

The development of a resource project inevitably requires the investigation of a vast range of issues across most engineering disciplines - mining, metallurgical, chemical, civil, electrical, mechanical and environmental.

It is also a characteristic feature of the resource industry that no two orebodies - and hence no two development projects - are the same.

The feasibility study process must therefore demonstrate that not only have the **technical issues** been addressed, but also that the **commercial, economic and social issues** have been considered in the development of a comprehensive business plan, which includes an assessment of the risk-reward profile of the proposed development.

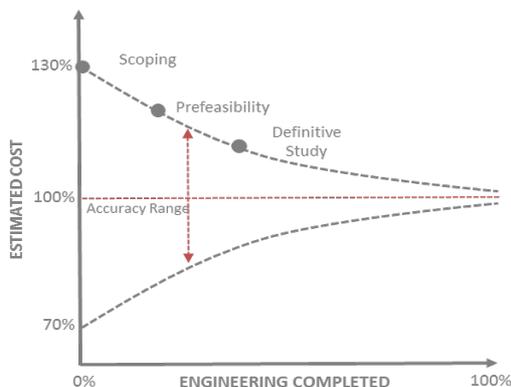
## Feasibility Study Process

The feasibility study process deals with uncertainty, and a phased and iterative study approach has evolved as a consequence. It is common practice for the feasibility study process to involve **three phases**, the conceptual or scoping phase, the preliminary or prefeasibility phase, and the final or definitive phase.

Scoping	Prefeasibility	Definitive Study
<i>A scoping (concept) study should be used to define the potential of a project, eliminate those options that are unlikely to become optimal, and determine if there is sufficient opportunity to justify the investment required for further studies.</i>	<i>Prefeasibility studies should be used to select the preferred operating options from the shortlisted options defined by the scoping study and to provide a case for whether or not to commit to the large expenditure and effort involved in a subsequent definitive feasibility study.</i>	<i>Definitive (full) feasibility studies should be used to refine the optimal operating scenario defined by the prefeasibility study. They are often used to assist with outside financing requirements. The definitive feasibility study provides the basis for the decision on whether in fact further study is required, whether the project is worth pursuing or whether to advance the project to design and construction.</i>

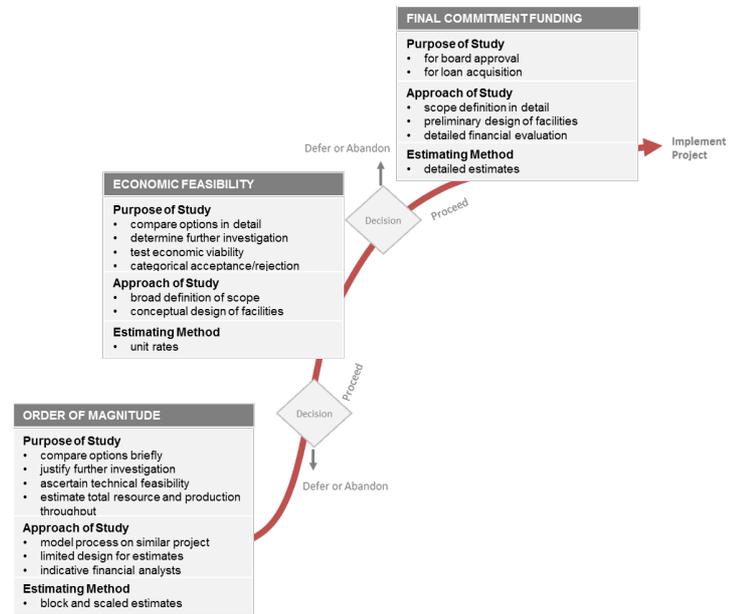
\*Refer to table overleaf for greater detail of the three phases.

As the Project develops and progresses through the Feasibility Study stages the accuracy of the estimated cost increases and the amount of engineering required for each phase also increases. As shown conceptually below:



## Project development

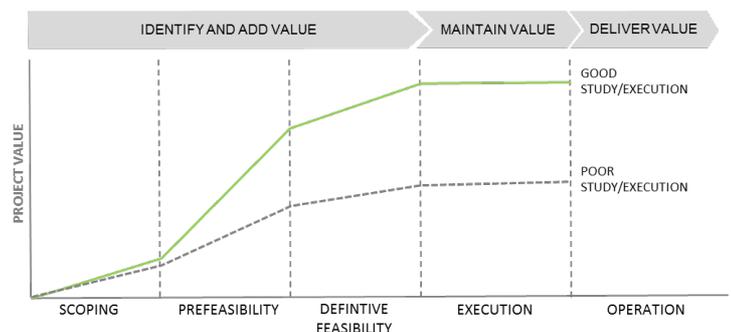
The Project decision framework (below) together with the study phases and associated studies (refer to table for typical studies of each phase) will determine whether the project will proceed or progress.



## Value Creation

A key feature of the feasibility study process is that the ability of an owner to influence the outcome of a project is at its peak when the feasibility study process is defining what the project should and will be - yet adequate project definition can be achieved in the study process for only a small fraction of the total project expenditure.

Once a decision to proceed is made, and design, procurement and construction efforts commence, there is little opportunity to create value no matter how good the project execution is. Excellence in project execution is required just to maintain the value opportunity created from a good feasibility study, and excellence in project operation is required to deliver the value. A poorly defined project will not deliver the same outcome as a well-defined project no matter how well executed and operated. Little scope exists to add or create value during project execution.



## Phased Approach

The feasibility involve three phases, namely the conceptual or scoping phase, the preliminary or prefeasibility phase, and the final or definitive phase.

	Scoping	Prefeasibility	Definitive Study
When?	A scoping (concept) study should be used to define the potential of a project, eliminate those options that are unlikely to become optimal, and determine if there is sufficient opportunity to justify the investment required for further studies.	Prefeasibility studies should be used to select the preferred operating options from the shortlisted options defined by the scoping study and to provide a case for whether or not to commit to the large expenditure and effort involved in a subsequent definitive feasibility study.	Definitive (full) feasibility studies should be used to refine the optimal operating scenario defined by the prefeasibility study. They are often used to assist with outside financing requirements. The definitive feasibility study provides the basis for the decision on whether in fact further study is required, whether the project is worth pursuing or whether to advance the project to design and construction.
Why?	<ul style="list-style-type: none"> <li>• What could it be?</li> <li>• Does it make sense to pursue this opportunity?</li> </ul>	<ul style="list-style-type: none"> <li>• What should it be?</li> <li>• Have I analysed enough alternatives?</li> <li>• Have I identified the optimum project configuration?</li> </ul>	<ul style="list-style-type: none"> <li>• What will it be?</li> <li>• What risks will this project involve?</li> <li>• What rewards will this project provide?</li> <li>• Have I presented an investment case that is unlikely to vary significantly?</li> </ul>
Typical scoping studies	<p>Scoping studies are typically undertaken during project generation or exploration and structured to:</p> <ul style="list-style-type: none"> <li>• Assess the potential of the new or expanded business opportunity;</li> <li>• Describe the general features of the opportunity including potential cases to be studied in the next phase;</li> <li>• Determine key business drivers for the opportunity and any potential fatal flaws;</li> <li>• Develop order of magnitude costs of the opportunity (both capital and operating);</li> <li>• Identify technical issues needing further investigation, such as geological drilling or test work required;</li> <li>• Determine the costs and time to undertake further development work to complete a prefeasibility study;</li> <li>• Identify the resources, personnel and services required to undertake further work on the opportunity; and</li> <li>• Provide a comprehensive report with supporting appendices that includes a recommendation to proceed or otherwise.</li> </ul>	<p>Prefeasibility studies are typically undertaken after the delineation of a mineral resource and structured to:</p> <ul style="list-style-type: none"> <li>• Assess the likely technical and economic viability of the opportunity;</li> <li>• Consider different mining, process, location and project configuration cases;</li> <li>• Consider different capacities for the project;</li> <li>• Determine and recommend the preferred optimum case to be examined during the feasibility study;</li> <li>• Outline the features of the recommended project;</li> <li>• Determine key business drivers for the opportunity and examine any potential fatal flaws;</li> <li>• Determine the risk profile of the opportunity;</li> <li>• Determine the nature and extent of the further geological, mining, metallurgical, environmental, marketing or other work needed to be undertaken during the feasibility study;</li> <li>• Determine the costs and time to undertake this work and prepare a feasibility study, including an estimate of the costs and time to develop the project following completion of the feasibility study;</li> <li>• Identify the resources, personnel and services required to undertake further work on the opportunity; and</li> <li>• Provide a comprehensive report with supporting appendices that includes a recommendation to proceed or otherwise.</li> </ul>	<p>Feasibility studies are typically undertaken after detailed data gathering of all material information relevant to the project development structured to:</p> <ul style="list-style-type: none"> <li>• Demonstrate the technical and economic viability of a business opportunity based on the proposed project;</li> <li>• Develop only one project configuration and investment case and define the scope, quality, cost and time of the proposed project;</li> <li>• Demonstrate that the project scope has been fully optimised to ensure the most efficient and productive use of the mineral resource, capital and human resources applied to the project;</li> <li>• Establish the risk profile and the uncertainties associated with this risk profile and develop mitigation strategies to reduce the likelihood of significant changes in the project assessment as set out in the feasibility study;</li> <li>• Plan the implementation phase of the proposed project to provide a baseline for management, control, monitoring and reporting of the project implementation and establish a management plan for the operations phase;</li> <li>• Facilitate the procurement of sufficient funds to develop the project in a timely manner; and</li> <li>• Provide a comprehensive report with supporting appendices that includes a clear recommendation to proceed with the investment or otherwise.</li> </ul>

## Key deliverables

The phased approach recognises that, in the event that a recommendation to proceed to the next phase of the project development cycle is made, then a key deliverable is a work plan for that subsequent phase. The deliverables from the three study phases are provided in the table below:

Scoping	Prefeasibility	Definitive Study
<p>Provide a future Work Plan (ie up to the point of commitment to a prefeasibility study) that includes a description of the following.</p> <p><b>Scope and objectives</b></p> <p>Define the scope and objectives for a project prefeasibility study (PFS), including:</p> <ul style="list-style-type: none"> <li>• declare the base and alternative cases to be considered,</li> <li>• declare technical issues requiring further investigation, and</li> <li>• identify test work to be undertaken.</li> </ul> <p><b>Approach</b></p> <p>Declare the execution strategy for the PFS, including:</p> <ul style="list-style-type: none"> <li>• minimum standards for the PFS Report,</li> <li>• resources required and organisation structure,</li> <li>• key personnel, and</li> <li>• key performance indicators for the PFS.</li> </ul> <p><b>Cost and schedule</b></p> <p>Provide an estimate of cost and schedule to undertake the PFS, including:</p> <ul style="list-style-type: none"> <li>• budget based on scope statement breakdown,</li> <li>• schedule, and</li> <li>• key milestones.</li> </ul>	<p>Provide a future Work Plan (ie up to the point of commitment to a feasibility study) that includes a description of the following.</p> <p><b>Scope and objectives</b></p> <p>Define the scope and objectives for a project feasibility study, including:</p> <ul style="list-style-type: none"> <li>• declare preferred case to be considered in the feasibility study;</li> <li>• declare the scope of the preferred case for the project;</li> <li>• declare technical issues requiring further investigation;</li> <li>• identify test work to be undertaken; and</li> <li>• key technical or commercial issues, which must be overcome to prevent the feasibility study activities from being curtailed, suspended or terminated.</li> </ul> <p><b>Approach</b></p> <p>Declare the execution strategy for the feasibility study, including:</p> <ul style="list-style-type: none"> <li>• minimum standards for the feasibility study report,</li> <li>• procedures and systems to be employed,</li> <li>• reporting requirements,</li> <li>• contents of the study report,</li> <li>• the development of documentation or any data room,</li> <li>• resources required and organisation structure,</li> <li>• key personnel, and</li> <li>• key performance indicators for the feasibility study.</li> </ul> <p>The approach to the feasibility study will incorporate phases consisting of:</p> <ul style="list-style-type: none"> <li>• activities needing to be completed prior to commitment of the feasibility study;</li> <li>• feasibility study activities planned; and</li> <li>• any post feasibility study, but pre-project commitment activities.</li> </ul> <p><b>Cost and schedule</b></p> <p>Provide an estimate of cost and schedule to undertake the feasibility study, including:</p> <ul style="list-style-type: none"> <li>• budget based on scope statement breakdown,</li> <li>• schedule, and</li> <li>• key milestones.</li> </ul>	<p>In addition to a detailed Project Execution Plan (see Section 14), provide an Early Works Plan for the period from completion of the feasibility study through to project approval that includes a description of the following.</p> <p><b>Scope and objectives</b></p> <p>Define the scope and objectives for the project:</p> <ul style="list-style-type: none"> <li>• declare the scope of the preferred case for the project; and</li> <li>• key technical or commercial issues, which must be overcome to prevent the project implementation activities from being curtailed, suspended or terminated.</li> </ul> <p><b>Approach</b></p> <p>The Early Works Plan will incorporate activities to be completed prior to commitment of the project (eg community liaison, contract negotiation, owners team set-up, land acquisition, early site works, long lead item procurement, preliminary engineering, training, etc).</p> <p>Declare the execution strategy for the project Early Works Program, including:</p> <ul style="list-style-type: none"> <li>• conditions precedent to board approval,</li> <li>• procedures and systems to be employed,</li> <li>• reporting requirements,</li> <li>• resources required and organisation structure,</li> <li>• key personnel, and</li> <li>• key performance indicators.</li> </ul> <p>Where third party funding is required for the project, the Early Works Plan will also cover financial closure activities necessary to procure third party funding for the project, including where necessary satisfaction of the conditions precedent to such third party funding.</p> <p><b>Cost and schedule</b></p> <p>Provide an estimate of cost and schedule to undertake the Early Works program, including:</p> <ul style="list-style-type: none"> <li>• budget based on scope statement breakdown,</li> <li>• schedule, and</li> <li>• key milestones.</li> </ul>