13 DELIVERY MODEL ANALYSIS

CHAPTER SUMMARY AND CONCLUSIONS:

- For the purpose of the Delivery Model Analysis chapter the Reference Projects 1 and 2 were treated as a single 'Nullinga Dam option' given the cost ($800-$1.1bn) qualifies as a significant project and either option would generate similar market interest and require a similar delivery model
- A number of traditional delivery model options may be used to undertake the Reference Projects including Construct Only, Design and Construct (D&C), Construction Management, Managing Contractor and Alliance (Nullinga Dam option only)
- The qualitative assessment of the VFM drivers found PPP delivery models are not justified, as Nullinga Dam has insufficient scope for value generation, in part to the absence of market appetite to take on demand risk
- The recommended packaging for Nullinga Dam is:
  - A single design and construction package for the dam related works
  - Peripheral works (access roads) to be completed prior to the dam construction
- The recommended delivery model for Nullinga Dam, at this point in time, is a Competitive Alliance with two-stage EOI/RFP stage and partial reimbursement of bidder costs

13.1 Purpose

This Chapter documents the potential delivery models to procure and deliver the Reference Project/s. The objective of the analysis is to identify a delivery model that is likely to provide the best value for money in meeting the identified service need. Delivery model analysis encompasses the recommendation of packaging options (e.g. bundled versus single package) and the contract model (e.g. Construct Only, Alliance).

For the purpose of the Delivery Model Analysis chapter the Reference Projects 1 and 2 were treated as a single Nullinga 'large' Dam option given the scale $800-$1.1bn qualifies as a significant project and either option would generate similar market interest and require a similar delivery approach.

Table 13-1 provides a summary of the key characteristics of the Reference Projects shared with participants.

Table 13-1 Summary of Reference Projects' key characteristics shared with participants

Characteristic	Reference Projects 1 and 2 Nullinga Dam and two distribution pipelines
Dam Type	RCC
Full Supply Level [Confirm Free Surface Level]	545m-556m AHD
Storage Capacity (at FSL)	256,262-518,497ML

Characteristic	Reference Projects 1 and 2 Nullinga Dam and two distribution pipelines
Additional Yield (approx.)	54,000-73,300ML[105]
Inundation Surface Area (at FSL)	1966-2797ha
Dam Height (Max)	54.7-65.3m
Wall Length	635-703m
Concrete Volume	375,000-586,968m3
Total Capex Estimate	$806m - $1,089m
Annual O&M Cost Estimate	$4.1 - $4.3m

13.2 Approach for the delivery model analysis

The delivery model analysis incorporates the:

- Project context (Section 1.3), including:
  - Constraints and opportunities
  - Sunwater capability
  - Market capability
  - Precedent projects
- Packaging options (Section 1.4)
- Available delivery models (Section 1.5)
- Value for Money (VfM) assessment of the PPP delivery model option (Section 1.6)
- Assessment of delivery model options – Nulling Dam (Section 1.8)
- Conclusions and recommendations (Section 1.9)

13.2.1 Methodology for the delivery model analysis

The approach relied on the following methodology:

- Review of project information to understand the project characteristics, objectives and risks
- Workshops with Sunwater personnel (November-December 2018) to understand the organisation's existing and future capital delivery capability, and learnings from recent project delivery experience
- Incorporation of findings from the market sounding (refer DBC Chapter 10) to understand industry perspectives
- A workshop with Sunwater and Building Queensland personnel (late-November 2018) to confirm assumptions prior to the delivery model assessment

[105] It is noted that these yields were preliminary in nature, and were subsequently updated to 58,000 ML/a and 74,000 ML/a

- Development of a draft Delivery Strategy for review at a workshop (mid-January 2019) with representative of:
  - Sunwater
  - Building Queensland
  - Queensland Treasury
  - Department of Natural Resources, Mines and Energy (DNRME).
- Incorporation of feedback of workshop participants.

Delivery Strategy is used here to describe an overarching strategy that Sunwater may consider to prudently progress planning for the delivery of the Reference Projects that also incorporates (and is distinguished from) the Delivery Model Assessment with its narrower focus on packaging and delivery model *(contract model)* options.

13.3 Project context

Project information was reviewed to understand the project characteristics, objectives and risk with constraints and opportunities confirmed with stakeholders, per Table 13-2 below.

Table 13-2 Constraints and opportunities

No.	Constraints	Opportunities
1	Feasibility uncertainty ▪ Water demand has nil binding commitments ▪ Current timeframe commences construction ~2030 ▪ Lack of precedent bulk water PPP assets	Competitive market with capacity and capability: ▪ to undertake the project including both design and construction scope ▪ industry preference for collaborative delivery models (CO/ETI, D&C/ECI, Alliance)
2	Funding uncertainty ▪ Potential to limit contractor engagement (e.g. reluctant to incur costs) prior to Financial Investment Decision.	Long delivery timeframes ▪ provides the opportunity to undertake further investigations (e.g. geotechnical) and reduce risk premiums
3	Planning uncertainty ▪ No EIS - unknown approvals and conditions ▪ Lack of land tenure/access to undertake EIS surveys	Design innovation ▪ incorporate into dam design and construction via collaborative delivery models
4	Technical uncertainty ▪ Limited geotechnical studies ▪ Limited constructability analysis ▪ Concept level of design and cost estimate	Sunwater knowledge and experience of operations and maintenance ▪ With ability to incorporate knowledge into dam design to optimise whole of life costs
5	Brownfield operation: ▪ Sunwater strong desire to maintain service and relationships with existing customers during delivery of future projects	Sunwater capital delivery expertise: ▪ Brownfield and greenfield expertise expected to increase in the period prior to project commencement

13.3.1 Sunwater capability assumptions

Noting a strong expectation and preference that Sunwater will be the operator of any new dam, workshop participants discussed and considered Sunwater's current and future capability. The delivery model assessment adopted the following assumptions:

- Sunwater has the capability to translate its operation and maintenance expertise into the functional specification of brownfield and greenfield dam design to optimise whole of life costs.
- Sunwater has the capability to effectively manage the design process for major infrastructure projects
- Sunwater has established capability in brownfield projects, and this capability will continue to grow given a forward program of dam safety projects planned for delivery in the next 5-years
- Nullinga Dam scale is greater than Sunwater's 'business as usual' greenfield projects.

13.3.2 Market capability assumptions

Based on the Market Sounding, it is understood that

- both Reference Projects are attractive to the contractor market with Tier 1 contractors having the capability and capacity to deliver the Nullinga Dam
- industry has a clear preference for collaborative delivery models (specifically Alliance and CO/ETI, D&C/ECI) given the characteristics and risks of the project.

13.3.3 Precedent projects

Examples of recent brownfield dam augmentations and greenfield RCC dam projects were reviewed to identify previously used delivery models. The review of precedent projects in Table 13-3 shows:

- projects relied on collaborative approaches during the procurement phase (ETI or Alliance)
- an Alliance (full or partial competition) was the most common approach for greenfield dam projects.

Table 13-3 Precedent greenfield and brownfield dam projects

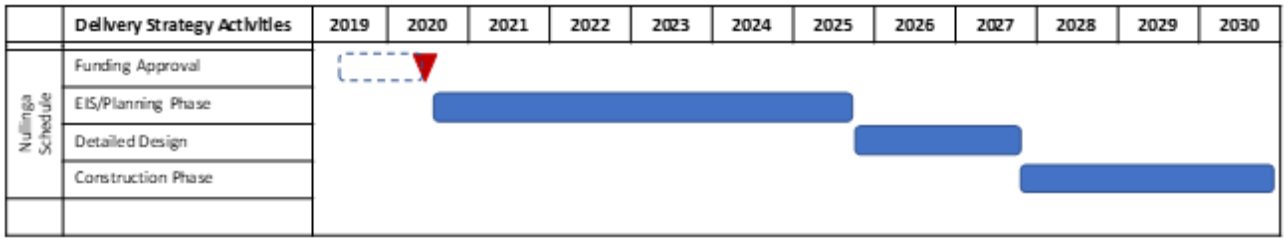
Dam	Description	Completed	Delivery Model
Chaffey Dam [WaterNSW - $50m]	Brownfield Augmentation of rockfill dam (including 8m raising of embank)	2016	Initially Design then Construct with an ETI phase transitioned to D&C following receipt of tenders
Hinze Dam [Gold Coast City Council - $340m]	Dam Augmentation of rockfill dam (20m)	2011	Alliance (Non-price Competition)
Traverston Dam [QWI - $800m]	Greenfield RCC Dam	Did not proceed	Alliance (Partial Price Competitive Process)
Wyaralong Dam [QWI - $130m]	Greenfield RCC Dam	2011	Alliance (Partial Price Competitive Process)
Burnett River Dam [Burnett Water SPV - $200m]	Greenfield RCC Dam	2006	Alliance (Full Price Competition)

Dam	Description	Completed	Delivery Model
Conners River Dam	Greenfield RCC Dam	Did not proceed	Construct Only with an ETI phase
Enlarged Cotter Dam ACTEW [Icon Water - $410m]	Greenfield RCC Dam	2013	Alliance (Non-Price Competition) (Independent Selection of Designer and Constructor)

13.3.4 Indicative Reference Project timeframes

Indicative projects timeframes for the Reference Project/s are provided in Figure 13-1.

Figure 13-1 Indicative construction schedule



The long lead time prior to commencement of construction provides the opportunity for the State (via Sunwater) to undertaking a program of investigations to reduce uncertainty (e.g. regards technical aspects including planning and approvals) progressively in-line with increasing certainty of project funding.

13.3.5 Objectives for the Delivery Strategy

Delivery Strategy is used here to describe an overarching strategy that Sunwater may consider to prudently progress planning for the delivery of the Reference Projects that also incorporates (and is distinguished from) the Delivery Model Assessment with its narrower focus on packaging and delivery model *(contract model)* options.

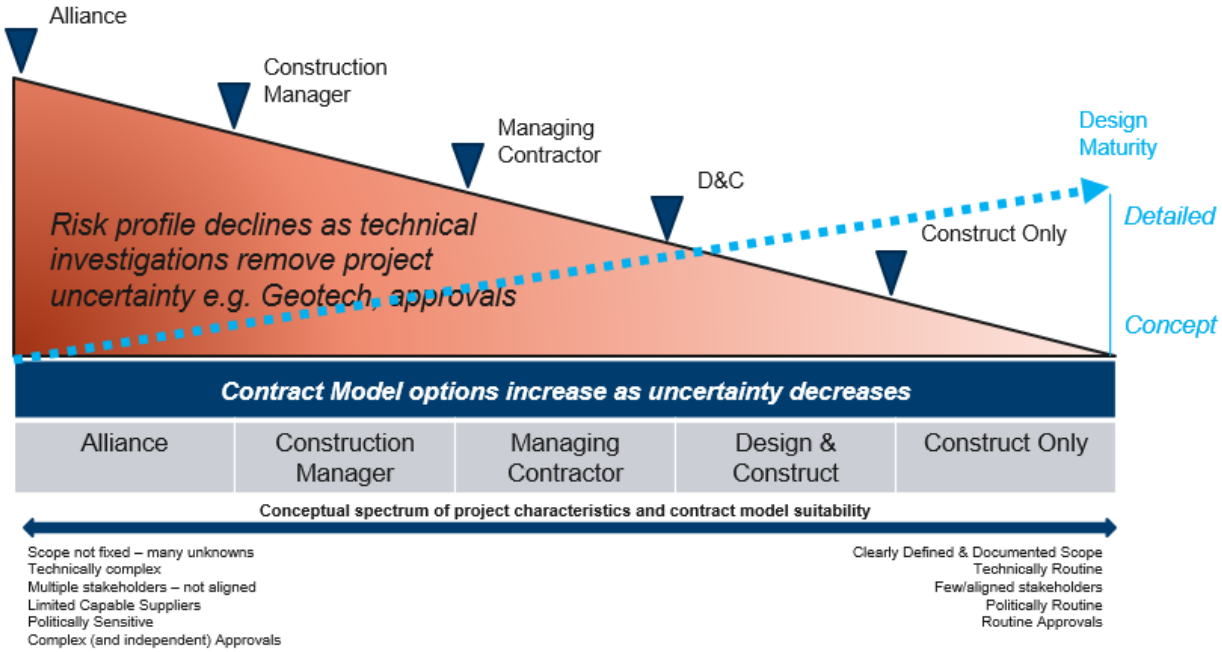
The need for an overarching strategy is to address the challenges presented by the Reference Projects, including the:

- long lead times, with construction on a proposed Nullinga Dam commencing mid-2027
- preliminary nature of technical and planning studies impacting the suitability of delivery models at a given point-in-time (i.e. the suitability of the delivery model options may change as studies progress)
- potential impact of further dam design on the range of suitable delivery model options.

This is shown diagrammatically in Figure 13-2 with:

- delivery model options increasing as uncertainty reduces
- delivery model options decreasing as design maturity increases.

Figure 13-2 Relationship between contract model options, project uncertainty, and design maturity



The level of dam design impacts the range of suitable delivery model options as the more complete the design, the less opportunity for innovation and effective risk transfer e.g. further maturing the dam design would likely lessen the benefits of the Alliance delivery model anticipated in this current assessment.

The current dam design development (~30%) is considered sufficient to lodge an EIS, without limiting available contract model options.

Given the uncertainty over a future investment decision and the preliminary nature of technical and planning studies, prudence requires limiting future design development and undertaking a program of investigations to progressively reduce uncertainty (e.g. uncertainty regards technical aspects, planning and approvals) in parallel with increased funding certainty (if it occurs).

Based on the understanding of the project context, the primary objectives of the Delivery Strategy for the Reference Project/s were agreed with stakeholders include:

- achieve project requirements including yield, timeframes, costs
- efficient investigatory expenditure while maintaining ability to respond effectively to changed circumstances
- optimise construction costs through effective mitigation of risks
- sustain Sunwater relationships with stakeholders (enhance social licence).

13.4 Packaging options

Packaging considers the benefits of consolidating versus disaggregating project components into distinct contract packages. Potential exists to disaggregate project delivery during construction by:

- work discipline (e.g. Separation of outlet conduits, mechanical/hydraulic supply and installation components, from mass concrete construction), or
- supply chain element (e.g. quarrying, aggregate production, and concrete supply separate to concrete placement).

Key considerations for determining an appropriate work packaging strategy include the:

- level of specialisation required for various components of the works
- potential for synergies across the various components
- cost premium for integrated packages versus the risk of interface coordination between packages
- potential for efficiencies or economies of scale between adjoining or adjacent work packages
- market appetite and capacity for delivery of the packages
- Principal's capacity to manage multiple packages.

For the purpose of the delivery model assessment the Reference Projects are assumed to be delivered in a single stage, noting potential for separate staging of early works (e.g. access roads).

13.4.1 Packaging

In the context of RCC dam construction (the currently proposed Nullinga Dam option) the supply of materials represents a major proportion of the overall project cost.

Contractor's management costs and profit margins on this supply chain component can be significant. However, the integration of supply chain with construction is critical for successful delivery e.g. the RCC mix design is highly dependent on the quality, size and placement rate of aggregate. Interface risk is substantial from a time, cost, quality perspective. The more contract package interfaces there are, the greater risk to the Principal.

Major dam projects are generally delivered as a single package of work (refer 13.3.3) with full supply chain integration. Based on the limited project development undertaken to date, and the market sounding feedback, there is no basis to change from the proven and traditional approach of a single works package spanning the various work disciplines including quarrying, aggregate production and concrete supply and potential for combined or separate design packages.

The access roads for the dam are considered peripheral to the dam construction package. The works associated with the access roads should be completed prior to the dam construction and are not considered further in the delivery model assessment.

13.5 Available delivery models

A number of recognised delivery models are available to deliver the reference projects and can be considered on a spectrum representing the extent of risk transfer to the private sector. The range of delivery models and their approach to risk transfer is shown in Table 13-4 below.

Table 13-4 Delivery models and approach to risk transfer to the private sector

'Traditional' Models – risk retained by the State	Alliance Models – risk is shared	'Private Partnership' Models – risk transferred by the State
▪ Construct Only ▪ D&C ▪ Construction Management ▪ Managing Contractor	▪ Alliance ▪ Competitive Alliance (default)	▪ Availability Payment Model ▪ Build, Own, Operate/Transfer (BOO/T) ▪ Design, Build, Finance, Operate (DBFO) ▪ Design, Build, Finance, Maintain (DBFM) ▪ Design, Build, Maintain and Operate (DBMO)

Early Tenderer Involvement (ETI) and Early Contractor Involvement (ECI) are variants of the Construct Only and D&C delivery models respectively. The ETI/ECI approach involves contractors early in the procurement process to improve collaboration between parties and to improve the potential for innovation, including the integration of design and constructability aspects.

Table 13-5 provides an overview of the recognised delivery models.

Table 13-5 Delivery model options[106]

Delivery Model	Suitability and Key Drivers
Traditional Delivery Model Options	
Construct Only: The principal retains full responsibility for the design and documentation (typically via engaging a design consultant). Contractors only tender for construction works component.	▪ the project scope is well-defined and there is little likelihood of scope creep or wholesale changes to requirements ▪ there is little incentive or need for innovation from the contractor ▪ there is sufficient time to complete design documentation prior to tendering ▪ the project owner is willing to retain the design risk during construction ▪ there is likely to be a large pool of tenderers and strong competition ▪ the project owner wishes to retain overall control of the project during construction and has appropriately skilled and experienced resources available to administer and manage the contract ▪ there is need for a high degree of cost certainty at the time of award ▪ site conditions are well known.

[106] As per National PPP Guidelines 2008 and Building and Construction Procurement Guide 2015

Delivery Model	Suitability and Key Drivers
Design and Construct: A contractor is engaged to both design and construct the project works, based on a design brief supplied by the Principal that sets out the functional (performance based) requirements.	Where there is: ▪ a desire for the administrative efficiency of a single point of accountability and improved integration of the design with construction ▪ a requirement to fast track project timeframes (compared to Construct Only) given construction can commence ahead of full design documentation ▪ an opportunity for Contractor to contribute construction experience into the design, resulting in innovation and efficiencies (noting the Contractor normally also warrants design including 'fitness for purpose') – and the project owner does not want to assume all of the design risk ▪ the need for a high degree of cost certainty at the time of award (lump sum) ▪ well defined project requirements at the time of going to tender and comprehensive design, quality and finishes standards are available.
Construction Management: A Construction Manager (CM) is engaged by the Principal to manage construction works on its behalf. The CM typically performs a management and co-ordination role, without delivery risk, receiving fees based on a percentage of the value of the works. The Principal engages the designer and trade contractors directly with the CM acting as the agent.	Where the: ▪ Principal desires to retain a high degree of control over works while engaging an expert professional to administer and coordinate the project e.g. choice of designer ▪ works can readily be broken down into separate parts and an early commencement (or specific early works) is required. Construction Management may also be suitable in particular situations e.g.: ▪ a contractor collapsed mid-project, and it is more efficient to complete the project through construction management than to fully document and tender the balance of the works as a single package ▪ where government needs to retain direct control over works e.g. in an operating hospital or rail corridor; and/or ▪ complex projects where it is not possible for design of some elements to be started before work is undertaken on others.
Managing Contractor (MC): The Principal appoints the MC to undertake some/all of the design and to engage subcontractors to deliver the works. The MC is responsible for administering subcontracts and accepts some delivery risk for a negotiated fixed lump sum management fee (with potential incentive payments for achieving cost and schedule targets).	Where there is: ▪ a complex or high-risk project(s) ▪ uncertainty over scope and risks ▪ a high degree of expert input available (however, Project owner resources to oversee the design and construction works are limited in capability or capacity) ▪ benefit in early contractor involvement ▪ complex project management and innovation is likely to be required, and early expert assistance would be advantageous with continuity throughout the delivery of the project ▪ constrained project delivery timeframes and a benefit from bundling of packages ▪ complex stakeholder interfaces requiring specialist handling.

Delivery Model	Suitability and Key Drivers
Design, Construct, Maintain and Operate (DCMO): The Principal contracts with a single entity that is responsible for both design and construction of the project as well as the operations and maintenance components	In addition to the points noted under D&C: ▪ there is a desire to have a single point of responsibility for the design, construction, operations and maintenance phases ▪ there is an opportunity to realise benefits by combining design, construction, operations and maintenance into one package ▪ innovation across the whole-of-life of the facility or infrastructure is desirable and achievable ▪ there is a desire/opportunity to realise efficiencies in the ongoing operations and maintenance components of an asset and associated service/s.
Project Alliancing: The Principal collaborates with one or more non-owner parties (e.g. a designer and constructor) to share the risks and responsibilities in delivering the construction phase of a project. All project delivery risks are shared by the alliance participants via pre-agreed pain/gain share arrangements. Non-owner parties are typically guaranteed reimbursement of their direct project costs and payment of corporate project overheads in an open-book arrangement.	Where: ▪ the solution/scope is unclear or uncertain ▪ the project delivery is complex and high-risk ▪ a high level of innovation is required ▪ risks are unpredictable and best managed collectively to improve effectiveness ▪ the owner can be closely involved and add value including organisational capability, resources and culture to deliver a project through an alliance ▪ the project scope and risks are highly uncertain ▪ there are critical/challenging time constraints ▪ the project is highly challenging in a technical sense ▪ there are complex external factors e.g. political, environmental or stakeholder-related ▪ there is a need for flexibility in scheduling and programming ▪ there is a desire for knowledge sharing and transfer between the parties.
Collaborative Variants	
Early Tenderer Involvement: A subset of the Construct Only delivery model, this model involves selecting shortlisted competing contractors to participate in value engineering and refinement of a client's preliminary designs	In addition to the points noted under Construct Only: ▪ the scope is well defined ▪ a relationship (not adversarial) contracting environment is desirable ▪ there is a perceived benefit of early involvement of the contractor, in identifying the most effective method to procure and manage the construction ▪ there is scope for value engineering / refinement of existing design documentation ▪ there is market interest and scope for competition.
Early Contractor Involvement: A two-stage relationship-style delivery model, generally structured to resemble a project alliance model during the first stage and a D&C model during the second.	In addition to the points noted under D&C, where: ▪ a relationship (not adversarial) contracting environment is desirable ▪ there is a perceived benefit of early involvement of the contractor, in assisting with scoping the project and outcomes ▪ there is a desire to achieve good relationship, cost and constructability outcomes by fostering the involvement of construction contractors during the preliminary (design and development) stages of project delivery.

Delivery Model	Suitability and Key Drivers
Non-Traditional Delivery Model Options	
PPP: A PPP is a service contract between the public and private sectors where the Government pays the private sector (typically a consortium) to deliver infrastructure and related services over the long term. The private provider will build the facility and operate or maintain it to specified standards over a long period. The private provider usually finances the project. Examples: Availability Payment Model Build, Own, Operate/Transfer (BOO/T) Design, Build, Finance, Operate (DBFO) Design, Build, Finance, Maintain (DBFM) Design, Build, Maintain, Operate (DBMO)	Availability Payment options where there is: ▪ a major and complex capital investment programme, requiring effective management of risks associated with construction and operations and maintenance ▪ private sector expertise to deliver the project and there is good reason to think it will offer value for money ▪ public sector ability to clearly define its needs as service outputs that can be adequately measured and contracted for in a way that ensures effective, equitable and accountable delivery of public services into the long-term and where risk allocation between public and private sectors can be clearly made and enforced ▪ assets and services identified as part of the partnership scheme are capable of being costed on a whole-of-life long-term basis and there is scope for innovation ▪ sufficiently large project value to ensure that procurement costs are not disproportionate ▪ the technology and other aspects of the sector are stable, and not susceptible to fast-paced change ▪ planning horizons are long-term, with assets used well into the future. Other options where: ▪ an element of demand/revenue risk is transferred to the private sector ▪ project returns depend in part on the user charges expected to be collected during the operations phase ▪ the state may be required to make capital contributions during the construction phase to help fund the project ▪ the state may be required to underwrite a minimum level of demand for the project (usually only sufficient to cover the debt obligations of the SPV).

13.5.1 VfM Assessment of the PPP delivery model option

The National PPP Guidelines require PPPs to be considered as a delivery option where the capital value of a project exceeds $50 million. VfM is the driver for adopting the PPP approach, rather than capital scarcity or the balance sheet treatment.

The expected capital cost of the Nullinga Dam option ($800-1.1bn) required a qualitative assessment of VfM to be undertaken consistent with the principles of the National PPP Guidelines and the Building Queensland BCDF. This included:

- identification of the key VfM Drivers for PPP delivery
- adoption of a scoring scheme for the assessment of VfM Drivers
- assessment of VfM Drivers ,

Based on feedback of the market sounding and consultation with Sunwater, assumptions underpinning the VfM assessment include:

- there is significant PPP financing capacity for Australian infrastructure projects, including for water projects, however there is little appetite to take-on demand risk
- Sunwater would prefer to manage design development given the long-life nature of the asset and its likely role as operator and maintainer.

3.1.1 VfM Assessment

Key VfM drivers for PPP delivery were identified from existing guidance material, as shown in Table 13-6.

Table 13-6 Key VfM drivers for PPP delivery (sourced from National PPP Guideline)

VFM Driver	Potential for VFM Under PPP delivery model
Risk Allocation	▪ have risks been allocated to the party best able to manage and control the risks? ▪ is there a genuine transfer of risk to the private sector? ▪ does the market have sufficient management quality to control the transferred risks? ▪ does the market have the appetite to take the risks being transferred? ▪ is there sufficient credit quality in the market? ▪ can the contract be developed to enforce the risk allocation? ▪ can the risk allocation be relied upon even under extreme circumstances, such as private sector default? ▪ have design, planning, completion and operational risks been allocated to the private sector? ▪ to what extent is residual value risk transferred to the private sector? ▪ is payment at risk to service performance?
Whole-of-life costing	▪ is the private sector free to determine the O&M requirements to meet the output specification? ▪ is the private sector responsible for all refurbishment requirements? ▪ is the private sector responsible for performance of the asset throughout the contract period?
Innovation	▪ is the private sector free to determine how to deliver the services? ▪ is the manner of the design and construction of the asset a decision under the control of the private sector? ▪ is there scope for innovation either in asset design or service delivery?

VFM Driver	Potential for VFM Under PPP delivery model
	▪ is the scope of service delivery sufficient to provide incentive for innovative design solutions? ▪ is the private sector responsible for all or only part of the services required to be delivered from the asset? ▪ to what extent is the public sector responsible for service delivery utilising the asset?
Improved Asset Utilisation	▪ is the private sector service provider able to generate additional third-party income from the asset? ▪ can the private sector provide additional services to third parties? ▪ is third party revenue generation likely to reduce the overall cost of the service to the Government?
Economies of Scale	▪ is the market for the service large enough to access significant economies of scale, either in construction or operations?

A scoring scheme for the qualitative assessment of the VfM drivers was adopted consistent with the National PPP Guidelines.

Table 13-7 Scoring scheme for the qualitative assessment of VfM Drivers

Score	Qualitative Assessment
✓✓✓	PPP option provides excellent scope for value generation - over and above traditional methods
✓✓	PPP option provides reasonable scope for value generation – over and above traditional methods
✓	PPP option provides reasonable scope for value generation just satisfies – limited potential benefits over and above traditional methods
✗	PPP option is ineffective with no scope for value generation over and above traditional methods

A qualitative assessment of the VfM Drivers was performed, with scoring and associated commentary shown in Table 13-8.

Table 13-8 Qualitative assessment of VfM Drivers

VfM Driver	Assessment	Commentary
Risk Allocation:	✗	Market Sounding found there is significant PPP financing capacity for Australian infrastructure projects, including water. However, there is little market appetite for demand risk that limits the scope for additional risk transfer and optimal VfM. Traditional delivery models provide the State with various options to achieve efficient risk allocation during construction. Operations and Maintenance (O&M) risk is assumed to reside with the State (via Sunwater).
Whole-of-life costing:	✓	O&M costs are a small percentage (<0.5%) of capital costs and therefore limit the ability for private sector efficiency in operations to reduce whole of life costs. Highly regulated operating rules for dams limit the potential for reducing whole-of-life costs (note below, potential for diseconomies of scale in O&M Traditional delivery models (e.g. D&C/Alliance) provide the State with opportunities to integrate design, construction, operations and asset management
Innovation:	✓	Highly regulated operating environment limits the private sector's ability to develop innovative solution to reduce construction and operation costs relative to traditional delivery models (and given Sunwater preference to manage design).
Improved Asset Utilisation:	✓	Environmental and regulatory constraints limit the ability to greatly improve asset utilisation versus public sector operation. Potential for private sector to focus more on business development opportunities but offset by modest available yield.
Economies of Scale	✗	Nullinga Dam option ($800-1.1bn) is a large-scale project and traditional delivery models can equally leverage strong competition in the infrastructure construction market. O&M cost is a small percentage of construction costs; potential diseconomies of scale compared to Sunwater operation.

Based on the assessment of VfM Drivers (refer Table 7) the PPP option is considered ineffective. A PPP option is unlikely to provide value generation over and above traditional methods, particularly given the markets unwillingness to take-on demand risk.

On this basis the PPP delivery model was rejected for the Reference Projects.

13.5.2 Shortlisting of delivery models to be assessed

The suitability of the different models will vary with the project circumstances (e.g. the level of design development that has already occurred) as well as the desire to efficiently transfer risk to the private sector.

The decision to undertake procurement via ETI/ECI process should reflect consideration of the benefits of collaboration prior to finalisation of the design and the market's ability to effectively collaborate with the Principal.

The shortlisting of delivery models to be assessed for each Reference Project was based primarily on Sunwater's assumed ongoing role as operator and maintainer of the infrastructure

The results of the initial shortlisting of delivery models for each reference project is shown in Table 13-9 below.

Table 13-9 Shortlisting of delivery models by reference project

Delivery Model	Reference Project/s
Construct Only (including potential ETI option)	✓
D&C (including potential ECI option)	✓
Construction Management	✓
Managing Contractor	✓
Alliancing (Competitive)	✓
PPP	✓

The Queensland Procurement Policy (QPP) 2018 requires the application of 'best practice principles' for all major projects valued at $100 million and above. Under all shortlisted delivery models, the Nullinga Dam tendering requirements would able to be tailored to ensure compliance with the objectives and principles of the QPP.

13.6 Assessment of delivery model options

The assessment of the shortlisted traditional delivery model options was conducted drawing on a draft PAF supplementary guide provided by Queensland Treasury that sets out how delivery models are to be evaluated to optimise value for money.

13.6.1 Assessment criteria and weightings

Value for money involves more than just price considerations and a range of cost and quality criteria were developed based on:

- the characteristics of the project
- consultation with stakeholders
- lessons from similar projects.

The cost and quality criteria were weighted equally (50 per cent each) with sub-criteria weighted based on their relevance to the project. The assessment criteria and sub-criteria are provided in Table 13-10.

Table 13-10 Assessment criteria including description and weighting

Category	Assessment Criteria Description	Weighting (%)
Cost Criteria		
Optimise Construction Costs	Ability to maximise competitive tension (and achieve cost optimisation) Ability to provide price certainty at contract award Ability to input owner learnings and expertise to optimise construction costs	20%
Effectively Mitigate Undimensionable Risk	Ability to mitigate undimensionable risk(s) Ability to minimise P90 (Long tail) risk	25%
Minimise Operation and Maintenance Costs	Ability to minimise O&M Costs (noting: O&M costs are considered small when compared to capital costs)	5%
Quality Criteria		
Maximise market attractiveness	Ability to maximise competitive tension by attracting experienced contractors Ability for parties to effectively manage and mitigate risks and changing circumstances during delivery (refer market feedback) Ability to facilitate collaborative approach to risk (refer market feedback)	25%
Maximise Innovation	Ability to extract/maximise innovation across both the design, construction and supply chain (linked to competitive tension)	10%
Provide flexibility to respond to change	Ability to cost effectively respond to changed delivery timelines (e.g. potential bring forward). [Linked to Q1] Ability to cost effectively respond to changed undimensionable risks (e.g. assumptions for geotechnical, flood and EIS conditions)	10%
Productive Interface with Sunwater	Ability to integrate Sunwater capability and facilitate handover to operations Ability to enhance Sunwater's social licence and optimise customer interface (Sunwater control of relationships with end customers) Ability to maximise input of Sunwater O&M expertise and expectations	5%

13.6.2 Delivery model rating process

A five-point rating scale was used to assess the suitability of the delivery models to satisfy the cost and quality criteria as shown in Table 13-11 below.

Table 13-11 Assessment criteria and rating scheme

Category	Rating Criteria
5	Very high satisfaction of the criterion by the delivery model
4	High satisfaction of the criterion by the delivery model
3	Neutral satisfaction of the criterion by the delivery model
2	Low satisfaction of the criterion by the delivery model
1	Very low satisfaction of the criterion by the delivery model

13.6.3 Delivery model assessment

The delivery models were each assessed for their suitability and allocated a 'raw score' based on the five-point scale. The assessment of the shortlisted delivery models is provided in Table 13-12 to Table 13-16 below.

Table 13-12 Construct Only Delivery Model Assessment

Criteria	Sub-Criteria	Assessment	Raw Score
Cost	Optimise Construction Costs	Will maximise competitive tension (with proviso regards low price certainty). Low price certainty because known high-levels of project risk/uncertainty. Owner can input to design prior to award but limited ability to input post-award. Difficult to obtain synergies across design, construction and supply chain. May be of greater value if uncertainty can be significantly reduced.	1
	Effectively Mitigate Undimensionable Risk	Enables owner to allocate an optimal level of risk before construction commences, however it will be difficult to identify and allocate undimensionable risk. Owner will retain design risk which is not desirable. Market feedback is that there is a strong reluctance to accept high levels of undimensionable risk that currently exist on the project. Should the risk be allocated there will be a long tail risk for inevitable potential claims. Minimal ability to mitigate emerging undimensionable risks.	1
	Minimise Operation and Maintenance Costs	There will be high potential for the owner to input O&M requirements into the design pre-award, less so post award. Narrow nature of CO will preclude material innovation in O&M by suppliers.	1

Criteria	Sub-Criteria	Assessment	Raw Score
Quality	Maximise market attractiveness	Major dams in Australia do not have a track record of using Construct Only. There is likely to be market resistance to a Construct Only package given the known undimensionable risks and likelihood for an adversarial contract. In the same vein a Construct Only package will not provide the environment to effectively manage and mitigate emerging risks. Minimal ability to facilitate a collaborative approach to risk.	1
	Maximise Innovation	The ability to extract innovation across design, construction and the supply chain will be wholly dependent on the efforts by the owner pre-award of the Construct Only contract. ETI process should allow limited collaboration/innovation however relatively limited compared to other models.	1
	Provide flexibility to respond to change	Limited ability to cost effectively respond to changes to delivery timetables and emerging risks. Construct Only model involves highly prescribed levels of risk allocation with defined scope that inevitably leads to positioning given the significant commercial misalignment between the owner and the contractor.	1
	Productive Interface with Sunwater	High ability for Sunwater to influence design but limited ability to interface post award. Limited ability to protect Sunwater's social licence or optimise customer relationships.	2

Table 13-13 D&C Delivery Model Assessment

Criteria	Sub-Criteria	Assessment	Raw Score
Cost	Optimise Construction Costs	Will also maximise competitive tension (with proviso regards low price certainty). Price certainty increases with allocation of design risk; however, project uncertainty still leaves high potential for contract positioning and major disputes. Owner can input to design prior to award but limited ability to input post-award. Maybe of greater value if uncertainty can be significantly reduced.	2
	Effectively Mitigate Undimensionable Risk	Similar to construct only with the advantage that the design risk can be allocated. There will be significant challenges in addressing emerging risks if they change the contactors assumed conditions (as is likely for D&C). Longtail risk of an overrun in project costs.	2
	Minimise Operation and Maintenance Costs	Similar to Construct Only (providing the owner stipulates the O&M Requirements in the functional specification for the tender) Benefits if high level of asset owner experience exists with the ability to specify O&M expectations and insight in tender docs.	4
Quality	Maximise market attractiveness	Major dams in Australia do not have a track record of using D&C. May be enhanced attractiveness to the market (relative to Construct Only) given the ability to integrate D&C and introduce innovation. Tenders can expect to be highly qualified.	2

Criteria	Sub-Criteria	Assessment	Raw Score
	Maximise Innovation	Higher potential for innovative solutions across design, construction and the supply chain. Innovation constrained post-award, relative to Alliance, if circumstances changes (e.g. latent conditions resulting in major design changes).	3
	Provide flexibility to respond to change	Similar to Construct Only in terms of high levels of risk allocation will lead to inevitable 'positioning' of project circumstances. This is tempered by the allocation of design risk.	1
	Productive Interface with Sunwater	High ability for Sunwater to influence design but limited ability to interface post award. Limited ability to protect Sunwater's social licence or optimise customer relationships.	2

Table 13-14 Construction Management Delivery Model Assessment

Criteria	Sub-Criteria	Assessment	Raw Score
Cost	Optimise Construction Costs	Competitive tension will be limited to Construction Manager fees only – not the bulk of costs. Construction Management model will preclude advantages of a contractor self-performing work and introduce 'margin-on-margin' issues. Difficult to obtain synergies across design, construction and supply chain. Good ability to input owner learnings pre and post award. Lacks price certainty at Award.	3
	Effectively Mitigate Undimensionable Risk	The challenges of optimising risk allocation and transferring allocated risk remain with the Construction Management model. The challenges will simply be at the sub-contract level not contract level. Longtail risk of overrun in project costs.	2
	Minimise Operation and Maintenance Costs	Will provide ability for owner to specify both D&C aspects that will minimise O&M costs.	2
Quality	Maximise market attractiveness	Effective competitive tension will be limited to the Construction Manager (i.e. fees) and the sub-contractors below the Construction Manager. Lack of design control will limit the effective management and mitigation risks. Collaboration should be reasonable given the typical Construction Management contract however potentially problematic with regard to the sub-contractors (noting the high risk of interface challenges between the individual sub-contracts).	2
	Maximise Innovation	Similar to Construct Only, limited ability to extract innovation across D&C.	1
	Provide flexibility to respond to change	Depending on the form of contract between the owner and the various sub-contracts there could be an enhanced ability to respond to changing timelines and risks. Experience however suggests that this will be very difficult to achieve during delivery and there will be major interface risks (also identified elsewhere) which would preclude cost effective responses.	1

Criteria	Sub-Criteria	Assessment	Raw Score
	Productive Interface with Sunwater	High ability to maximise interface with Sunwater pre and post award.	4

Table 13-15 Managing Contractor Delivery Model Assessment

Criteria	Sub-Criteria	Assessment	Raw Score
Cost	Optimise Construction Costs	Similar to Construction Management with potential advantage of introducing incentives (Time, Quality, Innovation). Potential to be productive approach however high levels of unknown risk are problematic for tender pricing.	3
	Effectively Mitigate Undimensionable Risk	Enables owner to allocate an optimal level of risk before construction commences, however it will be difficult to mitigate undimensionable risk. The challenges of risk allocation and longtail risk will be largely similar to that of CO.	3
	Minimise Operation and Maintenance Costs	Will provide ability for owner to specify both D&C aspects that will minimise O&M costs.	2
Quality	Maximise market attractiveness	Similar comments to the Construction Management approach, tempered marginally by the advantages of elements of design control and potential incentives on the main contract which should be produce more aligned and collaborative outcomes.	2
	Maximise Innovation	Advantages from the control of both D&C, however this will be offset by the parcelling or siloing of the packages underneath the Managing Contractor which will limit/preclude innovation and synergies. On balance, a marginally better scope for innovation than the Construction Management option.	2
	Provide flexibility to respond to change	Similar comments to Construction Management, tempered by the advantages of elements of design. Slightly higher flexibility than D&C if collaboration and incentives are introduced, however flexibility is still relatively low	2
	Productive Interface with Sunwater	High ability to maximise interface with Sunwater pre and post award.	4

Table 13-16 Alliance Delivery Model Assessment

Criteria	Sub-Criteria	Assessment	Raw Score
Cost	Optimise Construction Costs	Experience indicates high levels of competitive tension that will minimise tender price albeit not as much as D&C. Competitive Alliance procurement approach required to maximise competitive tension. Price certainty less than Construct Only in regard to risk sharing but higher price certainty overall given the collaborative approach to risk mitigation when uncertainty arises. High ability for owner to input learnings both pre and post award. Will require strong transaction management of tender to yield potential benefits. On balance, the best model to optimise construction costs.	5
	Effectively Mitigate Undimensionable Risk	An Alliance adopts a risk sharing approach which generally has a capped downside risk. On balance this will optimise risk allocation and mitigation. Long tail risk will be much reduced compared to other models given the aligned objectives of the owner and the contractor to mitigate emerging risks.	5
	Minimise Operation and Maintenance Costs	Providing there is substantive embedded owner resources in the Alliance team there will be a high ability to minimise O&M costs. Benefits if high level of asset owner experience and ability to specify O&M expectations and insight in tender docs. Post-award, alliance model allows continued ability to minimise O&M costs.	5
Quality	Maximise market attractiveness	Collaborative approach under an alliance together with capped downside will be attractive to tenderers. The extra management load for contract administration will reduce market attractiveness slightly but this should be offset somewhat by reimbursement of bid costs.	4
	Maximise Innovation	Control of both design and construction and ongoing owner input will result in a high potential for innovation. The nature of the alliance contract with each party sharing rewards and risks results in innovation continuing post-award. An effective one-project culture during construction results in ongoing innovation in the face of emerging risks and uncertainty. This contract model would produce the highest innovation across design, construction and supply chain and throughout the life of the project.	5
	Provide flexibility to respond to change	Reimbursable nature of the Alliance contract and alignment on project objective, including risk/reward sharing, provides high flexibility to respond to changes. Greatest flexibility to cost effectively respond to changing delivery times and emerging undimensionable risks.	5
	Productive Interface with Sunwater	Embedded management will ensure interface and focus on these areas.	5

The scores for each delivery model were multiplied by the sub-criteria weighting (per Table 13-12) to give the final 'weighted scores' and ranking for each delivery model. The Competitive Alliance contract model was the best ranked option as shown in Table 13-17 below.

Table 13-17 Outcomes of the Delivery Model Assessment

Criteria	Cost Criteria			Quality Criteria			Outcomes		
Sub Criteria	Optimise Construction Costs	Effectively Mitigate Undimensionable Risk	Minimise Operation and Maintenance Costs	Maximise market attractiveness	Maximise Innovation	Provide flexibility to respond to change	Productive Interface with Sunwater	Total Weighted Score	Rank
Construct Only	1	1	1	1	1	1	2	1.05	5
	0.2	0.25	0.05	0.25	0.1	0.1	0.1		
D&C	2	2	4	2	3	1	2	2.1	=3
	0.4	0.5	0.2	0.5	0.3	0.1	0.1		
Construction Mgmt.	3	2	2	2	1	1	4	2.1	=3
	0.6	0.5	0.1	0.5	0.1	0.1	0.2		
Managing Contractor	3	3	2	2	2	2	4	2.55	2
	0.6	0.75	0.1	0.5	0.2	0.2	0.2		
Alliance	5	5	5	4	5	5	5	4.75	1
	1	1.25	0.25	1	0.5	0.5	0.25		

13.6.4 Collaboration during procurement phase

The feedback from market sounding indicated a strong preference of industry participants for a collaborative approach given the risks to be managed. Recommended procurement process is a two-stage approach:

- Stage 1 - Expression of Interest (EOI), and
- Stage 2 - Request for Proposal (RFP)
  - Select field of participants (say two)
  - Partial reimbursement of bid costs.

If the Construct Only or D&C option was selected as an alternative to an Alliance, the procurement process should incorporate a collaborative approach with contractors early in the process to improve innovation and to integrate design and constructability aspects.

13.7 Recommended delivery model

The preferred and recommended delivery model for the Reference Projects is identified in Table 13-18.

Table 13-18 Summary of delivery model components

DELIVERY MODEL COMPONENT	REFERENCE PROJECTS 1 AND 2
Packaging	Single design and construction package
Delivery (Contract) Model	Competitive Alliance
Procurement	2-stage EOI/RFP Reimbursable bid costs

The project context highlights the current uncertainty regarding the likelihood and timing of a future investment decision for the Reference Projects. There is uncertainty over customer demand, availability of project funding and unknown future EIS requirements and approval conditions.

Therefore, the recommended delivery model components should be considered to be 'a point in time' assessment.

The long lead time prior to commencement of construction provides the opportunity for the State (via Sunwater) to undertaking a program of investigations to reduce uncertainty in parallel with increasing funding certainty. Prudence requires limiting future design development while undertaking these investigations.