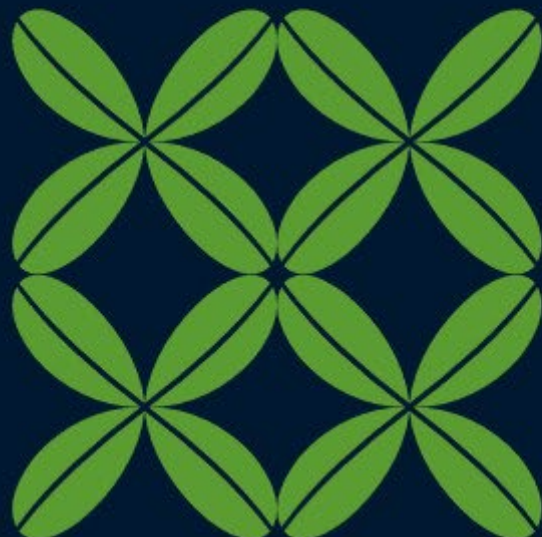
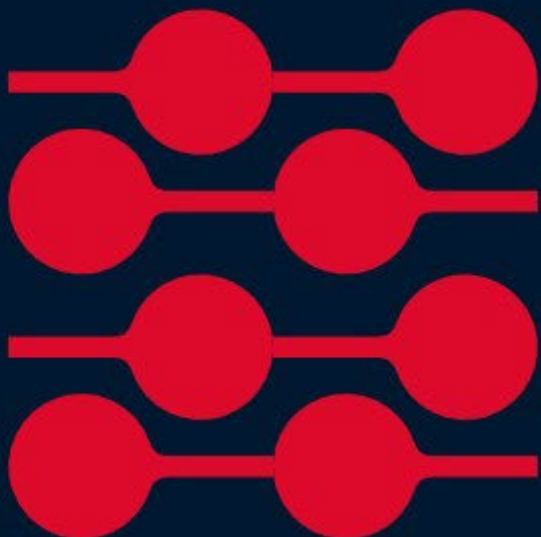




Cost escalation factors and interest rates

24 August 2022, Version 1.0



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Summary

- You have asked for advice on the values to be used over the next 30 years for: (1) inflation for land acquisition costs; (2) inflation for construction costs; (3) interest rates. These values will inform the setting of Development Contribution charges.
- The recommended approach is to differentiate between a near-term forecast, which accounts for the current economic cycle, and a long-run projection based on historic trends over the past three decades.
- A key finding is that using the Consumer Price Index (CPI) to inflate the modelled cost of acquiring land and of construction is likely to be insufficient to account for cost pressures over the long term.
- For land acquisition, the recommended long-run cost escalation factor is 7.2% per year, derived from the average growth rate for the median house price between 1992 and 2022. In the near term, house prices are forecast to fall, as shown in Table 1. The latest near-term forecast can be used at the time that the contributions are being calculated.
- For construction, the recommended long-run cost escalation factor is 2.5% per year, derived from cost pressures on capital and labour inputs over 1994 to 2022. In the near term, the construction industry is facing higher-than-average cost pressures. A forecast of pressures is shown Table 1. The latest near-term forecast can be used at the time that the contributions are being calculated.
- For interest rates, it is recommended that the rates provided by the Auckland Council's Treasury team, for use in financial planning, be used. Table 2 below shows recent near-term forecasts to 2030/31. The latest forecast can be used at the time that the contributions are being calculated.

Table 1: Recommended values for cost escalation

Measures (percent)	2021/22	2022/23	2023/24	2024/25	2025/26 onwards (long-run projection)
Land cost escalation	7.4	-7.0	-1.2	3.5	7.2
Construction cost escalation	6.0	5.2	4.0	3.2	2.5

Table 2: Recommended interest rates

Interest rate (%)	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30	30/31 onwards
Update of May 2022	4.26	4.41	4.44	4.45	4.46	4.49	4.52	4.51	4.49	4.46
Update of June 2022	-	4.35	4.41	4.45	4.50	4.57	4.66	4.72	4.82	4.89

Purpose and approach

Purpose

You have asked for advice on the values to be used over the next 30 years for: (1) inflation for land acquisition costs; (2) inflation for construction costs; (3) interest rates. These values will inform the setting of Development Contribution charges.

The objective is to ensure that the estimated costs of Auckland Council infrastructure investments over the next 30 years contain a reasonable allowance for future inflation, with respect to land and construction.

The calculation of charges also needs to allow for: interest gained on development contribution payments received before investments are made; and the interest incurred on costs incurred before the development contributions are fully recovered. As such, a view on future interest rates is needed.

This memo should be read in conjunction with Auckland Council development contributions policy.

Approach

The following principles have guided this analysis.

- *Differentiate between a near term forecast and a long-run projection.*

Investments scheduled to occur in the near term can be costed with relatively more certainty by factoring information about current market conditions how those conditions are forecast to evolve in the near term. Further out, uncertainty rises and so rather than aiming for year-to-year precision, the approach is to use a projection based on historic trends. The policy timeframe is a period of 30 years and so it is proposed that the near-term be defined as Years 1-3 from the point of cost estimation, with the long term being from Year 4 onwards. This approach recognises that any certainty about the near term quickly diminishes.

- *Business units best placed to determine near term costs.*

Business units responsible for planning and funding infrastructure may be best placed to determine near-term costs, drawing on detailed business cases, contracts for delivery, recent experience, or market soundings. In cases where guidance is required, a near-term forecast has been provided.

- *Identify a long-run average by looking at past performance.*

Projections into the long term need to look through future economic cycles, which are unknown and likely to vary considerably in duration and fluctuation. A starting point is to examine past patterns to identify any trends and relationships that can inform a view about the future. It is also

reasonable to consider whether any structural or policy shifts may mean the future could look different from the past.

- *Actual variance from the projected average will likely net out over time.*

A long-run average for cost inflation abstracts away from economic cycles by averaging out year-to-year fluctuations over the long term. This means that in any given year, the projected average will vary from the actual values, which will be either higher or lower than projected. Over time, these cumulative variances can be expected to net out around the projected trend value.

As with all forecasts and projections, the principle is to use best information and judgment at a point in time, recognising that the future may evolve differently.

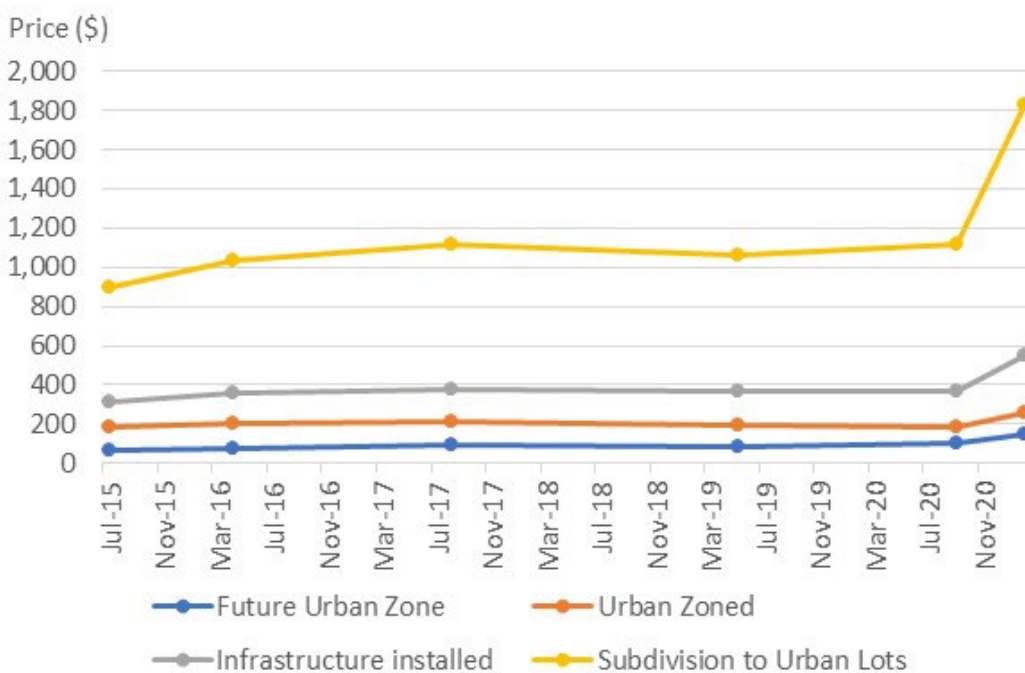
Inflation for land acquisition costs

Land – long term

Auckland Council has commissioned independent analysis of price movements of land in the residential development pipeline, using sales data at six points between July 2015 and February 2022. The land sales are categorised into four stages of the pipeline: (1) Future Urban Zone; (2) Urban Zoned; (3) Infrastructure installed; and (4) Subdivision to Urban Lots. The sales cover five areas of Auckland (north, north-west, west, east, and south) and the approach here is to average sales across these areas to obtain an Auckland view.

The chart below shows price changes on a per square metre basis. It is apparent that the value of land increases through the development pipeline, reflecting the increasing certainty that the land will be brought to market and the value added by infrastructure. Prices for Urban Zoned land have been consistently higher than those for Future Urban Zone land. In turn, prices for infrastructure installed land have been consistently higher than those for Urban Zoned land. In turn, subdivided urban land prices have been consistently higher than those for Urban Zoned land.

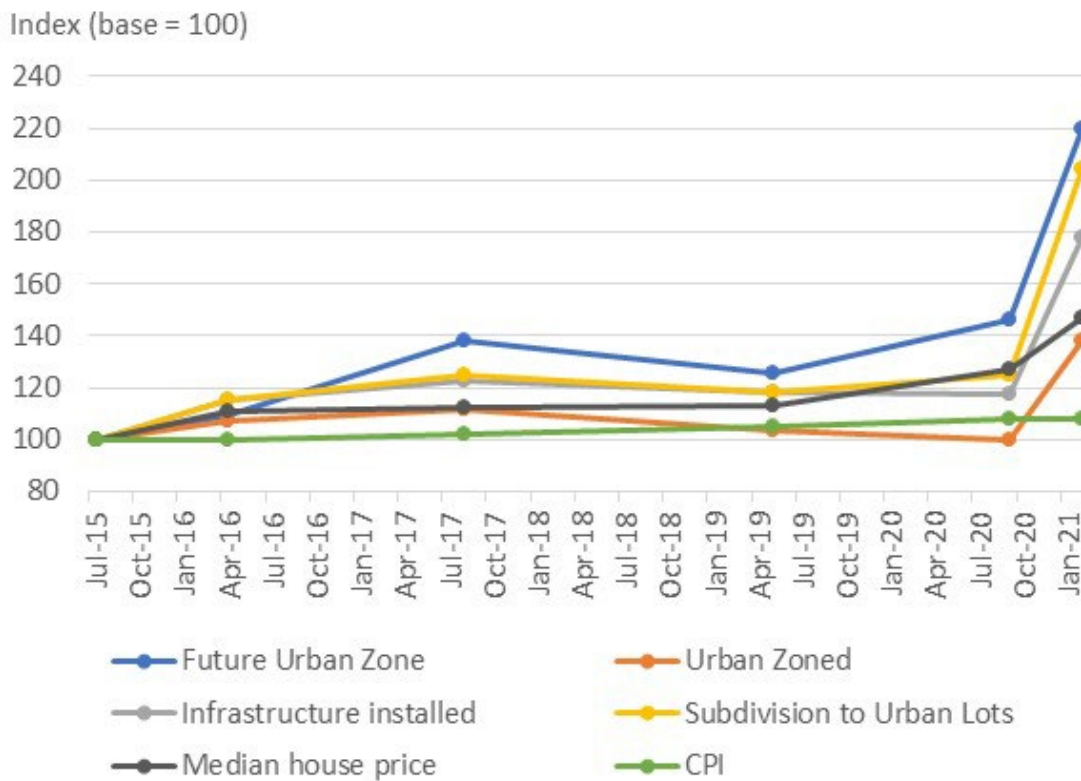
Figure 1: Price per square metre for land in the development pipeline, July 2015 – February 2021



Land in the development pipeline is influenced by conditions in the wider housing market. The Auckland Unitary Plan, which came into effect in November 2016 and added significant development capacity within the existing urban area. Land prices in sampled in May 2019 were similar to those in April 2016. Land prices increased materially between the samples of September 2020 and February 2021, reflecting high demand supported by lower interest rates from the onset of the pandemic in March 2020. The chart below indexes the changes in sampled land prices from July 2015 and adds the indexed change in the median house price.

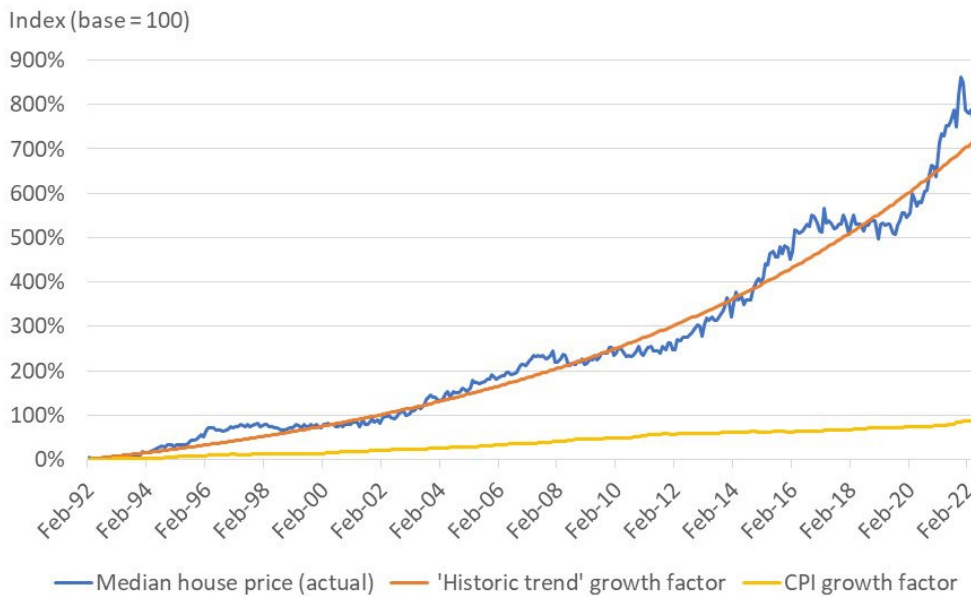
A simple cost escalation factor is derived from median house price growth, given that land is the dominant component in house prices. Analysis of Auckland house sales for the year to June 2022 shows that land value accounted for the majority of the Council Valuation of those properties (mean = 74%; median = 76%, N = 11,420).

Figure 2: Indexed changes in land values and median house price, July 2015 – February 2021



Using available data on the monthly median house price for 1992-2022, the change in price is identified over a series of periods equivalent in length to the required projection period. The analysis identified 42 overlapping 27-year periods, spanning from Jan 1992 - Jan 1919, to June 1995 - June 2022. In each case, a compounding average growth rate between year 1 and year 27 of each period was derived. The average across these of “historic growth factors” is 7.2% per year. This result is relatively stable (std dev = 0.2%; median = 7.2%) and within a range of 6.8% to 7.6%.

The chart below shows the cumulative change in the monthly median house price 30-year period from 1992 to 2022 alongside the historic trend growth factor (7.2%) and the annual average change in the Consumer Price Index (CPI) over the equivalent period (2.1%). This points to the use of CPI as being insufficient to account for cost escalation in land acquisition.

Figure 3: Indexed change median house price with growth factor scenarios, 1992-2022

As a check on the reasonableness of this approach, an econometric method was used to estimate the land price component as a residual of the net sales price less the value of capital improvements, while controlling for location, distance from the city centre, and site-specific factors that influence sale prices. The analysis used available data from the DVRS, for the period 2011q4 to 2022q2, to estimate a hedonic function and derive a hedonic index of land prices for each quarter.

The finding is that the price of land (estimated median land value per quarter) increased faster, on average, over this ten-year period than the headline sales price (median price per quarter). This suggests that the approach of using an historic growth factor derived from median sales prices over 30 years, as a proxy for land price growth, may potentially be an under-estimate.

It is also possible that the future price path for land acquisition will be more moderate, given that the recently enabled opportunities for intensification will allow for more efficient use of existing urban land.

Weighing up these considerations and the information available at this point, the conclusion is that it is reasonable to use the historic growth factor for the projection period. The preliminary work on the hedonic index of land values will be developed further and the findings may inform future updates.

Land – near term

The near-term outlook remains one of a cooling housing market after two years of price growth that had been fuelled by historically low interest rates. Factors contributing to this cooling include: a higher cost of finance, with commercial banks raising mortgage rates following several increases to the Official Cash Rate (with the Reserve Bank signalling more to come); reduced access to finance for some buyers, following changes to the Credit Contracts and Consumer

Finance Act from October 2021; and the strong pipeline of additional housing supply coming onto the market in response to demand.

Most economic forecasts are showing some house price falls in 2022/23, with stabilisation thereafter. The Reserve Bank forecasts a house price index, using data from CoreLogic. It refers to the index as being the official measure of house price levels in New Zealand. This represents a reasonable proxy for the near-term movement in land prices and can be used for the near-term cost escalation factors for land acquisition.

The table below shows the Reserve Bank's forecast changes in the house price index, from the *Monetary Policy Statement* of May 2022. The derived annual percentage change can be applied to future land prices at each step of the development pipeline. The assumption is that land price growth then reverts back to long-run trend from 2025/26 onwards. The latest forecast can be used at the time that the contributions are being calculated.

Table 3: House price index from MPS of May 2022

House prices (nominal)	2021/22	2022/23	2023/24	2024/25
Index (as at June quarter)	3772.5	3509.7	3466.0	3588.9
Annual percent change (%)	7.4	-7.0	-1.2	3.5

Source: RBNZ, MPS May 2022

Inflation for construction costs

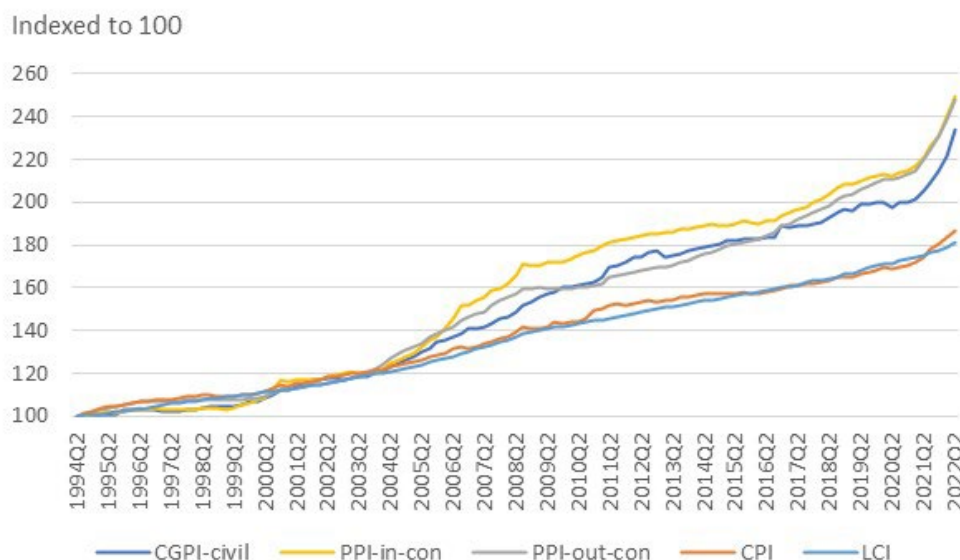
Construction – long term

Stats NZ produces several indices that offer insight into how construction costs have evolved over time.

- Capital Goods Price Index (CGPI) – estimates the overall price change in physical assets purchased by the productive sector – including the purchase of machinery, equipment, and plant. There is a sub-index for civil construction (referred to here as CGPI-civil).
- Labour cost index (LCI) – for general movements in private sector wages and salaries. There is a sub-index for construction, which is a shorter series that does not differ materially from the LCI.
- Producer Price Index (PPI) – estimates changes in prices for non-labour inputs and outputs that incur operating expenses – including materials and the leasing of machinery and equipment. There are sub-indices for construction (referred to here as PPI-inputs-con, PPI-outputs-con).

The chart below plots these indices alongside the Consumer Price Index (CPI), from 1994q2 to 2022q2, a 28-year period for which data is available across all indices. It is apparent that inflating future construction costs by a figure based on CPI would likely be insufficient to recognise the cost pressures across construction inputs and outputs, which have tended to increase faster since the early 2000s.

Figure 4: Selected indices, 1994-2022



The approach is to derive a cost escalation factor from historic trends, using annual average change in selected indices from 1994 to 2022. The analysis identified 6 overlapping 27-year

periods, spanning from 1994Q2 to 2022Q2. The chart below plots the median of these historic growth factors for each index.

The initial method has been to blend the relevant index on an input basis, capital 50% (CGPI and PPI inputs for construction) and labour 50% (LCI). This split is based on a finding that the income shares of capital and labour in the construction sector averaged at approximately 50% over 2000-2009.¹ This method gives a long-run cost escalation factor of 2.5% per year.

An alternate perspective is to use PPI output index, which measures changes in prices for the supply of goods and services (outputs) by New Zealand's productive sector, rather than the use (input) perspective.² The PPI output index measures changes in the prices of outputs that generate operating income and so may better represent the construction services that are being purchased by Auckland Council.

The chart below also includes the PPI output series for construction (NZSIOC level 2) with a selected sub-series of heavy and civil engineering construction, which includes road and bridge construction (NZSIOC level 3). This perspective suggests a long-run cost escalation factor of approximately 3.0% per year.

These results can be compared with the cost adjusters prepared for local government authorities by the consultancy BERL. BERL has noted that the primary focus of five cost adjusters (Planning & Regulation, Roding, Transport, Community, Water & Environment) is on operating expenditure, and so they may understate (or overstate) the change in the prices of capital expenditure items (i.e., built infrastructure or land acquisition). Instead, BERL has created a general capital expenditure adjuster, which has an average of 2.6% for the period 2026 to 2032, with a 20-year average of 2.3% per year over the period 2020-2040.³

¹ IR Page (2010) *Construction sector productivity*. BRANZ Study Report SR219

² Stats NZ (2015) *Producers price index: concepts, sources, and methods*

³ BERL (2021) *Taituarā Cost Adjusters*. Economic context and adjusters for local practitioners, October 2021

Figure 5: Average annual growth rates of selected price indices, 1992-2022

Source: Stats NZ, CEU analysis.

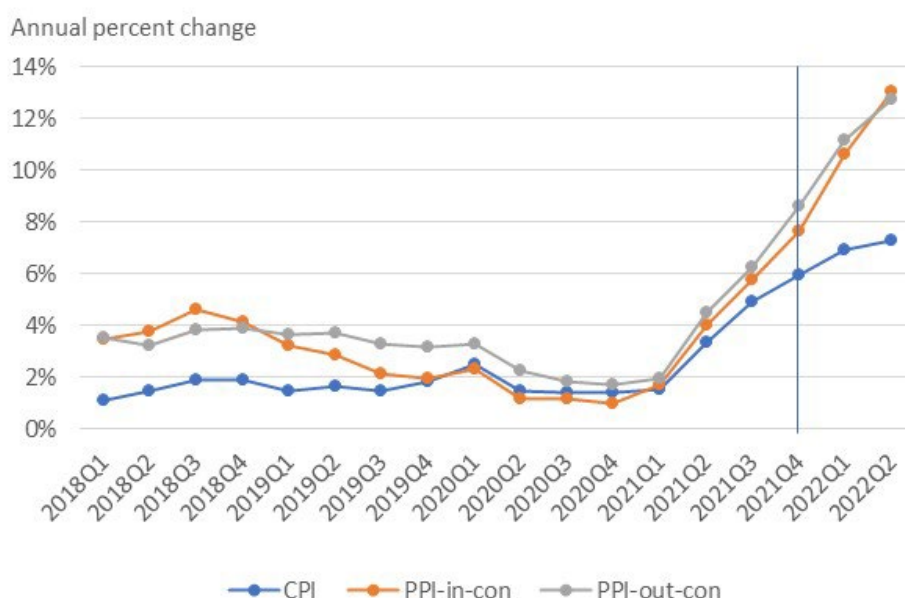
Notes: PPI output indices relate to ANZSIC: Construction (Division E); Heavy and civil engineering construction including road and bridge construction (Subdivision 31).

Construction – near term

Near-term inflationary pressures on construction inputs are likely to be above the long-run average. Core inflation has increased from mid-2021, with headline (CPI) inflation being 7.3% in the year to June 2022. Drivers include strong demand supported by relatively low interest rates and supply constraints arising from pandemic-related bottlenecks that are restricting flows of goods, input materials and labour. Border restrictions have meant limited the opportunities to fill labour shortages, with reported capacity utilisation for builders and manufacturers being at an all-time high. The chart below shows how the PPI indices for the construction industry have been materially higher than CPI during this stage of the economic cycle.

The Reserve Bank has signalled further increases to the Official Cash Rate and expects interest rises to dampen activity. Annual CPI inflation is forecast to ease back to the mid-point (2%) of the target band from early 2025, as at the *Monetary Policy Statement* of August 2022.

Figure 6: Annual percent change in selected indices, 2018-2022



The following forecast covers the next three years, using the input cost perspective outlined above. The overall assumption is that the series will trend back towards the long run average. The forecast was prepared in the first quarter of 2022 and so reflects available information at that time (i.e., 2021Q4); this forecast needs to be revised given that inflationary pressures have moved higher since, with implications for a more gradual easing than previously expected. The latest forecast can be used at the time that the contributions are being calculated.

Table 4: Near-term outlook for construction

Annual percent change (%) to June	2021/22	2022/23	2023/24	2024/25
Forecast of April 2022	6.0	5.2	4.0	3.2

Sources: Chief Economist Unit

Interest rates

The calculation of charges also needs to allow for interest gained on development contribution payments received before investments are made, and the interest incurred on costs incurred before the development contributions are fully recovered. As such, a view on future interest rates is needed.

Interest gained or incurred conceptually flows through to the amount of debt that Auckland Council needs to take on. Therefore, the interest rate should reflect the cost of debt that Auckland Council faces and is likely to face. This means using the effective interest rates for debt in the near term and long term, as estimated and forecast by the Auckland Council Treasury team.

The modelled cost of borrowing is essentially a function of the economic context (the forward interest rate curve), Auckland Council's policy position regarding the proportion and duration of hedging, and the debt margin faced by Auckland Council (i.e., the borrowing margin, which reflects credit worthiness and risk at a point in time).

This approach is consistent with that used in the 10-year Budget 2021-2031. The cost of borrowing is set to increase over the 10-year LTP forecast period. The forecast is not modelled beyond ten years, and so the recommendation is to use the final year value thereafter.

The forecast cost of borrowing has been increasing through 2022, as would be expected. The table below shows how the cost of borrowing has been upgraded in successive forecasts from the Treasury team, from 16 May to 14 June 2022. The outlook for interest rates is revised periodically and so the latest forecast can be used at the time that the contributions are being calculated.

Table 5: Forecast of interest rates

Interest rate (%)	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29	29/30	30/31 onwards
Update of May 2022	4.26	4.41	4.44	4.45	4.46	4.49	4.52	4.51	4.49	4.46
Update of June 2022		4.35	4.41	4.45	4.50	4.57	4.66	4.72	4.82	4.89

Source: Auckland Council Treasury