially and the possibility to loose control therefore increases exponentially as well
- Identify through the National Manager Doc Control a Document Controller for the project. This person will form an integral part of the team and will ensure that proper control and management will take place throughout the specific phase of the project
- With the document controller, set-up the Document Management Environment on the relevant computer network for the control, management and storage of all project related documentation. This will include the following:
  - File structure for "Native" files where all documents will be stored while being worked on
  - File structure for "Published" files which can only be accessed through the Document Management System
  - File structure for the filing of all communication type documentation i.e. letters, e-mail, faxes etc.
- With the introduction of electronic communication such as e-mail, it has become very easy to loose control of the flow of information and the tracking of decisions. Adding to this the fact that major decisions are discussed and taken via e-mail the management of this media is of utmost importance. It should be emphasised to the team members that all e-mail must be stored in the system identified for it and that all e-mail must be clearly identified by completing the necessary meta-data
- With the document controller establish the documentation identification methodology for this phase of the project based on the information in Procedures SYS-P-001 and a continuation of the identification system used in the Concept Phase. The methodology must make provision to differentiate between the different studies to be undertaken. The main reason for clear identification is to ensure structure in both the electronic and hard copy filing system as well as retrieving of information through searching the identifier
- The document controller will prepare a Project Document Work Instruction for the phase and distribute it to all participants on the phase. This will typically include the Identification of documentation, the flow of information, the approval and the filing thereof (electronic and hardcopy). This will also include any outside parties i.e. consultants, contractors etc. to be involved in the pre-feasibility studies
- The document controller will provide training were necessary on the utilisation of the Document Management System (DMS) to all members of the Project Team as well as outside parties
- Prepare a detailed Document Requirement List based on the Gate Review checklist for the Pre-feasibility Phase of all documents required to form part or support the Pre-feasibility Study Report. The preparation of these will be monitored by the document controller but it is suggested that a line item be added in the planning schedule to monitor and plan the delivery of the package

6.7.6.3 *Close-out of the Pre-feasibility Phase*

- Ensure, with the document controller that all documentation generated during this phase of the project has been properly captured and archived if the outcome of the phase is that the project will not move forward to the next phase
- If the project moves to the next phase the National Manager Doc Control will be responsible for ensuring handover of the relevant close out documentation to the Project Manager of the next phase and establish access for the project team to the documentation generated during the Concept Phase

6.8 Quality Management

6.8.1 Introduction

As with the Concept Phase (FEL-1), quality during the Pre-feasibility Phase (FEL-2) is primarily centered on the quality management aspects. Quality Assurance and Control in this phase consists primarily of establishing management systems and approach aligned with Owner requirements and decision making, as well as the verification of the deliverables.

6.8.2 Purpose

The purpose is to establish, develop, implement and maintain an effective Quality Execution Management Plan and system for the Pre-feasibility Phase (FEL-2), which meets the requirements of all the Stakeholders.

The key execution principles of the project quality function include:

- Providing a satisfactory interface and communications with Owner representatives
- Preparing the project Quality Plan
- Providing advice, interface and support to other Project functions on quality related matters including applicability, plans, processes, procedures, and decision support
- Alignment with the resource requirements
- Supporting assessments and reviews
- Interface to the main overall project functions
- Reporting against agreed performances measures / indicators
- Providing feedback on potential improvements and quality incidents

6.8.3 Process

6.8.3.1 *Project Initiation*

- Establishing the Project Inputs

  The minimum inputs should be:

  - The Project objectives
  - Owner requirements from the project including deliverables and their desired formats, special requirements, records, reporting requirements, etc.
  - Project refined scope, option drivers and limits

- Typical Activities

  The typical activities carried out during the various stages of the Pre-feasibility Phase (FEL-2) include:

  - Ensure that a project kick off meeting is held with the Owner
  - Ensure that a matrix of communication authorities documented and agreed with the Owner
  - Ensure that an alignment of processes for project functions such as Controls, Finance, etc. is agreed with the Owner
  - Ensure that the systems, procedures, document formats, records, assessment tools etc. are documented and agreed with the Owner
  - Ensure that a complete list of deliverables and their handover requirements is documented and agreed with the Owner
  - Ensure that a change management process is documented and agreed with the Owner
  - Align with the project resource requirements

  The items discussed and agreed with the Owner are typically used as inputs to the Project Planning stage.

- Outputs

  The typical output is a statement of Quality Objectives and details of the Quality Management System agreed with the Owner described in the preceding section.

6.8.3.2 Project Planning

- Establishing the Project Inputs

  The minimum Inputs should be:

  - Quality statement and agreed Project Management System detail

- Typical Activities

  The typical activities carried out during the various stages of the Pre-feasibility Phase (FEL-2) include:

  - Interfacing with the other disciplines in the project
  - Formulation of a project review programme
  - Formulation of a Quality Management Plan detailing the Objectives, Management System, compliance criteria and assessment methods, and resource requirements

- Outputs

  The typical output is a project Quality Plan which forms part of the Study Work Plan.

6.8.3.3 *Project Implementation*

- Typical Activities
  - Assess the project for compliance to the agreed upon Project Management Systems, procedures, and tools
  - Conduct reviews as per the project review programme
  - Validation of the deliverables as they are produced
  - Identification and verification of quality incidents and opportunities for improvement their resolution
  - Project management reporting as required by the project management systems in use on the project
  - Monitoring of the change management process and reporting against the baseline
- Outputs

  Performance reports as agreed with the Owner and feedback from the project reviews.

6.8.3.4 *Project Close-out*

- Typical Activities

  At project Close-out, the typical quality activities are:
  - The verification and handover of the deliverables in accordance with agreed Owner requirements
  - An assessment of the level of Owner engagement and satisfaction with the project outcomes
  - Verification that the overall project has been closed out with respect to all of the relevant disciplines such as Controls, Finance, Document and Records Management, etc.
- Typical Output

  The typical quality outputs at project Close-out include:
  - A statement of quality performance, review reports, and improvements for the project which is typically part of the project Close-out report
  - Handover of registers, documentation and records as agreed upon during the project initiation phase
  - A project Close-out self assessment checklist

6.8.4 *Resource Requirements*

The quality activities for the Pre-feasibility Phase (FEL-2) of a project are typically carried out by the project management team with technical advisory input from the quality discipline as and when required.

The quality discipline typically facilitates the project reviews and reports as per the Project Management System.

6.9 Human Resource Management

Management of the personnel project team is the responsibility of the Project Manager. He will execute this function through the defined project organisation structures in accordance with the Resourcing plan defined in the project setup. Key activities to be addressed include:

- Recruiting suitable personnel to fill the organisation structure in accordance with the timing and cost requirements to meet the project schedule and budget. Whilst the details of this activity will be carried by the Human Resources Department or other personnel, the Project Manager will of necessity need to be involved in the selection of key personnel. This activity also involves the administrative aspects of mobilising personnel onto the project. It is imperative that the identifying of human resource needs, the advising of those responsible for recruitment regarding the specific needs and job descriptions, and the selection of the appropriate candidates, takes place timeously in order to avoid the consequences of unwarranted delays in filling the positions and to the project
- Training, development and coaching of individuals and teams. Whilst mobilised personnel may have appropriate technical skills, they will probably have to be coached into the project requirements, given project specific and safety induction training as well as training on project specific procedures, norms and practices. This can be ongoing throughout the life of the project as new personnel come onto the project or retraining is needed for existing personnel
- Regular monitoring and reporting on personnel and team performance against project requirements and established norms. Control will need to be exercised over non conformances and even disciplinary action in necessary cases. This monitoring and control needs to be exercised under the auspices of applicable company policies and guidelines, national, regional and local legislation and most importantly, health and safety norms and requirements
- Demobilisation of personnel in accordance with the project schedule and Resourcing plan as well as in special circumstances when for example people leave the project early

6.10 Risk Management

Risk management will follow a structured approach, whereby risk will be identified, analysed, evaluated and treated. Risk communication strategies will be developed to ensure stakeholder alignment and buy-in. The focus of risk management in this phase is aligned to the following typical project or investment objectives for this phase:

- Evaluation of the options recommended from FEL-1 to select one as the preferred option for detail evaluation in the next phase
- To assist with confirming the commercial robustness of the business case
- To assist with confirming the technical solutions and ensure there are no fatal flaws

The associated risk management objectives for this phase typically include the following:

- Develop a the qualitative risk profile for each option that will summarise the key risk issues
- For technical risk management, complete Hazard Study 1 and 2 and complete preliminary CHAZOP (Controls HAZOP), Fire protection report and Hazardous Area Classification
- Identify the key risk treatments and controls for the preferred option
- Develop the capital and schedule risk profiles for the preferred option if appropriate

The Transnet risk management process will be followed and as a further aid the AS/NZS 4360 risk management process as illustrated in Figure 6-1 can be used as the framework for detail risk management activity in this phase.

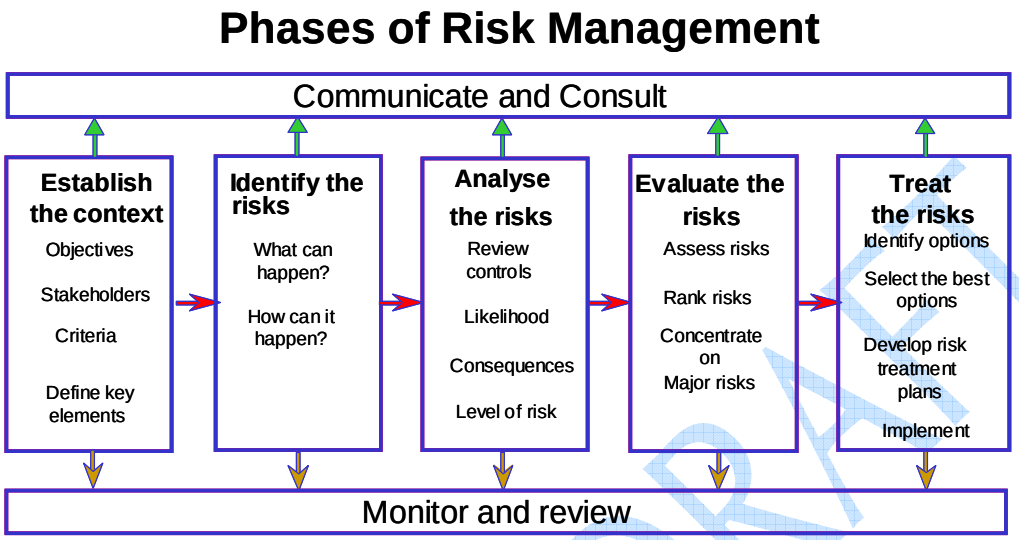

Figure 6-1: Phases of Risk Management (AS/NZS 4360:2004)

6.10.1 Establishing the Context

The context as documented in FEL-1 should reviewed and updated as necessary to reflect any specific context issues for this phase especially:

- Risk breakdown structure (RBS) – Structure of risk sources used to facilitate the efficient identification of risk issues – the FEL-1 structure developed by the risk manager in consultation with the project manager may need to be upgraded given the characteristics of the options being evaluated

Key outputs will include:

- Investment and project objectives
- Key or critical success factors and agreed risk criteria
- Stakeholder analysis
- Agreed risk management plan including scope and deliverables
- Whether a comparable risk assessment between options can be used rather an absolute risk assessment of each alternative

6.10.2 Risk Identification, Analysis, Evaluation and Treatment

6.10.2.1 Qualitative Process

The risk register from FEL-1 should be reviewed and a decision made as to whether it can be used in this phase based on any revisions to the context and RBS. An appropriate RBS, number of required project risk workshops and their timing will be agreed as part of the risk management plan for this study phase.

Facilitated risk and opportunity workshops for each alternative to:

- Identify the risk issues
- Characterise and rate the risks to populate the risk register
- Evaluate risks against the agreed risk criteria and agree risks that require treatment to reduce the residual risk level
- Identify key risk treatments and accountable manager

6.10.2.2 Quantitative Analysis

Quantitative capital and schedule risk analysis is not normally a requirement of this phase given the maturity of the engineering status though it should be used for large or risky projects. It can however also be used in a preliminary sense to develop risk profiles or comparative risk profiles of the alternatives to assist in the selection of the alternative for detailed study in the next phase.

For projects that are relatively uncomplicated and for which the engineering and design solutions are relatively well known and benchmarked then detailed quantitative risk analysis can be used to produce a capital risk profile for the project. This specific aspect of quantitative risk analysis is covered in Section 9.2 below.

If quantitative risk is used, the process should be completed in accordance with the quantitative risk analysis guideline.

6.10.3 Monitoring, Review and Communication

Risk management reports are to be provided for the key reporting milestones of this study phase to ensure that the project stakeholders are fully informed of the process and the results that will include reporting on the following:

- Risk management scope, objectives and process
- Risk register and risk profiles for the alternatives from which the most significant risks are noted and summarised
- Key risk treatments that are required for each alternative including the accountable manager
- Key controls that need to be monitored to manage the risk profile for each alternative

6.10.4 Technical Risk Management

In accordance with the technical risk management process shown in the following figure, Figure 6-2, the following activities will be completed:

- Technical Risk Management Plan for the this phase
- Complete Hazard Study 1 if it was not done in the previous phase
- Complete Hazard Study 2
- Complete the fire protection draft design for the preferred alternative if appropriate
- Complete a preliminary Hazardous Area Classification if appropriate
- Develop the technical risk register

Full details of the scope and requirements of the above activities can be found in the technical risk management guidelines.

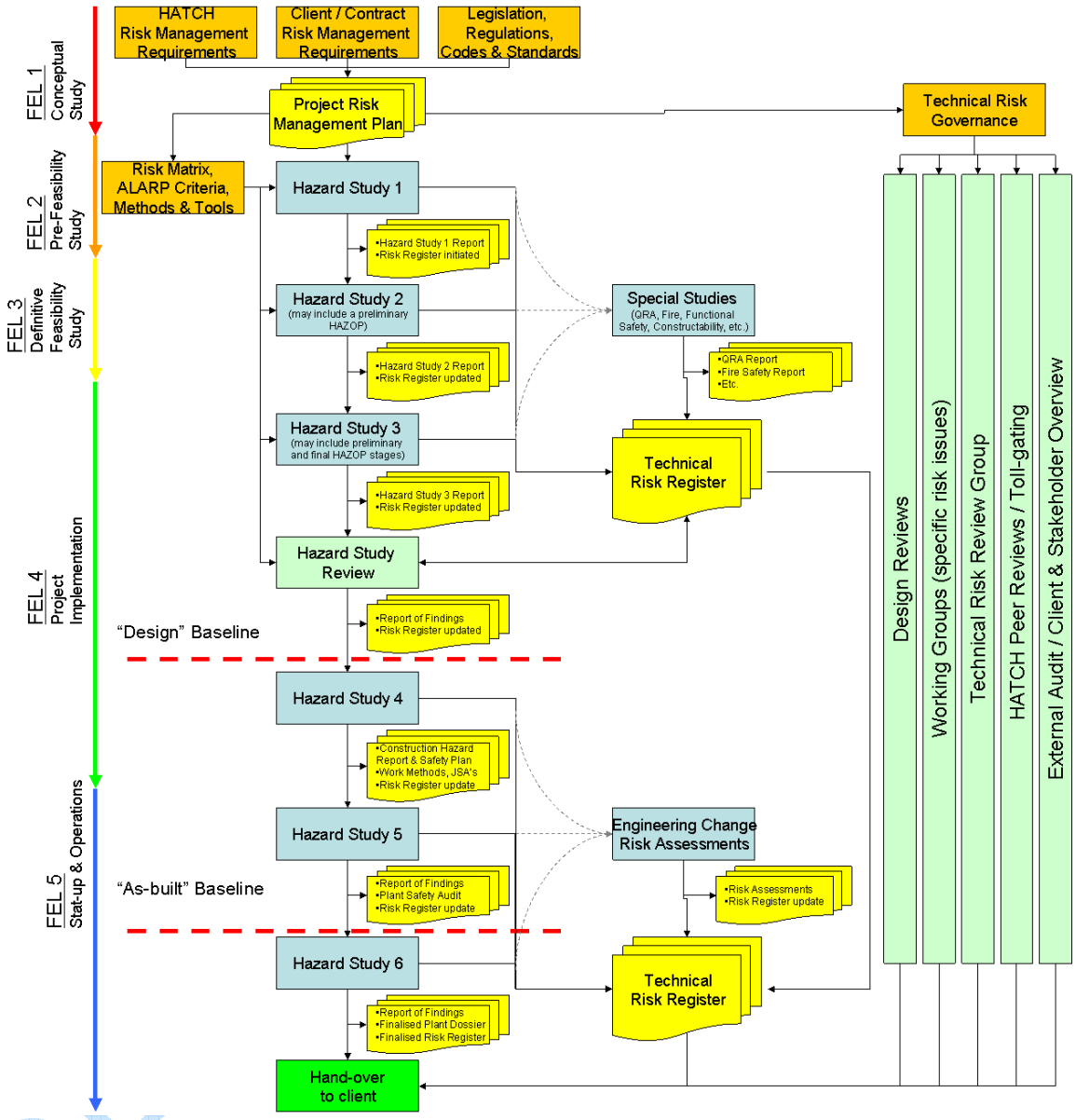

Figure 6-2: Risk Management Process

6.10.5 Risk Management Plan for FEL-3

Whilst the risk management scope and requirements for FEL-3 are defined in the FEL-3 manual it is necessary to identify and special or additional risk management activities that need to be considered or completed as part of FEL-3.

6.10.6 Lessons Learned

A lessons learned workshop shall also be held to review the risk management process and its effectiveness during this phase. Any process gaps or opportunities for improvement are to be noted for application in the next phase.

6.10.7 Risk Management Activities and Deliverables

Whilst there is overlap with other activities in FEL-2, the following deliverables are generated by risk management activities in FEL-2:

- **Pre-feasibility Study Risk Management Plan including the Technical Risk Management Plan -** The plan will outline the risk management system (i.e. Transnet or other) that will be used for the project. Includes risk management activities, deliverables, resourcing and responsibilities for the PFS
- **PFS Risk and Opportunity Register -** Develop agreed Risk Break-Down Structure and risk register structure and capture risk issues and treatment actions for each option considered
- **Qualitative PFS Risk Profile** - Produce risk profile using the data in the risk register. Risk profiles need to be produced for all options under consideration
- **PFS Risk Treatment Plans -** Develop treatment plans for unacceptably high risks and potential impacts for all options considered
- **PFS Schedule Risk Profile -** Not typically required at this stage, but if decided, use either 1) Schedule risk profile from a SRA (Schedule Risk Analysis) or 2) Best, Most Likely and Worst Case schedules to assess schedule contingency
- **PFS Capital Cost Risk Profile – This is n**ot typically required at this stage, but if it is used, it can develop a Quantitative risk profile of Capex based on estimate uncertainty and potential discrete risk events to get P10, P50 and P90 as input to contingency, where P90 implies a 90% likelihood of not exceeding the specified capital cost
- **Hazard Study 1 -** Completed in Concept or Pre-feasibility phase and also referred to as a Concept Hazard Analysis. The purpose of this study is to understand the project, the process and materials involved such that health, safety and environment issues can be assessed in later studies. A Risk Register is established (see above) that captures the major hazards identified and a "Hazard Study 1 Report" is produced according to standard procedures. All applicable regulations, legislation and company standards are identified
- **Hazard Study 2 -** Completed in the PFS or Feasibility Study phase and also referred to as a Preliminary Hazard Analysis. The purpose of this study is to identify significant hazards and to provide an opportunity for elimination through re-design. This study builds on Hazard Study 1 by pinpointing critical risks and design strategies to mitigate risk as well as identifying those hazards that require further analysis. Where the project could create significant on-site or off-site risks, a Quantitative Risk Assessment must also be carried out by a qualified Hazard/Reliability Engineer. The Risk Register is updated following the study and a "Hazard Study 2 Report" is produced according to standard procedures. The study will also produce most of the information and assessments needed to meet the requirements of the company and regulatory authorities on safety, health and environmental protection. At the end of Hazard Study 2 all information necessary for the production of an Environmental Impact Assessment will have been assembled
- **HAZOP Studies –** See 6.10.8 below
- **Fire Protection Draft Design - for preferred option -** Fire Protection Concept Report, with additional Data. Fire Protection Design Criteria. General supply calculation (Fire ring main and users). Fire Protection Equipment list and PFD (Draft)

- **Hazardous Area Classification (HAC) - preliminary HAC -** Preliminary HAC, including process and equipment study for classification. HAC Design Criteria
- **PFS Value Analysis (PVA) -** PVA typically not required at this stage, high level decision analysis used to address strategic and or business cases to select option for Feasibility Study
- **Monitoring, Review and Reporting -** Review of project risks and treatment plans as part of the Gate Review Process
- Lessons learnt and Risk management activities for the next phase

6.10.8 HAZOP Study

Hazard and operability studies (HAZOPs) are a key element in overall quality assurance. HAZOP studies are carried out to:

- Identify potential hazards and impediments to operability in a design
- Anticipate whether the plant will operate as intended under all possible circumstances
- Learn about hazards through foresight, instead of after-the-fact review

Every part of the design for the whole plant (project) is examined.

6.10.8.1 HAZOPs in Pre-feasibility Studies

HAZOPS are conducted during the pre-feasibility study to:

- Identify major hazards and make certain fundamental decisions:
  - Plant location within the site
  - Design aspects requiring special development to contain hazards
  - Further research required to obtain information needed to produce an effective design

  During the pre-feasibility study sufficient information exists to conduct a preliminary HAZOP study which reviews hazards and operability issues at the facility/process system level. For instance an entire system will be reviewed as a singular unit, instead of individually reviewing each piece of equipment within the system.

- Methodology

  The HAZOP process begins with selection of a facility or system to review. The facility system is highlighted on the process control diagram. A description of the intended operating function of the system is given.

  The team then systematically questions every part of the system to discover how deviations from the intention of the design can occur and decide whether these deviations give rise to hazards. The questions are formulated around guide words which ensure that the questions (posed to test integrity of each part of the design) explore every conceivable way that design could deviate from intention.

  Each deviation is considered to determine causes and consequences. Deviations with unrealistic causes or trivial consequences are rejected. For deviations with conceivable causes and consequences that are potentially hazardous, the hazards are noted. The team is then given an opportunity to identify preventative measures (safeguards), which if identified are noted and the

issue closed off. When no preventative measures can be found, action the point to a person whom must investigate the issue.

A template for use in HAZOP studies can be found in the Transnet Procedures.

Following the HAZOP study, the notes are issued to the project team in the form of a report. Outstanding issues must be investigated by the nominated personnel and a recommendation must be noted in the report. Once all outstanding issues have been dealt with, the HAZOP report can be closed out and issued to the Owner and all project team members concerned. The project manager and project engineer must ensure that all recommendations are implemented.

6.11 Communications Management

Infrastructure projects, and particularly large ones, are likely to involve a large and diverse group of stakeholder interest groups in addition to the project team and owner. A communications plan is needed at all project phases from Concept (FEL-1) to Close-out as there are stakeholders and team members to consider in each project phase. At the early phases of a project, the numbers of stakeholders and team members are typically fewer and communications requirements understandably simpler. Issues are also likely to be more internal to the owner than at later phases. At early phases, external stakeholder interest groups may not need to be engaged on issues, which are still at a Concept or Pre-feasibility Phase of consideration. In these early stages, much of the information may come from 'desk-top' reviews of published information, market research or previous reports, etc. As the project progresses through the phases, the number of stakeholders and team members will increase as will the complexity of communications. For the Concept (FEL-1) and Pre-feasibility (FEL-2) Phases, a plan is still needed though it may not necessarily be formal. It should still be documented however. At the Feasibility Phase, a formal communications plan will need to be implemented, particularly if environmental and social issues are to be identified and resolved with external stakeholders before the project Execution Phase (FEL-4). An effective and well-implemented communications plan is however an essential element of an Execution project (FEL-4).

The key elements of Communication Management include:

- Planning communications and incorporating these in a Communications Plan
- Distributing information to project stakeholders, when it is needed and in the form it is needed
- Collecting and reporting project performance information to the project team and stakeholders
- Engaging with and managing stakeholders to identify, address and resolve requirements and issues

For the Pre-feasibility Study Phase (FEL-2), the key aspects to address are:

- The project has passed the Concept (FEL-1) Phase. The project owner should now be prepared to invest more in this project phase than was invested in the concept study. As additional clarity has been generated, some of the risks have been reduced and additional investment can be substantiated. Specific market and/or physical research can be justified and is needed to reduce the project uncertainty even further. The project can and now needs to be exposed more to a wider audience, but still on a selective basis
- The project is now considering a number of identified options and which one of these should be taken through to the feasibility (FEL-3) study level. Some sensitive issues may now need to be raised with external stakeholders for each option such as landowners, environmental groups,

communities and possibly government. These issues to consider may not necessarily be raised in a public stakeholder forum. They could be approached in face-to-face 'sounding out' meetings without involving the public media or the public at large

- The project needs to identify the internal stakeholders for each option and their interests. These could be shareholders, customers, suppliers and employees. A decision needs to be taken whether they need to be engaged or not. If they need to be engaged, how should this be done? Should it be addressed confidentially or not? Unessential internal or external stakeholder involvement and interaction is time consuming, expensive and can be diversionary, especially at the FEL-2 Pre-feasibility Phase when many options are being considered
- Based on the above considerations, do the size and communications requirements of the phase warrant a documented communications plan? To do this, you can generate a rough draft of the lines of communication and estimate the number and nature of separate communications required. Who are the external and internal stakeholders and what are their communications requirements? Are these to be addressed informally or formally and are these communications to be defined ion a documented plan?
- At the FEL-2 Pre-feasibility Phase, the investment is likely to be substantially more than at the FEL-1 Phase. Project performance reporting on schedule, time, costs and quality needs to be addressed. This may not be documented in a separate communications plan but it must be incorporated in a documented project work plan. A typical communication plan basis is contained in Appendix C

6.12 Project Execution Systems Set Up

6.12.1 Approach

At the initiation of a project, regardless of phase, a range of systems, processes and documentation needs to be put in place to provide a framework to both guide and facilitate the execution of the project phase.

The extent to which these are each defined/ put in place increases in detail and complexity as the project progresses through successive Lifecycle Phases from FEL-1 to FEL-4.

A key principle in project set up is to remember that, for all project systems, the following applies:

"System = People + Practices/ Procedures + Tools"

Any system (engineering, control, financial, document management, etc) comprises 3 interdependent elements:

- Trained, capable people
- Documented practices and procedures
- The tools to support those procedures (e.g. Primavera, SAP, etc.) and the people using them

The greatest threat to successful project set up is the failure to adequately train the project team in the use of the project's tools and procedures.

The following table presents a generic set up checklist of those fundamental requirements that ought to be in place – at the appropriate level of development – at the start of the given phase.

The highlighted requirement of each project phase shown in the table below, Figure 6-3, indicates an option for the Project Team to assess and evaluate the need to change the designation of Generic or N/A to Yes or as deemed appropriate for the specific phase of the project.

Project Phase	FEL-1 Concept	FEL-2 Pre-feasibility	FEL-3 Feasibility	FEL-4 Execution
Project Structure				
Scope of Work	Yes	Yes	Yes	Yes
Scope of Services and Deliverables	Yes	Yes	Yes	Yes
Budget for current Phase	Yes	Yes	Yes	Yes
Schedule for current Phase	Yes	Yes	Yes	Yes
Project Execution Plan (PEP)/ Work Plan	Work plan	Work plan	PEP	Yes
• Organisation chart	Generic	Generic	Yes	Yes
• Position descriptions/ roles and responsibilities / RACI matrix/ staffing plan	Generic	Generic	Generic	Yes
• Health and Safety	Generic	Generic	Generic	Yes
• Environment and Community	Generic	Generic	Generic	Yes
• Sustainable Development	Generic	Generic	Generic	Yes
• Project controls (WBS/ FBS, PBS, estimate/ budget development, cost control, schedule, progress monitoring and reporting)	N/a	Yes	Yes	Yes
• Change management	Generic	Generic	Generic	Yes
• Engineering management	Generic	Generic	Yes	Yes
• Document management	Generic	Generic	Yes	Yes
• Procurement and contracting	N/a	N/a	Yes	Yes
• Materials management	N/a	N/a	Yes	Yes
• Construction (including IR/ ER)	N/a	N/a	Generic	Yes
• Commissioning	N/a	N/a	Generic	Yes
• Risk management	Generic	Generic	Yes	Yes
• Systems	N/a	N/a	Generic	Yes
• Communications	N/a	N/a	Generic	Yes
• Quality (including review)	Generic	Generic	Generic	Yes
• Training	Generic	Generic	Generic	Yes
• Project admin, accounting and financial control	Yes	Yes	Yes	Yes
• Project Procedures	Generic	Generic	Generic	Yes
• Execution Systems				
• Safety (e.g. SIMS)	Generic	Generic	Generic	Yes
• Accounting/ cost collection (e.g. SAP)	Generic	Generic	Generic	Yes
• Cost Control (e.g. iPAS)	N/a	N/a	Yes	Yes
• Schedule (e.g. Primavera, MS Project)	Yes	Yes	Yes	Yes
• Engineering execution (e.g. Bentley, Intergraph)	N/a	Generic	Generic	Yes
• Engineering management (e.g. HEMS)	Generic	Generic	Generic	Yes
• Document management (e.g. WorkSHARE)	Generic	Generic	Generic	Yes
• Procurement (e.g. iPAS)	N/a	N/a	Yes	Yes
• Contract administration (e.g. iPAS)	N/a	N/a	N/a	Yes
• Construction	N/a	N/a	N/a	Yes
• Commissioning	N/a	N/a	N/a	Yes
• Information and Communications Technologies (servers, networks, etc.)	N/a	N/a	Yes	Yes

Figure 6-3: Project Execution Systems Set-up

Chapter 7

7. PRIORITISE ALTERNATIVES

In the event that multiple options have been tabled in the User Requirements Specification or carried through from the Conceptual Study, it may be necessary to screen these to a manageable number prior to the commencement of preliminary engineering, by comparison against the evaluation criteria in the User Requirements Specification and looking for opportunities to consolidate or rationalise options.

This process should be done jointly by the Study Manager and the Owner's Project Director.

- Deliverable:
  - Shortened list of possible facility or technology options
- Action:
  - Co-ordinate and rationalise related projects against evaluation criteria

Chapter 8

8. EXECUTE STUDY

8.1 Health, Safety, Environment and Community

8.1.1 Health and Safety

It is the expectation of the Transet Projects board and executive management team that Project Managers take ownership of project Health and Safety and ensure an environment is created and maintained where Health and Safety is a prime value that will not be compromised.

Project Managers must be familiar with the Health and Safety requirements as stipulated in Section 12 of the Transnet Projects Life Cycle Overview Manual.

Use the Project Health and Safety Setup and Execution Manual for guidance based on the Transnet Health and Safety System and Delivery Approach. It provides a combination of applicable Health and Safety Functional Guides, Standards, Safe Work Procedures and Safety Guidance Notes.

The manual provides generic project documentation required during the Health and Safety Pre-feasibility Phase – FEL-2, in a logical sequence. For a brief summary also see table in 12.6 of the Transnet Projects Life Cycle Overview Manual.

Key focus areas:

- Start Design for Safety Criteria and approval
- Conduct Preliminary HAZAN guidance as technology, site options etc. are evaluated
- Known Hazards controlled, eliminated or included in the Risk/Hazard Register
- Initial evaluation of applicable Health and Safety legislation identified and included in the study (refer to applicable procedures)
- Copies of major legislation available
- Conduct preliminary Health and Safety alignment meeting (refer to applicable procedures)
- Develop preliminary Safety Management Plan covering major hazards identified
- Health and Safety manning levels identified and tabled
- Compile a list of project required Standards, Functional Guides, Safe Work Procedures and Safety Guidance Notes, (Refer Transnet Projects Life Cycle Overview Manual). Start with Emergency Management, Incident Management and Induction procedures

8.1.2 Environment and Sustainable Development

Environment is broadly defined in South African environmental legislation. Environment includes the ecological, social and economic environment. These further include cultural, aesthetic and heritage properties. As such, the project 'environment' we consider Environment in context of Sustainable Development (SD), comprising its Economic, Biophysical and Community/Social aspects. This is illustrated in the diagram below, Figure 8-1:

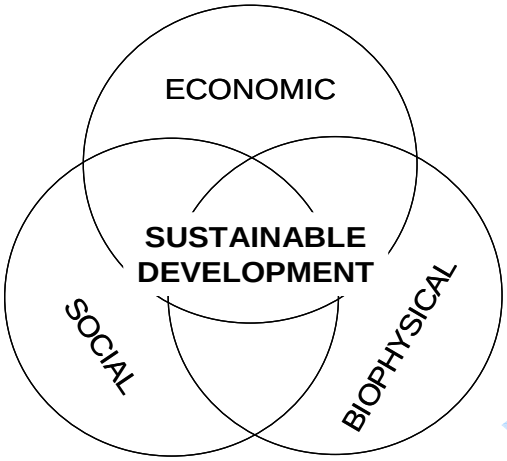

Figure 8-1: Three Aspects of Sustainable Development

Arising from this, a key issue for the project manager to bear in mind and address at all stages of the project is this: The project cannot only be considered from a financial and technical feasibility point of view. The positive and negative impacts of the project on the community and the environment need to be identified and addressed. This includes aspects up to and including project construction and commissioning but also ongoing operations. The need for the project manager to address these aspects arises from three responsibilities:

- The legal requirement to comply with the law, notably the National Environmental Management Principles Act 107 of 1998 (NEMA)
- The possible/probable Owner's requirement to adhere to Triple Bottom Line principles. These need to be ascertained and adhered to. Many companies, especially listed and public companies, measure and report on their environmental performance
- Besides market, economic and technical issues, environmental and social impact considerations are amongst the highest risks to project success. These high risks are called 'fatal flaws' as they can kill the project. These issues can delay the project start, add significantly to the costs or even stop it altogether

A primary key objective of integrated environmental management is sustainable development. Essentially this means that development meets the needs of the present without compromising the ability of future generations to meet their own needs.

The costs of addressing environmental and social aspects of a project can be high but the potential risks to the project going ahead and delays in project approvals are higher. It is important for the project manager should start addressing these processes early and laying the groundwork for the all-important government's GO/NO GO decision to proceed. This is referred to as the Record of Decision (RoD). Two types of environmental assessment processes are legislated, and each is triggered by different activities and requirements. These two are (1) a Basic Assessment, and (2) a full Environmental Impact Assessment (EIA). The full EIA requires a Scoping exercise which is to be followed by the EIA implementation. The EIA process takes considerably longer than the Basic Assessment because there are more steps involving the public and authorities.

These processes are time consuming and usually require considerable background information, research and stakeholder engagement. It is important to start these information gathering processes as early as possible so as to avoid excessive project execution delays. However, public engagement

cannot be started too early for confidentiality reasons and for one other very important reason. Government considers a particular chosen project concept/option in handling down the RoD. As the project progresses the options are refined and evaluated and even the chosen option may be refined over time. If a decision is given at a point in time and the chosen option is subsequently amended beyond certain bounds, the environmental authorisation process may have to be revisited. Hence the project manager has a challenging timing balance to maintain between A) the project requirements to get the right environmental (technical, economic, biophysical and social) solution and B) the timing to get it approved on time so that it does not delay the execution.

World best practice shows that environmental management and related studies and mitigation absorb about 10% of total project costs.

The project is now in the Pre-feasibility (FEL-2) Phase. It has passed the Concept (FEL-1) Phase and appears to be a potentially viable concept, bearing in mind the technical, economic, social and biophysical risks. In this phase, a number of alternative solutions for project delivery are to be considered and a preferred option selected. The next phase is Feasibility (FEL-3) in which the chosen option is to be selected to a comprehensive and final technical, economic, social and environmental test prior to going ahead with project Execution (FEL-4). The steps to be considered by the project managers for the environmental work stream in this phase are described below.

To facilitate later environmental approvals that may be required, identify feasible project alternatives and document why preferred alternative(s) has been selected.

Ask an environmental specialist to conduct an environmental fatal flaws analysis of the project and to identify the significant environmental issues. The cost of investigating and or mitigating significant environmental issues may be prohibitive.

The Project Manager should talk to local or regional planning officials to determine how the project alternatives integrate with the planning of the local or provincial authority. If there is misalignment between the plans this will become a source of conflict later when an EIA is conducted. It is better to address these issues early in the process than have to have to do it publicly later.

Determine whether environmental authorisation is required for the project by referring to the list of activities published in schedules R386 and R387 in terms of Section 24 of the National Environmental Management Act 107 of 1998. This should be done by your Environmental Manager who should be familiar with the environmental legislation.

Ensure that the schedule for the upcoming feasibility study includes realistic timeframes for obtaining environmental authorisation (should this be required).

A Basic Assessment (triggered by activities described in R386) will take 6 to 9 months on average. A full scoping and EIA process (triggered by activities described in R387) can take 18 to 24 months on average, depending on the complexity of the environmental issues that need to be investigated.

Anybody can appeal to the Minister of Environmental Affairs and Tourism against an environmental authorisation. In potentially controversial projects this appeal period should be included in the project schedule. An appeal can take a minimum of 6 months for the Minister's office to process.

Note that construction (physical work on site) cannot begin if environmental authorisation is not obtained.

Sometimes there is no baseline environmental information available, or 1 to 2 years is required to collect environmental data to support the EIA process for environmental applications. The studies needed to collect this information should be started as soon as possible.

It may be useful at this stage of the project to conduct a Life Cycle Assessment (LCA). The LCA is a tool to analyse and evaluate the environmental aspects of a product or service throughout all stages of its life cycle. All inputs, such as energy, raw materials and water, and all outputs, such as products, by-products, services and waste, are considered. The outcomes will enable better decisions to be made such as the selection of materials and appropriate technologies, which have reduced environmental impacts. The LCA methodology is frequently used in some industries to compare methods and materials and to make installations or products more recyclable and to reduce the generation of hazardous waste. The "cradle to grave" approach is in line with the expectations of the National Environmental Management Act (NEMA) that responsibility for managing environmental impacts is for the life of a project, which includes site closure and disposal of materials. There are several ISO standards that are applicable:

- ISO 14040 Life Cycle Assessment – Principles and Framework
- ISO 14041 Life Cycle Inventory Analysis
- ISO 14042 Life Cycle Impact Assessment
- ISO 14043 Life Cycle Interpretation

The pre-feasibility study report should describe the significant environmental issues associated with the project. List any environmental authorisations or permits that may be required. Describe the process and information required to obtain the authorisation or permit.

8.2 Preliminary Engineering

This is, in essence, the most critical phase of the evaluation process as a "Go" decision at this phase will result in the expenditure of major funds to complete the Feasibility Study.

8.2.1 Purpose

This phase is the first detailed assembly and evaluation stage of the project during which the project architecture is developed and key project parameters are measured and defined. It is the intent of this phase of the programme to provide information that will allow the Operating Division's senior management to assess the viability of the project.

The purpose of the study is:

- To provide a realistic preliminary design for all major elements of the project with a capital cost estimate
- To develop operating costs that are likely to be achievable
- To provide an indication of the social and political regime that is likely to be imposed on the project
- To provide an environmental evaluation that will realistically estimate the constraints and costs required to control liability during operation and subsequent close down/reclamation
- To develop a realistic risk profile of the project and identify the elements that need to be reduced or project concept/design areas that require further trade off

- To create a financial model
- To perform an economic analysis
- To complete initial studies on infrastructure and geotechnical requirements

This phase describes a conceptual installation that could be built. A realistic assessment of project worth is provided and justification for proceeding to the Feasibility Study Phase.

8.2.2 Methodology

- Develop detailed descriptions for each major area, including support facilities
- Prepare preliminary contract packaging plan
- Finalise facility layout and routing for short-listed options
- Prepare final draft Design Criteria
- Collect preliminary site-specific condition information from field investigation programs (survey, geotechnical program, environmental surveys, climatic data)
- Evaluate impacts of regulatory framework and requirements
- Evaluate and select sources for required services
- Perform preliminary material quantity take-off
- Identify long lead items and early works packages
- Conduct preliminary reliability, accessibility and maintainability reviews
- Preliminary general arrangement and cross sections for the facility will be completed. Major equipment will be located in plan and elevation
- Business Systems Design and Implementation Plan
- Motor list and electrical one line completed for each area
- Preliminary layouts of all major supporting facilities (i.e. warehouse, maintenance shops, etc.)
- Site investigation with boreholes being located at each major facility location
- Site grading and site preparation outline criteria. Identify abnormal site conditions that would lead to additional cost, i.e. steep terrain, poor surficial ground conditions requiring removal, replacement or upgrading, e.g. compaction? Is there a requirement for rock excavation or blasting?
- Foundation criteria and typical foundation details. It may be necessary to carry out a detailed design assessment in areas where abnormal foundation conditions exist or excessive equipment loading is applied. If a modularisation or skid mounted approach is adopted for the construction phase of the project foundation design criteria, quantity estimates, and costs must be modified accordingly
- Bulk materials, i.e. piping, electrical cable and cable trays, mass and reinforced concrete, structural steel, etc., will be quantified using preliminary engineering and approximate quantity take offs. Overall quantities for each commodity will be checked against comparable projects and industry norms (where applicable). If, in certain areas, the preliminary quantities cannot be

validated by this process a more detailed engineering assessment may be required. Suppliers will be solicited for current pricing of bulk materials

8.2.3 Design Reviews

8.2.3.1 Design Review Process

Depending on the phase of a project life cycle (i.e. Conceptual, Preliminary Engineering, Basic Engineering or Detailed Engineering/Implementation) the design review will have a different emphasis and will need to address different issues.

The guidelines below outline where the emphasis might be best placed in a pre-feasibility study.

- When?

  At least one, preferably two design reviews should be scheduled in a pre-feasibility study.

  Design review 1 should be held following the completion of:

  - Design basis, preliminary design criteria, preliminary mass and energy balance, preliminary process flow diagrams

  Design review 2 should be held prior to the HAZOP Study, which requires completion of:

  - All above documents plus process control diagrams

- Who?

  Design Review 1 should be attended by:

  - Owner and plant representatives, project manager, project engineer, discipline engineers, subject specialists and consultants

  Design review 2 should be attended by:

  - All of the above plus instrumentation engineers, controls engineers

- What?
  - Safety in construction, operations and maintenance
  - Design progress against Owner needs, schedule status, deliverables list, deliverables milestone
  - Look for "Value Engineering" opportunities
  - Thoroughness of designs
  - Maintainability (with operators input)
  - Operability (with operators input)
  - Quality control of work
  - Sustainable plant design
  - Evaluate whether the project team has or is progressing towards having sufficient information to generate an estimate of the target accuracy

8.2.3.2 *Design Review Checklists*

A series of design review checklists with increasing detail are available in the Transnet Document Management system.

Templates of these checklists can be found in the Transnet Project Procedures. The reviewer should review these guidelines when planning a design review and decide how to apply them.

8.2.4 *Deliverables*

- Detailed facility scope description
- Final draft Design Criteria
- Preliminary layout drawings
- Preliminary equipment list
- Preliminary specifications for major equipment; duty specifications for minor equipment
- Preliminary Material Take Off Sheets
- Generic standard specifications and drawings
- Major compliance issues addressed
- List of contracting packages, long lead items and early works
- Reliability, accessibility and maintainability review report
- Application of value improving practices
- Risk studies:
  - Project risk – project risk register
  - Technical risk - hazard studies

8.3 Procurement Management

8.3.1 *Introduction*

The purpose of Project Procurement Management is to develop strategic guidelines for managing and mitigating risks and issues on a project and standardising the approach to Procurement execution.

The Project Procurement and Contracts Manager is responsible for preparing, gaining approval of and issuing the overall Procurement Organisational Chart for the project to reflect a procurement organisation appropriate to the procurement tasks, duties and responsibilities in executing the contracts and purchase orders.

At this early phase of the Project Lifecycle there would usually be very little procurement activity other than the procurement of Professional Services for design, studies or field investigation.

8.3.2 *Procurement Functions*

The term "Procurement" broadly encompasses the following functions:

- Purchasing of goods
- Contracting for services (construction, design, consulting, equipment hire or design supply and install services etc.)

- Co-ordination of Quality Assurance Inspection activities for equipment and materials supply
- Expediting of Purchase Orders
- Materials Control including Traffic and Logistics, Receiving, Warehousing and issuing materials to construction

8.3.3 *Procurement Lifecycle*

The following flow chart, Figure 8-2, displays the Procurement Lifecycle through the various phases of the project development:

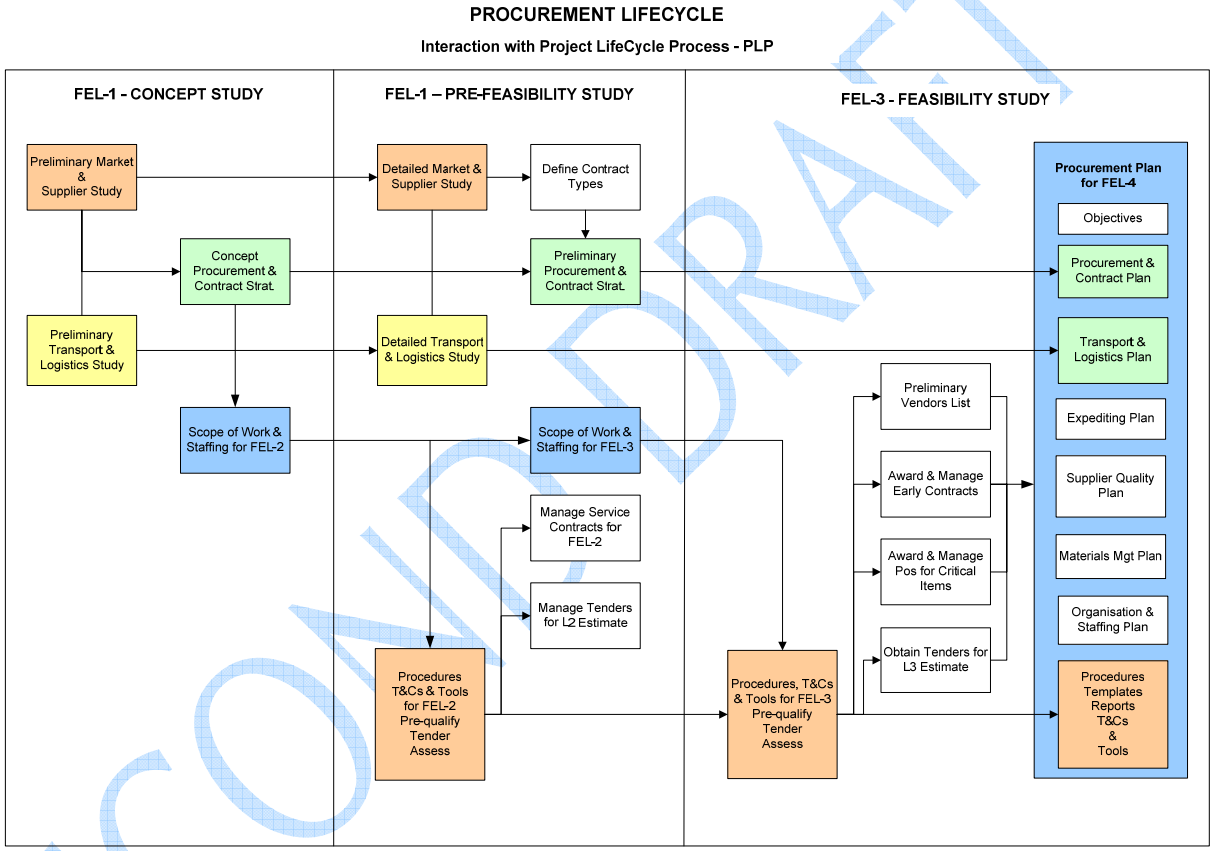

Figure 8-2: Procurement Lifecycle

8.3.4 *Pre-feasibility Procurement Activities*

Typical Procurement activities during the Pre-feasibility Phase are as follows:

- Define preliminary Procurement and Contract Strategy
- Determine Market and Suppliers
- Define scope of work and staffing requirements for Feasibility Study Phase (FEL-3)
- Pre-qualify and select Tenderers
- Manage service contracts for Pre-feasibility Phase
- Manage tenders for Level 2 Estimates

8.3.5 *Procurement Categories*

There are 6 distinct categories of procurement, not all of which are applicable during the Pre-feasibility Phase:

- Routine buying (Minor Purchase Orders and Minor Services Contracts)
- Standard supply (Purchase Order)
- Major supply (Major Purchase Orders or Supply of goods Contracts)
- Minor site worker site services (NEC Engineering and Construction short form Contract)
- Major Site work (NEC Engineering and Construction Contract)
- Consulting Professional Services (Professional Services Contract)

Those most likely to be applicable to the FEL-2 Phase are as follows:

8.3.5.1 Routine Buying

This includes the minor purchases or acquisition of minor services required to support the project. The items are non-capital and have an extremely low risk of poor outcomes affecting the project and would generally have a value less than R50 000.

8.3.5.2 Standard Supply

This includes standard capital items; generally off-the-shelf type products with no special design or manufacture. The items would have a low level of complexity and little risk of poor outcomes affecting the project.

8.3.5.3 Consulting Services/ Professional Services

This includes agreements for design work and specialist services such as Site Survey Works or Geotechnical Work.

8.3.6 *Process Flow*

The Procurement Procedures that apply to each of the six main procurement categories are outlined in the flow chart below, Figure 8-3:

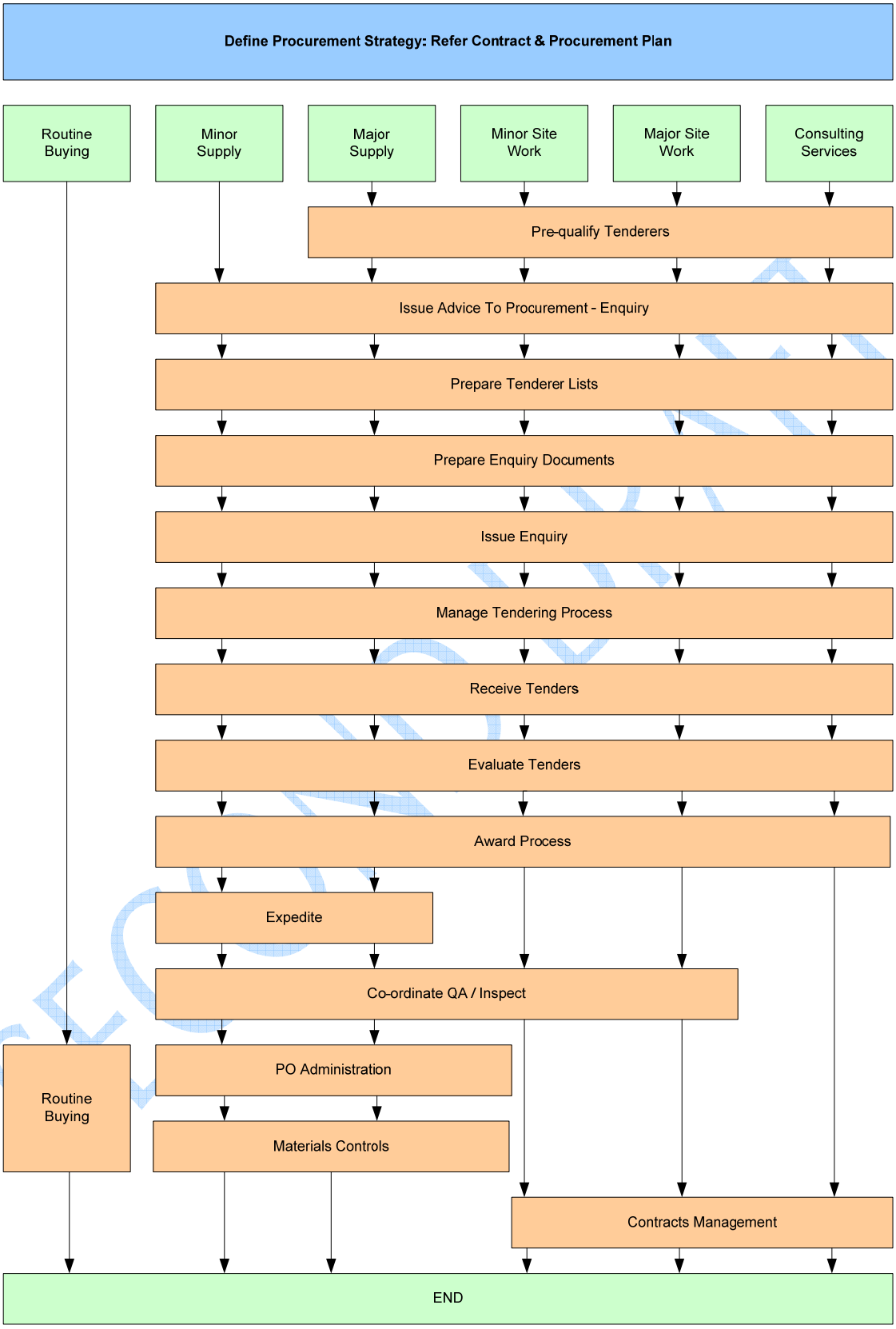

Figure 8-3: Process Flow

8.3.7 *Project Procurement Plan*

For each Project an individual Project Procurement Plan is required. This will address the following issues:

- Package list
- Cash flow
- Contracts Plans for the issuing and management of contacts for construction works and project services
- Procurement Plans for construction activities, acquisition of equipment and materials including Purchasing, Expediting, Inspection co-ordination to meet Quality requirements, Traffic and Logistics (shipping) and equipment and materials receiving, warehousing and issuing
- Materials Management Plans

8.3.8 *Roles and Responsibilities*

8.3.8.1 *Project Procurement Manager*

Each individual Project Procurement Manager is responsible for managing and coordinating the procurement team for the delivery of the Procurement and Contracts work on that Project to achieve required cost, schedule and quality outcomes. He reports to:

- The Project Manager for operational issues i.e. carrying out Procurement and Contracts activities to time and cost parameters set by the Project Manager

The Project Procurement Manager's responsibilities include:

- Prepare the Project Contracts and Procurement Execution Plan and lead a team of Contracts Specialists to issue and administer the Contracts for major construction and other services required for the project and appropriate Purchasing Expediting and Logistics teams to place orders for and expedite the delivery of equipment and materials to site or other delivery locations in accordance with project budgets and schedules
- Liaise with the Project Contracts and Procurement Manager and Project Manager to determine team Organisation and ensure required personnel are assigned to the project in accordance with the scheduling and workload requirements
- Assign personnel to various tasks
- Ensure Contract/Procurement documents are signed within allocated signing levels as per Project Authority Approval Matrix
- Prepare man-hour budgets and review and updating as required
- Prepare Procurement Status Reports, Exception Reports, etc.
- Set up a Project Procurement filing system
- Ensure that all procurement activities are carried out in accordance with the Project Procurement Procedures, sound business practices and in an ethical manner
- Interact with the Owner to ensure objectives are achieved, potential problems identified and corrective or preventative actions taken

- Audit Procurement activities against the Project Contracts and Procurement Execution Plan and Procedures

8.3.8.2 Contract Administrator

Although the primary function of the Contract Administrator at the FEL-2 Phase will be related to the procurement of Professional Services there may be a need in some cases for all or at least a few of the following duties:

- Review Scopes of Work and solicit Expressions of Interest and/or select and obtain approval of a Tenderers list in consultation with other Project disciplines and Owner
- Prepare and issue enquiry documentation by preparing commercial content and coordinating technical content of Invitation to Tender documents and obtaining appropriate approval prior to issue to approved Tenderers
- All activities required in the selection of bidders co-ordinating preparation and issuing of enquiry documents. Review of bids received and preparing and issuing Contract documentation
- Co-ordinate commercial aspects of all Contracts and determine Tender process document requirements
- Review Contract Terms and Conditions and select as appropriate and consider any project requirement for Special Conditions
- Supervise and maintain security of the tender process. Log tender queries and answers and issue Addenda as required
- Co-ordinate technical evaluations and conduct commercial evaluations, co-ordinate negotiations and the recommendation for Award
- Prepare contract documentation
- Attend negotiations regarding proposed changes to the contract documentation
- Liaise with legal services regarding proposed changes to contract documentation
- Where appropriate, liaising with quantity surveyors to ensure bills of quantities are properly prepared, priced and negotiated
- Ensuring contract documentation is properly signed
- Ensuring contract documentation, once signed, is properly filed

8.3.9 Public Sector Regulatory Requirements

The key Public Sector regulatory requirements that must be complied with in all Transnet Procurement activities are:

- PFMA Public Finance Administration Act
- CIDB Construction Industries Development Board
- NIPP National Industrial Participation Program
- Regional requirements/ political variations
- BBBEE Broad Based Black Economic Empowerment

Transnet internal requirement is for 50% of Capital Expansion Project spend to qualify as BBBEE spend in accordance with the balanced BBBEE scorecard, and utilisation of local labour in construction amounting to at least 60%.

8.3.10 References

- ISO 9001
- NEC 3rd edition family of Contracts published June 2005
- Transnet Projects Procedures covering the following applicable subjects:
  - Procurement Definition
  - Code of Conduct
  - Filing (electronic and hard copy)
  - Major Procurement Process Schematics
  - Minor Procurement Process Schematics

8.3.11 New Engineering Contract (NEC)

The NEC suite of contracts has been chosen by Transnet for utilisation on all construction and service type contracts. The NEC contracts are working documents which define processes and associated terminology for project execution. The primary applicable NEC contracts are:

- The Professional Services Contract (PSC) typically between Transnet Projects and the Operating Divisions for the provision of EPCM project management services
- The Engineering and Construction Contract (ECC) typically between the Operating Division, Transnet Projects and an equipment/material supply or construction company

Project personnel need to be aware of and use the applicable procedures and terminology in executing projects under NEC. Some of the specific contract terms applicable to roles on the projects are:

NEC CONTRACT	ROLE	NEC TERM	TRANSNET or OTHER ENTITY
PSC	**Owner (client)**	**Employer**	**Operating Division**
PSC	**Project Manager (organisation)**	**Consultant**	**Transnet Projects**
ECC	**Owner**	**Employer**	**Operating Division**
ECC	**Project Manager (organisation)**	**Project Manager**	**Transnet Projects**
ECC	**Supply or construction contractor**	**Contractor**	**Construction companies**

Figure 8-4: Specific Contract Terms

Use of these contracts will require:

- Development and use of Master Templates
  - Engineering and Construction Contract template
  - Professional Service Contract template
  - Works Information and Site Information standard templates to ensure NEC contract compatibility and consistency for all technical packages from Engineering
  - CIBD and government regulatory compliance
  - Minimise Z clauses
  - NEC Payment requirements to be compatible with Transnet payment process
  - Other Contract templates (services, Minor works etc.)
  - Purchase Order templates for supply only purchasing – not covered by NEC suite:-to be separately developed
- Internal NEC Training for anyone involved in preparing the Works Information or Site Information of an NEC contract or enquiry for an NEC Contract e.g. scope, specifications, programme, etc as well as for those involved in the pricing and commercial terms. Also necessary for anyone involved in the technical or commercial review of bids or involved in post award Contract administration or supervision of an NEC Contract including not only those nominated as a Project Manager or Supervisor within the terms of an NEC Contract but also anyone involved in the review of:
  - Compensation Events (Claims etc), including use of the Schedule of Cost Components
  - Early Warnings (potential claims and risk review)
  - Acceptance or Review of Programme or setting of Key Dates
  - Review of Payment Certificates or imposing Disallowed Costs
  - Managing Defects Liability period and
  - In the event of disputes, involvement in inputs to the Adjudication process
- Contract Administration:- templates and procedures to be NEC focused
- NEC Adjudicators-appointment; back-to-back with signing of contracts and consider same adjudicators as Owner agreement requirements

A set of project master documents to be developed to be used for all procurement and contractual requirements.

8.3.12 Records

All records generated in terms of this procedure will be classed as records and retained for the life of the project unless legal or statutory requirements determine that they need to be kept for longer periods.

8.4 Project Execution Schedule(s)

- Deliverable:
  - Level 2 Project Schedule – A level 2 Project Schedule provides additional breakdown of conceptual level activities and will be representative of major engineering, procurement and construction activities. High-level logic is applied. Durations of activities will be more task specific but not yet fully developed via logic or resource loading
  - Preparation of a preliminary detailed design, procurement and construction schedule on which the critical path and long lead procurement items will be identified. The schedule will also include commissioning, start-up and ramp-up to full throughput. Owners' costs during the construction commissioning and ramp-up phase will be quantified. A schedule of major capital expenditures on an annual basis will be prepared for inclusion in the financial analysis
- Action:
  - Identifies key milestones and decision points
  - Need to identify Progress Reviews and allow time for feedback on conceptual alternative and its impact on Cost and Schedule
  - Timelines are to be given to each level 2 activity to determine likely project duration, critical milestones and lead times for essential items and activities
  - Summary bar chart based on past experience of work of a similar nature and conceptual departmental schedules
  - These bar charts are based pm high level logic with durations typically based on related experience rather than detailed logic or critical path methodology. Major activities are defined and high level durations applied. The duration of long lead critical items may be based on informal discussions with potential vendors and contractors
  - Pre-feasibility schedules are intended to portray expected durations and relationships for major activities and are representative of the project as a whole. Whilst they contain more detail and a Conceptual Schedule they are still considered to be indicative only of the overall project durations
- It is expected that the PFS schedule will consider on option only in keeping with the objectives of the PFS. In this case where multiple options remain the schedule should include the key activities and decision points for selecting a single option

8.5 Construction Management/Constructability

- Deliverables:
  - Constructability inputs to preliminary engineering development
- Actions:
  - Construction Management representative joins the FEL-2 study team early enough in FEL-2 to undertake the works outlined below

8.5.1 Summary

The Construction Management team is responsible for ensuring that a project is built without any harm to any participants and in accordance with project objectives and requirements namely quality, schedule and budget.

The Construction Management approach treats the project design and construction phases as integrated tasks. As such, the Construction Management team will provide leadership on all matters relating to construction, keeping the Project Management team informed and making recommendations on health and safety, design improvements, constructability, schedules, contracting strategies and labour relations.

Ensuring cooperative efforts of designers and builders at the initial stage of design will reduce problems encountered during the construction phase. Most of the early involvement of these individuals will be to share their in-depth knowledge and understanding of the way projects are being built. A smooth and efficient construction phase is fundamentally important in securing a successful project.

8.5.2 Constructability

Throughout the industry, constructability is recognised as an essential planning methodology that can significantly increase the probability of project success both in meeting project cost objectives and especially in meeting project schedule objectives when applied in a formal comprehensive program. A basic constructability tenet is that the potential benefit of constructability is high during the early project phase and decreases with project duration while the cost of constructability implementation is low in the early phase and increases with time. Constructability requires that companies (Owners, EPCM and Contractors) go beyond their conventional approaches to project execution by expanding front-end planning and investing additional effort in order to anticipate potential construction problems. Constructability is implemented through a team effort involving Owner representatives, EPCM project leadership, engineering, procurement, and construction working together toward a common goal; producing a quality facility while optimising cost and schedule. Figure 8-5 presents the generic Project Constructability Road Map and indicates where the emphasis should be placed in addressing constructability issues during the current FEL phase. Refer also to the Construction Industry Institute (CII) manual.

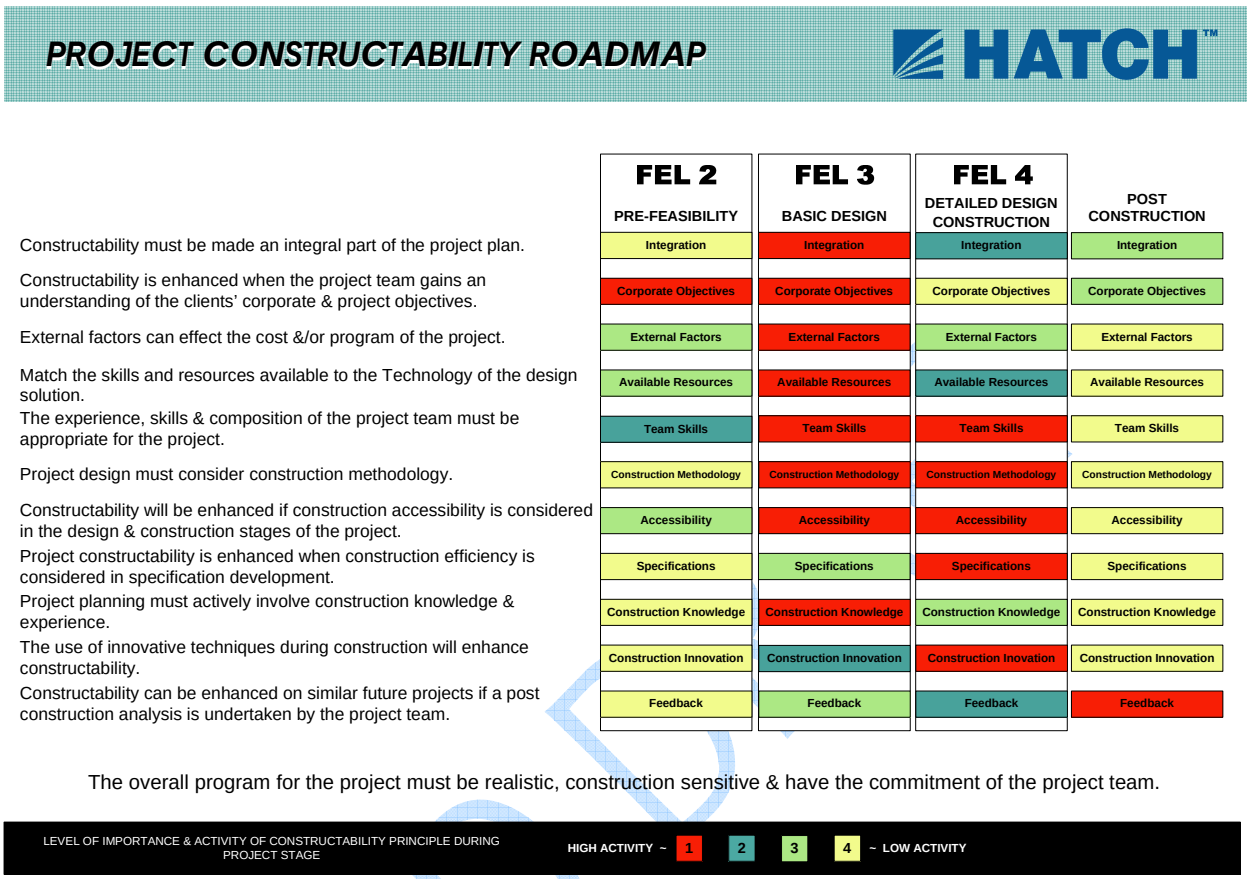

Figure 8-5: Constructability Roadmap

The effectiveness of the constructability process depends on several factors:

- Integration of constructability methodology into all project work process to maximise benefits and to minimise disruption to those processes. The focus must be on timely input of construction knowledge. Reviews are held only to verify that the input has already been incorporated into project deliverables
- Understanding of the process by all project personnel and recognition of their individual responsibilities with regard to constructability
- Support and guidance from project team leadership
- Simple but effective interfaces between all project participants
- Continuous evaluation and improvement of the constructability process

8.5.2.1 *Objectives*

Specific objectives for each project include:

- Cost reduction – Using the constructability process to identify potential cost minimising opportunities is a fundamental part of the process and supports the overall project CIP/Value Creation Program
- Schedule optimisation – Integrating engineering, procurement, and construction schedules for overall project duration optimisation is a key factor in the success of the project. Some areas requiring special attention are:
  - Critical equipment and long delivery items and development of construction contingency plans
  - Early focus on critical path activities
  - Simultaneously developing a systems completion based EP schedule and developing and prioritising construction work packages to correspond with the construction sequencing plan. This will support construction activities both during the geographic and system-based construction phases
  - Safety – The constructability program will address both the safety of construction workers and the safety of operations and maintenance personnel. Construction safety will be addressed in formal project reviews during the FEL-3 Phase that identify potential construction hazards and evaluate suggestions to minimise the impact of those hazards. Operations and maintenance safety will be addressed in reviews of specific design deliverables to ensure that safety requirements from applicable codes, standards, and specifications as well as specific owner concerns are satisfied in those deliverables

8.5.2.2 *Implementation*

Constructability input is especially beneficial during the critical early phases of the Project when cost sensitivity is at a maximum. Opportunities for cost savings are the highest during the Conceptual Preliminary and Basic Engineering Phases and diminish as project schedule progresses through Detail Design to completion.

Constructability will be integrated into the Study Work Plan. The FEL schedule will define the timing and incorporation of the key constructability activities into all phases of the Project.

During FEL-2 preliminary constructability studies are to be implemented, providing input into the plot plan development, contracting strategy development, materials management planning, etc. The Constructability Program includes more than a review of drawings and specifications, and requires the inclusion of Construction personnel in the engineering, design, and planning processes to ensure the input of their expertise and field construction knowledge.

8.6 Industrial Relations

Increasingly, a properly managed and stable labour environment has become a critical success factor in the implementation of large and mega-projects and the so-called “soft issues” are very often the determining factor between success and failure, in terms of meeting project time, cost and quality expectations.

Key industrial relations implementation principles to be applied include:

- Effective management of the labour environment on projects is a critical success factor in successful Project implementation
- Effective management of labour by Contractors will be a key contributor to success
- Industrial Relations risks will be prevented or reduced and social and economic benefits will be optimised, particularly for local labour
- Uniform Industrial Relations practices will be applied on projects as far as practicable, including standard conditions of employment and standard wage rates per job category
- Contractors will be monitored and audited for compliance to the required Industrial Relations standards which are contractually binding
- Industrial Relations related risks will be identified and managed at the regional and project level
- Efficient and effective dispute resolution processes will enable speedy solutions to potential disputes, industrial action or conflicts arising, and
- There will be proactive and effective communication on Industrial Relations throughout the project life cycle

Project personnel involved in project industrial relations are:

- Project Manager

  The responsibility for ensuring Industrial Relations management on a Project will rest with the Project Manager.

- Project Site Industrial Relations Manager

  The Project Site Industrial Relations Manager reports to the Project Manager and the Programme Industrial Relations Manager.

- Construction Manager

  The Construction Manager has overall responsibility for Industrial Relations management on site.

- Industrial Relations Officer

  This person supports and assists the Project Site Industrial Relations Manager.

- Procedure

  The Programme Industrial Relations Functional Execution Plan is managed as follows:

  - Identify the appropriate strategic approach, standards, processes and procedures required for the project
  - Determine the sequence and interaction of these processes
  - Determine criteria and methods needed to ensure that the implementation of these processes are effective
  - Ensure the availability of resources and information necessary to support the implementation and monitoring of these processes
  - Monitor, measure and analyse these processes, and

- Implement actions necessary to achieve planned results and continual improvement of these processes

The table below, Figure 8-6, summarises some IR activities to be addressed in the various project phases:

Activity	FEL-1 Concept	FEL-2 Pre-feasibility	FEL-3 Feasibility	FEL-4 Execution	FEL-5 Close-out
IR Risk Assessment Workshop	Yes *	Yes	Yes	Yes	Yes
Identification of key stakeholders	No	Yes	Yes	Yes	Yes
Interaction with key stakeholders	No	No	Yes	Yes	Yes
IR Policy/Framework	No	Prelim	Prelim	Yes	Yes
Project Labour Agreement (PLA)	No	No	Prelim	Yes	No
Labour Management Documentation	No	No	Prelim	Yes	No
IR Reporting Requirements	No	No	Prelim	Yes	No
Contractors IR "Kick-Off" Pack	No	No	Prelim	Yes	No
Local Work-seeker and Business Registration	No	No	Prelim	Yes	Yes
Skills Assessment, Skills Training and Employment	No	No	Prelim	Yes	Yes
Pre and Post-Employment Medical Examinations	No	No	Prelim	Yes	Yes
Project Induction Programme	No	No	Prelim	Yes	No
Induction Booklet	No	No	Prelim	Yes	No
Access Control and Access Permits	No	No	Prelim	Yes	No
Identification, Employment and Training of Implementation Resources	No	No	Prelim	Yes	No
Site IR Structures	No	No	Prelim	Yes	No
Ongoing Monitoring of IR	No	No	Prelim	Yes	Yes
Management Information System	No	No	Yes	Yes	Yes
Post-Mortem Workshop with all stakeholders	No	No	No	No	Yes

* included in fatal flaws/risk analysis

Figure 8-6: Industrial Relations Activities

Depending on the phase of the project, additional social/community interventions to be considered include HIV/Aids programmes, creation of entrepreneurial opportunities , establishing site clean-up teams or a janitorial services business, safety performance awards and milestone commemorative gifts, issue of T-Shirts with slogans expressing support for the Project, themed arts and crafts contests at local schools using a project theme, bi-annual project concerts featuring local musicians, family days, sports sponsorship, clinics and competitions, monthly project newsletters featuring local success stories, project golf day, project team relay, etc. This investment in local community initiatives will go a long way to ensuring a stable and supportive project environment.

In the context of the table above, specific activities for the Pre-feasibility (FEL-2) Phase include:

- Review proposed alternatives to ensure that the appropriate Industrial Relations model is applied
- Provide Industrial Relations inputs into Feasibility Studies as required, and
- Ensure that local labour opportunities are optimised
- Identify potential local and national stakeholders from an industrial relations perspective such as trade unions, employer organisations, community organisations and individuals that may have a vested interest in the project

8.7 Apply Value Improving Practices

Value Improvement (VI) encompasses many aspects which are seen as core to the manner in which successful projects are delivered and as such is seen as an integral part of the Project Manager's capabilities.

8.7.1 Value Improving Practices

There are a wide range of Value Improving practices available for application at the appropriate stages of a project's development. The Gate Review Guidelines contain an extensive list under "Value Improving Processes".

The VIP's most commonly applied during the Pre-feasibility Study Phase include:

8.7.1.1 Technology Selection

Aim: To ensure that the technology chosen is the most competitive available technology; focuses on evaluation and selection of technology that is appropriate for the project and is a viable solution for the business need.

8.7.1.2 Process Simplification

Aim: To reduce capital and/or operating costs by reduction of process steps/process complexity; a disciplined analytical facilitated session to examine the project's overall manufacturing process and facilities to identify non-revenue producing and non-value adding processes or process steps.

8.7.1.3 Waste Minimisation

Aim: An analysis of process streams on a stream-by-stream basis to reduce or eliminate each non-useful stream. Focus will be on prevention, recycle/reuse, reduction and treatment. End-of-pipe treatment of waste stream is to be avoided.

8.7.1.4 *Energy Optimisation*

Aim: To identify the facility, process and equipment options that achieve the most economical use of energy; employ technologies or materials of construction to optimise energy usage; make use of thermal or fuel waste streams to generate energy or reduce thermal or fuel requirement via recycling.

8.7.1.5 *Project Value Analysis (PVA)*

Aim: To achieve the business investment at lowest total cost, consistent with required levels of quality and performance (i.e. value for money). Aimed at eliminating plant/equipment/systems that do not add value to meeting business objectives; a structured and team-based analysis process used to generate and evaluate concepts and design alternatives which satisfy the required functionality at the lowest life cycle cost.

8.7.1.6 *Sustainable Development*

Aim: To address sustainability during the FEL phases in order to meet the Owner's corporate sustainability objectives.

8.7.1.7 *Designing for Safety*

This is critical to ensuring that any plant designed will not only be productive, but will ensure that the safety of both the construction and operations personnel is in no way compromised.

8.7.1.8 *Constructability Review*

Aim: Constructability Reviews by competent and experienced construction professionals during several phases of project development. Constructability reviews can take place at the outset of each project stage in preparation for/anticipation of constructability issues. These reviews can and should also take place at the end of each stage to contribute to the lessons learned process in preparation for the next stage or next project. Refer to the Construction Industry Institute (CII) manual for checklists of items to address.

Constructability is intended to:

- Provide guidance to design and construction documents to ensure that the plant is fundamentally constructible
- Utilise significant degrees of modularisation
- Maximising pre-assembly
- Mitigating field work via construction technology or modern work practices
- Reduce overall costs
- Maximise fabrication and shop assembly effort and minimise associated field time (particularly critical when plants are constructed utilising unskilled labour in remote areas)
- Reduce duration of field implementation

8.7.1.9 *Risk Management*

Aim: To address Risk Management - both qualitatively and quantitatively - during the FEL phases in order to meet the Owner's Objectives. For more detail refer to the Transnet PLP Gate Review Guidelines.

8.7.2 Application

Depending on the nature of the process it may be applied either as a key early step in project development (e.g. technology selection, process simplification), or progressively through the study phase (e.g. energy optimisation, waste minimisation, risk management, safety in design), or towards the end when sufficient work has been done to provide some focus for the activity (e.g. PVA, constructability).

The study schedule is to define when these processes are to be applied and reviewed.

Responsibility for ensuring that VIP's are applied timeously rests with the Project Manager.

Chapter 9

9. EVALUATE

Each Project Lifecycle Development or Front End Loading Phase has associated with it a specific "class" of estimates corresponding to the level of work done during that Phase. At the end of the Pre-feasibility Study the following is expected:

9.1 Capital Cost Estimates

9.1.1 Type

Preliminary or Pre-feasibility Estimate.

9.1.2 End Use

Used for Budgetary purposes, to establish viability of options during Pre-feasibility Phase, initiate financing and for obtaining approval to pass Gate 2, to proceed with a full Feasibility Study (FEL-3).

9.1.3 Process

The standard approach to the preparation of pre-feasibility study (Level 2) capital cost estimates is summarised as follows:

- Prepare a draft Estimate Plan
- Define the scope of work
- Prepare a schedule for preparation of the estimate
- Hold Estimate Kick-off Meeting
- Issue Estimate Plan and Schedule
- Set up the estimate in the Estimating System Software according to the agreed estimating breakdown structure (EBS)
- Quantify the work in accordance with the standard commodities
- Determine direct labour rates from other similar projects
- Schedule the work on a time/logic basis
- Determine the purchase cost of the installed material
- Determine the purchase cost of installed equipment
- Determine the cost of installation and construction
- Establish, and allow for, the requirements for freight, duty and taxes
- Determine and calculate the cost for the Engineering, Procurement and Construction Management effort as a percentage of Total Installed Cost (TIC)
- Establish foreign currency costs and exchange rates, if applicable
- Establish appropriate base date and escalation criteria

- Prepare estimate reports
- Undertake estimate reviews appropriate to the class of estimate being prepared
- Obtain approvals and issue completed estimate

9.1.4 Methodology

Methods used to obtain this Preliminary Estimate are based on the preliminary design and includes but is not limited to the following:

- Factoring of costs derived from other projects or packages of a similar nature
- An early assessment of the overall resource requirements
- Fairly well-defined packages for the options considered
- A semi-detailed definition of the project with a gross Work Breakdown Structure
- By using known and established benchmarks and contract rates data banks
- Vendor enquiries on critical packages only
- Cost of major equipment to be included in the Pre-feasibility Estimate will be based on the following procedures: Bids will be requested for all major equipment based on preliminary specifications. Bids will be technically and economically assessed and provisional vendor selection completed. Budget quotes based on duty specification only will be requested for all minor equipment
- Construction labour hours will be assessed using validated percentage factors applied to equipment and bulk quantities and checked against historical data and industrial norms. Productivity factors and labour rates will be those utilised in the general geographic region in which the project is located. Where the implementation plan calls for specialised construction techniques, e.g. modularisation, skid-mounted components or turnkey packages, the labour costs and productivities will be modified accordingly

Pre-feasibility Study (Level 2) estimates are generally prepared using a combination of both factored estimating techniques and detailed estimating methods based on preliminary engineering. All costs will be developed for the direct cost portion of the estimate with the indirects being factored off the estimated direct cost portion of the estimate.

When preparing Level 2 estimates it is important for the estimator to consider and address aspects such as:

- Country
- Location, site conditions
- Labour productivity
- Labour source
- Foreign currency exchange rates
- Base date and overall scope of the benchmark estimate
- Pricing Basis and market force conditions applicable to benchmark data

- Understanding of scope of work
- Status of engineering progress supporting Material Take Off's

9.1.5 Level of Engineering Definition

Between 10% and 20% of total engineering should be complete at this stage.

(Level of Engineering Definition is expressed as a % of total engineering, where total engineering = all engineering services in phases FEL-1, 2, 3 and FEL-4 - except FEL-4 Procurement, Project and Construction Management functions. It is presented as a range to reflect that in the early FEL stages "total engineering" has not been fully quantified.)

9.1.6 Level of Contingency

Between 15% and 20%.

9.1.7 Indicative Probability Range

Not greater than 90%.

9.1.8 Indicative Accuracy Range

Between –20% and +20%.

9.2 Quantitative Capital Risk Analysis

Quantitative Capital Risk Analysis is typically applied at stages of the project after the Pre-feasibility study. Under certain circumstances, it may be applied in this phase however. It is summarised here for this reason. For more details on these techniques, refer to the applicable sections in the FEL-3 Feasibility Study manual. Quantitative analysis applies to:

- Overall project risk assessment of capital and schedule risk
- Technical risk assessments

Project quantitative risk analysis is applied to cost and schedule using probabilistic analysis techniques. This will assist in determining the quantification of the project contingencies (capital and schedule) and the associated reserves or risk amounts that are congruent with the risk appetite of Transnet. Quantitative risk analysis (QRA) is a technique of risk analysis that uses numerical values (rather than the descriptive scales used in qualitative and semi-quantitative analysis) for both consequences and likelihood. The technique is used with capital cost estimates, schedules and project risks to develop a capital risk profile for the project. Although this section is focussing on capital risk assessment, the techniques apply in general to schedule risk analysis as well.

The methodology allows the following questions to be answered, which cannot be done using traditional approaches:

- What is the most likely project cost and what is the estimate accuracy?
- What is the probability that the estimate will be exceeded?
- What is the capital risk exposure and what risk allowance is required?
- What are the key risk drivers?

The following diagram, Figure 9-1, illustrates how capital risk profiling can answer these questions

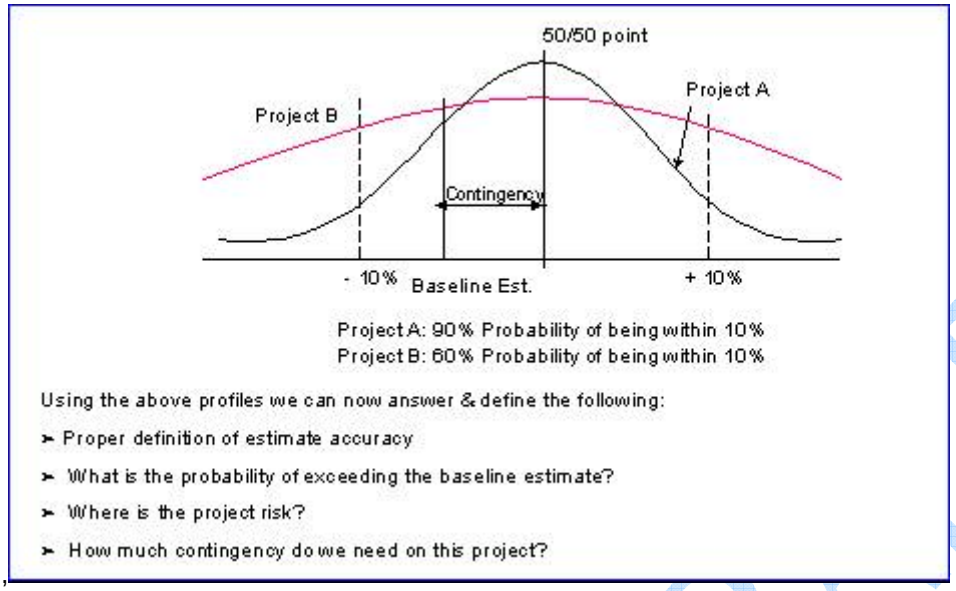

Figure 9-1: Capital Risk Profiling

9.3 Operating Cost Estimates

Operating manpower and costs will be developed in detail in an attempt to achieve a target accuracy in the range of +5% to +10%. Thus work will be carried out by experienced operations personnel assisted by the Project Manager. The deliverables will include manpower organisational charts, operating manpower requirements and operating labour costs, operating consumable, operating spares inventory, maintenance philosophy, external maintenance contract costs, sustaining capital and closure costs.

A Level 2 (preliminary) operating cost estimate should be developed for each option carried forward.

Typically operating cost estimates are developed jointly between the Project Manager and the Owner. While the technical data required will be available from the scope of facilities and equipment definition (via the Project Manager), the estimate can be largely based on cost data from similar operations (via the Owner). Useful information may also be extracted from the preliminary operating cost generated in the Pre-feasibility study phase. While operating costs are sometimes reported as unit costs, it is very seldom that these costs apply to all levels of production/throughput. It is therefore necessary to break operating costs down into their fixed and variable components. Variable costs change as throughput either increases or, while fixed costs do not. The operating cost estimate should address the following:

- Operating Labour
- Maintenance (routine, major and minor overhaul, labour, spares, consumables)
- Operating supplies (consumables)
- Utilities/ Services
- General and Administrative
- Rentals and Insurance
- Waste disposal or effluent treatment

Items to consider during the preparation of an operating cost estimate are as follows:

- *Basis of Estimate.* State the plant throughput basis for the operating cost estimate. Include the number of operating hours per day, the operating days per annum, base currency and applicable exchange rates. The base currency used for presenting the estimate should be agreed to with the Owner

- *Labour Costs.* Obtain labour rates from the Owner. If this is not possible, base labour rates on those of a facility local to the proposed development. Base manpower requirements on an evaluation of the organisation chart for the operating facility, considering the equipment required, proposed operating cycle and shift work requirements. Provide for management personnel, operations and maintenance supervision, and support personnel. Do not include maintenance labour, as these are usually included in maintenance costs (see below)

- *Maintenance Costs*

  - Either: estimate annual maintenance costs as a factor of the total new plant capital cost (typically in the range of 3 to 7 %, but confirm against the relevant Owner's operating experience) to include both maintenance supplies and labour

  - or: develop maintenance supplies and labour separately - develop maintenance requirements, obtain costs from suppliers (or estimate), base manpower requirements on the flow sheet and equipment, and obtain labour rates from Owner

- *Cost of Operating Supplies.* Consumables demands are developed from the scope of facilities and equipment definition, with costs obtained either from suppliers or in-house databases. The cost drivers that determine the rate of consumption of the major operating supplies must be identified (these may not necessarily be the actual final product). Changes in consumption rates at different throughputs must be understood

- *Service Requirements.* Obtain rates for gas, electricity and water from utility companies. If the operation will be a large user of either gas or electricity, investigate whether lower rates can be negotiated. Take into consideration sliding scales for average and peak demands on these utilities. Electricity demand should be calculated using the estimated power requirements found on the major equipment list. Allowance should be made for minor equipment power requirements

- *General and Administrative (G & A).*The operating cost estimate should recognise both the G & A costs that will be required on site as well as other legitimate G & A costs that may be incurred elsewhere (for example divisional headquarters)

- *Rentals and Insurance*. The relevant percentages to be used for insurance as well as any applicable rentals (typically a rate per square meter applicable to a type of asset) must be obtained in discussion with the operating divisions

- *Solids Disposal.* Assuming that solid waste streams have been treated so that they are suitable for land filling as harmless, non-hazardous and non-toxic waste, obtain disposal costs from a local waste handling company. Obtain and include the costs of trucking material if done by the owner

- *Liquid Effluent Treatment and Disposal*. If a new effluent treatment facility is required, develop all the necessary reagent costs. If an existing facility will be used, develop costs for the additional reagents required

- Provide notes at the bottom of the cost estimate to help clarify details, indicate possibilities for cost improvement or provide a basis of major costs

9.4 Business Case

Ownership of the business case and the underlying business financial models typically rests with the operating divisions and not with the project. Key inputs to the business case, notably the capital cost and the project schedule, need to be provided by the project to the business case. Figure 9-3 summarises the key inputs and the parties responsible for them. The project manager needs to clarify the project's responsibilities in this regard at the outset of each phase of the project. The business case process is presented here for the Project Manager to understand the underlying business drivers for the project and the associated processes.

As the investment progresses through the different stage gates it is evaluated against its alignment with Transnet's strategic framework. The document that summarises this alignment and accompanies the project as it applies for funding through each of the stage gates is referred to as the business case.

Each funding application has to progress through the approval cycle (

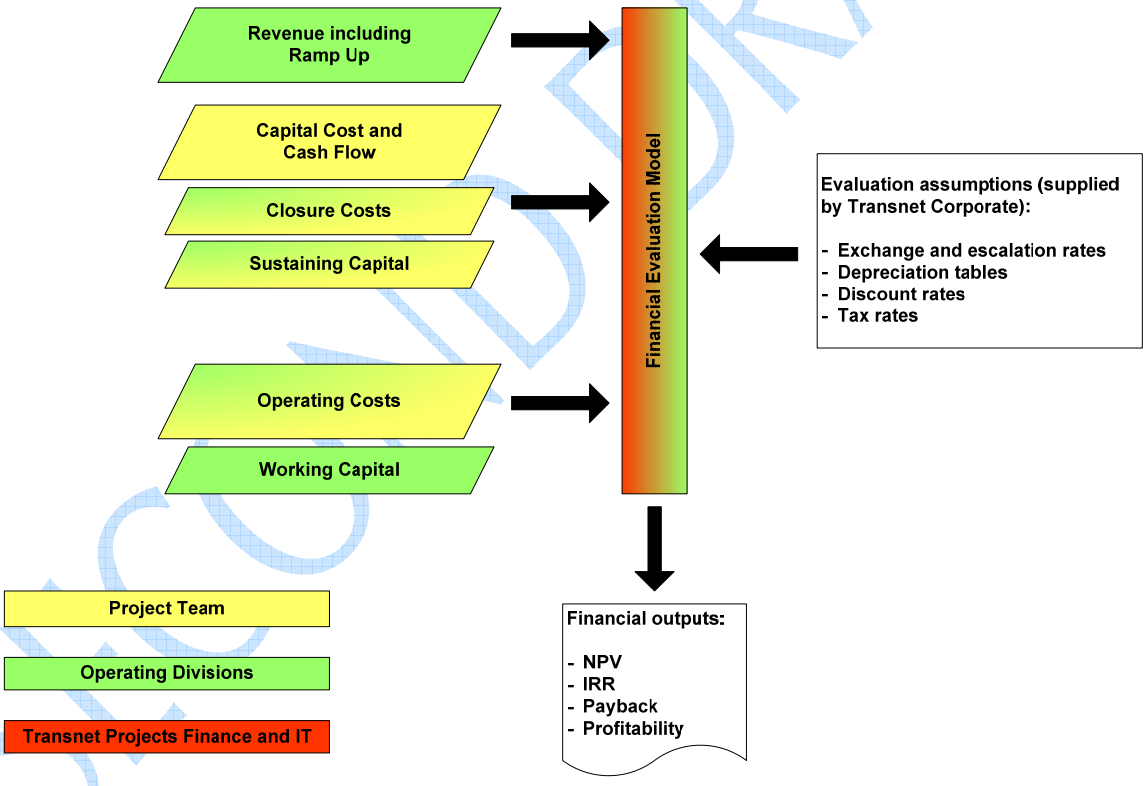

Figure 9-2). The level of funding required to progress to the next stage gate determines the body required to provide funding approval. During the Concept and Pre-feasibility Phases the funding is simply the funds required for the next stage of study. If the funds required fall within divisional authorisation levels, no more approvals may be required. It is only at the end of the Feasibility Phase that the funding required for execution is requested.

The investment forum is not a body that approves funding. However all projects needing to proceed to Transnet CAPIC and EXCO need to have been approved by the investment forum. The investment

forum tends to focus more on the project's alignment to Transnet's strategy and the financial evaluation.

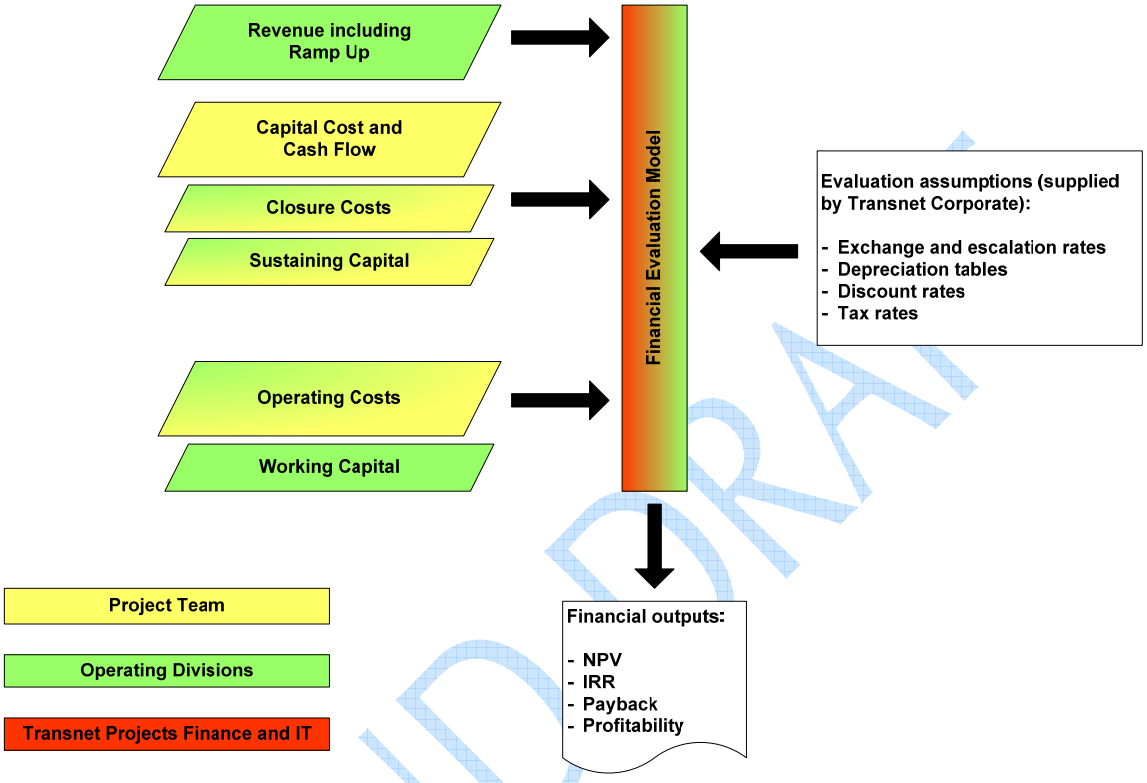

Figure 9-2: Key inputs to the financial evaluation inputs and those responsible

9.4.1 Context

The business case is the summary document that presents the project to the different decision making bodies in the organisation when funds are requested. As such the document must contain sufficient information for an informed decision to be made. It explains why the particular investment is aligned with the Transnet's strategic framework, supports Transnet and/or the various division's business plans and is consistent with Transnet's environmental, health and safety, social and broader economic policies. At the Pre-feasibility Study Phase, the investment has already proceeded through the Concept Phase and as such it will be similar to what was presented in the concept business case updated to reflect the greater understanding obtained on the capital costs, schedule and financial returns of the project.

9.4.2 Content of a Pre-feasibility Phase Business Case Submission

The written submission should include:

- A short description of the investment and its history
- Review of the alignment with Transnet's strategic framework
- A high level market analysis explaining the need and the target market

- A high level description of the options considered, both the single go forward option proceeding to feasibility as well as those rejected together with their reasons for rejection
- A capital cost estimate of the selected option together with indicative accuracy and confidence level
- Revenue and operating cost estimates
- A financial evaluation of the selected option
- Sensitivity analysis of the financial model to key variables
- A summary of the key risks and assumptions around the selected option as well as a mitigation plan for the key risks. The selected option should not be permitted to proceed to feasibility if it still contains a fatal flaw
- Key milestones and decision points to take the investment Lifecycle to conclusion
- A description of the salient points in the Work Plan for the Feasibility Phase
- A cost estimate and schedule for the execution of the feasibility study
- A recommendation to approve / not approve the funds required for the next phase (feasibility study) based on achievement of the User Requirements Specifications including established investment criteria for the pre-feasibility study
- Any provisions or conditions arising from the earlier steps in the approval process (i.e. decisions from the divisional CAPICs, Investment Forum, Transnet CAPIC, Transnet EXCO and Transnet Board)

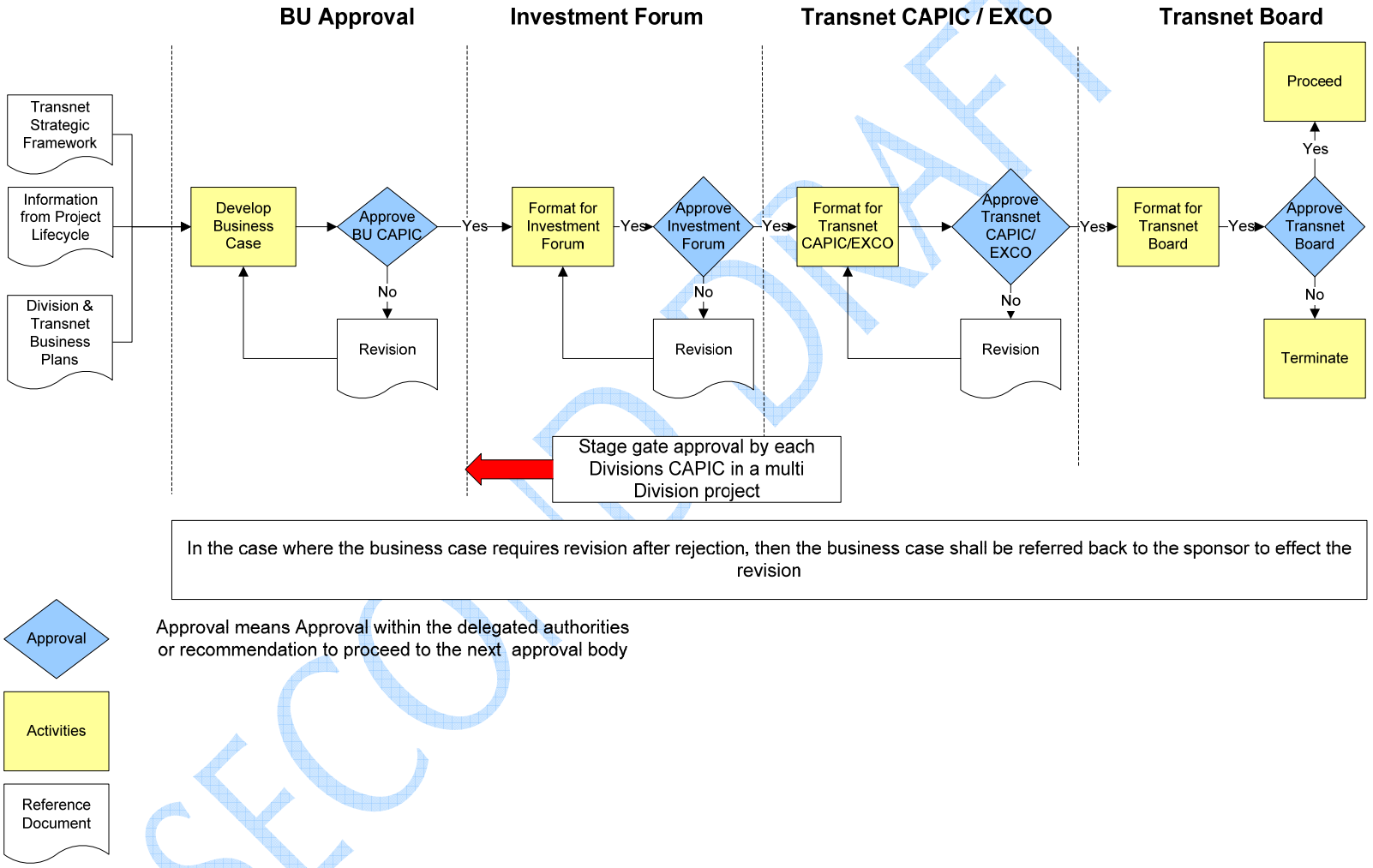

Figure 9-3: Business Case Work Flow

9.4.3 *Financial Evaluation*

In order to remain competitive and ensure long term sustainability Transnet management has to invest in activities that have a positive stakeholder return.

A company's financial value is largely driven by its ability to generate cash flow over the long term. A company's cash flow generating capability is determined by its long term growth and its ability to generate returns on invested capital that exceeds its cost of capital. When management make decisions it is therefore necessary to evaluate the financial impacts of the decisions.

Financial valuation is an important aspect of all project Lifecycle phases. While the principles remain the same for each phase in the project Lifecycle the detail differs as more detailed information becomes available. It is important that the evaluation model be fit for purpose; the effort that is applied should be proportionate to the level of capital investment required and the strategic imperative of the investment. The level of detail employed in the financial evaluation at the Pre-feasibility Phase must be aligned to the resolution of the input information. The financial evaluation model will look and feel very similar to the one used in the Concept Phase, but will have evolved to have greater content and precision.

During the Concept Phase divergent thinking has given rise to a number of different options. In the Pre-feasibility Phase this divergent thinking is continued and various options are developed to a point where the best option can be selected.

In order to inform the investment decision it is necessary to evaluate the financial impacts of different courses of action. Financial evaluation can be used to assist in the selection between options in the Concept and Pre-feasibility Phases, trade off studies within an option, as well as the evaluation of the project as a whole. A common evaluation approach across the corporation is necessary to make it possible to compare the numerous different projects that compete for funding. The methodology can be used to evaluate new (greenfields) projects, incremental expansions as well as capital replacements.

It is not simply an issue of developing a project that meets the technical requirements and creates value. The project should also maximise value.

The financial evaluation informs two key decisions in the Pre-feasibility Phase:

- It forms one of the evaluation criteria to select the preferred option that proceeds to feasibility. This can be done on a relative basis and can be less detailed as long as the simplification does not lead to the relative ranking of the options changing
- It evaluates the preferred option in absolute terms to confirm that there is a potential value opportunity that justifies proceeding to feasibility. This evaluation in absolute terms includes more detail than the relative evaluation

To evaluate the different options financially it is important that the relative accuracy between the options is similar.

Typically smaller projects and project Lifecycle phases up to Pre-feasibility will be handled in their entirety by the divisions, possibly with some support from Transnet Projects. While larger projects from feasibility study onwards will be handled by Transnet Projects, the business cases and financial models will still typically be owned by the divisions. The ownership of key strategic alignment, operating and revenue parameters will always rest with the divisions. To ensure that the financial evaluation evolves through the project Lifecycle it needs to be correctly structured from the outset.

The financial evaluation model consolidates a vast amount of project information and assumptions. While it is not necessary for the project manager to actually develop the evaluation model, the project manager must have a sound understanding of the input information and assumptions that have been used in the financial evaluation and what the outputs mean. The project manager will also be responsible for incorporating the outcomes of the financial evaluation into the business case document.

Required input information

Projects typically concentrate on the capital cost and the construction and ramp-up schedule required to achieve a specific throughput and quality. This is the project team's prime area of expertise and focus. The financial evaluation however requires substantial additional rigour in the generation of the operating cost, revenue and the integration of timing assumptions. These require a significant input from the operating divisions as these are their areas of expertise and focus.

Chapter 10

10. PRE-FEASIBILITY REPORT

10.1 Pre-feasibility Study (FEL-2) Report and deliverables

The purpose of the Pre-feasibility Report is to document the scope, procedure and outcomes of the Pre-feasibility Study (FEL-2) in a clear and consistent manner, in order to facilitate the quick and accurate review and evaluation of those outcomes. It also provides a detailed summary of the process and various actions taken for record purposes.

The Pre-feasibility Report, in order to be consistent, and address all relevant elements of the project is to be structured as follows:

- Executive Summary
- Introduction
- Location of Project
- Background
- Scope of Work
- Methodology
- Options Assessed and Options Deleted
- Level 2 Project Schedule
- Level 2 Capital Cost Estimate
- Updated Operating and Maintenance Cost Estimate
- Marketing Analysis
- Environmental
- Long-lead Items
- Framework for Feasibility Phase
- Updated qualitative and initial quantitative Risk Analysis
- Conclusions
- Recommendations
- Lessons learned
- Bibliography
- Appendices
- Socio-economic Details
- General Arrangement

- Specifications
- Preliminary Work Breakdown Structure
- Level 2 or Pre-feasibility Cost Estimate
- Level 2 Project Schedule appropriate for Pre-feasibility Studies
- Engineering Reports
- Terms of Reference

- Deliverable:
  - Pre-feasibility Study (FEL-2) Report
- Action:
  - The Study Manager allocates responsibilities for report preparation and manages the production process against the study time line
  - The report is to follow the Project Manager's standard review and approval process prior to release to the Owner

10.2 Work Plan for Next Phase - Feasibility Phase (FEL-3)

A Work Plan for the next phase (Feasibility Study) is to be produced during the Pre-feasibility Study.

That Work Plan should address the following:

- Introduction and Objectives of Study
- User Requirements Specification
- Scope of Work - Facilities Description - for the recommended option from the Pre-feasibility study
- Scope of Work to be undertaken by the Project Manager, by others
  - Extent of Basic Engineering to be undertaken
  - Expected study outcomes in terms of estimate accuracy
  - Extent of procurement activities to be undertaken
  - Assignment of responsibilities
- Feasibility Study deliverables
- Study team, responsibilities, locations
- Schedule for performing the work scope
- Estimate of costs, workhours and other resources required to complete the work
- Approach
  - Methodology for developing and assessing options (including annotation of the Gate Review Guidelines to define deliverables to be developed for each option)

- Basic engineering approach (packages, inputs, methodologies, outputs) defined
- Risk management
- Project controls and reporting
- Quality management/ reviews
- Health and safety
- Environmental management
- Communications
- Document/data management
- Close-out

- Table of Contents of Feasibility Study report
- Deliverable:
  - Feasibility Study (FEL-3) Work Plan
- Action:
  - Develop Feasibility Study (FEL-3) Work Plan

Chapter 11

11. PRE-FEASIBILITY APPROVAL

11.1 Deliverable:

- Approval for release of Pre-feasibility Study Report
- Approval for project to proceed to FEL-3 Feasibility Study Phase

11.2 Action:

There are 3 steps of review and assessment in order to secure Pre-feasibility Approval.

11.2.1 Review against User Requirements Specification

- Process

  When the study is approaching completion, the User Requirements Specification is reviewed by the Owner representative and the project manager to confirm that the stated goals, specifications and business benefits have been achieved (or are no longer relevant). The results of this review are used as inputs to the assessment by the Owner and the project team of the success of the project.

- Outcomes

  In the event of a non-compliance, either an action plan is to be prepared to achieve compliance, or an explanation of the reason that compliance is no longer relevant. In the event (relevant) compliance cannot be achieved, the reason for non-compliance shall be recorded in the completed project review documentation. Any relevant information from this review shall be communicated appropriately.

11.2.2 FEL-2 Gate Review

- Process

  The Gate Review is undertaken as a due diligence to ensure the work has been completed in accordance with the Work Plan, meets the requirements of an FEL-2 study and provides the targeted level of confidence in the outcomes (capital estimate). The Gate Review uses as the basis of the review the marked up version of the FEL-2 Gate Review Guidelines which were agreed and signed-off between Project Director and Project Manager during set up (Section 6.2.3). The Gate Review may be undertaken in one of two ways:

  - Internally within Transnet Projects (prior to submission of the Study Report) as a quality management measure
  - Externally, in conjunction with Owner's representatives. This process will be facilitated by the review team leader assigned at the start of the study

  The Gate Review Process Outline is set out in Appendix B.

- Responsibility

  The Project Sponsor is responsible to see that the Gate Review occurs and the Review Team Leader is responsible to carry out the review.

- Outcomes

  The Gate Review team will consolidate their observations and findings regarding the work done during the phase and arrive at an assessment that the work done has achieved one of the following statuses and submit a report to the Project Sponsor and Project Manager.

  - Approved
  - Hold - Further Minor Verification Required
  - Fail - Further Major Verification Required

11.2.3 Business Case Assessment against Financial Criteria

It is the Operating Division's responsibility to undertake the business case assessment, and, in the event of a favourable outcome – to secure approval and funding for the project to proceed to the FEL-3 Feasibility Study Phase.

- Process

  The process for progressing the Business Case through the Divisions, CAPIC, Investment Forum and Transnet Board is depicted in Figure 9-3 and described in section 9.4.2 above.

  The Business Case takes inputs from the Pre-feasibility Study project and the Operating Divisions. The Pre-feasibility Study report with its associated Gate Review Report are the primary inputs from the Pre-feasibility Study project. Other inputs including strategic fit, broader risk analysis, revenue and operating cost projections are largely sourced from the operating divisions. These are compiled into a Business Case which is to be amended and presented in the format required for each successive audience in the approval sequence. The Business Case needs to include the cost and time estimates for delivery of the FEL-3 Feasibility Study as this budget mandate is sought with the Business Case approval.

- Responsibility

  Development of the Business Case and its progression through the approvals processes rests with the operating divisions. Transnet Projects may assist in the process as agreed in the User Requirements Specification at the outset of the study project.

- Outcomes

  The possible outcomes of the Business Case Assessment and the further actions are given below. These eventualities could occur at each of the steps in the sequence:

  - Approved in which case the Business Case may proceed to the next step in the approval sequence. If Board approval is obtained, the FEL-3 Feasibility Study may proceed with the approved budget and schedule and within the bounds of the provisional Work Plan for the Feasibility Study included with the Pre-feasibility report and Business Case
  - Rejected in which case the process terminates and all documents should be filed with the project Close-out and the decision referred to the project sponsor or originator to decide whether to continue or abandon the prospect

- Further work or information required in which case the Business Case needs to reconsider the submission and undertake the additional work or collect the required information and resubmit the Business Case
- Approved with conditions in which case the Feasibility Study can either proceed directly as above or the conditions need to be evaluated to ascertain if the Feasibility Study can indeed proceed under the defined conditions. If not, the response is to be fed back to the authority which laid down the conditions for further consideration

Chapter 12

12. CLOSE-OUT

12.1 Administrative Close-out

The next phase of the project may or may not proceed soon or immediately after conclusion of this phase. It may also never happen. It may or may not be addressed by the same project team or even the same organisation. In closing out the current phase of the project, the project team needs to bear this in mind. It is therefore incumbent on the team to close out the project, archive all documentation in a structured format such that it is relatively simple to retrieve and continue the project at a later stage, even with a new team. Archive the way you'd like to find it if you were expecting to lead the next phase.

The Project Manager is responsible for the completion of Close-out.

Close-out checklist:

- Formal handover to Owner of study report
- Project files closed out and archived
- Owner feedback sought and documented
- Close-out review completed and documented
- Project payments completed and cost control/accounting system closed out
- Project learnings communicated
- Demobilisation of the project team members
- Recognition for the project team

12.2 Knowledge Management and Lessons Learned

The section in the Pre-feasibility Study Report for lessons learned will be sub-divided to include all departments or disciplines as the case may be (including Project Management) where potential to execute work more efficiently was apparent during the course of the job.

Lessons learned is part of the Transnet Projects continuous improvement process and has the potential to significantly improve the work methods on future projects if sufficient information is provided by the personnel closest to the subject process.

Significant issues will most likely have been recorded during the progress of the job and the project progress reports may provide the information if it was not specifically recorded under Project Lessons Learned during project delivery.

Appendix A

Transnet Gate Review Guidelines – Sample Documents

Appendix A - Example Extracts from Gate Review Guidelines

A.1 Functional work sheet

HATCH

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PROJECT LIFECYCLE GUIDELINES

DELIVERABLES STATUS

FEL2 PRE-FEASIBILITY STUDY PHASE

PROJECT DETAILS	
Project Number	
Project Title	
Project Manager	
Project Sponsor	
Project Execution Office	
Profit Centre	
Client	
Project Capital Value	

REVIEW DETAILS		
Date(s) of Review		
Review Team		
	Name	Area(s) of Responsibility
Project Team		
	Name	Project Role

REVIEW OUTCOME SUMMARY				
Assessed Status	Approve ☐	All Key Deliverables meet or exceed the required progress status. **No further action is required before proceeding with the next Project Phase.**		
Note: "Key deliverables" are those that - if not met - pose an impediment to the next project phase.	Hold ☐	Not all Key Deliverables meet the required progress status. **Minor Verification Required - Proceed to next phase but complete certain requirements identified during the review process**		
	Fail ☐	Insufficient Deliverables meet the required progress status. **Major verification work is needed to satisfy minimum requirements and resubmittal for Gate Review before proceeding to the next Project Phase.**		
Sign-off	Review Leader		Date	
	Project Manager		Date	
	Project Sponsor		Date	

Note": "Status Achieved" column can be completed by either using tick-boxes or traffic light colour coding as above

REF	DELIVERABLE	REQUIRED STATUS	STATUS ACHIEVED	COMMENTS
1	**EXECUTION PLANNING**			
1.01	Project Execution Plans	*Preliminary*	☐	
1.02	Project Set Up	*Preliminary*	☐	
1.03	Scope of Facilities	*See 1.02*	☐	
1.04	Scope of Hatch/JV Services	*Decided*	☐	
1.05	Hatch Services Contract/Commercial Agreement	*PO secure-filed*	☐	
1.06	JV/Alliance Relationships	*Decided*	☐	
1.07	Business Plan	*Developed Model*	☐	
1.08	Owner Interfaces	*Decided*	☐	

A.2 FEL Summary Sheet

HATCH

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PROJECT LIFECYCLE GUIDELINES

DELIVERABLES STATUS

REF	DELIVERABLE	FEL 1 CONCEPT STUDY	FEL 2 PRE-FEASIBILITY STUDY	FEL 3 FEASIBILITY STUDY (Includes Basic Engineering)	FEL 4 IMPLEMENTATION (Includes Detailed Engineering)
8.2	**CIVIL - PORTS AND MARINE**				
8.21	Geotechnical Data	***Preliminary Site Geotechnical Data*** Based on limited site geotechnical investigation - few boreholes and surface test pits.	***Indicative Site Geotechnical Data*** Geotechnical Report based on site-wide initial borehole drilling and surface test pits. Initial lab tests completed.	***Definitive Geotechnical Data*** Foundation design data based on location-specific boreholes for critical structures. All lab tests completed.	***Final*** Foundation design data based on location-specific boreholes for critical structures. All lab tests completed.
8.22	Site Conditions	***Public Domain Data*** Data based on public domain information, usually large scale maps for topography, wave climates, regional data for seismic & climatic.	***Preliminary Site Data*** * Site-specific topographical data with levels ± 1 m. * Prelim seismic study * Site-specific climatic and wave data.	***Detailed Site Data*** * Site-specific topographical data with levels ± 0.3 m. * Definitive seismic study. * Site-specific climatic and wave data.	***Final*** * Site-specific topographical data with levels ± 0.3 m. * Definitive seismic study. * Site-specific climatic and wave data.
8.23	Digital Terrain Model and Bathymetry	***Conceptual*** Topographical data imported from published information.	***Detailed*** Topographical data imported from detailed survey	***Detailed*** Topographic data imported from detailed survey.	***Final*** Issued for use.
8.24	Seismic Data (if relevant)	***Public Domain Data*** Data based on public domain information, usually regional data	***Preliminary Site Data*** Preliminary seismic study	***Detailed Site Data*** Definitive seismic study.	***Final*** Issued for use.
8.25	Design Vessel Criteria	***Preliminary*** Design Vessel Criteria internal issue only. Based on generali industry publisded criteria	***Draft*** Industry analysis to confirm Design Vessel size range. Issued for Client Review and comments. Input into Terminal	***Final*** Design Vessel design criteria defined and approved by Client and Marine Authority.. Issued for use.	***Frozen*** Design Vessel design criteria defined and approved by Client and Marine Authority.. Issued for use.

Appendix B

Gate Review Process Outline

1. Gate Review Process Outline

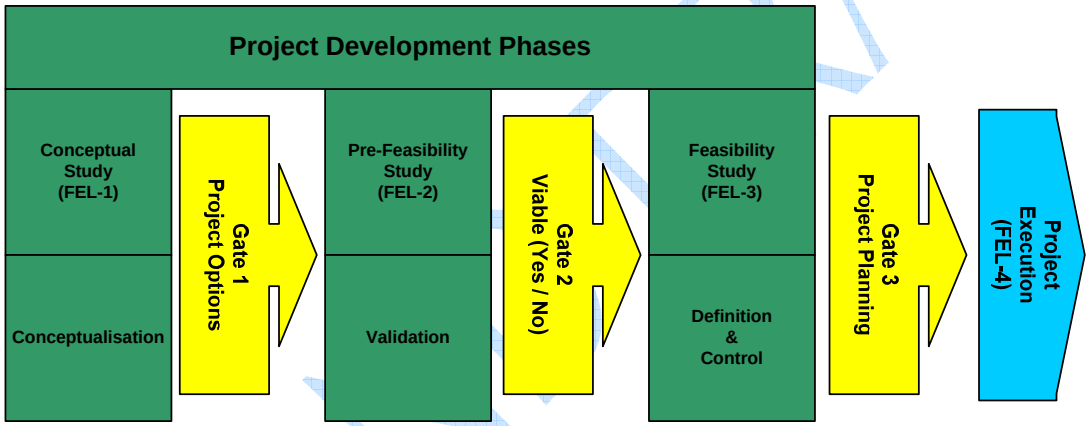
1.1 Purpose

The Project Lifecycle Management Process is a means of effectively controlling a project by breaking it into manageable stages or phases.

The Gate Review process provides a mechanism for management reviews of critical project outputs (engineering definition, capital estimate, schedule, EPCM fees estimate, execution plan, risk management), at the completion of each phase of a project's development to ensure project performance (development and execution) is as per plan. That is, towards the end of the relevant project development phase (FEL-1, FEL-2, FEL-3 or during the Execution Phase).

The Gate Review provides a basis to assess the viability of the project and grant the necessary authorisation for the project to proceed to the next phase.

This process is more clearly illustrated in the diagram below:



1.1.1 Gate Description

1.1.1.1 Gate 1 (FEL-1)

Technology Assessment and development of options - Internal high-level review of identified needs and solution options as well as an assessment of the required technology in order to assess its attractiveness as a possible business investment. Decision required by the Owner whether to proceed with a Pre-feasibility Study (FEL-2) or abort the process.

1.1.1.2 Gate 2 (FEL-2)

Most viable option identified and sufficient work completed to determine potential for project viability. Framework for Feasibility Study established. Decision required by the Owner whether to proceed to Feasibility Study (FEL-3) Phase.

1.1.1.3 Gate 3 (FEL-3)

Review of Comprehensive Scope of Work and Project Execution Plan.

Decision required by the Owner whether to proceed to the Execution Phase.

1.1.1.4 Gate 4 (FEL-4)

Review of the Definitive Estimate (typically when engineering is between 60% and 100% complete and construction has commenced).

May entail interim execution reviews for high risk projects.

1.2 Responsibility for Conducting Gate Reviews

The Project Sponsor is responsible for ensuring that the Gate Review Process is applied to the project. Transnet's Director – Project Review is responsible for organising and executing the review and reporting back to the Project Manager and Sponsor.

1.3 Gate Review Process Overview

The Gate Review process broadly comprises the following steps:

- Preparation of documentation prior to the review
- Selection and briefing of the Gate Review team
- Project team internal preparation
- Gate Review workshop (see agenda below)
- Quantitative risk workshops and determination of capital cost contingency (may be done as part of the Gate Review process (see agenda) but should preferably be done by the project team prior to a Gate Review
- Operations Division and Transnet Projects Senior Executive(s) review and approval to release documentation
- Gate Review report

The core of the Gate Review is the review workshop, which will use the PLP Gate Review Guidelines as the basis of the review and the review agenda.

No critical final stage documents (capital estimate, EPCM estimate, schedule, execution plan) and reports are to be formally issued to the Owner prior to the Gate Review.

1.4 Transnet Project Lifecycle Gate Review Guidelines

The Project Lifecycle Guidelines set out the expected standards for deliverables (quality, level of development) at the completion of each Front End Loading Phase.

The Project Lifecycle Guidelines have been structured for use as the detailed agenda for the Gate Review (see Agenda below). The Review Team and the Project Team work through the deliverables lists to assess the status of the project's deliverables against the project phase deliverables quality standards presented in the Guidelines.

1.5 Gate Review Agenda

The following table presents a typical Gate Review Agenda for an FEL-3 Gate Review. For earlier phase reviews this template may be "collapsed" to address only the functional areas relevant to that particular FEL phase work plan.

Typical (FEL-3) Gate Review Agenda

Project Name :

Project FEL Phase : FEL-1/ FEL-2/ FEL-3

Study Type : Concept/ Pre-feasibility/ Feasibility

Review Dates :

Day	Time	Activity	Project Team	Reviewer
Mon		**Project Definition**		
	8 – 10 am	Project outline, project organisation/responsibilities, documented scope of work and current status; schedule; capital estimate status; work done to validate the Study outputs; Owner's expectations; project risk overview	Project Manager	Review team
		Key issues and challenges facing the project	Project Manager	Review team
	10 - 12	**Engineering**		
		Status; level of engineering definition completed; guided by the Gate Review Guidelines	Eng Mgr, Leads	Specific reviewers
		Health and Safety – in design		
		Environment and Community – in design		
		Sustainable Development Design		
	12 - 1	Lunch		
	1 – 3	Process Design		
	3 - 4	Layout/ Model walkthrough		
	4 - 5	Mechanical		
Tues		**Engineering (cont'd)**		
	8 - 10	Civil		
	10 – 12	Structural		
	12 - 1	Lunch		
	1 – 2	Piping		
	2 – 3	Electrical		
	3 - 4	Control and Automation		
	4 - 5	Value Improving Practices in Engineering		
Wed		**Project, Procurement and Construction Management:**	PM + Final Leads	Specific reviewers
	8 - 9	Procurement and Contracting		
	9 - 10	Schedule		
	10 - 11	Health and Safety – in execution		
	10 - 11	Environment and Community – in execution		
	11 - 12	Construction Management/Planning		

	12 - 1	Lunch		
	1 - 2	Modularisation and Logistics		
	2 - 3	Commissioning		
	3 - 4	Project Execution Planning – overview		
	4 - 5	Value Improving Practices in Execution		
	5 - 6	Project Execution Systems		
Thur	8 - 9	Risk		
	9 - 12	**Capital Cost Estimate:**	PM, Estimator,	Review team
		Capital cost estimate review		
		- basis of estimate		
		- status of quantities		
		- status of market pricing:		
		- site labour: productivity; rates		
		- EPCM estimate		
		- Benchmarking		
		Operating cost estimate review		
	12 - 1	Lunch		
	1 - 5	**Quantitative Risk Workshop – Schedule Risk**	Internal/+ Owner	Review team
Fri	8 - 5	**Quantitative Risk Workshop – WBS Risk**	Internal/+ Owner	Review team
		Capital Risk		
		Operating Cost Risk		
Mon	8 - 12	**Quantitative Risk Workshop – Project Risk**	Internal/+ Owner	Review team
	12 - 1	Lunch		
	1 - 5	**Quantitative Risk Workshop – Owner's Cost Risk**	Internal/+ Owner	Review team
Tues	8 - 12	**Run risk model**		
	1 - 3	**Review model outputs**		
	3 - 4	Review team consolidate /observations/recommendations		Review team
	4 - 5	Initial feedback/discussion with project team		Review team
	5 - 6	Review with Transnet Senior Executive: Operating Division CEO's+ Project Sponsor/ Senior Project Manager to approve release.	PM	Review team
Wed		**Feedback to team**		Review team
		Complete Review Report		Review team

The review process applies the Transnet PLP Gate Review Guidelines for the relevant project phase, Concept, Pre-feasibility, Feasibility or Execution Phase (FEL-1, 2, 3 or 4), completing the guideline checklist for that FEL phase as the review progresses.

1.6 Gate Review Team

The composition of the Gate Review team needs careful consideration.

Essential elements include:

- Experienced leader (with extensive experience in project development phases (especially phases FEL-1, FEL-2 and FEL-3)
- Technical expert(s) in the key technical fields (may vary with the stage gate – i.e. at FEL-3 and FEL-4 each discipline should be adequately represented
- Cost estimating, scheduling and risk expertise, relevant to the project scope matter
- Key implementers who have managed similar projects, and can critically review implementation strategies (sometimes separating project management, construction management and commissioning)
- The team must (by and large) come from the business – this ensures comprehensive understanding of the business requirements. This team must not be confused with any "Peer Review" team which may come from outside of the business (preferable) to validate the discipline specific tasks and conclusions – this is a normal part of a Quality process

1.7 Gate Review Outcomes

The Gate Review team will consolidate their observations and findings regarding the work done during the phase and arrive at an assessment that the work done has achieved one of the following statuses:

1.7.1 Approved

- All key deliverables meet the required project phase quality standard
- No further action is required before proceeding to Business Case assessment

1.7.2 Hold -Further Minor Verification Required

- Not all key deliverables meet the required project phase quality standard
- Proceed Business Case assessment but complete certain requirements identified during the review process

1.7.3 Fail -Further Major Verification Required

- Insufficient deliverables meet the required project phase quality standard
- Do not proceed Business Case assessment
- Complete specific requirements identified during the review process, updating previous data and / or reports and re-submitting these for another Gate Review

Note: "Key deliverables" are those that - if not met - pose an impediment to the next project phase. The judgement of the Review Team in determining the overall assessment must be discussed with the Project Team at the time of drawing the conclusion.

Typically the guidelines are not used to "pass" or "fail" a body of work but more to a) focus on what work is lacking and needs to be addressed up before completion, and more particularly to b) understand where the soft parts of the work are and how that needs to be recognised in the estimate and risk assessment/contingency analysis activities.

1.8 Feedback and Approval to Release

When the Review Team has collectively drawn their conclusions, they are shared with the project team leadership – to ensure any misunderstandings are clarified. Once this is in place, the Review Team presents their findings to the Operating Division (OD) leaders for endorsement of the findings, and recommended remedial actions (if there are any).

The OD leaders then provide feedback to the Review Team and the Project Team with authority to issue the deliverables, take remedial actions (as agreed) and importantly, provide the resources (people, funds, time) and organisational commitment to the deliverables.

1.9 Gate Review Deliverable

The Gate Review team produce a Gate Review Report that records the process, findings, recommendations and working documents. Refer to typical Gate Review Report Table of Contents below: Refer to Gate Review Report Template available through Transnet document management system. See standard report contents list below.

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Appendix A

Gate Review Assessment

Appendix B

Meeting Action List

Appendix C

Estimate Class Analysis

Appendix D

Risk Review Report

Appendix E

Senior Executive Briefing – Meeting Minutes

Appendix C

Typical Communication Plan

No.	FROM WHOM/OWNER	TO WHOM	WHAT	WHEN	HOW	DESIRED EFFECT
	(Who is the message owner/stakeholder)	*(Who is the target audience/stakeholder)*	*(What needs to be communicated to stakeholders/what do they need to understand and act upon)*		*(What communication methods/tools are most appropriate for the stakeholder(s) groups?)*	*(what action/change/level of understanding do we want from this communication/what is the goal of this communication)*
1.00	Programme Manager	Transnet Head Office	Update on Projects	Monthly	Reports	Awareness of project progress by key stakeholders
1.01	Programme Manager	Transnet Operating Divisions	Update on Projects	Monthly	Presentation/meeting	Awareness of project progress by key stakeholders and "buy-in" from Business Units
1.02	Programme Manager	Transnet Operating Divisions	Project News	Quarterly	External newsletter	Information sharing on projects (less formal than monthly presentations)
1.03	Programme Manager (via Transnet H.O.)	Public	Incidents/Issues/Situations	Ad hoc		Keep public informed
1.04	Programme Manager (via Transnet H.O.)	Public	Crises	Ad hoc		Keep public informed
1.05	Programme Manager	Government - Dept of Public Enterprises, Eskom, etc	Project information on existing and new projects	As reqd	Meetings	Information sharing
2.00	Programme Co-ordinator	Programme Manager, Programme Directors, Snr Project Managers	Strategic Issues	Fortnightly	Meeting	Resolve programme level issues
2.01	Programme Co-ordinator	Programme Discipline Leads	Co-ordination across programme	Fortnightly	Meeting	Inform, raise issues
2.02	Programme Co-ordinator	HMG JV Steercom	Update on Projects	Monthly	Meeting	Keep Steercom informed
2.03	Programme Co-ordinator	Programme Team	Programme's "People" News	Monthly	Internal newsletter	People Engagement, teambuilding
2.04	Programme Co-ordinator	Programme Team and Small Projects Team	Updates on all projects - where they're at, goals for the period, progress, etc	Six-monthly	Feedback event	Stakeholders get a clearer picture of what the programme is about, celebrate key milestones, inform
2.05	Programme Co-ordinator	Programme Site teams	Updates on all projects - where they're at, goals for the period, progress, etc	Six-monthly	Feedback event	Stakeholders get a clearer picture of what the programme is about, celebrate key milestones, inform
2.06	Programme Co-ordinator	Programme Team	Programme Execution Strategy	Once-off	Visual - eg. posters	Team understanding of programme visions and mission
2.07	Programme Co-ordinator	Programme Team	Overview of programme - organogram, who's who, where to find people, what to do, etc	Once-off	Induction pack	People are kept up to speed and new recruits can "hit the ground running"
3.00	Project Services Managers	Programme Manager	Various Programme Issues	Weekly	Meeting and reports	Inform and resolve issues
4.00	HMGJV Steercom	HMGJV Steercom	Key risks, financials, key personnel, projects updates, other issues to raise at combined Steercom	Monthly	Meeting	Inform, raise key issues and deal with client concerns
4.01	HMGJV Steercom	Transnet Projects/JV combined Steercom	Key risks, financials, key personnel, projects updates, other issues	Monthly	Meeting	Action matters arising from morning meeting/presentation with clients (Business Units)
5.00	Programme Commercial Manager	HMG JV Steercom	Commercial and Financial issues	Monthly	Report	Inform
5.01	Internal Auditors	Programme Manager	Internal Audits	Ad hoc	Reports	report on procedural audits - invoicing, procurement, tendering & resourcing procedures, as well as financial audit
5.02	Programme Commercial Manager	HMG JV Steercom	Scope changes and compensation events on projects and within shared services	As required	Workshare, risk review register	Reduce risks
6.00	Senior/Project Managers	Transnet Operating Divisions and Programme Team	Update on Projects	Monthly	Presentation	Inform
6.01	Senior/Project Managers	Project Team	Update on Projects (incl performance on KPI's)	Monthly	Feedback Meeting	Inform & ensure team executes effectively
6.02	Senior/Project Managers	Project Team	Project Execution Plans	As reqd	Meetings	Project team executes effectively
6.03	Project Managers	Project Team	Project Charter, Project Lexicon, Organogram, templates, procedures, approval matrixes, systems, tools	As reqd	Training	Project team executes effectively