IRRIGATION NEW ZEALAND

Guidance Notes for Preparing Enterprise Valuations of Irrigation Schemes

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1. Introduction

A comprehensive, descriptive, step by step bible for your irrigation system These guidelines have been prepared by IrrigationNZ to assist with Enterprise Valuations of irrigation schemes.

This is part of a broader process involving the review of the valuation approach that has been used to estimate the rating valuation of irrigation schemes. In the past, the schemes have been valued using an approach that is broadly consistent with the optimised depreciated replacement cost (ODRC) methodology. The Valuer General (VG) is considering applying the optimised deprival value (ODV) approach to irrigation schemes. However, this would require a change to the Rating Valuation Rules. The ODV approach is also used to value lines businesses and other network infrastructure.

The Guidelines provide a brief background to the unique features of irrigation schemes (Section 2) and discuss the ODV approach in Section 3. Section 4 provides a brief discussion of the key assumptions and Section 5 outlines the EV model template that has been provided with the Guidelines.

2. Irrigation scheme valuation issues

2.1 Unique features of irrigation cooperatives

The majority of irrigation schemes in New Zealand are forms of cooperatives, meaning the scheme's shareholders are also its customers and in effect, are two separate but related steps in the water supply value chain. In the case of non-cooperatives (corporates), the shareholders are usually (but not always) unrelated parties with arms-length relationships to each other.

Therefore, irrigation schemes are relatively unique insofar as they:

- Occupy a fixed and defined command area,
- Are owned by the same parties that own the land that the schemes supply water to, and
- Are managed as cooperatives so as to minimise the cost of delivered water to the cooperative owners of the land.

Irrigation schemes occupy a fixed command area that may include a mix of irrigated and unirrigated land. The schemes are owned by the irrigated land holders within the command area. The value of the irrigated land will reflect the underlying productive capacity, the added value of water, and as discussed further below, the extent to which the water charges under-recover the full economic cost of the infrastructure used to supply the water.

The combination of these characteristics differentiates irrigation schemes from other utilities. The relationship between the value of irrigated land and the value of the irrigation schemes supplying them differs from the relationship between other infrastructure, such as roads or electricity, and the value of the land that it services. In summary, there is circularity in the relationship between the value of the irrigation schemes and the value of the land served by the schemes, which does not exist with other infrastructure.

2.2 Impacts on value

The standard view of the objective of the firm is to maximise shareholder wealth through growing the value of the firm and distributing capital and profits back to shareholders. Cooperatives have the same overall objective as non-cooperative, or corporate, businesses but they achieve it in a different way. Cooperatives maximise the utility of members by minimising what the shareholders pay for delivered water. In other words, a fundamental difference between a corporation and a cooperative is the way profits are returned to the firms' owners.

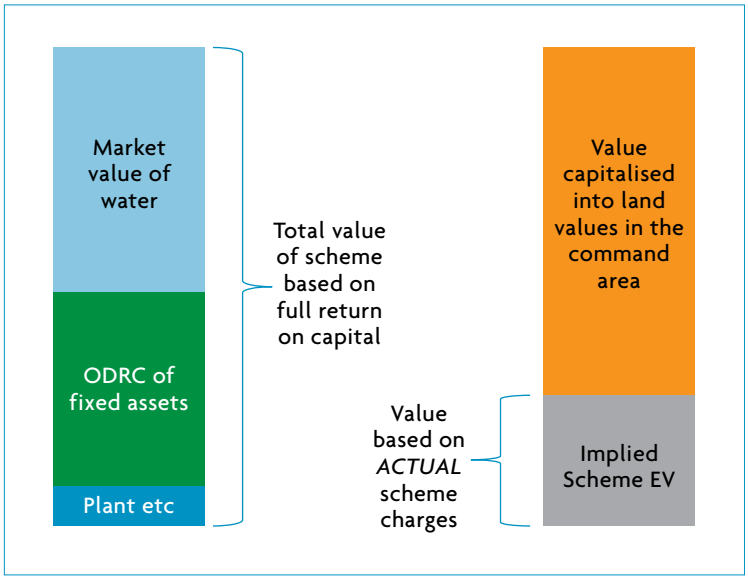

Figure 1. Relationship between the value of irrigation scheme assets, the implied scheme enterprise value and residual capitalised into land value.

Cooperatives can be managed the same way as non-cooperatives. A cooperative could set water charges at a level that returns a full rate of return on its assets. However, to get profits back to shareholders it would have to pay dividends. This is a more costly way of distributing profits (and thereby achieving lower prices) than simply charging lower prices for water. For these reasons irrigation cooperatives set charges at lower levels that, in general:

- Cover interest and principal repayments,
- Cover operating costs, and
- May or may not cover depreciation in the base infrastructure.

However, in the majority of cases cooperatives usually set prices so as to cover cash costs plus debt servicing. This all means that farmer shareholders capture part of the value that would otherwise accrue to 'dry' shareholders in a non-cooperative company. In general, the 'savings' from the cheap water are capitalised into farmland values of the irrigation scheme shareholders (see below).

If the schemes charged a full economic return on the value of all the scheme assets (including the water) the enterprise value would equal, roughly, the sum of the market value of water plus the ODRC of the scheme's assets. However, as irrigation schemes generally only charge to cover interest and operating costs, and usually, depreciation, the enterprise value based on actual charges will always be less than the summation of the market value of water and the ODRC of the assets. In contrast ODRC is an appropriate methodology for all other infrastructure assets where the asset owners seek to achieve a rate of return on their investment, which reflects the underlying systemic or business risk of that investment.

VALUE TRANSFER

In effect, with cooperative irrigation schemes the value that would normally be captured by a corporation and transferred to shareholders by way of dividends or increased share value is transferred to the cooperative scheme shareholders by way of lower water charges. In turn the economic value of lower charges for water is usually capitalised into land prices.

This difference has a significant impact on the assumptions that are made when forecasting the revenues and therefore operating cash flows that are a significant input into the calculation of free cash flow and ultimately the scheme's EV.

Although the allocation of economic value between the irrigation scheme and the land serviced by the scheme changes, the overall aggregate value of the scheme assets plus land in the command area remains largely constant. In other words value isn't created or lost; it is simply reassigned. This is illustrated in the following example. On the left hand side it is assumed a scheme levies charges that result in it earning a full return on capital. The scheme value would be roughly equal to its ODRC plus the value of its water. The land value in the command area is assumed to be $300 million and the combined value of the scheme assets and the land in the command area is $450 million.

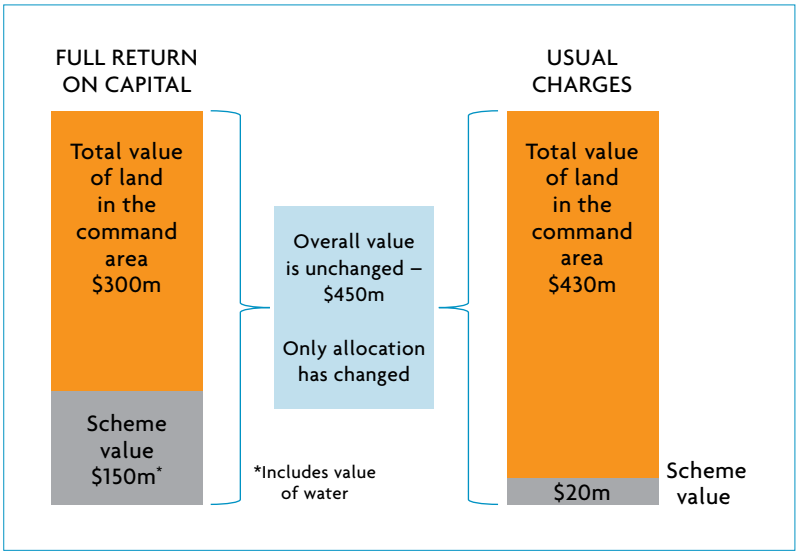

Figure 2. Relationship between the value of irrigation scheme assets, the implied scheme enterprise value and residual.

On the right hand side we have the case where the scheme bases its charges on recovering operating costs and the cost of interest on its debt, resulting in it making a small or negligible accounting profit but not earning a full economic return on its assets. Note also that the scheme is not charging a resource rental on the opportunity cost of the water. In this case the enterprise value of the scheme would be significantly less than its ODRC value plus the cost of water – for the sake of example we say it is worth $20 million. The difference in scheme value ($150 million versus $20 million) under the two sets of assumptions has not vanished; it has simply been transferred into the value of land in the command area.

2.3 How water charges are usually set

As noted above the underlying objective of most schemes is to minimize the cost of delivered water subject to the constraints of being able to repay any debt and preserve shareholders' funds by generating break-even levels of pre-tax profit, on average.

A further consideration, related to the fact that the schemes are cooperatives, is its stage in the asset investment and replacement cycle. In a market with effective and practical competition, prices for services do not normally reflect the age of assets or the capital structure of the firm. However, in the case of irrigation cooperatives, water charges will reflect the age of the assets and the scheme's financing as charges are set so as just to cover interest payments, operating costs and in most cases, depreciation.

In general, water charges for new schemes, or schemes that have recently borrowed to undertake a capital development project, will reflect the need to meet bank covenants for debt servicing. The most important covenant is the debt service coverage ratio (DSCR) usually calculated as cash flow available for debt service (CFADS) in each accounting period divided by the amount of principal and interest. CFADS is usually estimated as:

Operating revenues:

- Minus operating expenses,
- Minus capital expenditure paid in cash,
- Minus corporate taxes or other taxes on income or gains paid in cash,
- Plus the amount of any decrease, or minus the amount of any increase as the case may be, of working capital.

Charges are usually set to meet, or in some cases exceed by a small margin, the DSCR. The DSCR applied by banks will vary between schemes but is generally in the range of 1 x and 1.1 x CFADS.

Therefore, schemes' capital structures, i.e. the amount of debt that each scheme has, has a particularly significant impact on the level of water charges, revenues and profitability or economic returns. EV is calculated as the present value of free cash flow, which is equivalent to the post-tax cash flow generated by the company before the cost of debt servicing. Higher debt implies higher debt servicing which, in turn, implies higher water charges so as to meet bank and DSCR covenants. In general, the higher the water charges, the higher the level of revenues, the higher the free cash flow and, in general, the higher the EV.

These principles and considerations, as well as the following key assumptions, have been applied when generating the free cash flow forecasts used to estimate the schemes' EVs.

2.4 EV versus Share Value

Enterprise Value (EV) is the implied market value of the on-going operations of a business. EV is equal to the value of Debt plus the value of Equity. At its most general, the equity value is the value of a shareholder's investment in a business. As discussed previously, the amount of EV transferred from an irrigation scheme cooperative to the land occupied by shareholders in the scheme depends on the actual level of water charges, compared to the level required to cover all operating costs, depreciation and a market-related return on capital that is commensurate with the risk of the investment.

The price of irrigation shares (quoted or paid by new entrants to a scheme) should not be confused with either the EV calculated in this exercise, or the implied equity value estimated as part of the EV calculation.

In effect, irrigation cooperatives are run on the lines of a 'club' model where the up-front equity paid by a new entrant is similar to a joining fee and the annual water charges are like an on on-going annual subscription to the 'club'.

Therefore the 'value' of an irrigation share reflects a different bundle of rights and obligations than, say, a listed share on the NZX or ASX or a share in an unlisted company. An irrigation share confers a bundle of benefits and obligations on the irrigator shareholder, including:

- The right to receive water with a given level of reliability,
- The right to have access to the irrigation scheme infrastructure,
- The obligation to provide access for scheme infrastructure as required, and
- The obligation to pay water and access charges.

Furthermore, much of the 'net' value of these costs and benefits is absorbed into the value of the land that is irrigated by each scheme. For these reasons, the irrigation share values often quoted or paid by new entrants bear little relationship to the equity value and enterprise values derived as part of the rating valuation exercise.

3. The ODV approach

3.1 Rating Valuations Rules

The Rating Valuations Rules 2008 set out the how utilities (including irrigation schemes) should be valued for rating purposes. Section 7 of the valuation rules deals with the valuation of utilities and is made up of three parts:

- Rule 7.1 dealing with electricity line businesses and gas distribution networks,
- Rule 7.2 dealing with the other utilities, and
- Rule 7.3 dealing with utilities that traverse territorial authority boundaries.

The development of these rules was significantly influenced by the judgment of the ECNZ case[1] (1998), which highlighted the need for a test of potential profitability for utilities. The case was also particularly instrumental in leading the choice of wording of the Rating Valuations Rules concerning the valuation methodology for utilities.

Rule 7.1 states that the utility assets of electricity line businesses and gas distribution networks must be valued using the ODV methodology. Rule 7.3 deals with the apportionment of asset values between territorial authority areas. Irrigation schemes fall into the "other utilities" category and Rule 7.2 of the Rating Valuations Rules states that:

> *When valuing utilities other than electricity line businesses and gas distribution networks, the valuer must adopt the optimised depreciated replacement cost (ODRC) valuation methodology. The valuation is subject to consideration, where appropriate, of:*
>
> *a) adequate potential profitability or service potential of the entity, and*
>
> *b) comparable sales evidence or income streams.*

ODRC is a valuation approach that reflects the new replacement cost and the age of assets and is the approach that has been used to value most schemes so far. Rule 7.2 states, clearly, that the valuer should consider the factors listed in clauses a) and b) if appropriate.

Rule 7.2, in effect, describes the basis of what is often referred to a 'fair value' test where the book value of a firm's assets is compared to the economic value of the assets. If the EV is less than the book value, then an asset impairment needs to be accounted for. If the EV is greater than the book value then the asset is not impaired. The approach that Rule 7.2 describes also has strong similarities to the ODV methodology prescribed in Rule 7.1 for the valuation of electricity lines businesses and gas pipelines. It reflects the fact that in some instances specialised assets, such as irrigation schemes, may:

- Be used at less than their available capacity, or
- Be technologically redundant or obsolete,
- Generate cashflows that result in the economic value of the asset being less than the ODRC.

3.2 ODV approach

The ODV methodology is based on an assessment and comparison of the ODRC and the economic value (EV) of fixed assets. The first real application of the ODV approach was probably in the Transpower valuation handbook draft in the early 1990s. Since then the approach has been applied to a broad range of mainly utility industries. The ODRC value is, in effect, the cost of meeting current supply needs with the most technically efficient design and configuration of assets after adjustment for depreciation.

1. Valuer-General v Electricity Corporation of New Zealand Limited (Court of Appeal, CA188/97, CA185/97, 6 October 1998 Blanchard J)

The ODV of an asset is the minimum of the economic value or the ODRC. If the ODRC of an asset is lower than the EV of the asset, then the ODRC is the appropriate value for the asset since if the firm was deprived of the asset, it would be replaced with the optimised equivalent. Thought of another way, the ODRC is the value that a new entrant would pay for the assets given their current level of service and expected life. If the EV of the asset, after considering forecasts of revenues and costs, is less than the asset's ODRC then the EV is the appropriate value. This relationship is summarised in the adjacent chart.

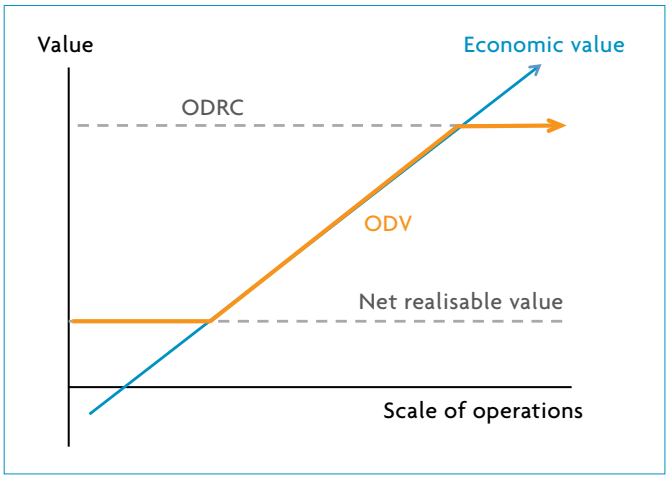

Figure 3.

The floor of the ODV is the net realisable value, (NRV) or the value of the asset in its next best use. As the assets are often highly specialised, the NRV may be the salvage or scrap value. The cap to the ODV is the ODRC value. In the case of irrigation schemes a number of things could also constrain the ODRC, including the relative costs of alternative sources of water such as deep bores or surface water.

To an extent the issues of over-capacity, redundancy and obsolescence may be picked up in the ODRC valuation. However, whether or not the asset generates cashflows that result in its economic value being less than the ODRC is not, and could result in 'fair value' of the scheme assets being less than the ODRC.

The New Zealand Equivalent to International Financial Reporting Standard 13 Fair Value Measurement (NZ IFRS 13) defines what fair value is, sets out measuring fair value in a single IFRS framework and defines the required disclosures about fair value measurements. NZ IFRS defines fair value as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date.

IFRS 13 points out that the objective of a fair value measurement is to estimate the price at which an orderly transaction to sell the asset or to transfer the liability would take place between market participants at the measurement date under current market conditions.

The definition emphasises that fair value is a market-based measurement, not an entity-specific measurement. When measuring fair value, an entity uses the assumptions that market participants would use when pricing the asset or liability under current market conditions, including assumptions about risk.

The approaches to assessing fair value set out in IFRS 13 Appendix B comprise:

- Market based approaches,
- Cost based approaches,
- Income based approaches, and
- Present value techniques.

In effect the income-based and present value approaches described in IFRS 13 are identical to the approaches used to estimate economic value applied in the ODV approach.

4. Key assumptions for populating the EV template

4.1 Information requirements

The EV template has been developed so that it can be populated with a minimum of information from the irrigation scheme. In general, the irrigation schemes should be able to provide:

- The two most recent financial years' financial accounts which will contain the three past years of financial data (i.e. current plus past years)
- An example water supply agreement and or a summary of the water charges that apply.
- A summary of the areas and shares applying to the scheme. Information on the number of shares on issue will be in the annual accounts. However, the accounts may not describe the number of shares that apply per hectare or per litre per second. Clarification will be required from the schemes in that case.
- Any information on "steady state" capital expenditure which, if unavailable, can be based on some proportion of the annual depreciation charge and the capital expenditure over the past two to three years that could be classified as maintaining the scheme for 'business as usual'.

The inputs from the financial accounts and others can then be inputted into the relevant parts of the EV financial model. The following sections provide guidance on each major section.

4.2 Revenues

The revenue forecasts are based on projections of water charges, scheme fees and other income. The total forecast revenues that are generated by the model should be compared with the past two to three years. As well, as noted previously, the objective of most schemes is to minimise water charges and meet minimum debt covenants. Therefore, charges should be set at levels that meet the CFADS requirement, or, in the case of companies that have little or no debt, generate a minimum breakeven profit before tax on average over a 5 to 10-year period.

The aim here is to generate realistic revenue forecasts by manipulating the forecast growth rate in charges. It is unrealistic to forecast a significant net profit after tax or significant on-going losses. The aim should be to forecast break-even financial performance – on average. On this basis, the revenues used to calculate EV may differ from actual scheme numbers. This is a rating valuation requirement to ensure assessments are made using a consistent methodology.

4.3 Operating Costs

Operating cost forecast can be based on the analysis of the past three years' actual operating costs. These costs can be forecast forward at an appropriate CPI forecast.

4.4 Capital expenditure

Capital expenditure forecasts are based on the expected level of expenditure required for the scheme to support the current level of operations. In the case of most schemes, capex is minimal and the scheme's capacity is maintained through repairs and maintenance. As noted above, the capex estimates can be based on some proportion of the annual depreciation charge and the capital expenditure over the past two to three years that could be classified as maintaining the scheme for 'business as usual'.

4.5 Cost of capital – WACC

The present value of the forecast free cash flows is estimated using an appropriate Weighted Average Cost of Capital (WACC) that reflects the systematic risk associated with irrigation schemes. Current practice is to estimate the cost of equity on a post-tax basis using the Brennan-Lally formulation of the Capital Asset Pricing Model (CAPM).

Using WACC to estimate discount rates and required rates of return is now regarded as corporate finance orthodoxy. It is the most commonly used and recommended approach for determining the appropriate cost of capital. The CAPM has its critics, but to paraphrase, "it is probably the worst approach, apart from the possible alternatives".

The WACC is the required return or hurdle rate on the operating assets employed by the prospective project or investment. As operating assets are usually financed by a mix of debt and equity the required rate of return on the investment should reflect the opportunity costs of all of the sources of capital, weighted by their proportions in the capital structure.

THE COST OF EQUITY

The CAPM estimates the return on equity of projects or investments for a given level of risk. The level of risk is expressed through the Asset beta, which can be thought of as a scaling factor that increases or decreases the risk associated with an unleveraged investment relative to a 'market portfolio". Over the past two decades there has been an extensive body of work (e.g. by the Commerce Commission) examining the required rate of return on infrastructure assets in New Zealand, including electricity distribution and transmission, gas pipelines and airports. The Asset Beta and resulting WACC summarised in the following table, are consistent with the WACCs used for gas and electricity distribution businesses. That is, infrastructure networks or 'tolling' businesses with limited business risk.

An important input to the cost of equity capital is the risk-free rate. In general, the risk-free rate used to estimate the CAPM base return on equity should be based on a proxy such as the New Zealand Government 10-year bond yield. The Reserve Bank of New Zealand website is a good source of this data (see www.rbnz.govt.nz/statistics/b2). As these rates are relatively volatile it is good practice to use a two-month average of daily rates as the estimate for the risk-free rate applying at the valuation date.

THE COST OF DEBT

The after-tax required return on debt is the rate on fixed rate debt, such as the swap rate plus the appropriate margin. In general, the maturity of the debt should match the duration of the assets. The swap rate margin over the government stock rate varies with market conditions. An indication of the cost of debt for a scheme can usually be obtained from the Notes to the schemes' financial accounts.

CAPITAL STRUCTURE

Capital structure is the mix of debt and equity used to finance the business. Theoretically, the cost of capital is not affected by changes in the mix of debt and equity. The WACC and CAPM are based on the idea that as more (or less) debt is used in the capital structure, the cost of equity increases (or decreases) offsetting the use of more (or less) of the cheaper funding source.

Therefore, one of the key principles of corporate finance is that "capital structure does not matter". In other words, the intrinsic operating value of two identical businesses will be the same, irrespective of how the businesses are financed.

Therefore, we should expect the WACC, which is the return on all of the capital employed, to be the same irrespective of the level of leverage. However, in practise, the Brennan-Lally version of the CAPM results in the WACC increasing slightly as leverage increases. This slight divergence from the theory is acknowledged and tolerated by practitioners and regulators.

An important point to note is that the capital structure used in estimating the WACC is the target capital structure for the scheme rather than the actual. For the sake of consistency, we have adopted an average leverage of 40% debt: 60% equity in these guidelines. However, in some cases differing capital structures may be adopted, particularly in the case of new schemes.

A significant cost for some schemes in the not-too-distant future is that associated with consent renewal. In some cases, the consent renewal may occur within the explicit forecast period of 15 years. In these cases, it would be appropriate to include as capital expenditure the expected cost of the renewal.

ANNUAL UPDATE

In general, the relative systematic risk of the schemes should not change significantly over time. However, several other inputs will need to be updated including the risk-free rate (as discussed above), and the debt margin (which affects the overall cost of debt). The Valuer General is proposing to issue an annual updated WACC that will be applied to all schemes valued during that financial year. The updated WACC will be issued around June of each year to coincide with the valuation programme.

The relevant parameters and the estimated pre- and post-tax WACC as at July 2016 are summarised below:

Table 1: WACC Calculation Summary June 2016.

Parameter		
Tax	R_f	28.0%
Risk free rate	T	2.7%
Asset Beta	$ß_a$	0.40
Equity Beta	$ß_e$	0.67
Market Risk Premium	MRP	7.5%
Return on Equity	R_e	6.9%
Debt Margin		2.2%
Cost of Debt	R_d	4.9%
Debt /(Debt + Equity)	D	40.0%
Equity/(Debt + Equity	E	60.0%
WACC – post tax		5.6%

5. The Financial Model

5.1 Background

IrrigationNZ has provided a financial model template for valuation providers to use when valuing irrigation schemes. The template has two tabs:

INPUTS – which is where the majority of the scheme inputs are populated.

EV – which contains the discounted cashflow, EV calculations and fixed asset schedules.

5.2 Legend

In general, the following conventions are used in the model:

Text	Inputs – usually names or text
Values	Inputs – usually numerical values
Formulae	Formulae or calculated values

5.3 Key ranges: INPUT Tab

The template provided is just that; additional fields and rows can be inserted as required as long as the formulae remain correct.

SCHEME DATA
This block summarises the shares on issue and the hectares served by the scheme. The share data can usually be found in the schemes' annual reports. The relationship between the number of shares per ha that are required (or the number of shares per litre per second if that is the basis of charging) also needs to be confirmed. This can be confirmed with the scheme General Manager or from the Scheme Water Supply Agreement.

CAPEX ROW
As mentioned above the only capex that should be entered in is the 'business as usual' capex. Scheme expansions or extensions should not be taken into account until the projects are completed and the new pricing confirmed by shareholders.

COST OF CAPITAL ROWS
As noted, the key variables to update here are the, ***Risk Free Rate*** and the ***Debt Margin***.

SCHEME FINANCIAL DATA
This is the major input section insofar as this is where financial information from the financial statements is entered. The section is laid out in much the same format as the schemes' financial statements with sections headed:

- Statement of Financial Performance
- Statement of Financial Position
- Statement of Cash-flows.

There are also inputs for other information normally held in the notes of the accounts. The information is laid out in this way so that the forecast of operating expenses, for example, can be traced back to an original source.

5.4 Scheme Charge Assumptions

The Financial Data section of the **INPUTS** tab includes a line item labelled "Price Path". Percentage values input into these cells increase or decrease the future water charges. Increasing water charges will, in general, lead to higher revenues and a higher EV for the scheme. As noted previously in Sections 2.2 and 4.2, the objective of most irrigation schemes is to minimise water charges, pay operating costs and meet minimum debt covenants. Charges should be set to meet the CFADS requirement, or, in the case of companies that have little or no debt, generate a minimum breakeven profit before tax on average over a 5 to 10-year period.

It is unrealistic to forecast a significant net profit after tax or significant on-going losses. The aim should always be to forecast break-even financial performance – on average. It is also unrealistic to forecast increasing charges that result in large cash balances in the future.

5.5 EV Tab

The EV section summarises the calculation of the estimated EV. EV is a well-recognised valuation measure that reflects the future earning potential of an asset, project or business. EV may be calculated in a number of ways that are all to a greater or lesser degree forward looking. In this case, EV has been estimated as the present value of forecast free cash flows generated by each scheme.

Free cash flow is calculated as:

	Cash revenues
Less	Cash operating expenses
Equals	Earnings before Interest, Tax, Depreciation and Amortisation (EBITDA)
Less	Ungeared Cash Tax
Less	Capital expenditure
Equals	**Free Cash Flow**

Where Ungeared Cash Taxes are calculated as:

	EBITDA
Less	Tax depreciation
Equals	Ungeared profit before tax
Multiply by	Tax rate on ungeared profit before tax
Equals	**Ungeared cash tax**

The EV calculation is split into two components: the present value (PV) of free cashflow from year 0 to year 15, and, the PV of the scheme beyond the explicit forecast period. The PV of the free cashflow from year 0 to year 15 is estimated using a set of discount factors. The PV of the cash-flows beyond year 15 is estimated as the PV of:

- the minimum of the capitalised free cash flow in year 15, or,
- the estimated revalued book value in year 15.

The fixed assets schedules from are used to generate estimates of the depreciation that are used to estimate tax.
The estimates of the closing asset value are also part of the residual value calculation.

Glossary

Asset beta	A measure of the systematic business risk associated with an investment.
CFADS	Cash Flow Available for Debt Service calculated as: Operating revenue: • minus operating expenses, • minus capital expenditure paid in cash, • minus corporate taxes or other taxes on income or gains paid in cash (net of cash tax refunds or other tax receipts received) and • plus the amount of any decrease, or minus the amount of any increase, of working capital.
Debt margin	The percentage margin between the risk-free rate and the cost of debt.
EBIT	Earnings before interest and tax
EBITDA	Earnings before interest, tax, depreciation and amortisation.
Enterprise Value	The implied market value of the on-going operations of a business. Enterprise Value (EV) is equal to the value of Debt plus Equity.
Equity beta	A measure of the systematic business associated with an investment including the impacts of financial risk associated with the level of the firm's debt. An equity beta of 1.0 o=implies the investment has the same risk as the 'market' portfolio. In effect, the equity beta scales up or down the returns on investment to reflect relative financing and risk.
Free cash flow	The post-tax cashflows available to all suppliers of capital after required capital expenditure. Calculated as earnings before interest and tax (EBIT), less Tax plus Depreciation and Amortisation less the change in Net Working Capital and Capital Expenditure.
Post tax market risk premium	The after-tax difference in expected returns between a diversified portfolio of equity investments (such as a broad market index) and the risk free asset (for example 10-year government bonds).
Risk free rate	Assumed to be the rate of return on a default free asset. In practice, the yield on 5 or 10-year government bonds is used as a proxy.
WACC	Weighted average cost of capital. A model that is applied to estimating the discount rate or hurdle rate for investments as the weighted average of the required returns on equity and debt in an investors capital structure. The WACC is usually estimated on a post-tax basis.

Appendix 1: Cost of Capital Notes

In general, schemes use a mix of debt and equity to finance their operating assets. Therefore, the total value of the business (V) must equal the value of debt (D) and equity (E). This is the accounting identity:

$$V = E + D.$$

V is the total value of the unencumbered business or what is often called the "intrinsic operating value" of the business. V is the present value of the free cashflows produced by the business when discounted at the appropriate discount rate.

The WACC calculation is:

$$WACC = r_e \times E + r_d \times D \times (1 + T_c)$$

Where:

- r_e = Required post tax return on equity,
- r_d = Cost of debt,
- T_c = Marginal tax rate,
- E = Proportion of equity in the target or long-term capital structure.
- D = Proportion of debt in the target or long-term capital structure.

The capital asset pricing model (CAPM) is the model most commonly used for deriving risk-adjusted rates of return on equity. The CAPM expresses the rate of return on equity as:

1. The rate of return on a risk-free investment, plus
2. A suitable risk premium.

The risk premium is scaled up or down depending upon the risk that the project would add to a notional portfolio. The CAPM model, in what is often referred to as the Brennan-Lally formulation, defines the expected post-tax required return on equity, r_e, as:

$$r_e = r_f (1 - T_c) + ß_e (PTMRP).$$

Where r_f is the risk-free rate, PTMRP is the post tax market risk premium or the difference between the return on a notional market portfolio and the risk free rate. $ß_e$, (beta), is the equity beta.

The equity beta measures the riskiness of the investment relative to the market portfolio of all other assets and captures the impact of both operating risk and financial risk. This concept is important, as firms with more debt will have higher equity betas and higher required returns on equity – all other things being equal. However, although the firms will have different equity betas, the identical firms will still have the same level of business risk and what is referred to as the same 'asset' beta.

If an investment had no systematic risk, its equity beta would be zero. If an investment is of average risk, the equity beta will be 1.0. This means that the premium over the risk-free rate that equity investors expect will be the same as the average for the overall market.