Final Report

SunWater Water Supply Schemes 2011-2016 Price Paths

Review of SunWater Pricing Model – Step 1

Prepared for:

Queensland Competition Authority

March 2011

DOCUMENT CONTROL SHEET

Version/ Revision No	File name (& path)	Prepared by (author)	Reviewed by	Approved by	Version date
1.0	F:\Quality\Project Reports\VIC\V1076 QCA SunWater Water Supply Schemes 2011-2016 Price Paths\Reports\Draft Report - Financial Model\v1076 Review of SunWater Pricing Model Step 1_v.1.0	Paul Gordon	Sandro Marin	Sandro Marin	23 December 2010
2.0	F:\Quality\Project Reports\VIC\V1076 QCA SunWater Water Supply Schemes 2011-2016 Price Paths\Reports\Draft Report - Financial Model\v1076 Review of SunWater Pricing Model Step 1_v.2.0	Sandro Marin Paul Gordon	Sandro Marin	David Gotze	24 December 2010
3.0	F:\Quality\Project Reports\VIC\V1076 QCA SunWater Water Supply Schemes 2011-2016 Price Paths\Reports\Draft Report - Financial Model\v1076 Review of SunWater Pricing Model Step 1_v.3.0	Sandro Marin Adam Roberts	Sandro Marin	David Gotze	25 January 2011
4.0	F:\Quality\Project Reports\VIC\V1076 QCA SunWater Water Supply Schemes 2011-2016 Price Paths\Reports\Draft Report - Financial Model\v1076 Review of SunWater Pricing Model Step 1_v.4.0	Sandro Marin Adam Roberts	Sandro Marin	David Gotze	2 March 2011
5.0	F:\Quality\Project Reports\VIC\V1076 QCA SunWater Water Supply Schemes 2011-2016 Price Paths\Reports\Draft Report - Financial Model\v1076 Review of SunWater Pricing Model Step 1_v.5.0	Sandro Marin	Sandro Marin	David Gotze	21 March 2011
Final	F:\Quality\Project Reports\VIC\V1076 QCA SunWater Water Supply Schemes 2011-2016 Price Paths\Reports\Draft Report - Financial Model\v1076 Review of SunWater Pricing Model Step 1 Final	Sandro Marin	Sandro Marin	David Gotze	28 March 2011

DISTRIBUTION HISTORY

Name	Location	Date
Queensland Competition Authority	Brisbane	21 March 2011
SunWater	Brisbane	21 March 2011
Queensland Competition Authority	Brisbane	28 March 2011

TABLE OF CONTENTS

Appendices

A - Terms of Reference

B - Original Ministerial Direction Notice

C - Amended Ministerial Direction Notice

D – SunWater Staff Interviews

E – Generic Testing – Spreadsheet Professional

EXECUTIVE SUMMARY

Background

Indec Consulting has been engaged by the Queensland Competition Authority (the Authority) to complete a review of the SunWater Pricing Model. The objective of the review is to establish the integrity and robustness of SunWater's pricing model to ensure it generates prices for individual schemes, or segments of schemes, that are consistent with pricing principles as set out in the Ministers' Referral Notice.

Objectives

This report delivers on the outcomes relating to the Step 1 Review of the SunWater Pricing Model as outlined in the Authority's Terms of Reference dated 21 September 2010 titled *Audit and Review of SunWater's Information System and Pricing Model*. The Step 1 review was based on a draft model not populated with final network service plan (NSP) data with the Step 2 review to be based on the final version of the model with final NSP data. The review will also assess the functionality of the model in terms of its flexibility to accommodate and modify key variables which impact on irrigation prices.

The fundamental objective of the review is to complete a preliminary review of the pricing model with the aim of addressing any issues with the SunWater Pricing Model prior to the NSP data being populated into the model.

SunWater Financial Model

The SunWater Pricing Model is housed within the SunWater Financial Model (SFM). The SFM serves a variety of functions within the business including strategic planning, budgeting, tridata submissions, credit rating review, project evaluation, pricing and discounted cash flow (DCF) asset valuation.

The multi functionality of the SFM creates a very comprehensive and integrated financial model with the benefit of enabling the financial and budgeting impacts of the irrigation pricing outcomes to be directly accessed in the corporate model for strategic planning and budgeting purposes. It however creates a large and extremely complex model which is further complicated by SunWater providing both regulated and unregulated services.

A separate reporting model has been created by SunWater, called the Pricing Reporting Model (PRM), to capture the historical costs from the financial information system and the forecasts costs from the SFM to report a consistent time series of pricing related data. The PRM involves two models: a data conversion model which converts historical SAP information and restates it in a consistent format to the SFM forecast data and a reporting model which combines historical and forecast data and presents this information in a series of tables and graphs for NSP reporting.

Review Methodology

The focus of the review relates to the irrigation pricing components within the model as part of SunWater's regulated business activities. A key objective of the SFM is the allocation of costs to each bulk supply and distribution section of each water supply scheme to determine the pricing revenue target and irrigation tariffs.

In particular the Step 1 stage of the review focused on:

- validating the logic and structure of the model, including an appraisal of the interface of the pricing module with other modules of SunWater's information and financial modelling systems; and
- testing the functionality of the model in terms of its flexibility to accommodate and modify key variables which impact on prices.

The Step 1 review summarised in this report focused on reviewing the following key issues:

- reviewing the model architecture and structure;
- understanding how inputs enter the model;
- understanding how assumptions are documented and applied in the model and the flexibility to vary assumptions;
- reviewing model logic and consistency with pricing policies to be adopted by the Authority;
- reviewing macros and functional equations of the model;
- reviewing the appropriateness and comprehensiveness of output reports; and
- developing an appropriate review technique, including principles and protocols for the Step 2 review of the pricing model.

Given the large size and the modular structure of the SFM, the methodology focused on comprehensively reviewing one of each of the key modules to assess the items listed above. This approach would efficiently and effectively provide an overview of the robustness and logic of the model without having to invest a great deal of time looking at the entire model. The Step 2 review would involve developing a review approach based on the knowledge gained during the Step 1 review to check the full model once it is finalised and populated with final NSP data.

Diagnostic testing was undertaken during the review on the SFM to automate some of the checking and testing to be undertaken. The propriety software package Spreadsheet Professional was the tool applied to undertake the automated diagnostic testing. Diagnostic testing applying the Spreadsheet Professional tool was not utilised for the PRM due to its structure and smaller size enabling manual checking to achieve similar outcomes to Spreadsheet Professional.

Key Findings of SFM Review

The Step 1 review of the SunWater Pricing Model has not identified any major issues which significantly impact on the robustness and integrity of the SFM for the purposes of generating irrigation tariffs. Although the focus of the model review is to observe the process to determine irrigation pricing, Indec is satisfied that all elements of the business, whether regulated or not, are allocated costs consistently and in accordance with the business rules established within the SFM.

A risk is introduced in the model due to its flexibility and ease to change key parameters via the use of drop-down box selections. SunWater counteracts this risk by tightly controlling access to and use of the model to a few key people, reducing the risk of unplanned or unintended changes to the model. A further risk arises due to the absence of comprehensive documentation and the knowledge of the operations of the model residing with a small group of people. SunWater is likely to experience difficulty in recovering knowledge of the model without these key individuals.

At this stage a user manual or documentation for the SFM has yet to be completed. Indec has been advised by SunWater that a user manual will be developed once the significant developments of SFM conclude and the model structure and functionality stabilises. The lack of model documentation and/or a user manual creates a key risk to SunWater as the knowledge and understanding of the SFM is concentrated to a number of key users. Furthermore, the lack of a reference document which outlines key business rules such as overhead and indirect cost allocation rules for the SFM provided Indec with no framework to access and verify the key algorithms of the SFM.

While Indec is satisfied with the methodology of the annuity calculation, its application could be improved to increase the transparency of the calculation. Indec identified hard coded data without adequate explanation in this part of model and some other parts of the model. Indec suggests greater referencing of hard coded data within the model by way of a separate data input sheet which clearly identifies, labels and references all hard coded data entering the SFM. This approach would improve the integrity and robustness of the model and strengthen the audit trail of hard coded data.

Indec does note that the annuity calculations rely on Excel's PMT function. While this is the correct formula within Excel to perform these calculations, the inherent assumption within this formula that cash flows occur at the end of the period may not be consistent with actual cash flows. On face value, the Excel PMT is likely to place a downward bias on the annuity calculations.

Indec identified an issue with the Infrastructure Management in-direct cost allocation. The cost descriptor 254 – Irrigation Pricing is allocated to 29 service contracts which are deemed to provide irrigation water services. Indec expected that 30 service contracts would be allocated irrigation pricing costs given that 30 service contracts are related to irrigation water services.

The overhead costs in the four Regional Centres are pooled to create a single Regional Centre overhead rate. This approach may reduce the causality of the regional centre overheads, particularly with the degree to which they can be assigned to the activities served by the respective Regional Centres. This is a greater issue if Regional Centre services are strongly correlated to service contracts under its responsibility and if variances in cost structures and services provided exist across the Regional Centres.

The Step 1 review involved assessing the SFM against a checklist of best practice criteria for financial modelling. These criteria are designed to test the overall robustness of the model so as to minimise the risks of errors occurring and to improve reliability, usability and accuracy.

The SFM rated strongly overall against the criteria with the following exceptions:

- Notation and comments in the model could be increased;
- Larger formulae are not documented;
- Universal use of SUBTOTAL rather than SUM to calculate subtotals;
- Charts are not featured in the SFM;
- Coding style guide is not in use at SunWater with no consistency between the coding styles used in the two models subject to this review – SFM and PRM; and
- Inadequate documentation with no system documentation to outline the business rules and a user manual to support existing and new users of the SFM.

Modelling Flexibility

The key advantage of using Excel as the platform for the model is it remains flexible to change. Indec are therefore of the belief that the SFM is flexible from a design perspective however the degree of flexibility may be constrained somewhat by its size, its broad and numerous objectives and the consequential complexity of the model.

The Step 1 review has identified that adequate flexibility exists within the model to vary key assumptions and data inputs to enable alternative pricing scenarios to be modelled.

The one area of the model identified as being inflexible relates to electricity costs not being linked to water usage forecasts within the SFM. This results in the SFM not having the independent ability to reset the PRT after a change in water use forecasts. Indec understands that a separate model needs to be run to recalculate the electricity costs based on a change of water use forecasts and the updated electricity costs are loaded in the SFM for PRT and irrigation tariffs to be recalculated. The electricity forecasting model was not subject to review during the Step 1 stage and subject to direction from the Authority can be reviewed during the Step 2 stage.

SFM Enhancements and Improvements

Indec has identified some enhancements or improvements to the SFM which could be considered to improve the model's overall robustness and to reduce the overall risk of error.

1. Documentation of Hard Coded Data

Indec suggests greater transparency and referencing of hard coded data within the model by way of a separate data input sheet which clearly identifies, labels and references all hard coded data entering the SFM. This approach would improve the integrity and robustness of the model and strengthen the audit trail of hard coded data.

2. Specified Module or Tab Summarising Irrigation Pricing

Indec recommend the creation of a specific module or tab within the SFM which summaries PRT and Tariffs. Users who are unfamiliar with the model may find it difficult to obtain the necessary overview given its scale, the various scenarios that can be modelled and the complexity.

3. Price Paths

Price path scenario modelling in the SFM is not undertaken on a NPV neutral glide path basis. The SFM would benefit from the ability to consider various price path scenarios based on a glide path approach so that on an NPV basis the revenues recovered by SunWater are revenue neutral.

4. Supporting Documentation

Indec were unable to obtain any detailed formal documentation relating to the business rules within the SFM for irrigation pricing purposes. There are certain areas within the model where the effective use of notation or comments would assist a non familiar user to better understand concepts, assumptions and data capture. It is recommended that the material used as part of the Indec induction to the SFM should be formalised and be updated as the model reaches design milestones.

5. Charts and Graphs

Indec believe the addition of charts and graphs may help at a headline level to dissimilate the large volumes of data and to enable users to quickly get across key issues and outcomes. It would be very beneficial if key reports included graphs and charts to illustrate key outcomes relevant to the irrigation price review process such as the graphing the time series of PRT and irrigation tariffs.

Key Findings of PRM Review

The structure of key sheets within the PRM represents a potentially significant risk to the operation of the PRM. While Indec did not find any significant errors in formulae, the lack of clear labelling, and inconsistencies within blocks of data increase the likelihood that future changes, such as inserting new rows into the tables, may trigger errors. Other key findings resulting from the PRM review include:

- Poor documentation and logic, key cells unlabelled, and data manipulation occurring in an ad-hoc fashion. Indec recommends that parts of the model be rewritten including correcting a formulae error;
- It is suggested that appropriate protection of cells be put in place to prevent inadvertent changes being made;
- The method of reading data into the model currently relies on hard coded formulae, which are modified using a macro to read the appropriate file. The hard coded values stop after a certain number of rows and if the source file has more than the specified number of rows, any additional rows will not be read. No warnings or errors will be generated;
- The uploading of data into the PRM could be improved to reduce potential errors and to improve the efficiency of the data up load process.
- Macros do not include any comments, and the names assigned to them are unhelpful. Indec suggests documenting the operations of the model by using comments to indicate the purpose and methodology of each of the macros. Similarly, naming the macros according to function rather than the button which activates them may be helpful.
- Indec notes that historical SAP data is imported into the model in terms of real dollars ($2010/11). Forecast results from the SFM are imported into the model in terms of nominal dollars ie dollars of the day included an annual inflation forecast. It is suggested that the inputs into this model be standardised into either real or nominal dollars to increase consistency and logic throughout the model.

Step 2 Review

The Step 2 review involves a second stage review of the SunWater pricing model on the finalisation of the pricing model and NSP data. This stage will enable a more thorough review of the model based on a review technique to be agreed with the Authority. The agreed review technique will ensure that small, medium and large schemes or service contracts are represented in the review.

1. BACKGROUND

Indec Consulting has been engaged by the Authority to complete a review of the SunWater Pricing Model. This review will establish the integrity and robustness of SunWater's pricing model to ensure it generates prices for individual schemes, or segments of schemes, that are consistent with pricing principles as set out in the Ministers' Referral Notice.

This report delivers on the outcomes relating to Step 1 Review of the SunWater Pricing Model as outlined in the Authority's Terms of Reference (ToR) dated 21 September 2010 titled *Audit and Review of SunWater's Information System and Pricing Model* Authority's (see Appendix A). The Step 1 stage of the review was based on a draft model not populated with network service plan (NSP) data. The fundamental objective of the Step 1 review was to complete a preliminary review of the pricing model prior to it being finalised and populated with NSP data and to address any issues with the pricing model prior to the NSP data being populated into the model.

The Step 2 review involves a second stage review of the SunWater pricing model once the final pricing model is available and populated with NSP data. This stage will enable a more thorough review of the model based on a review technique to be agreed with the Authority. The agreed approach will ensure that small, medium and large schemes are represented in the review.

The purpose of this report is to establish the integrity and robustness of the SunWater pricing model for pricing purposes through a validation of the logic and structure of the model, including an assessment of the interface of the pricing module with other relevant modules of SunWater's information and financial modelling systems.

In doing so the report will review the functionality of the model in terms of its flexibility to accommodate and modify key variables which impact on irrigation prices.

1.1.1. QCA's Role

The Authority is an independent pricing and access regulator responsible for ensuring that specified monopoly infrastructure-based services in Queensland comply with the principles of national competition policy. The Authority seeks to provide a recognised avenue whereby both government and third parties can rely on an independent, objective appraisal of the issues subject to its review. The Authority was established by the *Queensland Competition Authority Act 1997* (the Act).

On the 19th March 2010, the Premier and Treasurer of Queensland, pursuant to Section 23 of the Act, have directed that the Authority develop and recommend irrigation prices to apply for particular SunWater water supply schemes from 1 July 2011 to 30 June 2016 (the Ministers' Referral Notice). The Ministers' Referral Notice has specified certain matters that the Authority must take into consideration and the Authority may exercise all the powers under Part 6 of the Act.

On the 17th December 2010, the Premier and Treasurer of Queensland amended the Direction of 19th March 2010 to restate the matters the Authority must take into consideration including modifying the timing of the price path commencing 1 October 2011 and ending 30 June 2016 (the Amended Ministers' Referral Notice). Due to the timing of the release of the Amended Minister's Referral Notice, this report may not fully consider all the matters in the amended notice due to the release of the amended notice during the Step 1 review of the SunWater Pricing Model. Subject to further direction from the Authority, any matters not fully considered in the Step 1 review associated with the amended Minister's Referral Notice can be considered in the Step 2 review.

The original and amended Ministerial Direction Notices are shown in Appendix B and C.

1.1.2. SunWater Background

As a Queensland Government-owned Corporation (GOC), SunWater provides a range of services including infrastructure ownership, water delivery, operation and maintenance of infrastructure and engineering consultancy services. SunWater is the single largest service provider in the State providing retail and bulk supply services to industrial, agricultural and rural and urban users.

Over the last 80 years, SunWater has developed and now operates a regional network of water supply infrastructure throughout Queensland which supports irrigated agriculture, mining, power generation, industrial and urban development through 22 Water Supply Schemes. SunWater's water storage and infrastructure includes 19 major dams and more than 2,500 kilometres of pipelines.

1.1.3. Ministerial Referral Notice

The Ministers' Referral Notice requires that bulk water supply and channel prices/tariff structures are set so as to provide a revenue stream that allows SunWater to recover:

- its efficient operational, maintenance and administrative costs;
- its expenditure on renewing and rehabilitating existing assets, whether through a renewals annuity or a regulatory depreciation allowance;
- a rate of return on assets valued at 1 July 2011 (the initial regulated asset base (RAB)); and
- after 1 July 2011, a return of, and on, prudent capital expenditure on existing assets or for constructing new assets.

In recommending an initial RAB for irrigation supply assets the Authority is to:

- value particular channel distribution systems assets at zero; and
- apply a 'line in the sand' approach to value assets for bulk water supply based upon:
  - the level of service attributed to the supply of water for irrigation;
  - the efficient operating cost of meeting the required level of service;

- water prices that reflect the irrigators' anticipated capacity to pay; and
- water prices achieving a commercial return over a period not longer than 15 years.

In providing pricing recommendations for each scheme, the Authority is to also consider how to treat existing renewals reserves if it considers it appropriate to transition schemes to depreciation based RAB pricing approach.

1.1.4. Amended Ministerial Referral Notice

An amended Ministerial Referral Notice was issued on 17 December 2010 which clarifies the matters that the Authority must take into consideration. The more significant amendments include:

- recovery of prudent and efficient expenditure on renewing and rehabilitating existing assets through a renewals annuity;
- a commercial return of, and on, prudent capital expenditure for augmentation commissioned after 30 September 2011;
- the Authority is not to consider the regulatory asset base (RAB) for existing irrigation assets ie commissioned prior to 1 October 2011;
- in relation to tariffs, the Authority should have regard to the fixed and variable nature of the underlying costs and the Authority is to adopt tariff groups as proposed in SunWater's NSPs with no investigations for additional nodal pricing arrangements;
- consideration of price review triggers and other mechanisms to manage the risks associated with the allowable costs outside the control of SunWater; and
- capital expenditure for dam safety upgrades are not to be recovered in prices.

As mentioned above, due to timing of the release of the Amended Ministers' Referral Notice during the course of the Step 1 review, this report may not fully consider all the matters in the Amended Minister's Referral Notice. Subject to direction from the Authority, any matters not fully considered in the Step 1 review associated with the amended Minister's Referral Notice can be considered in the Step 2 review.

1.1.5. Purpose & Requirement of the Review of the SunWater Pricing Model – Step 1

The purpose of the review of the SunWater pricing model is to establish the integrity and robustness of SunWater's pricing model to ensure it generates prices for individual schemes, or segments of schemes, that are consistent with pricing principles as set out in the Ministerial Referral Notice.

In particular the Step 1 stage of the review will focus on:

- validating the logic and structure of the model, including an appraisal of the interface of the pricing module with other modules of SunWater's information and financial modelling systems; and
- testing the functionality of the model in terms of its flexibility to accommodate and modify key variables which impact on prices.

1.1.6. Step 2 Review

The Step 2 review involves a second stage review of the SunWater pricing model on the finalisation of the pricing model and NSP data. This stage will enable a more thorough review of the model based on a review technique to be agreed with the Authority. The agreed review technique will ensure that small, medium and large schemes or service contracts are represented in the review.

2. OUTLINE OF SUNWATER'S PRICING MODEL

2.1. Background

The SunWater Pricing Model is housed within the SunWater Financial Model (SFM). The construction of the SFM began in 2000 principally as a budgeting and strategic planning model. The SFM was not applied in the calculation of the irrigation price paths for the 2006/07 to 2010/11 period as SunWater constructed a stand-alone pricing model.

In 2007 SunWater modified the SFM as part of implementation of the Business Operating Model (BoM) project. One of the objectives of BoM was to integrate the pricing model with the budgeting and strategic planning model to directly incorporate irrigation pricing outcomes within the SFM.

The second generation SFM, which was developed as part of the BOM project, has been in operation for about 3 years as a budgeting and strategic planning tool. This provides a reasonable track record of use to enable technical issues and bugs to be identified and resolved. The SFM however has no track record as an irrigation pricing model as this is the first occasion that the model will produce irrigation tariffs.

A reporting model, called the Pricing Reporting Model (PRM), has been created by SunWater to capture the historical costs from the BOM system housed within the SAP financial information system and the forecasts costs from the SFM to report a consistent time series of pricing related data. The PRM involves the conversion of historical BOM based information to restate the data to a format consistent with the SFM data.

2.1.1. SFM Documentation/User Manual

At this stage a user manual or system documentation for the SFM has yet to be completed. Indec has been advised by SunWater that a user manual will be developed once the significant developments of the SFM conclude and the model structure and functionality stabilises.

Indec gained and developed its understanding of the SFM via a comprehensive induction program and hands-on experience with the model. Indec greatly appreciated the cooperation and assistance of the model developer and other SunWater staff to develop Indec's understanding of the SFM.

The lack of model documentation and/or a user manual creates a key risk to SunWater as the knowledge and understanding of the SFM is concentrated to a number of key users.

Furthermore, the lack of a reference document which outlines key business rules such as overhead and indirect cost allocation rules for the SFM provided Indec with no framework to access or verify the key algorithms of the SFM.

2.1.2. Key objectives & functionality

The SFM serves a variety of functions within the business including the following;

- strategic planning;
- budgeting;
- tridata submissions;
- credit rating reviews;
- project evaluations;
- pricing; and
- DCF asset valuation.

This list is not intended to be exhaustive, rather to demonstrate the broad and varied functionality of the SFM.

The multi functionality of the SFM creates a very comprehensive and integrated financial model with the benefit of enabling the financial and budgeting impacts of the irrigation pricing outcomes to be directly accessed in the corporate model for strategic planning and budgeting purposes. It however creates a large and extremely complex model which is further complicated by SunWater providing both regulated and unregulated services.

2.1.3. Software details

The model is developed within Microsoft Excel 2003 operating on a Microsoft Windows XP operating system platform. The SFM has the capability to be operated in compatibility mode for later version of Excel and Windows operating systems.

2.1.4. Development protocols

Indec was advised that development of the model occurs via a user request to add further functionality to the SFM or to amend or upgrade an existing function. User acceptance testing occurs to ensure that the requested changes have been made and to undertake quality control and sanity checking of the developments made to the model.

Version control protocols are in place to clearly identify the various versions of the model developed and to save and store the different versions of the model.

2.1.5. Users

SunWater has engaged a specialist contractor to develop the SFM and this contractor has worked on the development of both generations of the SFM on a non-continuous basis since 2000.

The SFM is a corporate wide model owned and used by Finance with key user being the Business Accounting Manager. The Business Accountants and various profit centre managers are also users of the SFM when developing budgets and other strategic planning documents.

The Strategy Group (Pricing) is the primary user for pricing purposes with the key user being the Corporate Strategy Analyst. The Corporate Strategy Analyst tests and accepts any pricing related changes.

2.1.6. Model structure – SunWater Financial Model

Figure 2.1.6.1 below shows the high level structure of the SFM outlining the key modules and the respective interfaces. This is a simplified diagram for illustrative purposes to demonstrate the key modules within the SFM and is not intended to fully reflect the structure, functionality and interfaces of the model.

The SFM is structured on a modular basis with the various business units clustered into common groups. This enables the data sheets to be consistent across the common groups.

The key business clusters within the model are:

- Brisbane Resource Centre – Health, Corporate, Strategy, Trader, Infrastructure Development and Infrastructure Management;
- Regional Resource Centres – South, Central, North and Far North;
- Service Contracts – 62 service contracts with 46 internal Service Contracts and 16 external Service Contracts with 30 service contracts directly relevant to irrigation pricing.; and
- Subsidiary – North West Queensland Water Pipeline Pty Ltd, Eungella Pipeline Pty Ltd and Burnett Water Pty Ltd.

Brisbane Resource Centres represent business operating units located in the Brisbane office which align with the business structure.

Regional Resource Centres are offices located in regional parts of Queensland providing both general and specialised services to support the business activities.

Service contracts represent a network of assets and are grouped at the bulk supply and distribution level. A river only system would have a single service contract for the bulk supply component whereas a river and distribution system would have two service contracts – bulk supply and distribution. An internal service contract relates to infrastructure owned and operated by SunWater whereas an external service contract represents a network of assets operated and/or maintained by SunWater and owned by a third party.

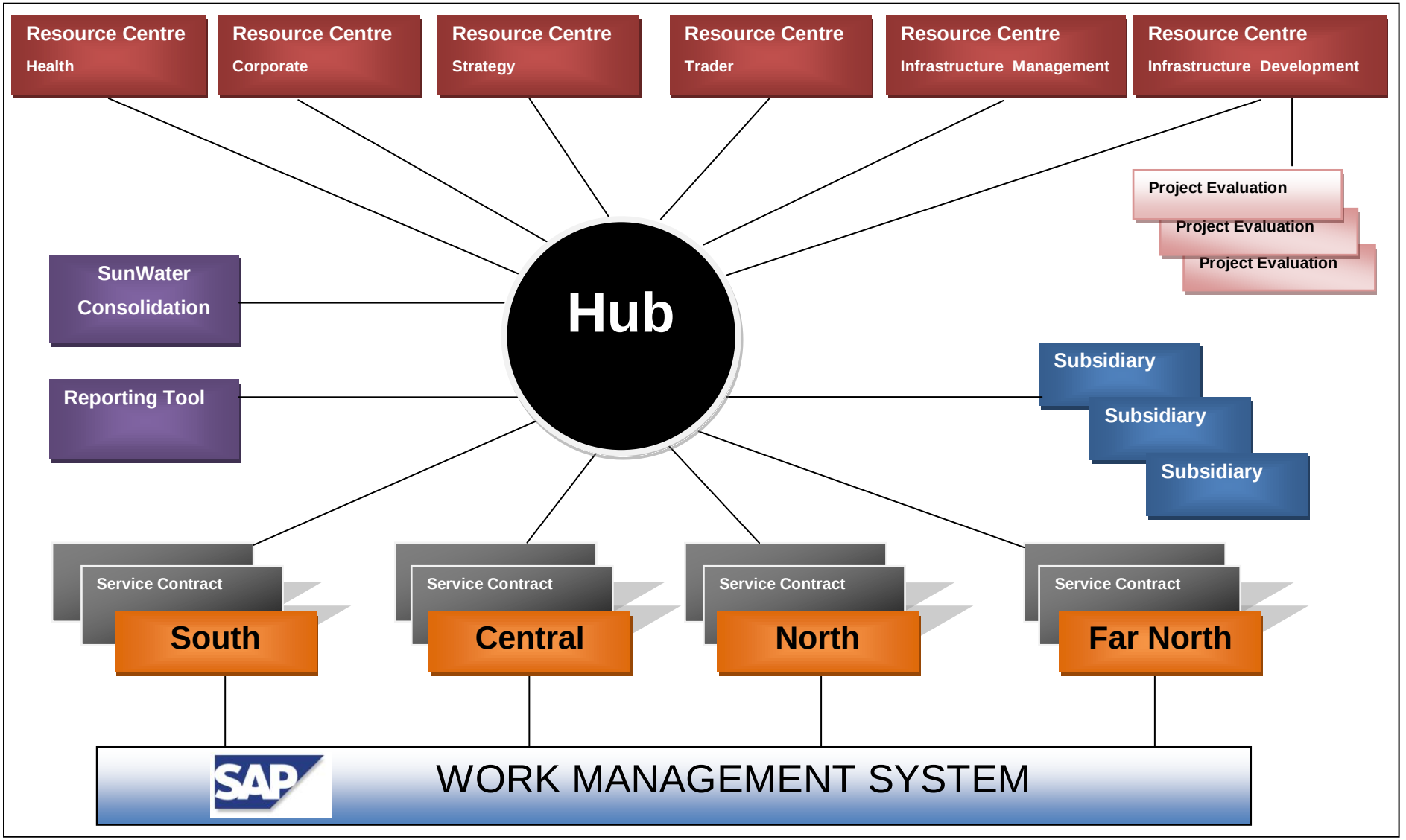

Figure 2.1.6.1 High Level Overview of SunWater Financial Model Structure

Reports and modelling outputs are run from either the Reporting Tool or SunWater Consolidation modules. The SunWater Consolidated reporting module runs standard financial reports such as Profit & Loss Statement, Balance Sheet, Cash Flow Statement, KPI reporting etc whereas the Reporting Tool enables the user to run non-standard and ad-hoc reports as defined by the user.

The Reporting Tool runs the relevant report to extract data from the SFM for uploading into the PRM which creates the relevant tables and graphs for reporting in SunWater's NSPs.

The following groups or clusters have a common modular format:

- Brisbane Resource Centres;
- Regional Centres;
- Service Contracts; and
- Subsidiary companies.

The role of the hub can be summarised as:

- Economic forecasts inputs such as cost escalators;
- Master data inputs;
- Overhead rates;
- Infrastructure Management indirect cost distribution;
- Internal service matrix;
- Capex/impairment report;
- Labour KPI reports and labour rates; and
- File links as part of the integrity checking process.

Figure 2.1.6.2 over page includes key statistics on the SFM including details on each of the modules outlining a brief description of each module, whether it is in scope for this review, file size and number of worksheets. For each of the modular sections further details are provided in relation to the number of Brisbane Resource Centres, Internal and External Service Contracts and Development Projects. The existence of unique VBA procedures is also identified within the table.

Filename	Description	In Scope	File Size (MGB)	Worksheets	VBA Unique Procedure	Brisbane Resource Centres	Internal Service Contract	External Service Contracts	Development Projects
A00-Report.xls	Reporting tool for the model with the ability to extract user defined reports	YES	1.50	4	Yes				
A01-Hub.xls	The centralised data gateway with determines how data flow through the SFM	YES	23.94	39	Yes				
A02-SunWater.xls	Consolidated Financial Reports	NO	5.80	11	Yes				
A03-Health.xls	Brisbane Resource Centre which provides services	YES	1.73	9		1			
A04-Corporate.xls	Brisbane Resource Centre which provides services	YES	14.78	21		11			
A05-Strategy.xls	Brisbane Resource Centre which provides services	YES	1.74	9		1			
A06-Trader.xls	Brisbane Resource Centre which provides services	YES	4.93	11		1			
A07-ID.xls	Infrastructure Development and new project	NO	20.17	35		6			15
A08-IM.xls	Infrastructure Management	YES	9.41	21		4		4	
A10-IM-Far North.xls	Regional Resource Centre which houses the Service Contracts	YES	33.36	31	Yes		11	8	
A11-IM-North.xls	Regional Resource Centre which houses the Service Contracts	YES	41.63	34	Yes		16	7	
A13-IM-Central.xls	Regional Resource Centre which houses the Service Contracts	YES	46.71	35	Yes		18	6	
A14-IM-South.xls	Regional Resource Centre which houses the Service Contracts	YES	27.03	27	Yes		9	7	
A15-BWPL.xls	Subsidiary Business	NO	9.26	18					
A16-EWPPL.xls	Subsidiary Business	NO	8.85	17					
A17-NWQWPPL.xls	Subsidiary Business	NO	8.43	17					
A19-10-WMS-Far North-MC.xls	Entry Point for the Work Management System data relating to Non-routine Maintenance	YES	1.71	6	Yes				
A19-10-WMS-Far North.xls	Entry Point for the Work Management System data relating to Non-routine Maintenance	YES	30.96	6	Yes				
A19-11-WMS-North.xls	Entry Point for the Work Management System data relating to Non-routine Maintenance	YES	29.36	6	Yes				
A19-13-WMS-Central-MC.xls	Entry Point for the Work Management System data relating to Non-routine Maintenance	YES	1.30	6	Yes				
A19-13-WMS-Central.xls	Entry Point for the Work Management System data relating to Non-routine Maintenance	YES	39.78	6	Yes				
A19-14-WMS-South.xls	Entry Point for the Work Management System Data relating to Non-Routine Maintenance	YES	8.30	6	Yes				

Figure 2.1.6.2 Key Statistics - SunWater Financial Model

2.1.7. Cost Escalation Factors

Costs are entered into the model in input dollars which are defined as dollars of the day ($2010/11). In order to account for forecast cost escalation, there are 9 separate indexation rates applied within the model. This enables flexibility to forecast unique cost escalation factors relating to the following cost items:

- C1 – Labour;
- C2 – Electricity;
- C3 - Contractors – commercial;
- C4 - Contractors – other;
- C5 - Materials – construction;
- C6 - Materials – chemicals;
- C7 - Materials – other;
- C8 - Other costs – CPI; and
- C9 - Plant, equipment & vehicles.

After the relevant indexation is applied to the 'input dollars or $2010/11', the escalated costs are then referred to as 'nominal dollars'.

The final step within the model converts the 'nominal dollars' or escalated dollars of the day to 'real dollars' which effectively excludes the general CPI escalator from the forecasts. Real dollars in essence includes any forecast cost escalations above the forecast general CPI related cost increase so if a cost is forecast to increase by 10% in any year and the CPI forecast is 2.5%, a real increase in costs of 7.5% remains within the 'real dollars' forecast.

2.1.8. Cost Allocation for Irrigation Pricing

The focus of the review relates to the irrigation pricing components within the model as part of SunWater's regulated business activities. A key objective of the model is the allocation of costs to each service contract to determine the pricing revenue target and irrigation tariffs for each service contract. Although the focus of the model review is to observe the process to determine irrigation pricing, Indec has sought satisfaction that all elements of the business, whether regulated or not, are allocated costs consistently and in accordance with the business rules established within the SFM.

Routine and non-routine costs are classified in to the following cost categories;

- Operative (including electricity);
- Preventative maintenance;

- Corrective maintenance; and
- Refurbishment & Enhancement (Non-Routine Only).

These costs can be further categories into the following types:

- Direct Costs - cost of activities directly employed in providing services for customers and primarily incurred by the Water Services & Asset Solutions business groups.
- Indirect Costs - cost of activities, resources and assets supporting direct activity, and used for a limited line of business or service type and typically incurred in the Regional Centres and in Brisbane.
- Overhead Costs - cost not applicable directly to a particular line of business, and therefore spread across the entire business using a standard business rule.
- Regional Centre overheads are generated in either a Regional Centre or a Brisbane Indirect resource pool.
- Brisbane overheads are generated in a Resource Centre that services the entire business.

SunWater was unable to provide specific documentation to Indec to describe the business rules relating to overhead and indirect cost allocation when this request was made during the review. Indec was advised that a draft paper was being prepared and will be made available to Indec once it was finalised. In the interim, SunWater referred Indec to the SFM which outlined business rules relating to overhead and indirect cost allocation. The paper prepared by SunWater on Centralised Costs in January 2011 was finalised during the end of the review which did not allow sufficient time for Indec to fully consider this paper. The paper describes the general process of how centralised costs are allocated across the business without providing detailed business rules.

Based on the information provided by SunWater during staff interview and the induction sessions, Indec has summarised some of the key business rules relating to cost allocations as follows:

- The supply and support of PCs, printers and related equipment by ICT is recovered via a Standard Rate per PC Kit. A similar process is used for phones, training courses, accommodation and some insurances e.g. Professional Indemnity.
- The allocation of insurance costs is hard coded into the model with the allocation undertaken outside the model.
- Housing provided for staff is treated as an overhead cost associated with a Regional Centre and is shown separately to the management cost of office premises, workshops and depots.
- Local rates, insurance and related costs are treated as a Regional Office overhead.

Overhead costs are allocated based on the following three rules:

1. infrastructural electricity, depreciation, other non-cash costs and contractors and materials in development projects do not receive overheads;
2. all other non-labour costs attract a 5% mark-up to recover handling costs; and
3. remaining overhead is allocated to labour cost and charged to:
    a. service contracts;
    b. internal projects (including R&E);
    c. indirect cost pools; and
    d. SunWater's labour costs charged to Development Projects.

Overhead costs are then allocated based on total direct labour costs to:

- service contracts; and
- internal projects (including R&E).

2.1.9. Indirect cost pools

The SFM has the ability to create indirect cost pools to effectively adopt a targeted allocation of certain indirect costs incurred by the Infrastructure Management business unit. As described above, indirect cost pools allow a targeted approach to allocate certain costs which are either performed within Brisbane or a Regional Office and are services provided to particular lines of business e.g. Dam Safety services relate to activities associated with bulk supply only and are accordingly allocated to bulk supply service contracts and not other activities within the business. Indirect cost pools can only be allocated to service contracts and are allocated based on direct labour costs.

The SFM applies a matrix within the Hub to trigger the allocation of 15 indirect cost pools based on two parameters assigned to each service contract – line of business and service contract type. Two indirect cost pools are an exception to this approach and the indirect costs are allocated based on a manual selection of individual service contracts.

Each service contract is classified as one of the following lines of business:

- Bulk water
- Transport
- Treatment
- Hydro
- Development

- Metering
- Trading
- Pipelines

Each service contract is then classified as one of the following types of service contract:

- Operations & Maintenance (O&M);
- Operations & Maintenance and Customer Service (O&M + CS);
- Operations & Maintenance and Asset Management (O&M + AM);
- Full;
- Consulting; or
- Trading.

The following indirect cost pools are established in the version of the SFM considered as part of this review:

- 253 - Strategic Water Management
- 254 - Irrigation Pricing
- 255 – Industry Regulation
- 640 – Management & Administration
- 651 – Dam Safety
- 652 - Strategy & Systems
- 654 – Pump Stations & Pipelines
- 655 – Irrigation & Drainage
- 656 – Water & Waste Water
- 657 – Head works
- 645 - Man.& Admin
- 638 - Flood room
- 661 - Customer Support
- 663 - Hydro graphic Services
- 665 - Water Accounting

Some of the cost pools have identical names which represent similar activities undertaken by different parts of the business which are identified by unique cost/profit centre codes.

Table 2.1.9.1 below outlines the indirect cost matrix within the model reviewed by Indec and the allocation rules for the respective indirect cost pools.

Indirect Cost Pool	Line of Business Type	Service Contract Type
253 - Strategic Water Management 663 – Hydrographic Services	Bulk Water	Full
255 - Industry Regulation 640 – Management & Administration 645 - Management & Administration	All lines of business	O&M O&M + CS O&M + AM Full
651 – Dam Safety 657 - Headworks	Bulk Water	O&M – AM Full
652 – Strategy & Systems	All lines of business	O&M – AM Full
654 – Pump Stations & Pipelines	Transport Hydro Pipelines	O&M – AM Full
655 – Irrigation & Drainage	Transport	O&M – AM Full
656 – Water & Waste Water	Bulk water Treatment	O&M – AM Full
661 – Customer Support	All	O&M – CS Full
665 – Water Accounting	Bulk water	O&M – CS Full

Table 2.1.9.1 Indirect Cost Pool Allocation Rules

Two indirect cost pools are not allocated via the matrix - 254 – Irrigation Pricing and 638 – Flood room. These indirect cost pools are allocated via manual selection of individual service contracts with further details outlined below.

254 – Irrigation Pricing is allocated to the 29 service contracts which are deemed to provide irrigation water services. Indec expected that 30 service contracts would be allocated irrigation pricing costs given that 30 service contracts are related to irrigation water services.

638 – Flood room is allocated to 13 service contracts which are deemed to be serviced by the Flood Room. Indec did not verify that these service contracts are appropriate or otherwise.

The SFM has the ability to treat certain costs within Infrastructure Management as in-direct costs and allocates these costs to identified service contracts. These costs are allocated based on a selection of 3 allocation drivers related to the type of labour cost:

1. Costed labour – routine;
2. Costed labour – non-routine; or
3. Costed labour – both.

Table 2.1.9.2 below details the Infrastructure Management costs allocated directly by the version of the model which Indec reviewed.

The model did not provide detailed explanation or justification for treating these costs as direct nor did it explain the allocation approach adopted.

Cost	Details	Allocation Rules
261 – Corporate Council	5.4 FTEs less amounts already in Brisbane IM	Allocated based on costed labour - routine to 46 service contracts
251 – 255 Strategy	Irrigation Pricing costs annualised costs	Allocated based on costed labour - routine to 29 service contracts
271 Co. Procurement	1.4 FTEs for weed contracts etc on distribution systems	Allocated base on costed labour - total to 8 service contracts (irrigation channel systems)
620 - Health & Safety	Based on original allocation from the budget	Allocated base on costed labour - total to 56 service contracts
645 – IM Services Delivery	- 4 staff at 80% direct	Allocated base on costed labour - routine to 41 service contracts

Table 2.1.9.2 Infrastructure Management Direct Cost Allocation

2.1.10. Regional Centre overhead pool

The overhead costs in the four Regional Centres are pooled to create a single Regional Centre overhead rate. This approach may reduce the causality of the regional centre overheads with the degree to which they can be assigned to the activities served by the respective Regional Centres. This is a greater issue if Regional Centre services are strongly correlated to service contracts under its responsibility and if variances in cost structures and services provided arise across the Regional Centres.

In other words, those activities or service contracts serviced by a more efficient Regional Centre do not directly benefit from those efficiencies as they are pooled with costs of other Regional Centres and allocated across all relevant SunWater activities. Alternatively, a Regional Centre that provides a greater level of services or operates on a higher cost base relative to other Regional Centres results in these higher costs being pooled and diluted when allocated as they are shared across relevant activities serviced by other Regional Centres.

2.1.11. Pricing Revenue Target

Once all relevant costs have been allocated to the service contract level, a pricing revenue target (PRT) is established for al service contracts. The following sections describe the key components to the PRT calculation in more detail.

All calculations in relation to irrigation pricing are performed on the basis of nominal dollars or dollars of the day. The final step in the calculation is translating this revenue target into real dollars or deescalating to 2010/11 dollars.

2.1.12. Cost Elements

The PRT has the option to include or exclude the following cost elements:

- operative (including electricity);
- preventative maintenance;
- corrective maintenance;
- refurbishment & enhancement annuity; and
- interest expense.

If the cost elements, with overheads and indirect costs allocated, are included, the model provides the option to recover directly via the PRT, via the annuity or via the ORC. The ORC is related to upper bound pricing and involves the capitalisation of costs and recovery via a return of and return on the ORC which represents a regulatory asset value. Indec has not reviewed the ORC calculation within the model as the amended Ministerial Direction is based on lower bound pricing.

The model has the flexibility, on the Settings tab, to assign bulk water costs as categorised above to the irrigation and other customer sectors either based on the Head works Utilisation Factor (HUF) or Aggregated Mega litres (AML). The HUF for Medium Priority customers is hard coded into the model as a percentage. The value for high priority customers is calculated by subtracting this from 100. AML is the proportion of water entitlements for medium priority customers relative to total water entitlements.

The flexibility of the model and the use of templates mean that this methodology is applied to both bulk water and distribution systems. The impact of altering these parameters within the model on irrigation pricing has the following impacts:

- a change in the calculation of the opening annuity balance; and
- alters the apportionment of costs to customer sectors.

The version of the model subject to the review was set so that Refurbishment & Enhancement (annuity) costs are allocated based on the HUF factor and most other costs allocated based on AML. This is shown in Figure 2.1.12.1.

The model also has an option to transfer certain costs out of the PRT, or from one service contract to another, which is the mechanism to transfer distribution losses from the bulk water service contract to the relevant distribution service contracts.

As outlined earlier in the report, the apportionment of insurance costs occurs outside of the SFM and this apportionment was not made available to Indec during this review. Subject to direction from the Authority, Indec can scrutinise the allocation of insurance costs during the Step 2 review.

Cost Element	Bulk Water	Distribution
Cash costs		
Operations		
• Non routine - Capital	AML	AML
• Non routine - Expense	AML	AML
• Routine - Expense (Includes electricity)	AML	AML
Preventive maintenance		
• Non routine - Capital	AML	AML
• Non routine - Expense	AML	AML
• Routine - Expense	AML	AML
Corrective maintenance		
• Non routine - Capital	AML	AML
• Non routine - Expense	AML	AML
• Routine - Expense	AML	AML
R&E		
• Non routine - Capital	HUF	AML
• Non routine - Expense	HUF	AML
Interest - expense	HUF	AML
Non cash costs		
Non-routine annuity	HUF	AML
Optimised Replacement Cost (ORC)		
• Return on	HUF	AML
• Indexation	HUF	AML
• Depreciation	HUF	AML
Notional costs		
Tax equivalents	HUF	AML
Dividends	HUF	AML
Cost reallocations		
Distribution losses	Transferred out	AML
P/S and M/C costs re-allocated to bulk water	HUF	AML
Revenue offsets	**AML**	**AML**

Figure 2.1.12.1 Cost Allocation Methodology

2.1.13. Distribution Losses

Forecast distribution losses are entered into the model directly and are represented by water allocations made to SunWater and remain constant over the life of the scheme. Medium and high priority distribution losses are entered separately.

Medium priority distribution losses are only applied if there are medium priority customers in the scheme and high priority distribution losses are always applied.

2.1.14. Revenue Offsets

The model captures revenue offsets to effectively reduce the PRT. The types of revenue offset that can be offset against the PRT include:

- access charges;
- drainage diversion charges;
- drainage levies;
- storage rental fees;
- other fees & charges;
- recreation - Commercial operator payments;
- flood mitigation;
- rent received;
- land leases;
- revenue cap adjustments; and
- termination fees

The revenue offsets are deducted from operating costs for the purpose of determining the PRT.

2.1.15. Irrigation Tariffs

The next step involves the calculation of tariffs for each type of priority allocation e.g. medium and high priority based on the allocation of PRT as described above to the various type of priority allocations.

The SFM calculates a vanilla tariff for each service contract for each priority allocation type on a Part A and Part B basis. The recovery of the PRT from Part A and Part B charges can be varied within the model and is user defined rather than being based on a causal relationship such as long run marginal cost or an estimate of fixed versus variable costs.

The SFM does not replicate the tariff structure of those service contracts which currently have multiple tariff structures for re-lift sections or for other existing segments. The SFM calculates a uniform or plain vanilla tariff for the entire service contract for each priority allocation type.

This may become a limitation if a comparison between new and current tariffs is required or if the current tariff structures are re-applied for the new price path.

Based on the model reviewed for Step 1, the model does not calculate separate drainage levies or channel water harvesting charges.

The model calculates the Part A charges for each service contract applying the following methodology:

- The relevant share of the PRT to be recovered from Part A charges is divided by the total nominal water allocations.
- The relevant share of PRT recovered from Part A revenues is calculated based on a user selection which is hard coded as a percentage in the model.
- The model includes irrigation, SunWater and Reserve in total nominal water allocations based on their priority type.
- 'Free water allocations' are recorded in the SFM but are excluded in any calculations to determine irrigation pricing.

The model calculates the Part B charges applying the following methodology:

- The relevant share of the PRT to be recovered from Part B charges is determined, which is the residual of the PRT after Part A charges have been calculated
- The PRT recovered from Part B charges is divided by the estimated water usage expressed as a percentage of total usage, ignoring distribution losses.
- Estimated water usage is hard coded into the model including an allowance for channel water harvesting where relevant. The model does not document the basis for the water use forecast or the assumptions relating to channel water harvesting volumes.

Figure 2.1.15.1 below is a simplified diagram to illustrate how the model processes the cost forecasts and other relevant data to determine irrigation tariffs. The diagram also demonstrates that the model allocates costs to both regulated and unregulated activities based on the allocation rules described above.

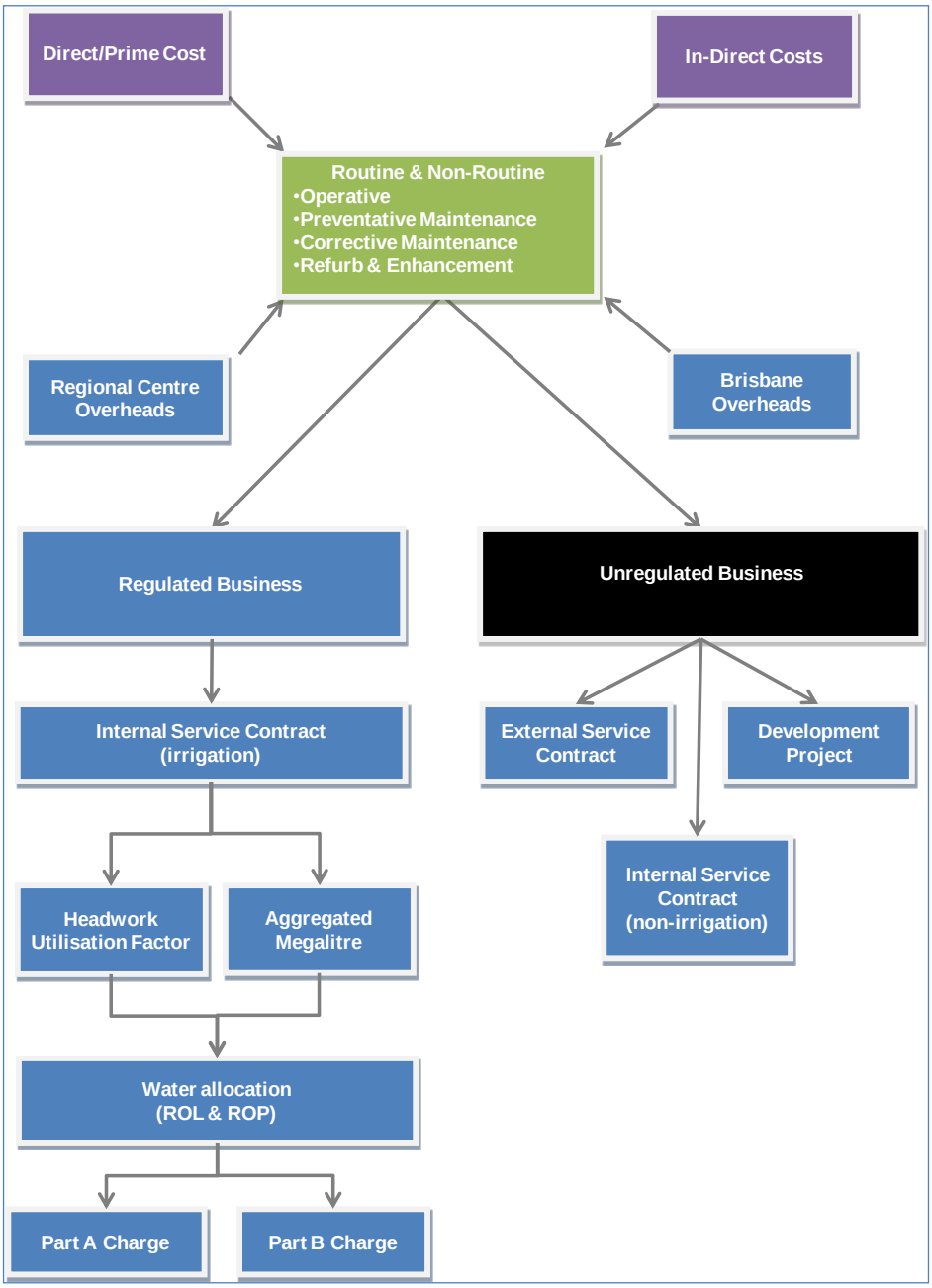

Figure 2.1.15.1 SFM Process Map

2.1.16. Pricing Reporting Model (NSP Pricing Report Tool)

As outlined earlier the PRM combines historical data from the SAP financial information system with forecast data from the SFM for presentation in the NSP tables. Figure 2.1.16.1 below illustrates this information flow.

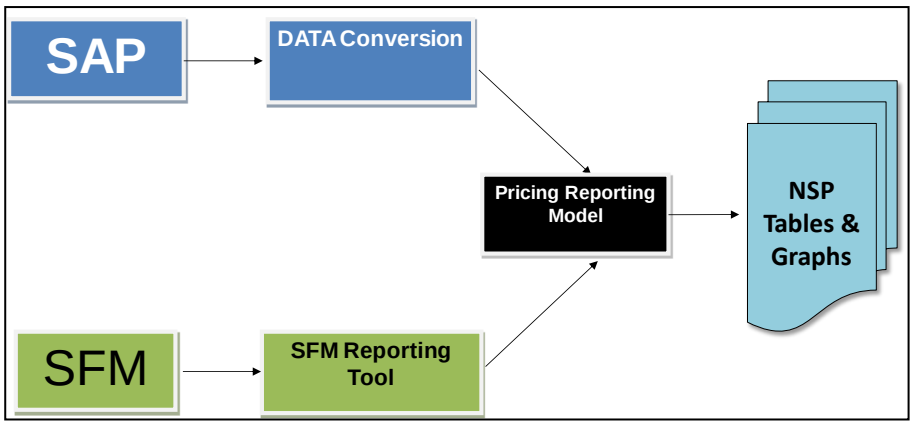

Figure 2.1.16.1 Pricing Reporting Model Information Flow

In total there are 24 worksheets within the NSP Pricing Report Tool. The Step 1 review will focus on the following sheets:

- NSP Bulk Nominal;
- NSP Channel Nominal;
- SAP Data;
- Revenue offsets;
- Electricity; and
- FM DATA Nominal.

SunWater has advised that the other 18 sheets are not directly related to the production of NSP tables and graphs. Indec has confirmed that these sheets are not involved in the production of the tables and graphs presented in the NSPs and has deemed that they are beyond the scope of the review.

2.1.17. Conversion Tool – Tabular Structure

In order to prepare data for insertion into the NSP reporting module, an LBC (Lower Bound Cost) model collects data from the BOM system, selects the appropriate figures, and formats this data for use in the reporting module.

The purpose of this module is to extract the relevant BOM data from the information system and organise in preparation for entry into the NSP Pricing Report.

The main sheets of this model are:

- NSPDATA - hard coded numbers which are the end result of a “Paste Values” macro to generate the numbers in preparation for inclusion in the NSP Tables;

- Summary - uses a series of macros to get data and copy data from the Data Tab which sit in the same workbook, as well as carrying out some intermediate calculations and presenting a user interface;
- Data (SOURCE) - holds links to external worksheets relating to pricing;
- Offsets - reference table which address revenue offsets;
- Cost Elements - cost elements, charts of account and account groupings; and
- Indexation - indexation table for calculating the price path.

3. METHODOLOGY OF REVIEW

3.1. Review Approach

The review approach has followed the methodology outlined in the Authority's Terms of Reference which involves two components to reviewing the SunWater Pricing Model. The two step approach has been adopted due to time constraints based on the timeframes within the original Ministerial Direction Notice and the SunWater pricing model and NSP data not being available when the ToR were developed by the Authority.

The advantage to the Authority of starting the review before the pricing model and the NSP data is finalised includes obtaining preliminary quality assurance advice on the logic and structure of the model. This is particularly beneficial given the size, complexity and sophistication of the SFM and it will also benefit the development of an appropriate review technique for the final review of the model. Under this approach, the Authority will also have the opportunity to alert SunWater of any material issues emerging from the preliminary quality assurance review with the benefit of any issues being addressed prior to the final NSP data being populated into the model.

3.2. Step 1 Review: Conduct quality assurance of the pricing model

The first stage review summarised in this report focused on reviewing the following issues:

- meeting with SunWater's model developer to discuss model design, data input capture, production of outputs and to assist with understanding the model's objectives, functionality and logic;
- reviewing the model architecture and structure;
- understanding how inputs enter the model;
- understanding how assumptions are documented and applied in the model and the flexibility to vary assumptions;
- review model logic and consistency with pricing policies to be adopted by the Authority;
- review macros and functional equations of the model;
- review the appropriateness and comprehensiveness of output reports; and
- develop an appropriate review technique including principles and protocols for the Step 2 review of the pricing model.

3.3. Step 2: Establish the integrity and robustness of the final pricing model

Once the final model is available and is populated with NSP data, Indec would commence the second stage of the pricing model review. This stage would enable a more thorough review of the model based on the review techniques agreed with the Authority at the conclusion of the Step 1

Review. The agreed approach will ensure that small, medium and large schemes or service contracts will be adequately represented in the review.

At this stage, the general approach Indec proposes to adopt for the Step 2 Review includes undertaking the following tasks:

- identify and register any changes made by SunWater to the final model (change and version register);
- review the overall logic of the model;
- check if the equations are logical and represent the appropriate regulatory, government and pricing policy;
- check the model's calculations, to ensure all formulas and macros (if any) are consistent with the functional specifications;
- identify cells that are hard-coded or include manual adjustments, and understand the justification for such;
- check to ensure that the data included within the model is being used appropriately;
- run diagnostic tests to verify the robustness and accuracy of the model;
- create issues and follow up action items register and seek SunWater response; and
- perform internal peer review.

3.4. Step 1 Review Methodology

Given the large size and the modular structure of the SFM, the methodology of the Step 1 Review focused on comprehensively reviewing one of each of the key modules to assess the items listed under Section 4.2. This approach efficiently and effectively provided an overview of the robustness and logic of the model without having to invest a great deal of time looking at the entire model. The Step 2 Review would involve developing an appropriate approach to check the full model once it is finalised and populated with final NSP data.

The review undertook a comprehensive assessment of the following key components of the SFM:

1. Key Module Review
    - WMS Module structure
    - Regional Module Structure
    - Infrastructure Management Module Structure
    - Brisbane Resource Centre Module Structure

2. Review of Service contracts

   - 1 Bulk water from each region
   - 1 Distribution contract from each region

3. Detailed Review of the HUB

4. Detailed review of the reporting tool and in particular the NSP tables report

The outcomes of reviewing the above modules of the model are documented in Section 5.1.

3.5. SunWater Induction Sessions

SunWater hosted a series of induction sessions conducted by SFM model developer. The objective of the induction sessions was to provide an interactive and fast tracked process to familiarise Indec with the SFM. An officer form the Authority participated in the 5 half day induction sessions held by SunWater.

The following material was covered at the induction sessions:

1. Architecture
2. Model Horizon
3. Protocol
4. Protection
5. Validation
6. Indec Addin
7. Named Ranges
8. Navigation
9. VBA
10. Hidden sheet – VBA only
11. Common Marco Buttons
12. Control Sheet
13. Integrity Checks
14. Mode
15. HUB
16. Version Control
17. File Size reduction
18. Economic Factors
19. Key Module – Resource Centre

20. Key Module – Regional Resource Centre
21. Key Module – IM internal service contract
22. Key Module – WMS interrogation file and process

Indec greatly appreciates SunWater making the model developer available to lead these induction sessions and to deal with follow up issues. Indec benefited significantly from these inductions sessions and the on-going availability of the model developer which enabled the review to carried out in a more effective and efficient manner.

3.6. Financial Model version number provided by SunWater

The Step 1 review was conducted with access to SFM version 610 stored at SunWater's offices. The SFM was made available to Indec on a PC located at SunWater's offices due to the commercial sensitive information contained within the model.

SunWater initially scrambled all data in the model and subsequently scrambled the commercial sensitive data to protect the identity and nature of commercial sensitive transactions. The data populated in the model was not substantiated by SunWater nor was it based on the SunWater NSPs issued in January 2011. This limited Indec's ability to apply risk tolerance testing or materiality thresholds when completing the review.

3.7. Staff Interviews

A number of staff interviews were held to test the level of understanding of the methodologies, practices and procedures of the SFM. The staff interviews also provided an insight on the use of internal controls to minimise risks of error in data capture and model maintenance and storage.

Appendix D lists the staff and their titles which were interviewed as part of this review.

3.8. Diagnostic testing

Diagnostic testing was undertaken during the review on the SFM to automate some of the checking and testing to be undertaken. In particular, the diagnostic testing was undertaken to check for the following:

- Common error types;
- Identifying complex formulae;
- Named ranges overview;
- Commonality and consistency of formulae; and
- Unique formulae analysis.

The propriety software package Spreadsheet Professional was the tool applied to undertake the automated diagnostic testing. The results of the diagnostic testing are outlined in Section 5.6 with Appendix E containing the reports from Spreadsheet Professional.

Diagnostic testing applying the Spreadsheet Professional tool was not utilised for the PRM due to the structure and smaller size of these models enabling manual checking to achieve similar outcomes to Spreadsheet Professional.

3.9. Best practice modelling checklist

The Step 1 review assessed the SFM and the NSP Models against the best practice modelling checklist shown in Figure 3.9.1.

This checklist assists in the assessment of the model's robustness so as to minimise the risks of errors occurring and to improve reliability, usability and accuracy. The results of the assessment against this checklist are outlined in Section 5.9 for the SFM and Section 6.3 for the PRM.

CRITERIA

Spreadsheet Design

- Logical Design for its overall purposes
- Effective use of notation and comments
- Use of modular structure
- Separation of data inputs, calculations, outputs
- Column and row heading should include units and currencies where relevant
- Workbook protected

Templates

- Details regarding the files overall purpose, spreadsheet owner, version control and integrity check, change register etc.
- Use of separate sheets for setup, calculations & workings, reference & lookup tables and data storage
- Commonality adopted across relevant template designs

Formatting

- Data input areas should be easily recognisable
- Data input should not be mixed with calculations and inputs should not be hard coded into calculations
- Limited use of merged cells
- Limited use of hidden cells, columns, rows and worksheets

Formulas and Functions

- Use of tables and lookups
- Documentation of longer formulas
- Named ranges
- Conditional formatting
- Offsets to hand column insertion
- Ensure formulae can handle non-numeric values

Charts

- Effective Use of Charts
- Limit number of series
- Axes and titles are correctly labelled, use of links
- Logical Relationship between data

VBA

- Style Guide
- Code stored within a function
- Named ranges rather than cell references
- Documentation

Established user manuals

- Specifications well documented
- Defined architecture
- Documentation of milestones
- Overview of key workings
- Key Outputs
- Well recorded source of inputs

Figure 3.9.1 Best Practice Modelling Checklist

4. KEY FINDING AND CONCLUSIONS – SUNWATER FINANCIAL MODEL

This section of the report outlines the key findings and conclusions resulting from the review of the SFM with Section 6 reporting on the key findings and conclusions relating to the review of the PRM, which an separate model to the SFM.

As discussed and agreed with the Authority, the review of the SFM during the Step 1 stage adopted the following steps:

- key module review;
- service contract review;
- review of VBA;
- review of Hub;
- review of Reporting Tool & NSP Tables;
- diagnostic testing;
- transaction review; and
- review against financial modelling best practice criteria.

As outlined earlier in the previous section of this report, this approach was adopted during the Step 1 review given the large size and the modular structure of the SFM. The methodology of the Step 1 Review focused on comprehensively reviewing one of each of the key modules to efficiently and effectively provide an overview of the robustness and logic of the model without having to invest a great deal of time looking at the entire model. The Step 2 Review would involve developing an appropriate approach to check the full model once it is finalised and populated with final NSP data.

The following sub sections provide further analysis and key findings associated with each step of the review conducted by Indec.

4.1. Key Module Review

4.1.1. WMS Module Structure

Identify and review key workings, calculations & output

The key workings within this module may be summaries as follows:

- Collecting of non-routine data from the SAP WMS module;
- Linking the predefined resource centre service providers;
- Grouping the data into 2 distinct data sets: Cost type and pricing category; and
- Aggregating the data in preparation for transfer to the service contracts within the respective regional centre modules.

Review In-built data integrity checking procedures

Various checks were conducted within the control tab of the module and the outcomes of these checks are summarised below:

- the entire workbook is protected which limits fundamental change to the overall structure of the module;
- the column and row structure was amended which was picked up and flagged by the integrity check;
- the names of key inputs was overwritten and subsequently picked up by the integrity check; and
- the sum total check (numeric hash totals) ensures that the volume of the data from the source WMS file is matched with the aggregated data set in the SFM by dollar value.

4.1.2. WMS Module Assessment

In Indec's view, the WMS Module architecture and structure was adequate and appropriate in dealing with the objective of obtaining the non-routine maintenance data and preparing it for entry into the SFM. Indec understand how the inputs enter the model and are satisfied it meets the functional design. All the macros tested successfully. Step 2 of the review will review the remaining three WMS modules.

The one issue to note is that the SFM relies on the correct assignment of the appropriate resource centre and the overall accuracy of the non-routine maintenance data when data is entered into the WMS. Any errors made within the WMS module will transfer to the SFM.

4.1.3. Regional Centre Module Review

Identify and review key workings, calculations & output

The key workings within this module may be summaries as follows:

- Collecting non-routine costs from the WMS Module;
- Introducing routine maintenance at the service contract level;
- Assigning the appropriate in-direct costs and Brisbane & Regional Centre overhead costs;
- Introducing water allocation data via the ROL/ROP data set;
- Introduction of the HUF and AML to allocate costs to customer sectors;
- Formulating PRT at the service contract level; and
- Calculating Part A and Part B charge and the ability to calculate various price path scenarios.

Review In-built data integrity checking procedures

Various checks were conducted by Indec within the control tab of the module and the outcomes of these checks are summarised below:

- The entire workbook is protected which limits fundamental change to the overall structure of the module;
- Numbers were deleted from the P&L and the integrity check within the sheet in question and the control tab flagged the issue;
- The column and row structure was amended and was picked up by the in-built integrity check and the control tab of the module;
- The integrity check allows for certain data over-rides which allows the user to firstly review the issue identified by the check and manually over-ride it when and if necessary; and
- Key formulas were removed which triggered the error handling process.

4.1.4. Regional Centre Module Assessment

In Indec's view, the overall Regional Centre Module architecture and structure was adequate and appropriate in dealing with the objective of collecting both routine and non-routine maintenance and attracting the overheads from the respective resource centre. Indec have understood how the inputs enter the model and are satisfied it meets the functional design. The cost allocation and irrigation pricing calculations are addressed later in this report. All the macros tested successfully. Step 2 of the review will review the other remaining three regional centre modules.

4.1.5. Infrastructure Management Module Review

Identify and review key workings, calculations & output

The key inputs within this module may be summaries as follows:

- Each of the resource centres are designed to be populated by the respective regional managers and the administration of this process is centralised and managed by the appropriate head office business accountant;
- The primary purpose for the resource centre is to include the forecast cost associated with routine operating activities, namely:
  - Salaries and wages by grade;
  - Employee related expenses;
  - Contractors by grade;
  - Other overhead cost ranging from travel, printing and postage etc;
  - Cost planning and reporting;

- Strategic water management; and
- Specific headcount for irrigation pricing.

- The key calculation and output is the formulation of the overhead recovery rate. In order to complete this calculation the model requires the following data:
  - regional centre overhead pool;
  - Brisbane overhead;
  - total overhead pool;
  - prime costs; and
  - costed labour.

The resource centre module receives the request for labour via the hub, which is work associated with performing routine and non-routine tasks within the regions or any other resource centre. Once overhead costs are set by the model, they are allocated to the various resource centres based on the cost allocation business rules.

Review In-built data integrity checking procedures

Various checks were conducted within the control tab of the module and the outcomes of these checks are summarised below:

- the entire workbook is protected, limiting changes to the structure of the module;
- numbers were deleted from the P&L and the integrity check within the sheet in question and the control tab flagged the issue;
- amendments made to the column and row structure were identified by the in-built sheet integrity check and the control tab of the module;
- the integrity check allows for certain data over-rides which permits the user to review the issue and manually over-ride when and if necessary; and
- key formulas were removed, triggering the error handling process.

4.1.6. Infrastructure Management Module Assessment

In Indec's view, the Infrastructure Management Resource Centre structure is adequate in the collection and calculation of forecast overheads, salaries and wages by grade and employee related expenses associated with the resource centre. Furthermore, it provides data aggregation at various levels within the module to provide alternative information levels to view the data.

4.1.7. Brisbane RC

Identify and review key workings, calculations & output

The key inputs within this module may be summaries as follows:

- each of the resource centres are designed to be populated by the respective regional managers and the administration of this process is centralised and managed by the appropriate head office business accountant;
- the primary purpose is for the resource centre to include the forecast cost associated with routine operating activities:
  - salaries and wages by grade;
  - employee related expenses;
  - contractors by grade;
  - other overhead cost ranging from travel, printing and postage etc;
  - cost and planning and reporting;
  - strategic water management; and
  - specific headcount for irrigation pricing.
- The key calculation and output is the formulation of the overhead recovery rate. In order to complete this calculation the model requires the following data:
  - regional centre overhead pool;
  - Brisbane overhead;
  - total overhead pool;
  - prime costs; and
  - costed labour.

The module has links to the HUB which determine whether the costs are direct or indirect.

Review In-built data integrity checking procedures

Indec performed various checks within the control tab of the module and the outcomes of these checks are summarised below:

- The entire workbook is protected, limiting change to the structure of the module;
- Numbers were deleted from the P&L, and the integrity check within the sheet in question and the control tab flagged the issue;

- The column and row structure was amended and this was detected by the in-built sheet integrity check and the control tab of the module;
- The integrity check allows for certain data over-rides which allows the user to review the issue and manually over-ride when and if necessary; and
- Key formulas were removed which triggered the error handling process.

4.1.8. Brisbane RC Assessment

The resource centre selected for the test case for all resource centres as part of the Step 1 review is adequate in its treatment of collecting and calculating forecast overheads, namely salaries and wages by grade and employee related expenses associated with the resource centre and its function.

Once overheads costs are set by the model, the resource centre module receives the request for labour via the hub for work relating to performing routine and non-routine task within the regions or any other resource centre.

4.2. Service Contract Review

4.2.1. Approach

The Step 1 review involved selecting two service contracts (one bulk supply and one distribution) from each of the four regions for detailed review, resulting in eight service contracts being reviewed in total.

The initial phase of the review was based on the in-built integrity test within the SFM and a formula test which was custom built as part of the development of the SFM.

The review consisted of four key criteria:

1. Design Logic;
2. Structure;
3. Commonality; and
4. Uniqueness.

4.2.2. Design Logic

Indec have not observed any inconsistencies with the design logic across any of the bulk supply and distribution service contracts across the four regions. This is due primarily to the modular structure which has been adopted across all bulk supply and distribution service contracts.

4.2.3. Structure

Indec have not observed any inconsistencies with the structure across any of the bulk supply and distribution service contracts across the four regions. This is due primarily to the modular structure which has been adopted across all bulk supply and distribution service contracts.

4.2.4. Commonality

Indec have not observed any inconsistencies with the common formula across any of the bulk supply and distribution service contracts across the four regions. This is due primarily to the modular structure which has been adopted across all bulk supply and distribution service contracts.

4.2.5. Uniqueness

Indec's review identified the following uniqueness across the service contracts:

Water allocation

This difference relates to the fact that some service contracts have both high priority and low priority water categories and/or other non-standard types of water allocations. As a result, the section within the model either has a formula or not to reflect the unique conditions relating to that service contract.

A hard coded adjustment was noted to the water allocations in one of the service contracts that was subject to the Step 1 review (South Regional Centre, Sheet 7-IIS, cell V379). This hard coded adjustment was not noted or identified with and explanatory comment to detail the adjustment.

Revenue Transfers

This difference relates to the fact that some service contracts have revenue transfers dealing with distribution losses being transferred from the bulk supply service contract to the distribution service contract. As a result, the section within the model either has a formula or not to reflect the condition of the service contract.

Annuity Calculation

The Annuity Calculation within the respective service contract contained "hard coded" numeric values to capture the initial opening balance. As a result, the numbers within the sampled service contract are unique.

4.3. Review of VBA

4.3.1. Formatting and Spreadsheet Management

There are two category of macros used within SFM. The first category is described as formatting type macros used primarily for style, format and spreadsheet management. This type of macro is

a “nice to have” and not essential in terms of the overall core functionality and robustness of the model. The following short list of randomly selected macros was tested as part of the review:

- trace precedents;
- adding and removing comments;
- numbers and formula formatting;
- synchronizing;
- protecting and un-protecting sheets;
- time stamps; and
- file recording.

4.3.2. Procedural and Interfacing

The second type of macro may be referred to as the procedural and interfacing type. These are integral to the overall structure and functionality of the model. Each of the following macros were observed and tested within the key modules:

- Updating data from subfolders;
- Error handling;
- Move the WMS data into Business Model; and
- Interrogating data.

4.3.3. VBA Assessment

All macros tested within the key modules operated in accordance with their intended function.

4.4. Review of HUB

Indentify & review Key workings, Calculations & Outputs

The Hub serves two primary functions within the broader SFM Model structure:

- setting and defining the global data flow rules in terms of how data flows across the relevant modules; and
- facilities this flow of the data via an interface platform.

The relationship between the HUB and the other modules is to facilitate the flow of data based on the global data flow rules. By way of example, a service contract requiring labour resulting from either a routine or non-routine work task would initiate a transaction via the HUB to the appropriate resource centre with the appropriate resources to provide the service. The HUB is the centralisation of this interaction between the service contracts located in the respective regional

centres and the resource centre. See Figure 3.5.1 above for a simplified diagram which illustrates the HUB's role in the SFM.

Review Integrity Checking Procedures

Given the HUB is the centralised portal which controls the flow of all data within the model, it was important to do a detailed review of the inbuilt integrity checks.

There are three key levels of integrity cheeks within the control tab of the HUB:

1. Supporting Files;
2. The HUB file; and
3. The Annual Model and Synchronisation process.

Various checks were conducted within the control tab of the module and the outcomes of these checks are summarised below:

- The entire workbook is protected, limiting fundamental changes to the overall structure of the module;
- Numbers were deleted from the P&L and the integrity check within the sheet and the control tab observed flagged the issue;
- The column and row structure was amended and was picked up by the in-built sheet integrity check and the control tab of the module;
- The integrity check allows for certain data over-rides which permits the user to review the issue and manually over-ride when and if necessary;
- Key formulas were removed which triggered the error handling process; and
- The override tab was reviewed within the control tab for the following linked files.
  - SunWater parent;
  - Infrastructure development;
  - IM far north;
  - Burnett; and
  - North West Queensland.

4.4.1. Macro Review

As the macros within the HUB play a critical role within the overall performance of the SFM, each of the following macros was tested successfully in terms of each macro performing in accordance with their designed function.

- Synchronisation Model;

- Adjust Overhead Rates;
- Adjust Brisbane Overheads;
- Adjust Regional Centre overheads;
- Distribute interest;
- Update labour Report;
- Construct SCI File;
- Construct CP File; and
- Optimise Hub File size.

4.4.2. HUB Assessment

In Indec's view, the HUB is comprehensive in its treatment of the functionality tested. The module is structurally sound and Indec did not observe any inconsistencies during our review of the module. From a functionality standpoint, it is well designed to meet the needs of SunWater's regulated and unregulated arms of the business.

4.5. Review of Reporting Tool & NSP Tables

The reporting tool is an additional module consisting of a single tab worksheet which saddles across the entire SFM structure and allows the creation of user defined reports. The data is interrogated with values returned across the selected forecast horizon.

As part of the review, Indec designed several custom reports in order to test the robustness and flexibility of the tool. Indec are satisfied that the output results reconciled with the underlying modules.

Indec also observed the use of the tool to generate the NSP tables via a predefined template. No errors or inconsistencies were noted by Indec during this process.

4.6. Diagnostic Testing

As part of this review, Indec applied the diagnostic tool Spreadsheet Professional across the four key modules and the reporting tool within the SFM.

Due to the modular structure of the SFM, Indec selected the summary tab which represented the majority of the data or key inputs within the respective module. This was in most case the Summary tab, as outlined below:

- Brisbane Resource Centre – Strategy Summary;
- Hub – Overhead;
- IM Far North - Summary Tab;

- WMS North – Economic Data; and
- Reporting Tool User Defined Summary Tab.

The detailed results from the generic test can be found in Appendix E of this report which present the Spreadsheet Professional output reports. Indec reviewed all issues identified from the tests and Indec are satisfied and understand the justification for the uniqueness of the formulas or layout identified by the testing.

The more comprehensive testing across all modules and an appropriate sample across the broader model will occur as part of the Step 2 review.

4.7. Transaction Review

The next layer of testing undertaken by Indec involved the review of a number of transaction types to test how these costs are captured and how they flow through the model and appear at the service contract level prior to being included in the PRT and irrigation tariffs.

The transaction types that Indec subjected to the transaction review included:

- annuity;
- salaries and wages;
- materials;
- 5% procurement fee exemption from electricity;
- 5% procurement fee exemption on significant projects; and
- reporting tool.

The results of the specified transaction tests are detailed below.

4.7.1. Test 1 – Annuity

The annuity calculation involves the following steps:

1. calculating the opening annuity balance;
2. forecasting R&E expenditure over the annuity period;
3. calculating the present value of the R&E expenditure adjusting for the opening balance to derive the amount to be recovered via the annuity; and
4. annuitising the present value amount to derive the annual rolling annuity.

The opening annuity balance for the start of the 2011/12 price path has been audited in a separate report prepared concurrently by Indec titled Audit and Review of SunWater's Business Operating Model (BOM).

Opening Balance

The opening balance of the annuity is important in establishing the starting point for future balance calculations.

The SFM refers to the irrigation-only annuity as an 'R&E Annuity' and the whole of scheme annuity as a 'Non-Routine Annuity'. The factors which are used to gross up the R&E Annuity are referred to as 2006 Factors.

The opening annuity balance is a gross up of the 'Notional Bank Account', which is the annuity based on an irrigation only basis. This figure is grossed up according to the equation below:

$$\frac{Total\ MP\ Cust\ Allns + (HP\ Cust\ Allns * 2006\ Factor\ (hard\ coded))}{MP\ Irrig\ Cust\ Allns + (HP\ Irrig\ Cust\ Allns * 2006\ Factor\ (hard\ coded))}$$

Where

- Cust Allns = Customer Allocations
- Irrig Cust Allns = Irrigation Customer Allocations
- MP = Medium Priority
- HP = High priority

The equation relates the high priority allocations of industrial users to the medium priority allocations of irrigation users. This ratio is adjusted by a variable titled '2006 Factor' in the SFM which, after Indec raised a query, SunWater has defined as the Converted Nominal Allocation (CNA) from the current price path (2005/6 to 2010/11). The CNA is the factor that was applied in the 2005/06 to 2010/11 Irrigation Price Path to convert high priority allocations to equivalent medium priority allocations for the allocation of costs for pricing purposes.

Forecast maintenance spend

Customer funded spend is the assumed expenditure on R&E activities. This expenditure is the result of forecasts from WMS which is an input into the SFM.

Indec has reviewed the data input process from the WMS and is satisfied that they comprehensively capture the forecast costs involved in R&E activities as entered into WMS (see Section 5.1.1).

Rolling Annuity

The rolling annuity is the calculation of the present value of future expected R&E expenditure. Each year, a forecast is made of future R&E expenditure to be recovered by the annuity. This cost

is discounted to present value, and the annual payment required to generate sufficient funds to fund this program of work is added to the annuity balance from revenue.

This is calculated on the basis of:

- A period of twenty years of maintenance spend is considered. While the model does provide flexibility to change this term, the version of the SFM provided to Indec is calculated assuming a 20 year term.
- The annuity is assumed to earn or incur interest at a pre-tax nominal WACC.
- The present value of future expenditure is assumed to be a discounted at the pre-tax nominal WACC, reflecting the nominal dollars in which these costs are expressed in the model.
- Given the characteristics of Excel's PMT function and the end of year assumption on cash flow timing, all cash flows captured within the annuity calculation are assumed to occur at the end of the period. This is unlikely to reflect reality as most cash flows would occur throughout the year. On face value, the Excel PMT function would likely result in a downward bias on the annuity calculations.

Interest

Interest is applied to the opening balance of the annuity for the year, at a nominal pre-tax WACC.

Indec notes that it may be more accurate for the model to use an average of the opening and closing annuity balances. However, this is more complex to model as it has the potential to introduce circularity as the closing balance which depends on interest is also used to calculate interest.

Recommendations and conclusions

While Indec is satisfied with the methodology of the annuity calculation, its application could be improved. The opening annuity balance is currently implemented by way of a hard coded number in the SFM which is subject to a grossing up procedure with poor referencing. Indec suggests greater transparency and referencing of hard coded data within the model by way of a separate data input sheet which clearly identifies, labels and references all hard coded data entering the SFM. This approach would improve the integrity and robustness of the model and strengthen the audit trail of hard coded data.

Indec does note that these calculations rely on the Excel's PMT function. While this is the correct formula within Microsoft Excel to perform these calculations, the inherent assumption within this formula that cash flows occur at the end of the period may not be consistent with actual cash flows. It is more likely that refurbishment and enhancement activities and cash flows occur throughout the year rather than on the final day of the financial year. On face value, the Excel PMT is likely to place a downward bias on the annuity calculations.

4.7.2. Test 2 - Salaries and Wages

According to the SFM business rules, resource centres employ people. These costs can be both primary costs or are allocated via secondary posting via the costed labour overheads.

This test involved the following steps:

1. Locate the costs in the resource centre;
2. Observe how the cost is defined i.e. Brisbane or Regional Centre;
3. Trace the cost into the relevant sheet within the HUB;
4. Track the cost to the service contract; and
5. Observe how the cost forms part of PRT.

Indec are comfortable having tested a sample transaction that the model correctly assigns both the prime cost and secondary posting for salaries and wages and assigns it appropriately to PRT based on the user defined settings for cost allocation and PRT calculation.

4.7.3. Test 3 - Materials

According to the business rules both resource centres & service contracts can incur material cost. Therefore this cost can be both a primary cost if incurred at the service contract level or allocated via secondary posting if incurred at the resource centre level.

This test involved the following steps:

1. Locate the prime costs in the service contract via the direct input; and
2. Trace the cost into the PRT via the allocation step.

Prime cost are entered at the service contract by the user and then assigned to PRT via the user defined setting. The prime cost also attracts the relevant Brisbane overhead, regional Centre overhead and the 5% procurement fee.

Indec are comfortable having tested a sample transaction that the model correctly assigns both the prime cost and secondary posting for materials and assigns it to PRT based on the user defined settings for cost allocation and PRT calculation.

4.7.4. Test 4 – 5% procurement fee excludes on electricity

According to the SFM business rules, electricity costs do not attract a 5% procurement fee.

This test involved the following steps:

1. Locate where electricity is incurred within a distribution service contract; and
2. Ensure the 5% procurement fee is not allocated to the electricity cost.

In the example Indec observed electricity did not attract the 5% procurement fee.

Based on the sample transaction Indec observed the model does not assign the 5% procurement fee to electricity costs.

4.7.5. Test 5 – 5% Procurement fee exemption on significant projects

According to the SFM business rules significant projects do not attract a 5% procurement fee.

This test involved the following steps:

1. Locate where spill way upgrades occur (i.e. dam safety) within a service contract; and
2. Ensure the 5% procurement fee is not allocated to spill way upgrade costs.

In the example Indec observed the spill way upgrade costs excluded the 5% procurement fee.

Based on the sample transaction Indec observed the model does not assign the 5% procurement fee to significant projects.

4.7.6. Test 6 – Reporting Tool

This test involved verifying the outputs from the Reporting Tool module in the SFM against the data from the SFM.
The following steps were undertaken to complete this test:

1. Randomly select a key figure from the NSP report template; and
2. Trace the number to its location within the HUB, service contract and respective resource centre.

Indec conducted several random checks in order to reconcile the output from the NSP reporting tool template and are satisfied the figures are correctly sourced to the underlying modules.

4.8. Review against financial modelling best practice criteria

Indec accessed the SFM against best practice criteria for financial models as a component of its review. The outcomes of this assessment is detailed below and summarised in Figure 5.1.

4.8.1. Spreadsheet Design

The design of the SunWater Financial model was good with the criteria being largely satisfied. Indec noted that the modular structure of the SFM modules was particularly strong. While this introduced complexity in the design of an individual spreadsheet, it provided flexibility to use a single sheet as a template, which facilitated the review process.

As part of the review process, Indec made use of an automated spreadsheet review tool, Spreadsheet Professional. This tool noted that the data flow in the models tended to deviate from a ‘left to right, up to down’ format.

4.8.2. Templates

The SunWater financial model contains strong version control and integrity checking. The SFM modules maintained a distinct separation between inputs, calculations and outputs with the use of cell formatting. Sheets in the SFM were typically protected, requiring a password to change the structure of the model or key formulae.

4.8.3. Formatting

The formatting of the models was generally sound. The formatting of each cell in the SFM indicated its role, and there was heavy use of drop-down boxes to limit user inputs to appropriate values. Any errors in the model were highlighted.

4.8.4. Formulas and Functions

SFM uses conditional formatting to highlight the status of the model, particularly the use of a red background if any errors occur. The SFM also makes some use of named ranges etc to make formulas easier to understand. Tables of lookups are used extensively.

4.8.5. Charts

The SFM does not include any charts.

4.8.6. VBA

The SFM does have well-documented macros. Indec is not aware of a coding style guide in use at SunWater, and there does not appear to be consistency between the coding styles used in the two models subject to this review – SFM and PRM. Section 6 details the outcomes of the PRM reviewed by Indec.

Criteria	SFM
Spreadsheet Design	
Logical Design for its overall purposes	✓
Effective use of notation and comments	✓
Use of modular structure	✓
Separation of data inputs, calculations, outputs	✓
Column and row heading should include units and currencies where relevant	✓
Workbook protected	✓
Templates	
Details regarding the files overall purpose, spreadsheet owner, version control and integrity check, change register etc.	✓
Use of separate sheets for setup, calculations & workings, reference & lookup tables and data storage	✓
Commonality adopted across relevant template designs	✓
Formatting	
Data input areas should be easily recognisable	✓
Data input should not be mixed with calculations and inputs should not be hard coded into calculations	✓
Limited use of merged cells	✓
Limited use of hidden cells, columns, rows and worksheets	x
Formulas and Functions	
Use of tables and lookups	✓
Documentation of longer formulas	x
Named ranges	✓
Conditional formatting	✓
Offsets to hand column insertion	✓
Ensure formulae can handle non-numeric values	✓
Charts	
Effective Use of Charts	x
Limit number of series	-
Axes and titles are correctly labelled, use of links	-
Logical Relationship between data	-
VBA	
Style Guide	x
Code stored within a function	✓
Named ranges rather than cell references	✓
Documentation	✓
Documentation	
Established user manuals	x
Specifications well documented	x
Defined architecture	✓
Documentation of milestones	✓
Overview of key workings	x
Key Outputs	x
Well recorded source of inputs	x

Figure 4.8.6.1 Best Practice Modelling Checklist - SFM

4.9. Key Conclusions

The Step 1 review of the SunWater Pricing Model has not identified any major issues which significantly impact on the robustness and integrity of the SFM for the purposes of generating irrigation tariffs. This review is the first component of a two stage review with the objective of providing the Authority with preliminary quality assurance advice on the logic and structure of the model. The Step 1 review was not based on a model populated with final NSP data. The Step 2 review will provide a more comprehensive and broader quality assurance review of the SFM for irrigation pricing purposes.

The flexibility and ease of user to change parameters in the model introduces a risk where significant portions of the basis of calculations can be easily changed via the use of a drop-down box. SunWater counteracts this by tightly controlling access to and use of the model to a few key people, reducing the risk of unplanned or unintended changes to the model. However, in the absence of comprehensive documentation, the knowledge of the operations of the model resides with a small group of people. SunWater is likely to experience difficulty in recovering knowledge of the model without these key individuals.

While Indec is satisfied with the methodology of the annuity calculation, its application could be improved. Indec suggests greater transparency and referencing of hard coded data within the model by way of a separate data input sheet which clearly identifies, labels and references all hard coded data entering the SFM. This approach would improve the integrity and robustness of the model and strengthen the audit trail of hard coded data.

Indec does note that these calculations rely on the Excel's PMT function. While this is the correct formula within Microsoft Excel to perform these calculations, the inherent assumption within this formula that cash flows occur at the end of the period may not be consistent with actual cash flows. On face value, the Excel PMT is likely to place a downward bias on the annuity calculations.

Indec identified an issue with the Infrastructure Management direct cost allocation. 254 – Irrigation Pricing is allocated to 29 service contracts which are deemed to provide irrigation water services. Indec expected that 30 service contracts would be allocated irrigation pricing costs given that 30 service contracts are related to irrigation water services.

An issue regarding the modelling of electricity in the SFM is that it is essentially modelled as a fixed cost in that it does not vary with the amount of water moving through the system. This does not appear to reflect the way that the business operates. Indec would recommend a review of this practice

Indec has identified some potential enhancements or improvements to the model to improve the model's overall robustness and to reduce the risk of error. These enhancements are outlined in the Section 6.

5. FLEXIBILITY AND ADAPTABILITY OF THE SUNWATER FINANCIAL MODEL

This section of the report discusses the flexibility and adaptability of the SFM and outlines some suggested recommended enhancements from Indec based on the review findings.

5.1. Objective

To review the functionality of the model in terms of its flexibility to accommodate and modify key variables and assumptions which impact on irrigation tariffs.

5.2. Key findings

Indec have assessed flexibility within the SFM across three key levels;

5.2.1. Design flexibility

As previously stated, the model has undergone various restructures since its beginning in 2000. The first wholesale adjustment was during the BOM Project with further amendments made as part of the current price review process. The advantage of using Excel as the platform for its design is it remains flexible to change. Indec are therefore of the belief that the SFM is flexible from a design perspective. This flexibility may be somewhat constrained by the model's size, its broad and numerous objectives and the consequent complexity of the model.

5.2.2. Functional Flexibility

From a functional flexibility perspective, the following observations are made:

- Each of the respective settings tab allow users to define global settings relating to the forecasting parameters.
- Each of the following inputs can be amended within the model
  - economic factors such as inflation and Interest rates
  - insurance
  - tax rates
  - work rate
  - indirect and overhead rates

5.2.3. Fundamental Flexibility

The following observations are made relating to fundamental flexibility:

- In reference to pricing, the model is flexible in it treatment of the key input factors.
- The model and user holds the ability to determine how the following costs are allocated to PRT(either via the Annuity, ORC, Directly or excluded):
  - operative

- preventative maintenance
- corrective maintenance
- R & E

- The model and user holds the ability to determine how the following costs are allocated to PRT via the HUF, Transfer Out, AML
  - cash cost
  - non cash cost
  - notional cost
  - cost reallocations
  - revenue offsets

5.2.4. Other Flexibility

The following additional flexibility has been observed within the SFM:

- ability to move from lower bound cost to upper bound pricing exists; and
- ability to model various price path scenarios based on a $ per ML increase, percentage increase or user defined increase.

5.2.5. Inflexibility

The one area of the model was identified as being inflexible relates to electricity costs not being linked to water usage forecasts within the SFM. The impact of this is that the SFM cannot reset the PRT after a change in water use forecasts. A separate model needs to be run to recalculate the electricity costs based on a change of water use forecasts and these updated electricity costs need to be loaded in the SFM for PRT and irrigation tariffs to be recalculated.

As outlined earlier in the report, the electricity forecasting model was not subject to review during the Step 1 stage and subject to direction from the Authority can be reviewed during the Component 2 stage.

5.3. SFM recommended enhancements

Indec recommended the following enhancements:

Documentation of Hard Coded Data

Indec suggests greater transparency and referencing of hard coded data within the model by way of a separate data input sheet which clearly identifies, labels and references all hard coded data entering the SFM. This approach would improve the integrity and robustness of the model and strengthen the audit trail of hard coded data.

Specified Module or Tab Summarising Irrigation Pricing

Indec recommend the creation of a specific module or tab within the SFM which summaries PRT and Tariffs which are calculated at the service contract level. Those unfamiliar with the model may find it difficult to obtain the necessary overview given its scale and complexity.

Price Paths

Price path scenario modelling in the SFM is not undertaken on a NPV glide path basis. The SFM would benefit from the ability to consider various price path scenarios based on a glide path approach so that on an NPV basis the revenues recovered by SunWater are revenue neutral.

Supporting Documentation

At the time of our review, Indec were unable to obtain any formal and detailed documentation relating to the business rules within the SFM for irrigation pricing purposes. The detailed documentation made available to Indec which attempts to address the classification of the business rules is the Business Operating Model Project Training Overview which was dated 19 June 2007 and likely to be out of date.

There are certain areas within the model where the effective use of notation or comments would assist a user to better understand concepts, assumptions and data capture.

It is recommended that the material used as part of the Indec induction to the SFM should be formalised and be updated as the model reaches design milestones.

Charts and Graphs

The addition of charts and graphs may help to dissimilate large volumes of data and enable users to quickly get across key issues and outcomes. It would be beneficial if key reports included graphs and charts to illustrate key outcomes relevant to the irrigation price review process such as the graphing the time series of PRT and irrigation tariffs.

6. KEY FINDING AND CONCLUSIONS – PRICING REPORTING MODEL

This section of the report outlines the key findings and conclusions resulting from the Step 1 review of the Pricing Reporting Model (PRM).

The review of the PRM covers two modules – NSP and LBC modules. The NSP or reporting module represents the output of the reporting model and presents tables and charts showing both historical and forecast data. The LBC module prepares historical data, which are sourced from BOM, into a format which is consistent with the forecast data.

The version of the PRM which was reviewed by Indec did not have forecast data sourced from SFM Version 610 which was the version of the SFM reviewed by Indec. This did not enable Indec to conduct transaction tests to verify the accuracy or otherwise of data transfer between the SFM and the PRM. Indec expects to conduct such tests during the Step 2 review.

6.1. LBC Data Conversion Module

The LBC Data Conversion module is designed to take a range of data files extracted from SAP on an annual per service contract basis, and format this data in preparation for its inclusion in the NSP.

The commentary below addresses this model on a sheet-by sheet basis.

6.1.1. NSP Data

This sheet represents the output of the model - the assembled data which is then available for the NSP module to collect. Macros are used to copy the calculations from the Summary sheet into this sheet.

Indec has noted that the data assembled on this sheet is formatted as Currency. While this is appropriate for most of the data, some percentages are also formatted in this manner. Given that other parts of the model (the SAP Data sheet of the NSP workbook) determine the appropriate treatment for a value by checking for a trailing "%", this represents a risk of errors occurring which will be difficult to identify and therefore rectify.

6.1.2. Summary

Summary serves a number of functions in the model – a workings section where intermediate calculations are carried out, the presentation of key results of the model, and the user interface.

However, there are several issues with this sheet which Indec recommends be given attention:

- This sheet appears to contain an error in column A. Where cell A273 refers to cell A273 in the sheet 'CostElements', cell A274 refers to cell A275 in the 'CostElements' sheet. This excludes the contents of this row of Cost Elements from the analysis. This cell currently refers to Prior Year Expenses, which are not included in the analysis and therefore this error will not change

the result. However, this is poor spreadsheet design and Indec strongly recommends that this error be corrected in future versions of the model.

- This sheet features a lack of labelling, a range of hidden values, and a general lack of coherence surrounding its contents.
- The table located at M19:N50 contains a mix of references to specific cells, and indexation of some other numbers. This inconsistency increases the risk of errors occurring in the model if changes are made.
- Indec suggests that the different functions of this sheet be separated into different sheets. The 'background workings' functionality of this sheet could be moved to another sheet, while this sheet retains its role as presenting user controls, showing a summary of the current state of the model, and the results of key calculations.

6.1.3. Data

This sheet is where data from external files is received by the model. It contains a series for formulae linked to other spreadsheets which contain data relating to specific Service Contracts for each year. The macros associated with this workbook (and accessed through the Summary tab) modify the formulae located in the Data sheet to pick up data from the required file.

The functionality of this tab is through a series of formulae which are modified by the macro. This limits the data transferred to this file to around 1,000 lines. If the data file were to exceed that length, the remaining lines would be ignored. No warnings or errors would be generated as a result.

Indec recommends a more robust methodology be implemented, where the required file is opened, and its contents are copied into this spreadsheet. A range of SUMIF formulae could then be utilised to extract the information from the copied data.

6.1.4. Offset Adj

Offset Adj contains a set of hard coded numbers and the source of these numbers is not identified. After raising a query, Indec has been advised that these numbers relate to termination fees (exit fees) and the access charge in the Mareeba Dimbulah Scheme. These revenue items reduce the PRT to be recovered from Part A and Part B charges.

6.1.5. Cost Elements

This sheet contains mappings of cost elements, which are the most granular of the cost data, into cost groups, which in turn are mapped into NSP labels or cost types. This is used for aggregation in the remainder of the spreadsheet.

6.1.6. Indexation

Indexation is applied to restate historical costs to real dollars (2010/11) based on CPI for the historical years covered by this model. This data is calculated on an annual basis, with the year end on 31 March to ensure that published CPI data is available for inclusion in the model at the time of the financial year end. Indec verified that the CPI figures used to perform the Indexation matched those published by the Australian Bureau of Statistics.

6.1.7. Macros

A significant amount of the functionality of this spreadsheet is contained in the three macros described below.

6.1.8. CommandButton1

This macro updates the formulae in the Data sheet to access the appropriate data source file.

6.1.9. CommandButton2

This macro copies the data assembled in the summary sheet and places it into the NSP data sheet, where the NSP module will access it.

6.1.10. CommandButton3

This macro cycles through the options available from the drop down boxes in the Summary sheet, which cover service contracts and years. With each combination of the year and service contract, the required data file is accessed, processed, and results pasted into the NSP Data sheet.

6.1.11. Conclusion and Recommendations

The structure of key sheets within the LBC model represents a potentially significant risk to the operation of the model. While Indec did not find any errors in formulae, the lack of clear labelling, and inconsistencies within blocks of data increase the likelihood that future changes – such as inserting new rows into the tables – may trigger errors. Other specific issues that the review raised included:

- Poor documentation and logic in the user interface 'Summary' with key cells unlabelled, and data manipulation occurring in an ad-hoc fashion. Indec recommends that this part of the model be rewritten, and makes the following suggestions
  - The functionality of this sheet, which currently combines a user interface, final results and space for intermediate calculations be separated into two sheets – one for the final results and user interface and one for the calculations.
  - An error is present in column A of this sheet. This sheet seems to be designed to calculate costs on a line by line basis, the data from the costs elements sheet. However, column 274 is skipped from this analysis. While this error does not currently affect the

operations of the model, this error represents a significant risk to the model. Indec recommends that this error be rectified, possibly as part of the re-write of the Summary sheet suggested above.

- Given the proximity of cells which are central to the operations of this model to the user interface, it is suggested that appropriate protection of these values be put in place to prevent inadvertent changes being made.
- Indec has identified several risks with the Data sheet, which reads SAP data into the model and the methodology which underlies it.
- The method of reading data into the model currently relies on hard coded formulae in this sheet, which are modified using a macro to read the appropriate file. However, the hard coded values stop after 1000 rows. If the source file has more than 1,000 rows any additional rows will not be read. No warnings or errors will be generated.
- Furthermore, the link to the last file opened will remain active as the formulae will continue to point to the last reference they were set to until a macro is run to update them.
- It is suggested that as an alternative to this methodology, the macro be re-written to open the required file, select all data and copy it into the LBC spreadsheet. A series of SUMIF formulae could consolidate the data.
- The macros do not include any comments, and the names assigned to them are unhelpful. Indec suggests documenting the operations of the model by using comments to indicate the purpose and methodology of each of the macros. Similarly, naming the macros according to function rather than the button which activates them may be helpful.

6.2. NSP Data Review

This sheet appears to serve as a front end of the suite of models analysed as part of the NSP reporting. The model creates tables and charts showing the path of key variables, where the values are drawn from both historical and forecast results.

Historical results are generated by the LBC model, as discussed above. The forecasts provided by SunWater were in a file 'SFM report - Pricing – NSP data set Nominal'. While the NSP model also accepts data from another file ('NSP data ser Input') SunWater advised that this file relates to functionality of the model that is not currently in use.

Given the role of the NSP as a presentation package, it is not expected that any significant calculations take place within this model. Calculations which take place in this model would not be fed into the SunWater Financial Model.

There are two sources of inputs into the NSP data file:

- LSP Conversion data file, which manages historical data, which is obtained through a series of files generated for each of the service contracts and each of the historical years; and
- NSP data set Nominal, which introduces source data from the SunWater Financial Model.

The LSP Conversion data file is discussed above.

6.2.1. Scope of the review

The scope of the review focused on the aspects of the PRM which directly serve the production of tables and graphs which are presented in the NSP, namely :

- Whole of scheme renewals annuity, as presented in the NSP-Bulk-Nominal worksheet;
- Expenditure by activity as presented in the NSP-Bulk-Nominal worksheet;
- Operating expenditure as presented in the NSP-Bulk-Nominal worksheet;
- Expenditure by activity as presented in the NSP-Channel_Nominal worksheet;
- Operating expenditure as presented in the NSP-Channel_Nominal worksheet;
- Revenue Offsets – Distribution as presented in the RevOffset sheet;
- Revenue Offsets- Bulk supply as presented in the RevOffset sheet; and
- The Electricity tables for distribution and supply, as presented in the Electricity sheet.

6.2.2. Expenditure by Activity and Expenditure By Type

The methodology for grouping expenditure by activity and expenditure by type is very similar, and is replicated between the NSP Bulk Nominal and NSP Channel Nominal sheets. Note that while expenditure by activity includes renewal annuity spend, expenditure by type does not. These figures are reconciled on Row 113 to flag any deviations.

The data for the cost components is both historical and forecast.

- Historical data is sourced from the SAP via the LBC tool. The data is imported in 2010/2011 dollar format, and is converted to nominal if this is selected by the user.
- Forecast data is sourced from the SunWater Financial Model, which is imported in terms of nominal dollars ie dollars of the day with annual indexation applied.

While the data extracted from the SFM is extracted in a whole of service contract form, when these sheets separate out medium priority customers, the whole of service contract figures are grossed down by the Medium Priority pricing factor, which is described below in Section 6.2.7.

Indec has examined the references made to the source data and is satisfied that these values are correctly accessed by the model.

6.2.3. Renewals Annuity

Renewal annuity calculations are presented in the NSP Bulk Nominal and NSP Channel Nominal sheets. These figures are extracted from the SFM, and represent the whole of service contract annuity, which is referred to as “Notional annuity bank account”. The data presented in this table is ultimately sourced from the FM Data Nominal worksheet. Indec’s review of this procedure indicates that it accurately collects data from the source data worksheet.

6.2.4. Revenue Offsets

Revenue Offsets are presented in the RevOffset Sheet. As well as the FMDataNominal sheet, this sheet draws data from the FMDataInput sheet, which Indec was advised is not operational. The audit trail followed by Indec was the data drawn from FMDataNominal sheet. The revenue offsets included are:

- Drainage Levies
- Drain Diversion Charge
- Other Charges & Fees
- Storage Rental Fees
- Recreation-Commercial Operator Payments
- Flood Mitigation
- Rent Received
- Land Leases
- Access charge
- Termination fees (exit fees) and
- Revenue cap adjustment.

The revenue offsets are obtained directly from the source data. The numbers assembled on this sheet do not feed into subsequent calculations.

6.2.5. Electricity

The Electricity sheet obtains data from the NSP bulk input sheet, regarding the cost of electricity. This in turn, is obtained from a combination of historical data extracted from SAP and forecast data extracted from the SunWater financial model. This data is presented in tables relating to the Bulk Water system and the distribution system. If the scheme selected does not have a distribution system, the table will return error values. The data presented is augmented according to a table in this worksheet containing volume assumptions and adjustments, with the table providing comments to explain the adjustments.

It should be noted that the adjustment is relating to the total electricity cost and is measured in $000. While these amounts are not material, Indec would suggest improving the documentation for these adjustments.

Indec has noted that while the user can select whether the figures are real or nominal elsewhere in the workbook, and the appropriate headings on this sheet are updated accordingly, there is no indexation of the adjustment amounts. Therefore, if the user selects 'Nominal' as the basis for calculations, the model may be combining real and nominal dollars, which is not accurate. This is not a material issue at the moment based on the adjustment data in the model subject to review, however if the adjustments did change to above a materiality threshold, a significant issue could emerge.

6.2.6. Exit fees

Exit or termination fees are referred to in the sheet 'RevOffset'. However, this sheet appears to merely format the data extracted from the SFM.

Total revenue offsets, including termination or exit fees, are included in the analysis carried out in the main presentation sheets (NSP Bulk Input, NSP Channel Input, NSP Bulk Nominal and NSP Channel Nominal). In these sheets, the offsets are counted as additional revenue items.

The data from which this information is generated is extracted from BOM through the LBC model, where it is converted from the nominal dollars expected to be used in an accounting system to real dollars (2010/11) which are more suitable for modelling. The NSP model will switch between real (2010/11) and nominal amounts dependent on users selection. This procedure appears to be carried out correctly in the NSP model.

When applied to the whole of the service contract in question, the revenue offsets are as per the BOM data. When the medium priority data is separated from this, it is carried out by dividing the whole of scheme revenue offset figure by a Medium Priority pricing factor (% PRT). This factor is sourced from the SFM through the FM Data Nominal Sheet.

The factors used, which are derived from the SFM and some small variations of the values occur between years.

6.2.7. Gross-Down Procedure

The NSP output presents a number of different series, including annuities. The data series consist of a whole of scheme result, as well as some other values which require 'grossing down' from this total. The NSP model has four factors available to gross down the whole of scheme results:

- The Relative Entitlement (Medium Priority);
- The Distribution Losses as a % of RML;

- The HUF Medium priority; and
- The distribution loss of HUF (as a %).

NSP data set is a single sheet spreadsheet which holds forecasts for a range of accounts. The sheet is designed to hold forecasts for the years 2010 through 2057 (i.e. 47 years). The version given to Indec has forecasts through 2016. The data in this sheet is sourced from the SFM.

6.3. Review against financial modelling best practice criteria

Indec accessed the LBC & NSP models against best practice criteria for financial models as a component of its review. The outcomes of this assessment is detailed below and summarised in Figure 6.3.3.1.

6.3.1. Spreadsheet Design

The design of the spreadsheets which make up the module was generally good, with the criteria being satisfied. Indec noted that the modular structure of the NSP was particularly strong. The LBC would be improved through the addition of labelling, separation of calculations from user input and output. The LBC workbook was also not protected which creates a risk of inadvertent changes being made to the model.

6.3.2. Templates

The SFMl contains strong version control, integrity checking etc. This is not featured in the other models which Indec reviewed. While the NSP module maintained a separation between inputs, calculations and outputs, this was not evident in the LBC module.

6.3.3. Formatting

The formatting of the models was generally sound. The NPC did feature some hidden sheets and Indec was advised that these sheets are not fundamental to the presentation of the NSP tables and graphs, so these sheets may have been hidden to facilitate this review.

The mixture of inputs, calculations and outputs which occurs in the LBC model has been discussed elsewhere.

Criteria	LBC	NSP
Spreadsheet Design		
Logical Design for its overall purposes	x	✓
Effective use of notation and comments	x	x
Use of modular structure	x	✓
Separation of data inputs, calculations, outputs	x	✓
Column and row heading should include units and currencies where relevant	x	✓
Workbook protected	x	✓
Templates		
Details regarding the files overall purpose, spreadsheet owner, version control and integrity check, change register etc.	x	x
Use of separate sheets for setup, calculations & workings, reference & lookup tables and data storage	x	✓
Commonality adopted across relevant template designs	x	✓
Formatting		
Data input areas should be easily recognisable	✓	✓
Data input should not be mixed with calculations and inputs should not be hard coded into calculations	x	✓
Limited use of merged cells	✓	✓
Limited use of hidden cells, columns, rows and worksheets	✓	x
Formulas and Functions		
Use of tables and lookups	✓	✓
Documentation of longer formulas	x	x
Named ranges	x	x
Conditional formatting	x	x
Offsets to hand column insertion	x	x
Ensure formulae can handle non-numeric values	x	x
Charts		
Effective Use of Charts	-	✓
Limit number of series	-	✓
Axes and titles are correctly labelled, use of links	-	x
Logical Relationship between data	-	✓
VBA		
Style Guide	x	x
Code stored within a function	-	-
Named ranges rather than cell references	✓	✓
Documentation	x	x
Documentation		
Established user manuals	x	x
Specifications well documented	x	x
Defined architecture	x	x
Documentation of milestones	x	x
Overview of key workings	x	x
Key Outputs	x	x
Well recorded source of inputs	x	x

Figure 6.3.3.1 Best Practice Modelling Checklist – LBC & NSP

6.3.4. Formulas and Functions

Tables and lookups are used extensively in the LBC and NSP models. The formulas used tend to be relatively straightforward and therefore do not require documentation to explain them.

6.3.5. Charts

NSP featured well designed charts. The LBC model did not use charts.

6.3.6. VBA

The coding in the LBC does not have any comments, and the macros names are derived from the buttons used to activate the macros rather than the function which they perform.

Indec is not aware of a coding style guide in use at SunWater, and there does not appear to be consistency between the coding styles used in these two models and the SFM.

6.4. Conclusions and Recommendations

The model currently obtains its data through the FMDataNominal sheet. This is done by having a series of references to an external data source. There are several difficulties with this approach:

- Due to the large number of cells being updated, this operation involves a large number of references to an external data sheet. This means that the time taken to perform this is measured in hours, decreasing the tractability of the analysis.
- Similar to an issue raised regarding the LBC pipeline, the import of data is done on the basis of formulae which have been filled to row 3,860 of the cells. If the data sheet contains more rows of data than this, the additional data will be ignored, and no warnings or errors will be generated.

Indec notes that historical SAP data is imported into the model in terms of real dollars ($2010/11). Forecast results from the SunWater financial model are imported into the model in terms of nominal dollars i.e. dollars of the day included an annual inflation forecast. It is suggested that the inputs into this model be standardised into either real or nominal dollars to increase consistency and logic throughout the model.

Appendix A

Terms of Reference

Terms of Reference

SunWater Water Supply Schemes 2011-2016 Price Paths

Audit and Review of

SunWater's Information System and Pricing Model

21 September 2010

1. **Project Background**

Queensland Competition Authority

The Queensland Competition Authority (the Authority) is an independent pricing and access regulator responsible for ensuring that specified monopoly infrastructure-based services in Queensland comply with the principles of national competition policy.

SunWater

As a Queensland Government-owned Corporation (GOC), SunWater provides a range of services including infrastructure ownership, water delivery, operation and maintenance of infrastructure and engineering consultancy services. Over the last 80 years, SunWater has built and now owns and operates a regional network of water supply infrastructure throughout Queensland which supports irrigated agriculture, mining, power generation, industrial and urban development.

SunWater's water storage and distribution infrastructure includes 19 major dams, 63 weirs and barrages, 80 major pumping stations, and more than 2500 kilometres of pipelines and open channels. The existing price paths that apply to the 22 water supply schemes (WSSs) are due to expire on 30 June 2011.

Ministerial Direction

The Premier and the Treasurer (the Ministers) have directed the Authority to develop irrigation prices to apply to 22 SunWater WSSs from 1 July 2011 to 30 June 2016. A copy of the Ministers' Referral Notice (the Notice) is available at http://www.qca.org.au/water/Sun-Irrig-Price/index.php

The Ministers' Referral Notice requires that bulk water supply and channel prices/tariff structures are set so as to provide a revenue stream that allows SunWater to recover:

- its efficient operational, maintenance and administrative costs;
- its expenditure on renewing and rehabilitating existing assets, whether through a renewals annuity or a regulatory depreciation allowance;
- a rate of return on assets valued at 1 July 2011 (the initial regulated asset base (RAB)); and
- after 1 July 2011, a return of, and on, prudent capital expenditure on existing assets or for constructing new assets. In recommending an initial RAB for irrigation supply assets the Authority is to:
- value particular channel distribution systems assets at zero; and
- apply a 'line in the sand' approach to value assets for bulk water supply based upon:
  - the level of service attributed to the supply of water for irrigation;
  - the efficient operating cost of meeting the required level of service;
  - water prices that reflect the irrigators' anticipated capacity to pay; and
  - water prices achieving a commercial return over a period not longer than 15 years.

In providing pricing recommendations for each scheme, the Authority is to also consider how to treat existing renewals reserves if it considers it appropriate to transition schemes to a depreciation-based RAB pricing approach.

2. Purpose and Requirements of Consultancy

This consultancy consists of two components, namely an audit of SunWater's information systems and a review of the SunWater Pricing Model.

(A) Information Systems Audit

The purpose of this component of the consultancy is to audit SunWater's business operating model (BOM) as established in SAP to ensure that it:

- comprehensively records cost information;
- allocates those costs to the intended cost centres; and
- accurately attributes costs to head office functions and specific services offered by SunWater to irrigators (at a scheme and scheme segment level).

In so doing, the audit would focus on the integrity of costing data within SAP and any relevant interfaces of the financial information system, and its functionality for forecasting and pricing. The degree of detail should be sufficient to enable an independent party to review the past basis of costs for the services provided by SunWater and relevant to the current review.

In this regard, the extent of disaggregation consistent with the recommendations of the Queensland Competition Authority (2010), SEQ Interim Price Monitoring Information Requirements for 2010/11 Final Report, April 2010 is relevant. Sufficient disaggregation of costs should be evident to ensure that they can be related to particular administration services provided to each scheme and scheme segment.

(B) Review of the SunWater Pricing Model

Component 1

The purpose of this component of the consultancy is to establish the integrity and robustness of SunWater's pricing model to ensure it generates prices for individual schemes, or segments of schemes, that are consistent with lower and upper bound pricing principles as set out in the Ministerial Direction. In particular, the consultant must:

- establish the integrity and robustness of the model for pricing purposes through a validation of the logic and structure of the model, including an assessment of the interface of the pricing module with other relevant modules of SunWater's information and financial modelling systems;
- test the functionality of the model in terms of its flexibility to accommodate and modify key variables and assumptions such as asset values, and alternative methods of asset consumption, including regulated depreciation allowances versus renewals annuity;
- quality assure the model using appropriate data based on SunWater's network service plans (NSP's), and associated supporting documentation, which are expected to become available during October 2010.

Component 2

Following quality assurance, to provide support services to operate the model and generate price paths and other relevant outputs as required and in particular:

- update the data and make any necessary structural changes to the model resulting from the positions adopted by the Authority for the 2011-2016 pricing period; and
- run the model to generate irrigation prices for the 2011-2016 price paths for each water supply scheme and relevant scheme segment.

Where relevant, the model and data used for the development of SunWater's previous (2006-2011) price path should be included as part of the support services provided to the Authority.

Other Concurrent Activities

In auditing and reviewing SunWater's information systems and pricing model, the consultant will need to take into account a number of other concurrent activities relevant to the price review. These activities will provide important inputs to the price modelling process. Specifically, the Authority:

- has commissioned, or will be commissioning, parallel consultancies to review SunWater's projected administration costs, and proposed operating and capital expenditures as this information is made available by SunWater via its NSP's and associated supporting documentation; and
- will be taking a position on several issues papers on topics of general relevance to the pricing review which are being prepared by external consultants.

The Authority may require the consultant to provide ad-hoc advice and peer group reviews in relation to the outcomes of these other consultancies.

The consultant will be expected to liaise and consult with various stakeholders, including but not limited to irrigation customer representatives, SunWater and other consultants providing advice to the Authority.

3. Output of Consultancy

The consultant will need to provide a report to the Authority which will include the following elements:

(a) an assessment of the appropriateness and robustness of SunWater's business operating model (BOM) as established in SAP for pricing purposes. The report must document how the BOM:
   - captures and records cost information and the appropriateness of data disaggregation for pricing purposes;
   - allocates those costs to the intended cost centres; and
   - attributes costs to head office functions and specific services offered by SunWater to irrigators (at a scheme and scheme segment level);

(b) an evaluation of the appropriateness and robustness of SunWater's pricing model, including assessments of:
   - the logic and structure of the model, including an appraisal of the interface of the pricing module with other modules of SunWater's information and financial modelling systems;
   - the functionality of the model in terms of its flexibility to accommodate and modify key variables and assumptions such as asset values and alternative methods of asset consumption;
   - the appropriateness of any changes to SunWater's data collection methodologies and pricing model since the last price review; and
   - the quality assurance of the model, using appropriate data based on SunWater's network service plans (NSP's) which are expected to become available during September 2010;

(c) recommendations for any modifications or enhancements that may be required to the BOM or pricing model for the purposes of generating price paths, including required data updates and structural

changes to the model resulting from the positions adopted by the Authority for the 2011-2016 price period; and

(d) at the conclusion of Component 2 of Part B, a working copy of a revenue and pricing module which outlines for each water supply scheme the key revenue components and irrigation tariffs, including descriptions of the operation of the model, and the generation of prices, in sufficient detail to explain how irrigation prices and other relevant outputs for each water supply scheme or relevant scheme segment are generated for the 2011-2016 period.

4. Proposal Specifications and Fees

The proposal should:

- include the name, address and legal status of the tenderer; and
- provide a fixed price quote for the provision of the services (A) and (B) and each component of (B) , individually and in total.

The fee quoted is to be inclusive of all expenses and disbursements. A full breakdown of consultancy costs will be required with staff costs reconciled to the consultancy work plan.

Due to the progressive development of SunWater's pricing model, it is expected that Part A and certain elements of Component 1 of Part B of this consultancy will be awarded at the same time, with the remainder of Component 1 and Component 2 of Part B following at a later date.

The consultant should note that award of any element (section of a Component, Component or Part) of the consultancy does not necessarily imply the award of any other element.

Total payment will be made within 28 days of receiving an invoice at the conclusion of the consultancy.

5. Resources/Data Provided

The consultant will be required to source information from relevant agencies as well as taking into account the following reports:

(a) SunWater (2006) Irrigation Price Paths 2006/07-2010/11 Final Report http://www.sunwater.com.au/irrigationpricing/SunWater_Irrigation_Price_Paths_Final_Report.pdf

(b) Queensland Competition Authority (2000), *Statement of Regulatory Pricing Principles for the Water Sector*, December 2000. http://www.qca.org.au/files/PricingPrinciples.pdf

(c) SunWater's SAP based asset and financial management system and pricing model including supporting data templates.

(d) Queensland Competition Authority (2010), SEQ Interim Price Monitoring Information Requirements for 2010/11 Final Report, April 2010. http://www.qca.org.au/files/W-SEQinterim-price-QCA-FinalReport-PriceFramWork-0410.pdf

Additional information relevant to this consultancy may also be found in the Authority's publications, available from the Authority or for downloading from its website at www.qca.org.au

6. **Project Time Frame**

The consultancy will commence in early October 2010.

Dates for completion will be determined at the time of appointment.

7. **Contractual Arrangements**

This consultancy will **only** be offered in accordance with the Authority's standard contractual agreement.

This agreement can be viewed at http://www.qca.org.au/about/consultancyagreement.php

8. **Reporting**

The consultant will be required to provide the Authority with progress reports on an "as needs" basis or at least weekly and drafts of final reports will be required prior to project completion. If necessary, the consultant should advise at the earliest opportunity any critical issues that may impede progress of the consultancy, particularly issues that impact on the successful delivery of the purpose and requirements of the consultancy as outlined in section 2 above.

At the conclusion of the consultancy, the consultant will be required to provide the Authority with a personal presentation on the findings of the analysis in addition to presenting three (3) copies of a written report. An electronic version of the final report is also required, saved in Microsoft© Word with any numeric data in Microsoft© Excel.

9. **Confidentiality**

Under no circumstances is the selected consultant to divulge any information obtained from the Authority for the purposes of this consultancy to any party other than with the express permission of the Authority.

10. **Conflicts of Interest**

For the purpose of this consultancy, the consultant is required to affirm that there is no, and will not be any, conflict of interest as a result of this consultancy.

11. **Insurance**

The consultant must hold all necessary work cover and professional indemnity insurance.

12. **Quality Assurance**

The consultant is required to include details of quality assurance procedures to be applied to all information and outputs provided to the Authority.

Appendix B

Original Ministerial Direction Notice

QUEENSLAND COMPETITION AUTHORITY ACT 1997
Section 23

MINISTERS' REFERRAL NOTICE

Referral

As the Premier and Treasurer of Queensland, pursuant to Section 23 of the *Queensland Competition Authority Act 1997* (the Act), we hereby direct the Queensland Competition Authority (the Authority) to develop irrigation prices to apply to the following SunWater water supply schemes (WSS) from 1 July 2011 to 30 June 2016:

Barker Barambah	Lower Fitzroy
Bowen Broken Rivers	Macintyre Brook
Boyne River and Tarong	Maranoa River
Bundaberg	Mareeba-Dimbulah
Burdekin-Haughton	Nogoa-Mackenzie
Callide Valley	Pioneer River
Chinchilla Weir	Proserpine River
Cunnamulla	St George
Dawson Valley	Three Moon Creek
Eton	Upper Burnett
Lower Mary	Upper Condamine

1. Matters the Authority must take into consideration

In referring this investigation, the Ministers direct the QCA under section 24 of the Act as follows:

1.1 For water supply schemes, or segments of schemes (except those listed in 1.2 below), bulk water supply and channel prices/tariff structures are to be set to provide a revenue stream that allows SunWater to recover:

a) its efficient operational, maintenance and administrative costs;

b) its expenditure on renewing and rehabilitating existing assets, whether through a renewals annuity or a regulatory depreciation allowance;

c) a rate of return on assets valued at 1 July 2011, as specified in 1.4 (below) (the initial regulated asset base (RAB)); and

d) after 1 July 2011, a return of, and on, prudent capital expenditure on existing assets or for constructing new assets.

1.2 For the following schemes (schemes or segments of schemes identified as unable to meet the full costs of 1.1 a) and 1.1 b) due to hardship):

a) irrigation prices are to be set to maintain current prices in real terms, and improve the level of cost recovery, where the capacity to do so exists;

b) after 1 July 2011, prices are to include a return of, and on, prudent capital expenditure to augment existing assets or construct new assets.

c) the Authority may recommend whether to set prices through the use of a renewals annuity or depreciation-based RAB pricing approach.

These schemes are:

- Redgate Relift in the Barker Barambah WSS
- Callide Valley WSS
- Cunnamulla WSS
- Maranoa River WSS
- Channel Relift in the Mareeba Dimbulah WSS
- Three Moon Creek WSS

1.3 For 1.1 (d) and 1.2 (b), the Authority is to have regard to the agreed level of service between SunWater and the customers of the water supply scheme, including for capital expenditure on existing assets or for the construction of new assets.

1.4 In recommending an initial RAB (1.1 c) for irrigation supply assets (or that part of an asset used for the supply of water for irrigation purpose), the Authority is to:

a) value the following channel distribution systems assets at zero;

- Bundaberg channel distribution system
- Burdekin channel distribution system
- Dawson Valley channel distribution system
- Eton channel distribution system
- Lower Mary channel distribution assets
- Mareeba Dimbulah channel distribution system
- Emerald channel distribution system
- St George channel distribution system
- Callide Valley channel distribution assets
- Yarramalong Pump Station and associated distribution assets in the Upper Condamine Scheme
- Youlambie channel distribution assets in the Three Moon Creek Scheme
- Redgate Relift distribution assets in the Barker Barambah scheme

b) For other schemes or segments of schemes, apply a 'line in the sand' approach[1] to value assets for bulk water supply based upon:

- the level of service attributed to the supply of water for irrigation;
- the efficient operating cost of meeting the required level of service;
- water prices reflecting the irrigators' anticipated capacity to pay;

[1] The 'line in the sand' approach can be used to set an initial regulated asset base between:

- at the upper end, a value at which customers would be better off if the asset was scrapped and a new asset installed – which is what a depreciated, optimised replacement cost provides an estimate of; and
- at the lower end, the value that the assets would have in their next best use, which for sunk investments may be very low.

- water prices achieving a commercial return over a period not longer than 15 years.

The 'line-in-the-sand' approach must not adversely affect the operator's ability to recover full commercial prices from urban and industrial customers.

1.5 In providing pricing recommendations for each scheme, the Authority is to also consider how to treat existing renewals reserves if it considers it appropriate to transition schemes to a depreciation-based RAB pricing approach.

1.6 For relevant schemes, the Authority is to review drainage charges and channel water harvesting charges.

1.7 The Authority is to recommend pricing principles to apply for the inclusion of capital expenditure on dam spillway upgrades.

2. Consultation

The Authority must undertake an open consultation process with all relevant parties and consider submissions within the timetable for the delivery of the Final Report to Government. All reports and submissions must be made publicly available, including on the Authority's website.

3. Timing

The Authority must provide to the responsible Ministers and the Minister for Natural Resources, Mines and Energy and Minister for Trade:

a) a Draft Report and draft irrigation prices by no later than 31 January 2011 and;

b) a Final Report and recommended price paths by no later than 30 April 2011.

The Final Report will inform the Government's deliberations for price paths to apply to SunWater's irrigation water prices for the five year period commencing 1 July 2011.

4. Other matters

The Authority may exercise all the powers under Part 6 of the *Queensland Competition Authority Act 1997*.

ANNA BLIGH

The Hon. Anna Bligh MP, Premier

Level 15 Executive Building
100 George Street, Brisbane

PO Box 15185, Brisbane
City East 4002 Australia

ANDREW FRASER

The Hon. Andrew Fraser MP, Treasurer

Level 9 Executive Building
100 George Street, Brisbane

GPO Box 611, Brisbane
Queensland 4001 Australia

Appendix C

Amended Ministerial Direction Notice

QUEENSLAND COMPETITION AUTHORITY ACT 1997
Section 23

AMENDED MINISTERS' REFERRAL NOTICE

Referral

As the Premier and Treasurer of Queensland, pursuant to Section 23 of the *Queensland Competition Authority Act 1997* (the Act), we hereby amend our Direction of 19 March 2010 and direct the Queensland Competition Authority (the Authority) to recommend irrigation prices to apply to the following SunWater water supply schemes (WSS) from 1 October 2011 to 30 June 2016 (the price path period):

Barker Barambah	Lower Fitzroy
Bowen Broken Rivers	Macintyre Brook
Boyne River and Tarong	Maranoa River
Bundaberg	Mareeba-Dimbulah
Burdekin-Haughton	Nogoa-Mackenzie
Callide Valley	Pioneer River
Chinchilla Weir	Proserpine River
Cunnamulla	St George
Dawson Valley	Three Moon Creek
Eton	Upper Burnett
Lower Mary	Upper Condamine

1. Matters the Authority must take into consideration

In referring this investigation, the Ministers direct the Authority under section 24 of the Act as follows:

1.1 For water supply schemes, or segments of schemes (except those listed in 1.2 below), bulk water supply and channel prices/tariff structures are to be set as follows:

a) to provide a revenue stream that allows SunWater to recover:

i) efficient operational, maintenance and administrative costs to ensure the continuing delivery of water services;

For the removal of doubt, costs include, but are not limited to:

- electricity costs;
- recreation management costs;
- compliance with workplace, health and safety; and
- compliance with Australian and Queensland Government initiatives on water management, planning, trading, accounting, metering and measurement.

ii) prudent and efficient expenditure on renewing and rehabilitating existing assets through a renewals annuity;

iii) to put beyond doubt, costs exclude any rate of return on existing rural irrigation assets (as at 30 September 2011); unless current prices are already above the level required to recover i) and ii), in which case water prices are to be maintained in real terms based on an appropriate measure of inflation as recommended by the Authority; and

iv) a commercial return of, and on, prudent capital expenditure for augmentation commissioned after 30 September 2011;

b) the Authority is not to consider the regulated asset base (RAB) for existing irrigation assets (that is assets commissioned prior to 1 October 2011);

c) in considering the tariff structures, the Authority should have regard to the fixed and variable nature of the underlying costs; and

d) the Authority is to adopt tariff groups as proposed in SunWater's network service plans. The Authority is not to investigate additional nodal pricing arrangements.

1.2 For the following schemes or segments of schemes, irrigation prices are to be set to:

i) For the price path period, increase in real terms at a pace consistent with the 2006-2011 prices or until such time as the scheme reaches costs sufficient to recover 1.1 a) i) and ii); and

ii) include a commercial return of, and on, prudent capital expenditure for augmentation commissioned after 30 September 2011.

These schemes are:

- Redgate Relift in the Barker Barambah WSS
- Callide Valley WSS
- Maranoa River WSS
- Channel Relift in the Mareeba Dimbulah WSS
- Cunnamulla WSS
- Three Moon Creek WSS

1.3 The Authority must recommend appropriate regulatory arrangements, including price review triggers and other mechanisms, to manage the risks associated with the allowable costs identified in 1.1 (above) outside the control of SunWater.

1.4 For the purposes of this Direction, the Authority is not to consider the recovery in prices of capital expenditure for dam safety upgrades.

1.5 The Authority is to have regard to the level of service provided by SunWater to its customers of the water supply scheme, including for capital expenditure on existing assets or for the construction of new assets.

1.6 In recommending irrigation prices the Authority must have regard for the legitimate commercial interests of SunWater, and the requirement for SunWater to operate as a commercial entity, subject to 1.1 (above).

1.7 For relevant schemes, the Authority is to review drainage charges and channel water harvesting charges.

1.8 If the Authority calculates tariffs for a water supply scheme, or segment of a water supply scheme that may have the effect of a price increase for irrigators that is higher than the Authority's measure of inflation,

a) the Authority must consider the need to implement a price path for the introduction of the price increase to moderate price impacts on irrigators, and that has regard for SunWater's legitimate commercial interests;

b) a price path may be longer than one price path period, however the Authority must provide its reason for the longer timeframe; and

c) if the Authority recommends not to implement a price path, the Authority must give its reasons.

2. Consultation

The Authority must undertake an open consultation process with all relevant parties and consider submissions within the timetable for the delivery of the Final Report to Government. All reports and submissions must be made publicly available, including on the Authority's website.

3. Timing

SunWater must provide its Network Services Plans and supporting documentation to the QCA by no later than 10 January 2011.

The Authority must provide to the responsible Ministers and the Minister for Natural Resources, Mines and Energy and Minister for Trade the:

a) Draft Report and draft irrigation prices by no later than 30 June 2011; and

b) Final Report and recommended price paths by no later than 31 August 2011.

The Final Report will inform the Government's deliberations for price paths to apply to SunWater's irrigation water prices for the period commencing 1 October 2011 and ending 30 June 2016.

4. Other matters

To put beyond doubt, nothing in this Referral prevents SunWater from setting full commercial prices for urban and industrial customers.

The Authority may exercise all the powers under Part 6 of the *Queensland Competition Authority Act 1997*.

ANNA BLIGH

The Hon. Anna Bligh MP, Premier

Level 15 Executive Building
100 George Street, Brisbane

PO Box 15185, Brisbane
City East 4002 Australia

Telephone +617 3224 4500
Facsimile +617 3221 3631

ANDREW FRASER

The Hon. Andrew Fraser MP, Treasurer

Level 9 Executive Building
100 George Street, Brisbane

GPO Box 611, Brisbane
Queensland 4001 Australia

Telephone +617 3224 6900
Facsimile +617 3229 0642

Appendix D

SunWater Staff Interviews

POSITION/TITLE	NAME
Manager – Finance	Colin Nicolson
Business Strategy Analyst	Neva Tran
Business Accounting Manager	Paul Wishart
Business Accountant	Alex Garcia
Business Accountant	Sue Manamoi
Internal Auditor	Gina Conde
Financial Modeller	Keith Esson

Appendix E

Generic Testing – Spreadsheet Professional

BACKGROUND

Spreadsheet Professional is the standard tool used by major accountancy firms around the world and over 10,000 other organisations around the world for the professional development of spreadsheet models.

Spreadsheet Professional is an Excel Addin which is added to the toolbar providing the user access to the following key functions.

- Automatically testing for the most common errors
- Generating a full set of spreadsheet documentation
- Providing tools to assist in the use of the spreadsheet
- Providing tools to audit differences in inputs, formulas and results

APPROACH

As part of **Step 1** of this review, Indec have applied the diagnostic tool ***"spreadsheet professional"*** across the four key modules and the reporting tool only and in line with our proposal.

Indec choose one tab which represented the majority of the data or key inputs within the respective module. This was in most case the Summary tab.

1. Brisbane Resource Centre – Strategy Summary
2. Hub – Overhead
3. IM Far North - Summary Tab
4. WMS North – Economic Data
5. Reporting Tool User Defined Summary Tab

The results from the generic test can be found in the appendix of this report. All areas identified from the test were reviewed and Indec are satisfied and understand the justification for the uniqueness of the formulas or layout.

The more comprehensive testing across all modules and a stratified sample across the broader model will occur as part of **Step 2 of** Indec Review.

RESULTS

WMS North Economic Data

Summary statistics		Comments
Range analysed	A1:AR213	
Number of numeric inputs	230	
Number of formulas	7214	
Number of unique formulas	56	
Unique cells are those that are not copies of the cell to the left or above.		
Percentage of unique formulas	1%	
Number of labels	220	
Potential errors summary		
Possible error condition	**Frequency**	
No precedents	16	Sheet was unprotected as part of the Review
Blank cells referenced	1	
Non numeric cells referenced	14	
Forward row reference	1	
Numeric rule	23	
Protection not enabled.		
This sheet is not protected. Users can overwrite the contents of any cell even if the cell is locked.		
Test notes.		
Only unique cells have been tested.		
Remember to check cells that are a copy of the cells shown on this report.		
Only the first cell in each range referenced by a formula has been tested.		
No precedents		
This formula does not depend on any other cells. Usually this implies that an input has been entered as a combination of values. Potential errors to watch for:		
1. Unless the individual values that make up the input are documented then it will be impossible to subsequently understand how the results were derived.		
A2, H10, H33, H36, H40, C40, H60, C60, H84, C84, H109, C109, H127, H147		Each cell identified was reviewed and Indec confirm it meets its function irrespective of its non dependence on other cells
H171, H196		
Blank cells referenced		
The following calculations reference a blank cell. Potential errors to watch for:		
1. An input value has not been entered.		
2. The calculation contains an incorrect reference.		

Summary Statistics	Comments
3. There maybe no error at present but users may subsequently enter values or formulas into the blank cells causing inconsistent results. **H6**	There were no issues which arose from the review of these blank cells
Non numeric cells referenced Although the following calculations have numeric answers they refer to non-numeric cells. Potential errors to watch for: 1. A value has been entered as a non numeric. 2. The calculation contains an incorrect reference. **A1, G6, G10, G21, G33, G36, G40, G60, G84, G109, G127, G147, G171, G196**	Each cell identified was reviewed and Indec confirm it meets its function. The modular structure is well designed in that sense to prevent such mistakes
Forward row reference The following calculations refer to a row after the row in which they are situated. Potential errors to watch for: 1. Well written spreadsheets should be read from top to bottom like a book. Forward references often indicate a late additional piece of code which has been inadequately checked. 2. The calculation contains an incorrect reference. **A1**	Each cell identified was reviewed and Indec confirm it meets its function. The modular structure is well designed in that sense to prevent such mistakes
Numeric rule The following calculations contain a number. This is the most common cause of errors within a spreadsheet. Potential errors to watch for: 1. A number has been added to the calculation as a 'quick fix' and not been subsequently removed. 2. A number has been used within the calculation even though it is also input elsewhere on the spreadsheet. Changing the input then has no effect. 3. The number is being used to convert from one set of units to another (000s to millions etc). This is often performed incorrectly. **G6:H6, G10, F21:G21, G33, G36, F40:G40, F60:G60, F84:G84, F109:G109 F127:G127, F147:G147, F171:G171, F196:G196**	Each cell identified was reviewed and Indec confirm it meets its function irrespective of the fact it holds numeric numbers within the formula.

Reporting Tool

Summary statistics		Comments
Range analysed	A1:BG1536	
Number of numeric inputs	1510	
Number of formulas	47812	
Number of unique formulas	1195	
Unique cells are those that are not copies of the cell to the left or above.		
Percentage of unique formulas	2%	
Number of labels	4248	
Potential errors summary		
Possible error condition	**Frequency**	
Unused calculation	2	
No precedents	930	
Blank cells referenced	14	
Non numeric cells referenced	5	
Forward row reference	32	
Forward column reference	9	
Hidden cell referenced	16	
VLOOKUP function	8	
IF function	20	
Double IF function	2	
Numeric rule	1129	
Complex calculation	14	
External reference	186	
Protection not enabled.		Sheet was unprotected as part of the Review
This sheet is not protected. Users can overwrite the		
contents of any cell even if the cell is locked.		
Test notes.		
Only unique cells have been tested. Remember to check cells that are a copy of the cells shown on this report.		
Only the first cell in each range referenced by a formula has been tested.		
Unused calculation		
The results from this calculation are not used elsewhere on this worksheet Potential errors to watch for:		
1. The results should be used but there is an incorrect reference in a subsequent calculation.		
A1, J1		This cell is used as part of the integrity check process and is ok

Summary Statistics		Comments
No precedents This formula does not depend on any other cells. Usually this implies that an input has been entered as a combination of values. Potential errors to watch for: 1. Unless the individual values that make up the input are documented then it will be impossible to subsequently understand how the results were derived. **L12:L30, L33:L38, L43:L61, L64:L69, L75:L93, L96:L101, L106:L124, L127:L132** **L137:L155, L158:L163, L168:L186, L189:L194, L199:L217, L220:L225, L230:L248** **L251:L256, L261:L279, L282:L287, L292:L310, L313:L318, L323:L341, L344:L349** **L352:L353, L361, L365:L383, L386:L391, L396:L414, L417:L422, L427:L445** **L448:L453, L458:L476, L479:L484, L489:L507, L510:L515, L520:L538, L541:L546** **L551:L569, L572:L577, L582:L600, L603:L608, L613:L631, L634:L639, L644:L662** **L665:L670, L675:L693, L696:L701, L706:L724, L727:L732, L737:L755, L758:L763** **L768:L786, L789:L794, L799:L817, L820:L825, L830:L848, L851:L856, L861:L879** **L882:L887, L892:L910, L913:L918, L923:L941, L944:L949, L954:L972, L975:L980** **L985:L1003, L1006:L1011, L1016:L1034, L1037:L1042, L1047:L1065, L1068:L1073** **L1078:L1096, L1099:L1104, L1109:L1127, L1130:L1135, L1140:L1158, L1161:L1166** **I1496, I1500**		Each cell identified was reviewed and Indec confirm it meets its function irrespective of its non dependence on other cells
Blank cells referenced The following calculations reference a blank cell. Potential errors to watch for: 1. An input value has not been entered. 2. The calculation contains an incorrect reference. 3. There maybe no error at present but users may subsequently enter values or formulas into the blank cells causing inconsistent results. **A1, E8:H8, B8, J8, E1180, I1448, I1453:I1454, A1534, L1534, BE1534**		There were no issues which arose from the review of these blank cells
Non numeric cells referenced Although the following calculations have numeric answers they refer to non-numeric cells. Potential errors to watch for: 1. A value has been entered as a non numeric. 2. The calculation contains an incorrect reference. H8, L1174, BE1450, C1463, BE1534		
Forward row reference The following calculations refer to a row after the row in which they are situated. Potential errors to watch for: 1.Well written spreadsheets should be read from top to bottom like a book. Forward references often indicate a late additional piece of code which has been inadequately checked. 2. The calculation contains an incorrect reference. **A1, J1, F2, B5, E1180, I1448, BE1450, L1450, C1508, E1508, C1515, E1515**		

Summary Statistics		Comments
C1521, E1521, C1523:C1527, E1523:E1527, C1529:C1532, E1529:E1532		Each cell identified was reviewed and Indec confirm it meets its function. The modular structure is Well designed in that sense to prevent such mistakes
Hidden cell referenced The following calculations reference to hidden cells. Potential errors to watch for: 1. It is impossible to check these calculations by examining the spreadsheet. In practice they are often found to contain errors.		
H8, J8, E1180, I1448, BE1450, L1450, I1453, C1463, I1497:I1499, I1501:I1503 **I1505, BE1534**		Not advisable within formula construction to use hidden cells however the review reveal no issue
VLOOKUP function The following calculations use the VLOOKUP function. Potential errors to watch for: 1. The range being searched must be in ascending order or errors may occur.		
E8:H8, J8, E1180, BE1450, L1450		
IF function The following calculations contain an IF statement. Potential errors to watch for: 1. The calculation used is dependent on the input values to the spreadsheet therefore these cells must be checked particularly carefully.		
M6, E8:H8, B8, J8, J1174, L1174, E1180, C1225, C1240, C1395, I1448, BE1450 **L1450:L1451, I1505, L1534, BE1534**		These formulas were reviewed in detail and confirmed they are correct.
Double IF function The following calculations contain two or more IF statements. Potential errors to watch for: 1. These are complex calculations which have been found to be incorrect in more than 25% of cases. 2. Ensure that all possible values are allowed for.		
M6, J8		These formulas were reviewed in detail and confirmed they are correct.
Numeric rule The following calculations contain a number. This is the most common cause of errors within a spreadsheet. Potential errors to watch for: 1. A number has been added to the calculation as a 'quick fix' and not been subsequently removed. 2. A number has been used within the calculation even though it is also input elsewhere on the spreadsheet. Changing the input then has no effect.		

Summary Statistics		Comments
3. The number is being used to convert from one set of units to another (000s to millions etc). This is often performed incorrectly.		
F2, M6, L8, L10:L39, L41:L70, L73:L102, L104:L133, L135:L164, L166:L195 **L197:L226, L228:L257, L259:L288, L290:L319, L321:L350, L352:L353, L361** **L363:L392, L394:L423, L425:L454, L456:L485, L487:L516, L518:L547, L549:L578** **L580:L609, L611:L640, L642:L671, L673:L702, L704:L733, L735:L764, L766:L795** **L797:L826, L828:L857, L859:L888, L890:L919, L921:L950, L952:L981, L983:L1012** **L1014:L1043, L1045:L1074, L1076:L1105, L1107:L1136, L1138:L1167, J8** **E1180, C1225, C1240, C1395, I1448, BE1450, L1450, I1454, C1463, I1500** **L1534, BE1534**		Each cell identified was reviewed and Indec confirm it meets its function irrespective of the fact it holds numeric numbers within the formula.
Complex calculation This calculation is particularly complex and therefore likely to contain errors. Potential errors to watch for: 1. Errors can be of all types. **M6, E8:H8, J8, E1180, I1448, BE1450, L1450:L1451, I1500, I1503, I1505**		These formulas were reviewed in detail and confirmed they are correct.
External reference This calculation references a value on a separate spreadsheet. Potential errors to watch for: 1. These cells often contain out of date values which have not been updated. **L8, L10:L11, L31:L32, L39, L41:L42, L62:L63, L70, L73:L74, L94:L95, L102** **L104:L105, L125:L126, L133, L135:L136, L156:L157, L164, L166:L167, L187:L188** **L195, L197:L198, L218:L219, L226, L228:L229, L249:L250, L257, L259:L260** **L280:L281, L288, L290:L291, L311:L312, L319, L321:L322, L342:L343, L350** **L363:L364, L384:L385, L392, L394:L395, L415:L416, L423, L425:L426, L446:L447** **L454, L456:L457, L477:L478, L485, L487:L488, L508:L509, L516, L518:L519** **L539:L540, L547, L549:L550, L570:L571, L578, L580:L581, L601:L602, L609** **L611:L612, L632:L633, L640, L642:L643, L663:L664, L671, L673:L674, L694:L695** **L702, L704:L705, L725:L726, L733, L735:L736, L756:L757, L764, L766:L767** **L787:L788, L795, L797:L798, L818:L819, L826, L828:L829, L849:L850, L857** **L859:L860, L880:L881, L888, L890:L891, L911:L912, L919, L921:L922, L942:L943** **L950, L952:L953, L973:L974, L981, L983:L984, L1004:L1005, L1012, L1014:L1015**		The links to the external Reference were checked and confirmed they act in accordance with its design.
Summary Statistics		**Comments**
L1035:L1036, L1043, L1045:L1046, L1066:L1067, L1074, L1076:L1077, L1097:L1098 **L1105, L1107:L1108, L1128:L1129, L1136, L1138:L1139,**		

L1159:L1160, L1167		

IM Far North (Summary Sheet Only)

Summary Statistics		Comments
Range analysed	A1:DH315	
Number of numeric inputs	9557	
Number of formulas	5666	
Number of unique formulas Unique cells are those that are not copies of the cell to the left or above.	291	
Percentage of unique formulas	5%	
Number of labels	870	
Potential errors summary		
Possible error condition	**Frequency**	
Unused calculation	1	
No precedents	38	
Blank cells referenced	20	
Non numeric cells referenced	2	
Forward row reference	53	
Forward column reference	4	
Hidden cell referenced	5	
HLOOKUP function	1	
IF function	5	
Double IF function	3	
Numeric rule	37	
Complex calculation	12	
Protection not enabled.		
This sheet is not protected. Users can overwrite the contents of any cell even if the cell is locked.		Sheet was unprotected as part of the Review
Test notes.		
Only unique cells have been tested. Remember to check cells that are a copy of the cells shown on this report.		
Only the first cell in each range referenced by a formula has been tested.		

Summary Statistics		Comments
Unused calculation		
The results from this calculation are not used elsewhere on this worksheet Potential errors to watch for: 1. The results should be used but there is an incorrect reference in a subsequent calculation.		

B1 **No precedents** This formula does not depend on any other cells. Usually this implies that an input has been entered as a combination of values. Potential errors to watch for: 1. Unless the individual values that make up the input are documented then it will be impossible to subsequently understand how the results were derived. **DG9, DG22, DG28, DG35, DG41, DG52, DG54, DG59, DG70, DG110, DG119, DG127** **DG133, DG138, DG146, V149, DG174, DG180, DG185, V194, C220, C228, V238** **DG238, U240, DG240, V248, DG249, DG255, DG257, DG266, V273:V274, DG277** **V280, V285, V293, W305** **Blank cells referenced** The following calculations reference a blank cell. Potential errors to watch for: 1. An input value has not been entered. 2. The calculation contains an incorrect reference. 3. There maybe no error at present but users may subsequently enter values or formulas into the blank cells causing inconsistent results. **BR1:BR2, DB3, DE9, DE59, CR62, DE110, DE119, DE146, CR149, CR156, CR161** **CR194, CR212, CR215, DE277, DB293, B297, A312, D297** **Non numeric cells referenced** Although the following calculations have numeric answers they refer to non-numeric cells. Potential errors to watch for: 1. A value has been entered as a non numeric. 2. The calculation contains an incorrect reference. **A1, V297** **Forward row reference** The following calculations refer to a row after the row in which they are situated. Potential errors to watch for: 1. Well written spreadsheets should be read from top to bottom like a book. Forward references often indicate a late additional piece of code which has been inadequately checked. 2. The calculation contains an incorrect reference. **C1, BR1, DB3, A1, A4, C5, DB5, V9:V11, V13:V14, V17:V18, V22, V24:V25** **V28, V35, V41, V44, V46, V52:V57, DB62, V110, V119, V127, V133, V144** **V146, DB149, DB156, DB161, V174, V180, V191, DB194, V204, V206:V207**		This cell is used as part of the integrity check process and is ok Each cell identified was reviewed and Indec confirm it meets its function irrespective of its non dependence on other cells There were no issues which arose from the review of these blank cells Each cell identified was reviewed and Indec confirm it meets its function. The modular structure is well designed in that sense to prevent such mistakes
Summary Statistics		**Comments**
V212, DB212, V215, DB215, V255, V265, V271, V277 **Forward column reference** The calculation refers to a column to the right of the column in which it is situated. Potential errors to watch for: 1. Well written spreadsheets should be read from left to right like a book. Forward references often indicate a late additional piece of code which has been inadequately checked.		

2. The calculation contains an incorrect reference. **C1, A4, V297, D297**		Each cell identified was reviewed and Indec confirm it meets its function. The modular structure is well designed in that sense to prevent such mistakes
Hidden cell referenced The following calculations reference to hidden cells. Potential errors to watch for: 1. It is impossible to check these calculations by examining the spreadsheet. In practice they are often found to contain errors. **BR2, BR4, DB5, DB293, D297**		Not advisable within formula construction to use hidden cells however the review reveal no issue
HLOOKUP function The following calculations use the HLOOKUP function. Potential errors to watch for: 1. The range being searched must be in ascending order or errors may occur. **DB293**		
IF function The following calculations contain an IF statement. Potential errors to watch for: 1. The calculation used is dependent on the input values to the spreadsheet therefore these cells must be checked particularly carefully. **BR1:BR2, DB3, V297, D297**		These formulas were reviewed in detail and confirmed they are correct.
Double IF function The following calculations contain two or more IF statements. Potential errors to watch for: 1. These are complex calculations which have been found to be incorrect in more than 25% of cases. 2. Ensure that all possible values are allowed for. **BR1:BR2, DB3**		
Numeric rule The following calculations contain a number. This is the most common cause of errors within a spreadsheet. Potential errors to watch for:		
Summary Statistics		**Comments**
1. A number has been added to the calculation as a 'quick fix' and not been subsequently removed. 2. A number has been used within the calculation even though it is also input elsewhere on the spreadsheet. Changing the input then has no effect. 3. The number is being used to convert from one set of units to another (000s to millions etc). This is often performed incorrectly. **BR1:BR2, CS2, A61, DB62, A108, A148, DB149, DB156, DB161, A171, A193** **DB194, A203, A210, DB212, DB215, A219, A236, A253, A270, A279, A284** **A290, DB293, A295, W305, V297:V304, B297, D297**		Each cell identified was reviewed and Indec confirm it meets its function irrespective of the fact it holds numeric numbers within the formula.

Complex calculation This calculation is particularly complex and therefore likely to contain errors. Potential errors to watch for: 1. Errors can be of all types. **BR1:BR2, V20, V48, V59, DB62, DB161, DB194, DB212, DB215, DB293, D297**		These formulas were reviewed in detail and confirmed they are correct.

HUB Overhead Rates

Summary Statistics		Comments
Range analysed	A1:AQ278	
Number of numeric inputs	1128	
Number of formulas	4759	
Number of unique formulas Unique cells are those that are not copies of the cell to the left or above.	361	
Percentage of unique formulas	8%	
Number of labels	421	
Potential errors summary		
Possible error condition	**Frequency**	
Unused calculation	1	
No precedents	1	
Blank cells referenced	8	
Non numeric cells referenced	1	
Forward row reference	102	
Forward column reference	9	
Hidden cell referenced	24	
IF function	6	
Double IF function	1	

Summary Statistics		Comments
Numeric rule	12	
Complex calculation	6	
Protection not enabled. This sheet is not protected. Users can overwrite the contents of any cell even if the cell is locked.		Sheet was unprotected as part of the Review
Test notes. Only unique cells have been tested. Remember to check cells that are a copy of the cells shown on this report. Only the first cell in each range referenced by a formula has been tested.		
Unused calculation		

The results from this calculation are not used elsewhere on this worksheet Potential errors to watch for: 1. The results should be used but there is an incorrect reference in a subsequent calculation. **B1**	This cell is used as part of the integrity check process and is ok
No precedents This formula does not depend on any other cells. Usually this implies that an input has been entered as a combination of values. Potential errors to watch for: 1. Unless the individual values that make up the input are documented then it will be impossible to subsequently understand how the results were derived. **Q275**	Each cell identified was reviewed and Indec confirm it meets its function irrespective of its non dependence on other cells
Blank cells referenced The following calculations reference a blank cell. Potential errors to watch for: 1. An input value has not been entered. 2. The calculation contains an incorrect reference. 3. There maybe no error at present but users may subsequently enter values or formulas into the blank cells causing inconsistent results. **E18, E25, E33, E39, E220, B270, A275, D270**	There were no issues which arose from the review of these blank cells
Non numeric cells referenced Although the following calculations have numeric answers they refer to non-numeric cells. Potential errors to watch for: 1. A value has been entered as a non numeric. 2. The calculation contains an incorrect reference. **A1**	Each cell identified was reviewed and Indec confirm it meets its function. The modular structure is well designed in that sense to prevent such mistakes
Summary Statistics	**Comments**
Forward row reference The following calculations refer to a row after the row in which they are situated. Potential errors to watch for: 1. Well written spreadsheets should be read from top to bottom like a book. Forward references often indicate a late additional piece of code which has been inadequately checked. 2. The calculation contains an incorrect reference. **C1, A1, C5, N5, Q8, V10:V11, V23:V24, V28, V32, V38, V44, V87, V127** **V130:V135, V137, V140:V142, V144:V148, V150:V152, V155, V158:V160, V162:V163** **V165:V168, V174:V179, V181, V184:V186, V188:V192, V194:V196, V199, V202:V204** **V206:V207, V209:V212, V215:V216, V220:V225, V227, V230:V232, V234:V238** **V240:V242, V245, V248:V250, V252:V253, V255:V258, E220**	Each cell identified was reviewed and Indec confirm it meets its function. The modular structure is well designed in that sense to prevent such mistakes

Forward column reference The calculation refers to a column to the right of the column in which it is situated. Potential errors to watch for: 1. Well written spreadsheets should be read from left to right like a book. Forward references often indicate a late additional piece of code which has been inadequately checked. 2. The calculation contains an incorrect reference. **C1, A2, N5, E18:F18, E25, E33, E39, D270**	Each cell identified was reviewed and Indec confirm it meets its function. The modular structure is well designed in that sense to prevent such mistakes
Hidden cell referenced The following calculations reference to hidden cells. Potential errors to watch for: 1. It is impossible to check these calculations by examining the spreadsheet. In practice they are often found to contain errors. **C1, R4, V10:V11, F18, F20, V23:V24, F25, V28, V32, F33, F39, V44, V87** **V127, V170, V214, V217, V260, B270, A275, D270, D275**	Not advisable within formula construction to use hidden cells however the review reveal no issue
IF function The following calculations contain an IF statement. Potential errors to watch for: 1. The calculation used is dependent on the input values to the spreadsheet therefore these cells must be checked particularly carefully. **V10:V11, V44, V87, V127, D270**	These formulas were reviewed in detail and confirmed they are correct.
Summary Statistics	**Comments**
Double IF function The following calculations contain two or more IF statements. Potential errors to watch for: 1. These are complex calculations which have been found to be incorrect in more than 25% of cases. 2. Ensure that all possible values are allowed for. **D270**	These formulas were reviewed in detail and confirmed they are correct.
Numeric rule The following calculations contain a number. This is the most common cause of errors within a spreadsheet. Potential errors to watch for: 1. A number has been added to the calculation as a 'quick fix' and not been subsequently removed. 2. A number has been used within the calculation even though it is also input elsewhere on the spreadsheet. Changing the input then has no effect. 3. The number is being used to convert from one set of units to another (000s to millions etc). This is often performed incorrectly. **V10:V11, F18, F25, F33, V40, F39, V44, V87, V127, B270, D270**	Each cell identified was reviewed and Indec confirm it meets its function irrespective of the fact it holds numeric numbers within the formula.

Complex calculation This calculation is particularly complex and therefore likely to contain errors. Potential errors to watch for: 1. Errors can be of all types. **V10:V11, V44, V87, V127, D270**	These formulas were reviewed in detail and confirmed they are correct.

Brisbane Resource Centre (DATA Tab only)

Summary Statistics		Comments
Range analysed	A1:AQ383	
Number of numeric inputs	258	
Number of formulas	4223	
Number of unique formulas	920	
Unique cells are those that are not copies of the cell to their left.		
Percentage of unique formulas	22%	
Number of labels	538	

Summary Statistics		Comments
Potential errors summary		
Possible error condition	**Frequency**	
Unused calculation	1	
No precedents	304	
Non numeric cells referenced	121	
Forward row reference	29	
Forward column reference	1	
Hidden cell referenced	26	
IF function	120	
Numeric rule	138	
Complex calculation	119	
Protection not enabled.		Sheet was unprotected as part of the Review
This sheet is not protected. Users can overwrite the contents of any cell even if the cell is locked.		
Test notes.		
Only unique cells have been tested. Remember to check cells that are a copy of the cells shown on this report.		
Only the first cell in each range referenced by a formula has been tested.		

Unused calculation The results from this calculation are not used elsewhere on this worksheet Potential errors to watch for: 1. The results should be used but there is an incorrect reference in a subsequent calculation. **B1**	This cell is used as part of the integrity check process and is ok
No precedents This formula does not depend on any other cells. Usually this implies that an input has been entered as a combination of values. Potential errors to watch for: 1. Unless the individual values that make up the input are documented then it will be impossible to subsequently understand how the results were derived. **V12, V19, W38, V56:V171, C52:C171, V175:V179, V184:V203, C184:C203, V205** **V208:V209, V211:V215, V220:V221, V223, V226, V240, V257, V274, V288** **V302, V316, V330, V344**	Each cell identified was reviewed and Indec confirm it meets its function irrespective of its non dependence on other cells
Summary Statistics	**Comments**
Non numeric cells referenced Although the following calculations have numeric answers they refer to non-numeric cells. Potential errors to watch for: 1. A value has been entered as a non numeric. 2. The calculation contains an incorrect reference. **S1, A1, W22, W29, W45, W56:W171**	
Forward row reference The following calculations refer to a row after the row in which they are situated. Potential errors to watch for: 1. Well written spreadsheets should be read from top to bottom like a book. Forward references often indicate a late additional piece of code which has been inadequately checked. 2. The calculation contains an incorrect reference. **S1, A1, A4, R4:AP4, C5**	Each cell identified was reviewed and Indec confirm it meets its function. The modular structure is well designed in that sense to prevent such mistakes
Forward column reference The calculation refers to a column to the right of the column in which it is situated. Potential errors to watch for: 1. Well written spreadsheets should be read from left to right like a book. Forward references often indicate a late additional piece of code which has been inadequately checked. 2. The calculation contains an incorrect reference. **A4**	Each cell identified was reviewed and Indec confirm it meets its function. The modular structure is well designed in that sense to prevent such mistakes

Hidden cell referenced The following calculations reference to hidden cells. Potential errors to watch for: 1. It is impossible to check these calculations by examining the spreadsheet. In practice they are often found to contain errors. **S1, R4:AP4**	Each cell identified was reviewed and Indec confirm it meets its function. The modular structure is well designed in that sense to prevent such mistakes
IF function The following calculations contain an IF statement. Potential errors to watch for: 1. The calculation used is dependent on the input values to the spreadsheet therefore these cells must be checked particularly carefully. **S1, W22, W29, W45, W56:W171**	These formulas were reviewed in detail and confirmed they are correct.
Summary Statistics	**Comments**
Numeric rule The following calculations contain a number. This is the most common cause of errors within a spreadsheet. Potential errors to watch for: 1. A number has been added to the calculation as a 'quick fix' and not been subsequently removed. 2. A number has been used within the calculation even though it is also input elsewhere on the spreadsheet. Changing the input then has no effect. 3. The number is being used to convert from one set of units to another (000s to millions etc). This is often performed incorrectly. **S1, W22, W29, W45, A51, W56:W171, A173, A182, A207, A218, A225, A239** **A256, A273, A287, A301, A315, A329, A343, A357, A364, A371, A379**	Each cell identified was reviewed and Indec confirm it meets its function irrespective of the fact it holds numeric numbers within the formula.
Complex calculation This calculation is particularly complex and therefore likely to contain errors. Potential errors to watch for: 1. Errors can be of all types. **W22, W29, W45, W56:W171**	These formulas were reviewed in detail and confirmed they are correct.