EPC and EPCM delivery models

Engineering, Procurement and Construction Management (EPCM) and Delivery Partner Models

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Key features of EPCM and Delivery Partner Models

Summary of key takeaways

- There is no 'one size fits all approach' or definition of the Engineering, Procurement and Construction Management project delivery model (**EPCM Model**) and Delivery Partner Models. Both models are adaptable depending on client and project requirements.
- Neither model replaces traditional contracting approaches for individual packages such as PPP, Alliance or D&C but rather supplements the risk allocation achieved under the contracting approaches with additional design development and a disaggregated, progressive approach to project packaging and procurement.
- The drivers for appointing an EPCM/Delivery Partner vary in line with client and project specific requirements and each client's core business and level of experience and expertise in project delivery.
- While EPCM/Delivery Partner means different things to different market participants, commonly accepted hallmarks of the EPCM/Delivery Partner approach are:
  - access to an additional pool of highly specialised project delivery resources
  - stage gated engagement across the project lifecycle
  - detailed scope development prior to investment decision and going to market
  - end-to-end procurement and project delivery focus based on overall critical path to completion
  - application of accountability and incentive mechanisms
  - a disaggregated, more granular packaging approach to project delivery
  - enhanced management of client risk including integration risk
  - application of specialised systems and processes which span the project lifecycle.

1.1 Introduction

Over the course of PwC's experience working with clients on large scale public infrastructure projects, it has become apparent that there are significant differences in the application and understanding of both the EPCM and Delivery Partner Models. Rather than reporting on the sometimes contradictory views, this paper provides a description and discusses the application of the models, incorporating PwC's experience and observations in the application of the models.

It is also apparent from PwC's experience that:

- other than identified differences in the level of accountability
- the extent of self-performance of design

the key features and drivers for using the EPCM and Delivery Partner Models are largely the same. Accordingly, except where the context requires the models to be distinguished, this section uses the terms 'EPCM/Delivery Partner Models' and 'EPCM/Delivery Partner' interchangeably. This paper is prepared on the basis that the client is the project Principal.

1.2 Overview of the EPCM/Delivery Partner Models

A recurrent theme from PwC's industry experience is that there is no precise or universally accepted definition of EPCM Model or Delivery Partner Model. The definition of each model varies from project to project depending on the project characteristics, delivery requirements and resourcing needs of the client.

The EPCM Model is a project delivery and client-side resourcing approach for complex mega projects. It has been used extensively in the oil and gas, petrochemical and mining and resources industries. The model is centred on the staged engagement of a multi-disciplinary organisation (**EPCM Partner**) throughout the project lifecycle under a professional services agreement. The EPCM Partner provides specialist project delivery resources (including personnel, systems and processes) for the project engineering, procurement and construction management interface and coordination functions.

The Delivery Partner Model is a more recent emanation of relationship contracting/partnering used on complex mega projects in the public sector. The Delivery Partner Model shares many characteristics of the EPCM, Managing Contractor and Alliancing models and has been adopted on projects in the United Kingdom, including London Olympics, Crossrail and, in Australia, on the RMS led Woolgoolga to Ballina Pacific Highway Upgrade, and in part on Western Sydney Airport and Sydney Metro. As with engaging an EPCM Partner, clients use delivery partners (**Delivery Partners**) to assist with project planning, programming, design management, procurement and construction management functions across various stages of the project lifecycle.

Under both the EPCM and Delivery Partner Models, the client adopts a disaggregated project procurement strategy. With the assistance of the additional EPCM/Delivery Partner resources, the client disaggregates, and progressively procures the project scope with multiple Contractors and suppliers under separate packages and potentially different delivery models. This is opposed to a single point of responsibility procurement approach where the client engages one entity (or a consortium) under a single contractual arrangement to deliver the entire project scope, creating a contractual layer and separation between the client and the rest of the construction supply chain.

The disaggregated procurement approach is predominantly selected where the scale of the project, combined with contracting market capacity constraints and competition issues, preclude procurement of the entire project scope under one package.

The disaggregated procurement approach is predominantly selected where the scale of the project, combined with contracting market capacity constraints and competition issues, preclude procurement of the entire project scope under one package. However, disaggregation results in an increase in complexity (particularly in respect of interface coordination) and client retained risk to be managed. The EPCM/Delivery Partner is typically engaged by the client to manage these resultant factors by supplementing its internal project delivery capability and capacity with additional specialist project delivery resources.

EPCM/Delivery Partners are often engaged early in the project feasibility analysis and early planning stage and provide services for the remainder of the project lifecycle on a staged engagement basis. In most instances, the client will have the option to end the engagement at key project decision points which are aligned (such as the outcomes of project feasibility studies or external finance credit approval).

Typical activities performed by the EPCM/Delivery Partner include:

- management of engineering and design (and in EPCM some instances of self-performance of Front End Engineering and Design (**FEED**) and detailed engineering and design, albeit some clients may preclude the EPCM from any self-performance due to perceived conflicts of interest)
- procurement and packaging options analysis
- implementation and management of the tendering and procurement processes for the various work packages
- overall project and construction management, including interface coordination and claims management.

Further examples of typical EPCM/Delivery Partner activities over the project lifecycle are outlined in Section 1.11. The scope of services and EPCM/Delivery Partner accountability varies and is tailored for each project based on a range of factors. These are discussed in further detail below.

1.3 Integration with traditional contracting and procurement approaches

The EPCM/Delivery Partner Model does not replace traditional contracting and procurement approaches, such as Construct Only, Design and Construct (**D&C**), Supply and Install (**S&I**), Engineering, Procurement and Construction (**EPC**), Public Private Partnerships (**PPPs**) or Alliance Contracting.

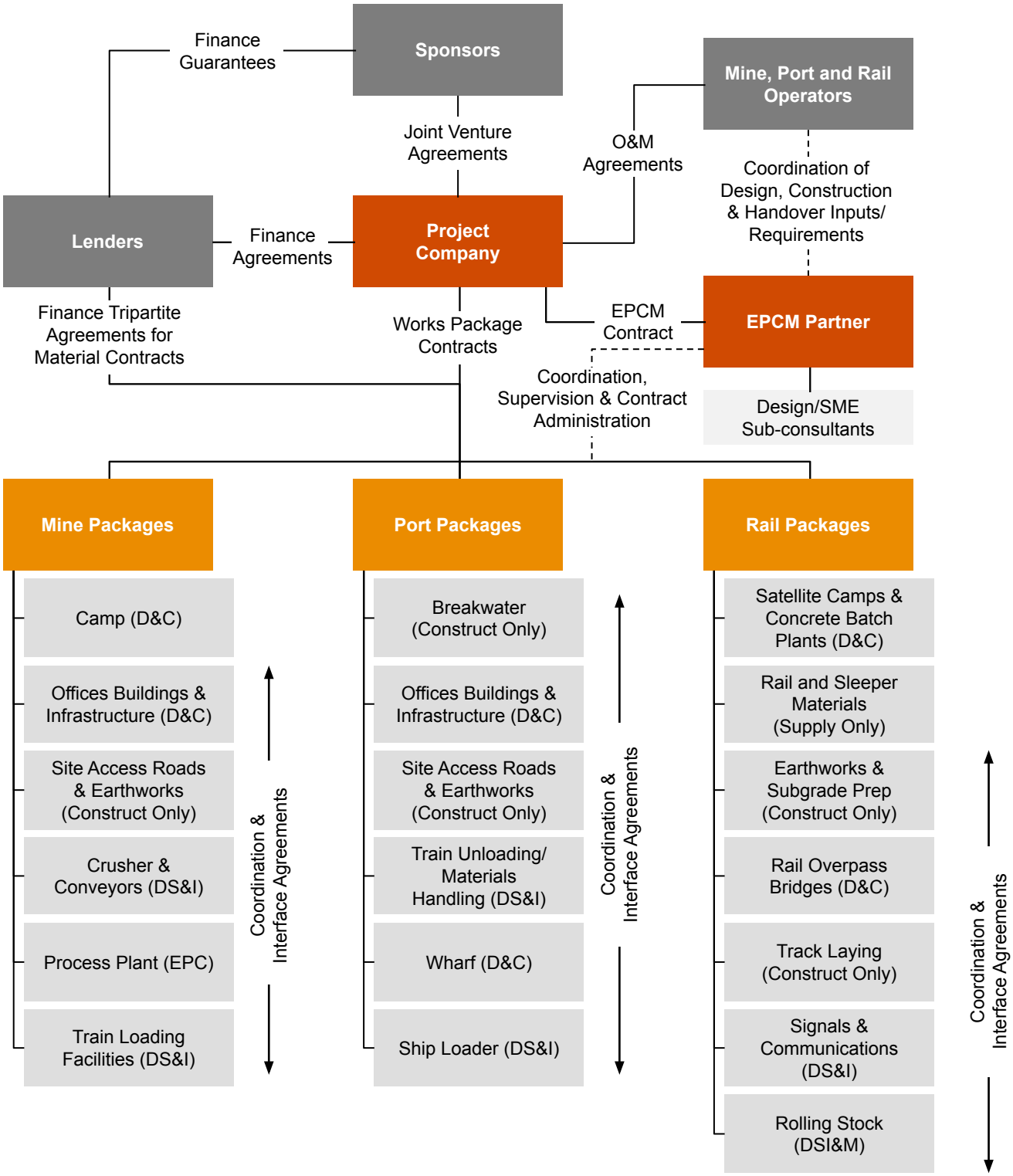
Rather, the EPCM/Delivery Partner Model facilitates and enables the appropriate use of traditional contracting and procurement approaches for the various work packages under a disaggregated project package structure.

In the private sector, clients and EPCM/Delivery Partners have traditionally relied more upon Construct Only, D&C, S&I and EPC approaches for the procurement of those works packages.

An example EPCM Model contractual framework diagram for the delivery of a large, complex mine expansion, deep water port and heavy haul rail project in the private sector, where these models have been extensively used in the past, is illustrated in **Figure 1.**

It shows the indicative project participants and contractual relationships, together with the work packages for the main project scope components and contracting and procurement approaches for each package. It also illustrates how the EPCM Model incorporates multiple interfacing work packages.

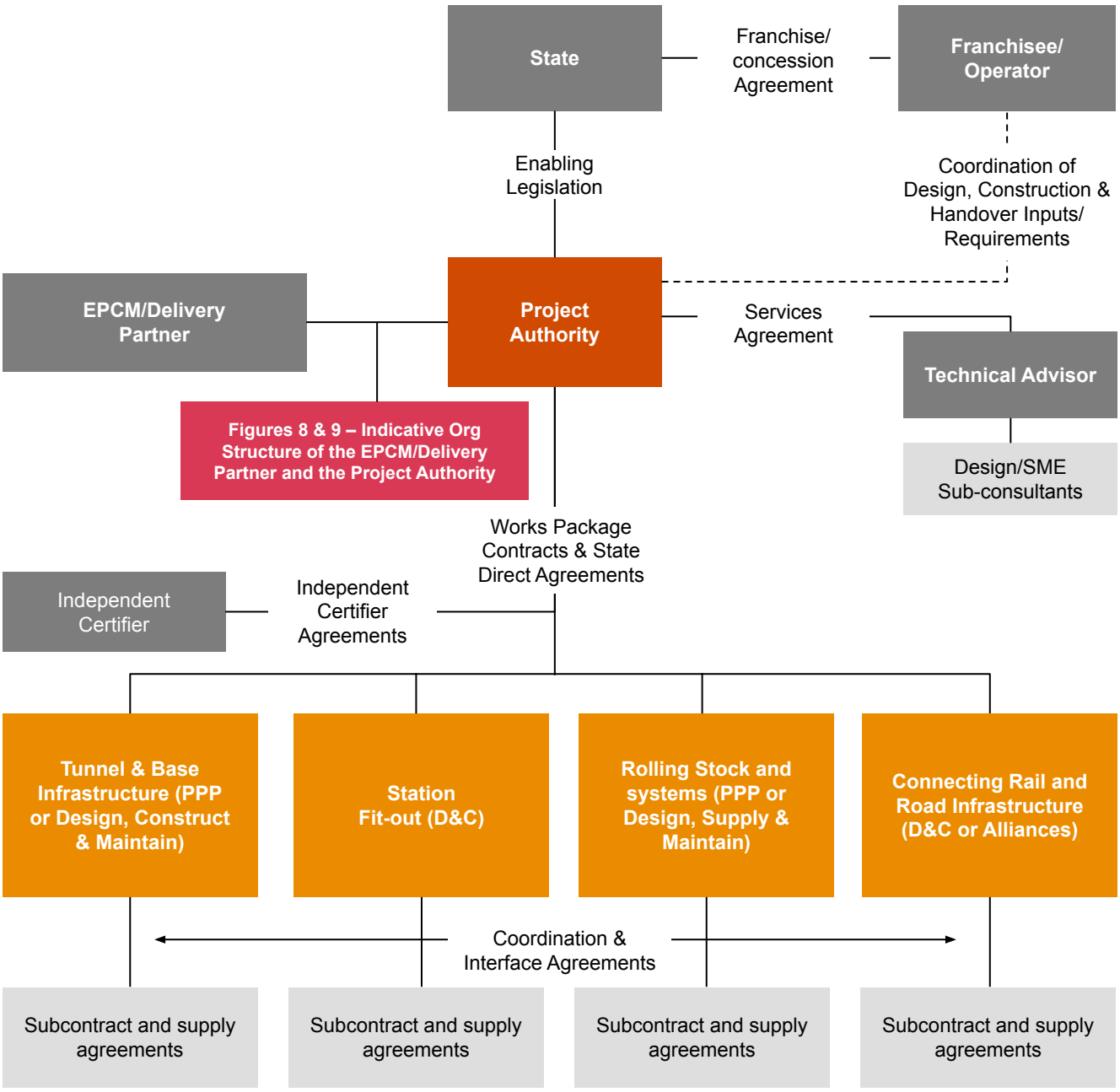
Figure 1: Example EPCM Model contracting structure and key packages for a multi-billion dollar interfacing mine, port and rail project



In the public sector, clients and EPCM/Delivery Partners have relied upon a combination of multiple interfacing work packages for separate contracting and procurement and, increasingly, PPP and Alliance approaches for the procurement of major works packages (e.g. rolling stock). For example, each of Crossrail, Sydney Metro and, we understand, Western Sydney Airport have adopted both PPP and Alliance contracting and procurement approaches for certain packages.

An example EPCM/Delivery Partner Model contractual framework diagram for the delivery of a mega transport project, incorporating some of the traditional contracting approaches used by public sector clients, is illustrated **Figure 2.**

Figure 2: Example EPCM/Delivery Partner Model contracting framework diagram for the delivery of a public sector mega transport project



1.4 Impact of EPCM/Delivery Partner Model on risk allocation

For each of the Crossrail, Sydney Metro Central and Southwest and Pacific Highway public sector mega transport projects, the intention in engaging an EPCM/Delivery Partner was to:

- maximise the likelihood of achieving project objectives
- ensure appropriate resourcing to manage the complexity, interfaces and client retained risks of mega projects.

Importantly, engaging an EPCM/Delivery Partner does not necessarily alter the contractual allocation of risk under the various work packages. Nor does engaging an EPCM/Delivery Partner avoid the client retaining overall accountability for the coordination and integration of the various work packages. These risks and responsibilities are ultimately retained by the client where it elects to procure projects in multiple, disaggregated packages, irrespective of whether the client engages an EPCM/Delivery Partner.

Example

For the RMS led Pacific Highway Upgrade Project, New South Wales Government standard form contracts were used to contract for discrete works packages. This means that the standard allocation of risk as between the State and actual delivery Contractor was unaltered by adoption of a Delivery Partner on that project. Rather than risk allocation, the motivation for appointing a Delivery Partner on this project was to enable rapid assembly of a client-side team, accelerate overall programme delivery and access a broader cross-section of the contracting market for package delivery. The Pacific Highway Upgrade Project is discussed further in **Figure 3** below.

So, rather than operating as a mechanism for the contractual allocation of project delivery risk, engaging an EPCM/Delivery Partner is more about providing additional project delivery assurance as part of the client's strategy for managing client retained risks and responsibilities.

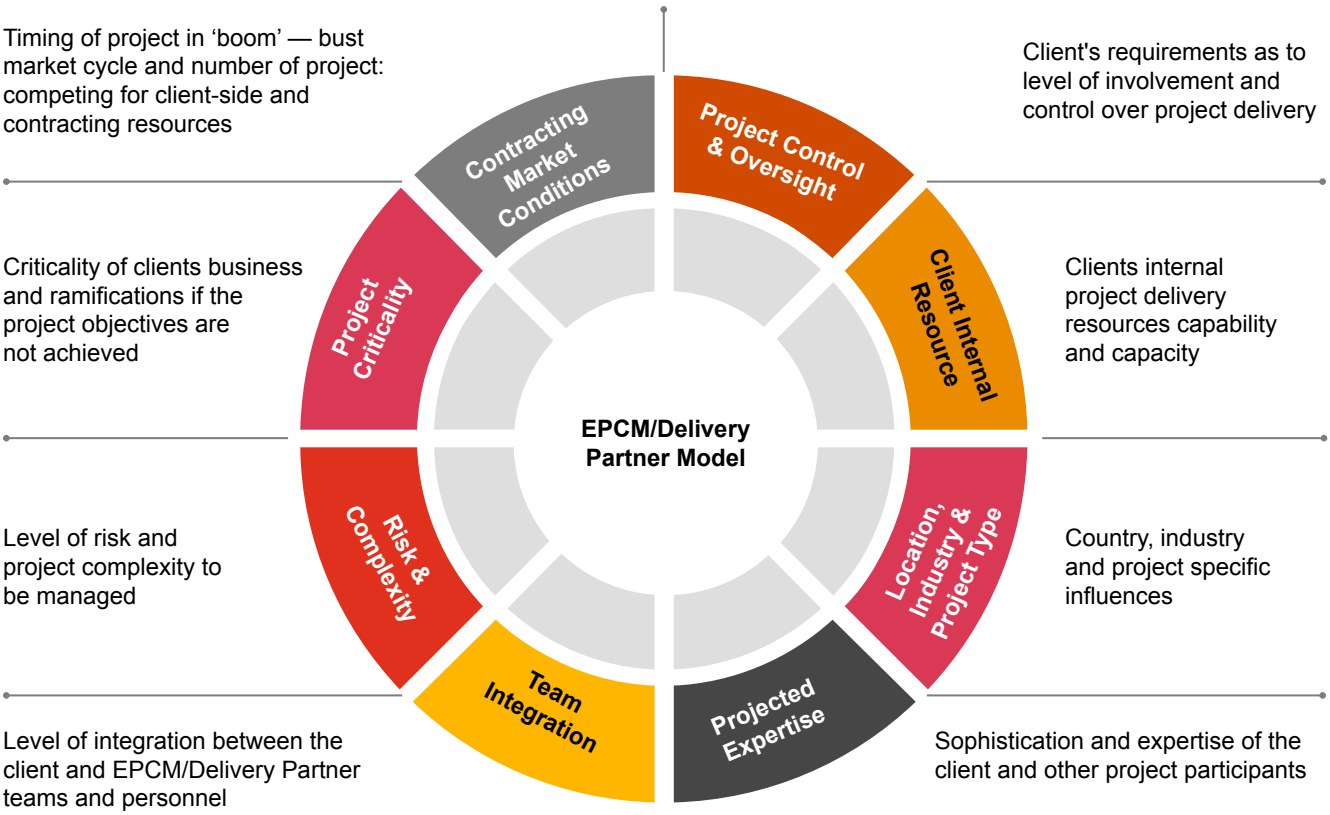
EPCM/Delivery Partners are typically required by clients to put a component of their fees at risk aligned to the achievement of measurable project outcomes. Outside those incentive arrangements and any design warranties provided by EPCM/Delivery Partners, they do not take overall project completion, integration or performance risk.

In that context, the relationship between the client and EPCM/Delivery Partner reflects more of a partnering arrangement along the lines of an integrated team. Typical EPCM/Delivery Partner incentive arrangements are discussed in Section 1.13 of this paper in terms of their potential application in the public sector context.

1.5 Structure and features of the EPCM/Delivery Partner Model

The structure and features of the EPCM/Delivery Partner Model vary from project to project. **Figure 3** identifies the key factors influencing the model.

Figure 3: Factors influencing the use and structure of the EPCM/Delivery Partner Model



While the detailed application and structure of the EPCM/Delivery Partner Model varies, there are a number of key features that appear across mega projects. These are described in **Table 1.**

Table 1: Key features of EPCM/Delivery Partner Model

Feature	Description
Engagement of external engineering and project delivery resources across the project lifecycle	• Rapid deployment of multi-disciplinary project resources drawn from a global employee pool that transfers from project to project and between different countries and regions based on engagements. • Still requires integration with local subject matter expert and operations/maintenance resources for certain project scope elements or location and industry specific requirements and nuisances. • EPCM/Delivery Partner commonly brings proprietary and other project delivery processes and systems which incorporate lessons learned from accumulated experience in project delivery over many years. To a degree, these processes and systems can be tailored to integrate with existing client systems and processes. • Clients retain overall decision making and leadership control and continue to directly employ and engage resources to perform project delivery functions that the client is better placed to manage (i.e. planning and regulatory approvals, financial and legal advisory functions, stakeholder negotiations etc).
Staged engagement aligned to client's investment approval stage gates	• EPCM/Delivery Partner engagement terms typically include progressive award of scope and commencements of services aligned to the client's investment approval stage gates (with the client having the option to end the engagement at each gateway). • EPCM/Delivery Partner's level of accountability and extent of commercial incentives increases as its engagement progresses through each stage gate.
Staged procurement throughout the project	• EPCM/Delivery Partner Model is typically only used on large complex projects where disaggregation of the project scope into multiple packages is unavoidable due to resourcing, material supplier and contracting market competition constraints. • Increased complexity and volume of work arises from having multiple packages and interfaces, as opposed to contracting with one party for the entire scope. • EPCM/Delivery Partner acts as the client's representative while the client retains overall accountability for the end-to-end integration and delivery of a project. • Client retains overall project delivery accountability and control throughout the project lifecycle rather than handing over accountability and transferring risk for project implementation to another party. • EPCM/Delivery Partner Model approach seeks opportunities to further disaggregate project scope (either horizontally or vertically) and optimise work package sizes during FEED development and procurement to align with Contractor specialisations and to maximise Contractor and supply competition and broaden resource capability and capacity.
Developed scope and design prior to investment decision and going to market	• Client investment parameters and/or financier requirements generally dictate more advanced scope development (i.e. in the order of 20-40% design development) to support the capital cost and programme estimates underpinning the investment decision. • The scope development and FEED process incorporate constructability assessments, operations and maintenance and procurement analysis from the outset and throughout the design process to inform and optimise the design and engineering solutions and reduce risk of scope creep in later stages of the project. • Typically, more developed designs (for example issued for construction) are developed prior to going to market. This is with a view to paying less upfront risk premiums to Contractors and seeking to derive more value from progressive allocation of risk to the contracting market as the design matures (i.e., rather than transferring risk to a Contractor at an earlier stage of design development when scope is more uncertain and risks are less defined).

Table 1: Key features of EPCM/Delivery Partner Model (Cont'd)

Feature	Description
End-to-end procurement and project delivery focus based on overall critical path to completion	• As the project is not delivered under one package with risk transferred to a single contracting entity, there is a shift in focus from managing a single transaction and contracting entity to managing multiple packages and interfaces and counterparties. • Resources, activities and procurement are allocated and prioritised based on the critical path to completion of the project rather than achievement of transaction milestones. • An EPCM/Delivery Partner is typically engaged from early in the project lifecycle and is required to adopt an end-to-end project focus and incentivised to assist the client to achieve whole-of-life project objectives, rather than a focus on achieving specific transaction milestones (i.e. contractual or financial close).
Staged procurement of work packages	• The scope and procurement approach for each work package is identified in the project work package breakdown structure. This remains a live document and is updated if required to respond to programme updates or market sounding and tender responses. • Work package scope and battery limits are determined based on a combination of factors including: – the critical path to project completion i.e. the procurement of project scope is broken down and prioritised based on what is needed to achieve overall project completion milestones – maximising the pool of available Contractor resources for delivery and creating appropriate levels of competition – the number of other projects competing for resources at the same time and manufacturing and materials availability. • The drivers must be balanced against the client's appetite for interface risk and financier requirements for bundling of packages to reduce dilution of performance and completion guarantees underpinning the project finance arrangements. • The FEED process continues throughout the procurement phase to avoid gaps in scope and ensure end-to-end design and system integration between work packages. A disciplined approach to change management is required to ensure ongoing design changes are minimised and scope creep that doesn't deliver the required return on investment hurdle rate is avoided.
Risk allocation and incentive mechanisms	• EPCM/Delivery Partners do not take overall project completion or performance risk which is typical for professional services and project management arrangements. • EPCM/Delivery Partners are generally incentivised by having a component of their fees and/or bonuses at risk, aligned to achievement of project objectives. The extent of incentivisation and skin in the game varies for each engagement. It is a point of distinction from standard technical adviser and project manager engagements which are often only based on reimbursable fee for services arrangements. • Incentive regimes usually incorporate both behavioural and harder project outcomes based Key Responsibility Areas (**KRAs**) and Key Performance Indicators (**KPIs**), assessed on both a rolling and end of project basis. • Extent of the EPCM/Delivery Partner risk and 'skin in the game' is influenced by the extent of the role and fees to be generated and the level of accountability and ability to influence project outcomes.

1.6 Common variables identified in EPCM/Delivery Partner Models

There are a number of variables across projects at both ends of the spectrum (i.e. active client and 'light' EPCM/Delivery Partner and passive client and 'heavy' EPCM/Delivery Partner). These are outlined in **Table 2.**

In practice, the approach adopted for each variable is determined by client resource requirements, project specific characteristics and market capability and capacity.

Table 2: EPCM/Delivery Partner Model common variables

Variable	Active Client – EPCM/Delivery Partner 'light'	Passive Client – EPCM/Delivery Partner 'heavy'
Level of EPCM/Delivery Partner resource engaged	• Predominately client employed project leadership and delivery resources. • EPCM/Delivery Partner provides specialised resource augmentation integrated with existing client team and governance structures. • Use of established client systems and processes with EPCM/Delivery Partner supplementing some processes and systems.	• Thin client organisation with limited internal project delivery capability. • Majority of project leadership staff and project delivery resources sourced from EPCM/Delivery Partner, with minimal client interface other than at very senior levels. • EPCM/Delivery Partner provides all or the majority of project governance and delivery systems and processes.
Level of delegated authority	• EPCM/Delivery Partner does not have any delegated authority to commence market engagement, enter into contracts or otherwise make commitments on behalf of the client without the client's prior approval. • EPCM/Delivery Partner is required to follow procurement procedures and processes, and use tender and contract documentation prepared and ultimate final approval by the client's commercial and legal team in procuring all work packages. • EPCM/Delivery Partner is required to review and provide its opinion on the contractual risk allocation from a market and value for money perspective but the client retains ultimate final approval rights.	• EPCM/Delivery Partner has delegated authority to commence market engagement and enter into contracts on behalf of the client without the client's prior approval for certain work packages up to pre-agreed contract values. All other commitments remain subject to client prior approval. • EPCM/Delivery Partner implements its own procurement procedures and processes incorporating client approval in line with the agreed delegated authority. • EPCM/Delivery Partner proposes proprietary standard contract forms which are reviewed and amended based on comments from the client's commercial and legal teams.
Extent of project disaggregation and interface risk	• Client and/or financier requirements dictate a limited number of horizontally integrated work packages • Scope components are bundled and delivery risks wrapped to the greatest extent possible based on contracting market capacity and appetite for risk • Clients prepared (or required by financiers) to pay an upfront risk premium to reduce interface risk and wrap a greater amount of risk under individual packages.	• Client is funding project on balance sheet and not restricted by finance requirements and/or is in a position to provide its own completion guarantees to financiers. • Client has the appetite and track record to successfully manage interface risk and divides the project scope into many horizontally and/or vertically integrated work packages, seeking to create greater competition from reducing package sizes and derive greater value from progressive allocation of risk to the contracting market. • A fast track project schedule and hard completion deadlines require long lead items that need to be procured immediately and the progressive procurement of scope elements in many separate work packages to maintain progress in line with the project critical path.

Table 2: EPCM/Delivery Partner Model common variables (Cont'd)

Variable	Active Client – EPCM/Delivery Partner 'light'	Passive Client – EPCM/Delivery Partner 'heavy'
Timing and duration of EPCM/Delivery Partner engagement	• EPCM/Delivery Partner is engaged after investment approval primarily to assist the client with procurement and construction management. • Primarily performs a project management support function (i.e. akin to a project management Contractor arrangement). • Engagement ends on achievement of practical completion of the project, with the client responsible for managing defects and warranty periods and project close-out activities.	• EPCM/Delivery Partner is engaged in stages throughout the project lifecycle, from pre-feasibility through to final completion. • EPCM/Delivery Partner's ongoing participation in the project is a requirement of client investment committee and finance approval. • The EPCM/Delivery Partner resources ramp up and down in line with typical project s-curve, and the engagement does not end until expiry of defects and warranty periods and project close-out and knowledge transfer activities are complete.
Engineering and design accountability	• No self-performance of design. • Management and limited peer review of design prepared by other consultants engaged by the client. • Very limited or no accountability for design.	• Self-performance of FEED where permitted by the client, reference designs for D&C work packages and detailed design for Construct Only work packages. • Review and coordination of detailed design prepared by work package Contractors and certification and inspection of works for compliance with approved design. • EPCM/Delivery Partner has level of accountability for self-performed FEED and detailed design achieving agreed cost, constructability and performance parameters. • EPCM/Delivery Partner has level of accountability for end-to-end design integration for both self-performed design and compliant design prepared by work package Contractors. • Extent of EPCM/Delivery Partner design accountability and liability is typically capped to re-performance of defective services and a component of the fee at risk, plus any proceeds recoverable from PI insurance.
Business case and investment recommendation	• No involvement in or accountability for business case development. • Limited accountability for peer reviewing and commenting on project cost and schedule estimates prepared by or on behalf of the client. • No self-performance of FEED for the business case and limited constructability peer review of design prepared by, or on behalf of, the client.	• EPCM/Delivery Partner performs a major role in preparing the business case. • EPCM/Delivery Partner has level of accountability for business case development and recommendations, primarily in respect of project cost and schedule estimates, plus the FEED upon which those estimates are based. • Extent of EPCM/Delivery Partner accountability and liability is typically capped to a component of the fee and/or incentive payment at risk, plus any proceeds recoverable from professional indemnity insurance for design. The accountability is also diluted by client inputs and decisions influencing business case recommendations.

Table 2: EPCM/Delivery Partner Model common variables (Cont'd)

Variable	Active Client – EPCM/Delivery Partner 'light'	Passive Client – EPCM/Delivery Partner 'heavy'
Amount of incentivisation ('skin in the game')	• Incentive arrangements based on KRAs and KPIs in respect of the EPCM/Delivery Partner's performance and retention of integrated personnel. • Relatively low percentage of fees/bonus payments at risk, reflecting limited involvement in business case and augmented resources structure and with delegated authority or project delivery autonomy to influence project outcomes.	• Base incentive arrangements based on KRAs and KPIs in respect of the EPCM/Delivery Partner's behaviours, timely performance of activities and deliverables, scope control and change management, retention of key personnel and demonstrated use of both local content and a global pool of client-side resources. • Additional incentive arrangements based on overall project KRAs and KPIs in respect of the overall project objective (i.e. output performance, cost and on time delivery), incorporating mechanisms to adjust for material adverse events or major project scope changes outside the EPCM/Delivery Partner's control. • Higher percentage of fees/bonus payments at risk, reflecting greater involvement in business case, team comprised majority of EPCM/Delivery Partner resources structure and with greater delegated authority or project delivery autonomy to influence project outcomes.

The EPCM/Delivery Partner 'heavy' approach outlined above is generally only adopted by clients where project delivery is not their core business and their preference is to outsource the majority of the project delivery function rather than develop in-house capability. This is most commonly the case in the oil and gas, petrochemical and mining and resources sectors.

The 'heavy' approach is not typically used where a client actively participates in project delivery and has a track-record in delivering major projects with sophisticated project delivery frameworks and in-house capability. In those circumstances, the client is more informed and better placed to take an active role and lead the project because it has delivered similar projects before and can draw on proven success factors and lessons learned from those projects.

Chevron, Roads and Maritime Services, Crossrail and Sydney Metro demonstrate that even active project developers with sophisticated internal project delivery capability see value in engaging an EPCM/Delivery Partner under a 'light' approach. This is particularly in relation to accessing additional specialised resources to enhance or supercharge existing internal capability and capacity for certain functions or in jurisdictions where the client has not previously delivered projects. Those entities recognise there is a commercial trade-off between retaining overall project delivery control and authority and the extent to which the entity can allocate risk of not achieving project objectives to the EPCM/Delivery Partner.

1.7 How is it different from the appointment of a Technical Adviser(s)

The following table sets out the differences between the appointment of a technical adviser(s) and the appointment of a Delivery Partner.

Table 3: Differences between the appointment of a Technical Adviser(s) and a Delivery Partner

Feature	Technical Adviser(s)	Delivery Partner
Front-end Engineering and Design	Focus on discrete deliverables: • Reference design • Process map	Focus on whole of life project needs: • Constructability • Market conditions • Raw material availability
Commercial terms of engagement	Typically employed on a 'Fee for Service' basis.	Long term contract with KPI regime tied to specific project outcomes including: • Accuracy of cost estimates • Adherence to planning requirements • Staff retention • Organisational/cultural cohesion Ongoing commercial tension throughout project lifecycle provided from stage gates, and the Principal's prerogative to expand or diminish Delivery Partner's role.
Market conditions	Very high quality pool of existing resources. However, scale of current infrastructure Programme means this market is at or over capacity.	Limited existing Delivery Partner presence in Victorian civil infrastructure market. However deep pool of available expertise and appetite from: • International DP/EPCM firms • Resources currently working in other sectors (mining/petrochemicals) • Technical Advisers looking to scale up into DP/EPCM Contractors
Resource mobilisation	Technical design and engineering expertise deployed in response to discrete tasks as procured by delivery authority. Limited capability in procurement and construction management.	Ability to rapidly scale up DP capability using international resources, including access to highly specialised technical skills.
Resource retention	Ability to incentivise retention of key resources limited by 'fee for service' nature of contract.	Can incentivise retention of key resources over the project lifecycle through DP contract.
Design risk	Varies depending on procurement method adopted. On PPP project, transferred to private sector through tender process.	Design risk stays with the Principal, but allows cost control through value engineering and refinement throughout project delivery.
Procurement milestones	First major procurement milestones occur with tending and award of primary D&C/PPP package(s).	First major procurement milestones occur during development phase, with appointment of Delivery Partner.

1.8 Drivers for using the EPCM/Delivery Partner Model

There are a number of key drivers for using the EPCM/Delivery Partner Model. These are summarised in **Table 4**, which includes examples identified from case studies to provide further context.

A recurring theme is that the EPCM/Delivery Partner Model is primarily adopted to access an additional pool of specialised project delivery resources. Accessing these additional resources is intended to maximise the likelihood of achieving project objectives and ensure the client is appropriately resourced to manage the additional complexity, interfaces and client retained risks arising in complex mega projects.

Another key driver for adopting the EPCM/Delivery Partner Model is the need for greater project disaggregation and progressive procurement of work packages in response to contracting market constraints and competition issues in a booming market, and to achieve aggressive fast-track target delivery timeframes to achieve project benefit realisation as early as possible (for example 'first ore on ship' ahead of competitors in the mining and resources context).

Table 4: Drivers for adopting EPCM/Delivery Partner Model

Drivers	Context	Examples
Thin/passive client driver	• Delivery of projects is not the client's core business or the client otherwise wants to retain a thin organisational structure and outsource the majority of the project delivery functions. • Client does not see value in investing in developing its own project delivery systems and processes for one project and wants to leverage an EPCM/Delivery Partner's purpose built project delivery systems and processes.	1. Small or mid-cap mining company with extensive in-house exploration and mining expertise but limited mining infrastructure delivery experience. Only has one project with investment approval and does not want to develop internal project delivery capability. Is also open to divesting interest in the project as it progresses and is de-risked and wants to maintain minimal permanent overheads and to outsource project delivery to an EPCM/Delivery Partner. 2. Special purpose organisation or project vehicle established solely for the purpose of delivering one project. With a finite purpose and duration, the client's preference is to only directly retain a number of key personnel and outsource the balance of the project delivery functions to an EPCM/ Delivery Partner.
Client-side resource constraints in heated market	• Booming market conditions with a large number of competing existing projects and project in the pipeline. • Client needs rapid access to an additional pool of client-side resources to properly staff its project and wants to leverage an EPCM/Delivery Partner's established network of existing resources and expertise.	1. Mining company seeking to deliver a project during the mining boom. Is not able to recruit and retain the necessary resources to deliver its project by target deadlines. The resultant project delivery delays and extended time frames risk the overall project viability as the client will lose sales if it is not able to complete the project and deliver ore earlier to customers. Despite paying a premium it elects to engage an EPCM/Delivery Partner on the basis it can rapidly deploy the necessary resources within required timeframes. 2. Client has a number of large projects to deliver in parallel. It has extensive internal project delivery capability and experience. However, the scale, complexity and number of parallel projects has exhausted internal capacity. Rather than defer the project until other projects are completed and resources become available, the client elects to engage an EPCM/Delivery Partner to assist it to deliver one of its projects under the direction of a client project leadership team.

Table 4: Drivers for adopting EPCM/Delivery Partner Model (Cont'd)

Drivers	Context	Examples
Larger more complex projects with greater disaggregation required	• Client is forced to split the project scope into a number in response to specialised technology needed and/or contracting market constraints and competition issues.	1. The project value is greater than AUD10 billion and is too big even for a consortium of large Contractors to wrap the delivery. Client also wants to restrict joint venture arrangements to maintain competition. The client is forced to split project scope into a large number of smaller packages resulting in more client-side work and resources required to manage additional complexity and risks. Client has internal project delivery capability and experience in delivering projects of less than AUD3 billion in value and wants to supplement that expertise with additional EPCM/Delivery Partner resources with complex mega project experience. 2. Client intends to deliver a highly complicated petrochemical plant with multiple specialist equipment suppliers and first of its kind technology. It is not practical or commercially feasible to obtain a wrap of all or major scope components. The client has to break the project up into a large number of smaller more manageable specialist trade packages. While the client has internal project delivery capability and experience, it does not have sufficient resources currently available to manage the additional complexity, volume of work and interface risk. It elects to engage an EPCM/Delivery Partner to assist it to manage these factors on a staged engagement basis.
Project delivery in foreign country or different industry sector or asset type	• Client is expanding its business into new markets and needs to develop infrastructure assets in those countries to support the business' expansion. • Client has significant internal domestic project delivery experience but limited experience in those countries or access to resources on the ground in those locations. • Alternatively, the client may have delivered projects in the country but not the type assets needed.	1. Client intends to deliver a petrochemical plant in a country in the Middle East. It has a core team of experienced project delivery personnel who have delivered similar projects that will be deployed to the project location. However, it has not previously delivered a project in the Middle East and elects to engage an EPCM/Delivery Partner which has a team of personnel with a proven track-record of delivering similar projects in the region which it will make available for the project. 2. Client is a mining company with assets in China. It is in the process of a major mine expansion and needs to develop new rail, port and power infrastructure to support the expansion and provide supply chain certainty to customers. The client has delivered mine infrastructure assets in China previously but not rail, port or power assets. It engages an EPCM/Delivery Partner to who was recently involved delivering similar assets in another region of China.

Table 4: Drivers for adopting EPCM/Delivery Partner Model (Cont'd)

Drivers	Context	Examples
Criticality of achieving project objectives and on time project delivery	• Client is embarking on the delivery of a major strategic infrastructure asset that is critical to the overall business strategy. • The ramifications to the business if the project is not delivered on time and in accordance with other objectives are such that it requires an additional level of project assurance and the client is prepared to pay a premium to secure the necessary resources. • Client engages an EPCM/Delivery Partner to gain access to additional 'best in class' global project delivery to supercharge its existing project delivery capability with experience and lessons learned from delivering projects under similar brownfield conditions and levels of public scrutiny.	1. Client has secured several major offtake agreements that will underpin its profits for the next ten years. Management is confident it has the resources it needs to deliver the infrastructure assets required to meet the commitments. However, the penalties under the offtake arrangements and consequential business interruption impacts if the assets are not delivered on time to deliver on supply commitments are such that the Board requires a greater level of project assurance and directs the engagement of an EPCM/Delivery Partner to supplement the internal resources. 2. Client is a special purpose government agency established to deliver a major international sporting event. On time delivery of the required stadiums and associated infrastructure is imperative and not negotiable. In response, the government agency engages an EPCM/Delivery Partner consortium to gain access to 'best in class' global project delivery resources with experience and lessons learned from delivering projects under similar brownfield conditions and levels of public scrutiny.

1.9 Opportunities for the EPCM/Delivery Partner Model to add value

For both private sector market participants and government stakeholders, there are several opportunities where an EPCM/Delivery Partner may add value. These observations were made in light of the current infrastructure boom and indications of a potential up-turn in project development in the mining and resources sector. These conditions are resulting in increased competition to secure both client-side and contracting resources, similar to the conditions encountered during the mining and resources and oil and gas boom in Australia a decade ago.

The main opportunities identified for an EPCM/Delivery Partner to add value include:

- **Access to additional specialised resources** – access to, and rapid deployment of, highly specialised project resources with mega project experience to respond to a heated and resource constrained domestic project environment and future pipeline.

  How: *The domestic infrastructure market is increasingly facing a drain of specialised client-side project delivery resources and is nearing or is at capacity. Some global EPCM/Delivery Partners have established domestic and international pools of resources which can be drawn upon as required at various stages of the project lifecycle. This enables the client to leverage core project delivery disciplines and subject matter expertise which can be deployed in multiple locations and across different time zones. For example, certain EPCM/Delivery Partners use locally based core project delivery resources and subject matter experts, combined with offshore global experts and design hubs (for more generic or non-location specific aspects of design) to introduce efficiencies into the project scope definition and design development process. Some EPCM/Delivery Partners may also have global procurement arrangements in place with international material suppliers and equipment manufacturers which a client can leverage to increase competition and potentially secure priority manufacturing slots at competitive rates (i.e. for steel supply or tunnel boring machines). Access to an established pool of resources can also enhance a client's ability to rapidly deploy additional procurement and implementation resources and respond to surges in project activity in the event that tender and contracting market responses dictate further disaggregation of project scope into smaller packages.*

- **Flexibility for greater project disaggregation – access to a broader cross section of the contracting market** – by adopting an EPCM/Delivery Partner Model approach to project disaggregation, procurement of work packages can occur progressively once project scope and design matures. Further disaggregation can also increase competition in an already constrained contracting market facing increasing capacity constraints and competition issues.

  How: *Dividing the project scope into a greater number of smaller, more manageable, packages enables tendering across a broader contracting pool than would be possible under a single contract package. This is particularly the case for projects where some Contractors may have significant project delivery capability, but for commercial reasons are only prepared to contract directly with the client and are not willing to subcontract to a tier 1 head Contractor consortium. This outcome of the Delivery Partner Model can be observed on the Pacific Highway Upgrade Project, where project disaggregation increased the number of tier 2 Contractors able to tender for work packages. Broadening the pool of Contractors able to bid on projects is expected to become increasingly important in enabling delivery of mega projects in the pipeline that are so large that even a consortium of tier 1 Contractors is unable or unwilling to wrap the delivery of the end-to-end project under a single contacting arrangement given the extent of project delivery risks and balance sheet constraints. However, the benefits of reducing the size and increasing the number of work packages to address competition issues has to be balanced against the client's appetite for managing interface risk and financier requirements for bundling of packages where applicable.*

- **Flexibility for greater project disaggregation – progressive allocation of risk as the scope definition matures** – there is an opportunity to derive more value from progressive allocation of risk to the contracting market as the design matures and external stakeholder requirements and risks are better understood by all parties.

  How: *The procurement of project scope is broken down and procurement activities prioritised based on design maturity and what scope components need to be prioritised to achieve overall project completion milestones. Other than critical long lead items and scope components which need to commence earlier, tender packages are generally only released once the relevant reference design has reached an appropriate level of design development and the project scope, stakeholder requirements and risks have been assessed. The FEED process continues throughout the procurement phase to avoid gaps in scope and ensure end-to-end design and system integration between work packages. This requires a disciplined approach to change management to ensure ongoing design changes and scope creep are controlled and minimised where it doesn't deliver the required benefits/return on investment. Again, the number of work packages has to be balanced against the client's appetite for managing interface risk and financier requirements where relevant.*

- **Enhanced management of client risk** – Incentivising external client-side resources to drive best for project behaviours and outcomes – adoption of typical EPCM/Delivery Partner accountability allocations and incentive regimes, if structured appropriately, can drive better alignment and best for project behaviours to support achievement of overall project objectives. This is as opposed to traditional fee for services arrangements for external engineering and project delivery resources which rely heavily on reputation and existing relationships, and have generally been structured around achieving a single transaction outcome and assisting the client to ensure the contracting entity delivers the contracted project outcomes and obligations.

  How: *While engaging an EPCM/Delivery Partner does not fundamentally alter the allocation of risk between client and Contractor based on chosen contracting approach, it can provide access to additional resources (personnel and systems) to manage client retained risks.*

  Complementing this is the ability to impose commercial incentives which drive an EPCM/Delivery Partner to manage risk on a whole of project basis rather than transactional basis (i.e. working to achieve project delivery rather than to achieve, for example, contract or financial close). The respective roles and responsibilities of the client, EPCM/Delivery Partner and other client-side resources are established during upfront alignment sessions and clearly documented in accountability matrices. Tailored incentive arrangements aligned to interim and overall project specific objectives are agreed and assessed on both a rolling and end of project/engagement basis. As with any incentive based regimes, appropriate and measurable KRAs and KPIs need to be agreed and documented to reflect required behaviours and outcomes. However, the extent of the EPCM/Delivery Partner's 'skin in the game' and effectiveness of the incentive regime will be largely dependent on how early in the project lifecycle the EPCM/Delivery Partner is engaged and the extent of its authority and ability to influence project outcomes.

- **Additional project wide controls, supervision and contract administration resources** – Adoption of typical EPCM/Delivery Partner Model approach to client controlled project programme, systems and records, combined with access to highly specialised project delivery resources to enable the client to be better informed on project progress and issues, and be in a better position to respond to and resolve major claims and disputes. This is critical on disaggregated mega projects where the client has to manage multiple Contractors and ultimately takes to end-to-end project integration risk. These risks include exposures to underperformance of one Contractor materially impacting and delaying other work packages for which the client bears the risk above EPCM/Delivery Partner liability caps.

  How: *It is generally accepted that EPCM/Delivery Partners have deep programming, site supervision and contract management expertise. A client can leverage that expertise to ensure it is more fully informed and has access to the necessary information and records throughout the implementation phase to assess actual progress versus the target project critical path and the root causes of delays and scope variations. It was observed that a lack of detailed information and records on actual progress and performance on site is a major hindrance for the client to be in a position to properly respond to and defend claims if necessary. EPCM/Delivery Partner Model also adopts a 'one source of the truth' approach similar to Alliances, where the client, with the assistance of the EPCM/Delivery Partner, establishes and maintains project wide programme, systems and records which Contractors are required to integrate with and use but which are ultimately controlled by the client.*

Example

Large clients in the oil and gas and petrochemical sectors often undertake project delivery as an important part of their core business. Those clients actively participate in project delivery and have established project governance frameworks and processes developed over many years. They also retain specialised project delivery and technical engineering specialists that are arguably leaders in their respective fields. These clients have established project leadership approaches and ways of working that draw on demonstrated success factors and lessons learned over many years on past projects. In these circumstances, an EPCM/Delivery Partner 'heavy' approach with a large team and significant delegated authority is not required. In addition, deploying such an approach may disrupt and adversely impact established project delivery behaviours and cultures seen by the client as critical project success factors. However, these 'sophisticated' active clients acknowledge the depth of highly specialised project delivery resources retained in-house by EPCM/Delivery Partner organisations and frequently engage them on an integrated EPCM/Delivery Partner 'light' basis to supplement the client's internal capability and capacity.

1.10 Constraints in deriving value from EPCM/Delivery Partner Model

Elements of the EPCM/Delivery Partner Model can add value to most projects. However, engaging an EPCM/Delivery Partner may not be appropriate and will not deliver value in all instances.

Many clients actively participate in project delivery and have established and sophisticated project delivery frameworks and capability in-house, including engineering and project delivery personnel with significant practical experience delivering projects in the relevant industry. Not surprisingly, this internal capability reduces the benefits and value that can be realised by a client from engaging an EPCM/Delivery Partner, particularly the use of the passive client 'heavy' EPCM/Delivery Partner approach described in Section 1.6. This is not a practical or economical option in those circumstances.

It was generally accepted that brownfield projects, particularly in urban environments, are subject to a large number of external factors and stakeholder requirements. These factors are typically beyond the control of an EPCM/Delivery Partner and require retention of a sophisticated client team to mitigate impacts on project progress and risks of material scope changes.

Other constraints in applying and/or deriving value from the EPCM/Delivery Model include:

- Potential for cannibalisation of existing local expertise and resources which are already in high demand in a heated and resource constrained domestic project environment.
- Higher demand on client resources to manage the EPCM/Delivery Partner. Specialised EPCM/Delivery Partner resources come at a cost premium and their engagement and ongoing management requires disciplined management by dedicated client resources.
- Inserting an extra layer between the client and Contractors may cause additional tensions and disputes which needs to be considered in the context of retaining existing strong client/contracting market relationships.
- Advancing the FEED and design development prior to going to market may, to an extent, stifle Contractors' ability to gain a competitive advantage and/or increase in margin during the tender and detailed design phases.
- Without appropriate change control processes and EPCM/Delivery Partner contractual disincentives, there is potential for scope creep from ongoing design development. The EPCM/Delivery Partner also needs to be managed to ensure disaggregation is controlled and an optimum work package breakdown structure is adopted that reduces interfaces and EPCM/Delivery Partner resources.
- The benefits of disaggregation and the progressive procurement of work packages in an EPCM/Delivery Partner Model approach will be significantly reduced, where disaggregation is constrained by a client's limited appetite for managing interface risks and/or financier requirements for bundling of work packages to the greatest extent possible.
- Under more heavily disaggregated work package breakdown structures there are greater difficulties in coordinating and avoiding gaps in liabilities between the individual Contractors. There are also typically lower levels of liquidated damages and overall caps on liabilities.

Further comparative analyses of the advantages and disadvantages of the EPCM/Delivery Partner Model and other delivery models are discussed in other briefing papers in this series.

1.11 Typical EPCM/Delivery Partner activities over project lifecycle

The EPCM/Delivery Partner is typically engaged in stages aligned to the client's internal gated project approval and governance frameworks.

The client usually retains the discretion whether or not it will direct the EPCM/Delivery Partner to proceed with the next stage of services beyond each stage gate. The EPCM/Delivery Partner's scope of services also needs to be aligned with its level of accountability and the risks it is assuming for project outcomes.

Typical activities performed by an EPCM/Delivery Partner are summarised in **Table 5.**

Table 5: EPCM/Delivery Partner typical activities

Phase	Role	Typical activities
Business Case	Supporting or delivering the business case that underpins the project investment decision.	• Basic and detailed engineering and design (often referred to as pre-feasibility/concept design and FEED). • Constructability analysis. • Materials and resource availability assessment and contracting market sounding. • Work package breakdown structure and procurement approach recommendations in respect of each package.
Procurement	Procurement planning, package preparation, implementation and management.	• Ongoing FEED, including development of work package performance specifications, reference designs and detailed designs for Construct Only work packages). • End-to-end design and systems integration of the separate work packages. • Further market sounding, preparation of tender packages, tendering, tender evaluations and recommendations for award of project packages. • Dynamic updating of work package breakdown and associated procurement approaches reflecting the outcomes of market sounding and tender responses. • Prioritising procurement of packages based on the overall project critical path, maturity of design and certainty of scope and stakeholder requirements. • Overall procurement process management in accordance with the client's internal governance frameworks and approved delegations of authority.
Implementation	Construction management, coordination, supervision and contract administration.	• Design and systems integration management and coordination between work packages, including reviewing detailed designs prepared by work package Contractors. • Site inspections and certification of completed work. • Work package coordination and interface management. • Construction Programme monitoring and scenario analysis. • Contract administration and claims management. • Contractor defect rectification management.

1.12 Typical process for engaging EPCM/Delivery Partner

For both private sector market participants and government stakeholders, the process for engaging an EPCM/Delivery Partner varies significantly from project to project.

Where clients have an existing relationship, and have successfully delivered projects with the assistance of a particular EPCM/Delivery Partner, it is common for them to engage the same partner on a single source procurement basis. In doing so, both parties leverage existing relationships, proven team and project success factors and lessons learned on the past projects. To ensure competitive pricing, clients reference the pricing and build on commercial arrangements used on the previous projects. Open book pricing is often used and informed clients generally have a good understanding of current market rates for project delivery personnel.

Alternatively, the scale of the project and number of personnel to be provided by the EPCM/Delivery Partner may necessitate a competitive tender process. In addition to creating competition, this enables a client to compare capability and ability to access best in class personnel across a range of tenderers. Subject to overriding time constraints, this would typically follow an expression of interest and request for tender process for professional services, including evaluation and down selection of tenderers in several stages. One or more preferred candidates is then selected to proceed to a final pricing and team selection and alignment phase before award of the contract.

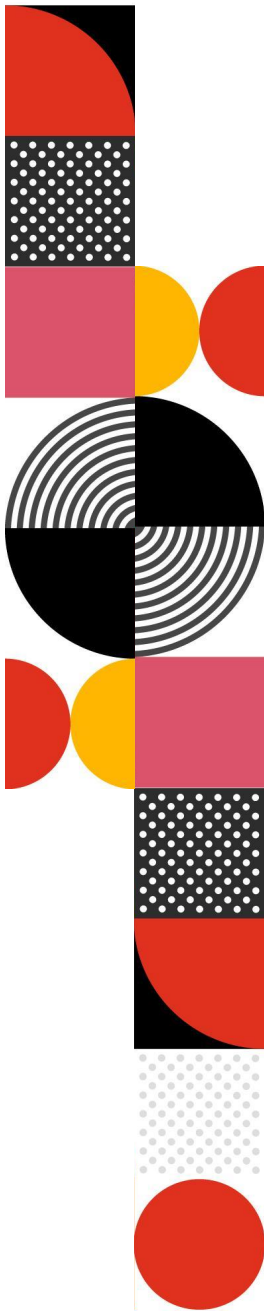
Clients often adopt a two stage engagement process. Under this approach, a client will initially only tender for and engage an EPCM/Delivery Partner for the feasibility and business case preparation phase of the project under a fixed or capped fee professional services arrangement.

In parallel with the performance of their respective activities and the project scope development during that phase, the parties continue to assess and align on the project organisational structure and the extent and timing of EPCM/Delivery Partner resources required for subsequent phases of the project. They also continue to negotiate the commercial terms and incentive arrangements under a professional services agreement for the balance of the project phases, which is aligned to the agreed resources, accountabilities and delegated authority (if any) of the EPCM/Delivery Partner (**EPCM/Delivery Partner Contract**).

Where the parties reach agreement on the scope and commercial terms, the client will engage an EPCM/Delivery Partner under a fully termed EPCM/Delivery Partner Contract. This form of contract is typically subject to conditions precedent, including client investment committee approval and financial close (if external project financing is required). Clients also typically reserve the right to go back to the market and tender the EPCM/Delivery Partner services for the remaining phases of the project or operations and maintenance, if for any reason the client is not satisfied with the incumbent EPCM/Delivery Partner's performance or its personnel during the initial phase, or the parties are otherwise unable to reach agreement on commercial terms. These provisions are often referred to as 'off ramps' or 'stage gates' in an EPCM/Delivery Partner engagement.

Clients have noted a need for commercial protection from price increases as an EPCM/Delivery Partner becomes more embedded in a client team over the project lifecycle. To achieve some level of insulation from future price increases, EPCM/Delivery Partners are often required to commit to personnel pricing and margins (spanning the project lifecycle) while there is competitive tension during EPCM/Delivery Partner procurement.

Critical to the success of the EPCM/Delivery Partner Model is allowing appropriate time to undertake a client-side organisational capability and capacity gap analysis prior to procuring an EPCM/Delivery Partner. This process is necessary to determine the supplementary project delivery skills and experience required from the EPCM/Delivery Partner.



1.13 Key contractual concepts between the client and the EPCM/Delivery Partner

The EPCM/Delivery Partner Contract is usually a bespoke professional services agreement prepared by the client's commercial and legal teams. Some EPCM/Delivery Partners propose their own forms of amended industry standard agreements incorporating collaborative contracting elements which they have used on past projects. This is not a recommended approach as it will not take into account client-side preferences or reflect the public sector staged approach to engagement.

In its simplest form, an EPCM/Delivery Partner Contract is a consultancy services agreement for the provision of professional and technical services. At the other end of the spectrum, it is more akin to an integrated Alliance style contract where the parties' interests are aligned and risks are shared through open book compensations frameworks and KRA and KPI incentive mechanisms built into the agreement.

There are many factors which influence the form of, and risk allocation under, the EPCM/Delivery Partner Contract. They include:

- the current market demand in the engineering/project management sector.
- the size, complexity and risk profile of the project.
- whether the project is to be delivered on a fast-track schedule.
- the requirements and approach to allocation of risk of the project Sponsor(s).
- the requirements of the Lenders where the project is to be financed on a limited or non-recourse basis.
- the requirements of other stakeholders.
- the extent of engineering and design already undertaken by the client under separate contracts (if any).

Whatever form of contract is used, the terms need to be tailored for each project with clear delineation of the respective roles and accountabilities of the client and the EPCM/Delivery Partner. Carefully considered incentive arrangements aligned to the client's project objectives are also critical to driving the appropriate behaviours and successful project outcomes. The EPCM/Delivery Partner Contract will also usually incorporate the award and commencement of the EPCM/Delivery Partner's services in stages aligned with the client's project lifecycle phases and investment decision points/gateways.

Some of the contractual concepts to be considered for an EPCM/Delivery Partner engagement are summarised in **Table 7**. This table is not an exhaustive list and further detailed analysis of typical EPCM/Delivery Partner contractual issues and incentive arrangements are also discussed in other briefing papers in this series.

Table 7: Key EPCM/Delivery Partner contractual concepts

Concept	Description
Staged engagement with optional phases	Contracts are typically structured in such a way so as to permit the client, in its absolute discretion, to instruct the EPCM/Delivery Partner to proceed to the next stage. For example, at the conclusion of the feasibility stage, the client can elect to end the engagement and go to market regardless of whether an incumbent EPCM/Delivery Partner has properly performed the services. Similarly, where the project is to be financed through limited or non-recourse project financing, the client must be entitled to terminate the contract in its absolute discretion if the Lenders do not give finance approval or the clients cannot raise the required capital. Terms establishing the process, consequences (including payment on termination outlined above) and risks in the services undertaken during a particular phase will need to be clearly articulated in the contract.
Project objectives and project scope	The contract should include a description of the client's overarching project goals, list of project objectives and a detailed description of the scope and the client's project requirements. This would usually be aligned to the business case objectives, scope and assumptions underpinning the investment decision. Traditional provisions regarding obligations to use all reasonable endeavours to perform the services to ensure the defined scope is delivered in accordance with the project objectives and requirements should be included. This also becomes the reference point for determining whether a change is material giving rise to a variation or adjustment to KRA and KPI targets upon which incentive payments are based as discussed below.
Accountability matrix	In addition to the detailed scope of services and agreed personnel and resource schedules, the contract should include a detailed accountability matrix for each phase of the services. This is typically in the form of a table and includes a detailed list of all key project tasks and activities during each phase, and delineates, at a high-level, the accountability of the client, EPCM/Delivery Partner and other key project participants for the performance of or contribution to each task or activity. The accountability matrix must align with the client governance and organisational structure and the agreed resources to be provided by EPCM/Delivery Partner. The process of preparing it often provides a good opportunity to identify and correct any misalignment between the parties in terms of respective roles and responsibilities.
Client reserve powers and delegated authority	Provisions should be included in the contract which clarify the 'reserve powers' held by the client to manage and direct the project, including: • approval of systems and procedures governing the project • urgent protection of people and property • issuing bid documents • awarding implementation contracts • approving variations and extensions of time or • any event likely to have a major impact on the operation or viability of the project etc. The extent of the EPCM/Delivery Partner's delegated authority (if any) also needs to clearly articulated and remain subject to change at the client's discretion. Terms establishing the process and consequences (including any impact on incentive arrangements) for a change in the EPCM/Delivery Partner's delegated authority must be clearly articulated.
Retention of key personnel	The traditional provisions regarding key personnel (i.e. the EPCM/Delivery Partner cannot remove them without the client's prior approval) are likely to be too inflexible for complex mega projects delivered over several years. Consideration should be given to alternate arrangements such as incentives or payment of a liquidated amount where senior key personnel leave or are taken off the project within a certain period. There will typically be exceptions to such payment for illness, incapacitation and resignation, or if the personnel are temporarily absent on, for example, annual, sick, long service or compassionate leave (provided a suitable replacement is deployed to the project).

Table 7: Key EPCM/Delivery Partner contractual concepts (Cont'd)

Concept	Description
Overall design integration responsibility, constructability warranties and novation of exiting design	Early consideration of the scope of the EPCM/Delivery Partner's design obligations is vital. In particular, a client must consider whether an EPCM/Delivery Partner is responsible for: • the end-to-end design integration of the various work packages • guaranteeing that, when integrated, the design of the various project scope elements will enable the overall project to meet the client's functional and performance requirements for the whole project. If an EPCM/Delivery Partner is responsible for end-to-end integration, there will need to be certain carve-out to the design warranties for latent errors or deficiencies in detailed engineering and design performed by the works package Contractor and Suppliers. Where the EPCM/Delivery Partner is permitted by the client to self-perform FEED and detailed design, it should be required to provide design constructability warranties and also warrant that the design of the works will be fit for the purposes it was intended for. In the event a major proportion of the engineering and design for the project has already been undertaken under separate design/consultancy packages let by the client (i.e. FEED during the initial project feasibility phase), the client should consider avoiding potential gaps in liability by creating a single point of responsibility for the performance of the FEED. This is achieved, in part, through the novation of the existing design to the EPCM/Delivery Partner so that it has contractual rights against those consultants. If the EPCM/Delivery Partner is to be a single point of responsibility for the performance of the FEED, the client must allow sufficient time and budget for the EPCM/Delivery Partner to verify and correct errors or deficiencies in the existing design. Field engineers coordinate specialist design and engineering resources to resolve design and engineering issues until the works have been fully commissioned.
Intellectual property	The contract intellectual property (**IP**) regime needs to reflect: • the range of Contractor and Supplier background IP being contributed • the range of project IP being developed at the work package and supply contract level • the corresponding need for licences and rights to use and develop that IP, including ensuring appropriate IP warranties and indemnities in the work package and supply contracts. The client should also ensure it retains ownership of and rights to use and adapt the IP in the FEED and other materials prepared by or on behalf of the EPCM/Delivery Partner as part of the business case. This will prevent the client from being restricted in using that material in the event it elects to terminate the EPCM/Delivery Partner's engagement at the end of the feasibility and business case phase. The client should also specify the format and form by which this IP is handed over in the event of a termination of engagement.
Insurance	The whole of project insurance strategy is critical and will impact on the contract risk allocation and extent of insurances to be procured and maintained by the EPCM/Delivery Partner. In addition to any project wide insurance policies, the EPCM/Delivery Partner will usually take out and maintain public liability and professional indemnity insurance. In reality the scope of the professional indemnity insurance may not underwrite all of the contractually assumed liabilities under the contract, in particular EPCM/Delivery Partner warranties and indemnities. This may or may not influence negotiations of contract terms, including liability cap, depending on the EPCM/Delivery Partner's balance sheet capacity to meet its liabilities. The EPCM/Delivery Partner's liability caps are sometimes limited to the amount recoverable under insurance policies maintained under the contract. If this position applies, the EPCM/Delivery Partner's policy must operate on an 'each and every claim basis' rather than an 'in the aggregate basis'.
Overall project cost and programme control	The EPCM/Delivery Partner is usually required to prepare a capital cost budget and programme for the business case. Once approved, the EPCM/Delivery Partner becomes responsible for monitoring and managing actual cost and progress against the approved budget and Programme, and for providing the Principal with regular costs and Programme updates. Although the EPCM/Delivery Partner does not take the risk of delivering the project on time and on budget, it generally has an obligation to use reasonable endeavours to do so, and is incentivised to manage the budget and Programme to ensure project cost or Programme overruns are avoided or minimised through incentive payments.

Table 7: Key EPCM/Delivery Partner contractual concepts (Cont'd)

Concept	Description
EPCM/Delivery Partner remuneration	EPCM/Delivery Partners are typically remunerated on an cost-reimbursable basis, including the following components: • Fixed Fee: Pre-agreed fixed fee or percentage of the estimated cost for each phase of the project to cover margin and overheads. • Actual Personnel Costs: Reimbursement for directly and reasonably incurred personnel costs at pre-agreed rates or on an open book costs basis, with typical deductions for duplication of work undertaken due to defects in the services or otherwise for the EPCM/Delivery Partner's default. • Reimbursable Expenses: Reimbursement for a discrete list of reimbursable expenses, subject to the client's approval prior to the expense being incurred (i.e. pre-approved work related travel). The EPCM/Delivery Partner will typically also be entitled to bonuses (or subject to a reduction in payment) under an agreed incentive regime as outlined below. The EPCM/Delivery Partner may also agree to fixed-fee arrangement for certain activities where it is able to reasonably estimate the extent of work and resources required. However, any fixed fee or capped fee arrangements need to be considered carefully and structured in a way that does not create behaviours which are not in the overall project's best interests.
Material variations	Not all project scope changes will constitute a variation under the Contract which should include mechanisms for determining what amounts to a material variation (i.e. a major change to the project scope or other material adverse event not contemplated by the parties) and the corresponding cost consequences (i.e. adjustment to fixed fee and overhead component or payment of direct costs only). This area becomes more important in relation to the achievement of KRA and KPI targets and whether the target costs and time frames are to be adjusted. Pre-award workshops are often conducted to define the limited nature of events giving rise to a variation.
Incentive arrangements	Given the cost reimbursable nature of the contracts, without incentive mechanisms, it is difficult, if not impossible, to instil the same sense of urgency and efficiency in the EPCM/Delivery Partner and its personnel over a long period as compared to a fixed price model. Therefore, the regime will be critical in incentivising the EPCM/Delivery Partner to perform in a safe, productive, efficient and timely manner in order to ensure the client's key objectives for the project are realised – usually a combination of time, cost, quality, safety, environment, stakeholder and community management. It is critical when formulating the targets and methods of measuring performance, that there is sufficient clarity of project scope and the client's requirements. Whenever possible, the Principal must allow sufficient time and resources to agree and clearly articulate quantifiable KRA and KPI targets and corresponding methods of measuring performance against those targets. The incentive regime should focus on maximising productivity and timely delivery whilst striking a balance between time and budget, without sacrificing quality or safety. We have seen very detailed and sophisticated incentive regimes, particularly in an Alliancing or relationship contracting context and where project deliverables are to be measured over long time frames. Conversely, some parties prefer to move away from (or limit the extent and impact of) incentive regimes, because they believe these arrangements can create uncertainty (and therefore some risks in a rising cost market) and drive the wrong behaviours due to additional friction between the parties, which does not foster co-operation or trust between the parties. Some EPCM/Delivery Partners are also unwilling to put a material percentage of their remuneration at risk based on an incentive regime. However, if the incentive regime is structured with proper recognition of the current market conditions and the issues below are addressed then successful outcomes are achievable.

1.14 Financing a mega project using an EPCM/Delivery Partner Model

For private sector projects financed through limited or non-recourse project financing, the syndicate of Lenders often demand certainty in terms of time and cost. This is because security is reliant on achieving completion and satisfying the completion tests to allow project revenues to flow during the operations phase.

Where the borrower is an entity newly established to deliver, own and operate the project, this usually restricts the use of an EPCM/Delivery Partner Model even though the outcome may potentially be cheaper and faster (with some exceptions where there is government or Export Credit Agency support or very strong Principal-financier relationships or influence).

Where an EPCM/Delivery Partner Model is used, it is not uncommon for Lenders to require the client to provide them with a completion guarantee. That is, the client (or its ultimate parent company) provides the Lenders with some form of company guarantee until practical completion/commercial operation or a commitment to cover cost overruns, delay costs and debt service obligations during a period of delay.

That guarantee is usually capped, falling away upon practical completion/commercial operation. Depending on the requirements of the Lenders, the project characteristics and the client's and EPCM/Delivery Partner's track record for delivering similar projects, the completion guarantee may be more limited and step down prior to practical/commercial operation or as various stages of the project are completed. Conversely, it may extend beyond commercial operation to cover market pricing risk depending on the type of project and output.

The processes that Lenders use to identify, allocate and manage risks prior to financial close and during the construction phase include:

- obtaining due diligence (including technical, environmental and financial) as part of the credit process.
- appointing Lenders' technical consultants to review project cost estimates and revenue projections, as well as monitoring the progress of the project.
- appointing a certifier to assess the value of the work completed and what it will cost to complete the construction of the project.
- only allowing further drawdowns of the debt facilities if the latest forecast 'cost to complete' does not exceed the project company's available funding and the latest forecast date of completion will occur before the debt sunset date.

Where government funded disaggregated mega projects are financed by drawing on revenue through the State budget, the EPCM/Delivery Partner can assist the State by providing the same level of project due diligence and by monitoring cost and time overruns in the absence of private sector project finance by:

- being engaged as part of FEED to prepare cost, budget and schedule estimates based on experience with other mega projects, and the parallel activities being done in collaboration with the client's team in respect of scope definition work, development of the preliminary/full business case and design engineering development.
- monitoring and reporting on anticipated costs of the Project as well as the progress of the build.
- implementing cost controls incentivised through the incentive regime.
- playing an active role in monitoring and reporting during the testing and commissioning phase of the works packages.
- applying its integration management expertise.
- taking end to end design responsibility.

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