Submission to the Economic Regulation Authority

APPLICATION FOR DETERMINATION THAT A FORECAST NEW FACILITIES INVESTMENT WILL SATISFY THE NEW FACILITIES INVESTMENT TEST

Establishment of a new 132-66/11 kV zone substation at the QEII Medical Centre

DATE:

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safe reliable efficient

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1 Summary

Western Power intends to construct a new 132-66/11 kV Medical Centre (MCE) zone substation adjacent to the existing 66/6.6 kV Medical Centre (MC) zone substation with commissioning by the end of June 2014. Under Western Power's long term strategic plan, this project was scheduled for completion in 2016 but is being undertaken now in response to a request from the Queen Elizabeth II (QEII) Medical Centre for a load increase that cannot be met from the existing substation (MC).

A major portion of the load at the MC zone substation is from Sir Charles Gairdner Hospital, which is part of the QEII Medical Centre (the customer). As part of State Government plans to rationalise State health facilities, the customer is undertaking a major redevelopment/expansion programme for the medical centre. The customer's load is anticipated to rise from 12.5 MVA to 27.5 MVA by 2020 and its high voltage distribution network will need to be upgraded from 6.6 kV to 11 kV by June 2014.

The customer is also making land available to Western Power, adjacent to the existing MC zone substation, for construction of the new MCE zone substation. The customer will then redevelop the land currently occupied by the existing 66/6.6 kV MC zone substation once it has been decommissioned.

This project aligns with the recommended development strategy detailed in Western Power's February 2012 report titled "Western Power Long-term Strategic Option Review – Western Terminal Area Development Report" (Attachment 1). In this report, Western Power identified a number of issues related to network constraints and reduced network reliability at the existing MC zone substation. It is to be noted that the existing 66/6.6 kV MC zone substation is forecast to be non-compliant with the N-1 reliability requirement within the Technical Rules by 2016. These plans also include a 6.6 kV to 11 kV migration of the Western Power distribution network adjacent to the Medical Centre. Therefore this customer-driven project brings Western Power's network development plans forward by two years.

The new MCE zone substation will ultimately comprise three 33 MVA 132-66/11 kV transformers and three 11 kV switchboards. However, only two 33 MVA transformers and two 11 kV switchboards (six feeder circuit breakers in total) will be required to meet the customer's immediate electrical requirements[1].

The third transformer will be installed at the same time as the rest of the works but this is to facilitate decommissioning of the University zone substation which is unrelated to the works being carried out to meet the customer's requirements. That separate project is not considered within the scope of this submission. The justification for carrying out the third transformer installation at the same time is contained within the attached Project Planning Report (Attachment 2).

The high level scope of works that will meet the customer's needs by the required in-service date of 30 June 2014 includes:

- Establishing a new 132-66/11 kV MCE zone substation with two 33 MVA 132-66/11 kV transformers. The reconfigurable primary windings of the transformers will allow the new zone substation to initially operate at a primary voltage of 66 kV and at a later stage operate at 132 kV with 33MVA capacity in each arrangement.
- Establishing two 11 kV switchboards, sections of which (six circuit breakers in total) will be for customer-use only and so these sections will be categorised as connection assets.
- Transferring the load from the existing 66/6.6 kV MC zone substation to the new 132-66/11 kV MCE zone substation and upgrading the high voltage distribution

[1] The customer has indicated that in the longer term additional supply for further expansion of the QEII Medical Centre may be required.

network to 11 kV (commencing June 2014 and expected to be completed by June 2015).

- Decommissioning the existing 66/6.6 kV MC zone substation (commencing June 2015 and expected to be completed by June 2016).

The total cost of the above works is $28.84M as assessed by Western Power in this submission. However, the amount that meets the New Facilities Investment Test (NFIT) is $27.21M, the difference being the costs of works associated with connection assets and the brought forward cost of the distribution voltage conversion works. These figures are based on an A2 estimate cost which has a ± 10% tolerance.

Western Power is of the opinion that, for this customer-driven new facilities investment, it is efficiently minimising costs given:

- The new MCE zone substation will be adjacent to the existing MC zone substation, thereby saving interconnection infrastructure costs.
- The new MCE zone substation can be constructed with minimal interference and interruption to the transmission and distribution networks, thus minimising any impact on customers and services.
- The design is in accordance with Western Power's design standards (refer Attachment 6).
- The costs associated with plant and equipment procurement and delivery of the works will be undertaken efficiently.

Western Power is also of the view that were this facility commissioned in 2016, the new facilities investment (excluding connection assets constructed for the sole benefit of the customer) would meet the requirements of section 6.52(b)(iii) of the *Electricity Networks Access Code 2004* (the Code), (i.e the section of the Code dealing with the necessity to maintain the safety or reliability of the covered network or ability to provide covered services) in that:

- It is the most efficient solution to provide the required contracted covered services in this part of the network over the next 25 years and beyond,
- The risks of plant failure and supply interruptions at the existing MC zone substation as a result of replacing ageing and/or poor condition plant will be mitigated. Western Power will therefore be able to continue to meet the safety and reliability requirements of the covered network.
- Compliance with Technical Rules' N-1 criterion (clause 2.5.2.2(b)) will be met from 2016, whereas the existing MC zone substation will not meet this criterion by that year.
- Compliance with section 2.5.5.3(b) 2(A) of the Technical Rules will be met (urban distribution feeders designed for sufficient backup capabilities).

Western Power hereby applies to the Economic Regulation Authority (the Authority), under section 6.71 (b) of the Code, for the Authority to determine whether the part of the forecast new facilities investment described in this submission, namely $27.21M, meets the requirements of NFIT. Table 1 below summarises the works in question and the amounts that meet the requirements of NFIT.

Table 1: Summary of works

Element of works	Comment	Base Cost of works ($M)	Value that meets NFIT ($M)
Zone substation shared works	Value that meets NFIT clauses 6.52(a) and 6.52(b) (iii) if constructed in 2014.	20.49	20.49
Zone substation shared works	Bring forward (2016 to 2014) cost of $1.73M allocated to customer and offset by incremental revenue.	1.73	1.73
Zone substation connection works	Customer connection works (six dedicated feeders)	1.22	0
Distribution shared works	Value that meets NFIT clauses 6.52(a) and 6.52(b) (iii) if constructed in 2014.	4.99	4.99
Distribution shared works	Bring forward (2016 to 2014) cost of $0.41M allocated to customer.	0.41	0
Total value		**28.84**	**27.21**

2 Background

The existing MC zone substation is located in the Western Terminal load area, and consists of three 66/6.6 kV transformers and two 6.6 kV switchboards. The substation currently supplies Sir Charles Gairdner Hospital (SCGH), all other facilities located at the customer's premises, Hollywood Hospital, and the local 6.6 kV distribution network.

The QEII Medical Centre is undergoing major expansion over the next few years as part of the Government's efforts to rationalise the public health system in Western Australia. This upgrade will increase the customer's load from 12.5 MVA to 27.5 MVA by 2020 (with an expected load of 23 MVA by 2015). This anticipated load increase has resulted in a customer-driven project to upgrade the MC zone substation to 11 kV by June 2014.

Western Power has investigated four long-term development strategies for the Western Terminal load area to address several issues in addition to the identified customer-driven requirements. These issues include insufficient capacity to support forecast load growth, asset age/condition and network reliability issues. The recommended strategy from this analysis was determined to be Development Strategy 3, predominantly due to it providing the lowest cost option in net present terms. Development Strategies 3 and 4 are however common up until the year 2018, and therefore the option to move to Development Strategy 4 remains open until 2018. The selected investment path, among other things, proposes to upgrade the Medical Centre zone substation from 66/6.6 kV to 132/11 kV. Refer to section 4.1 of this document for further details.

Within Development Strategy 3, five specific options for investment in the Medical Centre area were investigated (refer to section 4.2 of this document). From this analysis, Option 3 was identified as the recommended option. The components of Option 3 that are driven by the customer's requirements and therefore the subject of this submission are as follows:

- Establish a new 132-66/11 kV MCE zone substation with two 33 MVA 132-66/11 kV transformers.
- Transfer the load from the existing 66/6.6 kV MC zone substation to the new 132-66/11 kV MCE zone substation and upgrade the operating voltage from 6.6 kV to 11 kV.
- Decommission the existing MC zone substation.

The following additional components of work are part of the overall recommended Option 3 but are not driven by the customer's requirements and are therefore not part of this submission:

- Install the third 33 MVA 132-66/11 kV transformer and associated 11 kV switchboard at MCE zone substation.
- Transfer the load from the existing 66/6.6 kV University (U) zone substation to the new 132-66/11 kV MCE zone substation and upgrade the operating voltage from 6.6 kV to 11 kV.
- Decommission the existing U zone substation.

The location of the proposed new 132-66/11 kV MCE zone substation is on land just north of the existing 66/6.6 kV MC zone substation as shown in Appendix 1. The total cost of the customer-driven transmission and distribution work is $28.84M and the required-in-service (RIS) date for this work is June 2014.

In March 2008, Western Power made a submission to the Authority to waive the Regulatory Test (clause 9.23 of the Code) for a 66/11 kV MC zone substation expansion and voltage conversion of the distribution network from 6.6 kV to 11 kV. This submission was made on the grounds that establishing a new 66/11 kV zone substation was the only feasible solution to provide the required network capacity to support the forecast load growth due to the expansion of the customer's operations and that of the surrounding area.

In April 2008, the Authority approved the Regulatory Test waiver and determined that:

> *"the application of a Regulatory Test in respect of the proposed Major Augmentation would be contrary to the objectives of Chapter 9 of the Access Code".*

There have been some changes in the scope of works primarily relating to the construction of an outdoor air-insulated substation rather than an indoor gas-insulated substation as originally planned. Western Power wrote to the Authority advising them of these changes and in October 2011 the Authority confirmed that the Medical Centre Regulatory Test waiver remained valid.

3 Proposed augmentation

There are three components of work proposed in the QEII Medical Centre area that are driven by the customer requirements as outlined in Table 2 below:

Table 2: Customer-driven components of the proposed augmentation

Component description	Base Cost of component ($M)
Establish a new 132-66/11 kV MCE zone substation with two 33 MVA 132-66/11/11 kV transformers	19.96
Transfer the load from the existing 66/6.6 kV MC zone substation to the new 132-66/11 kV MCE zone substation and upgrade the operating voltage from 6.6 kV to 11 kV	5.40
Decommission the existing MC zone substation	3.48
Total cost of customer-driven work	**28.84**

3.1 Impact of the QEII Medical Centre upgrade

As part of the Medical Centre Project Planning Report (Attachment 2), analysis was undertaken to understand the impact the customer's upgrade is having on the selected investment strategy in the Western Terminal area. As part of this analysis, a scenario was considered in which the customer's upgrade did not proceed and the required Western Power network reinforcements were determined on that basis.

The analysis indicated that, without the customer driver, Western Power would undertake a series of minor distribution network reconfigurations in the short term in order to off-load University substation and defer its capacity constraint. Following this a new 132-66/11 kV Medical Centre zone substation would be established in 2016, two years later than required by the customer's upgrade. Importantly, the main elements of the scope would be the same for this scenario, only that the investment would occur two years later.

For full details of this analysis, refer to Section 4 of the Medical Centre Project Planning Report (Attachment 2).

4 Options analysis

A long term strategic option review (Attachment 1) was undertaken which identified several problematic conditions in the Western Terminal load area including customer-driven requirements, insufficient capacity to support forecast load growth, asset age/condition and network reliability issues.

4.1 Western Terminal long-term development strategies

In response to these issues, four long-term (25 year) development strategies for the Western Terminal load area were determined as outlined below:

- **Development Strategy 1:** Retain 66 kV and upgrade network capacity.
- **Development Strategy 2:** Shenton Park upgraded to 132/11 kV, Herdsman Parade load transferred to Shenton Park and Herdsman Parade decommissioned.
- **Development Strategy 3:** Shenton Park and Medical Centre upgraded to 132/11 kV, Herdsman Parade load transferred to Shenton Park, University load transferred to Medical Centre, Herdsman Parade and University decommissioned.
- **Development Strategy 4:** Full 132 kV Migration of Shenton Park, Medical Centre, Wembley Downs and Nedlands with Herdsman Parade and University decommissioned.

These options were evaluated against a range of financial and technical measures resulting in Development Strategy 3 being identified as the recommended solution for the Western Terminal load area, principally on its lower net present cost. However, Development Strategies 3 and 4 are common up until the year 2018, therefore the option to move to Development Strategy 4 remains open until 2018. Western Power intends to review this analysis again prior to the 2018 decision to determine the optimal strategy for the network.

Within Development Strategy 3 is a recommended investment path for the Medical Centre area. This strategy recommends the construction of a new 132/11 kV MCE zone substation on the customer's site to incorporate the load from the existing 66/6.6 kV MC and U zone substations. Following this load transfer, the existing 66/6.6 kV MC and U zone substations are to be decommissioned.

4.2 Medical Centre network reinforcement options

As part of the specific Medical Centre project development, five network reinforcement options were investigated as outlined below:

- **Option 1:** Establish new 132-66/11/11 kV MCE zone substation with two 66 MVA transformers energised at 66 kV initially and ultimately converted to 132 kV operation in 2018 (using the reconfigurable primary winding of the transformers).
- **Option 2:** Establish new 66/11 kV MCE zone substation with three 33 MVA transformers energised at 66 kV initially and ultimately converted to 132 kV operation by 2018 (the 66/11 kV transformers will need to be replaced with equivalent 132/11 kV units).
- **Option 3:** Establish new 132-66/11 kV MCE zone substation with three 33 MVA transformers energised at 66 kV initially and ultimately converted to 132 kV operation in 2018 (using the reconfigurable primary winding of the transformers).
- **Option 4:** Demand side management.
- **Option 5:** Transfer load to surrounding zone substations.

Option 3 was identified as the recommended solution as it effectively addressed the key investment drivers, achieved compliance with the Technical Rules, resulted in the equal least-cost option in net present terms and presented a relatively low technical/delivery risk.

Option 1 has the same cost as Option 3 but was rejected due to the technical risk of a reconfigurable primary winding transformer with dual LV windings. Options 4 and 5 were not considered viable as they did not address the indentified constraints.

5 Access Code considerations

5.1 New facilities investment test requirements

Prior to new facilities investments being added to the capital base, a number of requirements under section 6.52 of the Code must be met. Section 6.52 is reproduced below.

> **Section 6.52** *New facilities investment* satisfies the *new facilities investment test* if:
>
> (a) the *new facilities investment* does not exceed the amount that would be invested by a *service provider efficiently minimising costs*, having regard, without limitation, to:
>
> (i) whether the *new facility* exhibits economies of scale or scope and the increments in which capacity can be added; and
>
> (ii) whether the lowest sustainable cost of providing the *covered services* forecast to be sold over a reasonable period may require the installation of a *new facility* with capacity sufficient to meet the forecast sales; and
>
> (b) one or more of the following conditions is satisfied:
>
> (i) either:
>
> A. the *anticipated incremental revenue* for the *new facility* is expected to at least recover the *new facilities investment*; or
>
> B. if a *modified test* has been approved under section 6.53 and the *new facilities investment* is below the *test application threshold* – the *modified test* is satisfied; or
>
> (ii) the *new facility* provides a *net benefit* in the *covered network* over a reasonable period of time that justifies the approval of higher *reference tariffs*; or
>
> (iii) the *new facility* is necessary to maintain the safety or reliability of the *covered network* or its ability to provide contracted *covered services*.

The NFIT elements (or 'legs') are referred to as the 'efficiency test' (section 6.52(a)), 'incremental revenue test' (section 6.52(b) (i)), 'net benefits test' (section 6.52(b) (ii)) and 'safety and reliability test' (section 6.52(b) (iii)).

In order for the new facility investment to satisfy the requirements of this part of the Code, the efficiency test and at least one of the other remaining tests must be satisfied.

5.2 Assessment with respect to section 6.52 (a) of the Code

Section 6.52(a) of the Code requires that any new facilities investment to be added to the capital base does not exceed the amount that would be invested by a service provider efficiently minimising costs. The new facility should exhibit economies of scale having consideration of system growth and load forecasts.

To demonstrate compliance with this section of the Code, Western Power submits that it must:

- ensure the most appropriate option has been selected to meet the requirements associated with reasonable forecasts of growth of covered services
- demonstrate that the design and design standards are appropriate
- demonstrate that the delivery cost of the new facility is efficient

These requirements are detailed in the following sections.

5.2.1 Choice of network option

The choice of network option is closely analogous to the requirements of the Regulatory Test under the Code. The Regulatory Test is an assessment of whether a proposed major augmentation maximises the net benefit after considering all reasonable alternative options.

In this case, the Regulatory Test has been waived. In its determination on Western Power's application to waive the Regulatory Test on the Medical Centre Zone Substation (dated 15 April 2008), the Authority noted in sections 5 and 6 that:

> 5 *In its application, Western Power proposes that the proposed major augmentation meets the requirements of both sections 9.23(a) and 9.23(d) of the Access Code in that there are no viable alternative options to the proposed Medical Centre substation and that the nature of the funding of the proposed substation will not cause a net cost to those who generate, transport and consume electricity in the covered network and any interconnected system.*
>
> 6 *The Authority has considered the information provided in Western Power's application and is satisfied that the proposed major augmentation meets the requirements of both sections 9.23(a) and 9.23(d) of the Access Code.*

On the basis of the work undertaken for the Regulatory Test waiver submission, Western Power submits that the chosen network augmentation option satisfies the requirements of section 6.52 (a) of the Code, subject to demonstration that Western Power will efficiently minimise costs in implementing that option.

5.2.2 Design standards

The second requirement with respect to section 6.52 (a) of the Code is to demonstrate that the selected network option's design and design standards will be efficient.

Western Power has developed a suite of Standard Design Documentation which was peer reviewed by Hydro Tasmania and deemed to be "industry standard". Part 1 of this suite of documentation has been attached for reference (Attachment 6), as well as the Hydro Tasmania Substation Design Standard Review (Attachment 7).

The new MCE zone substation will be designed in accordance with the functional specifications, concept design, catalogue of standard equipment and construction level design drawings as described in the Standard Design Documentation, which comprises the following five parts:

Part 1 – Policies:

The main purpose of the policy document is to act as an enabler to ensure safety, reliability and efficiency is achieved through standardization of how Western Power plans, designs, purchases and constructs Western Power assets.

Part 2 – Functional Specifications:

The main purpose of the functional specification documentation is to describe the main functions and assembly of the plant, equipment, buildings and structures that forms the asset to deliver its intended service and functions at a desired performance quality through-out its life cycle. Several discipline specific documents were developed and are:

- Functional Specification – 132/22 kV Zone Substations
- Functional Specification – 330/132 kV Terminal Yard
- Functional Specification – 132 kV Urban Wood Pole Lines
- Functional Specification – 132 kV Underground Cables Circuits

Part 3 – Concept Designs:

The main purpose of the concept design documentation is to clarify the functionality intended for the asset. It provides a full picture view of the end state of the asset. This document is in the form of an "assembly plan" supported by a set of drawings and documentation describing the plan and its components.

Western Power has a comprehensive set of equipment design standards and purchasing specifications. In addition, Western Power has period contracts for the procurement of major equipment. These standards and specifications are based on national and international standards.

Several discipline specific documents were developed as listed below:

- Concept Design – 132/22 kV Zone Substations
- Concept Design – 330/132 kV Terminal Yard
- Concept Design – 132 kV Urban Wood Pole Lines
- Concept Design – 132 kV Underground Cables Circuits

Part 4 – Catalogue of Standard Plant and Equipment:

This section provides a comprehensive list of standard plant and equipment, linked to the relevant drawings for both primary and secondary equipment.

Part 5 – Construction Level Design Drawings and Specifications:

A complete suite of drawings have been developed and are listed in the above documents. These drawings consist of standard drawings and templates. All required safety, construction, constructability, maintenance and management of assets were considered when developing these drawings. A comprehensive construction specification was developed with the above in mind with references to detailed specifications.

5.2.3 Project documentation:

The following outlines the documentation that has been developed as part of the Medical Centre project development.

Western Power Long Term Strategic Option Review – Western Terminal Area Development Report (Attachment 1):

This document has been developed to determine strategic options for the entire Western Terminal load area and is intended to guide network engineering decisions along a clear, economically sound investment path and underpin future NFIT submissions.

This review was assessed over a 25 year period with a view to establishing a robust, long-term solution that provides global efficiency across the entire Western Terminal load area, not just the individual substations contained within the area. The outcome of this assessment was a recommendation to proceed with Development Strategy 3 for the Western Terminal load area.

Medical Centre – Project Planning Report (Attachment 2):

The objective of this document is to select the optimal investment option for reinforcing the supply to the Medical Centre zone substation and the surrounding area that meets the requirements of the Technical Rules and the Transmission Network Planning Guidelines (TNPG).

The selected option should address the identified project drivers and align with long term strategic objectives in the Western Terminal load area, whilst ensuring the requirements of NFIT are suitably addressed. The outcome of this assessment was a recommendation to proceed with Option 3 for the Medical Centre zone substation.

Medical Centre – Project Planning Definition (Attachment 3):

This document provides the detailed scope of the recommended investment option for the Medical Centre area (as determined in the Project Planning Report), and is used to initiate the A2 cost estimate for the recommended option (Option 3).

Medical Centre Planning Phase (A2) Project Transmission Estimate (Attachment 4):

This document provides the detailed A2 cost estimate for the transmission component of work associated with the recommended option (Option 3).

Medical Centre Planning Phase (A2) Project Distribution Estimate (Attachment 5):

This document provides the detailed A2 cost estimate for the distribution component of work associated with the recommended option (Option 3).

Medical Centre – Transmission Design Definition Report (Attachment 8):

The purpose of this document is to record the supporting information with respect to the design process, and also to demonstrate how Western Power intends to meet its Occupational Health and Safety obligations by achieving a safe design of the asset over its life.

This document describes the planning and engineering parameters and design variables, and is intended to:

- Describe the selected design solution
- Provide an explanation of the reasons for the design, including outlining the design inputs underpinning the design and the methodology that was taken
- Provide a description on the key assumptions made, the subsequent impact and the sensitivity of these on project costs
- Outline the key design risks and how these are being mitigated
- Describe any external / peer review independent checks that have been undertaken

This report is typically undertaken in parallel with the detailed design phase of the project and will therefore only be finalised when all designs for the project are completed. As this particular project has progressed from the preliminary design phase to the detailed design phase, this document is currently a work-in-progress, and some information contained within may not currently reflect the final design decisions for the project. This draft report does however provide an indication as to the level of rigour that is applied to Western Power projects.

5.2.4 Design considerations:

The existing configuration and proposed new works at MCE as part of this project are shown in Appendix 2.

As part of the project planning phase, net present cost analysis was undertaken (as detailed in Attachment 2) from which two least-cost options were identified from a total of five considered options. Of these least-cost options, one involved utilising two 132-66/11/11 kV 66 MVA transformers (Option 1) and the other involved utilising three 132-66/11 kV 33 MVA transformers (Option 3). As these two options could not be distinguished on cost alone, the technical merits of each transformer type were used to determine the preferred solution.

The 66 MVA transformer is a non-standard unit (i.e. a reconfigurable 132-66 kV primary winding coupled with dual 11 kV secondary windings) and uncommonly used in the electrical industry. Western Power has no experience using a transformer of this kind and its introduction would require a new suite of designs to be created, resulting in additional technical risk. The 66 MVA transformer construction time is also anticipated to be longer than a more standard unit and therefore has the potential to impact the project delivery.

Although the 33 MVA transformer also features a reconfigurable 132-66 kV primary winding, it only utilises a single 11 kV secondary winding. From a design perspective this is a much simpler solution and therefore the technical risk and anticipated delivery time is less than the 66 MVA option.

The 132-66/11 kV transformers proposed for the MCE project are not currently part of Western Power's standard suite of zone substation transformers. However, this type of unit was selected as the reconfigurable 132-66 kV high voltage primary winding not only allows immediate reinforcement to occur at a 66 kV operating voltage to address the short-term capacity and age/condition constraints but also facilitates an ultimate upgrade to 132 kV when the surrounding network infrastructure is appropriately upgraded to 132 kV with minimal disruption.

There are several other 66 kV zone substations in the Western Power network that have similar plans to upgrade to 132 kV in the long-term but also require shorter term reinforcement. It is envisaged that the 132-66/11 kV transformers used at MCE will become part of a new suite of standard transformers to cater for all future sites requiring 66 kV to 132 kV transition.

5.2.5 Cost of delivery

The third matter for Western Power to demonstrate is that the project will be delivered efficiently. Western Power uses a suite of approaches in its project delivery portfolio to ensure, on an ongoing basis, an efficient cost is achieved. Appendix 3 contains a detailed breakdown of the components of the work and the delivery mechanism employed for both components required to meet the customer's needs. This approach is summarised in Table 3 (transmission costs) and Table 4 (distribution costs) below.

Table 3: Delivery portfolio for transmission work

Delivery mechanism	Value ($M)	Percentage of works (%)
Competitive tender	8.95	38.18
Western Power internal resource	6.39	27.27
Alliance delivery	-	-
Preferred supplier	5.79	24.70
Offsets and easements	-	-
Re-use of materials	-	-
Risk allowance	2.31	9.85
Total	**23.44**	**100**

Table 4: Delivery portfolio for distribution work

Delivery mechanism	Value ($M)	Percentage of works (%)
Internal labour resources	1.58	29.26
Preferred vendor contracts	1.91	35.37
Materials	0.76	14.07
On-costs & risk allowance	1.16	21.48
Total	**5.40**	**100**

5.3 Assessment with respect to section 6.52 (b) (ii) of the Code (Net Benefits Test)

This section of the Code is satisfied if "*the new facility provides a net benefit in the covered network over a reasonable period of time that justifies the approval of higher reference tariffs*". The net benefit classified in the code is a net benefit to those who generate, transport or consume electricity. Matters considered under this clause include reduction in system losses, reduction in average cost of generation of electricity, and reduction in costs associated with transport of electricity. Western Power is not seeking to justify this forecast new facilities investment against this provision of the Code because it is not considered to provide any quantifiable net benefit to network users. Consequently the net benefits test will not be taken into consideration as part of this new facilities investment test submission.

5.4 Assessment with respect to section 6.52 (b) (iii) of the Code (Safety and Reliability Test)

Section 6.52(b) (iii) of the Code is satisfied if "*the new facility is necessary to maintain the safety or reliability of the covered network or its ability to provide contracted covered services*".

As indicated in the attached Works Planning Report (Attachment 2), Western Power considers that the installation of the new substation is required by 2016 because:

- Two of the 6.6 kV feeders from the existing MC zone substation are at 100% or exceeding rated capacity
- There is insufficient distribution feeder back-up capability to satisfy clause 2.5.5.3(b)2(A) of the Technical Rules
- Compliance with Technical Rules' N-1 criterion (clause 2.5.2.2(b)) will not be met by the existing substation from 2016

Therefore, the transmission works, as proposed, would fully meet this leg of NFIT, (were the works completed in 2016) in order to provide contracted covered services and to continue to meet the safety and reliability requirements of the network. The proposed value of the investment that meets this leg of the NFIT is the current value of these transmission works which is $20.49M. This is equivalent to the cost of the substation works discounted by the brought-forward cost of carrying out the substation works two years ahead of what would otherwise be required.

Equally, the distribution works involving conversion of the local network from 6.6 kV to 11 kV also satisfies this leg of NFIT if it were undertaken in 2016. This cost is $5.40M. However this work will have to be undertaken two years ahead of time to meet the customer's requirements and it is considered that this brought forward cost ($0.41M) should be borne by the customer. Consequently Western Power submits that $4.99M of the distribution works meets the NFIT under this leg.

5.5 Assessment with respect to section 6.52 (b) (i) of the Code (Incremental Revenue Test)

Section 6.52(b) (i) of the Code is satisfied if "*the anticipated incremental revenue for the new facility is expected to at least recover the new facilities investment*".

A new facilities investment will pass the incremental revenue test if the incremental revenue from the new investment is greater than the cost of the new facilities This analysis is undertaken by comparing the present value of the anticipated incremental revenue to Western Power from the user/customer, less the present value of the costs associated with providing the new facilities.

In this case, the value of new facilities investment that is tested against this part of NFIT is the brought-forward costs of the works. The brought-forward costs of both the zone substation works and the distribution works have been fully allocated to the customer because they are the sole beneficiary of bringing these works forward in time. In this case, there is sufficient transmission revenue to fully offset the transmission costs which relate to the brought-forward cost of the substation ($1.73M). However, there is no incremental revenue associated with the distribution works and consequently only the brought-forward costs of the substation meet this leg of NFIT.

Details of this assessment are included in Appendix 4.

6 Conclusion

In proposing to build a new 132-66/11 kV MCE zone substation to replace the existing 66/6.6 kV MC zone substation by 30 June 2014, Western Power is of the view that it has chosen the best option to meet the QEII Medical Centre's (the customer's) electricity needs and address the 66 kV and 6.6 kV network capacity constraints in the area as well as the condition of the electrical plant and switchgear at the existing MC zone substation.

From the information presented in this submission, Western Power considers that the value of the forecast new facilities investment that meets NFIT is $27.21M. The $1.63M costs of works comprising the assets dedicated to the customer and the brought forward cost of the distribution voltage conversion works do not meet the requirements of NFIT and will be fully funded by the customer. Table 5 below summarises the components of the works and the values that meet NFIT.

Table 5: Value of new facilities investment that meets NFIT

Element of works	Comment	Base Cost of works ($M)	Value that meets NFIT ($M)
Zone substation shared works	Value that meets NFIT clauses 6.52(a) and 6.52(b) (iii) if constructed in 2014.	20.49	20.49
Zone substation shared works	Bring forward (2016 to 2014) cost of $1.73M allocated to customer and offset by incremental revenue.	1.73	1.73
Zone substation connection works	Customer connection works (six dedicated feeders)	1.22	0
Distribution shared works	Value that meets NFIT clauses 6.52(a) and 6.52(b) (iii) if constructed in 2014.	4.99	4.99
Distribution shared works	Bring forward (2016 to 2014) cost of $0.41M allocated to customer.	0.41	0
Total value		**28.84**	**27.21**

Appendix 1: Proposed new MCE zone substation location

Figure 1: Proposed new MCE zone substation location

Appendix 2: Existing configuration and proposed new Medical Centre works

Figure 2: Existing MC zone substation single line diagram

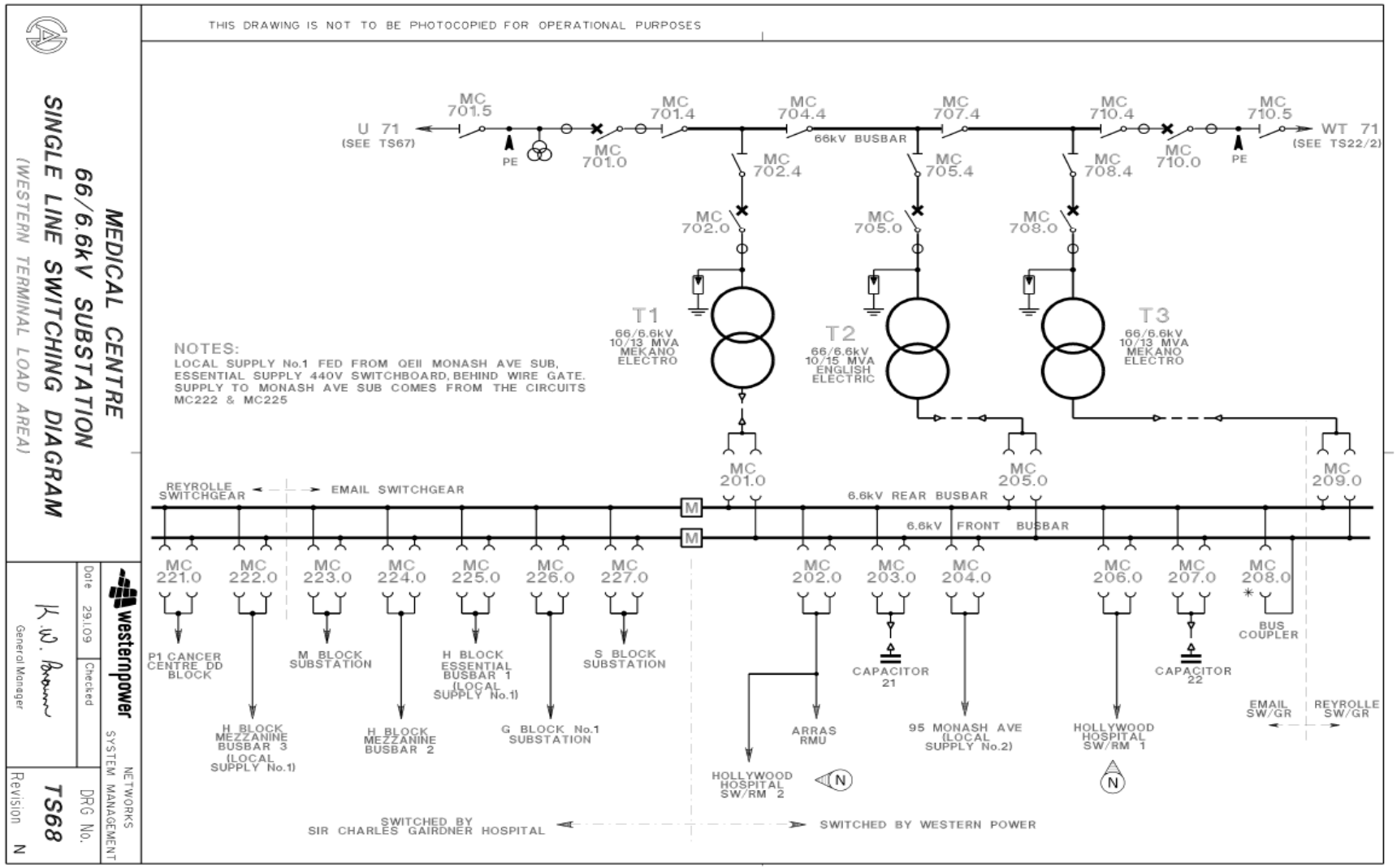


Figure 3: Proposed new MCE zone substation single line diagram – Stage 1

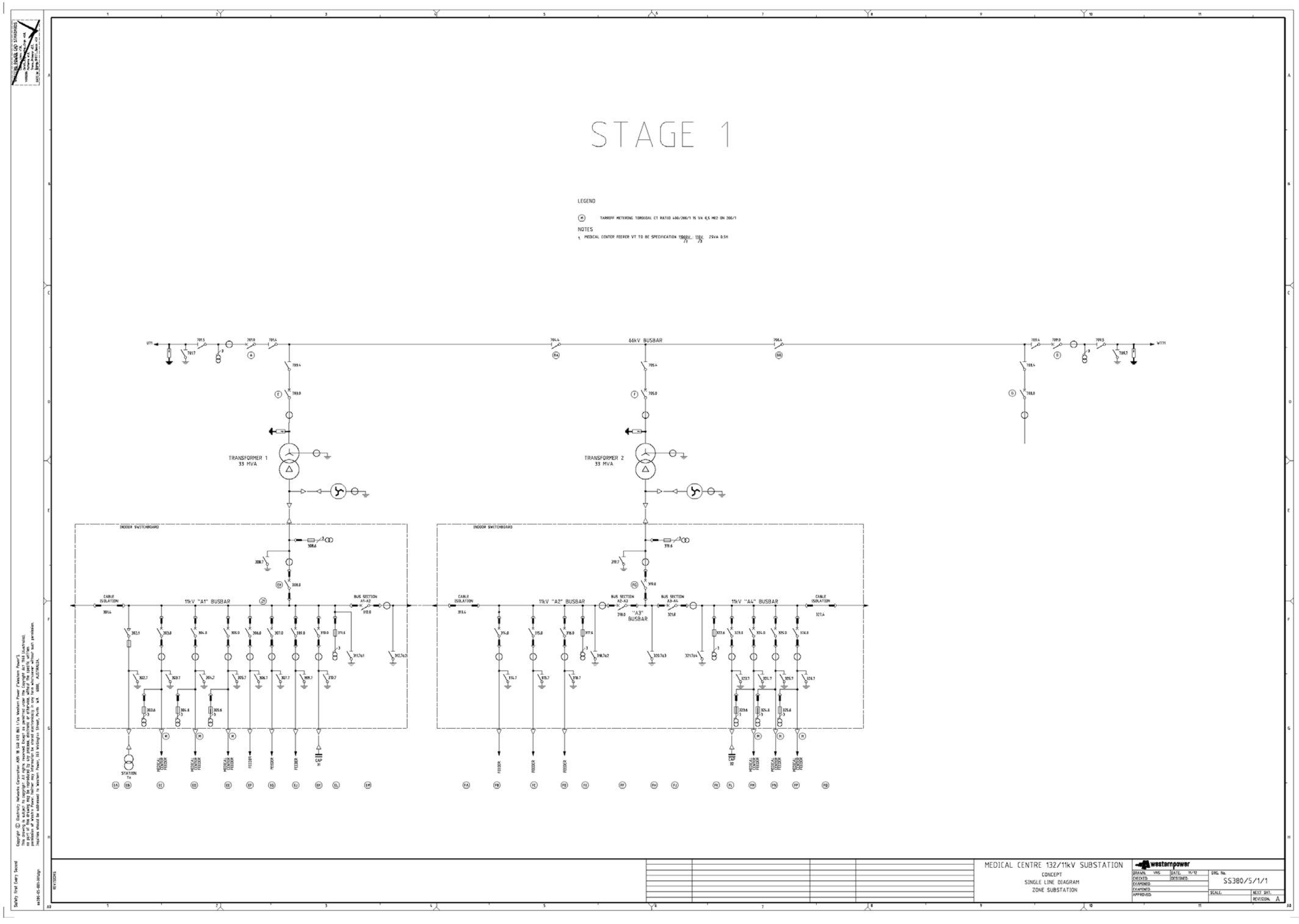
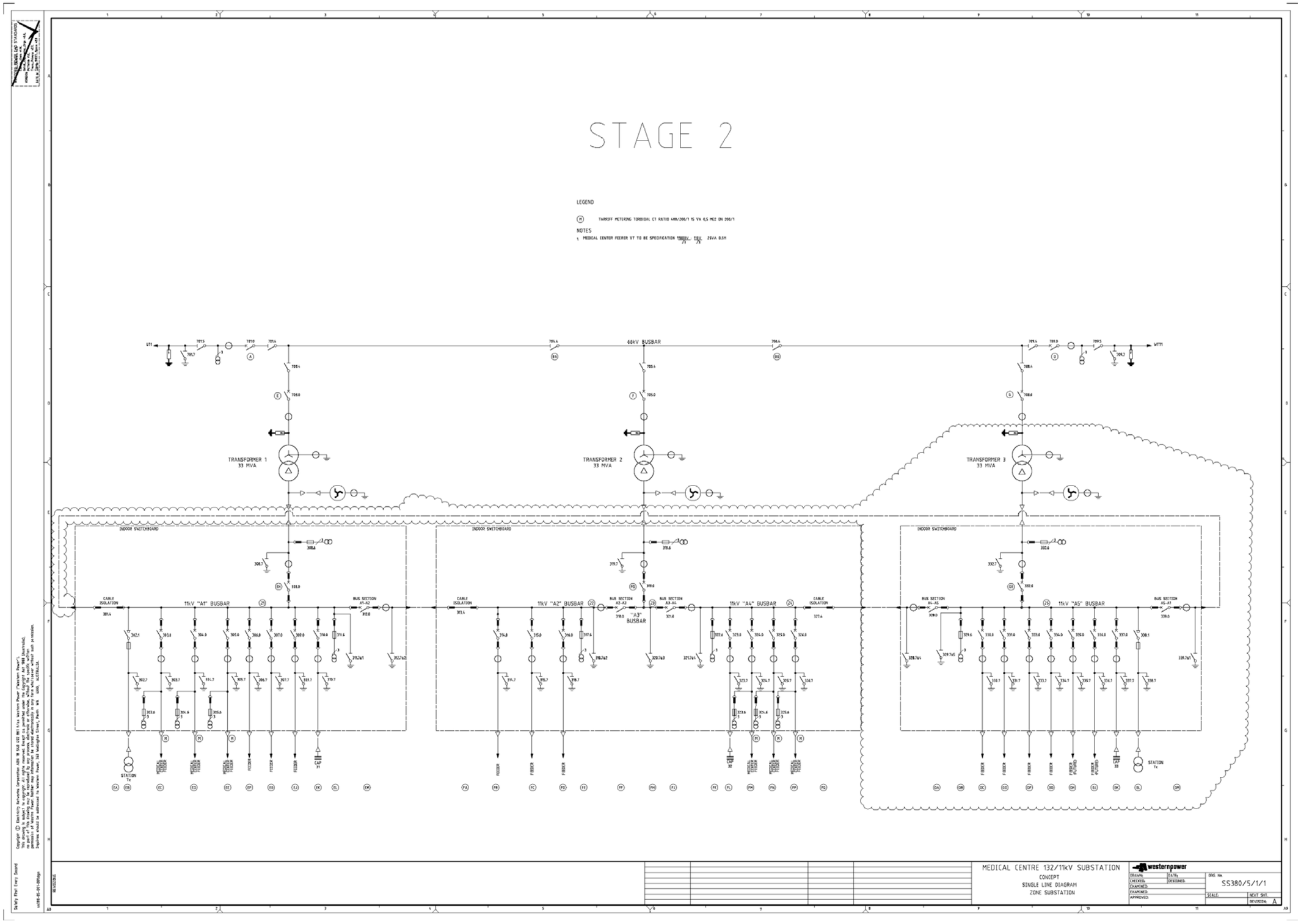


Figure 4: Proposed new MCE zone substation single line diagram – Stage 2



Appendix 3: Procurement strategy and delivery assessment

Table 6 and Table 7 below provide details as to the delivery strategy for the two project components.

Table 6: New MCE zone substation (two 132-66/11 kV transformers) – Transmission costs and delivery mechanism

Cost components	Estimate $M	Percentage (%)	Delivery mechanism	Justification
Planning & Project Management	0.318	1.73	Internal	Planning & Project Management costs are a small part of the project total. Ensuring specific processes are done during project delivery and utilisation of local team is efficient and effective.
Design	1.030	5.60	Internal	Design cost is a small part of the project total. Many aspects of design and drafting require Western Power specific softwares, standard designs and a close liaison with the customer design team, hence it is neither efficient nor effective to outsource at this time.
Procurement	5.760	31.33	Preferred supplier contract	General standard primary plants and secondary equipments are being utilised for the majority of the yard even though the two transformers are non-standard. In any case, Western Power has negotiated preferred suppliers via extensive competitive tender processes.
Construction	7.308	39.75	Preferred supplier contract	As part of Western Power's portfolio of construction for a customer solutions green field site, the civil, primary and secondary electrical construction will be obtained via tender process.
Commissioning	0.708	3.85	Internal	Commissioning cost is a small part of the project total. Ensuring specific critical tests are done; utilisation of local commissioning team is efficient and effective.
Environmental Community Engagement	0.181	0.99	Internal	Environmental cost is a small part of the project total. Ensuring specific environmental strategies are done and utilisation of local environmental team is efficient and effective.
Labour on cost @ $6 per hr	0.274	1.49	Internal	Labour hour charge used for partial recovery of indirect costs for timesheeted hours.
Indirect Cost Allocation @ 18%	2.804	15.25	Internal	These costs are indirectly related to the maintaining, constructing and providing access to system assets and comprise such activities as training, labour which is not timesheeted and cannot be directly allocated to specific projects or programs.
Total excl risk allowance	**18.383**	**100**	**-**	**This is the expected costs of the project.**
Risk allowance at P80	1.573	-	-	This is the possible risks costs for the project.
Total	**19.956**	**-**	**-**	**This will be the approved cost of the project in case of the possible risks occurring.**

Table 7: Decommissioning of existing MCE zone substation – Transmission costs and delivery mechanism

Cost components	Estimate ($M)	Percentage (%)	Delivery mechanism	Justification
Planning & Project Management	0.081	2.95	Internal	Planning & Project Management costs are a small part of the project total. Ensuring specific processes are done during project delivery and utilisation of local team is efficient and effective.
Design	0.176	6.41	Internal	Design cost is a small part of the project total. Many aspects of design and drafting require Western Power specific softwares, standard designs and a close liaison with the customer design team, hence it is neither efficient nor effective to outsource at this time.
Procurement	0.028	1.02	Preferred supplier contract	Procurement cost is a small part of the project total in this case. General standard secondary equipments are being utilised where required. In any case, Western Power has negotiated preferred suppliers via extensive competitive tender processes.
Construction	1.641	59.76	Preferred supplier contract	This work is mainly associated with civil works. The civil construction will be obtained via tender process.
Commissioning	0.073	2.66	Internal	Commissioning cost is a small part of the project total. Ensuring specific critical tests are done and utilisation of local commissioning team is efficient and effective.
Environmental Community Engagement	0.267	9.72	Internal	Environmental cost is a small part of the project total. Ensuring specific environmental strategies are done and utilisation of local environmental team is efficient and effective.
Labour on cost @ $6 per hr	0.061	2.22	Internal	Labour hour charge used for partial recovery of indirect costs for timesheeted hours.
Indirect Cost Allocation @ 18%	0.419	15.26	Internal	These costs are indirectly related to the maintaining, constructing and providing access to system assets and comprise such activities as training, labour which is not timesheeted and cannot be directly allocated to specific projects or programs.
Total excl risk allowance	**2.746**	**100**	**-**	**This is the expected costs of the project.**
Risk allowance at P80	0.735	-	-	This is the possible risks costs for the project.
Total	**3.481**	**-**	**-**	**This will be the approved cost of the project in case of the possible risks occurring.**

Table 8: Transfer the MC load and upgrade from 6.6kV to 11kV – Distribution costs and delivery mechanism

Cost components	Estimate ($M)	Percentage (%)	Delivery mechanism	Justification
Planning & Project Management	0.373	6.90	Internal	Planning & Project Management costs are a small part of the project total. Ensuring specific processes are done during project delivery and utilisation of local team is efficient and effective.
Design	0.217	4.02	Internal / preferred vendor	Internal Design resources plus selected Specialist Preferred Vendor Contractors.
Construction	4.784	88.54	Internal / preferred vendor	Internal labour resources utilised for O/H work, U/G jointing and plant installation and Preferred Vendor Contracts for cable installation.
Commissioning	0.022	0.41	Internal	Commissioning cost is a small part of the project total. Ensuring specific critical tests are done; utilisation of local commissioning team is efficient and effective.
QA	0.007	0.13	Internal	Internal labour resources. Utilisation of local team is efficient and effective.
Total	**5.403**	**100**	**-**	**Including Indirect Cost Allocation and Risk**

Appendix 4 Incremental revenue determination

To determine the incremental revenue to be used to determine the portion of costs that meet the "incremental revenue test" in the NFIT Western Power uses standard spreadsheets which are updated as required to reflect the current approved tariffs and discount rates.

Tariff calculation

The following information is taken from the tariff calculation spreadsheet (DM# 7040460). The annual amount of $717,723 (refer to Figure 5) is used as the forecast annual incremental revenue for the year 2012/13 to determine the amount that meets the requirements of section 6.52 (b) (I) A of the Code.

There is no currently published price for a connection to the new MCE zone substation and so the price at the old MC zone substation has been used as this is the closest transmission node for which a price currently exists. This is consistent with the approach taken by Western Power where no published price is available (as described in the Price List Information in the Access Arrangement).

For purposes of the incremental revenue assessment it has been assumed that there will be real price maintenance over the longer term which is considered a conservative but reasonable assumption.

Figure 5: Tariff calculation

7 - High Voltage Contract Maximum Demand

riff Inputs

Copy Sheet | Back

Forecasted Maximum Demand (kVA)	10363
Zone substation	Medical Centre
Transmission Node Identifier	WMCR
Pricing Zone	Urban
Distance to Zone Substation (km)	0
Meter Type	Western Power Funded
# of Metering Installations	6
Connected directly at zone substation?	Yes

Updated: 16 May 2011 - 2011/12 Price List (Approved) 14/09/2012 14:33

riff Calculation

		Daily & GST Exclusive						GST Inclusive		
		Transmission		Distribution		Bundled Daily	GST	Daily	Monthly	Annual
	Units	Rate	Charge	Rate	Charge	Charge		Charge	Charge	Charge
Fixed Demand Charge		0.00	0.00	0.00	0.00	0.00	0.00	-	-	-
Variable Demand Charge	10363	18.92	1,960.99	0.00	0.00	1,960.99	196.10	2,157.09	-	789,494.77
Variable Demand Length Charge (<= 10 kms	0	0.00	0.00	0.850	0.00	0.00	0.00	-	-	-
Variable Demand Length Charge (> 10 kms)	0	0.00	0.00	0.595	0.00	0.00	0.00	-	-	-
Fixed Metering Charge	6	0.00	0.00	1,404.31	84.26	84.26	8.43	92.68	-	33,922.44
Fixed Administration Charges	1	0.00	0.00	5020.00	50.20	50.20	5.02	55.22	-	20,210.52
Total Charge			**1,960.99**		**134.46**	**2,095.45**	**209.54**	**2,304.99**	**-**	**843,627.73**

r use in the Capital Contribution Calculator Only - Tariff Calculation (excludes GST)

	Transmission	Distribution
Revenue for Capital Contribution Calculations	**717,722.52**	**18,373.20**

	MVA	Tariff (for CapCon)
Load 20112012 (actual CMD 4 June 2012)	12717	$880,756.28
Load 2014/15 (as per load profile projection by client)	23080	$1,598,478.79
Increment	**10363**	**$717,722.51**

Determination of brought forward cost

Western Power has used the brought forward cost of the Medical Centre zone substation shared works as the amount that should be funded by the customer with respect to the shared network costs. In this determination a standard spreadsheet (Western Power document reference DM# 9821565) is employed and copies of the outputs are provided in Figure 6 and 7 below.

Figure 6: Determination of transmission brought forward cost

Western Power Revised Access Arrangement Capital Contribution Model													
Ref	2	3	8	9	10	11	12	13	14	15			
Model Inputs													
Applicant Details													
5		**Applicant Details**											
6		Applicant Name											
7													
Economic Parameters													
9		**Regulated WACC**											
10		WACC (real pre-tax)			4.33%								
11		WACC (nominal pre-tax)			6.53%								
12		RBA Indicator Rate			11.10%	RBA Large Business Indicator Rate							
13													
Asset Parameters													
15		**Capital Costs for Project under consideration**											
16		Construction Commences in Year Ending 30 June			**2013**								
17				**Year Ending 30 June**	**2013**	**2014**	**2015**	**2016**	**2017**	**TOTAL**			
18		Capital Cost of Shared Assets [$ of today]			**5,398,568**	**12,649,551**	**3,841,088**	**324,306**		22,213,513	external cost, exclude GST		
19													
20		**Original Planned Capital Costs**											
21		Original Construction Commencement forecasrt (in Year Ending 30 June			**2015**								
22				**Year Ending 30 June**	**2015**	**2016**	**2017**	**2018**	**2019**	**TOTAL**			
23		Capital Cost of Shared Assets [$ of today]			5,398,568	12,649,551	3,841,088	324,306	0	22,213,513	external cost, exclude GST		
24													
Model Outputs													
Bought Forward Cost				**Bought Forward Cost (ex-GST)**									
27		**Calculated Capital Contribution**											
28		Bought Forward Cost for Shared Assets			1,734,390								
29													

Figure 7: Determination of distribution brought forward cost

Western Power Revised Access Arrangement Capital Contribution Model													
Ref	2	3	8	9	10	11	12	13	14	15			
Model Inputs													
Applicant Details													
5		**Applicant Details**											
6		Applicant Name											
7													
Economic Parameters													
9		**Regulated WACC**											
10		WACC (real pre-tax)			4.33%								
11		WACC (nominal pre-tax)			6.53%								
12		RBA Indicator Rate			11.10%	RBA Large Business Indicator Rate							
13													
Asset Parameters													
15		**Capital Costs for Project under consideration**											
16		Construction Commences in Year Ending 30 June			**2013**								
17				**Year Ending 30 June**	**2013**	**2014**	**2015**	**2016**	**2017**	**TOTAL**			
18		Capital Cost of Shared Assets [$ of today]			**593,807**	**2,374,869**	**1,798,601**	**636,249**		5,403,526	external cost, exclude GST		
19													
20		**Original Planned Capital Costs**											
21		Original Construction Commencement forecasrt (in Year Ending 30 June			**2015**								
22				**Year Ending 30 June**	**2015**	**2016**	**2017**	**2018**	**2019**	**TOTAL**			
23		Capital Cost of Shared Assets [$ of today]			593,807	2,374,869	1,798,601	636,249	0	5,403,526	external cost, exclude GST		
24													
Model Outputs													
Bought Forward Cost				**Bought Forward Cost (ex-GST)**									
27		**Calculated Capital Contribution**											
28		Bought Forward Cost for Shared Assets			413,146								
29													

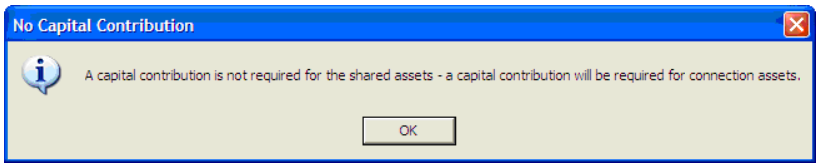
Incremental revenue determination

Western Power used its standard capital contribution calculation spreadsheet to determine the incremental revenue offset for the brought forward cost of the new MCE zone substation works. A copy of the output is provided in Figure 8 below. There was sufficient incremental revenue within a 15 year period to cover the brought forward cost as demonstrated by this calculation. Consequently no further determination of incremental revenue has been undertaken.

Figure 8: Incremental revenue determination

Western Power Revised Access Arrangement Capital Contribution Model

Ref	2	3	8	9	10	11	12	13	14	15	
Model Inputs											
Applicant Details											
5	**Applicant Details**										
6		Applicant Name			QEII MEDICAL CENTRE TRANSMISSION WORKS						
7											
Economic Parameters											
9	**Regulated WACC**										
10		WACC (real pre-tax)			4.33%						
11		WACC (nominal pre-tax)			6.53%						
12		RBA Indicator Rate			11.10%	RBA Large Business Indicator Rate					
13											
Asset Parameters											
15	**Capital Costs**										
16		Construction Commences in Year Ending 30 June			2013						
17				**Year Ending 30 June**	**2013**	**2014**	**2015**	**2016**	**2017**	**TOTAL**	
18		Capital Cost of Shared Assets [$ Nominal]			1,734,390					1,734,390	external cost, exclude GST
19		Capital Cost of Connection Assets [$ Nominal]			1,258,334					1,258,334	external cost, exclude GST
20		Total Costs [$ Nominal]			2,992,724	0	0	0	0	2,992,724	
21											
22	**Operating Costs**										
23		O&M Costs of Shared Assets			36,422	3% dist/2.1% trans internal cost - in today's dollars					
24		O&M annual escalation (real)			0.00%	assume 0% unless advised by Regulation, Pricing & Access Development					
25											
Applicant Parameters											
27	**Covered Service Revenue**										
28		Applicant Revenue Commences in Year Ending 30 June			2015						
29											
30		Applicant Tariff Revenue			717,723	first year (exclude GST) - in today's dollars					
31		Applicant Tariff Revenue annual escalation (real)			0.00%	assume 0% unless advised by Regulation, Pricing & Access Development					
32											
Model Parameters											
34	**Model**										
35		Discounted Cashflow Period			15	years (no longer than 15)					
36											
Periodic Payments											
38	**Payment Options**										
39		Periodic Payment Period			0	years (no longer than 5)					
40		Credit Risk			Security in	assume "Security in place (full amount)" unless advised by Treasury					
41											
Model Outputs											
Capital Contribution				**Capital Contribution (ex-GST)**		**GST**		**Total (inc-GST)**			
44	**Calculated Capital Contribution**										
45		Capital Contribution for Shared Assets			0		0		**0**		
46		Capital Contribution for Connection Assets			1,258,334		125,833		**1,384,167**		
47		Total Capital Contribution			1,258,334		125,833		**1,384,167**		
48											
49		IRR over Discounted Cashflow Period			29.68%		Solve Capital Contribution				
50		**Check**			OK						



Attachment 1: Western Power Long Term Strategic Option Review – Western Terminal Area Development Report – (DM# 8381133)

Attachment 2: Medical Centre – Project Planning Report (DM# 8486991)

Attachment 3: Medical Centre – Project Planning Definition (DM# 8881718)

Attachment 4: Medical Centre Planning Phase (A2) Project Transmission Estimate (DM# 9117358)

Attachment 5: Medical Centre Planning Phase (A2) Project Distribution Estimate (DM# 9704574)

Attachment 6: Western Power Transmission Standard Design: Part 1 – Policy Requirements and Design Guidelines (DM# 3377089)

Attachment 7: Western Power Substation Design Standard Review – Hydro Tasmania Consulting (DM# 7442038)

Attachment 8: Medical Centre – Transmission Design Definition Report (DM# 9380416)