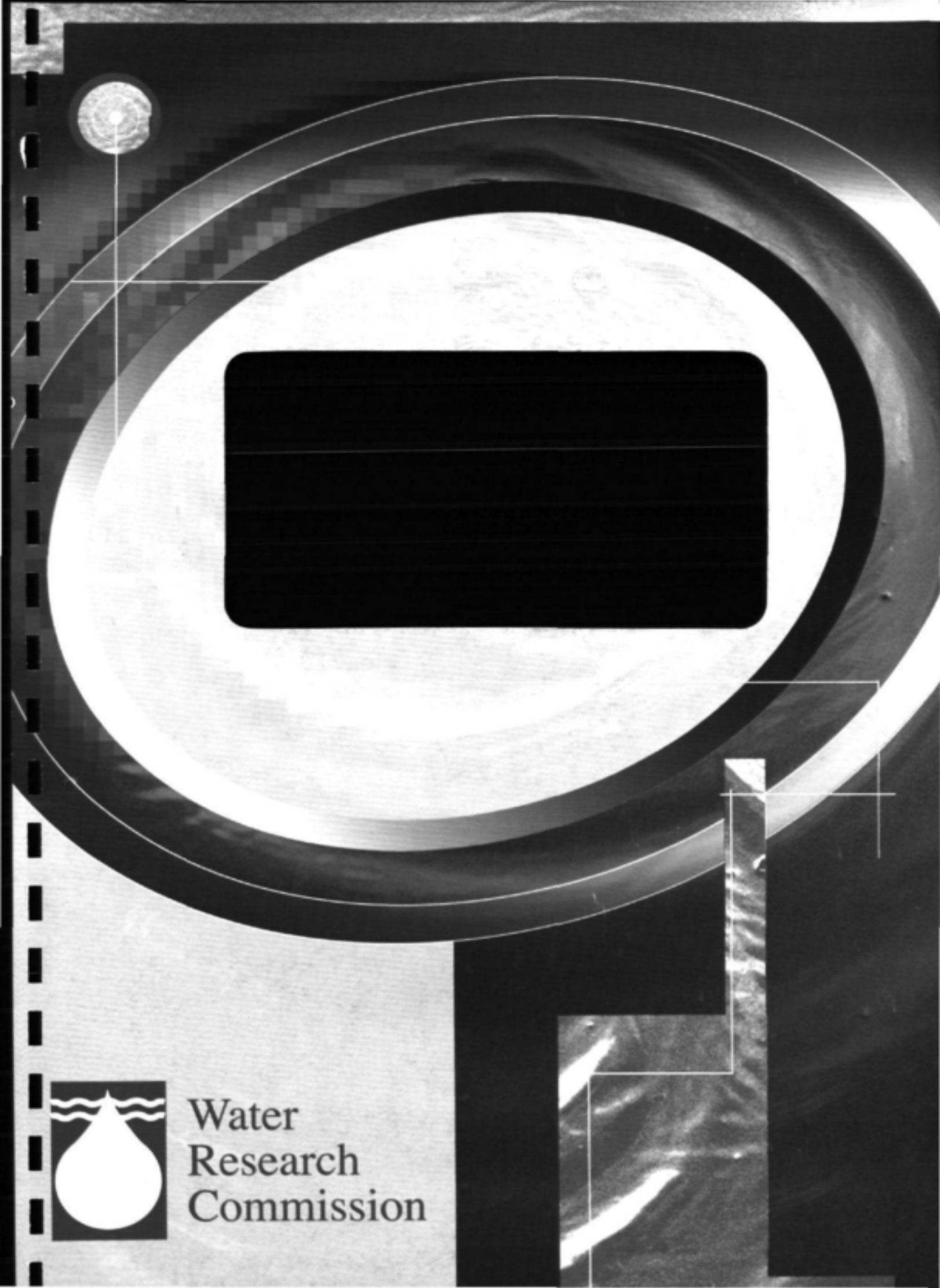

Water
Research
Commission

FUNDWAT
A project finance model for stochastically evaluating the funding of water resource development projects, especially at the planning stage: Executive Summary

by Peter Ramsden

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"Development of a tool for evaluating the effect of alternative funding options (with different risk profiles) on water tariffs"

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The following persons served on the steering committee responsible for the project:

- Dr G.R. Backeberg — Water Research Commission (Chairman)
- Mr J. Bhagwan — Water Research Commission
- Mr J.A. van Rooyen — Department of Water Affairs and Forestry
- Ms M. van Rensburg — Trans Caledon Tunnel Authority
- Mr P. Archary — Umgeni Water
- Mr A. Steyn — AIG Global Investment Group
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- Mr M. Schur — Department of Finance

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1 Purpose of this document

This executive summary document is merely intended to provide a broad overview of the water resource funding model called Fundwat. A detailed user manual and the actual financial model can be downloaded from the WRC web site at the address provided at the end of this document.

2 Introduction

Funds for implementing large water resource development projects (such as dams, canals, and inter-basin transfer schemes) were previously provided mainly by Government. Present government policy however recognises the importance of mobilising private sector funding for those water resource development projects that are potentially self-financing, thus leaving a greater share of the allocation from the National Treasury for those socially deserving projects that are unlikely to be self financing.

Because of the anticipated growth of private sector funding in the water resource sector, and the relative inexperience in the South African water sector with BOT type projects, the Water Research Commission agreed to fund the development of a standardised funding model with which water sector institutions and other potential client bodies could evaluate private sector funding proposals. This standardised financial model is called Fundwat.

Novel funding options are regularly offered to water sector institutions. Many of these, especially those bearing overseas funding rates, appear to be extremely attractive at first sight, but because of inherent risks such as the likelihood of exchange rate movements, these apparently attractive offers could result in a financial crisis for the borrowing institution if a possible set of circumstances should prevail. It is therefore necessary for institutions to not only examine the most likely cost of a funding offer, but to also examine the distribution of the risk of that funding offer.

Each financial instrument (such as a foreign loan or a local water bond) has its own risk profile, depending on the variability of particular parameters, such as interest rates, foreign exchange rates etc. It was thus deemed important to be able to analyse the risk inherent in the various funding instruments likely to be encountered in project financing. Fundwat has accordingly been written to provide the decision maker with the capability of stochastically modeling a probabilistic distribution of inputs.

3 Overview of Fundwat

Fundwat is a spreadsheet based computer model used for evaluating optional ways of funding water resource development projects. Fundwat is particularly appropriate for use at the planning or preliminary stages of projects.

Macro buttons can be used to operate Fundwat in either deterministic mode for goal seeking the required tariff to attain a specified objective (such as a required rate of return) given the most likely input parameters; or to operate Fundwat in stochastic mode to derive a probabilistic distribution of tariffs given the probability distribution of input parameters.

Fundwat provides the ability to make projections of -

- water sales and revenue from each project phase or component;
- disbursements related to construction and operation of each project phase;
- loan repayments, interest charges, and outstanding debt and equity balances for up to 10 individually specified loans, each of which can be either of the annuity, fixed payment or bullet type;
- future financial statements, including balance sheet, income statement and funds flow statement associated with the project; and
- indicators such as internal rate of return and return on assets and return on equity.

The modeling of the loan portfolio is particularly sophisticated allowing the amortisation of discounts to face value, foreign exchange gains and losses, different types of repayment structures, grace periods and various linked interest rate modeling assumptions.

4 Flexibility of the model

Fundwat is compiled as an Excel Spreadsheet workbook. This spreadsheet developed by the Microsoft Corporation is the most popular spreadsheet programme in use today.

Because all formulae are visible and can be overwritten by the user after unprotecting the relevant sheet, any specific applications can be accommodated by a user well versed in Excel by merely overwriting existing formulae or by adding additional worksheets or linked workbooks.

Although Fundwat was specifically developed for evaluating funding offers or options at the planning stage of a water resource development project, the ability to develop the model further by fixing inputs as they become known during the project development cycle is very attractive. Fundwat can thus be evolved continuously throughout the project by fixing attributes as they become known enabling Fundwat to be used as a benchmark against which the project finance model developed by the project finance professionals can be continuously verified.

Fundwat can thus be seen as a pro-forma project finance model that can be readily adapted to suit the specific circumstance of the project to be analysed.

It must be noted that the operation of spreadsheet based models such as Fundwat requires that the user should have at least a basic knowledge of Excel (or similar spreadsheet) in order to navigate, print, recalculate, save etc. with confidence.

5 Characteristics of Water Resources Projects as opposed to other types of projects

Water resources projects are usually (but not necessarily) characterised by:

- Large lumpy capital investments;
- Operational costs that are relatively small compared to capital costs;
- Sales that grow steadily up to the yield/capacity of scheme at which time the scheme is augmented with a further lumpy investment that needs to be funded;
- Sales do not earn foreign exchange while sources of funding can be local or foreign; and
- Taxation calculations are relatively straightforward.

This characterisation of water resource projects means that it is the norm for large loan and equity draw downs to take place during the construction of the project and that these loans are only paid back over a long period of some 20 to 30 years after construction has been completed or even rolled over after that time.

Because the water sales curve would normally be expected to grow over time, it is also possible that some capitalisation of interest is appropriate in the early years of the project, and that some loans will be negotiated with a grace period during which period interest charges are not payable but are capitalised or added to the loan principle.

6 Inputs to the Model

In order to facilitate stochastic modeling, inputs to the model are generally defined as a mean figure and a standard deviation.

The following Input sheets need to be completed-

- Cover sheet
- Controls
- Water Sold
- Costs
- Cost distribution
- Depreciation parameters
- Financial parameters

- Loan parameters
- Loan draw down schedules

7 Programming and technical aspects of the model

All calculations are done at year end (or if used for 6 monthly analysis at the end of the period).

The model follows the following sequence of calculations -

- projection of the water sold curve;
- calculation of the incremental volume of water sold out of a phase and the date that each phase needs to be implemented;
- placing of disbursements along the time line according to the determined implementation date of each phase;
- calculation of the timing and costs of scheduled replacements;
- calculation of depreciation charges
- calculation of amortisation charges for up front payment and discount to face value of loans;
- calculation of scheduled equity and loan draw downs;
- calculation of sales revenue;
- calculation of funding shortfalls;
- allocation of funding shortfalls to loans and calculation of additional loan drawdowns to make up the shortfall;
- calculation of loan repayment schedules, interest charges, interest capitalisation, and outstanding balance on loans;
- calculation of loss on foreign exchange;
- calculation of income statement and taxation;
- calculation of dividends or retained income;
- calculation of balance sheet;
- calculation of funds flow statement; and
- calculation of various rates of return.

8 Graphical Output

Important outputs are shown graphically on a separate but linked workbook called "Fundwat Graphs". A separate workbook is used to save space and to improve recalculation time when working with the main model.

The following graphs are provided –

- incremental sales per phase (up to 5 phases);
- construction costs per phase;
- depreciation per phase;
- variable costs and Operations and maintenance costs per phase;
- scheduled replacement costs per phase;
- equity drawdown;

- loan draw down per loan;
- loan rates per loan;
- loan capital repayments per loan;
- outstanding debt per loan;
- interest charges per loan;
- foreign exchange loss per loan;
- statement of income (items from income statement);
- statement of expenditure (items from income statement);
- capital employed (items from balance sheet);
- employment of capital (items from balance sheet);
- retained earnings (cumulative and per year);
- funds available (items from funds flow statement);
- utilisation of funds (items from funds flow statement);
- rates of return including:
  - dividend return on Equity
  - after tax return on Equity
  - pre-tax return on Equity
  - dividend return on Assets
  - after tax return on Assets
  - pre-tax return on Assets

9 User manual

A user manual has been compiled for Fundwat.

The assumptions underlying each calculation sheet is provided in the user manual. The user manual is only available in electronic format.

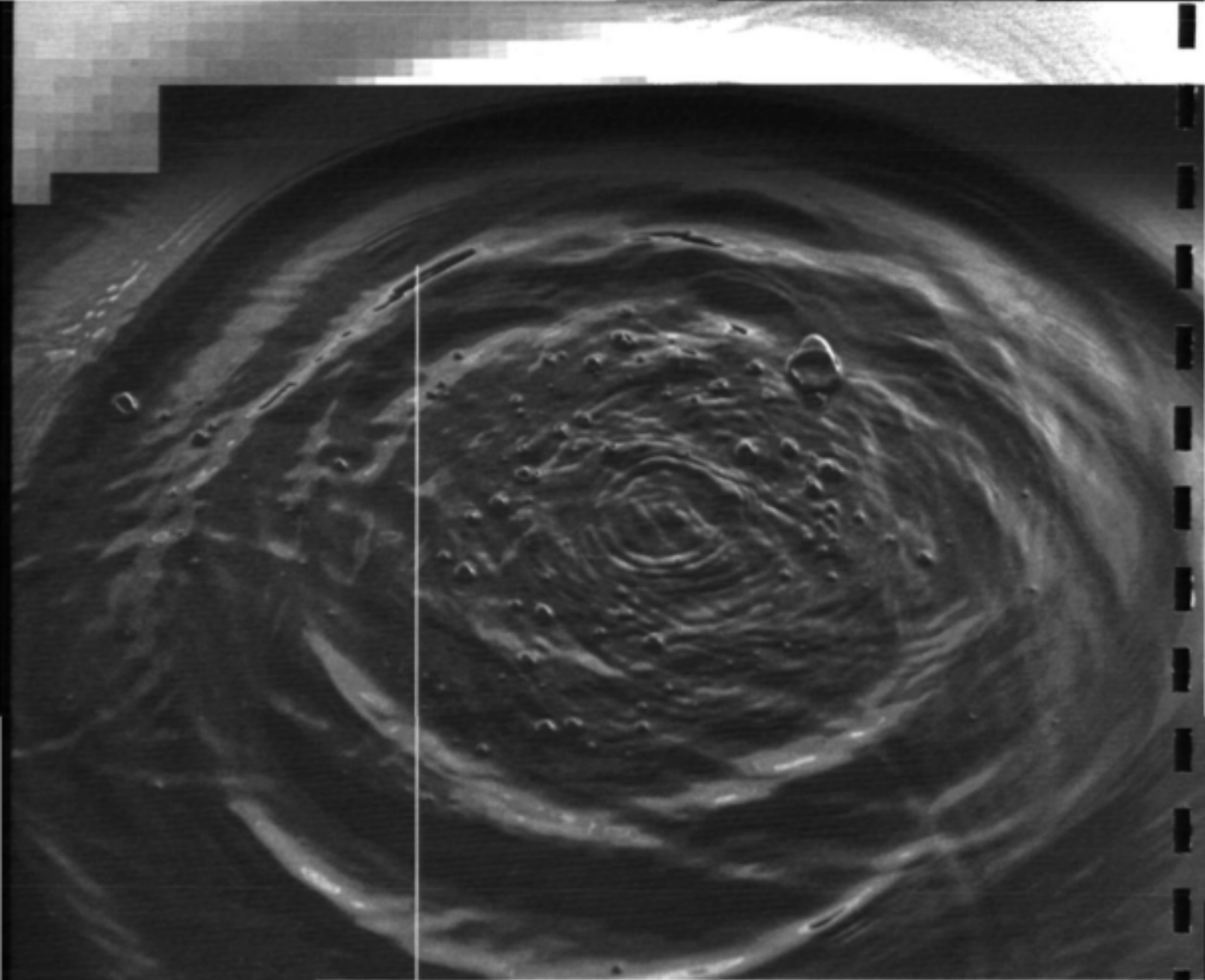
10 Obtaining the model and user manual

The model, this executive summary and user manual can be downloaded from the Water Research Commission's web site at:

http://www.wrc.org.za/wrcsoftware/Fundwat.htm

The author of the model, Peter Ramsden, can be contacted at:

ramsden@icon.co.za (state "Fundwat" in the subject line).



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