IPART

Independent Pricing and Regulatory Tribunal
New South Wales

Modelling local infrastructure contributions

in a present value framework

Final Technical Paper
Local Government

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The Independent Pricing and Regulatory Tribunal (IPART)

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1 Executive Summary

Councils have the option of using a net present value (NPV) approach when determining contribution rates in a contributions plan. The NPV approach involves the use of a discounted cash flow model. In a discounted cash flow model, contribution rates are calculated so that the present value of anticipated revenue is equal to the present value of anticipated costs. This approach recognises that today's dollars are of greater value than dollars received in the future.[1]

This Technical Paper outlines our recommended approach to calculating the discount rate and other aspects of modelling local infrastructure contributions using an NPV approach.

We first published a Technical Paper on modelling contributions in September 2012 and revised the paper in June 2015 and February 2016.[2]

In this version of the Technical Paper we have made three changes to our recommended approach:

- We have updated our method of calculating the cost of debt (which is our recommended discount rate) to adopt a trailing average of sample values. This is consistent with IPART's current Weighted Average Cost of Capital (WACC) method, which was finalised in February 2018.[3]
- We have updated our method of calculating the expected inflation rate which we use to convert the nominal discount rate to a real discount rate. Our revised method was a five-year estimate rather than a 10-year estimate used previously. This change also aligns with the current WACC method, which calculates the expected inflation rate over the regulatory period for the relevant business.
- We have modified our approach to the escalation of contribution rates and now recommend that councils modelling in nominal terms use an escalation factor of 2.5%, which is the midpoint of the Reserve Bank of Australia's (RBA) target range for inflation.

In summary, we recommend that in a present value framework for local infrastructure contributions:

1 Because current consumption is preferred to future consumption, lenders demand compensation for postponing their consumption. The opportunity cost of current consumption then becomes the interest that borrowers are prepared to pay. In numerical terms, if you want to have $100 in one year's time with interest rates at 5%pa you only need to invest $95.24 today. The corollary being that the present value of $100 in one year's time is $95.24.

2 IPART, *Modelling local development contributions – Technical Paper*, September 2012; IPART, *Modelling local development contributions in a present value framework – Technical Paper*, June 2015; and IPART, *Modelling local development contributions in a present value framework – Technical Paper*, February 2016.

3 IPART, *Review of our WACC method - Final Report*, February 2018.

1. The nominal discount rate should be based on a market-based estimate of the cost of debt for the local government sector. We to do this by taking the risk-free rate (10-year Commonwealth bond yield), adding a debt margin which we estimate to be half the spread between the yields on 10-year Commonwealth bonds and 10-year non-financial corporate bonds with an 'A' credit rating, and adding debt-raising costs of 12.5 basis points. This provides a conservative estimate of the risk premium above the risk free rate to reflect the cost of borrowing that local councils are likely to face.[4]

2. The cost of debt has a historic and current component. We calculate the cost of debt using the midpoint method of the two relevant components (ie, midpoint of the historic and current cost of debt). This calculation method is consistent with IPART's current WACC methodology.

3. The nominal discount rate should be adjusted for inflation in order to derive a real discount rate, if councils are using a real model. We use an inflation forecast based on the geometric average of the RBA's forecast for headline inflation for the first year, and four years of the midpoint of its target inflation range.

4. The escalation factor used to escalate contributions rates in a nominal model should be 2.5%, which is the midpoint of the RBA's target range for inflation.

We accept that councils can use either real or nominal modelling approaches, provided their chosen approach uses realistic and observable changes in cost indexation. In the case of nominal models, they must also incorporate realistic assumptions of inflation.

We do not insist that councils use an NPV approach when modelling local infrastructure contributions. However, if they do, we recommend they use the assumptions outlined in this paper.

We sought stakeholder feedback on a draft version of the Technical Paper during July 2018. At the request of The Hills Shire Council, this final Technical Paper includes a more detailed description of the trailing average approach to calculating the cost of debt.[5]

We have also clarified our approach to estimating inflation. No other changes have been made since the draft.

As we have in the past, we will continue to publish on our website the latest recommended nominal and real discount rates biannually (in February and August each year). We will also publish the calculation of the discount rate in the WACC model spreadsheet, available on our website.

4 We use a different method of calculating the average yields but we have not changed our choice of debt instruments.

5 The Hills Shire Council submission to IPART Draft Report, July 2018, p 1.

2 Funding local infrastructure for new development

Local councils are responsible for providing public amenities or public services to facilitate new development in greenfield and existing urban (infill) areas. Typically, this includes providing:

- land and facilities for stormwater management (eg, drainage channels, culverts, raingardens)
- land and facilities for transport (eg, road works and traffic management)
- open space and embellishment (eg, parks and playing fields)
- land for community services
- costs of plan preparation and administration.

The *Environmental Planning and Assessment Act 1979* (EP&A Act) enables councils to levy development contributions to fund local infrastructure. As a condition of development consent, councils may impose:

- s7.11 contributions (previously s94 of the EP&A Act) - a monetary, dedication of land free of cost and/or works in kind contribution towards the cost of new local infrastructure
- s7.12 contributions (previously s94A of the EP&A Act) – a fixed levy, which is a percentage of the proposed cost of carrying out the development.

IPART only reviews plans for s7.11 contributions, and only those plans proposing contributions above the relevant threshold amount.[6]

2.1 What is a local infrastructure contributions plan?

To levy s7.11 contributions, councils must have a local infrastructure contributions plan in force. Among other things, a local infrastructure contributions plan must outline:

- the expected development in the plan's catchment area
- the projected future population of the area
- the estimated cost of local infrastructure works
- the estimated cost of land required for local infrastructure
- the contribution rates that apply to development in the plan's catchment area
- how contribution rates will change over time (ie, how contribution rates will be escalated).

6 *Environmental Planning and Assessment (Local Infrastructure Contributions) Direction 2012*, as amended in February 2018.

2.2 How do councils finance infrastructure in a contributions plan?

Councils have a number of options for financing the expenditure that is included in a contributions plan:

- using funds collected under the relevant s7.11 plan
- borrowing and repaying funds accumulated in other s7.11 plans or in other reserves
- borrowing externally (through T-Corp or commercial lenders)

In some instances councils may delay expenditure until they receive sufficient contributions from the relevant plan. However, this is not usually a feasible option in greenfield areas because councils must provide some local infrastructure (eg, road and stormwater facilities) before development can occur.

We understand that most councils use funds accumulated under other s7.11 plans or in other reserves.

2.3 How do councils calculate contribution rates?

In determining contribution rates, councils have the option of using an NPV approach. This involves the use of a discounted cash flow model. In the discounted cash flow model, the contribution rates are calculated so that the present value of anticipated expenditure is equal to the present value of anticipated revenue.

Most councils choose not to use an NPV approach. This could mean that these councils do not collect sufficient revenue to cover what they spend on land and works over the duration of a plan, due to the mismatch between the timing of expenditure and receipt of contributions revenue. However, councils may choose to mitigate this risk by regularly reviewing their contributions plans. The regular review of plans does not involve the complexities of using an NPV approach, which may include the setting of, and subsequent revision to model assumptions (ie, timing of receipt of contributions revenue and delivery of infrastructure, progressive forecast of population growth with development etc).

2.3.1 Typical approach to calculating contribution rates

Most councils do not have regard to the timing of cash flows and do not use an NPV approach. Instead, to derive the base year contribution rates for each infrastructure category, they:

- estimate the total cost of land acquisition and works required as a result of development in the plan's catchment area, in current dollar terms, then
- divide this amount by the size of the catchment area, usually expressed in hectares (ha) of net developable area (NDA) or net increase in population.

Box 2.1 shows a general formula for calculating local infrastructure contributions without regard to timing of cash flows.

Box 2.1 Contributions rate formula for councils not using an NPV approach

$$DC_0 = \frac{C}{N}$$

Where:

- DC_0 is the base contribution rate (usually expressed in $ per ha of NDA or $ per person)
- C is the estimated cost of infrastructure apportioned to the development area
- N is size of the catchment (usually ha of NDA or net increase in population)

Note: the net increase in population is the total anticipated population in the area less any existing residents.

2.3.2 Using a Net Present Value approach

The NPV approach involves the use of a discounted cash flow model in which the contribution rate is calculated so that the present value of anticipated expenditure is equal to the present value of anticipated revenue. This helps to ensure that a council recovers sufficient revenue from local infrastructure contributions to recover its costs in present value terms.

Box 2.2 shows a general formula for calculating local infrastructure contributions using an NPV model.

Box 2.2 Contributions rate formula for councils using an NPV approach

$$PV\ (Costs) = PV\ (Revenue)$$

$$PV\ (Costs) = N_1 * DC_0 + \frac{N_2 * DC_0 * (1+e)}{(1+d)} + \cdots + \frac{N_t * DC_0 * (1+e)^{t-1}}{(1+d)^{t-1}}$$

$$DC_0 = \frac{PV\ (Costs)}{\sum_{t=1}^{t} N_t \frac{(1+e)^{t-1}}{(1+d)^{t-1}}}$$

Where:

- N(t) is the assumed size of the catchment (usually ha of NDA or net increase in population) in year t
- DC_0 is the base contribution rate ($ per person/ hectare)
- d is the discount rate
- e is the escalation factor
- t is time in years

Note: the net increase in population is the total anticipated population in the area less any existing residents.

3 Our recommended approach for NPV modelling

The specifics of our recommended approach to modelling local infrastructure contributions in an NPV framework involve the following decisions:

1. The choice of a discount rate.
2. Whether NPV-based contributions plans should be modelled in nominal or real terms.
3. The choice of rates for escalation of costs used in the plan.
4. The choice of an escalation factor for escalation of contribution rates (that drives revenue).

We discuss each of these decisions in turn below.

3.1 Our recommended discount rate

An NPV approach to modelling local infrastructure contributions recognises that the future value of cash flows (revenue) and costs must be discounted. That is because a dollar next year is worth less than a dollar today. It is well accepted that the discount rate that an organisation should use for this purpose must be its own cost of capital.

IPART uses the WACC model to estimate discount rates for regulated utilities. We use this approach for private sector companies and state-owned corporations, which both have a debt and equity component (ie, shareholders are owners of private firms and the state government is the equity owner for state-owned corporations).

Unlike a regulated utility, a council's cost of capital does not have an equity component. Councils cannot raise equity funding by selling shares in their enterprise, as that would amount to privatisation. For this reason, a council's cost of capital is its cost of debt (ie, cost of borrowing).

We set out our method of estimating our recommended discount rate for a council in the subsections below. This approach recognises that councils are relatively low-risk borrowers.

3.1.1 Estimating the cost of debt

We calculate the cost of debt as the nominal risk-free rate plus a debt margin. We have decided to continue determining the cost of debt as the midpoint between our estimates of the historic and the current cost of debt, and only consider moving away from this midpoint rule when market conditions are highly volatile, indicating there is significant economic uncertainty.

Risk-free rate

The risk-free rate is the rate of return of an investment with no risk or loss. We have calculated the risk-free rate using the 10-year Commonwealth bond yield data, consistent with IPART's WACC method.

Debt margin

The debt margin represents the level of compensation lenders require above the risk-free rate. This margin takes into account the probability of default by the borrower and the duration of the debt. For the utilities IPART regulates, we apply the benchmark debt margin to all businesses in one industry sector.

For councils, the debt margin should be the spread between its interest cost incurred on their debt (expressed as a percentage) and the risk-free rate. There is no available data to estimate the benchmark debt margin for all local councils. Since we cannot directly estimate this benchmark, we use a proxy based on a benchmark credit rating.

We considered the yields on credit-rated non-financial corporate 10-year debt (ranging from A+, A, A- to BBB). It is highly likely that the councils that would want to issue debt would be both well managed and financially sustainable. We consider they would be likely to have a credit rating considerably better than BBB because, unlike a corporate entity, a council has compulsory taxation powers, which enables it to meet its financial commitments in response to the adverse effects of changes in circumstances and economic conditions.[7] We assume that councils would most likely bear a AA credit rating, for which no specific data exist. In the absence of this data, we consider the appropriate benchmark credit rating for the cost of borrowing by local governments to be the non-financial corporate A rated debt.

Historic and current cost of debt

In our 2016 Technical paper, we used the average rate for the previous 10 years to calculate the historic cost of debt and the average rate for the previous 2 months for the current cost of debt. This was consistent with IPART's WACC method at that time. Since the publication of our 2016 Technical Paper, IPART has updated our method of calculating the WACC.

IPART's current WACC method, finalised in February 2018, uses a trailing average to calculate the cost of debt. We have chosen to also apply the trailing average method to calculate the local government cost of debt, in order to maintain consistency between this and the WACC calculations which we update biannually on our website.

In simple terms, we assume that the debt is split into a historic portion and a current portion. The trailing average approach for calculating the historic portion consists of ten equal tranches of debt each of which has a ten year term, and the maturity dates are staggered so that one tranche matures each year. This reflects an efficient debt strategy designed to minimise refinancing risk. The trailing average approach for calculating the current portion of debt

7 We are guided by the descriptions of credit ratings used by Standard & Poor's. Standard and Poor's Global, *Guide to Credit Rating Essentials*, no date, p 13.

consists of a smaller number of equal tranches. We have relied on the 2005 Practice Note,[8] which states that it is best practice to review contribution plans every five years. This would enable a council to capture any changes to expected timing of expenditures. For plans with significant changes, it is likely that a review will have already occurred within a five year period.

For each annual tranche, we will obtain the average interest rate estimated over a consistent observation period (ie, a 40-day period for the Commonwealth 10-year bond yield and a 2-month period for the non-financial corporate A rated bond).

This approach means that the interest rate on the historic debt portion is an average of the interest rates over the observation period for the past ten years and the interest rate on the current debt portion is an average of interest rates over the observation period for the past five years. For more detail on this method of calculating debt costs, please see the 2018 Final Report on our Review of our WACC Method.[9]

3.1.2 Calculating the discount rate

Our method for estimating the discount rate involves:

- calculating the midpoint of the historic and current cost of debt for the 10-year Commonwealth bond yield and non-financial corporate A rated debt,
- halving the spread between the 10-year Commonwealth bond yields and non-financial corporate A rated debt and adding to the risk-free rate,
- adding IPART's standard allowance for debt-raising costs of 12.5 basis points, and
- rounding this to one decimal place to derive a nominal discount rate.

Table 3.1 provides an example of this calculation based on market data from July 2018.

Key advantages of this approach are that:

- it is consistent with IPART's WACC method (in determining the cost of debt for utilities)
- it is market based (based on an assumed credit rating for the sector)
- it is relatively simple to administer, and
- historical data are available on the relevant margin.

8 Department of Infrastructure, Planning and Natural Resources, *Development contributions Practice Note – July 2005, Life of a development contributions plan*, *review and amendment*, p 1.

9 IPART, *Review of our WACC method - Final Report*, February 2018.

Table 3.1 Calculation of the discount rate

Relevant rates	Commonwealth 10-yr bond yield(%)[b]	Corporate A-rated 10-yr yield (%)[b]	Spread (%)
Current cost of debt[a]	2.70[c]	4.20[c]	
Historic cost of debt[a]	3.60[c]	5.40[c]	
Midpoint	3.15	4.80	1.65
Calculating the discount rates			
Commonwealth 10-year bond yield (midpoint)	3.15		
+ Half of the spread	0.83		
+ Debt raising costs	0.125		
= Nominal discount rate	**4.10**		
Nominal discount rate (rounded to 1 decimal place)	**4.1**		

[a] We use a trailing average to calculate the historic and current cost of debt. The historic cost of debt consists of ten equal tranches of debt for a 10 year period and the current cost of debt consists of five equal tranches of debt for a five-year period.

[b] For each tranche of debt, the Commonwealth 10-year bond yield is based on 40 trading days data and the non-financial corporate A-rated 10 year yield is based on 2 months of data.

[c] The bond yield values are all rounded to 1 decimal place to be consistent with the corresponding inputs in the primary WACC calculation.

Note: The periods over which the trailing averages are calculated are to 31 July 2018.

Source: Reserve Bank of Australia, Statistical Tables F2 (Commonwealth 10-year bond yield) and F3 (non-financial corporate A-rated 10 year yield).

3.2 Real versus nominal NPV models

The 2005 Practice Note gives councils the flexibility to model contribution rates using either nominal or real values.[10] Modelling in real terms means that inflation assumptions are not included within the model. Modelling in nominal terms means that the council includes inflation or escalation assumptions within the model.

Some councils found that nominal models were easier to explain to their stakeholders and to integrate into overall council financial frameworks, such as their long term financial plan.[11]

Constant dollar (real) NPV models on the other hand clearly show the changes in costs and revenues excluding inflation and therefore are generally more transparent.

For these reasons, we accept both the real and nominal modelling approaches, provided either approach uses realistic and consistently applied assumptions in relation to the escalation of costs and revenues.

10 Department of Infrastructure, Planning and Natural Resources, *Development Contributions Practice Notes – July 2005, Financial management of development contributions,* p 3. The Practice Note does not specify whether councils should use real or nominal modelling NPV approaches.

11 Ku-ring-gai Council submission to IPART Consultation Paper, March 2015, p 1.

3.2.1 Adjusting a nominal discount rate to a real discount rate

The nominal discount rate we derived in section 3.1 can easily be converted to a real rate by adjusting for inflation. This conversion uses the formula in Box 3.1.

Box 3.1 Converting nominal rates to real rates

A nominal discount rate can be converted to a real discount rate by adjusting for expected inflation. This conversion uses the Fisher equation rearranged as follows:

$$r = \frac{1 + i}{1 + \pi} - 1$$

Where
- r = real discount rate
- i = nominal discount rate
- π = expected rate of inflation

There are various ways to estimate inflation. IPART's current WACC method calculates the expected inflation rate as a geometric average of the change in the level of prices over a specified period. We define the 1-year ahead RBA forecast as the inflation forecast in the RBA's most recently issued Statement of Monetary Policy (SMP) that is closest to 12 months ahead of the start of the regulatory period for the first year of the regulatory period, and the midpoint of the RBA's target inflation band (2.5%) for the remaining years in the regulatory period. [12]

We have chosen to calculate the expected inflation rate in the local government context so that it is consistent with IPART's current WACC method. While there is no specified regulatory period for a local infrastructure contribution plan, we use five years because it is in line with the period for calculating the current cost of debt and the expected period of review for contribution plans.

This means our inflation estimate is the average of the RBA's inflation forecast for the next year, and four years of the midpoint of its target inflation range. Inflation data are accessible on the RBA's website. We also plan to publish the nominal discount rate, the inflation adjustment and the real discount rate biannually.

We provide an example of the conversion of the current nominal discount rate to a real discount rate in Table 3.2. The data is sampled at July 2018. Councils should use more up-to-date data to perform this calculation based on our biannual market updates.

12 See IPART, *Review of our WACC method*, pp 75-76.

Table 3.2 Converting a nominal discount rate to a real discount rate

Nominal discount rate	4.10
Inflation forecast	2.40
Real discount rate	1.66
Real discount rate (rounded to 1 decimal place)	1.7

Source: IPART calculations based on Reserve Bank of Australia, Statistical Tables F2 (Commonwealth 10-year bond yield), F3 (non-financial corporate A-rated 10-year yield) and Statement on Monetary Policy, 31 July 2018.

3.3 Escalating costs within a contributions model

The costs of land or of different categories of infrastructure (eg, open space works vs stormwater management works) may increase at different rates. It is therefore reasonable for councils to use different rates of escalation for each cost category, provided there is sound reason to do so.

For example, in the case of CP15 – Box Hill Precinct, we considered that the escalation assumptions were reasonable because they were based on recent past growth rates of land and capital costs (measured by Australian Bureau of Statistics (ABS) indices of established house prices and producer prices).[13]

Both real and nominal models can make use of different cost indices. Whilst the established house price and producer price indices published by the ABS are nominal indices, they are readily convertible to real indices using the method described above for converting the discount rate.

3.4 Escalating contribution rates within a contributions model

The *Environmental Planning and Assessment Regulation 2000* allows councils to index contribution rates quarterly or annually using:

- readily accessible index figures adopted by the plan (such as a Consumer Price Index), or
- index figures prepared by or on behalf of the council from time to time that are specifically adopted by the plan.[14]

In a nominal model, a council must make an assumption about how it will adjust contribution rates over time. IPART recommends that councils using a nominal approach assume an escalation factor of 2.5%, which is the midpoint of the RBA's target range for inflation.

In our February 2016 Technical Paper, we recommended that councils use an escalation factor equivalent to the discount rate. We have since revised our position to take account of the

13 IPART, *Assessment of The Hills Shire Council's Section 94 Contributions Plan No 15 Box Hill Precinct*, March 2016.

14 *Environmental Planning and Assessment Regulation 2000, cl 32 (3)(b).*

incentives councils have to ensure development proceeds according to the timing anticipated when the plan is prepared.

When an area is rezoned to facilitate new urban development, all the participants (including the relevant council, public water utility (PWU), state government agencies, property developers and the local community) build expectations about the scope and timing of the development. Councils reflect their commitment to the development in the form of a local infrastructure contributions plan.

The contributions plan is publicly available and provides important information to stakeholders. It lists local infrastructure contributions based on the forecast amount, type of new development and the expected costs of local infrastructure required as a result of the new development over a specified period of time. In the case of contributions plans using NPV models, the local infrastructure contributions are also based on the expected timing of infrastructure costs and development, as the council's forecast infrastructure costs and local infrastructure contributions revenue are discounted to present values.

Affected parties, including councils and developers, can make financial commitments based on the contributions plan. We aim to establish an escalation factor where each player has a financial incentive to prefer adherence to the timetable for development and infrastructure provision in the plan. Developers have such an incentive because, of all participants they face the largest holding costs for the land they must purchase in advance of any construction activity. That is the case regardless of the escalation factor that the council applies to the local infrastructure contributions.

If the escalation factor within a contributions model was equal to the council's own discount rate, the council would be financially indifferent as to whether development proceeded according to the timetable in the contributions plan. That is, it would be just as well off financially if it failed to do what the plan specifies according to the expected timetable or if it took other decisions (eg, approval of development applications) that tended to delay the development.

If the escalation factor is less than the council's discount rate, the council has a financial incentive to ensure development proceeds according to the timetable in the plan. This is why we have recommended an escalation factor of 2.5%, which is the midpoint of the RBA's target range for inflation, and is typically less than a council's cost of borrowing.

A range of factors can influence a council's decisions, and the recovery of local infrastructure costs may not be the determining factor in all cases. However, when all else is equal, this incentive may impact on a council's actions and therefore the development timetable.