STATE ACTUARY'S OFFICE

Actuarial Investigation of QSuper

as at 30 June 2021

QUEENSLAND TREASURY

Queensland Government

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1 Summary and Recommendations

On the basis that the assets of the Employer Fund are hypothecated for the purpose of funding QSuper defined benefit payments, total assets exceeded *accrued liabilities* by $6.649 billion as at 30 June 2021. This compares with the $3.573 billion surplus disclosed at the 2020 valuation, with the increase substantially due to the strong investment return earned during 2020-21. In addition, the accounting basis applying to the Government's financial statements shows an accrued deficit of $0.624 billion, noting of course that there is no requirement or practice to fund defined benefit schemes to the levels indicated by the accounting basis.

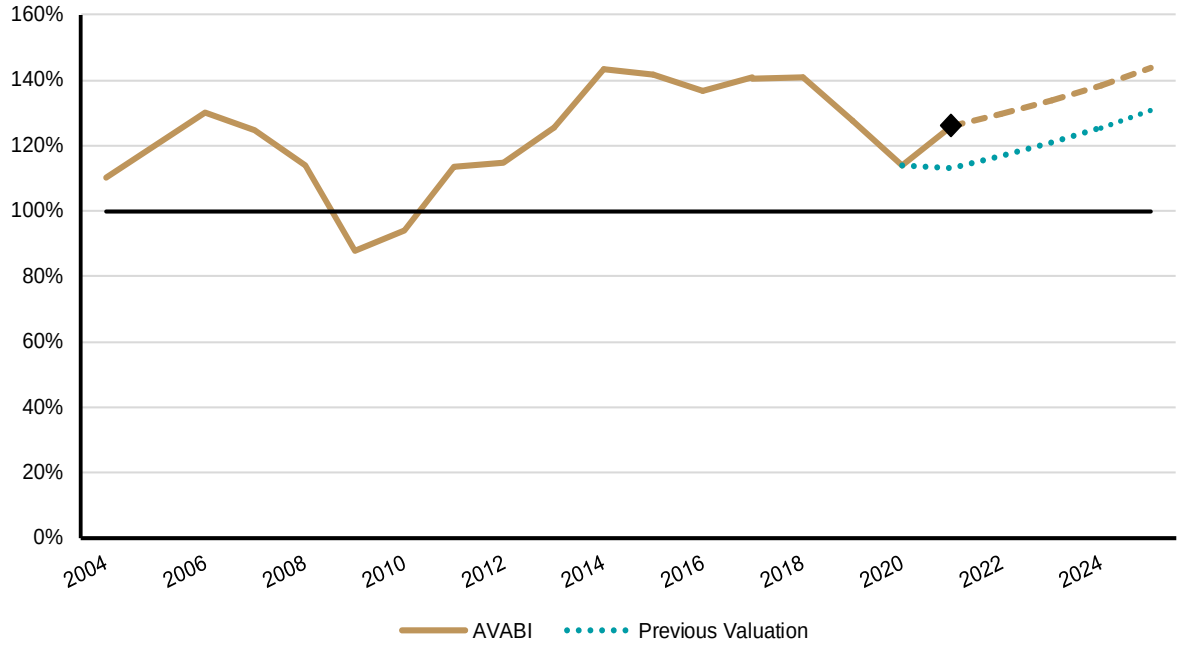
The *Queensland Future Fund Act 2020* introduced a funding guarantee which had the effect of changing the emphasis on the vested benefit funding index utilised within the previous funding framework towards the accrued liability funding position that was used prior to the 2016 Review. The key changes to the funding management framework were:

- The "headline" funding position is based on the accrued liability, rather than vested benefits. However, in accordance with the relevant actuarial professional standard, vested benefits and their outlook are still reported (see Section 8.1).
- Accrued liabilities are measured on the funding basis at least every three years, consistent with the practice prior to 2016 and APRA's requirements for defined benefit schemes generally[1].
- As a consequence of the funding guarantee, it is no longer necessary for the actuarial review to consider the effects of potential surplus repatriations or funding injections.

Based on the assumptions underlying this Review (see Section C.1) and expressed as a ratio relative to scheme assets (see Section 8.4), the outlook for the actuarial value of accrued benefits index (AVABI) is shown in Figure 1. The position has improved relative to that presented in the previous Review and is expected to continue to strengthen further.

[1] APRA requires annual actuarial review of defined benefit *pension* schemes, unless otherwise approved.

Figure 1 Historical and Projected AVABI – Defined Benefit Scheme



Subsequent to the introduction of the full funding guarantee, there are no downside funding risks from the perspective of the scheme, as these risks fall to the Government. It is therefore a Government decision as to what, if any, funding initiatives should be undertaken, taking into account its overall balance sheet and financial priorities. For these reasons, I make no comment or recommendation regarding the relative merits of any funding management scenarios.

Noting that the projections above are based on fixed assumptions (see Appendix C) I have also examined the potential distribution of the AVABI, allowing for stochastic variation in investment and inflation outcomes. The probability of the AVABI falling below 100% *in any year of the Budget period up to 2025* has been estimated to be 22%, or around 1 in 5.

I emphasise that there is no single "correct" level of surplus for any defined benefit scheme and that no guarantee can be provided as to future funding levels due to the variability of scheme outcomes, particularly investment returns. It is important to note that the risk of fund deficiency falls upon the State, with the legislative guarantee protecting member entitlements and so the effects of a deficit on the security of members' entitlements are insignificant compared to similar funds in the private sector.

Section 27B of the *Superannuation (State Public Sector) Deed 1990* (the *Deed*) requires the QSuper Board (the *Board*) to decide, on the advice of the Actuary, the State's contributions to the QSuper fund to meet benefit payments. Accordingly, I have recommended the following funding arrangements to meet the State's share of the defined benefit liabilities:

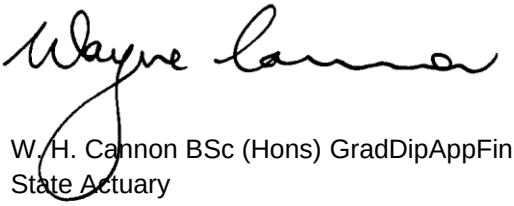
Income protection to be met by State	Income protection benefits to be fully met by the State as required by the Deed
Payments to pensioners from QSuper fund	Consistent with current practice, all payments to pensioners to be met solely from the QSuper fund with no last minute funding drawn from the Employer Fund in respect of them

State to meet **92%** of defined benefit payments	Other than the above, the State to meet **92%** of defined benefit payments. Benefit payments for this purpose include any transfers to an accumulation category and the present value (see Appendix D) of new pensions that emerge on the exit of defined benefit active members. All payments to pensioners are met solely from the QSuper fund and therefore need to be fully funded at commencement

This proportion has decreased from 96% since the last Review, mainly due to the high investment return on the QSuper Fund DB Assets during 2020-21.

This Review also reports on the Experience Review covering the triennium from 1 July 2017 until 30 June 2020. Consistent with the intent of the funding guarantee, actuarial reviews will now return to the triennial cycle utilised prior to 2016, with the next Review to be undertaken as at 30 June 2024.

In summary, if the actuarial assumptions are realised, then last minute State contributions as recommended above will fund the balance of all defined benefit liabilities not met from current QSuper fund assets and future member contributions.



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State Actuary

3 December 2021

2 Introduction

2.1 Background

The provisions of the *Superannuation (State Public Sector) Act 1990* (the *Act*) and the Deed govern the operation of QSuper[2,3]. The Act established the scheme on 13 June 1990 and provided that QSuper conditions are governed by the Deed, which was gazetted on 23 June 1990. Throughout this Report, the assets held within QSuper are referred to as the QSuper fund.

The Board is responsible for the management of QSuper. Since 1 July 2007, QSuper Limited (QSL) has provided the scheme's administration, succeeding the Government Superannuation Office (which was a Portfolio Office of Queensland Treasury).

QSuper is a defined benefit scheme and in accordance with the Superannuation Industry (Supervision) Act and Regulations (SIS) and Australian Prudential Regulation Authority (APRA) Superannuation Prudential Standard SPS 160 a regular actuarial review is necessary. Furthermore, Section 19 of the Deed requires an investigation and report as to the state and sufficiency of the fund to be made by the Actuary periodically so that there shall not be a period longer than 3 years between successive such investigations.

Section 19 of the Deed also requires that any such report shall include:

- A statement of the assets of the fund;
- A statement as to any liability for benefit payments not expected to be financed out of the assets of the fund or any future contributions to the fund; and
- Any other matters which the Actuary may consider appropriate generally.

This Report presents the results of the actuarial Review performed as at 30 June 2021, the final on the annual cycle agreed with the then Under Treasurer during the 2016-17 State Budget deliberations. I also undertook the last actuarial review of QSuper as at 30 June 2020, which was signed on 2 December 2020. As noted in my previous Review and in Appendix B, scheme *experience* reviews are still undertaken on a triennial basis and reported at the subsequent actuarial Review. The next experience review will cover the triennium from 1 July 2020 until 30 June 2023 and be reported in the 30 June 2024 actuarial investigation report, reverting to the triennial cycle of actuarial reviews, consistent with the requirements of Section 29A of the Act.

QSuper is a regulated superannuation scheme (effective 9 July 2009) under the prudential supervision of APRA and is subject to the SIS legislation. Prior to becoming regulated, QSuper was an exempt public sector superannuation scheme for the purposes of SIS and was subject to a Heads of Government Agreement covering its conduct that required compliance with the "spirit" of SIS where appropriate.

Section 29 of the Act provides for the Government guarantee in respect of the defined benefit payments. This statutory guarantee forms the basis for the specific exemption provided to QSuper

[2] Note that QSuper was previously denoted as the State Public Sector Superannuation Scheme, however the name was formally changed to QSuper in the *Superannuation (State Public Sector) (Scheme Membership) Amendment of Deed Regulation 2017*.

[3] All references to the Act and Deed in this Report refer to the versions in force at the valuation date.

from the normal SIS funding and solvency requirements of a regulated fund. In addition, new Section 29A of the Act provides a further guarantee of full funding of accrued liabilities.

The character of QSuper changed considerably on 1 May 2000, from which new permanent and temporary Queensland public sector employees joined the Comprehensive Accumulation Category by default and were able to transfer to the Standard Defined Benefit Category at any time in the future but on a once only basis. Subsequently, the Defined Benefit Category was closed to new members from 12 November 2008. Defined Benefit Category members are still allowed to transfer to the Comprehensive Accumulation Category on an open-ended basis. Casual employees join the Basic Accumulation Category and most can opt to join the Comprehensive Accumulation Category, which requires member contributions.

I note that on 15 March 2021 QSuper and Sunsuper signed a Heads of Agreement to merge, subject to a range of conditions. The *Superannuation (State Public Sector) (Scheme Administration) Amendment Act 2021* provides the legislative support for the merger to proceed but at the time of writing the merger had not been formalised. The amendments do not have a material effect on the conduct of this Review.

2.2 Structure of the Scheme

QSuper has been designed as a “master plan” so that it is able to provide tailored superannuation coverage for all Queensland public sector employees, depending on the requirements of the relevant employing authority. As a result of various scheme mergers in the past, QSuper has retained membership categories for the members of the predecessor schemes who have not elected to transfer to the main categories. In 2009 a new category (Non-Public Sector Accumulation, subsequently renamed General Accumulation) was introduced to allow non-government employers to make contributions on behalf of existing members. The membership categories are shown in Table 1.

It will be noted that, consequent to the *Revenue and Other Legislation Amendment Act 2017*, QSuper became a public offer fund on 1 July 2017, with the Non-Public Sector Accumulation Category being replaced by the General Accumulation Category to accept new non-Government members. Another consequence of that Act was the capacity for members to choose superannuation funds other than QSuper from 1 July 2017. To enable such movement, a Defined Benefit Category member will be required to first transfer to the Accumulation Category and so the extent of such transfers may subsequently increase. This issue is considered in Section B.4.21.

Table 1 Membership Categories

Category	Previous Scheme	Current Status
Standard Defined Benefit	QSuper	Closed to new entrants
Comprehensive Accumulation	–	Open to new permanent and temporary public sector (core and non-core) employees and transfers from the other categories, including casuals
Basic Accumulation	Government Officers' Superannuation Scheme (Gosuper)	Open to new casual public sector employees, police cadets and others where nominated by non-core public sector employers
State 58	State Service Superannuation Fund (State Super)	Closed to new entrants
State 72	State Service Superannuation Fund (State Super)	Closed to new entrants
Police 68	Police Superannuation Fund (Police Super)	Closed to new entrants and no contributing members remaining
Police 74	Police Superannuation Fund (Police Super)	Closed to new entrants
Fire	Queensland Fire Service Superannuation Plan (Fire Super)	Closed to new entrants and no active members remain
Parliament 70	Parliamentary Contributory Superannuation Fund (Parliamentary Super)	Closed to new entrants
Income Stream	–	Open to the general public, including existing members
General Accumulation	–	Open to the general public, former public sector employees who continue QSuper membership and employees of an employer that is not a unit of the State public sector

This Report concentrates on the investigation of the Standard Defined Benefit Category (hereinafter denoted the *Defined Benefit Category* for ease of communication). However, the experience and the liabilities of the closed defined benefit State, Police, Fire and Parliamentary Categories are included where relevant. In addition, the assets and liabilities in respect of the accumulation categories are incorporated as appropriate.

Whilst the employees of most participating agencies are subject to the same basic benefit structure in the Defined Benefit Category, Police officers (*Police members*) have slightly different benefit conditions. In addition, the police have traditionally had higher rates of death and disablement than the remainder of the public sector. For these reasons, Police members are considered as a separate sub-category within the Defined Benefit Category and are valued separately with their own investigation assumptions. Consequently, throughout this Report, the "non-police" members of the Defined Benefit Category are referred to as Standard members.

The standard benefit payable from the Defined Benefit Category is a defined benefit lump sum, although a pension benefit is available on exit due to total and permanent disablement (TPD). The standard benefit payable from the accumulation categories is a defined contribution lump sum, whilst the State, Police, and Parliamentary categories pay a variety of pension and lump sum benefits. A description of the standard benefits payable under each of the categories is contained in Appendix A.

The contributions required by the Government in respect of defined benefits are set out in Section 27B of the Deed. This Section requires that the contributions payable by the State to the QSuper fund are

the amounts decided by the Board on the advice of the Actuary. Section 27B of the Deed also allows for the State to make additional contributions to the QSuper fund for the efficient and effective operation of the scheme. As required by the Deed, the State meets the entire amount of any income protection benefit.

2.3 Funding Arrangements

2.3.1 Defined Benefit Categories

The defined benefit categories in QSuper are funded differently to a typical regulated scheme in that only employee contributions (including net salary sacrifice contributions) are deposited into the QSuper fund. Benefit payments from the scheme are determined according to the benefit rules as described in Appendix A. However, the State pays a share of these benefits as a “last minute” contribution to the QSuper fund. The State makes advance provision for its share of benefits in that, at the same time as member contributions are remitted, employing authorities are required to remit employer contributions to Queensland Treasury, which then deposits them[4] in the Employer Fund[5]. The rate of employer contribution is reviewed at each actuarial investigation.

QSuper’s liabilities are effectively limited to the assets in the QSuper fund with the State providing a statutory guarantee in respect of the balance of the defined benefit obligations. However, the total liabilities of the defined benefit categories are the total benefits as described in the Deed and summarised in Appendix A. Consideration of the QSuper fund only would not give a comprehensive understanding of the funding of the scheme and hence, consistent with past practice, this Report considers the overall funding of the scheme taking into account both the QSuper fund and the Employer Fund.

2.3.2 Accumulation Categories

The QSuper accumulation categories provide defined contribution benefits and both member contributions and employer contributions are deposited into the QSuper fund. Each member of the category has an account in their name into which the contributions are recorded. Net investment earnings are applied to the account and administration, insurance and taxation costs are deducted from the account. Benefit payments are made from the member’s account. The benefits available to members are summarised in Appendix A.

2.4 Taxation Status

QSuper is a complying superannuation scheme and is taxed accordingly. The QSuper fund is thus liable for tax at the rate of 15% on investment income and employer contributions, less deductions for the notional cost of insurance, expenses, the discount component of realised capital gains and the income earned in respect of pension assets. The QSuper fund receives foreign tax credits and rebates for imputation credits in respect of its franked dividend income.

[4] Unless the investment of employer contributions is suspended by the Treasurer.

[5] Throughout this Report, the term Employer Fund refers to the investment assets accumulated in a reserve by the Government to meet its future superannuation obligations.

This Review has been conducted on the assumption that the QSuper fund will continue to be liable to pay tax on employer contributions and investment income at the standard rates.

2.5 Insurance Arrangements

QSuper self-insures death and disability benefits for members of the Defined Benefit Categories. The Accumulation Category was substantially self-insured prior to 30 June 2016, with new business from 1 July 2016 underwritten by QInsure. The corresponding liabilities were subject to regular actuarial review, with reserves maintained by QSuper in accordance with actuarial advice (latest review undertaken by me as at 30 June 2019). However, since 30 June 2020, QSuper have not required actuarial advice on these liabilities on materiality grounds.

With regard to the self-insurance of *defined benefit* entitlements, I believe that self-insurance remains appropriate, recognising:

- the defined benefit membership is large enough so that variations in death and disability experience from year to year are small relative to the size of the scheme and to variations in other aspects of the scheme's experience;
- the insured component of death and TPD benefits is declining as the membership ages so the risk exposures are declining; and
- the State has a statutory obligation in respect of the defined benefit obligations of the scheme, so insured benefits are effectively guaranteed.

It has been assumed for the purposes of this Review that the balance of the Accumulation self-insurance reserve is sufficient to meet the liability for outstanding claims as at the investigation date and that any excess is considered part of QSuper's overall accumulation reserves and therefore not available to meet defined benefit liabilities.

Similar to recent Reviews, the liability in respect of outstanding defined benefit income protection payments has been estimated and included in the actuarial balance sheet shown in Section 6.1. Previously, no explicit allowance for outstanding death and TPD payments has been made due to issues with the underlying data able to be provided by QSuper. However at this Review, we have obtained some reasonable historical data on which to base such estimates and so a liability for outstanding death and TPD payments has also been included in the actuarial balance sheet[6]. Further details are provided in Section B.8.

In view of the effective guarantee provided by the State and the declining risk exposure, I believe that it is reasonable for the scheme not to obtain catastrophe insurance cover.

2.6 Professional Standards and Legislative Compliance

This Report has been prepared in accordance with Professional Standards 400 and 402 (both dated March 2021) published by the Actuaries Institute (IAAust) relating to the investigation of defined benefit superannuation funds. It has also taken account of the IAAust Superannuation Practice Committee documents: Discussion Note: Actuarial Requirements of Superannuation Prudential Standard 160 and Discussion Note: Self-insurance Arrangements and Superannuation Prudential

[6] Included with "Other Former Members".

Standard 160 (both dated July 2020, noting that they are not directed at public sector schemes such as QSuper).

QSuper is a regulated superannuation fund under the supervision of APRA and must meet the relevant prudential reporting requirements. These requirements were described in SPS 160 and Prudential Practice Guide SPG 160 applying from 1 July 2013. It will be noted that QSuper is not considered a fully funded public sector scheme for the purposes of SPS 160 and therefore its disclosure requirements are limited to those listed in paragraph 24 of SPS 160 (see Section 9).

2.7 Financial Accounts

The financial information used in this Review is sourced from:

- the QSuper Financial Statements, which have been audited by the Queensland Auditor-General in the audit report dated 30 September 2021;
- additional information provided by QSuper regarding the allocation of assets between sub-plans; and
- Queensland Treasury and QIC relating to the Employer Fund.

2.8 Legislative Changes

At the time of writing, the *Superannuation (State Public Sector) (Scheme Administration) Amendment Act 2021* had just been passed by the Parliament. It amended the Act and the Deed to provide for the merger of QSuper and Sunsuper to proceed, should the respective Boards make a final decision to do so.

Neither that Act nor the other relevant Acts passed since the previous Report have had any material effect on the analysis and results of this Review.

2.9 Recommendations of Previous Actuarial Investigation

I understand that the recommendations from the previous actuarial Review (Report dated 2 December 2020) have been implemented by the Board.

2.10 Post Valuation Date Events

As noted above, the QSuper Board has announced its intention to merge with Sunsuper, although a final decision had not been made at the time of writing. Based on the publicly available information, I do not expect the merger to materially affect the analysis or results of this Review.

3 Membership

3.1 Data

QSL supplied data for the investigation at the individual member level, rather than on a grouped basis. The fact that membership information is provided to QSuper directly by employers results in a reasonable amount of inaccurate data being stored. QSL undertakes a data integrity program, which substantially improves the quality of the membership data.

A number of consistency checks have been applied to the data, both internally and compared to previous data, with these checks shown in Appendix E. As part of the 2017-2020 Experience Review, we undertook a detailed analysis of the membership data provided by QSuper, focussing on its consistency and coverage. In conjunction with QSL staff we identified several issues both with the data and our understanding and interpretation of it that has resulted in several changes to our processes in dealing with the membership data. These issues and our attempts to account for them are discussed below and in Appendix E.

Values in the following tables shown in this Section were taken from the data supplied by QSL for the purpose of valuing the scheme's liabilities. It should be noted that the numbers shown may differ from the information provided in other QSL reports although the difference should be immaterial.

Overall, the quality of the membership data is considered acceptable for the purposes of the investigation, noting that I have adjusted the salaries to correct for the expected bias in the less comprehensively cleansed data (see Section 3.2.5).

In addition, notwithstanding the fact that the investigation is undertaken as at **30 June 2021**, the **1 July 2021** salaries were available and have been used when calculating the scheme's liabilities. This provides a more realistic assessment of the scheme's financial position.

3.2 Membership Statistics

3.2.1 Experience Review Reconciliation – Defined Benefit Category Contributors

The full reconciliation of the membership over the experience review period is shown in Table 2. The components of the reconciliation are discussed in Appendix E.

Table 2 Reconciliation of Defined Benefit Contributor Membership – 1 July 2017 - 30 June 2020

	Standard Males	Standard Females	Police	Total
Reported Membership at 30 June 2017	**15,462**	**24,447**	**3,796**	**43,705**
Recognition of Secondments/Transfers	12	74	1	87
Administrative Corrections	(2)	(3)	-	(5)
Exits prior to 1 July 2017	(50)	(74)	(10)	(134)
Discrepancy	(1)	6	(4)	1
Adjusted Membership at 30 June 2017	**15,421**	**24,450**	**3,783**	**43,654**
Transfers to Police	-	(1)	1	-
Transfers from Police	33	11	(44)	-
Exits				
Retirements	2,584	3,347	361	6,292
Deaths	67	56	6	129
Total and Permanent Disablements	67	108	31	206
Permanent and Partial Disablements	-	2	-	2
Resignation/Dismissals	196	375	55	626
Involuntary Terminations	104	78	-	182
Transfer to Accumulation	18	46	15	79
Unresolved Data Issues				
Members at Opening but not End or Exited	-	(4)	-	(4)
Members at End but not in Opening	1	2	-	3
Membership at 30 June 2020	**12,419**	**20,446**	**3,272**	**36,137**

There are several reasons why membership does not reconcile (i.e. active contributors at start of period plus new entrants minus exits equals active contributors at the end of the period), including:

- Delays in the recording of exit events that result in “backdated” exits
- “False” memberships created by agencies accepting transferring or seconded employees, with similarly false exits recorded by the prior agency
- “False” memberships created for administrative purposes; e.g. to allow for an additional benefit payment subsequent to additional information becoming available subsequent to the initial payment
- Errors in provision and interpretation of data

When members transfer between or are seconded to different pay offices, their membership of the Defined Benefit Category is considered continuous[7]. However, the source pay office generally “exits” the member so that QSuper transfer them to the “Leaver Unpaid” pay office, in a similar way to a legitimate exit that has not yet finalized their benefit option and/or payment. The receiving pay office

[7] Continuity of DB membership requires a period of no more than one month between “exit” from one employer to “entry” at another.

generally “starts” the member as a new entrant and QSuper maintains data quality processes that identify these situations and merge the record so that there is a single DB membership.

In previous years, we were not aware of this treatment for secondments/transfers and treated the Leaver Unpaid members as “true” exits, albeit with an unknown type of exit. We reserved for such members using their vested benefit and considered them as a resignation or retirement exit, depending on their age at exit.

As part of our detailed review of the membership data, we have been better able to identify secondments/transfers and have merged their “Leaver Unpaid” record with their “active” record, reflecting the process that QSuper will eventually undertake once the records are identified. As shown in Table 2, the net effect of this new treatment resulted in 87 “new” members at the last review date.

Whilst they are not shown separately in the reconciliation above, we also identified several exit records that were not being provided by QSuper. These have been manually added for this experience review and work is underway at QSuper to ensure these records are provided in future.

3.2.2 Membership Movements Since Last Review

Since the previous Review, the numbers within most member types have been declining over time, as shown in Table 3.

Table 3 Membership by Type (as at 30 June)

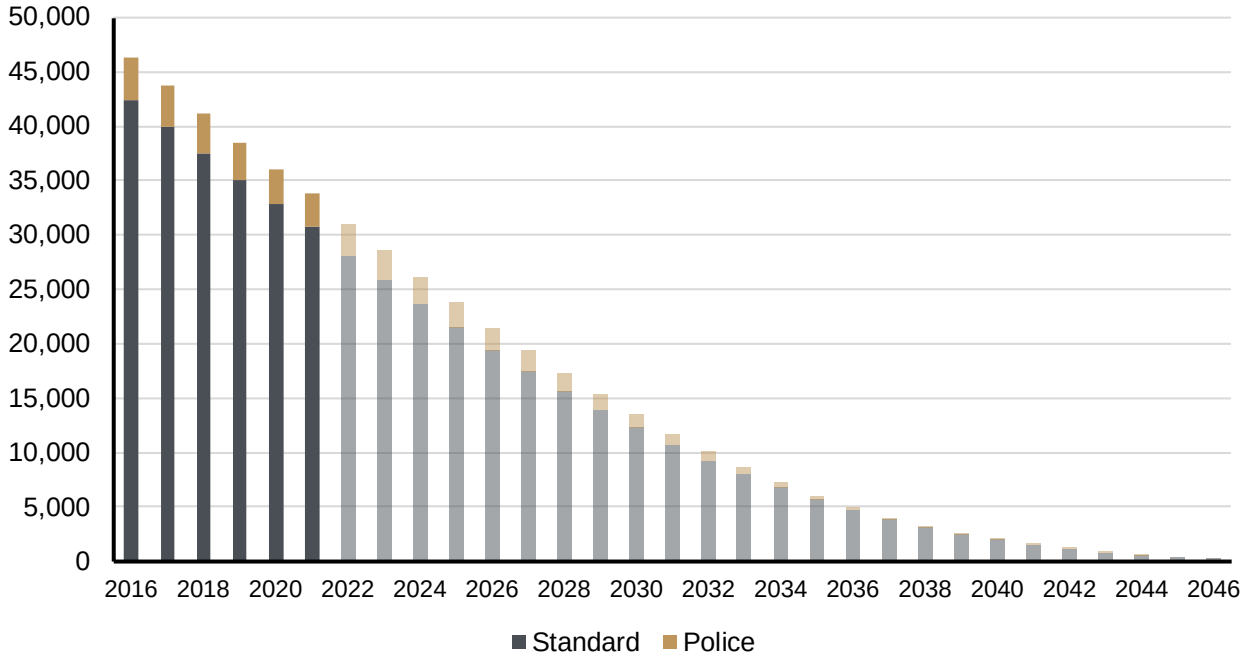
	2020	2021
Contributors		
Defined Benefit - Standard	32,865	30,717
Defined Benefit - Police	3,272	3,115
State	283	263
Police	93	88
Parliamentary	4	3
Former Contributors - Pensioners		
Defined Benefit	768	765
State	1,100	1,079
Police	195	194
Parliamentary	139	136
Fire	2	2
Former Contributors - Deferred		
Defined Benefit	24,867	22,703
State	100	66
Police	16	13
Total	**63,704**	**59,144**

3.2.3 Projections – Contributors – Defined Benefit Category

Based on the assumptions listed in Appendix C, the projected number of members of the Defined Benefit Category is shown in Figure 2, as well as the recent history. This figure demonstrates the expected continued decline in active membership over time, with around 10% of the members leaving

each year, as well as confirmation that the decrement assumptions in this Review are broadly consistent with the recent membership trends.

Figure 2 Defined Benefit Category – Historic and Projected Number of Contributors



3.2.4 Membership Profile – Defined Benefit Category

The membership characteristics of the Defined Benefit Category Standard members as at 30 June 2020 and at 30 June 2021 are summarised in Table 4. All averages are weighted by the relevant 1 July salary.

Table 4 Defined Benefit Category – Standard Membership Profile[8]

	30 June 2020			30 June 2021		
	Males	Females	Persons	Males	Females	Persons
Average Age (years)	56.0	54.6	55.1	56.5	55.1	55.7
Age of Youngest Member	32	32	32	33	33	33
Average Age At Entry (years)	28.0	27.5	27.7	27.8	27.1	27.4
Average Membership (years)	28.0	27.1	27.4	28.8	28.0	28.3
Average Review Date Salary	$109,416	$102,090	$104,861	$111,999	$104,189	$107,124
Average 1 July Salary	$111,661	$104,039	$106,923	$114,391	$106,584	$109,517
Average Contribution Rate (%)	4.96	4.91	4.93	4.98	4.93	4.95
Average Career Part-Time Ratio	0.987	0.908	0.940	0.986	0.907	0.938

[8] Review Date Salary refers to the salary used for benefit purposes at 30 June of the relevant year; i.e. the superannuable salary as at the preceding 1 July or later entry. 1 July Salary refers to the salary on the subsequent 1 July; i.e. 1 day after the investigation date of 30 June.

From this table, the following observations about the Standard membership can be made:

- Average age has increased by 0.6 years since the last Review, to almost 56 years.
- The youngest member of the scheme is only 33 years old, illustrating that the scheme is expected to remain in place for many years to come.
- Average service has increased by 0.9 years with males having longer average membership than females.
- Males continue to have higher average salaries than females.
- The average contribution rate is virtually unchanged since the last Review, with females contributing at slightly lower average rates than males.
- Female members continue to work part-time to a greater extent than males. The extent of part-time work has remained similar to the level observed in the last Review.

The membership characteristics of the Police members as at 30 June 2020 and at 30 June 2021 are summarised in Table 5. All averages are weighted by the relevant 1 July salary.

Table 5 Defined Benefit Category – Police Membership Profile

	30 June 2020			30 June 2021		
	Males	Females	Persons	Males	Females	Persons
Average Age (years)	51.7	48.6	51.0	52.3	49.5	51.6
Age of Youngest Member	35	38	35	36	39	36
Average Age At Entry (years)	23.4	24.0	23.6	23.4	24.0	23.6
Average Membership (years)	28.2	24.6	27.4	28.8	25.5	28.1
Average Review Date Salary	$110,151	$104,587	$108,893	$110,728	$105,734	$109,564
Average 1 July Salary	$111,102	$105,686	$109,877	$114,337	$109,322	$113,168
Average Contribution Rate (%)	6.01	6.00	6.01	6.01	6.02	6.01
Average Career Part-Time Ratio	0.999	0.950	0.988	0.999	0.951	0.988

From this table, the following observations about the Police membership can be made:

- Male members are 2.8 years older on average than females.
- The youngest Police member is a few years older than the youngest Standard member, although still indicating a long time horizon for the Police membership.
- Although male and female police entered the scheme at about the same average age, males have longer average membership than females.
- Male Police members have higher average salaries than female Police members.
- Females tend to contribute at similar rates to males and average contribution rates for both genders have remained virtually stable since the last Review. The vast majority of Police members contribute at the standard rate of 6% of salary. The average contribution rate above the default level of 6% reflects the balance of members who are “catching up” at higher rates, offset by those members who contribute less than the standard rate.
- The extent of part-time work for the police is very limited with the level of females’ part-time work remaining higher than males.

As discussed in previous Reviews, despite the differences in profile between male and female Police members, it is not practical to consider the groups separately due to the relatively small number of

female Police. Consequently, the Police members of QSuper are considered as a group throughout the remainder of this Report.

3.2.5 Adjustments to Salaries

As discussed in Section 3.1, I have adjusted the raw salaries provided by QSL to compensate for the expected overall underestimation of scheme liabilities. Prior to 2016, QSL provided membership data in a two-phase approach, with the Phase I data supplied in late July and used to derive various accounting measures. The data was then reviewed and adjustments were made to incorporate later information as well as any erroneous items. This cleansed data was supplied later in the year and generally used for the actuarial Review, noting that the APRA deadline for the corresponding Report was compressed to six months in 2016.

To determine the accuracy of the Phase I dataset, I compared the total review date salaries for both sets of membership data, as shown in Table 6. It will be noted that Phase II data was not analysed in 2014.

Table 6 Comparison of Salaries based on Phase I and II Membership Data

	No of Members		Total 1 July Salaries ($'000)		Salary
Year	Phase I	Phase II	Phase I	Phase II	Adjustment
2010	75,056	74,975	5,790,139	5,797,979	0.14%
2011	70,565	70,533	5,718,503	5,747,327	0.50%
2012	64,805	64,660	5,428,335	5,435,315	0.13%
2013	56,712	56,618	4,885,826	4,898,214	0.25%
2014	52,416	-	4,673,457	-	
2015	49,113	49,015	4,500,051	4,505,789	0.13%
Average					0.23%

Table 6 demonstrates that an increase in salaries of 0.25% will result in total review date salaries materially equivalent to those provided in the more complete Phase II data.

In order to assess whether any further adjustment was necessary in order to provide a more accurate estimate of scheme liabilities, the total service liabilities were compared again on an equivalent basis, but with the salary adjustments described above at each Review excluded from the differential. This resulted in the differences shown in Table 7, which demonstrates that the remaining differences, whilst all positive are sufficiently small that no further adjustment is necessary.

Table 7 Comparison of Liabilities[9] based on Phase I and II Membership Data

Year	Total Service Liability Difference After Salary Adjustment
2010	0.01%
2011	0.14%
2012	0.04%
2013	0.14%
2014	-
2015	0.08%
Average	0.08%

[9] Liabilities are only in respect of active Defined Benefit Category members.

4 Investments and Accounts

4.1 Fund Accounts

QSuper's financial statements are subject to the accounting standard AASB 1056. In order to determine the net assets available to meet member benefits for the purposes of the actuarial review, the value of the Employer-sponsor receivables has been excluded, as shown in Table 8.

Table 8 Net Assets Available for Member Benefits

	$ million
Net Assets Available for Member Benefits at 30 June 2021	132,912
Employer-sponsor receivables	(22,504)
Net Assets Available for Valuation Purposes at 30 June 2021	**110,408**

After the assets are apportioned within the QSuper Fund and the market value of the assets in the Employer Fund are included, the overall asset position as at 30 June 2021 is shown in Table 9[10].

Table 9 Overall Asset Summary

	$ million		
As at 30 June 2021	Defined Benefit	Other	Total
QSuper Fund	6,536	103,872	110,408
Employer Fund	25,553	-	25,553
Total	32,089	103,872	135,961

4.2 Investment Policy

In accordance with the legislative requirements of SIS, the Board has formulated an Investment Policy Statement (IPS) covering both the defined benefit and accumulation categories.

The accumulation categories operate under a Member Investment Choice structure, with clear communication of asset allocations and investment constraints to members. I have previously reviewed the unit pricing and crediting rate policies for the scheme and believe them to be suitable mechanisms for crediting investment earnings to members' accounts. Accordingly, no further comment regarding the investment policies for the accumulation categories is warranted for the purposes of this Review.

The IPS recognises the benefit guarantee provided by the State in respect of the defined benefits and that the assets to meet these are predominantly held in the Employer Fund. The investment policy for the Employer Fund assets is set by the State Investment Advisory Board (SIAB) (formerly named the Long Term Assets Advisory Board or LTAAB), an advisory board constituted under the Queensland

[10] The Defined Benefit component of the QSuper Fund underwrites a capital guarantee in respect of former Voluntary Preservation Plan members. The amount of accumulated capital guarantee charges in respect of these members has consequently been attributed to the Accumulation Category via a notional "transfer" from the Defined Benefit assets. The portion of the QSuper Fund relating to the Defined Benefit scheme for actuarial valuation purposes is therefore lower than the value shown in the QSuper financial statements.

Treasury Corporation Act. Accordingly, the IPS is set in liaison with SIAB and is applicable to the total defined benefit assets. The investments are managed by QIC, with whom SIAB and the Board have each concluded Investment Management Agreements.

The investment objectives for the total defined benefit assets are as follows:

Table 10 Investment Objectives

Return	A return of CPI + 3% over rolling seven year periods;
Risk	A probability of a negative return no more than 1 in 3 years; and
Aggregate	Maximising the probability of being fully funded, subject to 95th percentile funding risk over 10 years.

SIAB and the Board have subsequently concluded that the following target asset allocation will provide the optimal chance of meeting those objectives, as shown in Table 11.

Table 11 Target Asset Allocation

Asset Class	Target Allocation
Global equities	42.0%
Australian equities	5.0%
International equities	37.0%
Real Assets	16.0%
Property	8.0%
Infrastructure	8.0%
Diversified Alternatives	27.0%
Private Capital (PE)	8.0%
Private Capital (Debt)	7.0%
Insurance (Nat Cat)	2.0%
Insurance (Life)	2.0%
Liquid Alts (growth)	4.0%
Liquid Alts (defensive)	4.0%
Fixed Interest & Cash	15.0%
Global Fixed Interest	10.0%
Cash	5.0%
Total	100.0%
FX Overlay	20.0%
Credit Overlay (IG)	20.0%
Opportunistic Asset Allocation	0.5%

In view of the benefit guarantee provided by the State, the investment policy does not materially affect the security of beneficiary entitlements and should reflect the risk preferences of the Government through SIAB. The policy described above achieves that objective and can therefore be considered appropriate given the nature of the scheme's liabilities and the funding guarantee provided by the Government.

5 Investigation of Assets and Liabilities

5.1 Purpose of the Investigation

The purpose of an actuarial investigation is to examine the long and short term financial position of a superannuation scheme. Normally, the major reason for an investigation is to determine the level of employer contributions required to provide for the benefits payable from a scheme. However, as discussed in Section 2.3.1, the defined benefit categories are set up differently to most schemes in that employer (i.e. State) contributions are accumulated in the Employer Fund. Benefits payable from QSuper are effectively limited to the assets in the QSuper fund with the balance of the benefits met by the State as a “last minute” contribution through transfers from the Employer Fund to the QSuper fund. However, since the defined benefit liabilities of the scheme are based on the total benefits described in Appendix A, consideration of the QSuper fund only would not give a comprehensive understanding of the funding and financial position of the scheme. It is therefore appropriate to consider the level of State contribution necessary to provide the benefits payable from the scheme.

Since 1 May 2000, it had been the Government’s intention that the contribution levels to the Comprehensive Accumulation Category and the Defined Benefit Category were equivalent. However, subsequent to the decision by the then Treasurer to suspend the investment of employer contributions in the 2015-16 Budget, the contribution rate nexus no longer applies. The resulting variation in contribution rates is consistent with actuarial practice in defined benefit schemes generally and provides more flexibility in managing the funding position of the scheme. However, in view of the limited effectiveness of variation in employer contribution levels to affect the funding of the scheme (due to the maturity of the membership) and the utilisation of surplus repatriations since 2016, in practice, the contribution rates to the Employer Fund can be considered as fixed at their current levels.

Similar to previous Reviews, in recognition of the small size of the other defined benefit liabilities (State, Police and Parliamentary categories), the existing contribution levels to these plans have been assumed to be consistent with the corresponding component of the Defined Benefit Category where relevant, with the Parliamentary scheme contribution level maintained at the level recommended at its last direct assessment in 2005, noting the immateriality of the Parliamentary liabilities within the Defined Benefit Categories as a whole, subject to any scheme-wide suspensions of contribution investment.

Noting the split funding arrangements of the scheme (see Section 2.3.1), an additional requirement of this investigation is to recommend the level of last minute contributions to be made from the Employer Fund to the QSuper fund to meet the State’s share of the defined benefit payments. This is discussed in Section 6.5.

For the 2016 to 2019 Reviews, the valuations were undertaken within a framework specified by the Government’s fiscal principle and the clarification provided subsequent to the 2015 Review, as follows:

- Target full funding of long-term liabilities such as superannuation and WorkCover Queensland (WorkCover) in accordance with actuarial advice; but that
- “Overfunding” of the Scheme should be minimised; and
- The funding of the Scheme is to be managed in accordance with the spirit of the APRA funding and solvency standards applying to corporate defined benefit schemes.

Subsequent to the passing of the *Future Fund Act 2020*, a funding guarantee was introduced into Section 29A of the Act. This had the effect of changing the emphasis on the vested benefit funding index utilised within the APRA framework towards the accrued liability funding position that was used prior to the 2016 Review. The resulting change was formalised in a letter from the Under Treasurer dated 26 September 2020, which was included in the 2020 Report. The key changes to the funding management framework clarified in that letter are:

- The "headline" funding position will be based on the accrued liability, rather than the vested benefits. However, in accordance with PS 400, vested benefits and their outlook will still be reported (see Section 8.1).
- Accrued liabilities are measured on the funding basis at least every three years, consistent with the practice prior to 2016 and APRA's requirements for defined benefit schemes generally.
- As a consequence of the funding guarantee, it is no longer necessary for the actuarial review to consider the effects of potential surplus repatriations or funding injections.

5.2 Funding and Actuarial Assumptions

Funding is the making of advance provision to meet the cost of accruing benefits. This provides a degree of security for members' benefits and also spreads the cost of providing these benefits over their membership. This setting aside of contributions as benefits accrue is what differentiates between funded and unfunded superannuation schemes. Whilst QSuper is technically an unfunded superannuation scheme, the funding arrangements and the assets maintained in the Employer Fund mean that, for the purposes of actuarial review, it can be regarded as a funded scheme.

It is important to note that the *cost* of the defined benefit scheme is the amount of benefit payments, administration expenses and taxation; i.e. the liabilities listed in the actuarial balance sheets shown in Section 6.1. The funding of the scheme is intended to meet these costs in a smooth and equitable manner over time but does not affect the cost of the scheme. Consequently, employer contributions and surplus repatriations are simply two sides of the same coin, linked by the fact that higher repatriations at any point in time increase the likelihood of greater contributions in future; i.e. there is an effective trade-off between them with the material difference being one of timing.

The actuarial review process continually re-evaluates the progress of scheme funding and makes adjustment over time to target the liabilities. In theory, the intent is to ensure that there is exactly the right amount to pay the last benefit liability of the fund after the last member exits. In practice of course, scheme experience (particularly investment returns) varies from expectation and so surpluses or deficits emerge. Just as adjustments need to be made to react to deficits, it is also reasonable to react to large surpluses, which effectively represent an over contribution *in hindsight*.

In order to determine the contribution rates likely to meet the cost of benefits, it is necessary to make certain actuarial assumptions regarding the future experience of the scheme. These assumptions are based not only on the past experience of the scheme but also, inter alia, on views regarding the likely future values of financial factors such as the rate of investment return and salary inflation. Whilst each assumption should be reasonable in its own right, it is important to consider the collective assumption set or *actuarial basis* as a whole as variations in one or more assumptions are often counterbalanced by consequent changes in other aspects of the basis. The relevant actuarial professional standard (PS 400) requires that funding assessments are undertaken on the assumption that projected future cash flows are discounted to present value using the expected return on the asset portfolio, denoted as the *funding basis*.

In this Review, I have also considered liabilities derived in accordance with the relevant accounting standard within the Government's financial statements; viz. AASB 119. It requires that liabilities and expenses for certain employee entitlements (defined benefit superannuation, long service leave) be measured using actuarial techniques which incorporate specific assumptions regarding the discount rate applicable to the liability, financial variables such as salary and benefit inflation, and demographic variables such as turnover and mortality which affect the timing and amount of benefit payments. In practice, the assumption set (*accounting basis*) utilises the same non-financial and inflation assumptions as the funding basis but uses a discount rate based on risk-free Commonwealth bond yields (see Section B.2).

The AASB 119 net discount rate of 1.4% is well below the 4.50% discount rate used to calculate the accrued liabilities under the funding basis, resulting in materially higher liability estimates. As I have noted in previous Reviews, the AASB 119 liabilities can provide useful information in assessing the funding position of the scheme, noting that AASB 119 applies to the financial statements of the employer sponsor and the corresponding AASB 1056 member liabilities are calculated consistently. However, it is important to note that there is no requirement nor is it accepted Australian actuarial practice to target the accounting liabilities. The funding basis is used to guide the budgeting process underlying contribution rate recommendations, as required by the relevant professional standard.

I have retained the previous practice of consideration of the funding position of the scheme over the Budget horizon (i.e. four years) with asset projections based on the corresponding assumptions used within the Budget. It is important to note that these return assumptions are not consistent with the return expectations implicit within the funding basis used in this Review, recognising the different contexts in which they are formulated. Throughout this Report, projected *liabilities* are calculated using the discount rates specified in the relevant actuarial basis, but *assets* are projected to earn the investment returns assumed in the Budget, unless otherwise specified.

The assumptions employed in this Review are summarised in Appendix C with the financial assumptions shown in Table 12 below.

Table 12 Summary of Financial Assumptions

	Basis	
	Funding	Accounting
Discount Rate	4.50%	1.40%
Salary Inflation	3.10%	3.10%
Price (CPI) Inflation	2.10%	2.10%
	2021-22	2022-23+
Net Investment Return (Asset Projections)	6.50%	6.50%

5.3 Valuation Method

The introduction of the funding guarantee has effectively superseded a "funding method" in the traditional sense. Liabilities have been based on the aggregate funding method, split between past and future service but no recommendations are made regarding surplus management. A consequence of the surplus repatriations over the past few years has meant that the employer contribution model (see Section 6.7) is now considered practically fixed, noting that employer sponsors external to Government would be unlikely to support any increases in those rates.

The employer contribution would generally be expressed as a percentage of members' salaries. Whilst these contribution rates are provided in Table 19, it should be noted that this Review has been undertaken on the basis that the investment of employer contributions recommenced from 1 July 2020, following the suspension announced by the then Treasurer in the 2015-16 Budget. It should also be noted that the valuation also considers the level of contributions paid from the Employer Fund to the QSuper fund as part of the last minute funding arrangements.

5.4 Value of Assets

The value placed on the QSuper fund assets for this Review was the market value at 30 June 2021 from the QSuper audited financial statements, viz. $110,408 million. After allowing for the other membership Categories within QSuper, the assets held in respect of the Defined Benefit Categories was estimated to be $6,536 million.

The market value at the investigation date of the assets in the Employer Fund of $25,553 million was used where relevant to achieve an understanding of the total funding and financial position.

6 Investigation Results

6.1 Actuarial Balance Sheets

The results of the investigation in respect of existing members (including former members with preserved or pension entitlements) at the investigation date on a whole of scheme basis can be summarised in the actuarial balance sheet shown in Table 13.

Table 13 Overall Actuarial Balance Sheet as at 30 June 2021[11]

	$ millions		
	Past Service	Future Service	Total Service
Value of Assets and Future Member Contributions			
QSuper Fund Assets	110,408	-	110,408
Employer Fund Assets	25,553	-	25,553
Member Contributions	-	1,350	1,350
Employer Contributions at Recommended Rate	-	3,524	3,524
Total Value of Assets (A)	**135,961**	**4,874**	**140,835**
Value of Benefits, Tax & Expenses			
Active Defined Benefit Members	18,641	5,271	23,912
Current and Contingent Pensioners	1,500	-	1,500
Other Former Members	1,952	-	1,952
Accumulation Benefits	80,191	-	80,191
Account Based Pensions	22,640	-	22,640
Disability Income Benefit	24	343	368
Expenses	675	192	867
Reserves	1,041	-	1,041
Value of Net Contributions Tax	2,647	725	3,372
Total Value of Benefits, Expenses & Tax (B)	**129,312**	**6,532**	**135,844**
Surplus / (Deficit) (A) - (B)	**6,649**	**(1,658)**	**4,991**

The actuarial balance sheet has been constructed on the basis that invested future employer contributions will be consistent with the rates recommended at the 2015 Review. This is not well defined for the Defined Benefit Category because the amount is dependent upon each member's contribution rate and part-time status. It has been assumed for this purpose that the average member contribution rate and part-time ratio will remain constant for each of the main membership groups, viz. Standard Males, Standard Females and Police. It will be noted that *Past Service* refers to service prior to the investigation date (also denoted *accrued*), whilst *Future Service* refers to projected service of members after the investigation date.

The figure for net contributions tax reflects the present value of tax payable as the last minute contributions are paid when benefits crystallise. Allowance has been made for the expected value of

[11] Reserves include the accumulated premiums in respect of the capital guarantee provided to members of the closed VPP option within the Accumulation Category.

the tax deductions for the notional cost of insurance and administration expenses (see Section 2.4), resulting in an effective tax rate of 14%.

All reserves held in respect of accumulation categories have been included as an accrued liability in the actuarial balance sheet. It will also be noted that future service liabilities have not been incorporated into the actuarial balance sheet in respect of accumulation categories. As these categories are fully funded, these liabilities would be exactly offset by corresponding assets resulting from future employer and member contributions and so the net financial position of the scheme is unaffected.

The actuarial balance sheet shown in Table 13 incorporates all the categories within QSuper. This Review is substantially concerned with the defined benefit components of the scheme and so I have recast the actuarial balance sheet with all non-defined benefit assets and liabilities removed, as shown in Table 14.

Table 14 Defined Benefit Actuarial Balance Sheet as at 30 June 2021 – Funding Basis

	$ millions		
	Past Service	Future Service	Total Service
Value of Assets and Future Member Contributions			
Market Value of QSuper Fund Notional DB Assets	6,536	-	6,536
Market Value of Employer Fund Assets	25,553	-	25,553
Member Contributions	-	1,350	1,350
Employer Contributions at Recommended Rate	-	3,524	3,524
Total Value of Assets (A)	**32,089**	**4,874**	**36,963**
Value of Benefits, Tax & Expenses			
Active Defined Benefit Members	18,641	5,271	23,912
Current and Contingent Pensioners	1,500	-	1,500
Other Former Members	1,952	-	1,952
Disability Income Benefit	24	343	368
Expenses	675	192	867
Value of Net Contributions Tax	2,647	725	3,372
Total Value of Benefits, Expenses & Tax (B)	**25,440**	**6,532**	**31,972**
Surplus / (Deficit) (A) - (B)	**6,649**	**(1,658)**	**4,991**

Table 14 shows that, on the assumptions underlying the funding basis, the defined benefit scheme is in a healthy financial position. A reconciliation of the movement in the accrued surplus since the last Review is shown in Section 7. It is important to note that the surplus position demonstrated above already allows for the asset repatriation announced by the Government as seed funding for the Queensland Future Fund; i.e. the surplus would have been around $1.5 billion higher prior to the transfer.

In order to gain a more comprehensive understanding of the financial position of the scheme, it is also important to consider the corresponding actuarial balance sheet derived in accordance with the accounting basis used in the Government's financial statements, as shown in Table 15. It is important to note that only the past service (i.e. accrued) liabilities are considered in the Government's financial statements, in accordance with the relevant accounting standards.

Table 15 Defined Benefit Actuarial Balance Sheet as at 30 June 2021 – Accounting Basis[12]

	$ millions		
	Past Service	Future Service	Total Service
Value of Assets and Future Contributions			
Market Value of QSuper Fund Notional DB Assets	6,536	-	6,536
Market Value of Employer Fund Assets	25,553	-	25,553
Member Contributions	-	1,632	1,632
Employer Contributions at Recommended Rate	-	4,260	4,260
Total Value of Assets (A)	**32,089**	**5,892**	**37,981**
Value of Benefits, Tax & Expenses			
Active Members	23,747	7,692	31,439
Current & Contingent Pensioners	2,216	-	2,216
Other Former Members	2,200	-	2,200
Disability Income Benefit	25	418	443
Expenses	861	273	1,133
Contributions Tax	3,665	1,099	4,764
Total Value of Benefits, Expenses & Tax (B)	**32,712**	**9,482**	**42,194**
Surplus / (Deficit) (A) - (B)	**(624)**	**(3,590)**	**(4,213)**

The difference in the surplus positions between the funding and accounting bases is effectively the present value of the risk premia expected to be earned from the asset allocation over the remaining time until the defined benefit liabilities are eventually extinguished. Whilst these returns are based on reasonable expectations, they are of course not available until earned. In the usual context where contribution rates are the key mechanism for defined benefit funding management, they can be considered as a budgeting estimate, which are adjusted as investment returns and other aspects of scheme experience emerge over time.

The accounting basis can be considered to provide a view of the solvency position of the scheme in that it does not require the sponsor and therefore future generations of taxpayers to guarantee investment returns above risk-free rates. The extent of intergenerational risk transfer is linked to the strategic investment strategy for the assets, which is selected by the Board and Government, taking into account their collective risk preferences. Putting aside the conceptual differences between the two bases, it is important to recognise the practical reality that the Government is required to include the past service liabilities on the accounting basis within its overall balance sheet. Consequently, whilst the accounting view does not drive recommendations of contribution rates, it can provide useful context when considering the funding position of the scheme.

As noted in Section 2.3.1, the Government has a legislative obligation to fund the defined benefit liabilities over and above the assets held within the QSuper fund. The difference between the economic value of the defined benefit liabilities (as proxied by the accounting value) and the assets held in the QSuper fund in respect of the defined benefit members can be considered as an estimate

[12] Note that the total value of Benefits, Tax and Expenses and Net Contributions Tax shown here are not consistent with figures included in the corresponding disclosure within the QSuper Financial Statements, which is based on preliminary estimates. In addition, the value of outstanding disability income benefits attributed to past service has been maintained at the figure estimated during the latest experience review, on the grounds of materiality.

of the value of the Government's benefit guarantee. At the valuation date, the value of the Government benefit guarantee in respect of accrued service was $26.176 billion.

The deficit in respect of future service when contributions are made at the current rates under either basis is indicative that the value of future accruals is greater than the existing employer contribution rates. This shortfall is not problematic in itself and is taken into account with the accrued and projected surplus positions demonstrated in this Review.

6.2 Sensitivity to Key Assumptions

The actuarial balance sheets shown in Table 14 and Table 15 are based on the relevant actuarial assumptions listed in Appendix C without any loading to allow for possible adverse experience. Whilst these assumptions represent our best estimates of the likely future experience of the scheme, it is important to consider the effect on the funding position of departures from them.

Table 16 illustrates the alternative scenarios considered and their effects on the accrued liabilities. It is important to note that the scenarios shown are not considered equally likely nor do they reflect any particular percentile of the distributions of possible scheme experience, especially any lower or upper bound. They are simply shown to demonstrate the sensitivity of the valuation results to the various assumptions. Further consideration of the distribution of financial outcomes is discussed in Section 8.

Table 16 Sensitivity of Investigation Results on Accrued Liabilities

Scenario	Effect on Accrued Liability
Discount Rate +1%	-7.9%
Salary Inflation +1%	8.2%
CPI Inflation +1%	0.7%

These scenarios refer to changes in the financial assumptions; viz. the assumed rate of salary and price inflation and the discount rate used to derive the present value of projected future cash flows. These are critical assumptions within any actuarial investigation, and it is important to understand the effect of changes in these parameters. Table 16 demonstrates the importance of the discount rate and salary inflation assumptions as well as the minor impact of variations in the assumed level of price inflation. These outcomes are not surprising as most defined benefit liabilities are linked to salary growth with only a small proportion of the overall liabilities being CPI-linked pensions.

Consideration was given to extending the analysis to other parameters such as the promotional salary scale, decrement rates etc. However, given the maturity of the scheme membership (the average age of Standard members is now 55.7 years), the effect of these parameters on liabilities is quite limited.

In summary, the accrued liabilities are not very sensitive to the price inflation assumption but are quite sensitive to the gap between investment returns and salary inflation.

6.3 Cash Flow Profile

The projected cash flows underlying the liabilities shown in Table 13 and Table 14 are shown in Figure 3. Only the first forty years have been shown.

Figure 3 Projected Benefit Cash Flows

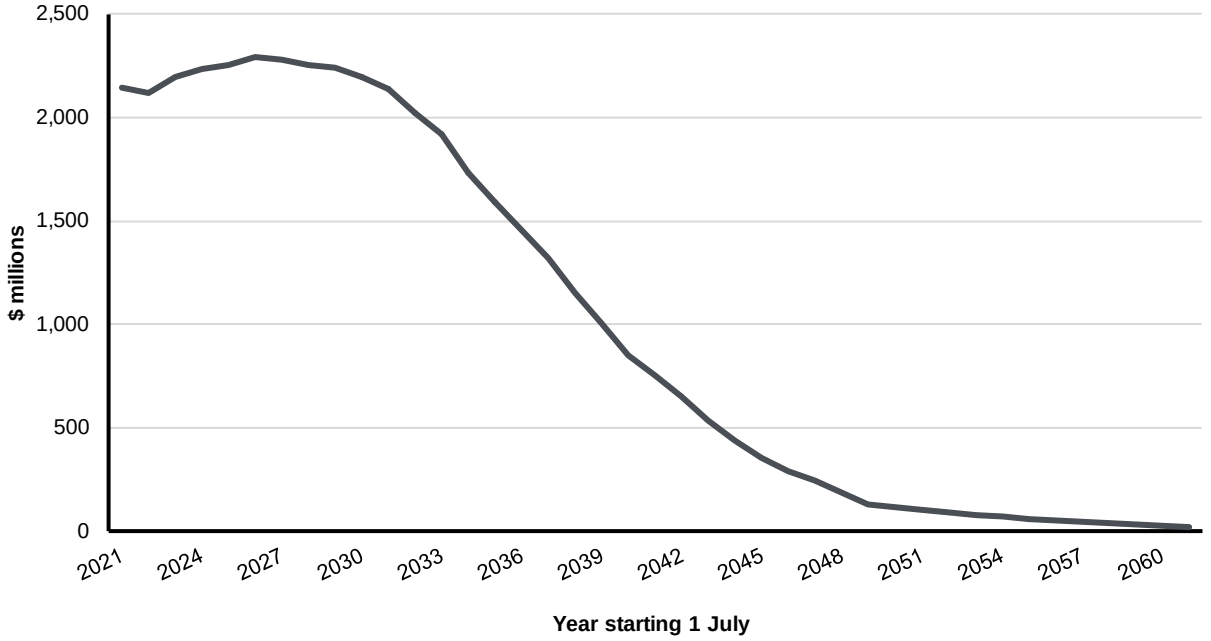


Figure 3 demonstrates that annual cash flows will remain high for some years with projected annual benefit payments over $1 billion for almost twenty years and consequently that the effective “life” of the defined benefit scheme is still quite long.

6.4 Superannuation Guarantee

The *Superannuation Guarantee (Administration) Act (1992)* (the *SG Act*) requires that, from 1 July 1992, employers contribute a specified minimum percentage of salary to a complying superannuation scheme on behalf of each employee. This payment must be fully vested (i.e. available to the employee unconditionally) and preserved in the scheme until the person meets a condition of release.

The rate of employer contribution generally exceeds that required by the SG Act for member contribution levels above 3% for a comparable salary definition. However, since 1 July 2008 the effective salary definition for SG purposes is Ordinary Time Earnings (OTE) and in addition the SG rates have been legislated to increase over time, with the rate increasing gradually from its current level of 10% to 12% by 2025.

The Deed was amended so that if the contribution paid on behalf of a member in a pay period after 1 July 2008 is less than the notional employer contribution rate applied to OTE, the difference is paid by the employer into the member’s accumulation account. However, for those QSuper members employed in core government agencies, this test applied from 1 July 2006. In a sense this top-up contribution can be considered as a pre-payment of any potential additional benefits that would have otherwise been payable as a result of the comparison of standard QSuper benefits with the SG equivalent minimum requisite benefit and the SG Certificate reflects this.

Given this approach, and the relatively high level of benefit accrual within QSuper for most members, the possibility of further additional benefit payments over and above the standard benefits plus the

accumulated top-up contributions is relatively remote. The possible circumstances where such payments might be required have been analysed and one or more of the following attributes are required:

- OTE greater than superannuable salary;
- Low member contribution rate;
- Long membership (equivalently young age at entry and/or late retirement);
- Recent entry (noting that the plan was closed to new entrants in November 2008); and
- High investment returns over long periods.

Whilst these situations are very unlikely to occur, they are not impossible and in addition, the level of the top-ups is asymmetrically related to several of the parameters listed above. Consequently, I have modelled the potential additional top-ups using a Monte Carlo simulation, with the existing membership used to calibrate the potential parameter space, noting that there have been no top-up payments made to date. The expected present value of additional top-up payments relative to the present value of Defined Benefit entitlements has been estimated to be 0.15%, including a margin for model uncertainty. Given the unlikelihood of top-up payments, this represents a conservative approach with the amount included in the actuarial balance sheets shown above within the liabilities relating to active Defined Benefit members.

Similar issues apply to the State and Police Categories although even less commonly, except for situations where a resigning member does not choose the preserved benefit. As it has been assumed that all such members choose that benefit, in line with the experience of the scheme, and considering the relatively minor component of the overall liabilities, no further explicit allowance has been made for these Categories. There are no additional payments expected in respect of the Parliamentary Category.

6.5 Employer Fund Share of Defined Benefit Payments

The Deed was amended in February 2011 such that contributions payable to meet the State's share of defined benefits not provided by the QSuper fund assets are decided by the Board on the advice of the Actuary. This amendment generalised the funding provisions and removed the specific provisions that previously applied to each of the defined benefit categories.

For several years all payments to pensioners have been met from the QSuper fund with no last minute contribution drawn from the Employer Fund in respect of them and I recommend that this arrangement continue. The Deed further requires that all income protection benefits in respect of defined benefit members be fully met by the State.

Other than pension and accumulation benefits (fully met from the QSuper fund) and defined benefit income protection benefits (fully met by the State), I recommend that transfers from the Employer Fund be made as last minute contributions by the State at the level of 92% of defined benefit payments (whether paid directly to a member or to an accumulation category), as shown in Table 17. This proportion has decreased from 96% since the last Review, mainly due to the high investment return on the QSuper Fund DB Assets during 2020-21.

Table 17 Derivation of Employer Fund Proportion of Benefits

	Item	Amount ($m)	Note
(a)	Total Value of All Benefits	135,844	
(b)	Member Fund Assets	110,408	From Balance Sheet shown in Section 6.1
(c)	Future Member Contributions	1,350	
(d) = (a) - (b) - (c)	Total Crown Payments required to fund benefits	24,086	Total benefits less amounts funded by member
(e)	Disability Income Benefit	368	From Balance Sheet shown in Section 6.1
(f) = (d) - (e)	Balance of Future Crown Payments to required to fund benefits	23,719	
(g)	DB Benefits to which proportion applies	25,864	Total DB Benefits excl Current Pensions and Disability Income Benefits
(f) ÷ (g)	Prima facie Proportion of Benefits required to fund benefits	91.70%	
(c)	Selected Proportion of Benefits (rounded up)	92%	Rounded up to provide prudent buffer for Member Fund

It should be noted that defined benefit member voluntary contributions are excluded as they are held within the accumulation assets and that the Employer Fund proportion includes an allowance for contributions tax and hence there should be no grossing up of the amounts to be transferred. “Defined benefit payments” for this purpose explicitly *include*:

- Preserved benefits in respect of State/Police members on transfer to an accumulation category;
- Member balances transferred to an accumulation account in respect of DB category members who resign before age 55; and
- DRB benefits transferred to an accumulation category as a result of a conversion to an ILO, death or TPD or reaching age 55

New pensions that commence payment upon an active member’s exit should be fully funded at emergence since all payments made to pensioners are to be met from the QSuper fund with no last minute contribution in respect of them. A contribution from the Employer Fund equal to 92% of the estimated present value at the commencement of each new pension (derived as shown in Appendix D) should therefore also be made.

If the actuarial assumptions are realised, then last minute State contributions as described above will fund the balance of all defined benefit liabilities (including those that arise in respect of service after the investigation date) not met from the current QSuper fund assets and future member contributions.

It should be noted that the defined benefit liabilities include contributions tax and expenses in addition to benefit payments to which the recommended proportion is applied. The proportion to apply to those benefits not *fully* met from either the QSuper fund or the State will continue to be recalculated as part of each future actuarial valuation.

6.6 Level of Surplus

As discussed in Section 6.2, the surplus position of the defined benefit plan depends critically on the assumptions used to calculate the present value of benefit payments. On the funding basis, used in this and past Reviews to assess the level of required contributions on the assumption that investment risk premia are achieved, the plan has an accrued surplus of $6.649 billion and an overall *actuarial* surplus (i.e. relating to both past and future service) of $4.991 billion, or 16% of defined benefit assets.

On the accounting basis used within the Government's financial statements, the picture is quite different, with an accrued deficit of $0.624 billion. Allowing for liabilities in respect of projected future service as well results in a corresponding *actuarial* deficit of $4.213 billion. This position compares extremely favourably with other Governments in Australia and I note that there is no requirement or practice to fund defined benefit schemes to the levels indicated by the accounting basis. Nevertheless, the funding positions shown under the funding and accounting bases still provide useful input regarding the solvency and management of the scheme and therefore I have considered them in greater detail here.

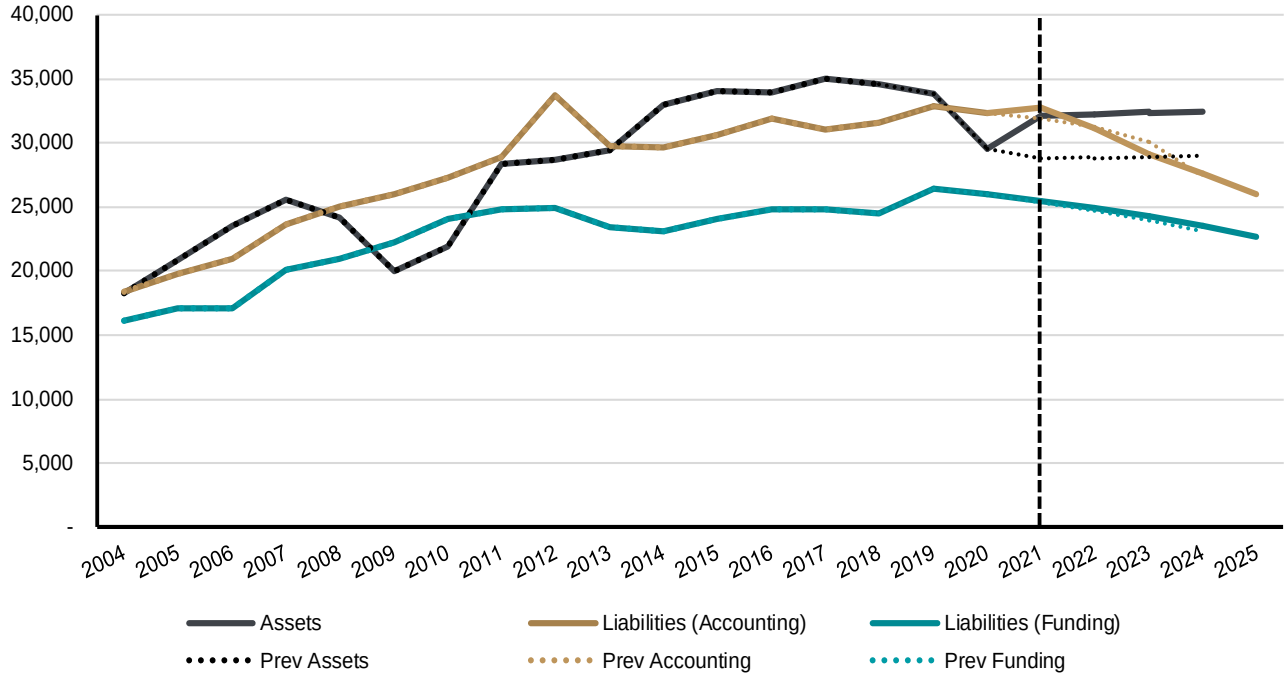
As a baseline, the projected assets and liabilities of the defined benefit scheme over the next four years are shown in Figure 4. The accounting basis liabilities are based on October 2021 Consensus Economic forecasts of bond yields[13], as shown in Table 18, whilst assets are projected to provide a return consistent with the Budget assumptions shown in Appendix C.1.1. Whilst I recognise that these forecasts may not eventuate and there will be differing views as to their accuracy, as there always are with forecasts of this nature, it is important to recognise that this comparison is only one component of the overall analysis used to inform the projected funding levels within the scheme.

Table 18 Forecast Net Discount Rates

As at 30 June	Net Discount Rate
2021	1.40%
2022	1.60%
2023	2.00%
2024	2.20%
2025	2.40%

[13] The April 2021 forecasts were used in the 2021-22 Budget at https://budget.qld.gov.au/files/Budget_2021-22_Budget_Strategy_Outlook.pdf.

Figure 4 Historical and Projected Defined Benefit Assets and Liabilities ($m) - Baseline



Consistent with the relevant Professional Standard (PS 400), I have also reproduced Figure 4 on the assumption that asset returns are equivalent to the funding basis discount rate (i.e. 4.50%) rather than the assumptions used within the Budget framework (see Section C.1.1), shown in Figure 5.

Figure 5 Historical and Projected DB Assets and Liabilities ($m) – Assets Earn Funding Basis Discount Rate

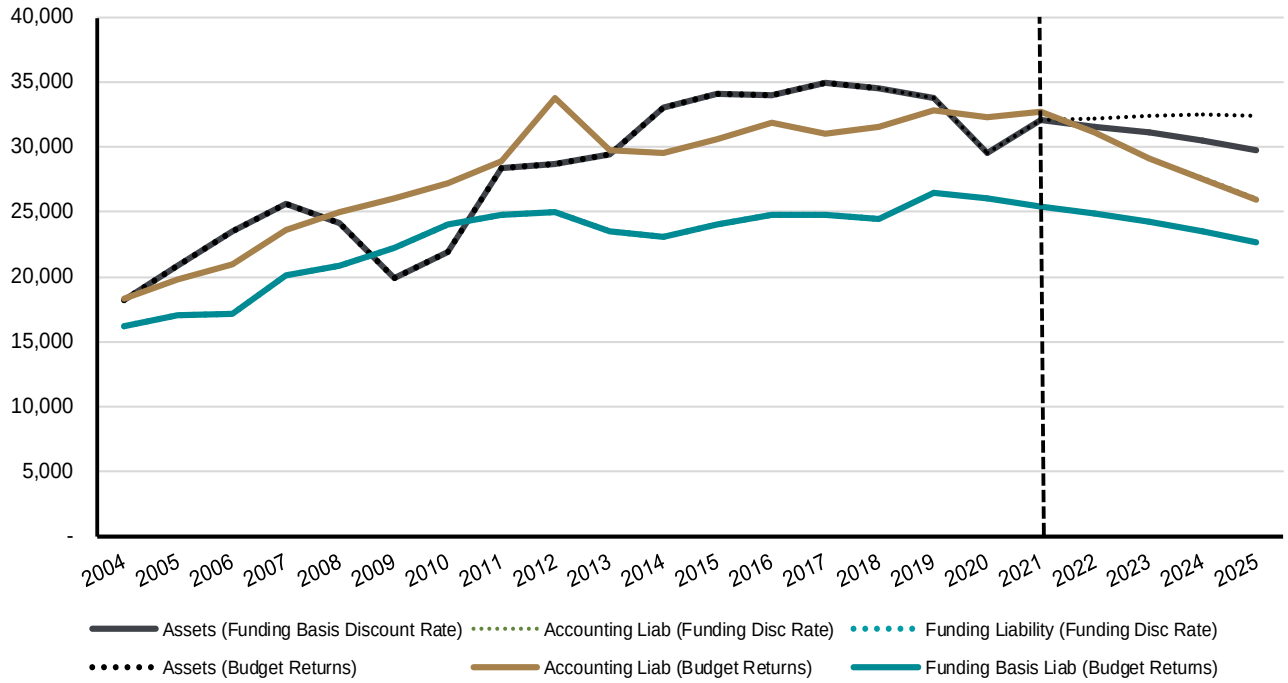


Figure 5 demonstrates the effect of the differing investment return assumptions on the overall scheme assets. The effects on both the accounting and funding basis liabilities are trivial as the only difference relates to the accrued contribution tax liability which is relatively higher when the projected QSuper Fund assets are lower.

In summary, the baseline projections of the funding position of the defined benefit scheme suggest that the overall funding position is projected to increase from its current levels shown in this Review, noting of course that there is no requirement nor actuarial practice to target an accounting surplus.

6.7 Recommended Contribution Rates

As noted in Section 5.1, this Review has been undertaken on the basis that the suspension of investment of employer contributions announced by the then Treasurer in the 2015-16 Budget continued for five years; i.e. investment recommenced from 1 July 2020. A consequence of the surplus repatriations over the past few years has meant that the employer contribution model is now considered practically fixed, noting that employer sponsors external to Government would be unlikely to support any increases in those rates.

The employer contribution rates for Standard and Police members of the Defined Benefit Category are therefore shown in Table 19. The legacy State and Police Categories contribution rates will remain consistent with the corresponding group in the Defined Benefit Category, also shown in Table 19. It will be noted that the Parliamentary Category does not have a corresponding group with the Defined Benefit Category and so its contribution level has been determined using the last direct assessment in 2005, noting the immateriality of the Parliamentary liabilities within the overall Defined Benefit Categories.

Table 19 Employer Contribution Rates[14]

Category	Employer Contribution Rate
Defined Benefit - Standard	7.75% of Salary + 1.00 x Member Contributions
Defined Benefit - Police	6.00% of Salary + 2.00 x Member Contributions
State	4.75% of Salary + 1.00 x Member Contributions
Police	3.00% of Salary + 2.00 x Member Contributions
Parliamentary	5.00 x Member Contributions

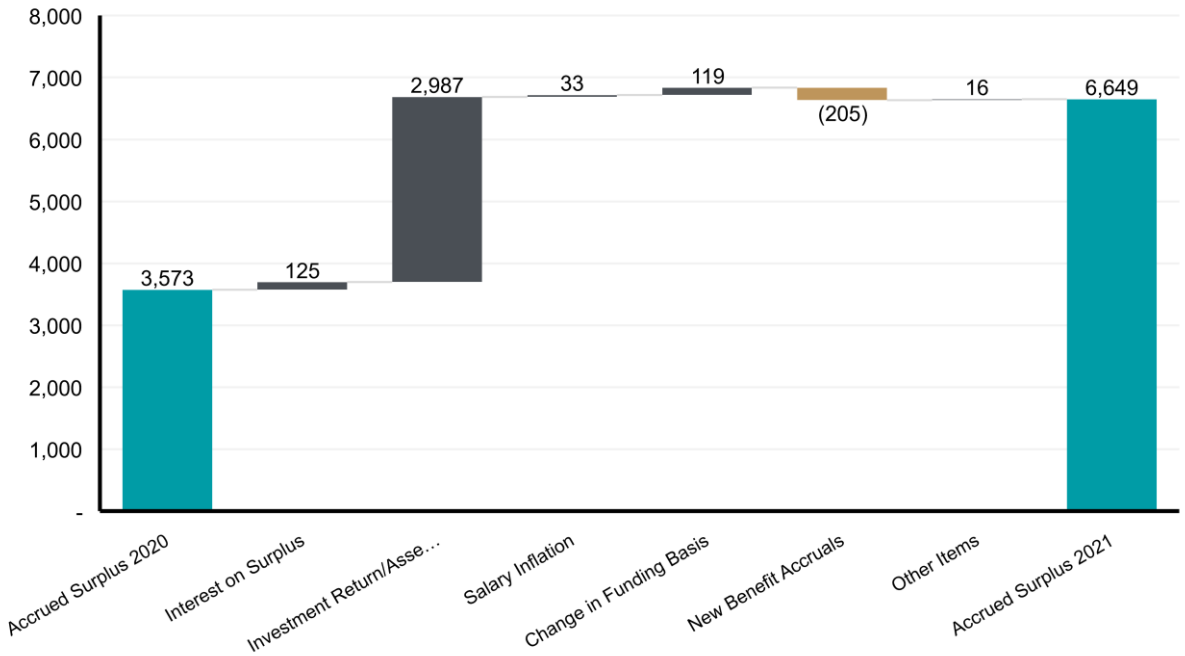
[14] The employer contribution rates for the State and Police categories are equivalent to the contribution rates in respect of the relevant Defined Benefit Plan members less the 3% contribution to the Basic Accumulation Plan.

7 Factors Affecting the Accrued Surplus

The last Review revealed a surplus of assets over accrued liabilities of $3,573 million as at 30 June 2020.

The actuarial balance sheets illustrated in Table 13 and Table 14 show an accrued surplus position of $6,649 million which is an increase of $3,075 million from that disclosed at the previous Review. The main sources of this change are shown in Figure 6 and discussed further below.

Figure 6 Components of Surplus



- Interest on Surplus

  The surplus at the last Review is expected to increase at the previously assumed discount rate, resulting in an additional surplus at this Review of approximately $125 million.

- Investment Returns/Asset Changes

  The actual investment return achieved over the last year has been higher than the level assumed at the last Review, offset by the $1.5 billion transfer to the Queensland Future Fund. The resulting combined surplus has been estimated to be $2,987 million.

- Salary Inflation

  The growth in salaries since the last Review was lower than assumed in the 2020 valuation, resulting in a surplus of approximately $33 million.

- Changes in Funding Basis

  The actuarial valuation basis has changed from that used in the 2020 Review, with the reasons for this discussed in detail in Appendix B. The basis changes have increased the surplus by approximately $119 million.

- New Benefit Accruals

  The deficit arising from the cost of new benefit accruals being greater than employer contributions over the inter-investigation period has been estimated to be $205 million.

8 Funding Status

This section of the Report looks at the extent to which QSuper would be able to meet benefits accrued to date, without taking into account future contributions, by deriving various indices comparing assets with different benefit liability measures. In order to allow a meaningful comparison to be made, the QSuper fund and the Employer Fund have been combined when determining the market value of assets for the purposes of calculating the various indices.

In addition, some of the indices have been projected after the investigation date. Unless otherwise specified, these projections have assumed that the employer contribution rates are maintained, subject to any investment suspension, previous repatriations/restorations are implemented as planned, the valuation assumptions are exactly realised and further that the Budget investment return assumptions are achieved, unless otherwise specified.

8.1 Vested Benefits

8.1.1 Definition

“Vested Benefits” are the benefits that would be payable had all members voluntarily resigned on the investigation date. Total vested benefits would usually be regarded as the bare minimum that should be covered by a regulated scheme. Whilst paragraph 23 of SPS 160 does not apply to QSuper, the coverage of vested benefits is nevertheless an important indicator of a scheme’s short term financial condition and so I have followed the spirit of SPS 160 in this regard. This relationship is usually expressed as an index defined as the ratio of assets to vested benefits, or vested benefits index (VBI).

The vested benefits have been calculated as the total of all resignation benefits or, for eligible members (including the accumulation categories where relevant), early retirement benefits that would have been payable to members at the investigation date plus the value of former members’ preserved benefits and pensions in payment. In determining the value of preserved and pension benefits in the Defined Benefit Category, deferred retirement benefits and projected pension payments have been discounted in line with the funding basis. The value of the vested benefits has also been adjusted to reflect the contribution tax liability that would become payable if all members were to resign. Compared to the accrued liabilities considered in Section 6, where allowance could be made for future tax deductions in respect of insurance and administration expenses, the *vested* contribution tax liability is calculated using the “full” rate of 15%.

It is an interesting consequence of the benefit design of the Defined Benefit Category that the vested benefit is generally greater than the present value of accrued liabilities and consequently, in the absence of an accrued surplus, the vested benefits would be expected to be greater than scheme assets.

In Reviews prior to 2016 I noted that, with a Government sponsor assured of perpetual existence and also given the funding arrangements of the scheme and benefit guarantee, a VBI of less than 100% did not necessarily require specific action. In addition, accrued liabilities represent the present value of the expected future benefit payments related to service prior to the calculation date, whilst vested benefits represent the somewhat artificial situation where all members effectively leave on the one day. This is why actuarial management has concentrated on accrued liabilities rather than vested

benefits as they represent the more meaningful measure for a scheme that is practically assured of perpetual existence.

As noted in Section 5.1, the funding management framework for QSuper has changed subsequent to the introduction of the funding guarantee embodied in the Future Fund Act (see also the letter from the Under Treasurer included in the 2020 Review). Effectively, the change represents a return to the pre-2016 approach, concentrating on the accrued funding position, with less emphasis on vested benefits. Another consequence is that the shortfall limit and target buffer discussed in the 2016-2019 Reviews are no longer relevant and the corresponding sections are excluded from this Report.

8.1.2 VBIs at the Valuation Date

The VBI can be defined in respect of various membership groups within QSuper. As at 30 June 2021, the value of the vested benefits and VBI for the commonly considered groups were as shown in Table 20.

Table 20 Vested Benefits and VBI at 30 June 2021

	Vested Benefits ($ million)	VBI
QSuper (incl Accumulation etc)	131,063	103.7%
QSuper Defined Benefit Scheme (incl deferred and pensioner members)	**27,191**	**118.0%**
Active Defined Benefit category members only	22,572	126.8%

8.1.3 VBI Projections

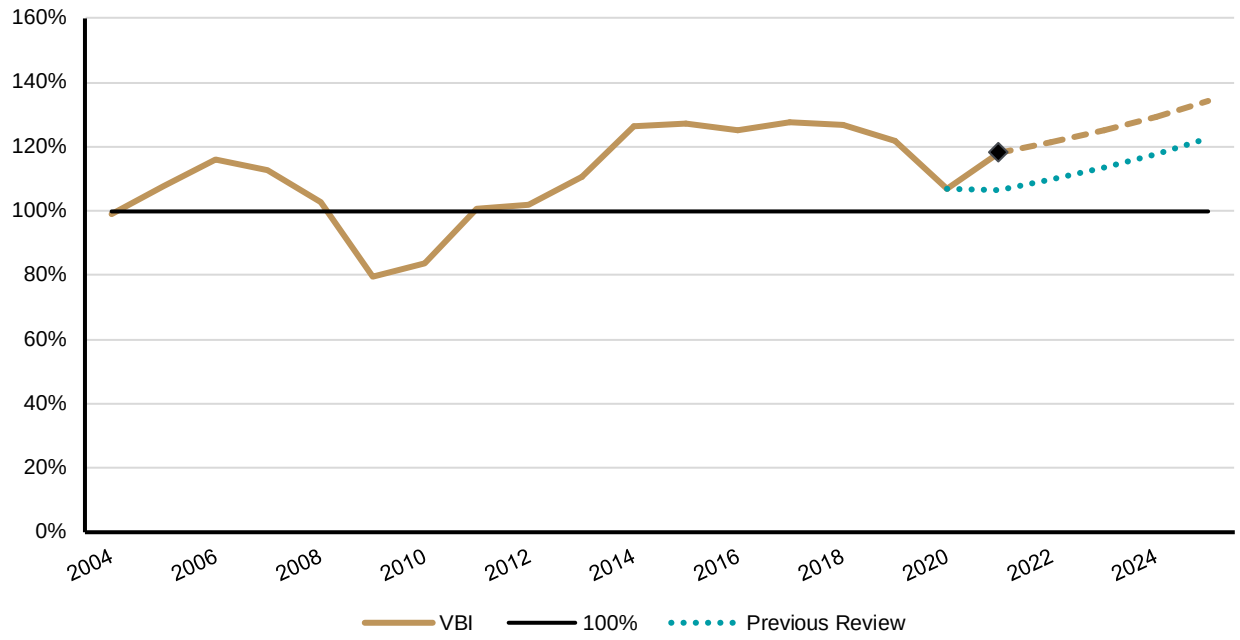
It is usual to look at the progress of the various indices from Review to Review. An increase in an index would generally indicate a strengthening of a scheme's financial position while a decrease would indicate a weakening. The corresponding vested benefit indices at the previous Review are shown in Table 21. The improvements since the last Review are substantially due to the strong investment return during 2020-21.

Table 21 VBI at 30 June 2020

	VBI at 30 June 2020
QSuper (incl Accumulation etc)	101.7%
QSuper Defined Benefit Scheme (incl deferred and pensioner members)	**107.1%**
Active Defined Benefit category members only	113.5%

In addition, Figure 7 shows the vested benefits index for the last several years as well as its projection for the four years following the investigation date, based on the Budget investment return assumptions (see Appendix C.1.1). As noted above, the vested benefits depend on the actuarial valuation assumptions because the withdrawal benefit for defined benefit members is the deferred AWOTE linked retirement benefit. Consequently, the historical values aren't strictly comparable, but the broad trends are still meaningful.

Figure 7 Historical and Projected Deterministic Vested Benefits Index – Defined Benefit Scheme

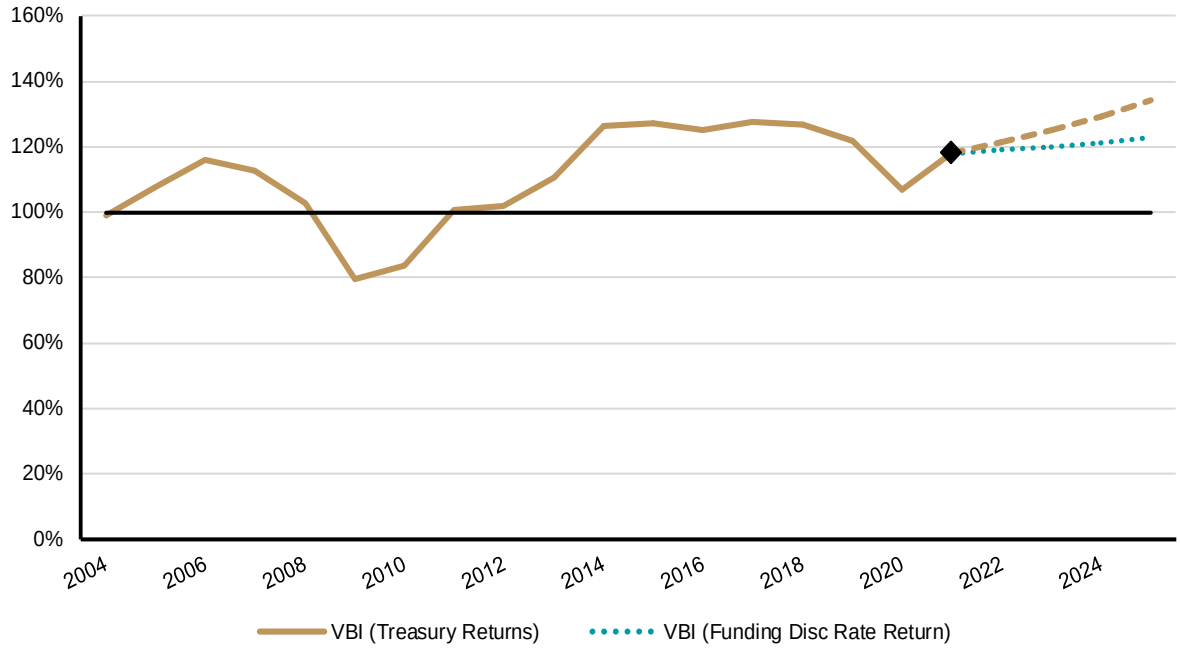


The effect of both the 2019-20 and 2020-21 investment returns can be clearly seen in Figure 7, with the VBI returning to around its level at 30 June 2019. Based on the assumptions specified in Section C.1.1, the VBI is expected to improve over time.

Consistent with the relevant Professional Standard (PS 400), I have also reproduced Figure 7 on the assumption that asset returns are equivalent to the funding basis discount rate (i.e. 4.50%) rather than the assumptions used within the Budget framework (see Section C.1.1), shown in Figure 8.

Similarly to Figure 5, Figure 8 demonstrates the effect of the differing investment return assumptions on the overall scheme assets although the VBI is still projected to remain well above 100%. The effect on the vested benefits liability is again trivial as the only difference relates to the vested contribution tax liability which is relatively higher when the projected QSuper Fund assets are lower.

Figure 8 Historical and Projected Deterministic VBI – Assets Earn Funding Basis Discount Rate



8.2 Accrued Retirement Benefits

For the purpose of assessing the progress of a scheme towards funding the members' normal age retirement benefits it is useful to compare the value of the scheme's assets to the level of normal age retirement benefits accrued at the date of the investigation. This comparison gives the "Accrued Retirement Benefits Index" or ARBI. The ARBI *excludes* the assets and liabilities in respect of the accumulation categories, deferred benefits and pensioners.

The value of the accrued benefits has been determined as the member's retirement benefit based on the 1 July 2021 salary and service to the investigation date. The accrued retirement benefits have been adjusted to take into account the estimated vested contributions tax liability.

The accrued retirement benefits are only payable when the member has reached retirement age. With a positive gap between the rate of investment income and salary inflation, the assets would grow at a faster rate than the accrued benefits and so the ratio of assets to accrued retirement benefits should increase over time. Hence, it would be expected that the ARBI would generally be less than 100% during the active service of the collective membership.

The ARBI for active defined benefit members at the Review date was 126.7%, compared to the equivalent ARBI at the last Review of 112.9%. As the average age of the membership has grown since the last Review, the ARBI would have been expected to increase, other things being equal. The observed material increase is substantially due to the strong investment return during 2020-21. The fact that the ARBI is over 100% is indicative of the high level of accrued surplus.

8.3 Discounted Accrued Retirement Benefits

To illustrate the effect of the gap between investment earnings and salary inflation, a further calculation was made in which the accrued benefit for each *active* member was discounted, for each year prior to age 55, by the gap between salary inflation and the discount rate assumed in the funding basis. The ratio of the assets to these “discounted accrued retirement benefits” is another indicator of the degree to which members’ retirement benefits are funded. The “discounted accrued retirement benefits” index at this valuation was 130.0%, including allowance for the vested contributions tax liability.

The equivalent index at the last Review was 116.4%. The material increase is again substantially related to the strong investment return during 2020-21.

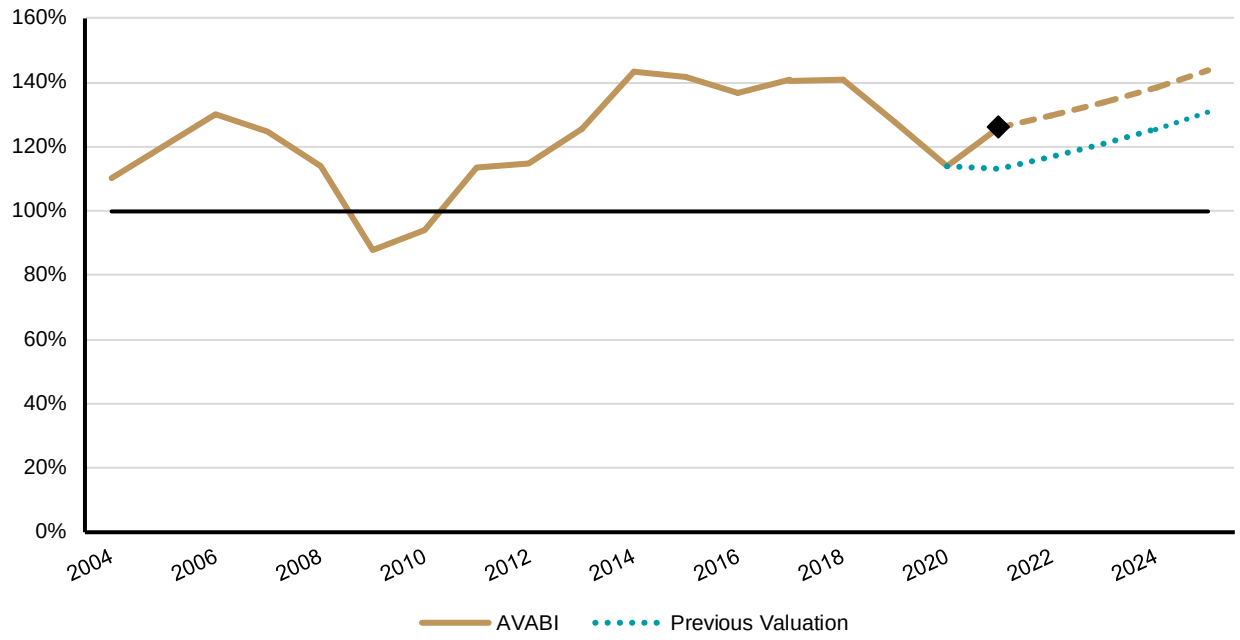
8.4 Actuarial Value of Accrued Benefits

An additional funding indicator which takes into account the liability accrued from service prior to the investigation date for all types of benefit (i.e. not only age retirement) is the present value of accrued liabilities. The present value of accrued liabilities (*including* current pensions, preserved benefits, Accumulation members and adjusted for accrued taxation liabilities) on the funding basis at the investigation date was $129,312 million, as shown in Table 13.

Another way of presenting this figure is in the form of an index defined similarly to the other indices defined in Section 8. As at the investigation date, the actuarial value of accrued benefits index (AVABI) for QSuper as a whole (i.e. including the Accumulation Categories) was 105.1%. For the defined benefits scheme only, the AVABI at the investigation date was 126.1%, compared to 113.7% at the previous Review. The increase in this index is largely due to the strong investment return during 2020-21, offset by the minor strengthening of the valuation basis at this Review. The dependence on the valuation basis, particularly the financial assumptions, means that the levels of the AVABI over time are not strictly comparable; however the broad trends can still be meaningful.

The historical and projected AVABI (for the defined benefit scheme) for the four years following the investigation date is shown in Figure 9. This chart demonstrates that, based on the assumptions made within this Review, the funding position is projected to increase over the next several years, building on the improvement since the last Review.

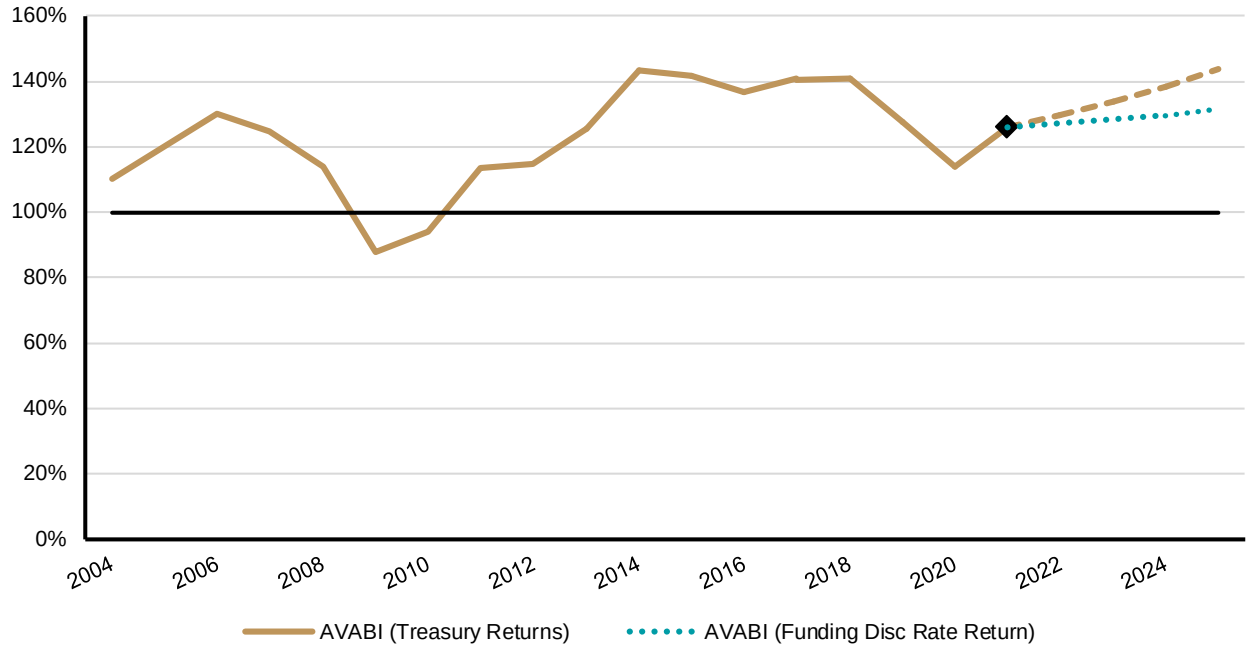
Figure 9 Historical and Projected AVABI (Funding Basis Liability)



Consistent with the relevant Professional Standard (PS 400), I have also reproduced Figure 9 on the assumption that asset returns are equivalent to the funding basis discount rate (i.e. 4.50%) rather than the assumptions used within the Budget framework (see Section C.1.1), shown in Figure 10.

Similarly to Figure 5, Figure 10 demonstrates the effect of the differing investment return assumptions on the overall scheme assets although the AVABI is still projected to remain well above 100%. The effect on the accrued benefit liability is again trivial as the only difference relates to the accrued contribution tax liability which is relatively higher when the projected QSuper Fund assets are lower.

Figure 10 Historical and Projected Deterministic AVABI – Assets Earn Funding Basis Discount Rate



The projections shown in Figure 9 and Figure 10 are based on the deterministic assumptions shown in Appendix C.1.1 and so do not reflect the expected volatility related to inflation and investment returns. Consistent with my previous Review, QIC has kindly provided stochastic projections of the AVABI so that I can assess the distribution of potential outcomes and allow for more extreme positions than the baseline projection shown above. These models incorporate QIC's assessment of asset class returns, volatility and correlation, as well as realised inflation and prospective inflation and interest rates.

Before considering the distributions of potential outcomes for the funding position of the scheme it is worth noting the uncertainties implicit within QIC's models, or any such asset-liability models for that matter. These models reflect reasonable expectations as to future returns and volatility but they are subject to specification and calibration errors and cannot be expected to demonstrate the entire range of possible outcomes; i.e. it is certainly possible for outcomes outside the distributions shown to occur in practice. Whilst they provide useful input for decisions regarding funding strategies, it is important for all stakeholders to recognise that the modelled outcomes are not subject to any guarantees.

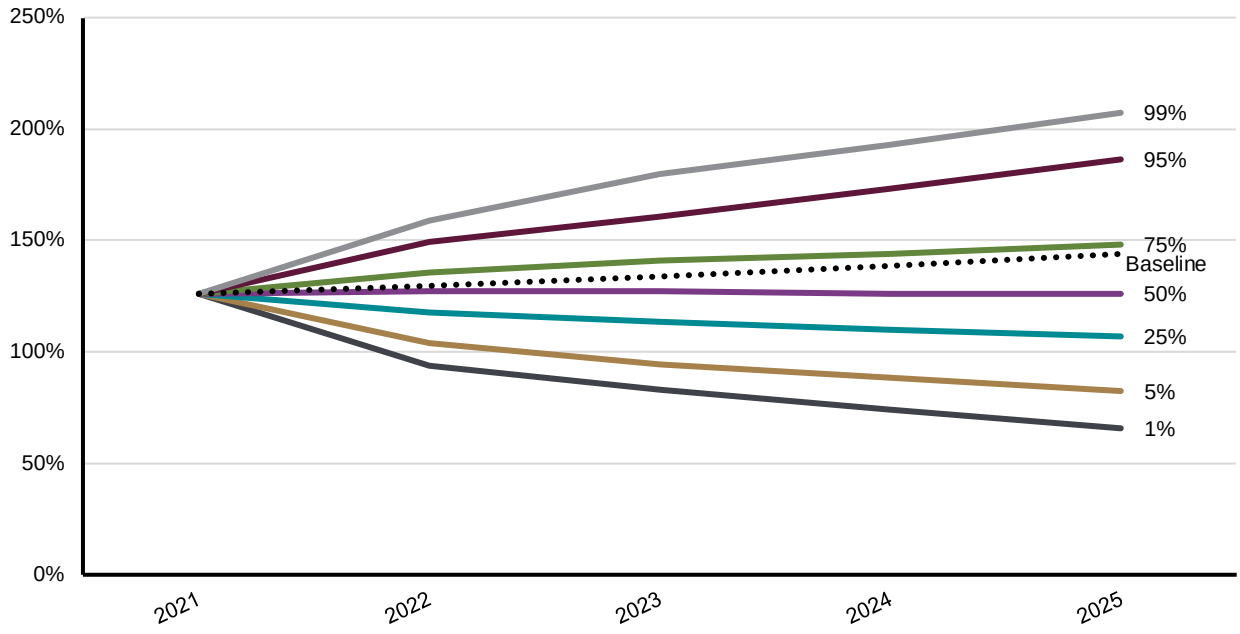
It is also worth commenting on the forecast horizon over which to assess these projections. I have continued to use four years, reflecting the Budget forward estimates and a reasonable period to allow for the models to perform at their best[15] as well as a medium term horizon for decision making that is not overly reactive to short term issues. Longer periods can be subject to one of the major risks with such models where mean reversion assumptions tend to underestimate the "tail" of return distributions, particularly on the downside.

The distribution of potential values for the AVABI over the next four years is shown in Figure 11. Each line represents a percentile of the distribution of possible values. For example, the line labelled "50%" represents the median outcome with a 50% chance of a higher value and 50% chance of lower. The

[15] The economic and other relationships underlying QIC's models are more reflective of medium term outcomes and so the projected outcomes are more meaningful over 3-5 years than in the shorter or longer term.

line labelled 5% represents the fifth percentile, the amount where there is a 5% or 1 in 20 chance of a lower value.

Figure 11 Projected AVABI Distribution – Defined Benefit Scheme[16]



For the four year period to 30 June 2025, QIC's median cumulative net return, salary inflation and CPI inflation are 3.3%, 3.1% and 2.1%, respectively. The implied median real investment return above salary inflation from the QIC models is therefore 0.2%, compared to the Budget assumptions underlying the projections shown in Figure 4 and Figure 7 of 3.3% (see Appendix C.1.1) and so the Baseline projection is materially higher than the median stochastic projection. Whilst the Budget investment return assumptions represent a more optimistic view than the QIC models, I have used them for consistency with the Budget framework, within which funding decisions are to be considered (see Section 5.2). Based on the distributions demonstrated in Figure 11, the probability of the AVABI falling below 100% *in any year of the Budget period up to 2025* has been estimated to be 22%, or around 1 in 5.

Subsequent to the introduction of the funding guarantee, there are no downside funding risks from the perspective of the scheme, as these risks fall to the Government. It is therefore a Government decision as to what, if any, funding initiatives should be undertaken, taking into account its overall balance sheet and financial priorities. For these reasons, confirmed in the Under Treasurer's letter included in the 2020 Report, I make no comment or recommendation regarding the relative merits of any funding management scenarios.

I emphasise that there is no single "correct" level of surplus for any defined benefit scheme and that no guarantee can be provided as to future funding levels due to the variability of scheme outcomes, particularly investment returns. It is important to note that the risk of fund deficiency falls upon the State, with the benefit guarantee protecting member entitlements and so the effects of a deficit on the security of members' entitlements are insignificant compared to similar funds in the private sector.

[16] Note that the stochastic projections are based on QIC's short to medium term expectations and are independent of the Budget investment return assumptions.

8.5 Summary

The funding indices have materially increased since the last Review, primarily due to the strong investment return during 2020-21. The absolute levels of the indices are all reasonable and indicative of the strong funding position, measured on the funding basis. I have also shown the projected progress of the funding positions demonstrating that the funding position of the scheme is projected to remain strong for the next four years.

9 Required Statements

Section 19 of the Deed requires the following statements:

- The assets of the QSuper fund as at 30 June 2021 were $110,408 million.
- It is expected that the assets of the QSuper fund and future member and employer contributions will finance all liabilities for benefit payments as at 30 June 2021.

The requirements of paragraph 23 of SPS 160 are not appropriate to QSuper in view of the funding arrangements of the scheme. With regard to paragraph 24 of SPS 160, I make the following statements:

- The value of the assets of the fund at the valuation date, excluding any amount held to meet the Operational Risk Financial Reserve (ORFR) was $110,128 million.
- I recommend that employer contributions from the Employer fund to QSuper be made as follows:

Income protection to be met by State	Income protection benefits to be fully met by the State as required by the Deed
Payments to pensioners from QSuper fund	Consistent with current practice, all payments to pensioners to be met solely from the QSuper fund with no last minute funding drawn from the Employer Fund in respect of them
State to meet 92% of defined benefit payments	Other than the above, the State to meet 92% of defined benefit payments. Benefit payments for this purpose include any transfers to an accumulation category and the present value (see Appendix D) of new pensions that emerge on the exit of defined benefit active members. All payments to pensioners are met solely from the QSuper fund and therefore need to be fully funded at commencement

- These recommendations are based on accrued liabilities that have been determined using assumptions and valuation methods that are appropriate to the liabilities of QSuper.
- Section 29 of the Act requires that the Treasurer must contribute the amounts necessary to meet defined benefit payments that do not relate to past member and employer contributions. The contributions described above are consistent with that requirement and therefore I consider that the liabilities are adequately funded.
- An event prescribed under section 342(4)(a) of the SIS Act and listed in regulation 12.10 of the SIS Regulations has not occurred.

QSuper self-insures death and disability benefits for members of the Accumulation[17] and Defined Benefit Categories. The Accumulation self-insurance liabilities are now immaterial although QSuper still maintains reserves based on actuarial advice. With regard to the self-insurance of defined benefit entitlements, I believe that self-insurance remains appropriate, recognising:

- the State has a statutory obligation in respect of the defined benefit obligations of the scheme, so insured benefits are effectively guaranteed;

[17] Only claims incurred prior to 1 July 2016 are self-insured. From that date, Accumulation insurance has been provided by QInsure.

- the defined benefit membership is large enough so that variations in death and disability experience from year to year are small relative to the size of the scheme and to variations in other aspects of the scheme's experience; and
- the insured component of death/TPD benefits is declining as the membership ages so the risks are declining.

With regard to APRA reporting standard SRS 160.0, I note the following:

- The long term investment return assumption (i.e. funding basis discount rate) was 4.50%.
- The long term wage growth assumption was 3.1%.
- The long term consumer price index assumption was 2.1%.
- The weighted average term of projected defined benefit liabilities was 9 years.
- The relevant date for the above items was 30 June 2021.

10 Material Risks

The Actuaries Institute professional standard governing the valuation of defined benefit schemes (PS 400) requires a discussion of the material risks relevant to the scheme. In my view, the major risks affecting the defined benefit plan within QSuper are as follows:

- Investment risks resulting from the mismatch between the investment strategy and the liabilities. The change to the investment strategy subsequent to the change in interpretation of the relevant fiscal principle has increased this mismatch, which represents the single largest risk to the funding position of the scheme.
- Most of the scheme's liabilities are linked to members' salaries and therefore the funding position of the scheme can also be adversely affected by an increase in liabilities resulting from unexpected public sector wages growth. Similarly, the liabilities linked to AWOTE (deferred retirement benefits of former members) and CPI (pensions) are also subject to the risk of high inflation levels, although the impacts are much less.
- In previous Reviews, I noted that they were predicated on the basis that the assets held in respect of employee entitlement liabilities within the Consolidated Fund would continue to be hypothecated for that purpose, subject to any recommendations made via the actuarial review process, noting that this had been the stated and practised position of successive Governments over many years. However, since the introduction of the funding guarantee as part of the *Queensland Future Fund Act 2020*, this risk no longer applies.

In view of the benefit guarantee provided by the State, these risks manifest as a funding risk for the Government, rather than practically affecting beneficiary security. Nevertheless, overseas experience has demonstrated that even Government guarantees are not inviolable and so all stakeholders need to be aware of them.

Appendix A Benefit and Contribution Conditions

QSuper is designed on a “master trust” concept, which permits state public sector employing authorities to provide unique scheme conditions for their employees. Some employing authorities have opted for benefit conditions slightly different to the standard QSuper benefits but the vast majority of members of the scheme receive the standard benefits set out below.

Over the years a number of government superannuation schemes have been merged into QSuper. Each of the merged schemes now operates as a category of QSuper with existing members’ benefits and conditions carried through substantially unaltered.

A full description of the benefit and contribution conditions of the scheme is contained in the Deed. This summary is intended to provide a broad overview only.

In accordance with the Commonwealth Family Law Act, QSuper is required to transfer benefits to non-member spouses in certain circumstances. The Board has received approval to use a “valuation and payout” methodology where a member’s interest is valued at the relevant date. The valuation method for the defined benefit categories[18] has been specified as the value payable upon transfer to an accumulation category, whilst the member’s account balance is used for accumulation category members (i.e. the default method prescribed by the Family Law Regulations). Following a family law split, the member’s entitlements are reduced proportionately and then they continue to accrue benefits normally, thus implementing a “clean break” between the parties to the split.

Since 1 July 2006, members have been able to crystallise part or all of their defined benefit and transfer the resulting amount to a “transition to retirement” (TtR) pension. The basis upon which the crystallisation is undertaken is equivalent to that applying to Family Law split; i.e. the basis used for transfers to an accumulation category.

A.1 QSuper Defined Benefit Category

A.1.1 Eligibility

The Defined Benefit Category was closed to new entrants from 12 November 2008, although there was a 6 month window for late elections to occur.

Non-casual members of the Comprehensive Accumulation Category were previously allowed a once-only option to transfer to the Defined Benefit Category.

In addition, members who retained their entire benefit within QSuper after a previous exit were able to return to the Defined Benefit Category upon re-joining the Queensland public sector. However, since the closure of the latter category this option is no longer available, except for members who are re-appointed to the Government within one month of exit who are essentially deemed to have continued their original membership.

[18] The Parliamentary Category uses a different methodology for Family Law valuation and also splits certain benefit payments using the “percentage only” technique described in the relevant regulations.

A.1.2 Review Date

The accounting year for QSuper is the financial year ended 30 June. However, salaries for benefit and contribution purposes in the Defined Benefit Category are updated on 1 July of each year (the Annual Review Date). Salary is defined in the Deed and is usually the base salary or wages of a member although various subgroups have approved allowances included within superannuable salary.

A.1.3 Retirement Date

There is no Normal Retirement Date for the Defined Benefit Category. Members over age 65 who work for more than 40 hours in a 30 consecutive day period are allowed to contribute until age 75. This Review has incorporated allowance for members retiring after age 65 (see Section B.4.2).

A.1.4 Final Average Salary/Final Salary

Final Average Salary is the average of the review date salaries over the previous year, having regard to the period of time for which they were applicable.

Final Salary is the review date salary applicable immediately prior to the occurrence of the relevant event unless this occurs in the year preceding the member's 55th birthday, in which case the final salary is equal to the average of review salaries since age 54.

A.1.5 Benefit Accruals

During each Annual Review Year, members accrue an Annual Compulsory Contribution Accrual, which depends on the rate of the member's contributions, and an Annual Basic Benefit Accrual. Both of these are expressed as a percentage of salary.

The Annual Compulsory Contribution Accrual for Standard members is calculated as follows:

$$\textit{Annual Compulsory Contribution Accrual} = 12.5\% \times \frac{\textit{Compulsory Contributions During Year}}{\textit{Annual Review Date Salary}} \div 5\%$$

The Annual Basic Benefit Accrual for Standard members is calculated as follows:

$$\textit{Annual Basic Benefit Accrual} = 8.5\% \times \textit{The proportion of the Annual Review Year during which compulsory contributions have been received in respect of the member}$$

This can be summarised as 8.5% plus 2.5 times member contribution rate.

For Police members, the accruals are defined as follows:

$$\textit{Annual Compulsory Contribution Accrual} = 21.0\% \times \frac{\textit{Compulsory Contributions During Year}}{\textit{Annual Review Date Salary}} \div 6\%$$

Annual Basic Benefit Accrual	*= 3.5% x*	*The proportion of the Annual Review Year during which compulsory contributions have been received in respect of the member*

This can be summarised as 3.5% plus 3.5 times member contribution rate.

Thus, a Standard member who contributes at the standard rate of 5% of salary will accrue a benefit of 21% of salary per annum. Similarly, Police who contribute at the standard rate of 6% accrue benefits at 24.5% of salary per annum.

A.1.6 Retirement Benefit

Where a member retires or otherwise leaves service on or after their 55th birthday, a lump sum benefit is payable that is calculated as follows:

Benefit	*= Final Average Salary x*	*The sum of the member's Annual Compulsory Contribution Accruals and Annual Basic Benefit Accruals*

A.1.7 Total and Permanent Disablement Benefit

Where a member becomes totally and permanently disabled (TPD) prior to age 55, the member has the choice of taking a lump sum benefit or a pension benefit[19]. The lump sum benefit is calculated as follows:

Benefit = Retirement Benefit + Prospective Membership Benefit

The retirement benefit is calculated using Final Salary rather than Final Average Salary. The prospective membership benefit for Standard members is as follows:

Prospective Membership Benefit	*= Final Salary x 21% x*	*Potential Membership from date of disablement to member's 55th birthday*

The prospective membership benefit for Police members is as follows:

Prospective Membership Benefit	*= Final Salary x 24.5% x*	*Potential Membership from date of disablement to member's 55th birthday*

Members may elect to take an annual pension benefit, which is calculated as follows:

$$\text{Annual Pension} = \frac{\text{Lump Sum Benefit}}{9.8} \quad \text{(Standard member)}$$

$$\text{Annual Pension} = \frac{\text{Lump Sum Benefit}}{11.43} \quad \text{(Police member)}$$

[19] The pension election must occur within three months of notification of TPD acceptance.

The annual pension is limited to 75% of Final Salary. This pension is adjusted annually in line with increases in the Brisbane All Groups Consumer Price Index. On the death of the pensioner before the pension has been paid for five years, a lump sum benefit is payable equal to the current annual rate of the pension multiplied by the number of years and fractions of a year until the five year term is reached.

The Deed was amended on 1 July 2006 to provide for the children of members who die within one year of TPD to receive pensions equivalent to those payable had the member died in service (see Section A.1.9).

A.1.8 Permanent and Partial Disablement Benefit

Where a member becomes permanently and partially disabled (PPD) prior to age 55 a lump sum benefit is payable which is calculated as for the retirement benefit but using Final Salary rather than Final Average Salary.

A.1.9 Death Benefit

Where a member dies prior to age 55, a lump sum benefit equal to the lump sum on total and permanent disablement is payable. Since 1 July 2020, this benefit is also payable on the occurrence of a terminal medical condition, defined in accordance with SIS Regulation 6.01A.

In addition, a child's pension is payable to each child of the deceased member.

A.1.10 Benefit on Involuntary Termination

Where a member's employment is terminated involuntarily a lump sum benefit is payable that is equal to the benefit payable on permanent and partial disablement. Involuntary termination includes voluntary early retirements, redundancies and retrenchments.

A.1.11 Benefit on Withdrawal

Where a member ceases employment and is not entitled to any other benefit, the benefit payable is calculated as for the retirement benefit but using Final Salary rather than Final Average Salary. This benefit comprises two components:

- An amount equal to the member's contributions accumulated with interest. This component is transferred to an accumulation category and a portion may, subject to SIS preservation requirements, be immediately accessible as cash.
- The balance of the benefit (the Deferred Retirement Benefit or DRB) must be preserved until a preservation cashing condition is satisfied. Members can choose two options for indexation of the DRB. The default option is for the benefit to be increased in line with Average Weekly Ordinary Time Earnings (AWOTE) until age 55, at which time it is transferred to an accumulation category. Alternatively, the DRB can at any time be converted to a cash equivalent amount (the Investment Linked Option or ILO) that will be transferred to an accumulation category. The ILO is calculated by discounting the AWOTE linked benefit by 2.88% compound for each year from conversion until age 55.

A.1.12 Minimum Benefit

The minimum benefit payable for any reason shall not be less than the defined Withdrawal Benefit as at the date of exit. In addition, benefits payable since 1 July 1992 must not be less than the Minimum Requisite Benefit defined in the Superannuation Guarantee Benefit Certificate for the scheme.

A.1.13 Income Protection Benefit

Where a Standard member becomes temporarily disabled and has been absent from duty on sick leave without salary for a continuous period of 14 days, the member may be entitled to receive a pension of 75% of Final Salary for the period of temporary disability. Whilst in receipt of an Income Protection benefit, a member is deemed to have contributed at the Standard Contribution Rate for benefit accrual purposes. The pension ceases when the pension has been paid in respect of a single condition for a period of two years or the member is deemed PPD or TPD. Police members of the Defined Benefit Category, magistrates and Parliamentarians do not have access to the Income Protection benefit.

A.1.14 Member Contributions

The Standard Contribution Rate to the Defined Benefit Category is 5% of salary. However, members are able to choose the level at which they contribute within the range 2% to 8% provided that contributions in excess of 5% are only allowed in order to “catch up” for having previously contributed at a rate below 5%. Members are able to salary sacrifice their member contributions by grossing up their contribution by dividing by 85%; e.g. a 5.88% salary sacrifice contribution is equivalent to a 5% after-tax contribution.

The standard rate of contribution for Police members is 6% of salary, with rates allowed between 3% and 9%.

A.1.15 Transfer to the Accumulation Category

Members of the Defined Benefit Category are able to transfer to the Comprehensive Accumulation Category at any time on an open-ended basis. The transfer benefit is equivalent to the cash equivalent withdrawal benefit (see Section A.1.11) for members under age 55 and the retirement benefit (see Section A.1.6) for members over age 55. Having transferred from the Defined Benefit Category, members are unable to transfer back from the Comprehensive Accumulation Category.

A.2 QSuper Accumulation Categories

A.2.1 Eligibility

Since 1 May 2000, all new public sector employees have joined an accumulation category by default. Non-casual members were previously allowed a once-only option to transfer to the Defined Benefit Category but following the closure of this category from 12 November 2008 this option is no longer available.

A.2.2 Benefits

A lump sum benefit is available to members when they permanently retire at or after their preservation age. The benefit is equal to the balance of the member's account at retirement. The member's account is comprised of member and employer contributions and interest. Deductions are made for administration costs, taxation and insurance premiums.

On resignation, all or part of a member's account must be preserved until a preservation cashing condition is satisfied.

If a member dies or becomes TPD before age 65, the benefit provided is equal to the member's account balance plus any additional insurance proceeds. Non-casual members (other than police and Parliamentarians) also have access to income protection insurance.

A.2.3 Member Contributions

Generally, all non-casual employees contribute 5% of their salary. The standard contribution level may be varied, from 2% to 5%, and members (including those in defined benefit categories) may make additional voluntary contributions.

There are some non-casual employees (wages employees with commencement dates prior to 1 May 2000) who have elected not to make contributions. These employees are not compelled to change. However, the option to contribute remains open for these employees and there is no time limit for this choice. If they commence contributions they must continue to contribute. The option not to contribute is unavailable for non-casual employees who commenced after 1 May 2000.

Casual employees do not have to contribute. If they choose to contribute, they are eligible to receive the same level of employer contributions as non-casual employees.

A.2.4 Employer Contributions

Members who contribute to an accumulation category receive employer contributions at the rate of 7.75% of salary plus a matching of their own net contributions up to 5% of salary.

For non-contributory members, the employer contribution rate is in line with the Commonwealth's Superannuation Guarantee requirements.

Where the employee is a member of either the State or Police Category, the employer contributes 3% of salary to an accumulation account (formerly known as "GOSUPER").

A.2.5 Transfer to Defined Benefit Category

With the closure of the Defined Benefit Category in November 2008, this option is no longer available.

A.3 QSuper State Category

Since 1 January 1991, new members have not generally been able to enter the State Category. An exception to this occurs when a previous member who has retained a preserved benefit in the

category re-joins the public sector. They are allowed the option of continuing their previous membership or joining the Comprehensive Accumulation Category. Due to changes in benefit design over the lifetime of the scheme, the complexity of some benefit conditions and the operation of transitional arrangements, the category does not lend itself to a simple and concise summary of the benefit and contribution conditions.

The following summarises the benefit and contribution conditions for a member who entered the category after 30 June 1988.

A.3.1 Normal Retirement Age

The normal retirement date is the 65th birthday for all members. Members who remain as public sector employees after their 65th birthday, or after 42.5 years of membership from age 20, do not continue to accrue benefits within the category and the QSuper fund component of their normal retirement benefit is paid from that date. The member is then moved to the Comprehensive Accumulation Category where all future contributions are deposited. The remainder of the benefit is paid on retirement.

A.3.2 Final Average Salary

Final average salary (FAS) is defined as the average fortnightly salary received by the contributor during the year immediately preceding the member's exit from the scheme. However, any increases in salary in the two years prior to retirement which are in addition to Award increases are averaged over two years.

A.3.3 Service to Count

Service starts accruing from the later of the date of joining the category and the member's 20th birthday.

The maximum amount of service to count is 42.5 years.

A.3.4 Categories of Membership

There were two categories of membership – category A and category B. These were medical categories based on a medical examination of the member on entry to the category, although there are no longer any contributing members in category B.

The benefits of the two categories are basically the same except that the ill-health and death benefits for category B members are restricted during the first 10 years of their membership if the cause of ill-health or death is related to the reason for being classified as category B.

A.3.5 Pensions

Pensions payable are indexed annually according to the increase in the Brisbane All Groups Consumer Price Index (CPI).

Where a pensioner dies leaving a spouse, a lump sum benefit is payable that may be converted to a 2/3rds reversionary pension at the discretion of the spouse. In certain circumstances, child and orphan pensions are also payable.

A.3.6 Retirement Benefit

The retirement benefit is available after the member has reached age 60.

The benefit is defined as a pension but this can be commuted to a lump sum.

The fortnightly amount of the pension is calculated as follows:

$$\text{Fortnightly Pension} = \frac{3}{200} \times \text{Service to date of retirement} \times \text{FAS}$$

The lump sum payable in lieu of the pension is calculated by multiplying the above pension by a commutation factor that varies depending on the member's age in years and complete months. At age 60 the commutation factor equals 313. It then reduces linearly to 261 at age 65.

A.3.7 Early Retirement Benefit

The early retirement benefit is available after the member has reached age 55 but before age 60. It is defined as a lump sum benefit; however, this can be converted to a pension at the member's choice.

The amount of the lump sum benefit is calculated as follows:

$$\text{Benefit} = \frac{3}{200} \times \text{Service to date of early retirement} \times \text{FAS} \times 313 \times (1 - 2\% \times [60 - \text{Age at Retirement}])$$

The fortnightly pension payable in lieu of the lump sum benefit is equal to the lump sum benefit divided by a factor. This factor is equal to 365 at age 55 and reduces linearly to 313 at age 60.

A.3.8 Death Benefit

The death benefit is payable as a lump sum or a pension.

The lump sum benefit payable is as follows:

$$\text{Benefit} = \frac{3}{170} \times \max(\text{Service to date of death, Potential service to age 60}) \times \text{FAS} \times T$$

T is a factor dependent on the age of the member at death. For a member aged 25 or less at death, T equals 137. It rises linearly to 235 at age 50, remains constant until age 60 and then falls to equal 196 at age 65.

The spouse's pension is calculated as follows:

$$\text{Benefit} = \frac{3}{170} \times \text{Potential service to age 65} \times \text{FAS} \times \frac{2}{3}$$

Orphan and child pensions are also payable where applicable.

The death benefit as defined above is inclusive of the member's GOSUPER balance, which is reimbursed to the State account.

A.3.9 Ill-Health Benefit

A short term incapacity benefit is payable to members commencing after 2 weeks of approved sick leave without pay. This benefit is a pension calculated as follows:

$$\textit{Fortnightly Pension} = \frac{3}{170} \times \textit{Potential service to age 65} \times \textit{FAS}$$

On ill-health retirement a pension is payable calculated as for the short term benefit.

Where the Board is satisfied with the member's medical competency to deal with a lump sum, the pension may be commuted. In this situation, the lump sum payable is the same as that payable had the member died.

The ill-health benefit as defined above is inclusive of the member's GOSUPER balance, which is reimbursed to the State account.

A.3.10 Resignation Benefit

On resignation the member has the option to take a withdrawal benefit or to preserve the entire benefit in QSuper.

The withdrawal benefit is equal to member contributions plus interest, and the required level of superannuation guarantee contributions as referred to in Section A.3.11. A portion of the benefit is, subject to SIS preservation requirements, immediately accessible in cash. The balance of the withdrawal benefit is transferred to an accumulation account and must be preserved until a preservation cashing condition is satisfied.

The benefit payable if the member takes the preservation option is calculated as follows:

$$\textit{Benefit} = \textit{Retirement Benefit payable at 55} \times \frac{\textit{Service to date of exit}}{\textit{Service to age 55}} \; X \; \textit{Discount}$$

Where,

$$\textit{Discount} = 1 - 2\% \times (55 - \textit{Age at Exit})$$

The benefit as calculated above is preserved in accordance with SIS requirements until a preservation cashing condition is met and earns interest at the crediting rate of the Balanced member investment option in the accumulation category while it remains in the State Category.

A member who has previously elected the preserved option and whose benefit remains within the State Category may subsequently choose to take the withdrawal benefit instead, in which case the benefit will be determined as described above for the latter option.

The preserved benefit is transferred to an accumulation account or another complying superannuation fund at age 55, on becoming incapacitated or earlier at the option of the member.

The amount calculated above under the preserved option is payable on involuntary termination.

A.3.11 Superannuation Guarantee

Since 30 June 1992, a minimum requisite benefit (MRB) has been defined in accordance with the Superannuation Guarantee Administration Act (1992). Every benefit payable from QSuper is subject to a minimum of the MRB. In practice, an increase in benefit is usually only payable when a resigning member chooses not to take the preserved benefit defined above (see Section 6.4). In this case, an additional benefit is paid and preserved in accordance with the SIS requirements.

A.3.12 Member Contributions

The level of contributions paid by a member is a percentage of the member's salary as at the previous review date (1 October) or later date of joining the category. The percentage depends on the member's age at the review date and is as set out in Table 22.

Table 22 State Category Level of Members' Contributions

Age	Member Contribution Rate
Under 20	2.0%
20-24	4.0%
25-34	4.5%
35 or greater	5.0%

A.3.13 Existing Members' Benefit Design

There are several differences between the benefit design described above and that for existing members. The differences with the greatest financial significance are:

- Members who joined the category prior to 1 July 1988 have an accrual rate of 3/170 for service prior to that date for the purposes of age and early retirement benefits.
- Male members who joined the category prior to 27 February 1984 and who commute their pension benefit on retirement are paid an endowment benefit in lieu of a spouse's pension.
- For female members who joined the category prior to 27 February 1984 the commutation factors for converting the retirement pension to a lump sum are higher than for other members. This is illustrated in the Table 23.

Table 23 State Category Retirement Pension Commutation Factors

Age	Pre 27/2/84 Females	Other Members
60	13	12
65	11	10

A.3.14 Transfer to the Accumulation Category

Members of the State Category are able to transfer to the Comprehensive Accumulation Category at any time on an open-ended basis. The transfer benefit is equivalent to the preserved withdrawal benefit described in A.3.10. Having transferred from the State Category, members are unable to transfer back from the Comprehensive Accumulation Category.

A.4 QSuper Police Category

Since 1 January 1993, new members have not generally been able to enter the Police Category. An exception to this occurs when a previous member who has retained a preserved benefit in the category re-joins the police service. They are allowed the option of continuing their previous membership or joining the Comprehensive Accumulation Category. Due to changes in benefit design over the lifetime of the Police Category, the complexity of some benefit conditions and the operation of transitional arrangements, the category does not lend itself to a simple and concise summary of the benefit and contribution conditions.

The following summarises the benefit and contribution conditions for a member who entered the category after 30 June 1988.

A.4.1 Normal Retirement Age

The normal retirement date is the 60th birthday for all members. The Superannuation Legislation Amendment Act 1995 removed the previous specific variations for the Commissioner and Deputy Commissioner for whom the 65th and 62nd birthday respectively were considered as the normal retirement date. Members are now able to continue their membership after age 60 but in practice most retirements occur at or before age 60.

A.4.2 Final Average Salary

FAS is defined as the average fortnightly salary received by the contributor during the year immediately preceding the member's exit from the category except that any increases in salary in the two years prior to retirement which are in addition to Award increases are averaged over two years.

A.4.3 Service to Count

Service starts accruing from the later of the date of joining the category and the member's 20th birthday.

A.4.4 Pensions

Pensions payable are indexed annually according to the increase in the Brisbane All Groups CPI.

Where a pensioner dies leaving a spouse, a lump sum benefit is payable, which may be converted to a 2/3rds reversionary pension at the discretion of the spouse.

A.4.5 Retirement Benefit

The retirement benefit is payable when the member reaches age 60.

The benefit is defined as a pension but this can be commuted to a lump sum.

The fortnightly amount of the pension is calculated as follows:

$$\textit{Fortnightly Pension} = \frac{1}{62.5} \times \textit{Service to date of retirement} \times \textit{FAS}$$

The lump sum payable in lieu of the pension is calculated by multiplying the above pension by a commutation factor of 313.1.

A.4.6 Early Retirement Benefit

The early retirement benefit is available after the member has reached age 55. It is defined as a pension benefit, however this can be converted to a lump sum if the member wishes.

The fortnightly amount of the pension is calculated as follows:

$$\textit{Fortnightly Pension} = \frac{1}{62.5} \times \textit{Service to date of early retirement} \times \textit{FAS} \times (1 - 3\% \times [60 - \textit{Age at Retirement}])$$

The lump sum payable in lieu of the pension benefit is equal to the pension benefit multiplied by a commutation factor. This factor is equal to 365.3 at age 55 and reduces linearly to 313.1 at age 60.

A.4.7 Death Benefit

The death benefit is payable as a lump sum or a pension.

The lump sum benefit payable is as follows:

$$\textit{Benefit} = \frac{3}{160} \times \max(\textit{Service to date of death}, \textit{Potential service to age 55}) \times \textit{FAS} \times T$$

T is a factor dependent on the age of the member at death. For a member aged 25 or less at death, T equals 139. It rises linearly to 235 at age 50 and remains constant until age 60.

The spouse's pension is calculated as follows:

$$\textit{Fortnightly Pension} = \frac{3}{160} \times \textit{Potential service to age 60} \times \textit{FAS} \times \frac{2}{3}$$

Orphan and child pensions are also payable where applicable.

The death benefit as defined above is inclusive of the member's GOSUPER balance, which is reimbursed to the Police account.

A.4.8 Ill-Health Benefit

On ill-health retirement a pension is payable calculated as follows:

$$\textit{Fortnightly Pension} = \frac{3}{160} \times \textit{Potential service to age 60} \times \textit{FAS}$$

Where the Board is satisfied with the member's medical competency to deal with a lump sum, the pension may be commuted. In this situation, the lump sum payable is the same as that payable had the member died.

The ill-health benefit as defined above is inclusive of the member's GOSUPER balance, which is reimbursed to the Police account.

A.4.9 Resignation Benefit

On resignation the member has the option to take a withdrawal benefit or to preserve the entire benefit in QSuper.

The withdrawal benefit is equal to member contributions plus interest, and the required level of superannuation guarantee contributions as referred to in Section A.4.10. A portion of the benefit is, subject to SIS preservation requirements, immediately accessible in cash. The balance of the withdrawal benefit is transferred to an accumulation account and must be preserved until a preservation cashing condition is satisfied.

The benefit payable if the member takes the preservation option is calculated as follows:

$$\textit{Benefit} = \textit{Retirement Benefit payable at 55} \times \frac{\textit{Service to date of exit}}{\textit{Service to age 55}} \textit{ X Discount}$$

Where,

$$\textit{Discount} = 1 - 2\% \times (55 - \textit{Age at Exit})$$

The benefit as calculated above is preserved in accordance with SIS requirements until a preservation cashing condition is met and earns interest at the crediting rate of the Balanced member investment option in the accumulation category while it remains in the Police Category.

A member who has previously elected the preserved option and whose benefit remains within the Police Category may subsequently choose to take the withdrawal benefit instead, in which case the benefit will be determined as described above for the latter option.

The preserved benefit is transferred to an accumulation account or another complying superannuation fund at age 55, on becoming incapacitated or earlier at the option of the member.

The amount calculated above under the preserved option is payable on involuntary termination.

A.4.10 Superannuation Guarantee

Since 30 June 1992, a MRB has been defined in accordance with the Superannuation Guarantee Administration Act (1992). Every benefit payable from QSuper is subject to a minimum of the MRB. In

practice, an increase in benefit is usually only payable when a resigning member chooses not to take the preserved benefit defined above (see Section 6.4). In this case, an additional benefit is paid and preserved in accordance with the SIS requirements.

A.4.11 Member Contributions

The level of contributions paid by a member is a percentage of the member's salary. Here "salary" is the member's salary as at the preceding review date (1 October) or later entry. The percentage depends on the member's age at the review date or later entry as set out in Table 24.

Table 24 Police Category Level of Members' Contributions

Age	Member Contribution Rate
Under 20	2.0%
20-24	6.0%
25-34	6.5%
35 or greater	7.0%

A.4.12 Existing Members' Benefit Design

There are several differences between the benefit design described above and that for existing members. The differences with the greatest financial significance are:

- Members who joined the category prior to 1 July 1988 have an accrual rate of 3/160 for service prior to that date for the purposes of age and early retirement benefits.
- Members who were members under the 1968 Act receive unit benefits in respect of the level of their salary as at 31 December 1974 and receive benefits as described above only in respect of their salary increases since that date.
- Male members who joined the category prior to 27 February 1984 and who commute their pension benefit on retirement are entitled to an endowment benefit in lieu of a spouse's pension.

A.4.13 Transfer to the Accumulation Category

Members of the Police Category are able to transfer to the Comprehensive Accumulation Category at any time on an open-ended basis. The transfer benefit is equivalent to the preserved withdrawal benefit described in Appendix A.4.9. Having transferred from the Police Category, members are unable to transfer back from the Accumulation Category.

A.5 QSuper Parliamentary Category

Since the closure of the Defined Benefit Category, new Parliamentarians have become members of the Comprehensive Accumulation Category. On 30 June 2007, all assets and liabilities of the Parliamentary Contributory Superannuation Fund were transferred to the QSuper fund. Consequently, all contributing members and pensioners became members of QSuper at that date.

Due to changes in benefit design over the lifetime of the Parliamentary Scheme, the complexity of some benefit conditions and the operation of transitional arrangements, the category does not lend itself to a simple and concise summary of the benefit and contribution conditions.

The following summarises the main benefit and contribution conditions applying to most members.

A.5.1 Pensions

Pensions payable from the Scheme are indexed annually according to the increase in the Brisbane All Groups CPI for members exiting prior to 17 December 2004. For those members active at 17 December 2004 who later become eligible for a pension, the pension is indexed annually according to the increase in backbenchers' salary.

A.5.2 Leaving Service Benefit

(a) If the member left voluntarily with less than 11 years membership:

$$\textit{Benefit} = 2\ \frac{1}{6} \times \textit{Member's Aggregate Contributions}$$

If the member left with less than 8 years membership due to defeat at an election, failure to gain preselection (i.e. the member left involuntarily), or for other reasons that satisfy the Board:

$$\textit{Benefit} = 3\ \frac{1}{3} \times \textit{Member's Aggregate Contributions}$$

(b) In any other case:

$$\textit{Annual Pension} = \textit{Basic Salary} \times \left[0.50 + \frac{0.025}{12} \times (t - 96)\right] \times \frac{\textit{Total Salary Received}}{\textit{Total Basic Salary}}$$

Where:

t is complete months of membership with a maximum value of 240; and

Basic Salary is the annual salary of a backbencher

This pension may be converted to a lump sum (provided the member is less than 75 years old) using a commutation factor of 10 for a member aged less than 71. The commutation factor is reduced by 0.5 for each year of age in excess of 70.

A.5.3 Death Benefit for Current Member

(a) Less than 8 years of membership:

$$\textit{Annual Pension} = \textit{40\% of Basic Salary at the date of the member's death}$$

(b) 8 or more years of membership:

The greater of the following two pensions:

Annual Pension = 40% of Basic Salary at the date of the member's death

$$\text{Annual Pension} = \frac{2}{3} \text{ of Leaving Service pension payable at the member's death}$$

The spouse has the option of receiving a lump sum benefit in lieu of the above. The commutation factor to apply to the annual pension amount depends on the age of the spouse at the date of the member's death. These factors are listed in Schedule 29 of the Deed.

A.5.4 Death Benefit for Former Member

The greater of the following two pensions:

Annual Pension = 40% of Basic Salary at the date of the member's death

$$\text{Annual Pension} = \frac{2}{3} \text{ of pension payable on leaving service}$$

The benefit payable to spouses of former members is in proportion to the amount of pension the former member took on leaving service.

The spouse has the option of receiving a lump sum benefit in lieu of the above. The commutation factor to apply to the annual pension amount depends on the age of the spouse at the date of the member's death. These factors are listed in Schedule 29 of the Deed.

A.5.5 Ill-Health Benefit

The benefit payable is calculated as for leaving service for those with over 8 years membership. For those with less than 8 years membership, the benefit payable is a pension calculated as for leaving service except that a minimum of 50% of basic salary is applied. The resulting pension may be commuted to a lump sum using a commutation factor of 9.

A.5.6 Superannuation Guarantee

Since 30 June 1992, a MRB has been defined in accordance with the Superannuation Guarantee Administration Act (1992). Every benefit payable from the Scheme is subject to a minimum of the MRB. In practice, an increase in benefit from that described above is not expected (see Section 6.4).

A.5.7 Member Contributions

Members contribute a net 11.5% of their salary until their 70th birthday.

Appendix B Analysis of Experience

B.1 General

Despite the previous decision to undertake actuarial reviews on an annual basis[20], experience reviews are not generally undertaken more frequently than the previous triennial cycle as the data will not be statistically credible. In practice, experience reviews are undertaken out of cycle with the rest of the valuation process and reported on in the next scheduled valuation report. This Review reports on the experience analysis undertaken in respect of the period 1 July 2017 until 30 June 2020.

B.2 Financial Assumptions

As discussed in Section 5.2, liabilities have been calculated on two different bases within this Report; viz. the funding basis and the accounting basis. These bases consist of the same demographic and member behaviour assumptions but use different financial assumptions (discount rate and potentially price and salary inflation) in line with their different purposes. This Section concentrates on the funding basis, as the accounting assumptions have been chosen by Queensland Treasury, based on my advice. For completeness, these assumptions are shown in Table 25.

Table 25 Accounting Financial Assumptions

Gross Discount Rate	1.5%
Net Discount Rate (allowing for investment taxation)	1.4%
Salary Inflation	3.1%
Price (CPI) Inflation	2.1%

It is important to note that the assumptions used for accounting purposes are consistent with the requirements of the relevant accounting standard (AASB 119) and are not strictly comparable with those used in the funding basis, as discussed in Section 5.2. However, in line with the previous review, I have used consistent assumptions for price and salary inflation in both the accounting and funding bases. This is discussed further in Section B.2.2.

When setting the discount rate and inflation assumptions to be used in the funding basis, it is not so much their absolute value that is important but their relative levels. This is mainly due to the simple mathematics of inflation and discounting, where adjustments to both the assumptions effectively cancel out but also because the intrinsic economic relationships between the parameters are more stable than their absolute levels.

The assumptions made in the previous actuarial Review (funding basis) are shown in Table 26.

Table 26 Previous Review Funding Basis Financial Assumptions

Discount Rate (Net Investment Return)	3.5%
Salary Inflation	2.0%
Price (CPI) Inflation	1.0%

[20] Noting that the triennial cycle recommences at this Review.

The implied real salary inflation rate was therefore 1.0% and the net real investment return was assumed to be 2.50%, with the gap between investment return and salary inflation at 1.50%.

Whilst each of these assumptions are considered in turn, it is important to emphasise that, whilst the assumed level of each parameter should be reasonable in its own right, the relativities between the financial assumptions are more important.

B.2.1 Investment Returns

The net investment return earned by the combined QSuper fund and Employer Fund since the last Review was 19.0%. However, the funding basis discount rate assumed in the Review is not necessarily based on past experience but should be a realistic estimate of the average rate of return expected to be earned over the duration of the liabilities.

Firstly, it is important to note that the starting point for the funding basis discount rate assumption is that consistent with the previous valuation and the assumed level of inflation (see below). It will be noted that, technically the real rate of return rather than the gap between return and inflation measure is the relevant measure of financial consistency, however it is common practice to consider the gap due to its ease of calculation. Consequently, the return assumption consistent with the previous basis would be 4.60%.

At the time of setting our assumptions, QIC's asset class return models (adjusted for consistency with the Consumer Price Index (CPI) assumption used in this Review) implied a net real return for the current asset portfolio described in Section 4.2 of approximately 4.30% p.a. over the next eight years and 4.60% over the next ten years. Noting the approximate duration of the defined benefit liabilities of around nine years, I have decided to assume a long term net real return of 4.50% p.a. in order to discount projected cash flows within the funding basis. The reduction in the gap of 0.10% reflects QIC's slightly lower real return expectations.

B.2.2 Price (CPI) Inflation – Funding Basis

The level of price inflation is not a critical assumption in itself, as only a small proportion of the scheme's liabilities are CPI linked. However, the analysis concentrates on the levels of real salary inflation and real investment return and so the price inflation assumption forms an important component of the financial basis.

The starting point when setting an assumption for future inflation is commonly the midpoint of the 2%-3% range targeted by the Reserve Bank (RBA). This is not unreasonable given the credible record that the RBA has built in containing inflation within that band and it is not uncommon for actuarial bases to use a 2.5% CPI growth assumption combined with selected "gaps" above that for wage inflation and the funding discount rate.

However, I have concluded that the complexity of differential price and salary inflation assumptions in the funding and accounting bases is not justified, especially given the importance of the "gap" and the relatively simplistic approach previously used to calibrate the inflation assumption for funding purposes. Consequently, a single set of price and salary inflation assumptions will be used for both bases, with just the discount rate differing, in line with their different purposes. This approach also has the useful benefit of materially reducing the complexity of the valuation calculations whilst retaining the integrity of the overall process.

So, for both accounting and funding bases, I have assumed price inflation of 2.1% p.a.

For completeness, the rationale underlying the selected CPI inflation in the accounting basis is shown in Section B.2.3 below.

B.2.3 Price (CPI) Inflation

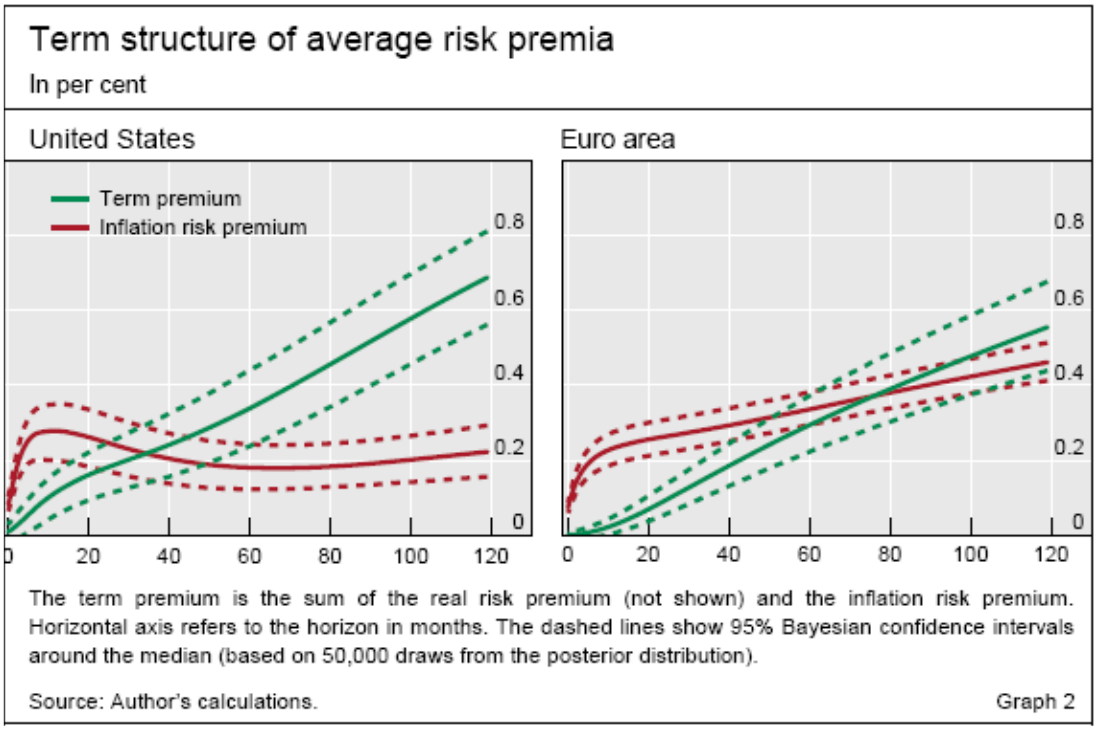
One method of determining the level of price inflation implied by the market is to consider the difference between yields on nominal and inflation-linked Commonwealth bonds of similar maturity, generally referred to as break-even inflation (BEI). Break-even inflation is not, however, an unbiased estimate of the market's expectation of future price inflation, since nominal bond investors would be expected to demand a premium above their expectations to compensate them for bearing inflation risk. This relationship can be expressed as[21]:

Nominal Yield = Inflation-linked Yield + Expected inflation + Inflation Risk Premium

where Inflation Risk Premium (IRP) is the risk premium that holders of nominal bonds should receive to cover the risk of unanticipated inflation reducing the real value of the nominal asset.

Various research has attempted to quantify the IRP and a consensus estimate has not emerged that can be applied in the current context. For example, 2008 research[22] by Peter Hördahl produced estimates of the average IRP term structure for US and Euro markets, as follows (taken from Hördahl's paper):

Figure 12 Average IRP Term Structure

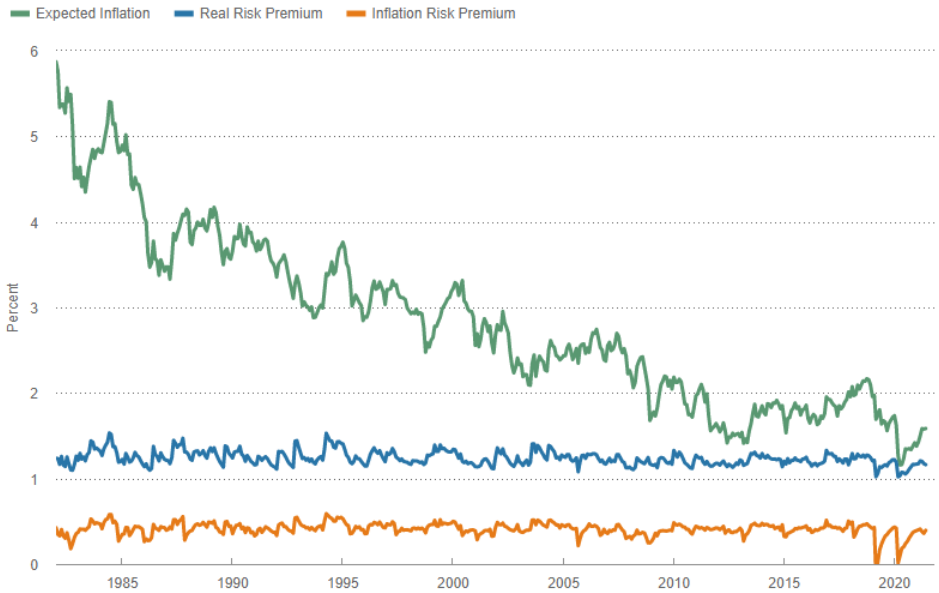


[21] See https://treasury.gov.au/sites/default/files/2019-03/01_Measuring_market_inflation_exp.pdf for a comprehensive discussion.

[22] See http://www.bis.org/publ/qtrpdf/r_qt0809e.pdf

The Federal Reserve Bank of Cleveland produces a comprehensive model of market-consistent inflation expectations within the US market and derives an explicit estimate of the US IRP over time[23]. At the time of writing, their estimates of ten-year inflation expectations and IRP were as follows:

Figure 13 Expectations of Inflation and the IRP – US Market



Source: Federal Reserve Bank of Cleveland calculations based on data from Blue Chip, Bloomberg, Bureau of Labor Statistics, Federal Reserve Bank of Philadelphia, Federal Reserve Board, Haver Analytics, and the model of Haubrich, Pennacchi, and Ritchken, 2012. "Inflation Expectations, Real Rates, and Risk Premia: Evidence from Inflation Swaps." Review of Financial Studies, 25(5).

Continuing the RBA's strong record of research into these issues, Hambur and Finlay[24] have built a similar model for the Australian market, with the results summarised in the charts below.

[23] See https://www.clevelandfed.org/our-research/indicators-and-data/inflation-expectations.aspx

[24] See https://www.rba.gov.au/publications/rdp/2018/pdf/rdp2018-02.pdf

Figure 14 Decomposition of Australian Nominal Commonwealth Forward Rates

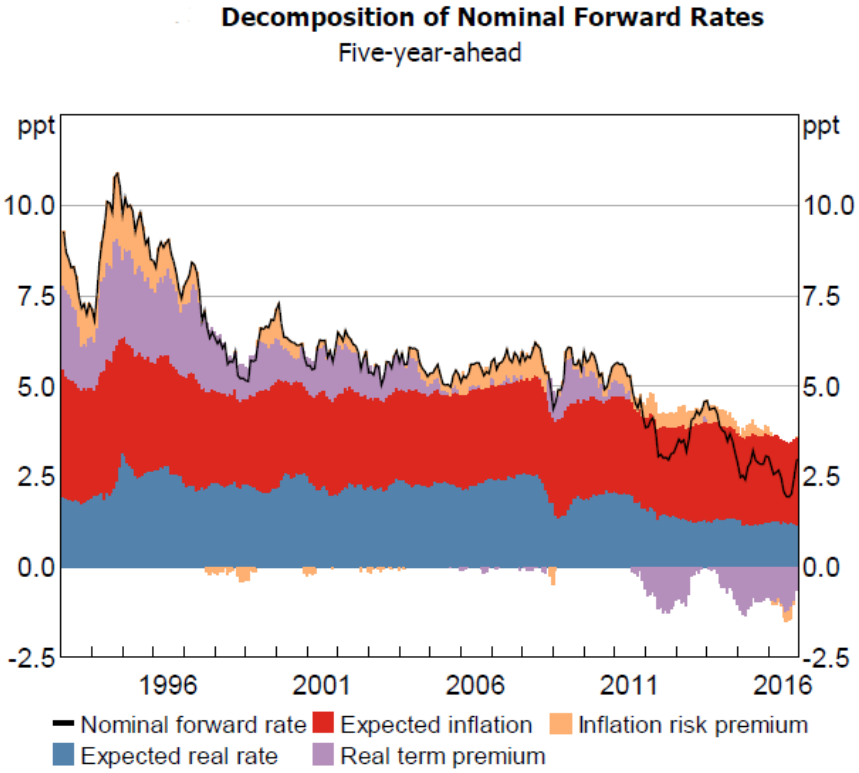


Figure 15 Expected Future Inflation Rates Implied by Commonwealth Bond Yields

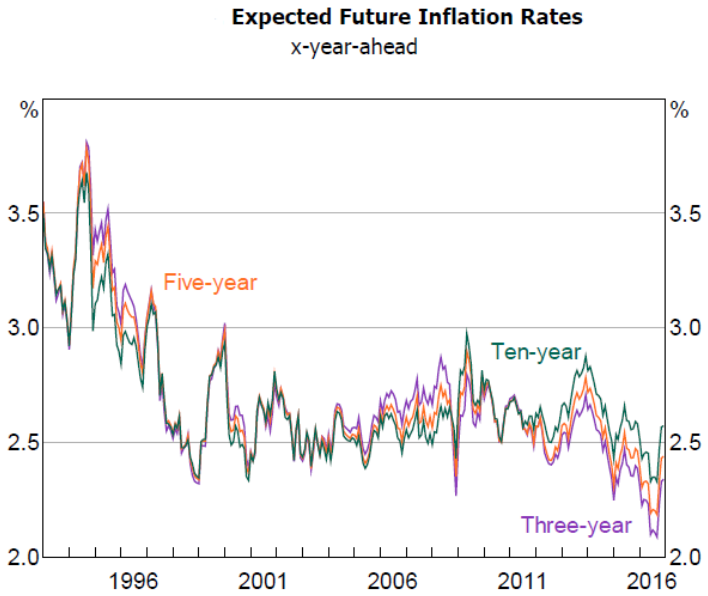
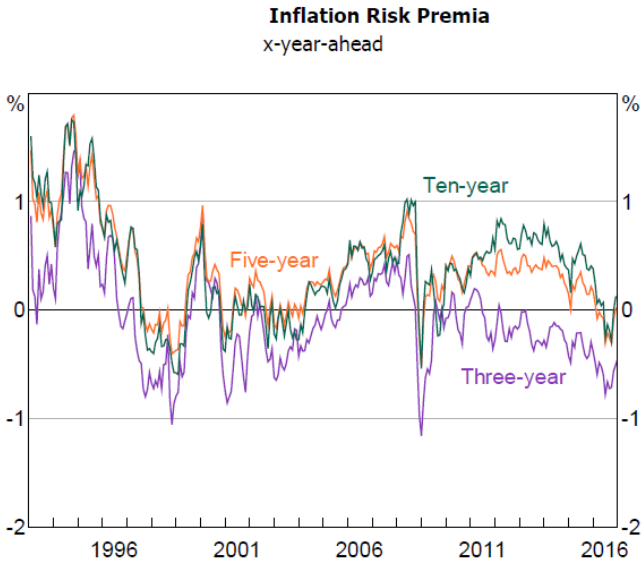


Figure 16 Estimated Inflation Risk Premia for Commonwealth Bonds



These charts demonstrate the volatility of the various components of the nominal yield over time, with even negative risk premia from time to time, all during a period where expected inflation has remained relatively stable.

A previous paper by Angus Moore of the RBA[25] has examined inflation expectations in the Australian market, including the assessment of the IRP. Extending the work of Finlay and Wende[26], Moore has produced estimates of BEI and the IRP shown in Figure 17.

[25] See https://www.rba.gov.au/publications/bulletin/2016/dec/pdf/rba-bulletin-2016-12-measures-of-inflation-expectations-in-australia.pdf

[26] See https://www.rba.gov.au/publications/rdp/2011/pdf/rdp2011-01.pdf

Figure 17 Break-even Inflation and the Inflation Risk Premium – Australian Market

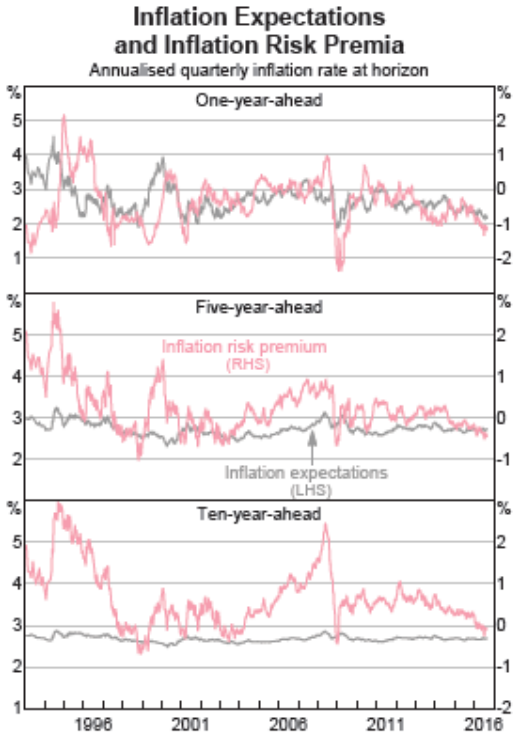
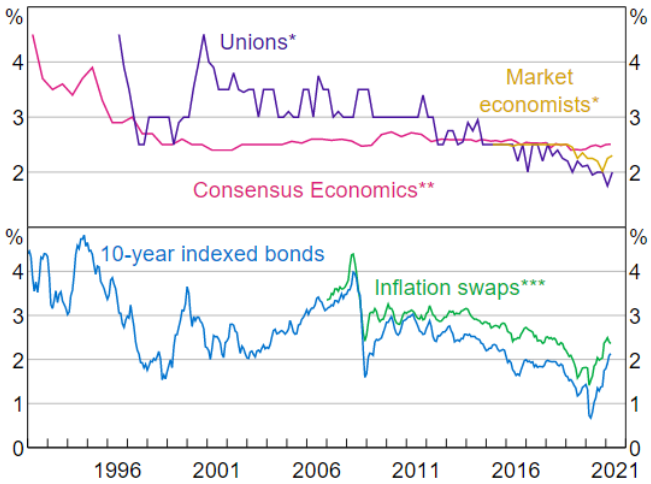


Figure 17 demonstrates the volatility of the Australian IRP over time, with a similar conclusion being reached by Evans[27] based on UK data. One final input to the consideration of inflation expectations is included in the May 2021 Statement on Monetary Policy by the RBA[28], as follows:

Figure 18 Australian Inflation Expectations



* Average over the next 5 to 10 years
** Average over 6 to 10 years in the future
*** 5- to 10-years forward
Sources: Australian Council of Trade Unions; Bloomberg; Consensus Economics; RBA; Workplace Research Centre; Yieldbroker

[27] See https://notendur.hi.is/~ajonsson/kennsla2005/evans.pdf

[28] See https://www.rba.gov.au/publications/smp/2021/may/inflation.html

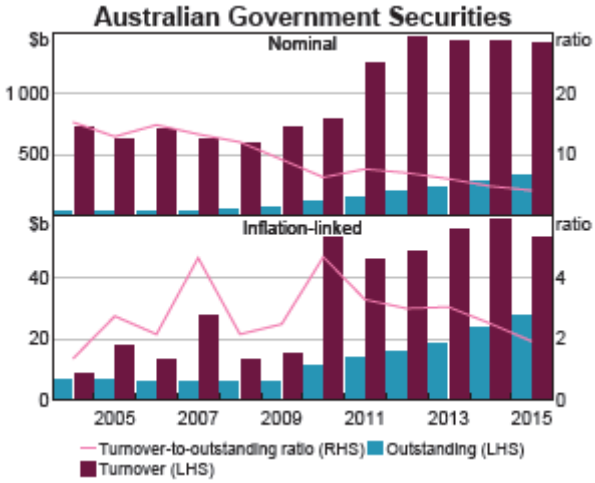
Again, whilst these latest estimates are targeting different measures, they suggest rates at the lower end of the range between two and three percent and potentially even lower, although there is clearly considerable uncertainty.

Before finalising our position, I will look further at the other adjustments often made to BEI to estimate "pure" prospective inflation.

B.2.3.1 Relative Liquidity Premium

Another factor affecting this approach for estimating inflation expectations is the so-called *scarcity* or *liquidity* bias in indexed versus nominal bonds in Australia because of the relative scarcity of the former, as shown in Figure 19, sourced from Moore's paper.

Figure 19 Relative Liquidity on Nominal and Inflation-linked Australian Bonds



Moore observes that:

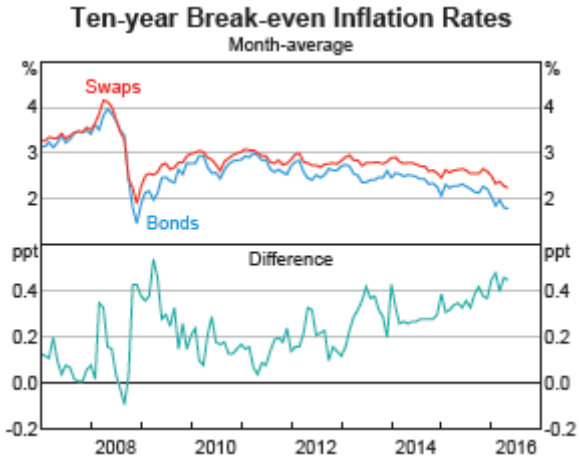
> *In theory, inflation swaps may be less affected by a liquidity premium than inflation-linked bonds; as long as a willing counterparty can be found, the swap can be created. Similarly, unlike purchasing government securities, inflation swaps involve no exchange of funds at the initiation of the contract. Despite being off-balance sheet, swaps nonetheless carry capital and leverage implications for prudential regulatory purposes. This means that balance sheet space still represents a constraint on liquidity in this market. Recent regulatory reforms, such as the Basel III leverage ratio, have made OTC derivatives (including inflation swaps) more expensive for banks (see Heath and Manning (2012) for more detail). These developments are likely to have reduced liquidity in the inflation swaps market. However, it is unclear how this should affect inflation swaps rates – whether it should raise or lower the rate depends on which side of the swap the bank is on.*

and

> *The main liquidity-related concern with inflation swaps is that the market is not particularly active and so prices are not broadly representative and are not always based on actual transactions.*

Consequently, whilst not perfect, the difference in inflation expectations between inflation swaps and BEI can provide an indication of the effect of the liquidity bias, as shown in Figure 20, which suggests that a premium should be added to BEI to reflect the effect of relative liquidity between the nominal and indexed bonds. Again however, I note the variability of the implied liquidity premium.

Figure 20 Ten Year Break-even Inflation and Swap Differential



The correlation between the two approaches is clearly very strong, although inflation expectations from the swap market are somewhat higher than break-even inflation. The gap was greater during the turmoil in bond markets in the first half of 2009 but declined before rising again since around 2011. Finlay and Olivan[29] attribute this difference to the scarcity bias discussed earlier and note another related potential cause; market intermediaries hedging their positions in the inflation-indexed bond market may require compensation for the relatively lower liquidity in that market. Further, they note that the implied inflation rates from swaps can also be biased by the variable level of the IRP. Devlin and Patwardhan[21] however assert that *"inflation swap rates are not subject to the kind of liquidity premia that can affect bond market break-evens"* but that there are other reasons why the swap rates provide a biased estimate of inflation expectations, as follows:

1. inflation swap rates likely incorporate some premia for inflation risk — compensation demanded by the inflation payer for potential volatility in realised inflation over the term of the swap
2. while inflation swaps are more liquid than Treasury indexed bonds in the sense that they can be created as required, the tailoring of contracts and their bilateral nature makes inflation swaps less liquid 'on the way out' — since the holder of an inflation swap who wished to exit the contract early would have to renegotiate terms with the original issuer, who may or may not be willing to do so
3. regulatory changes enacted in recent years have meant that banks dealing in the inflation swaps market are required to set aside significantly more capital against any derivatives exposures. Compensation demanded by banks for these higher capital charges may also have introduced a systematic bias into inflation swap rates

Whilst these factors will generally result in the swap rates overestimating the market's underlying inflation expectations, their effects are not quantifiable and so the adjustment necessary to produce an unbiased and mutually compatible estimate of price inflation is not clear.

This issue was also examined in a NERA Economic Consulting Report in March 2007[30] where they estimated that the "relative bias" in indexed versus nominal Commonwealth bonds was of the order of 20 bps in the Australian market, because of the relative scarcity of and the substantial demand for indexed bonds; i.e. indexed yields are relatively *lower* than nominals on this account and therefore a premium of 20 bps should be added to BEI to estimate "true" prospective inflation.

[29] See http://www.rba.gov.au/publications/bulletin/2012/mar/pdf/bu-0312-6.pdf

[30] See https://www.aer.gov.au/system/files/Attachment%20to%20Alinta's%20submission%20-%20NERA%20report%20(March%202007).pdf

Another view is that the lower relative liquidity of inflation-indexed bonds means that investors require a relatively higher index-linked yield, to compensate for the greater difficulty in eventually liquidating the bond in future. However, this effect would have been included in the net position demonstrated by the NERA analysis and so presumably the liquidity bias on sale is more than offset by the relative demand/supply pressures applying to index-linked bonds.

B.2.3.2 Other Issues

It must also be recognised that the design of inflation-linked Commonwealth bonds is such that prices embed not only expected future inflation, but also in part known past CPI[31]. The cumulative annualised change over the two most recent quarters is lower than the breakeven rate and consequently it can be argued that the implied market estimate of *prospective* inflation should be somewhat higher than breakeven.

In previous years, I have estimated this effect to be around 10 bps per annum over the duration of the liabilities, although this adjustment obviously depends upon the difference between previous inflation and the implied prospective level. As at 30 June 2021, the difference was estimated to be 6 bps.

A final point to note is that the use of BEI as the market-consistent estimate of prospective inflation will result in consistency of liability calculations based on both nominal and inflation-linked bond yields; i.e. real cash flows discounted by indexed bond yields will have the same value as the present value of a stream of inflated cash flows discounted by nominal yields as long as the assumed level of prospective inflation is BEI, adjusting for the known past CPI effect.

B.2.3.3 Summary

In summary, there is not a single objective and widely accepted estimate of market-consistent inflation expectations. Recognising the difficulty in estimating the various adjustments necessary to isolate the “true” level of prospective inflation and their offsetting nature, this year I have continued our simplified approach by estimating the market-consistent level of price inflation over the term of the liabilities to be BEI, adjusted for the prior two quarters actual inflation as discussed above; i.e. 2.1% p.a..

B.2.4 Salary Inflation

A comparison of actual to expected increases in salaries over the investigation period is shown in Table 27.

Table 27 Observed Rates of Salary Inflation

Year Ending	Standard Males		Standard Females		Police		Total	
1 July	Actual	Expected	Actual	Expected	Actual	Expected	Actual	Expected
2021	2.1%	2.4%	2.3%	2.4%	3.3%	2.8%	2.3%	2.5%

From the above it would appear that total salary increases over 2020-21 were somewhat lower than those assumed. However, this analysis is based on the 2021 membership data (i.e. those members who were active at 30 June 2021) and uses the 1 July 2020 salaries provided on that data. Consequently I have examined the 1 July *2020* salary information for each surviving member between

[31] For example, an interest payment in August would be based on the average of known CPI increases in the preceding March and December quarters. Similarly a payment in November would be based on the average of the preceding known March and (not yet known) June quarter CPI.

the two datasets representing the 2020 and 2021 member data. The average salaries were very close indicating that there have been no material backdated salary increases since the last Review.

In June 2020, the Government implemented a “freeze” on enterprise bargaining salary increases occurring during 2020-21, with “catch-up” increases occurring in 2021-22. Whilst exiting members’ benefits during the affected financial years (i.e. up to 2022-23, noting the definition of Final Average Salary in Section A.1.4) will be relatively reduced, the longer-term trajectory of salaries is not expected to be affected and so no adjustment has been made to our assumption methodology. It will be noted that the Government also announced the application of a “no disadvantage” test to defined benefit category members affected by the freeze, however such payments will be paid directly by employers; i.e. external to QSuper. Consequently, the membership data utilised in this Review and all of the analysis and conclusions are based on the “frozen” salaries provided to QSuper; i.e. this Review is unaffected.

Looking forward, the amount of salaries received by members in the future will be affected by the following two factors:

- Inflationary increases; and
- Promotional increases due to increasing seniority etc.

For a scheme with a broadly stable membership profile, changes in average salaries are largely unaffected by promotional salary changes and can be used to estimate inflationary salary increases. However, this is not the case for the Defined Benefit Category since it was closed to new entrants in November 2008 and there had been comparatively few new entrants since 2001. As such, changes in average salaries reflect both inflationary and promotional effects.

Furthermore, there are a multitude of Certified Agreements and the distribution of these can differ significantly by age, gender and for the Defined Benefit Category compared with the overall QSuper membership. Realised salary inflation would therefore not be expected to be uniform for the different sub-groups and thus can only be estimated.

Given the difficulties in determining past salary inflation rates and recognising that future inflation is not necessarily related to the recent past, the level of real salary growth has been considered in some detail, noting that there are no financial instruments that may be used to infer market-consistent estimates of prospective *nominal* salary inflation, particularly that underlying the liabilities considered herein.

One way of inferring prospective real salary growth is by considering past levels of salary inflation in the broader market such as Average Weekly Ordinary Time Earnings (AWOTE). The historical rates of real salary growth as measured by the excess of Queensland AWOTE over Australia All Groups CPI[32] for various periods ending in December 2020 are shown in the following table.

[32] The measure of price inflation incorporated in inflation-linked bonds is the All Groups weighted average capital cities, commonly considered as “Australia CPI”.

Table 28 Real Salary Growth[33]

Number of Years to Dec 2020	Real Qld AWOTE Increase (p.a.)
5	0.6%
10	0.6%
15	1.3%
20	1.5%
25	1.6%
30	1.5%

Whilst the longer-term level of real salary growth has been around 1.4%-1.6% p.a., the level has been materially lower over the last five to ten years. Patrick D'Arcy and Linus Gustafsson[34] of the RBA also note that sustained changes in the terms of trade mean that real income growth per hour worked can diverge from productivity growth for a period of time" and that "the boom in the terms of trade over the past decade has allowed national income to grow at a faster pace than productivity.". The then Governor of the RBA, Glenn Stevens, stated in his media release of 3 July 2012 that *"Australia's terms of trade have peaked, though remain historically high."* The real income growth in excess of productivity growth that occurred over the last decade from the improvement in Australia's terms of trade is thus unlikely to be repeated.

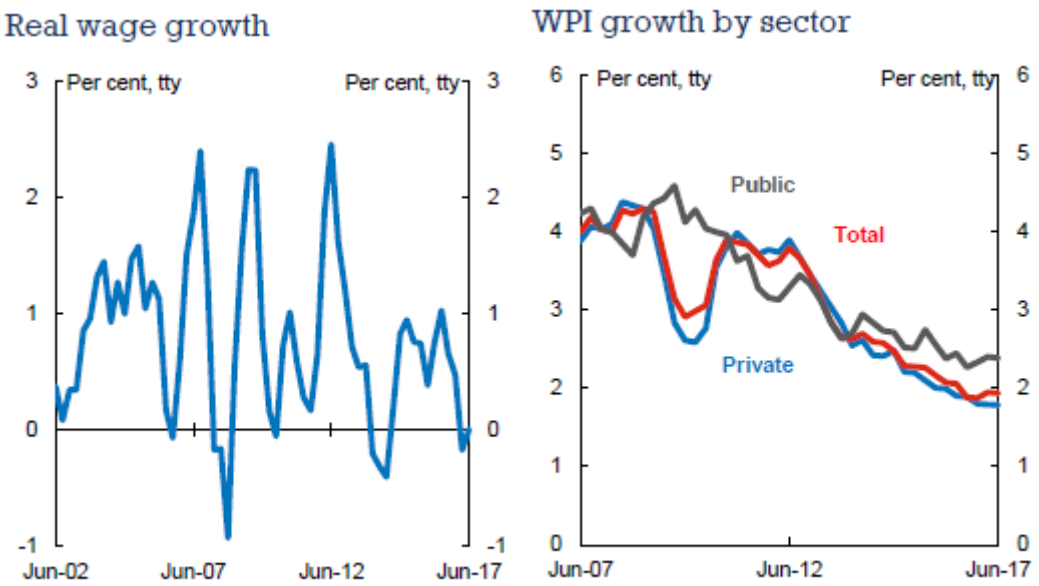
This sustained low wage growth has been further examined in a Commonwealth Treasury report[35], noting that both nominal public sector and real wages have been growing relatively slowly over recent years, as shown below:

[33] Source: ABS 6401.0 Consumer Price Index, Australia and ABS 6302.0 - Average Weekly Earnings, Australia.

[34] Patrick D'Arcy and Linus Gustafsson, in an article entitled "Australia's Productivity Performance and Real Incomes" published in the June 2012 RBA Bulletin observe "In the long run, growth in productivity is the primary determinant of growth in real income."

[35] See https://treasury.gov.au/publication/p2017-t237966/

Figure 21 Real Wage Growth and WPI Growth by Sector

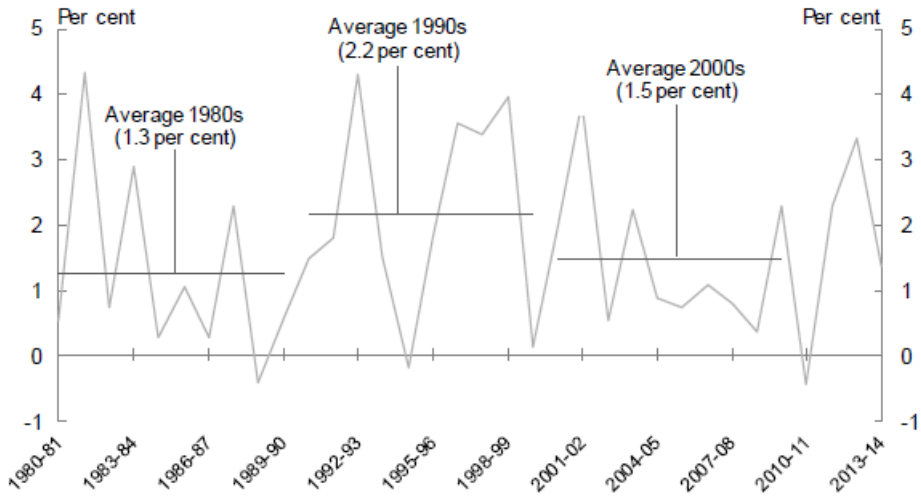


Source: ABS Cat. no. 6345.0 and 6401.0.

Source: ABS Cat. no. 6345.0.

As noted above, economic theory asserts that long-run real salary growth should be closely related to labour productivity growth[34]. The most recent Intergenerational Report[36] assumed a rate of productivity growth of 1.5% p.a. based on that observed through the 2000s, shown in the following graph, taken from that Report.

Figure 22 Average Labour Productivity Growth Rates

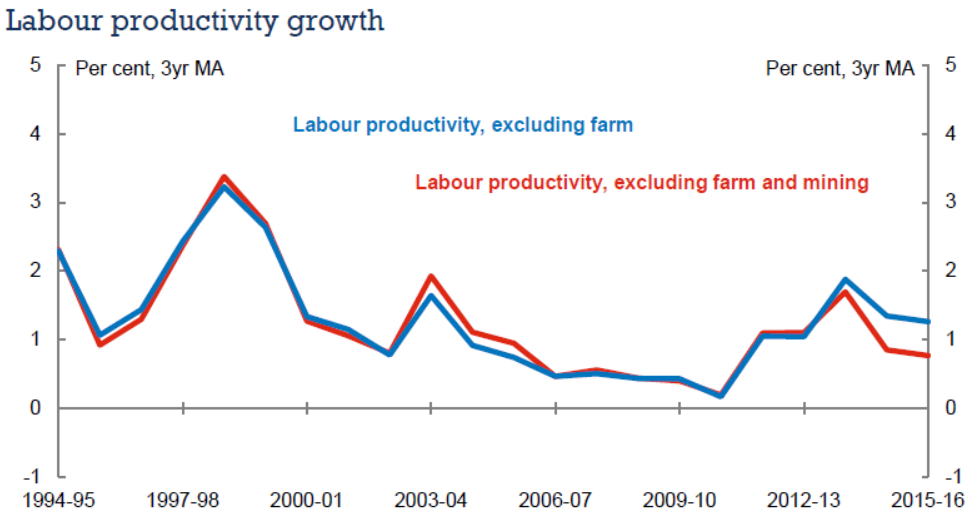


Source: ABS cat. no. 5206.0.

The Commonwealth Treasury paper also notes that recent productivity growth has been around 1% p.a., as follows:

[36] See https://treasury.gov.au/sites/default/files/2019-03/2015_IGR.pdf

Figure 23 Labour Productivity Growth Rates - Smoothed



Source: ABS Cat. no. 5204.0, 6291.0.55.003, Treasury.

Commonwealth Treasury have considered a number of potential causes underlying the subdued wage growth (underemployment, increased labour market flexibility), although there is international debate as to the broader drivers[37]. Overall, whilst there is some expectation that wage inflation will increase over time, the quantum and timing is quite uncertain and the effect on real salary growth remains unclear.

Another source of information regarding real salary growth is the forecasts produced by Deloitte Access Economics[38]. Their projections for growth in various inflation measures for Queensland and Australia for the next several years are shown below.

Table 29 Wage and Price Inflation Forecasts by Deloitte Access Economics

Year	Qld AWE	Qld Wage Price Index	Australia AWE	Australia AWOTE	Australia Wage Price Index	Australia CPI
2021-22	0.2%	1.0%	0.1%	0.4%	1.2%	1.4%
2022-23	1.0%	1.5%	0.9%	1.7%	1.3%	1.6%
2023-24	2.0%	2.3%	1.8%	2.6%	2.0%	2.1%
2024-25	2.1%	2.4%	1.9%	2.8%	2.3%	2.3%
Average	1.3%	1.8%	1.2%	1.9%	1.7%	1.9%

Whilst Deloitte do not produce a Queensland AWOTE forecast, Table 29 demonstrates that the Queensland and Australian forecasts of AWE growth are somewhat similar with Queensland AWE higher than Australian forecasts. This suggests an expected level of real Queensland salary growth above Australian price inflation of around 0.2% over the forecast period, noting of course that it is considerably less than the duration of the relevant liabilities.

[37] See for example https://www.nytimes.com/2018/05/04/opinion/is-the-great-recession-still-holding-down-wages-wonkish.html

[38] Source: Deloitte Access Economics Business Outlook March 2021

Queensland Treasury also produces inflation forecasts as part of the Budget papers[39], as follows:

Table 30 Queensland Treasury Inflation Forecasts

Year	Queensland CPI	Queensland Wage Price Index
2020-21	1.25%	1.25%
2021-22	1.50%	1.50%
2022-23	1.75%	2.00%
2023-24	2.00%	2.25%
Average	1.63%	1.75%

The Wage Price Index measures changes in the price of labour over time unaffected by measurable changes in the quantity or quality of work performed; i.e. it effectively excludes labour productivity growth. Consequently, these forecasts would imply a greater rate of real increase in AWOTE than the 0.13% p.a. indicated.

Another source of information regarding this relationship is the corresponding assumptions used by actuaries in similar contexts, as follows:

[39] See page 15 of https://budget.qld.gov.au/files/Budget_Strategy_and_Outlook_2.pdf

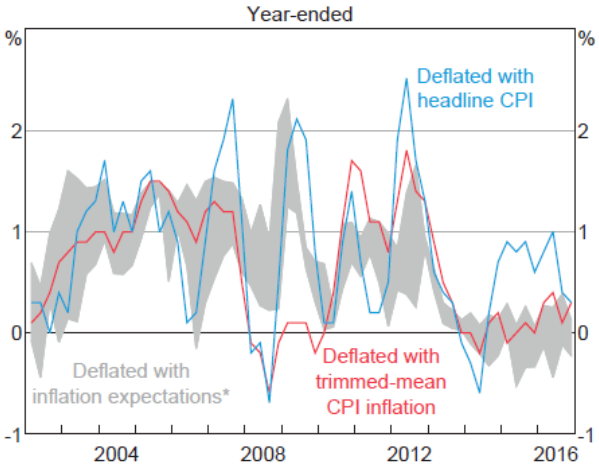
Table 31 Summary of Real Salary Growth Assumptions Used

Year	Scheme	Real Salary Growth Assumption
2015	NSW Report on State Finances - State Super Funds	0.00%
2015	ASIC Superannuation Calculator	1.50%
2015	Australia Post Superannuation Scheme	0.75%
2015	Victoria State Super Fund	1.50%
2015	BHP Superannuation Fund	1.50%
2016	NSW Report on State Finances - State Super Funds	1.00%
2016	ASIC Superannuation Calculator	1.50%
2016	Qantas Superannuation Fund	1.00%
2016	Commonwealth Bank Superannuation Fund	0.75%
2016	Unisuper	1.00%
2017	NSW Report on State Finances - State Super Funds	1.00%
2017	ASIC Superannuation Calculator	1.00%
2017	Local Authorities Superannuation Fund	1.00%
2017	PSS and CSS	1.00%
2017	NZ Government Superannuation Fund	0.50%
2017	Military Superannuation Schemes	1.50%
2017	ACT Government	0.50%
2017	Unisuper	1.00%
2018	Equipsuper	1.63%
2018	ESSS	1.50%
2018	SA Super Scheme	1.50%
2018	LGIAsuper	0.50%
2018	Commonwealth Bank Superannuation Fund	0.30%
2018	ACT Government	0.75%
2019	ASIC Superannuation Calculator	1.20%
2019	Unisuper	1.00%
2019	NSW Report on State Finances - State Super Funds	1.00%
2020	ASIC Superannuation Calculator	1.50%
2020	NSW Report on State Finances - State Super Funds	0.70%

Another RBA paper[40] has also updated the history of real wage price index growth, as shown below:

[40] See https://www.rba.gov.au/publications/bulletin/2017/mar/pdf/bu-0317-2-insights-into-low-wage-growth-in-australia.pdf

Figure 24 Real Wage Price Index Growth

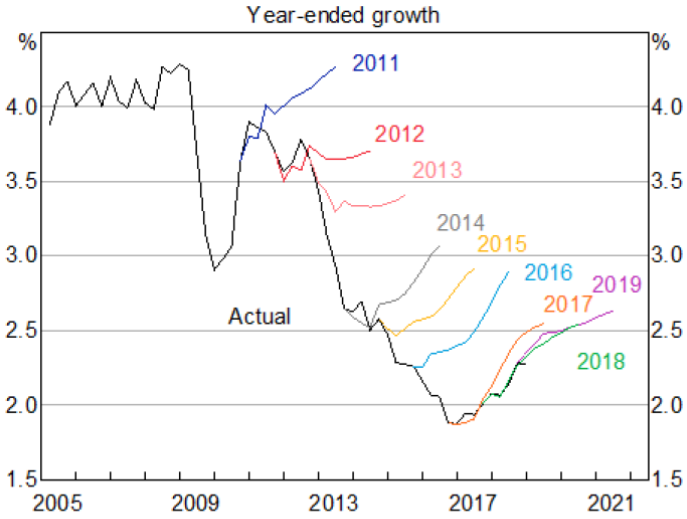


* Inflation expectations obtained from bond yields, union surveys and market economist surveys

Sources: ABS; RBA; Workplace Research Centre; Yieldbroker

It is interesting to note that real WPI growth has been a little under 1% p.a. over the last few years, with the corresponding figure based on inflation expectations around 0% p.a. That paper also showed the consistent overestimation of prospective wage price index growth for the last several years, with actual growth continually surprising on the downside, as follows:

Figure 25 Wage Price Index Forecasts



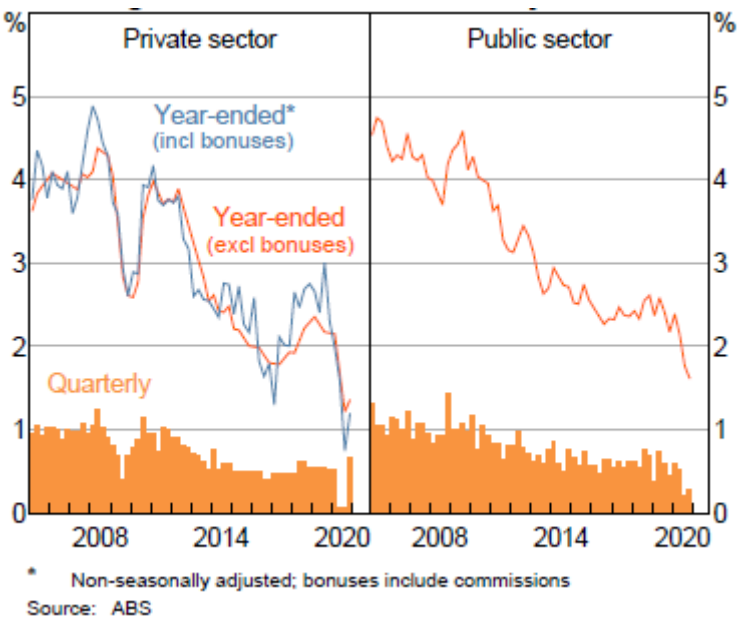
* February Statement of Monetary Policy forecasts

Sources: ABS; RBA

These relatively low wage price index outcomes have continued, as demonstrated in the following chart, taken from the RBA May 2021 Statement on Monetary Policy[41].

[41] See https://www.rba.gov.au/publications/smp/2021/may/pdf/statement-on-monetary-policy-2021-05.pdf

Figure 26 Wage Price Index Growth



Whilst there is no guarantee that the recent subdued wage growth environment will continue over the duration of the liabilities in question, it is difficult to argue for an assumption at the higher end of commonly used assumptions.

Taking all of the above into account, I have concluded that a reasonable estimate of the level of real AWOTE growth is 1.0% p.a. in excess of the rate of CPI. This results in an assumed market-consistent annual rate of salary inflation of 3.1%.

Noting the expected effect of the “freeze” on public sector salaries during 2021-22, I considered applying a short-term additional increase in salary inflation. However, there is no basis upon which to calibrate such a parameter as the effects of announced salary increases affect the various membership groups formed by Enterprise Bargain timing quite differently. To the extent that salary rises are higher than our assumed level in the period following the valuation date, this will increase the liabilities proportionately however the funding position is sufficiently strong to absorb such effects.

The resulting gap between salary inflation and investment return of 1.40% is lower than the 1.50% assumed at the last Review. This is consistent with the decrease in QIC’s real return expectations since the last Review.

In summary, the financial assumptions chosen for the funding basis at this Review are shown in Table 32, with the previous assumptions shown for comparison.

Table 32 Current and Previous Funding Basis Financial Assumptions

	Previous	Current
Discount Rate (Net Investment Return)	3.5%	4.5%
Salary Inflation	2.0%	3.1%
Price (CPI) Inflation	1.0%	2.1%

B.3 Promotional Increases

For the 1998 Review, the estimated actual promotional increases were calculated by considering the group of members who were present throughout the investigation period (cohort method). Estimates of salary inflation were removed from the overall salary increases so that the remaining increase represents promotional effects. However, this method assumes that the membership is in a state of equilibrium with regard to the distribution of salary levels. Whilst the Standard Defined Benefit Category was open to new entrants prior to Q2000, this assumption generally held and the cohort method was appropriate. The resulting breakdown in the equilibrium has meant that the cohort method cannot be applied after 1 July 2000.

This has meant that snapshots of the salary distribution at review dates have had to be used to analyse the promotional salary scale. The snapshot salary scale represents the cumulative effect of all the promotions that have been awarded to the membership as at the calculation date, whilst the cohort scale illustrates the promotional effects occurring over the period analysed. Because it concentrates on the more recent experience of the membership, the cohort method is generally preferred to the snapshot method, although both can assist in the analysis. In this regard, I have considered the relationship between the cohort and snapshot methods demonstrated in the 2001 and 2004 Reviews when determining whether any changes are necessary to the current assumed scales.

Historically, promotional salary scales were seen as likely to become increasingly important for the Standard Defined Benefit Category as, a priori employees who believe their promotional prospects to be better than average would be more likely to elect to join the Standard Defined Benefit Category. Consequently, the promotional salary scale would be expected to steepen over time as the membership moves towards the new equilibrium level derived from this new “type” of entrant (i.e. those who choose to join the Standard Defined Benefit Category). However, new entrant numbers have been low until the scheme was closed in 2008, so the “selection” effect described above has not been material. In addition, the membership has aged relatively and promotional salary growth at the higher ages is expected to be fairly limited so that the effect of this assumption has now lessened (see Section 6.2).

For the Police Members however, the vast majority of whom are subject to a single Collective Agreement, the cohort method described above has been able to be used to determine promotional increases over the experience review period.

The estimated promotional salary increases over the investigation period and the adopted promotional scales for this valuation are discussed below and are summarised in the service tables presented in Appendix C.

B.3.1 Promotional Increases – Standard Members

As noted above, in addition to the broader inflationary growth in salaries discussed in Section B.2.4, we also allow for salaries to progress age by age on the basis of a promotional salary scale. Figure 27 and Figure 28 illustrate the snapshot salary scales for Standard Male and Female members respectively, as at each review date during the analysis period, compared to the assumptions used in the previous Review. Consideration has been restricted to those members over age 30, as the youngest member is now 33 years of age.

Figure 27 Promotional Increases by Age – Standard Male Members

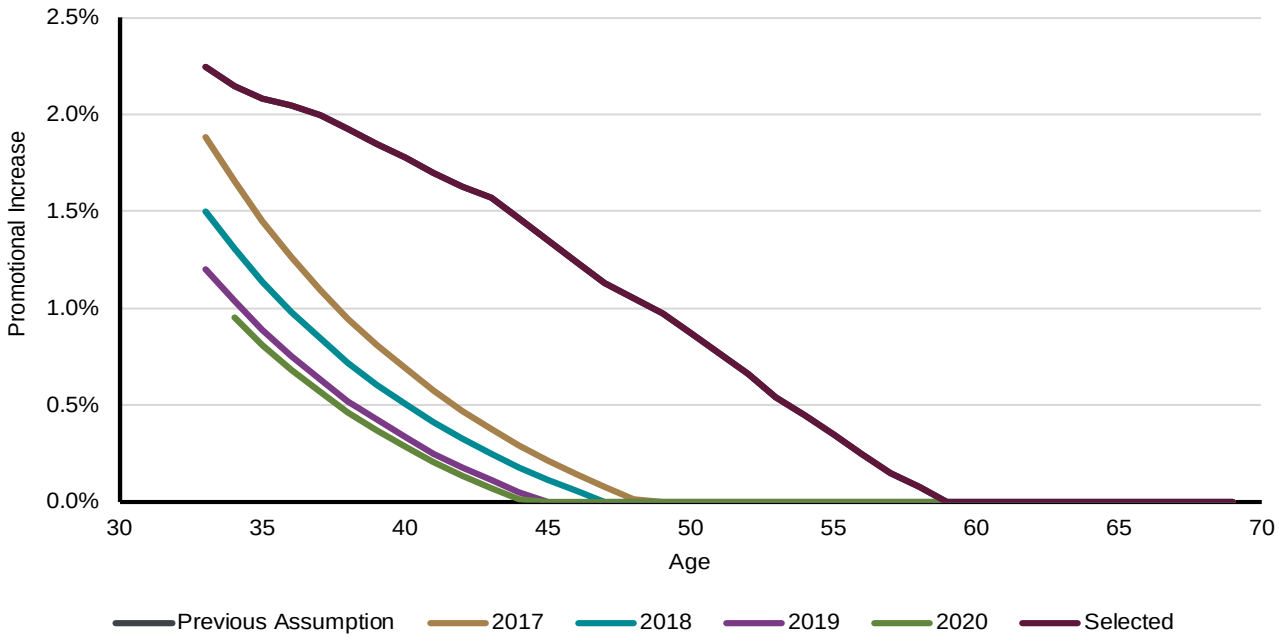
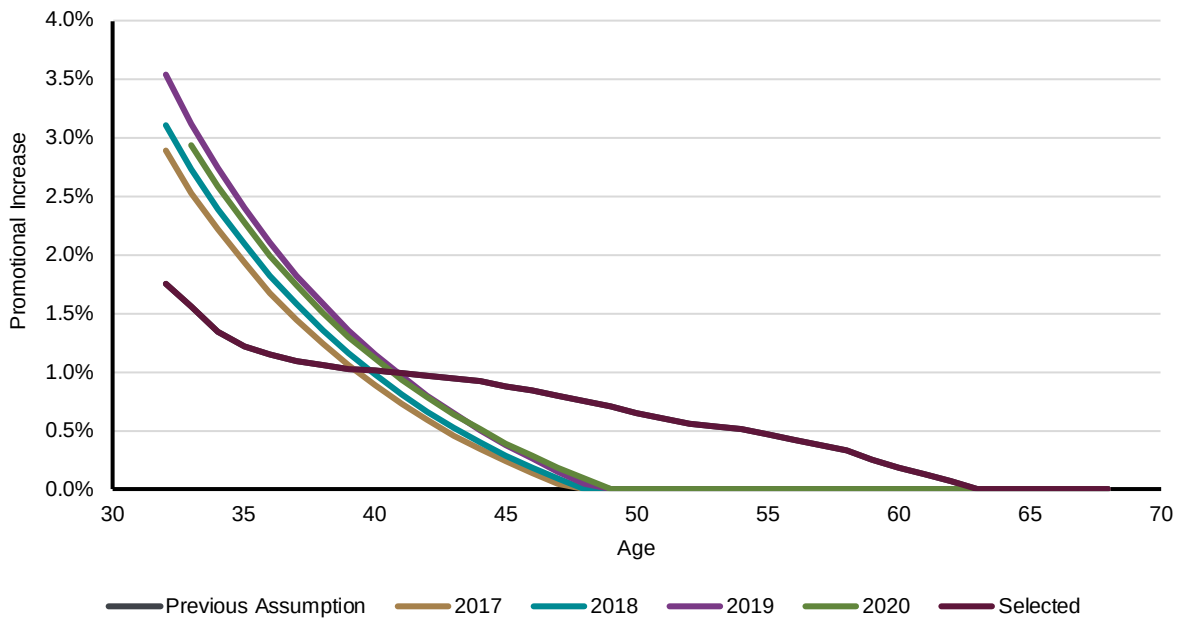


Figure 28 Promotional Increases by Age – Standard Female Members



It is interesting to observe that the graduated snapshot scales for Standard Males appear to be falling each year, exactly the opposite of the trend shown for the Standard Female scales, although it must be recognised that the data at the younger ages is quite sparse and so it is difficult to infer statistically credible information at these ages.

Given the relative unimportance of the promotional salary scale assumptions due to the advanced age of the remaining membership and the fact that the apparent effects are offsetting between the

genders, I have decided to retain the existing cohort-based salary scales for Standard Males and Standard Females.

B.3.2 Promotional Increases – Police Members

The promotional salary increases for Police members have been derived by subtracting the inflationary component estimated from an analysis of the relevant Certified Agreements, estimated to have averaged 2.7% p.a. over the intervaluation period, as follows.

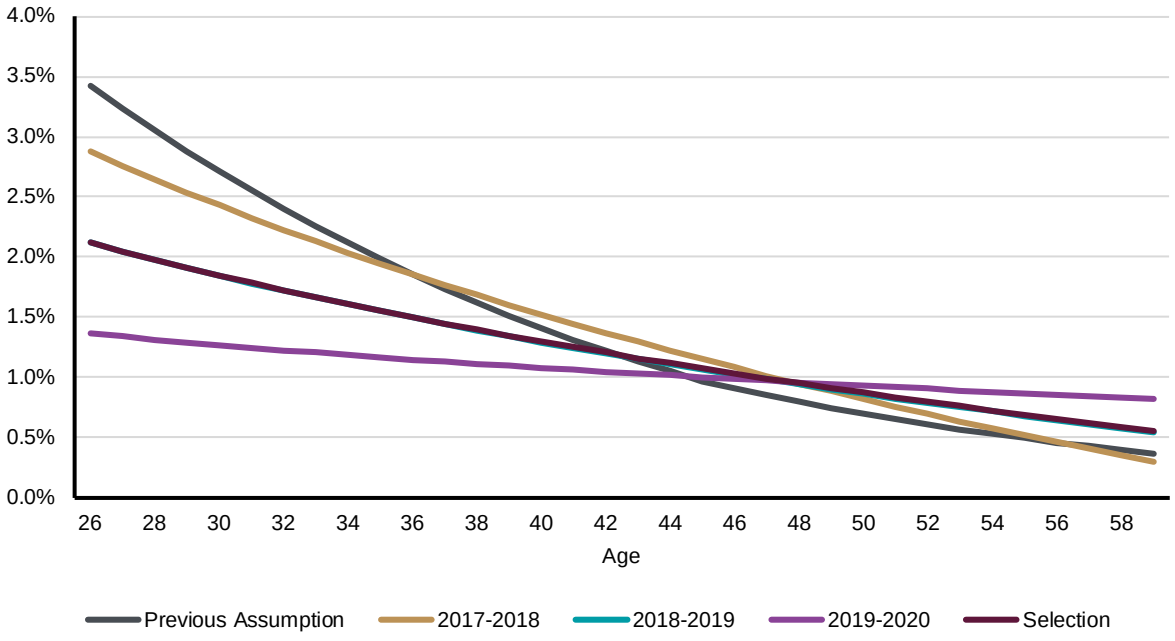
Table 33 Estimated Salary Inflation for Police Members

Year Ending 1 July	Overall Salary Increase
2018	3.0%
2019	2.5%
2020	2.5%
Average 2017-2020 (p.a.)	**2.7%**

Figure 29 shows the resulting promotional salary increases over 2017-2020 as well as the previous salary scale assumption. We have smoothed the scales for ease of presentation.

It is interesting to note that the scales seem to be flattening, especially relative to the previous assumption. This may be indicative of the now relatively common practice of extending the number of pay increments for many of the positions within the Police service. This “extension” of pay scales would tend to benefit officers later in their career on average, so that promotional effects linger later in the age profile compared to previous scheme experience. Our adopted assumption has tempered this flattening somewhat by taking the average of the three curves during the experience review period.

Figure 29 Promotional Increases by Age – Police Members



B.4 Decrement Experience – Active Members

B.4.1 General

As mentioned in Section B.1, the analysis of member based experience has been performed separately for Standard Males, Standard Females and Police. The expected rates for Standard members and Police members are those assumed in the previous Review, which were generally based on the previous experience review covering 2015-17, reported in the 2018 Report.

However, the 30 June 2019 Review included an adjustment of retirement and withdrawal rates aimed at better reflecting the relatively low rates of voluntary exit observed over the years since the material retrenchment programs in 2012-13. This assumption change was done outside of the usual triennial cycle of experience reviews and considered the longer term experience of the scheme, as well as the short to medium term expectations. At this Review, we have analysed the experience for the triennium 2017-2020 in the usual way and taken into account those expectations similarly. However, the expected retirement and resignation rates are those chosen for the 2019 Review, whilst all other expected decrement rates relate to the previous “full” experience review.

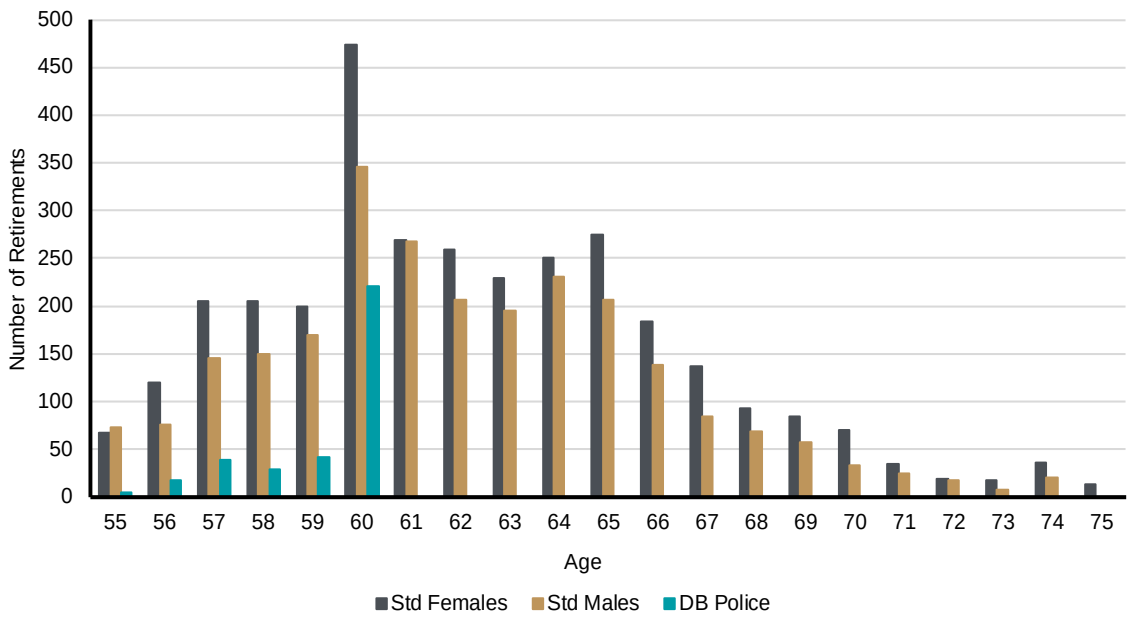
Finally, as discussed in Section 3.1, a number of issues have been identified with the membership data used to calibrate the decrement assumptions. Consequently, we have applied substantially more weight to the experience observed during the review period and less to the previous decrement assumptions than would be done in a “normal” experience review.

The selected decrement rates are presented in the service tables in Appendix C.

B.4.2 Age Retirement – Normal Retirement Age

As indicated in Section A.3 there is no normal retirement date for Standard Defined Benefit Category members. In practice, the vast majority of members retire at or before age 65, however Figure 30 shows that there are still significant numbers of retirements until age 70, with quite limited numbers at higher ages. Consequently, I have retained the previous de facto normal retirement age for Standard members at age 70.

Figure 30 Age at Retirement during Experience Review



B.4.3 Age Retirement – Effect of Preservation Age Rises

Before considering the retirement experience more closely, we note that the preservation age changes that applied from 30 June 1998 are continuing to affect the retirement experience as those affected reach the relevant ages. For convenience, the age at which members are generally able to access their superannuation entitlements, or "preservation age" is shown in Table 34.

Table 34 Preservation Age

Date of Birth	Preservation Age
Before 1 July 1960	55
1 July 1960 - 30 June 1961	56
1 July 1961 - 30 June 1962	57
1 July 1962 - 30 June 1963	58
1 July 1963 - 30 June 1964	59
After 30 June 1964	60

Prima facie, one would expect many members who are now unable to access their superannuation entitlement to delay their retirement until their preservation age and so we would need to allow for this likelihood in our assumed future retirement rates as well as observing declines in the retirement experience for the affected ages.

It will be noted that not *all* such members delay their retirement. During the experience review period, members born prior to 1 July 1960 must have been at least age 57 and consequently any age 55 retirements observed must have been born after 30 June 1960 and therefore unable to access their superannuation benefit immediately (presumably such members have other sources of income either by themselves or through a spouse/partner or perhaps they leave work after age 55 for specific reasons). Consequently, the assumed retirement rates below age 60 will not be zero.

In our recent Reviews, we have allowed for this by adjusting the retirement rates for the “delayed” crystallisation of defined benefit entitlements by increasing the probability of retirement at the preservation age and allowing for the delay described above, independently for each member grouping defined by preservation age. Given that most relevant members will exceed their preservation ages in the next three years at most, the “distorting” effect on retirement rates will have limited effect and so I have decided to revert to the previous, simpler approach of a single set of retirement rates applied to all members within each membership group; i.e. Standard Males, Standard Females and Police, with the detailed rates base shown in Appendix C.

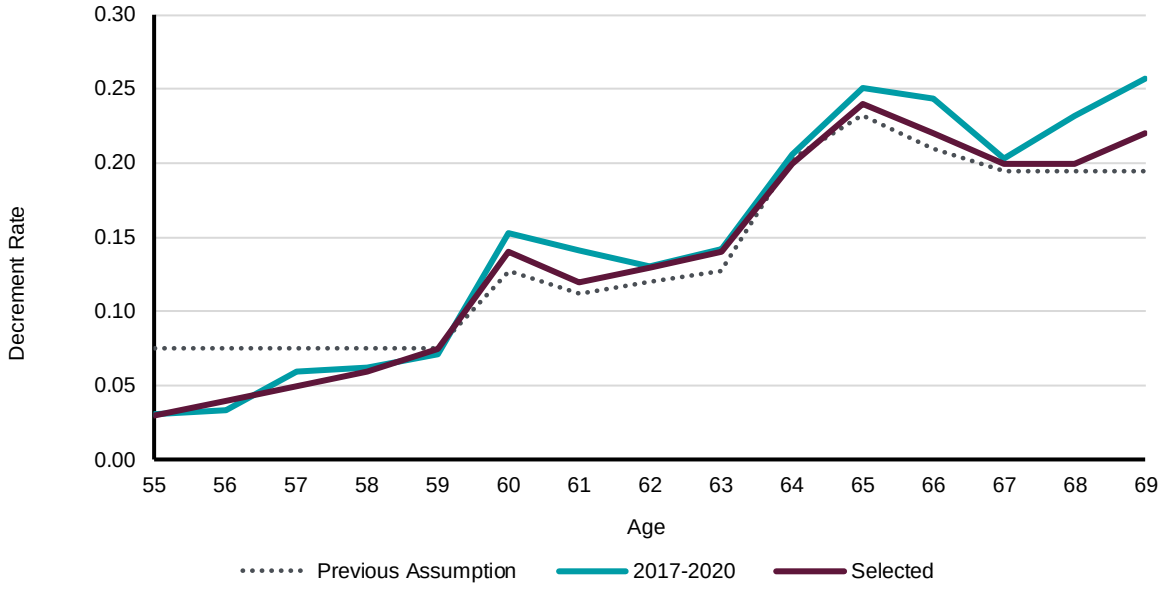
B.4.4 Age Retirement – Standard Male Members

A comparison of actual to expected retirements of Standard Male members over the investigation period is contained in Table 35. The expected number of retirements has been calculated based on the “adjusted” rates set in the 2019 Review. The implied actual and expected retirement rates are shown in Figure 31, which also illustrates our selected rates for this Review.

Table 35 Actual vs Expected Age Retirements – Standard Male Members

Age	Actual Retirements	Expected Retirements	Ratio of Actual to Expected
55	70	172	41%
56	80	181	44%
57	150	188	80%
58	155	187	83%
59	173	182	95%
60	346	288	120%
61	274	217	126%
62	216	198	109%
63	199	179	111%
64	234	230	102%
65	215	200	108%
66	143	123	116%
67	86	82	104%
68	77	65	119%
69	61	46	132%
Total	**2,479**	**2,538**	**98%**

Figure 31 Age Retirement Rates – Standard Male Members



Whilst the overall experience is quite close to expectation, the age-based "shape" is different and so I have adjusted our assumption to represent a blend of the prior assumption and that observed during the experience review period, weighted heavily towards the latest experience, as discussed in Section B.4.1. In particular, I have explicitly reduced the pre-age 60 rates to reflect the effects of the preservation age changes noted above.

B.4.5 Age Retirement – Standard Female Members

A comparison of actual to expected retirements of Standard Female members over the experience review period is contained in Table 36. The expected number of retirements has been calculated based on the "adjusted" rates set in the 2019 Review. The implied actual and expected retirement rates are shown in Figure 32, which also illustrates our selected rates for this Review.

Table 36 Actual vs Expected Age Retirements – Standard Female Members

Age	Actual Retirements	Expected Retirements	Ratio of Actual to Expected
55	64	252	25%
56	116	215	54%
57	208	214	97%
58	213	209	102%
59	197	200	99%
60	490	316	155%
61	277	248	112%
62	267	221	121%
63	240	247	97%
64	261	254	103%
65	297	248	120%
66	187	155	120%
67	146	117	125%
68	94	89	105%
69	89	68	131%
Total	**3,146**	**3,055**	**103%**

Figure 32 Age Retirement Rates – Standard Female Members

Similarly to Standard Males, whilst the overall experience is quite close to expectation, the age-based "shape" is different and so I have adjusted our assumption to represent a blend of the prior assumption and that observed during the experience review period, again weighted heavily towards the recent experience. In particular, I have explicitly reduced the pre-age 60 rates to reflect the effects of the preservation age changes noted above.

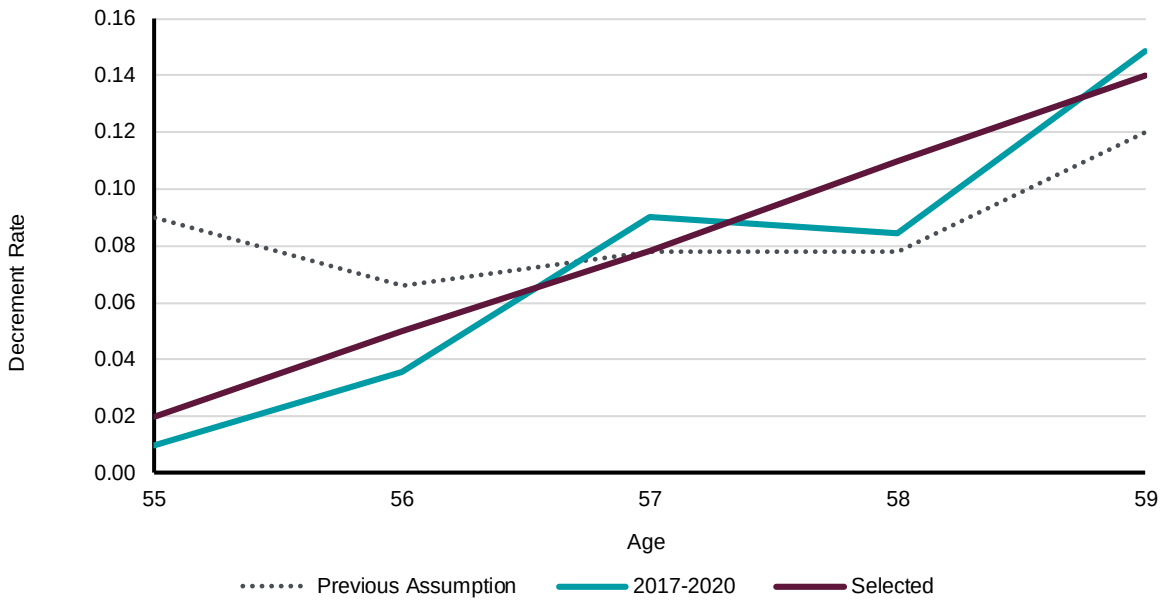
B.4.6 Age Retirement – Police Members

A comparison of actual to expected retirements of Police members over the investigation period is contained in Table 37. The expected number of retirements has been calculated based on the "adjusted" rates set in the 2019 Review. The implied actual and expected retirement rates are shown in Figure 33, which also illustrates our selected rates for this Review. It will be noted that, in practice, the vast majority of members retire at or before age 60 in line with the previous experience of Police Super (see Figure 30).

Table 37 Expected vs Actual Age Retirements – Police Members

Age	Actual Retirements	Expected Retirements	Ratio of Actual to Expected
55	5	46	11%
56	17	32	54%
57	38	33	116%
58	29	27	108%
59	42	34	124%
Total	**131**	**172**	**76%**

Figure 33 Age Retirement Rates – Police Members



In contrast to the Standard members, the experience is materially lower than expectation for Police members, with the age-based shape again different from our previous assumption, with most of the difference occurring at the youngest retirement ages. We have again adjusted our assumption to be closer to the more recent experience for Police members.

B.4.7 Mortality – Standard Male Members

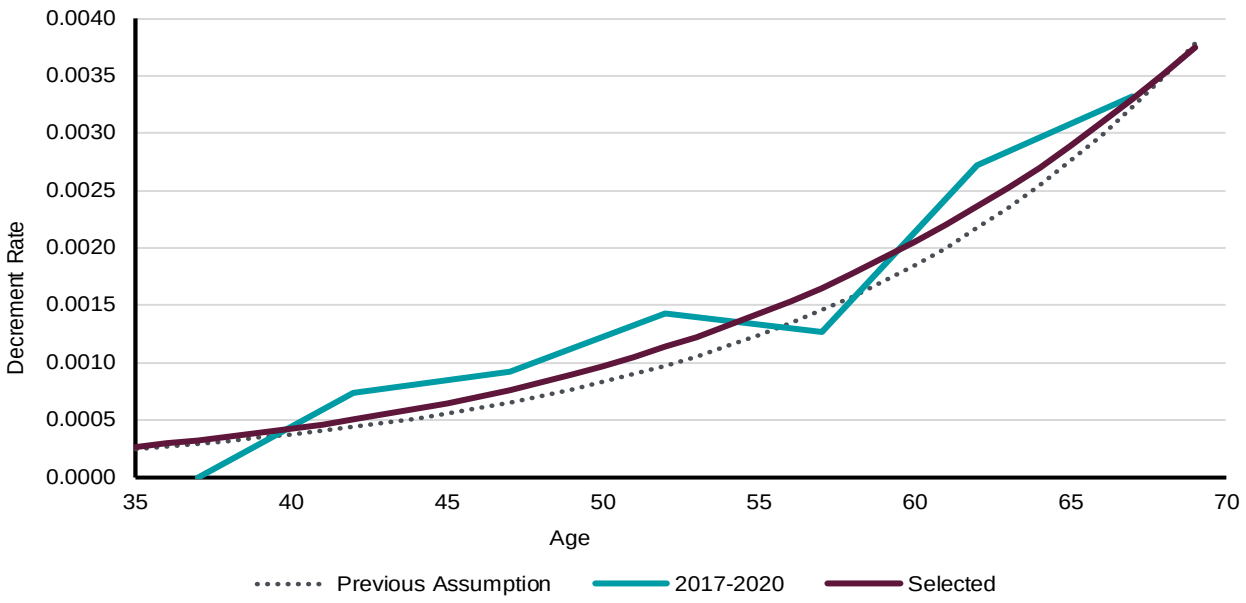
A comparison of actual to expected deaths of Standard Male members over the investigation period is contained in Table 38. The expected number of deaths has been calculated based on the assumptions used in the last actuarial Review. The implied actual and expected mortality rates are shown in Figure 34, which also illustrates our selected rates for this Review.

Table 38 Actual vs Expected Mortality – Standard Male Members

Age Group	Actual Deaths	Expected Deaths	Ratio of Actual to Expected
35-39	0	0	0%
40-44	2	1	162%
45-49	6	4	137%
50-54	14	10	145%
55-59	15	17	87%
60-64	21	16	128%
65-69	7	7	107%
Total	**65**	**56**	**117%**

Table 38 shows that the actual experience during the intervaluation period has been somewhat higher than the previous assumption, however there is not a great deal of experience. Noting the data issues discussed in Section B.4.1, I have decided to recalibrate the assumption, based on the recent experience, as shown in Figure 34.

Figure 34 Mortality Rates – Standard Male Members



B.4.8 Mortality – Standard Female Members

A comparison of actual to expected deaths of Standard Female members over the investigation period is contained in Table 39. The expected number of deaths has been calculated based on the

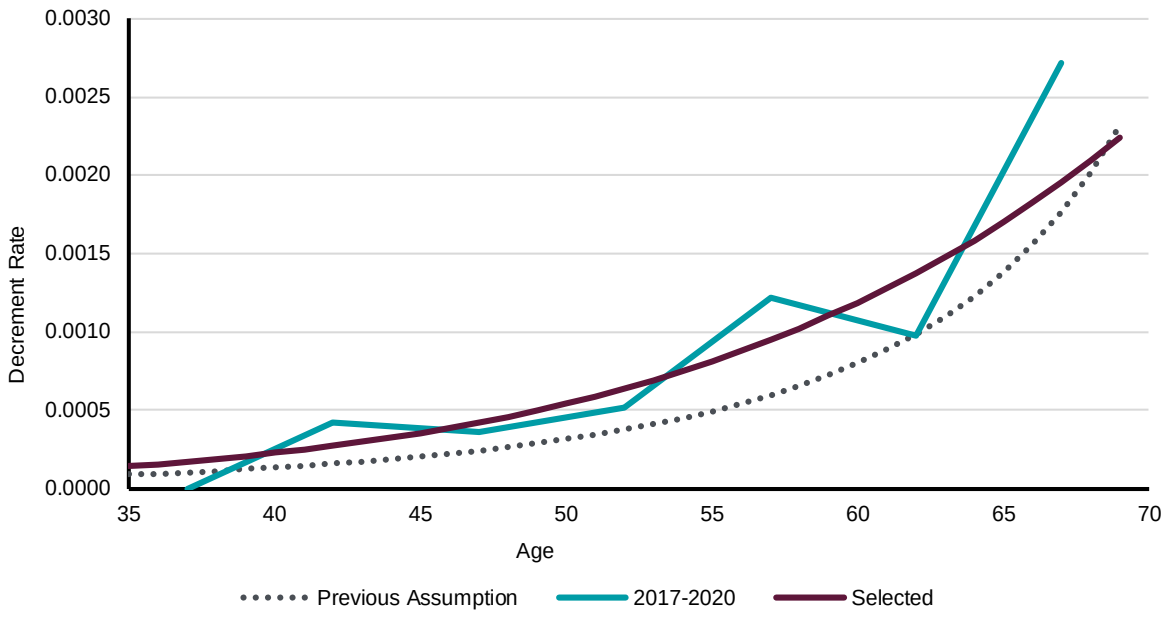
assumptions used in the last actuarial Review. The implied actual and expected mortality rates are shown in Figure 35, which also illustrates our selected rates for this Review.

Table 39 Actual vs Expected Mortality – Standard Female Members

Age Group	Actual Deaths	Expected Deaths	Ratio of Actual to Expected
35-39	0	0	0%
40-44	3	1	257%
45-49	5	3	146%
50-54	8	6	136%
55-59	19	9	203%
60-64	10	10	101%
65-69	9	6	162%
Total	**54**	**35**	**152%**

The mortality experience of Standard Females has been materially higher than expectation, however there is not a great deal of experience. Noting the data issues discussed in Section B.4.1, I have again decided to recalibrate the assumption, based on the recent experience, as shown in Figure 35.

Figure 35 Mortality Rates – Standard Female Members



B.4.9 Mortality – Police Members

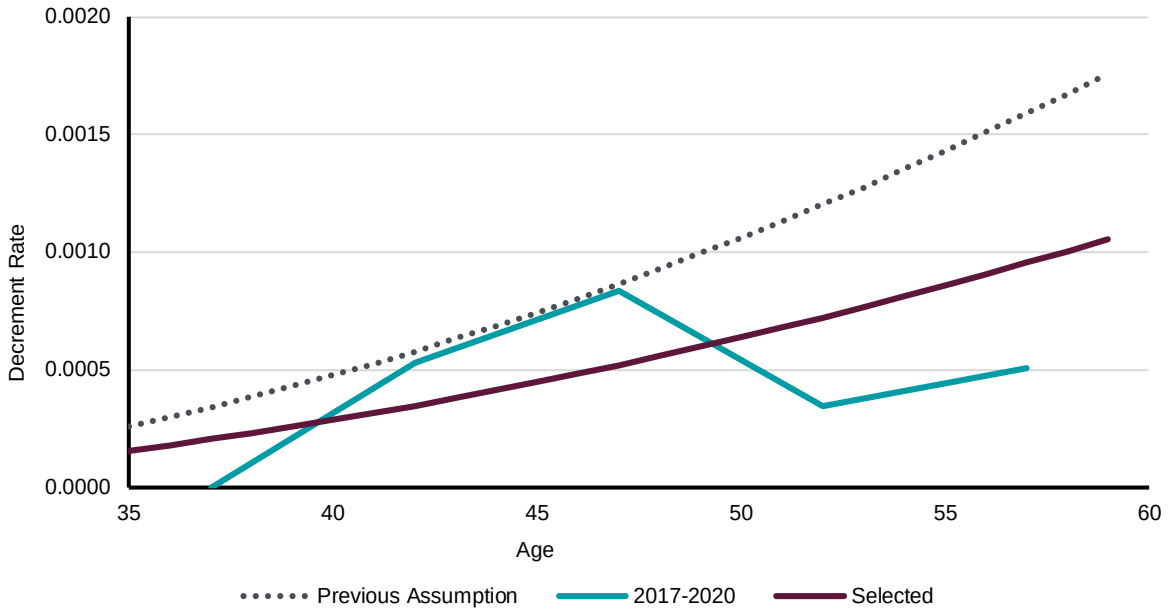
A comparison of actual to expected deaths of Police members over the investigation period is contained in Table 40. The expected number of deaths has been calculated based on the assumptions used in the last actuarial Review. The implied actual and expected mortality rates are shown in Figure 36, which also illustrates our selected rates for this Review.

Table 40 Actual vs Expected Mortality – Police Members

Age Group	Actual Deaths	Expected Deaths	Ratio of Actual to Expected
35-39	1	1	88%
40-44	3	3	96%
45-49	1	3	29%
50-54	1	3	32%
55-59	0	0	0%
Total	**6**	**11**	**55%**

There is very limited mortality experience for Police members and attempting to fit a curve is spurious. Consequently, I have retained the previous age-based shape and reduced the rates proportionately to be more consistent with the recent experience, noting the data issues discussed in Section B.4.1, as shown in Figure 36.

Figure 36 Mortality Rates – Police Members



B.4.10 Permanent and Partial Disablement

As noted in my last Review, there is very limited PPD experience and it is debatable whether the very low rates of PPD should be modelled at all. Consequently, I have continued not to make any allowance for PPD decrements within the valuation basis. I will still monitor the experience however and reintroduce the PPD decrement assumption if required.

B.4.11 Total and Permanent Disablement – Standard Male Members

A comparison of actual to expected exits due to total and permanent disablement (TPD) of Standard Male members during the investigation period is contained in Table 41. The expected number of TPDs

has been calculated based on the assumptions used in the last actuarial Review. The implied actual and expected TPD rates are shown in Figure 37, which also illustrates our selected rates for this Review.

Table 41 Actual vs Expected TPD Rates – Standard Male Members

Age Group	Actual TPDs	Expected TPDs	Ratio of Actual to Expected
35-39	0	0	0%
40-44	1	2	46%
45-49	13	8	160%
50-54	27	17	156%
55-59	25	28	89%
Total	**66**	**56**	**118%**

Figure 37 TPD Rates – Standard Male Members

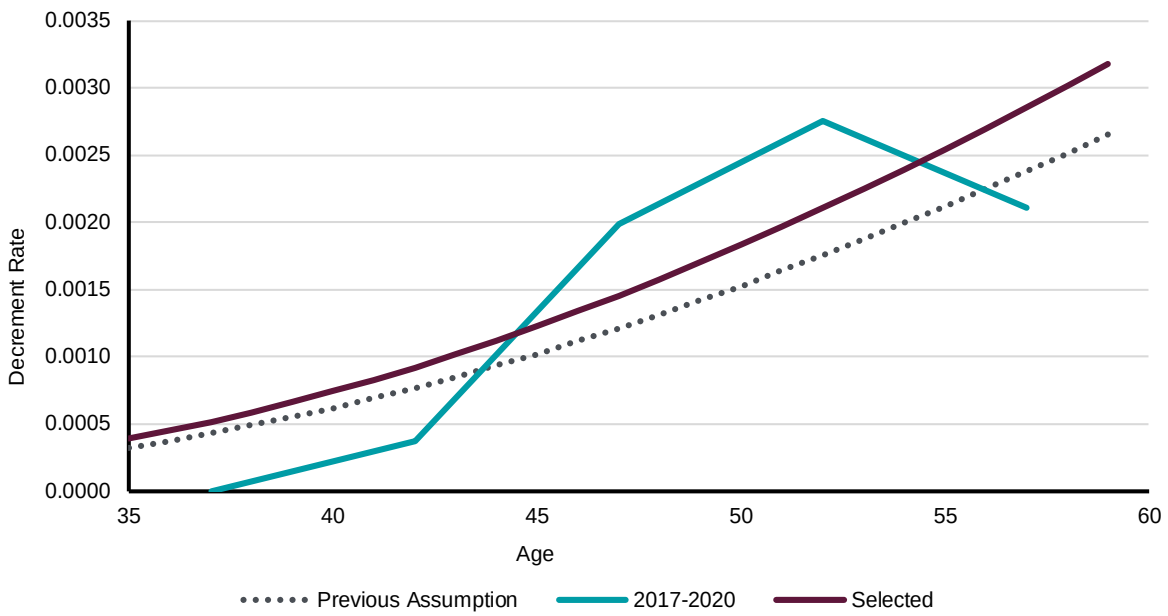


Table 41 shows that the actual experience during the intervaluation period has been somewhat above the previous assumption, however there is not a great deal of experience. Given the paucity of data, curve fitting is again spurious and so I have retained the previous age-based shape and increased the rates proportionately to be more consistent with the recent experience, noting the data issues discussed in Section B.4.1, as shown in Figure 37.

B.4.12 Total and Permanent Disablement – Standard Female Members

A comparison of actual to expected exits due to TPD of Standard Female members during the investigation period is contained in Table 42. The expected number of TPDs has been calculated based on the assumptions used in the last actuarial Review. The implied actual and expected TPD rates are shown in Figure 38, which also illustrates our selected rates for this Review.

Table 42 Actual vs Expected TPD Rates – Standard Female Members

Age Group	Actual TPDs	Expected TPDs	Ratio of Actual to Expected
35-39	0	0	0%
40-44	10	6	159%
45-49	17	18	94%
50-54	53	28	190%
55-59	28	37	76%
Total	**108**	**89**	**121%**

Figure 38 TPD Rates – Standard Female Members

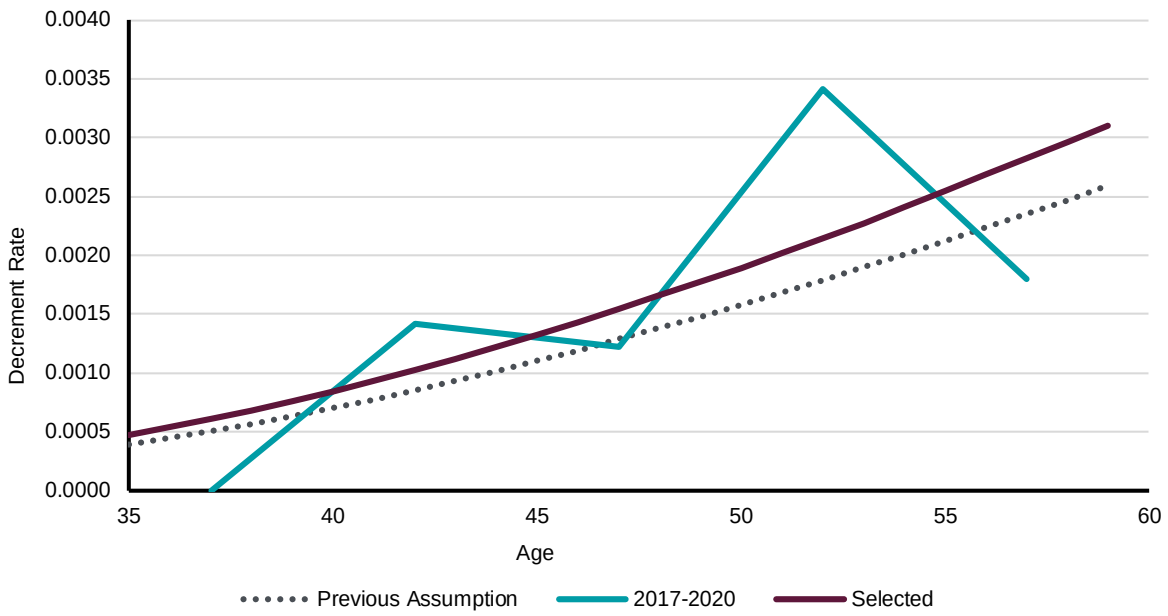


Table 42 shows that the actual experience during the intervaluation period has been somewhat above the previous assumption, however there is again not a great deal of experience. Given the paucity of data, curve fitting is again spurious and so I have retained the previous age-based shape and increased the rates proportionately to be more consistent with the recent experience, noting the data issues discussed in Section B.4.1, as shown in Figure 38.

B.4.13 Total and Permanent Disablement – Police Members

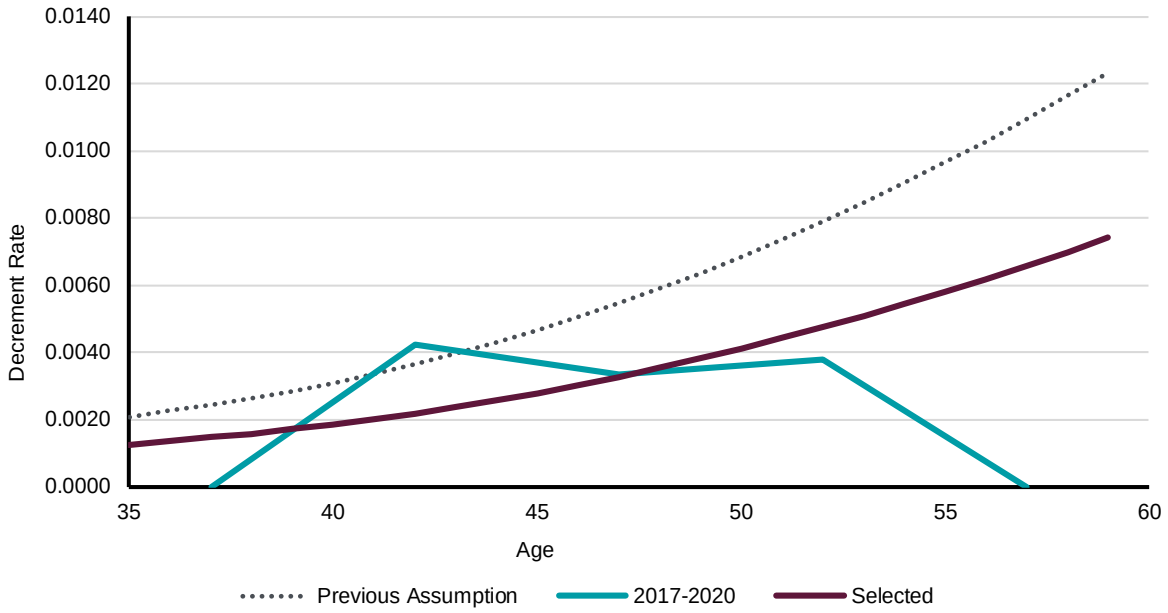
A comparison of actual to expected exits due to TPD of Police members during the investigation period is contained in Table 43. The expected number of TPDs has been calculated based on the assumptions used in the last actuarial Review. The implied actual and expected TPD rates are shown in Figure 39, which also illustrates our selected rates for this Review.

Table 43 Actual vs Expected TPD Rates – Police Members

Age Group	Actual TPDs	Expected TPDs	Ratio of Actual to Expected
35-39	8	7	111%
40-44	12	20	61%
45-49	11	23	48%
50-54	0	21	0%
55-59	0	0	0%
Total	**31**	**71**	**44%**

Table 43 shows that the actual experience during the intervaluation period has been materially below the previous assumption, however there is even less experience. Given the paucity of data, curve fitting is again spurious and so I have retained the previous age-based shape and reduced the rates proportionately to be more consistent with the recent experience, noting the data issues discussed in Section B.4.1, as shown in Figure 39.

Figure 39 TPD Rates – Police Members



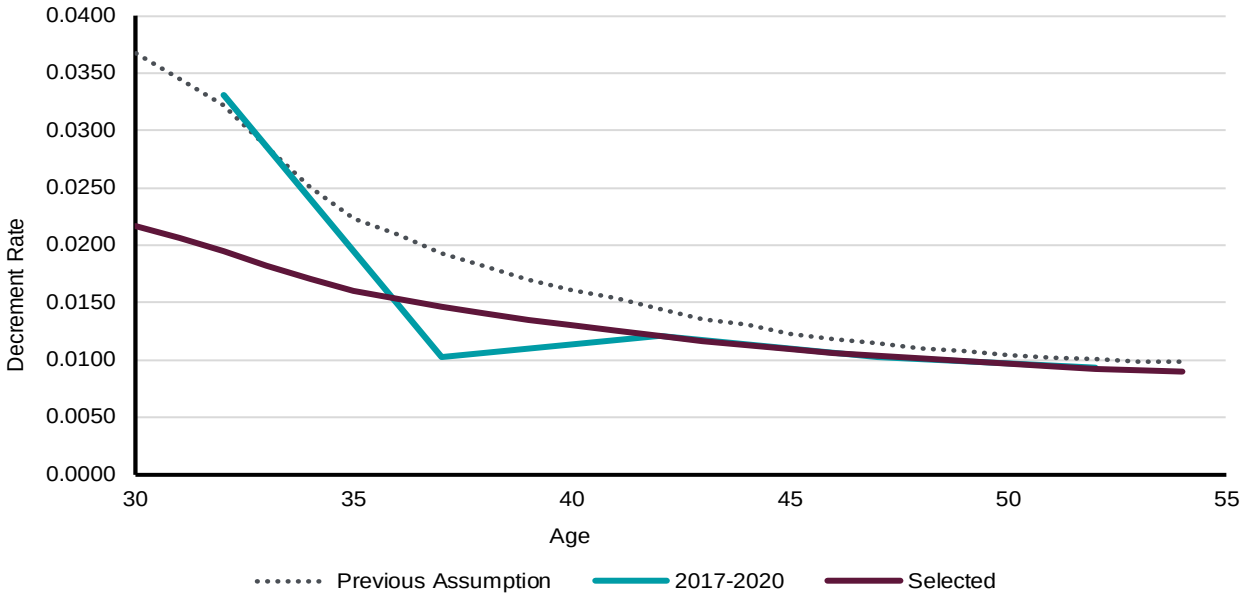
B.4.14 Resignation – Standard Male Members

A comparison of actual to expected resignations of Standard Male members over the experience review period is contained in Table 44. The expected number of resignations has been calculated based on the “adjusted” rates set in the 2019 Review. The implied actual and expected resignation rates are shown in Figure 40, which also illustrates our selected rates for this Review.

Table 44 Actual vs Expected Resignations – Standard Male Members

Age Group	Actual Resignations	Expected Resignations	Ratio of Actual to Expected
30-34	1	1	115%
35-39	4	7	56%
40-44	33	38	86%
45-49	67	75	90%
50-54	91	99	92%
Total	**196**	**220**	**89%**

Figure 40 Resignation Rates – Standard Male Members



Whilst Table 44 shows that resignations have been below the previous assumption, we have fitted a curve to the recent experience, noting the data issues discussed in Section B.4.1. Our adopted rates are then a weighted average of the fitted curve and our previously assumed rates, with the recent experience dominant.

B.4.15 Resignation – Standard Female Members

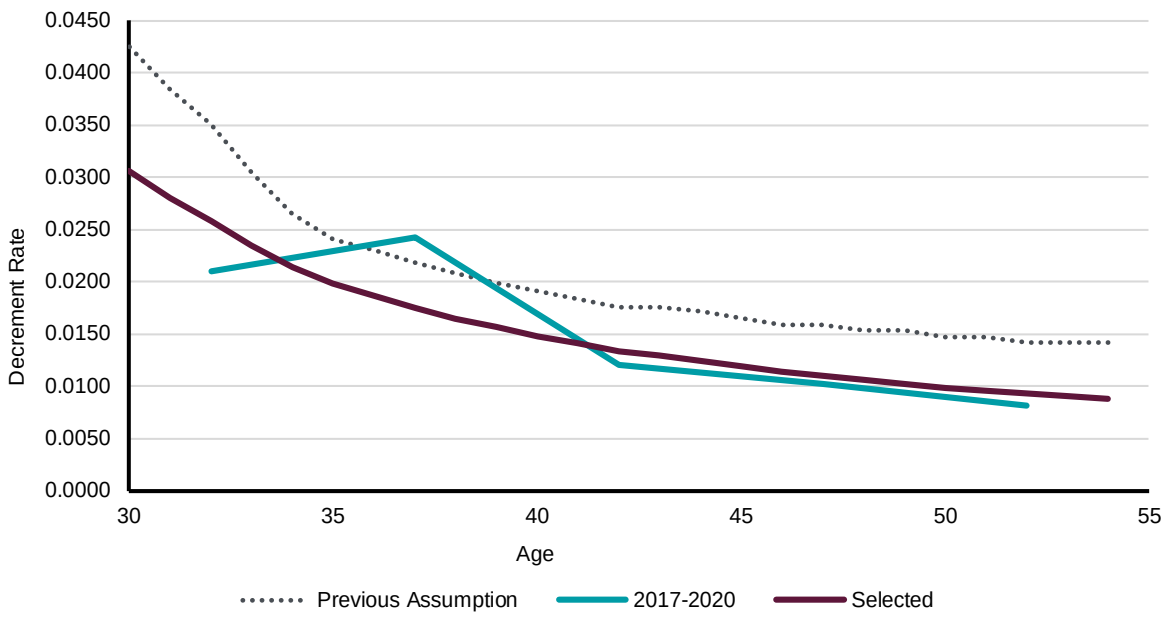
A comparison of actual to expected resignations of Standard Female members over the experience review period is contained in Table 45. The expected number of resignations has been calculated based on the “adjusted” rates set in the 2019 Review. The implied actual and expected resignation rates are shown in Figure 41, which also illustrates our selected rates for this Review.

Table 45 Actual vs Expected Resignations – Standard Female Members

Age Group	Actual Resignations	Expected Resignations	Ratio of Actual to Expected
30-34	1	1	67%
35-39	19	16	117%
40-44	86	126	68%
45-49	142	220	65%
50-54	127	225	57%
Total	**375**	**588**	**64%**

Table 45 demonstrates that the actual rates have been materially lower than previously assumed. Noting the data issues discussed in Section B.4.1, I have therefore graduated the 2017-2020 experience and have adopted the average of the graduated rates and the previous assumption, with the recent experience dominant.

Figure 41 Resignation Rates – Standard Female Members



B.4.16 Resignation – Police Members

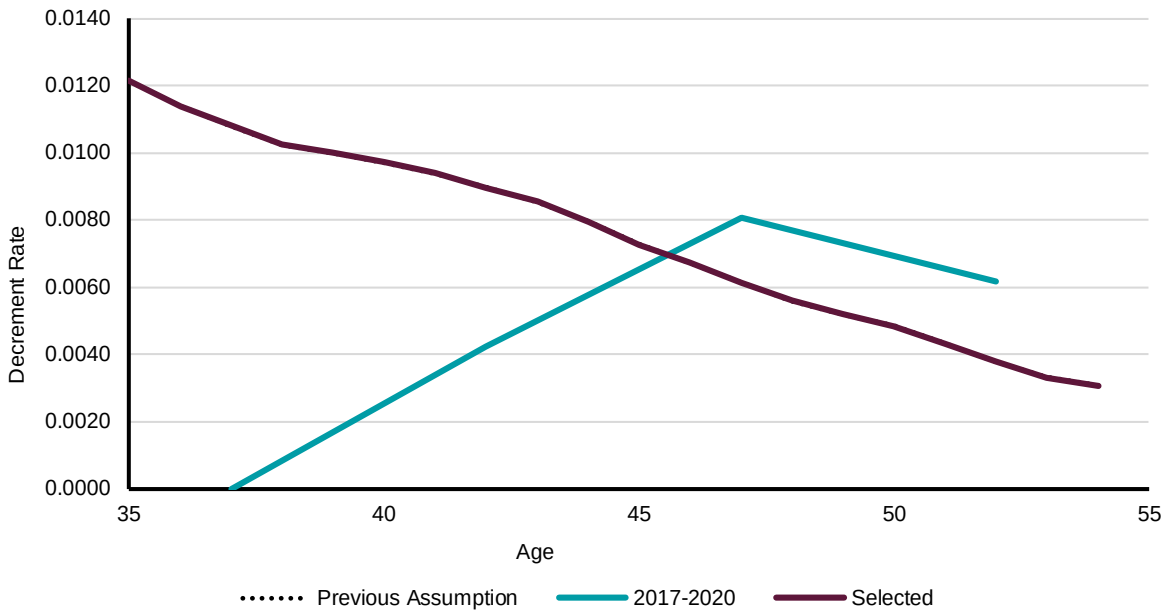
A comparison of actual to expected resignations of Police members over the experience review period is contained in Table 46. The expected number of resignations has been calculated based on the "adjusted" rates set in the 2019 Review. The implied actual and expected resignation rates are shown in Figure 42, which also illustrates our selected rates for this Review.

Table 46 Actual vs Expected Resignations – Police Members

Age Group	Actual Resignations	Expected Resignations	Ratio of Actual to Expected
30-34	0	0	0%
35-39	0	1	0%
40-44	8	16	49%
45-49	29	22	130%
50-54	18	11	157%
Total	**55**	**52**	**107%**

The overall comparison is reasonably close and there is very limited data from which to infer any change in resignation rates, so I have retained the previous assumption, as shown in Figure 42.

Figure 42 Resignation Rates – Police Members



B.4.17 Involuntary Termination – General

Due to the ad-hoc nature of involuntary terminations, it is difficult to determine their likely future level. However, they need to be considered since the involuntary termination benefit is greater than the actuarial reserve, although the liabilities are not particularly sensitive to variations in this assumption and will become increasingly less so as the active membership continues to age. Involuntary termination includes voluntary early retirements (prior to age 55), retrenchments and redundancies.

B.4.18 Involuntary Termination Experience – Standard Male Members

A comparison of actual to expected involuntary terminations of Standard Male members during the investigation period is contained in Table 47. The expected number of Involuntary terminations has

been calculated based on the assumptions used in the last actuarial Review. The implied actual and expected involuntary termination rates are shown in Figure 43, which also illustrates our selected rates for this Review.

Table 47 Actual vs Expected Involuntary Terminations – Standard Male Members

Age Group	Actual Involuntary Terminations	Expected Involuntary Terminations	Ratio of Actual to Expected
30-34	0	0	0%
35-39	0	3	0%
40-44	15	23	67%
45-49	30	70	43%
50-54	59	161	37%
Total	**104**	**256**	**41%**

The levels of involuntary terminations over the intervaluation period have been lower than assumed in the last valuation, as illustrated in Figure 43. However, as noted in the previous experience review, this decrement tends to be quite volatile over time and it is difficult to observe statistically credible experience over a single triennium. Consequently, we have shown the actual rates for the last three experience reviews in order to provide a broader context.

Figure 43 Involuntary Termination Rates - Standard Males

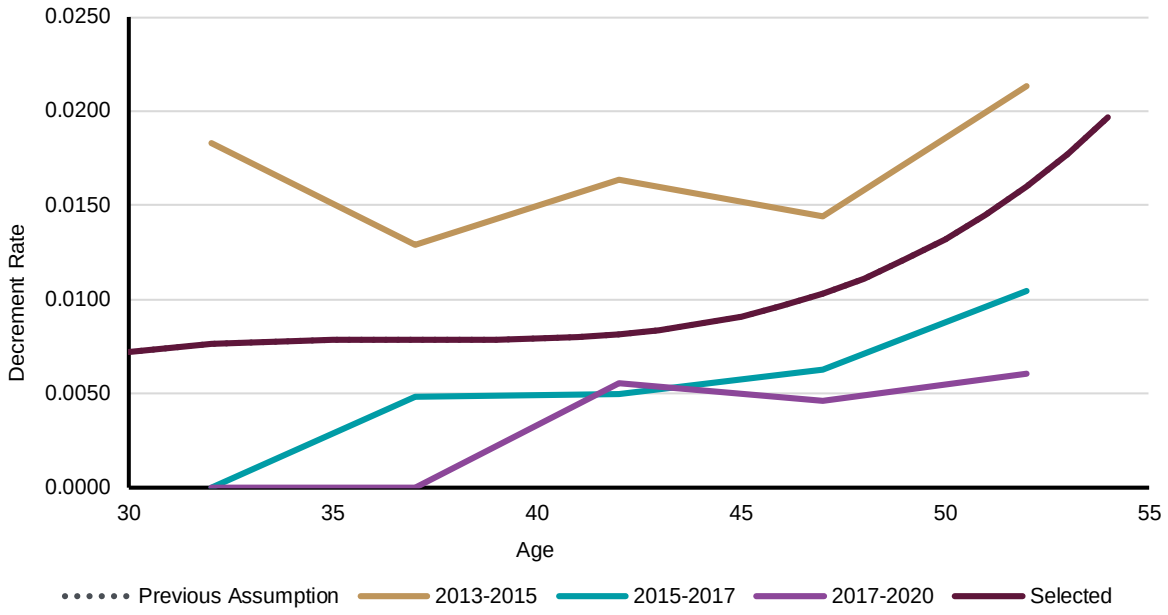


Figure 43 clearly demonstrates the volatility of the involuntary termination experience and does not present any indication that the existing assumption shouldn't be retained.

B.4.19 Involuntary Termination Experience – Standard Female Members

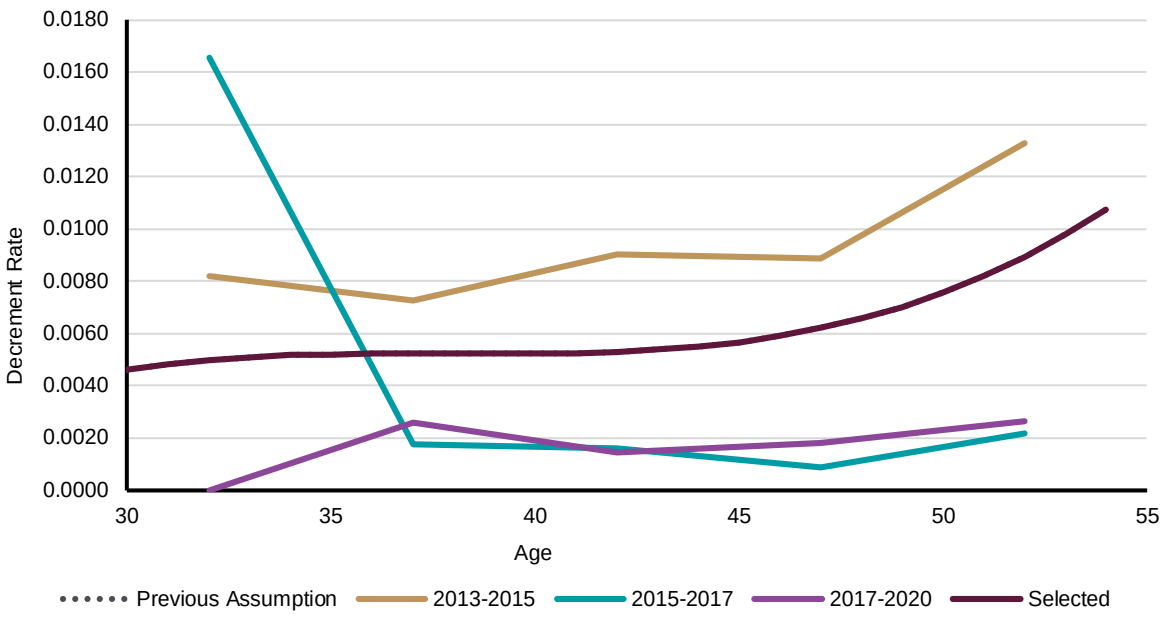
A comparison of actual to expected involuntary terminations of Standard Female members during the investigation period is contained in Table 48. The expected number of Involuntary terminations has been calculated based on the assumptions used in the last actuarial Review. The implied actual and expected involuntary termination rates are shown in Figure 44, which also illustrates our selected rates for this Review.

Table 48 Actual vs Expected Involuntary Terminations – Standard Female Members

Age Group	Actual Involuntary Terminations	Expected Involuntary Terminations	Ratio of Actual to Expected
30-34	0	0	0%
35-39	2	4	49%
40-44	10	38	26%
45-49	25	88	29%
50-54	41	140	29%
Total	**78**	**270**	**29%**

Once again, the experience is lower than expectation and this is confirmed in Figure 44, noting the very limited experience at the younger age groups.

Figure 44 Involuntary Termination Rates - Standard Females



Similarly to Standard Males, I have considered the longer term experience and do not believe that there is sufficient evidence to change the assumption, so it has been retained.

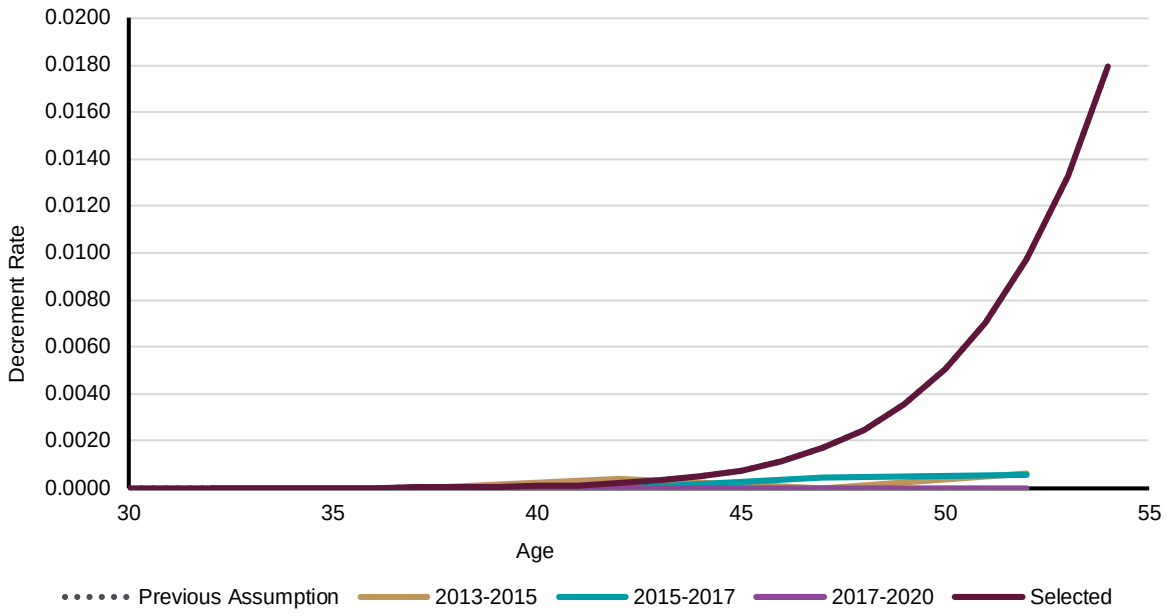
B.4.20 Involuntary Termination Experience – Police Members

A comparison of actual to expected involuntary terminations of Police members during the investigation period is contained in Table 49. The expected number of Involuntary terminations has been calculated based on the assumptions used in the last actuarial Review. The implied actual and expected involuntary termination rates are shown in Figure 45, which also illustrates our selected rates for this Review.

Table 49 Actual vs Expected Involuntary Terminations – Police Members

Age Group	Actual Involuntary Terminations	Expected Involuntary Terminations	Ratio of Actual to Expected
30-34	0	0	0%
35-39	0	1	0%
40-44	0	7	0%
45-49	0	30	0%
50-54	0	0	0%
Total	**0**	**37**	**0%**

Figure 45 Involuntary Termination Rates – Police Members



Whilst the number of involuntary terminations for Police is below expectation, the numbers are too small to make statistical inferences. Similarly to the other membership groups, I have considered the longer term experience and retained the previous assumption.

B.4.21 Transfers to the Comprehensive Accumulation Category - General

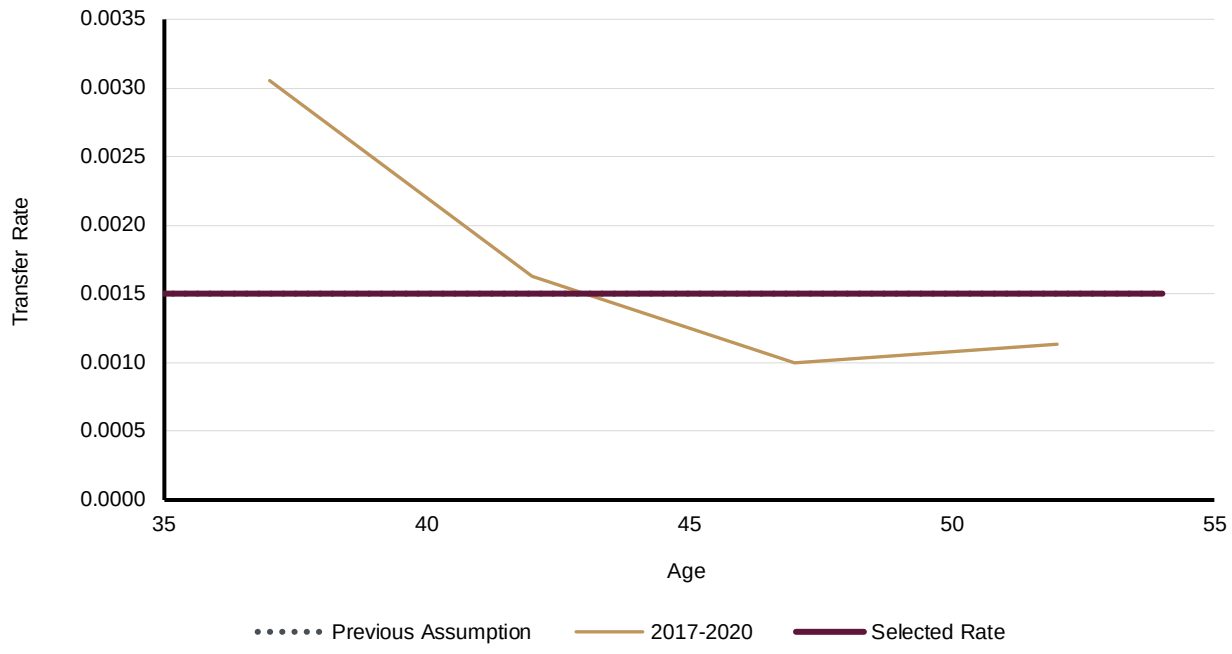
The benefit offered to members of the Standard Defined Benefit Category who transfer to the Comprehensive Accumulation Category is equivalent to the Investment Linked Option (ILO) benefit payable on resignation. Since the option to transfer is available on an open-ended basis, future transfers have a similar financial effect to resignations (although it is possible for resigning members to transfer their entitlements away from QSuper, in practice this occurs rarely). As the rate of transfer does not vary significantly by member type I have considered this at an overall level.

A comparison of actual to expected transfer rates for all members under age 55 over the investigation period is contained in Table 50. The expected number of transfers has been calculated based on the assumptions used in the last actuarial Review. The implied actual and expected transfer rates are shown in Figure 46, which also illustrates our selected rates for this Review.

Table 50 Actual vs Expected Transfers – All Members

Age Group	Actual Transfers	Expected Transfers	Ratio of Actual to Expected
30-34	1	0	304%
35-39	5	5	109%
40-44	23	20	115%
45-49	24	35	68%
50-54	26	38	69%
Total	**79**	**98**	**81%**

Figure 46 Transfer Rates – All Members



Whilst there is some age based "shape" to the transfer experience, noting the impact of this assumption on the overall valuation results, I have decided to retain the previous assumption.

B.4.22 Family Law Splits and Transition to Retirement Pensions

As noted in Section A.1, members can (or may be required to) crystallise part or all of their defined benefit entitlement as a result of a Family Law split or when converting to a Transition to Retirement pension. These events effectively result in an “in-service” benefit payment as the member remains in the Standard Defined Benefit Category and continues to accrue benefits in the usual manner.

The yearly proportions of benefits crystallised under a Family Law split during the investigation period are shown in Figure 47 and the corresponding number of splits in Table 51.

Figure 47 Family Law Proportions Under Age 55 – Experience

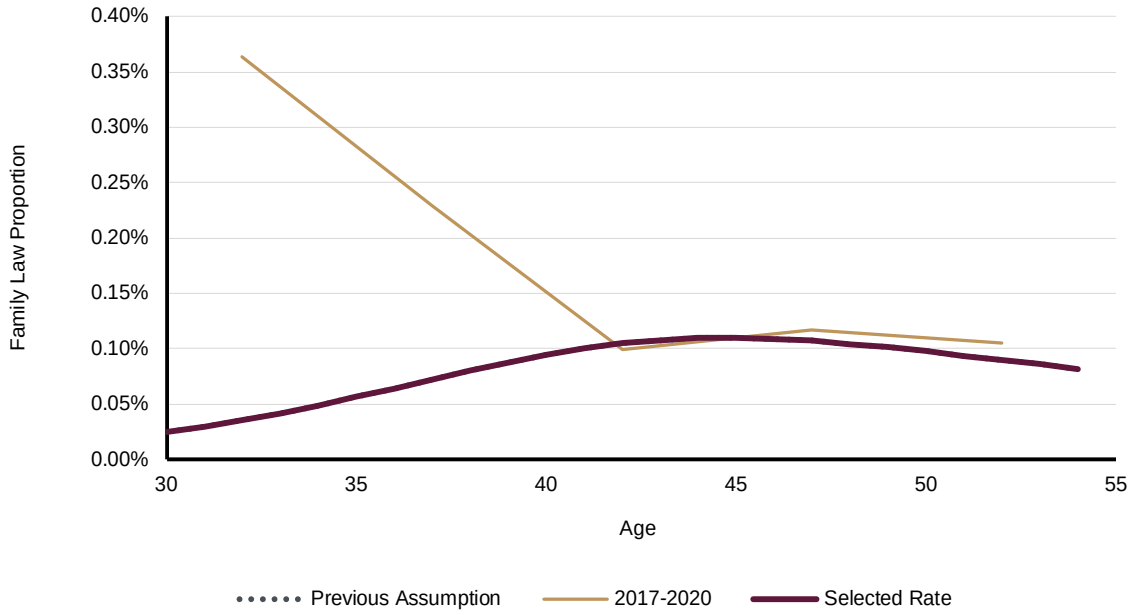


Table 51 Number of Family Law Splits – Under Age 55

Year Ending 30 June	Number of Family Law Splits
2018	66
2019	60
2020	65
Total	**191**

Noting the sparse experience at younger ages, there is no evidence to suggest a change in the previous rates under age 55, so they have been retained.

Over age 55, the annual scheme experience for Family Law splits and transition to retirement (TtR) transfers are shown in Figure 48 and the corresponding number of splits and TtR transfers in Table 52.

Figure 48 Family Law and TTR Proportions Over Age 55 – Experience

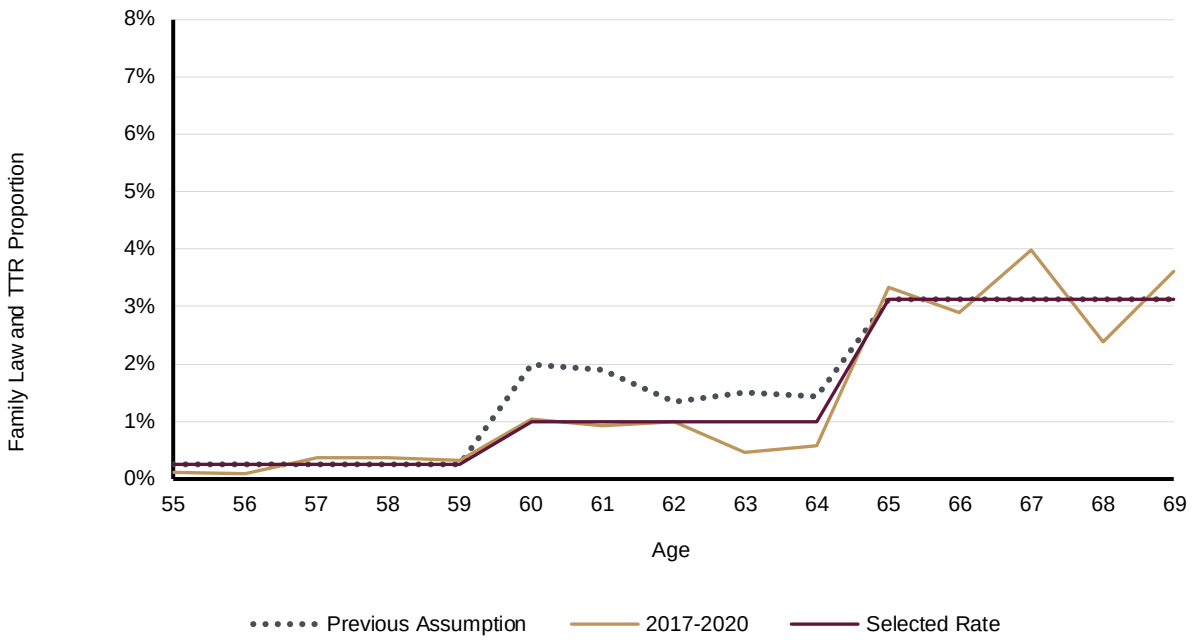


Table 52 Number of Family Law Splits and TtR Conversions - Over Age 55

Year Ending 30 June	Number of Family Law Splits	Number of TTRs
2018	31	489
2019	33	542
2020	34	470
Total	**98**	**1,501**

The experience during the review period is a bit lower than previously between ages 60 and 64, although quite consistent at younger and older ages. Given the recent change in tax treatment of TtRs, where they are not taxed concessionally under age 60, I have been more cognisant of the recent experience and have therefore reduced the assumption somewhat between ages 60 & 64.

B.4.23 Leaving Service – Parliamentary Category

As noted is Section B.1, the decrement assumptions for the Parliamentary Category have been based on those derived from the experience of the relevant groups within the Standard Defined Benefit Category, due to the insignificance of these liabilities in the overall context of QSuper. However, an important assumption for the Parliamentary members, which cannot be inferred from any analysis of the Standard Defined Benefit Category, is the probability of exit at each election.

It might be expected a priori that both the probability of voluntary retirement and election loss might be correlated with the number of times already elected and therefore the member's service prior to the election. However, even the relatively large number of exits at several recent elections does not provide a sufficiently large sample of data on which to base statistically valid inferences. A detailed investigation of the leaving service experience for the last several elections is shown in Table 53,

noting that we have included the outcome of the October 2020 election, even though it is strictly after the review date.

Table 53 Percentage of Members Exiting by Years of Service

Years of Service at Election	Election												
	1992	1995	1998	2001	2004	2006	2009	2012	2015	2017	2020	1992-2020	2001-2020
0-4	13%	19%	44%	44%	18%	0%	0%	0%	0%	0%	0%	22%	24%
4-8	8%	19%	0%	20%	0%	19%	0%	0%	0%	0%	0%	11%	10%
8-11	0%	0%	23%	33%	0%	7%	25%	50%	29%	0%	0%	22%	26%
11+	36%	18%	39%	40%	22%	37%	38%	67%	54%	36%	43%	39%	42%
Total	**17%**	**16%**	**29%**	**38%**	**15%**	**21%**	**24%**	**62%**	**45%**	**36%**	**43%**	**27%**	**36%**

As can be seen from Table 53, there has been considerable variation in the probabilities of exit from election to election with no real trend evident. Overall though, there would appear to be justification to assume varying probabilities of exit depending on service prior to the election, although that issue has effectively disappeared as all members are now above 11 years membership.

Whilst this assumption is relatively insignificant for QSuper overall, I have decided to recalibrate it based on the last four elections, as shown in Table 54.

Table 54 Percentage of Parliamentary Category Members Exiting at Future Elections

Years of Service at Election	Probability of Exit at Election
0-11	n/a
11+	50%

B.5 Deferred Retirement Benefit

As discussed in Section A.1.11, Standard Defined Benefit Category members receive an AWOTE indexed benefit (the deferred retirement benefit or DRB) on leaving employment prior to age 55. This benefit can be converted at any time to a cash equivalent amount (ILO) invested in the Basic Accumulation Category earning investment returns in line with the member's choice of investment strategy. The conversion involves discounting the balance of the AWOTE indexed benefit by 2.88% compound for each year below age 55.

Where the assumed real discount rate in the actuarial valuation is different from 2.88%, allowance needs to be made for the effect of the ILO, both in respect of the existing DRB population and the future DRB members who are projected to withdraw from the Standard Defined Benefit Category.

The rates at which existing members with deferred retirement benefits have converted to the investment linked option over the investigation period are shown in Table 55.

Table 55 ILO Conversion Rates for Existing DRB Members

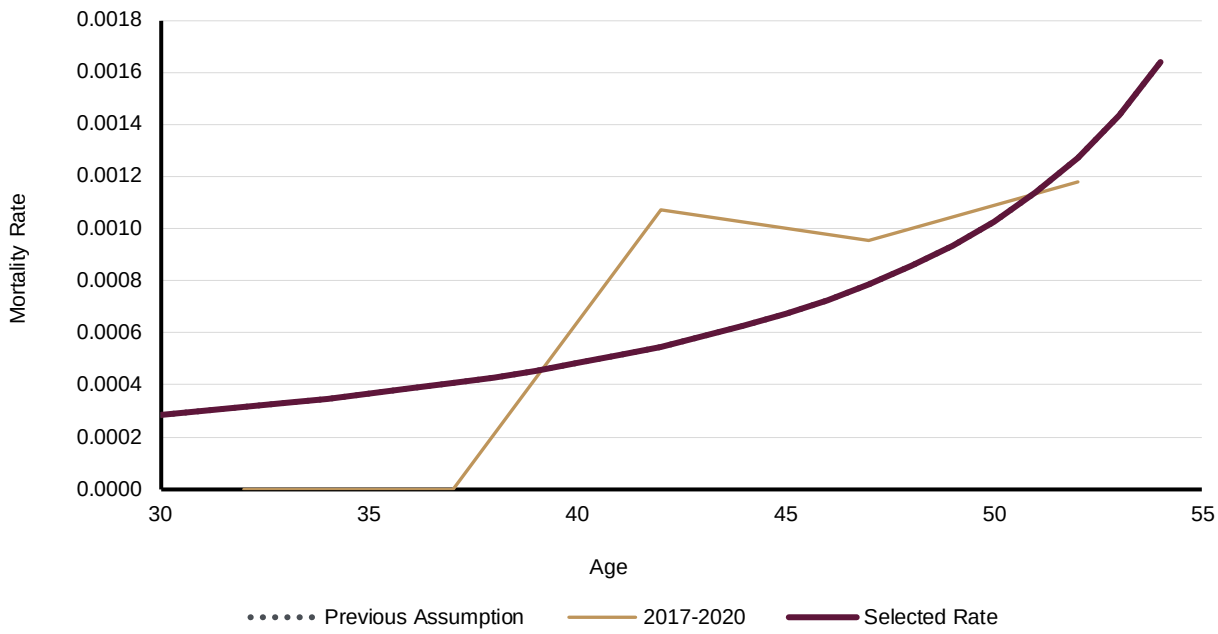
Year Ending 30 June	Average
2018	1.2%
2019	1.3%
2020	1.3%
Total	**1.3%**

Whilst there is some evidence to suggest that age-based rates are warranted, the additional complexity is not justified given the minimal impact on the scheme's liabilities. The rates over the intervaluation period have been a little lower than assumed in the previous Review. There is not sufficient evidence at this stage to further reduce the assumption and so I have retained it at 1.5%.

The liability for existing DRB members has been calculated by projecting their benefits with AWOTE until age 55, but allowing for the conversion of their benefits to the ILO at the assumed rate of 1.5% per year and also for the payment of the face value on death or permanent disablement prior to age 55.

The graduated rates of DRB members exiting due to mortality or disablement over the intervaluation period have been derived and compared with the previous assumptions. The mortality rates of existing members with deferred retirement benefits are illustrated in Figure 49.

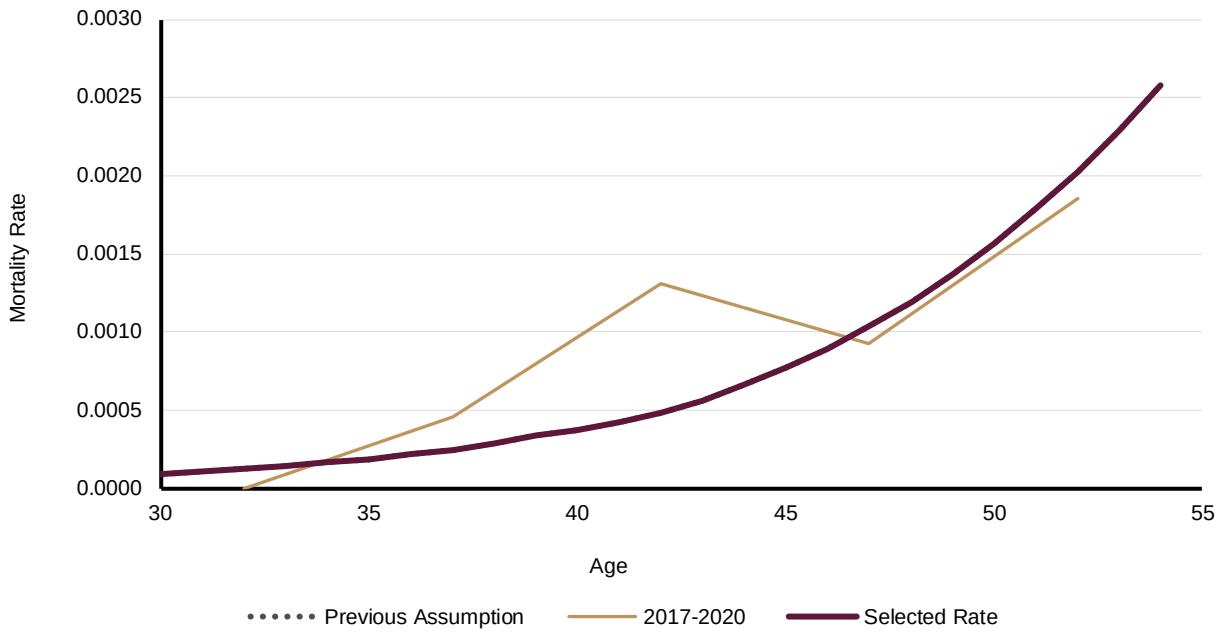
Figure 49 Mortality Rates for Existing DRB Members



There is an argument for an increase as the 2017-2020 experience is a little higher than the 2017 assumption. However, noting the significance of the mortality assumption on DRB and subsequently overall liabilities, as well as the relatively minor difference based on fairly scant experience, I have retained the previous decrement rate.

The TPD rates of existing members with deferred retirement benefits are illustrated in Figure 50.

Figure 50 TPD Rates for Existing DRB Members



Similarly for mortality, there is an argument for an increase as the 2017-2020 experience is a little higher than the 2017 assumption. However, noting the significance of the mortality assumption on DRB and subsequently overall liabilities, as well as the relatively minor difference based on fairly scant experience, I have retained the previous decrement rate Figure 50.

The difference between the liability in respect of existing DRB benefits at the investigation date as described above and that obtained by simply discounting the existing balances at the real investigation discount rate to age 55 measures the effect of the future ILO conversion option and the implicit insurance provided on death and TPD. Based on the membership with a DRB benefit at the investigation date, the loading necessary to allow for ILO conversion and the implicit insurance has been estimated to be 0.0%, equivalent to the assumption at the previous Review of 0.0%. Whilst the allowance for pre-age 55 death and disablement acts to increase the loading, the real discount rate at this Review is lower than that underlying the ILO and consequently conversions reduce the liability relative to the simple discounting approach, sufficient to offset the increase from death and disablement.

It has been assumed that future DRB members will have similar characteristics to the existing DRB members with regard to their propensity to subsequently convert to the ILO and their death and disablement rates. The relative increase in the liability estimated above in excess of that calculated ignoring the ILO option and the death and disablement decrements can therefore be used as a loading for projected DRB liabilities emerging on future resignations.

It is also possible to examine the experience of resigning members who have the option of converting their (default) DRB into the ILO immediately upon exit. The proportions of exiting members choosing the ILO over the investigation period are displayed in Table 56.

Table 56 Proportion of Resigning DB Members Choosing the ILO at Exit

Year Ending 30 June	Average
2018	4.4%
2019	5.5%
2020	3.0%
Total	**4.4%**

Whilst there is some evidence to suggest that age-based rates are warranted, the additional complexity is not justified as the impact on the scheme's liabilities is minimal. The experience over the intervaluation period has been higher than the assumed level and so I have increased the assumption regarding the number of DB members who would select the ILO rather than the default DRB at resignation to be 4.0%, up from 3.0% at the last Review.

B.6 Pensions

B.6.1 Pensioner Mortality

The mortality of pensioners has minimal impact on the overall QSuper liability and there is relatively little data. At the 2010 valuation, a broad analysis was undertaken to determine the suitability of the age ratings applied to the population mortality rates, with the results shown in Table 57. In view of the immateriality of these assumptions and the lack of data from which to justify any change, I have decided to retain the previous assumptions.

Table 57 Pensioner Mortality Age Ratings

Type of Pension	Males	Females
Age Retirement	- 2 years	- 2 years
Ill-Health Retirement	+ 4 years	+ 4 years
Spouse	- 2 years	- 2 years

The base mortality rates have been derived from the Queensland Life Tables 2017-19 (Males or Females as appropriate with the Male values used for Police) as produced by the Australian Bureau of Statistics.

When valuing current and future pensions, it is prudent to allow for expected future improvements in mortality because the liabilities would otherwise be undervalued. The Australian Government Actuary published mortality improvement rates based on the last 25 and 125 years of population mortality experience in the Australian Life Tables 2015-17. There are no definitive reasons to choose either set of rates, although I note that Mercer's study of public sector pensioner mortality[42] used the 25 year assumption when projecting forward past mortality rates in their analysis and the use of the 25 year rates in previous Reviews. In the absence of compelling evidence to the contrary, the 25 year expected mortality improvements have been retained for this Review. These rates are shown in Appendix C.

[42] See http://actuaries.asn.au/Library/Events/FSF/2014/BoyfieldWilsonMortalityPaper140505.pdf

An assumption as to the proportion of future pensioners who are married is needed in order to value the pension entitlement of spouses. The pension is more valuable to a member when they are married due to the reversion that is paid to the spouse on the member's death. It is therefore more likely that those members who choose the pension are married. Therefore the assumption used in the last Review (viz. that all future pensioners are married) has been retained for this Review. Assumptions are also made regarding the proportion of spouses who would commute their pension on the death of the former member.

B.6.2 Pension Increases

There are two types of pensions. The majority of pensions are increased annually by CPI but there are a small number of pensions that are increased annually by the change in the Parliamentary backbencher salary. Both types of pensions are increased annually in the first full fortnight in August. Pensions that are linked to CPI are increased according to the percentage increase in the Brisbane All Groups CPI for the year to the previous June quarter. Pensions that are linked to the Parliamentary backbencher salary are increased according to the percentage increase in the Parliamentary backbencher salary over the financial year. Table 58 shows the increases experienced during the review period, noting that where the CPI *decreases*, as it did during 2019-20, the pension remains unchanged.

Table 58 Pension Increases over the Experience Review Period

Year Ending 30 June	Increase in CPI linked Pensions	Increase in Salary linked Pensions
2018	1.7%	2.2%
2019	1.7%	0.0%
2020	0.0%	0.0%
Average 2017-2020	**1.1%**	**0.7%**

As can be seen from Table 58, CPI linked pension increases have been just above the average 1.0% p.a. assumed at the last Review, and those linked to Parliamentary backbencher salary have been materially lower than the 2.0% p.a. assumption.

For this Review it has been assumed that CPI linked pensions will increase at the rate of 2.1% p.a. and salary linked pensions will increase at the rate of general salary inflation of 3.1% p.a. (as discussed in Section B.3.1).

B.6.3 Proportion Taking Pensions – Standard Defined Benefit Category

The proportion of TPD exits who selected the pension option on exiting the Standard Defined Benefit Category throughout the experience review period was 49.2%, which is consistent with the last Review where it was assumed that 50% of members exiting due to TPD would take a pension. Consequently, I have retained the assumption at this Review.

B.6.4 Proportion Taking Pensions – State Category

It is necessary to make an assumption as to what proportion of contributors and also what proportion of pensioner spouses will choose a pension benefit. This parameter has a material effect on the value

of the Category's liabilities and is the only one that has been investigated in detail for the State and Police categories.

A comparison of the expected, observed and adopted proportions of State Category retirees not commuting their pension entitlement is shown in Table 59. When determining the proportions taking pensions, partial commutations were assumed to be 50% on average.

Table 59 Proportion Taking Pensions – State Category[43]

Type of Pension	Number Fully Commuting	Number taking Full Pension	Number Partial Commutation	Total	Proportion Taking Pension	Previous Valuation Assumption	Adopted Assumption
Age - Persons	**38**	**42**	**12**	**92**	**52%**	70%	**50%**
Ill-Health - Persons	**0**	**3**	**1**	**4**	**88%**	80%	**80%**
Spouse on Death of Contributor	**0**	**0**	**0**	**0**		50%	**50%**
Spouse on Death of Pensioner or Commuter	**10**	**10**	**0**	**20**	**50%**	50%	**50%**

The proportion of Age retirees electing pension benefits has been declining over the last several reviews and there is now sufficient evidence to reduce the assumption at this Review. The other pension proportions have been fairly consistent with the previous assumptions and have therefore been retained.

B.6.5 Proportion Taking Pensions – Police Category

A comparison of the expected, observed and adopted proportions of Police Category retirees not commuting their pension entitlement is shown in Table 60.

Table 60 Proportions Taking Pension – Police Category

Type of Pension	Number Fully Commuting	Number taking Full Pension	Number Partial Commutation	Total	Proportion Taking Pension	Previous Valuation Assumption	Adopted Assumption
Age - Persons	**3**	**5**	**3**	**11**	**59%**	50%	**50%**
Ill-Health - Persons	**0**	**3**	**1**	**4**	**88%**	50%	**50%**
Spouse on Death of Contributor	**0**	**0**	**0**	**0**		50%	**50%**
Spouse on Death of Pensioner or Commuter	**2**	**5**	**0**	**7**	**71%**	50%	**50%**

On the basis of the scarcity of relevant experience and the effect of this parameter on the Review as a whole, it has been decided to retain the previous assumed pension proportions.

B.6.6 Proportion Taking Pensions – Parliamentary Category

The experience of the Parliamentary Category for the last several elections is illustrated in Table 61.

[43] Data on the numbers of spouses partially commuting their benefits was not available.

Table 61 Proportion Taking Pensions – Parliamentary Category

Election	Proportion Taking Pension
1995 or earlier exit	24.9%
1998 or earlier exit	67.3%
2001 or earlier exit	36.4%
2004 or earlier exit	79.2%
2006 or earlier exit	78.5%
2009 or earlier exit	83.4%
2012 or earlier exit	95.1%
2015 or earlier exit	75.1%
2017 or earlier exit	67.0%
2020 or earlier exit	75.6%

There have been only six new potential pensioners since 2017 so there is not a lot of new experience. That said, we can observe that pension proportion has been maintained at around 75% for a few elections/by-elections now. Given that the relative tax benefits between pensions and lump sums after age 60 have now effectively disappeared, the decision for retirees is now more about the value of longevity protection compared to the flexibility of lump sums. Whilst this is not a material parameter within the valuation basis overall, there is sufficient evidence to reduce the proportion at this experience review to 75%.

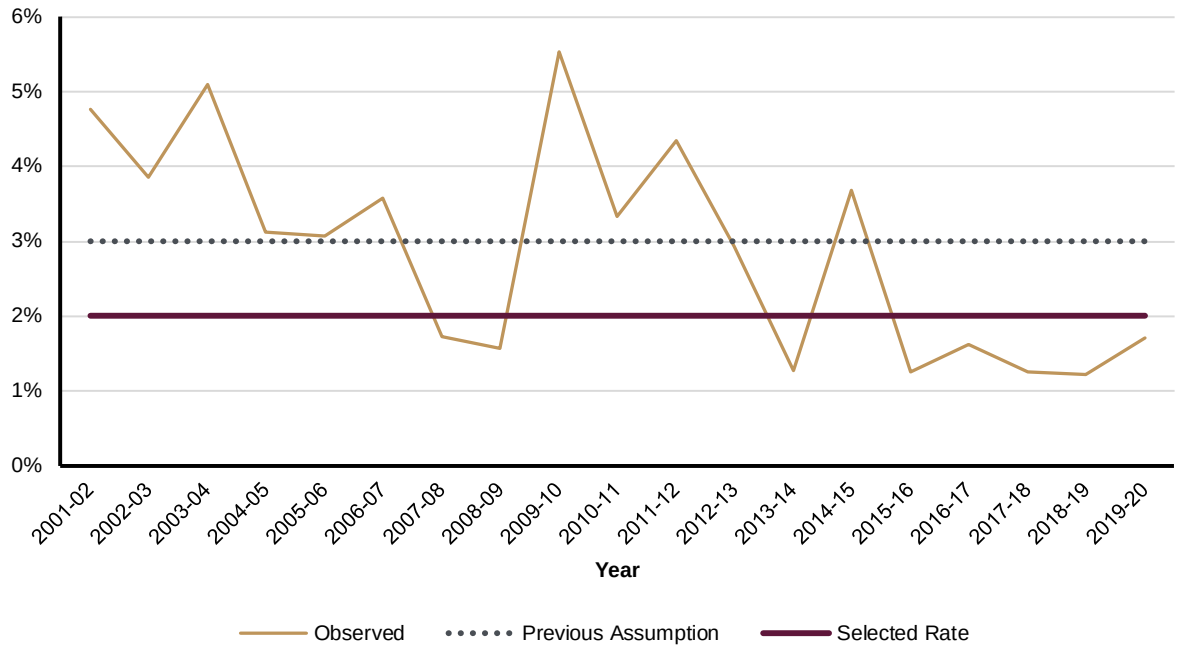
There have not been any deaths in service and only limited numbers of deaths of pensioners. It was therefore decided to retain the assumption that all Parliamentary spouses would choose a pension.

B.6.7 Child and Orphan Pensions

The cost of child and orphan pensions commencing in each year as a percentage of the death benefits paid in that year for the Standard Defined Benefit Category was 1.4% over the investigation period, with the historical experience shown in Figure 51. The child pensions have been valued ignoring mortality and assuming that the pension continues until age 20 if a child is currently aged under 20 and until age 25 for children currently aged 20 or older. Further, the Deed provides that children who, in the opinion of the Board, have a disability as defined under the Disability Services Act 2006 are entitled to a lifetime pension, but the number of expected claims is low and considered immaterial in the context of the valuation.

The latest experience is lower than the 3.0% rate chosen at the last Review and we note that the membership continues to age and so members are less likely on average to have dependent children. We have therefore decided to reduce the assumption to 2.0% of the level of future lump sum death benefits.

Figure 51 Child Pensions as Proportion of Lump Sum Death Benefits



Due to the size of the Standard Defined Benefit Category relative to the State and Police Categories it was decided to also use this experience as the basis for the loading assumed for these Categories. It has therefore been assumed that the value of child and orphan pensions will be equivalent to 2.0% of the value of lump sum death benefits paid from each of these Categories.

B.7 Income Protection Benefit

In order to determine the accrued liabilities relating to income protection claims incurred prior to the valuation date as well as the estimated incurred cost of these benefits in future, a payments per active claim (PPAC) model has been applied, separately for Standard Males and Standard Females[44]. The effects of past benefit indexation have been removed when determining the benefit as a percentage of salary and then future inflation has been explicitly projected. The model projects the number of active claims (i.e. claims in receipt of payment) and average salary per claim at any point in time and applies a benefit percentage which is dependent on the time of payment.

It should be noted that this analysis does not cover the income protection benefit provided within the Comprehensive Accumulation Category.

B.7.1 Payments Per Active Claim Method

The payments per active claim (PPAC) projection method models the relationship between the size of monthly gross benefit payments and average salaries at claim commencement and the continuance of a claim from incident to finalisation.

[44] Police members are not eligible for an income protection benefit, as the Police Service uses a sick leave bank arrangement for temporary incapacity.

Historical salaries at claim commencement are divided by the number of active claims in each development month[45] and these average salaries are then averaged again by incident month, resulting in an effective weighted average by claim activity, S_l for incident period *l*.

Historical payments are divided by the total salaries at claim commencement of active claims in each development month to produce benefit proportion values of the form:

$$BenProp_{l,t} = \frac{P_{l,t}}{S_{l,t}}$$

where

$P_{l,t}$ are the claim payments made in the period *t-1* to *t* for incident period *l,* deflated to remove the effects of CPI increases to benefits in payment at each July 1

$S_{l,t}$ are the total salaries in respect of active claims in the period *t-1* to *t* for incident period *l*

are derived from the historical experience. *BenProp* selections are then made for each development period.

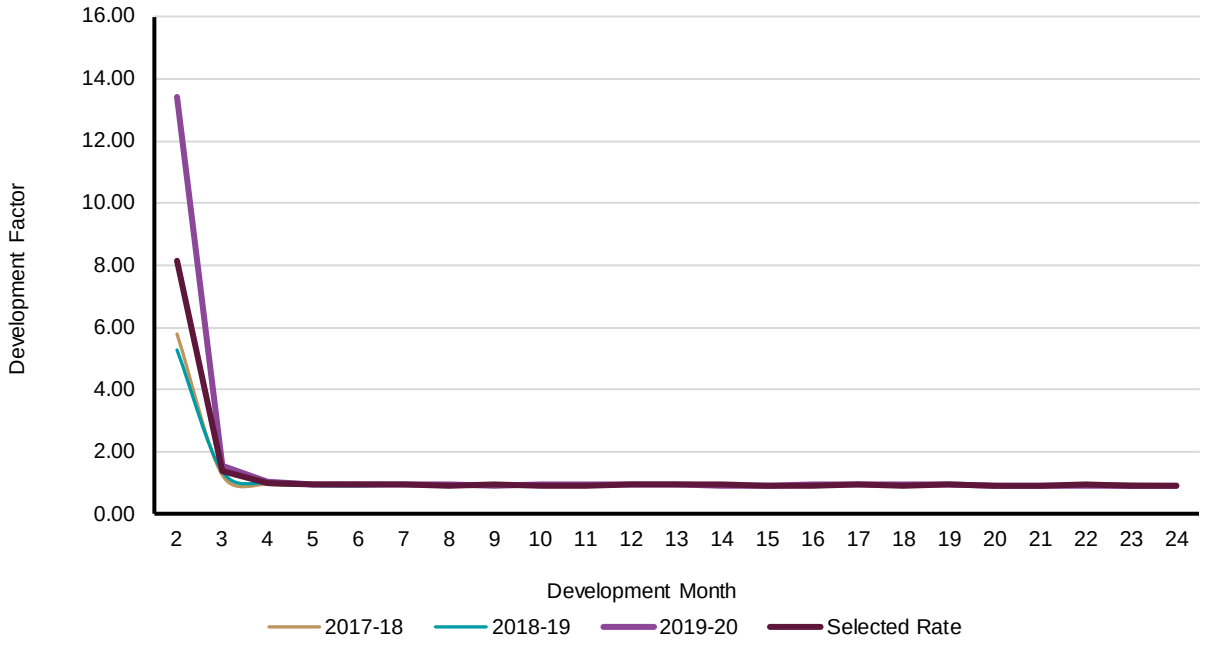
Future payments (current values) by incident period and development period are then projected by multiplying the *BenProp* selection for each development period by the average salary (S_l) for the incident period and by the projected number of future active claims. The future payments are then inflated to allow for the assumed level of CPI inflation and reduced to allow for the assumed level of recoveries to produce expected net benefit payments by incident period and development period. These projected payments are then discounted using the relevant assumption to give the estimated outstanding claims liability.

B.7.2 Claim Continuance Rates

The selected active claim number continuance rates against the experience of the last two payment years are shown in Figure 52. As noted above, continuance rates represent the proportion of claims at each development month expected to remain in force in the subsequent month. Rates have been smoothed for presentation purposes.

[45] Development month refers to the number of months since the incident date. For example, active claims between two and three months after the initial incident would be allocated to development month three.

Figure 52 Income Protection – Active Claim Continuance Rates by Payment Year



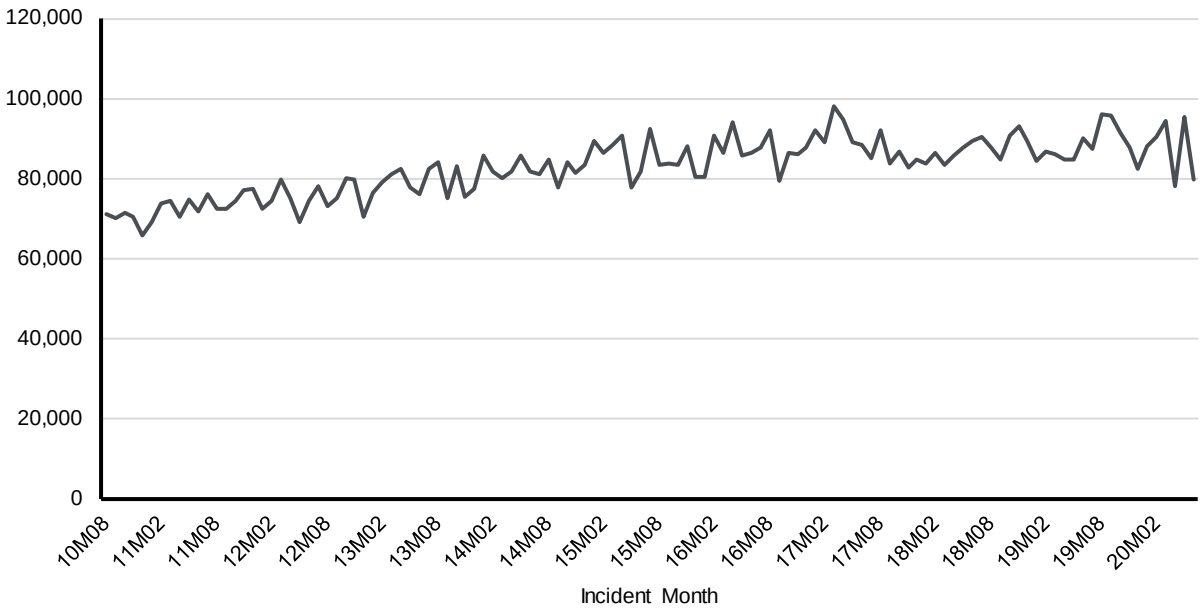
The active claim development above shows that after around 5 months, continuance rates become very stable at around 0.94 per month. Projected numbers of active claims in each future month may be derived for each month of incidence by applying the selected continuance rates to the numbers of active claims at the review date.

B.7.3 Average Salary per Active Claim

Salary is recorded at the commencement of a claim and does not change through the payment period. Consequently, any variation in the average as claims develop is due to changes in the mix of active claims. I did not observe any particular trend by development month, although the average salary rose by incident month, in line with general levels of salary growth. Consequently, average salary per active claim was modelled as an increasing function of incident month.

Figure 53 shows the average salaries at commencement for members receiving income protection benefits by incident month. These levels were used as the basis for the projection of benefit amounts in each future payment month.

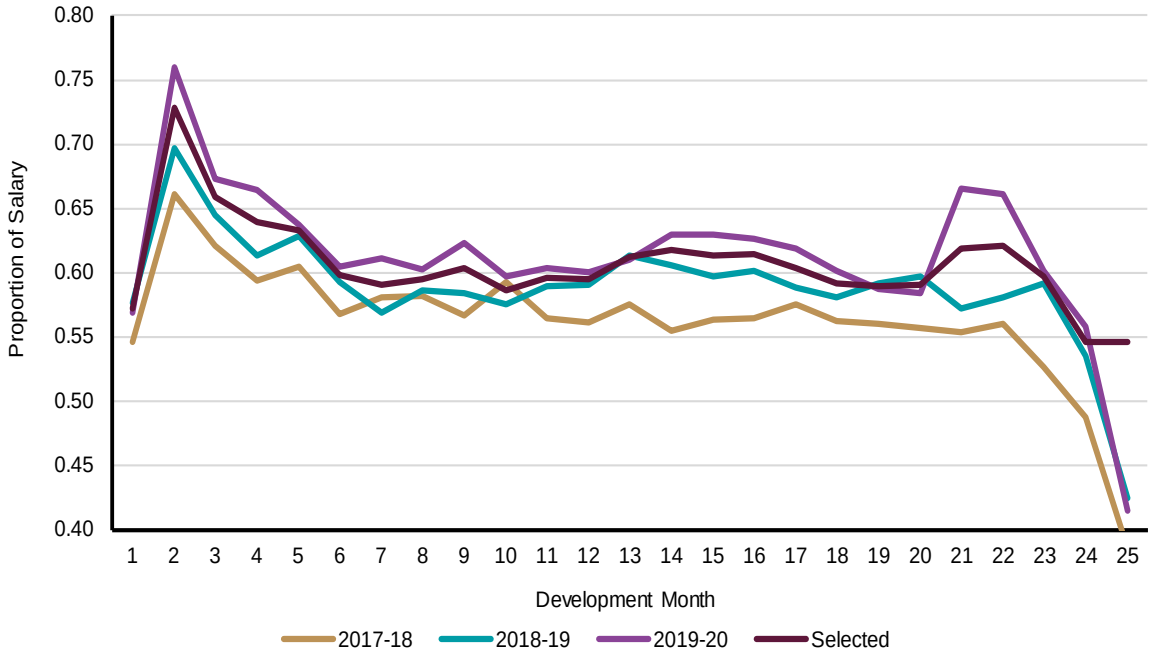
Figure 53 Average Active Claimant Salary by Incident Month



B.7.4 Benefit Percentage

The remaining factor from which to project future benefit payments is the benefit as a proportion of the assumed salary at commencement. This was derived by firstly removing the effects of inflation indexation on past benefit payments and then observing the relationship between these deflated benefit payments and the average salary of active claimants, as shown in Figure 54. The benefit percentage has a maximum of 75% of salary at commencement of claim but is usually lower on average, due to the increasing levels of rehabilitation programs, which reduce the benefit proportionately.

Figure 54 Average Benefit per Active Claim as Proportion of Average Salary



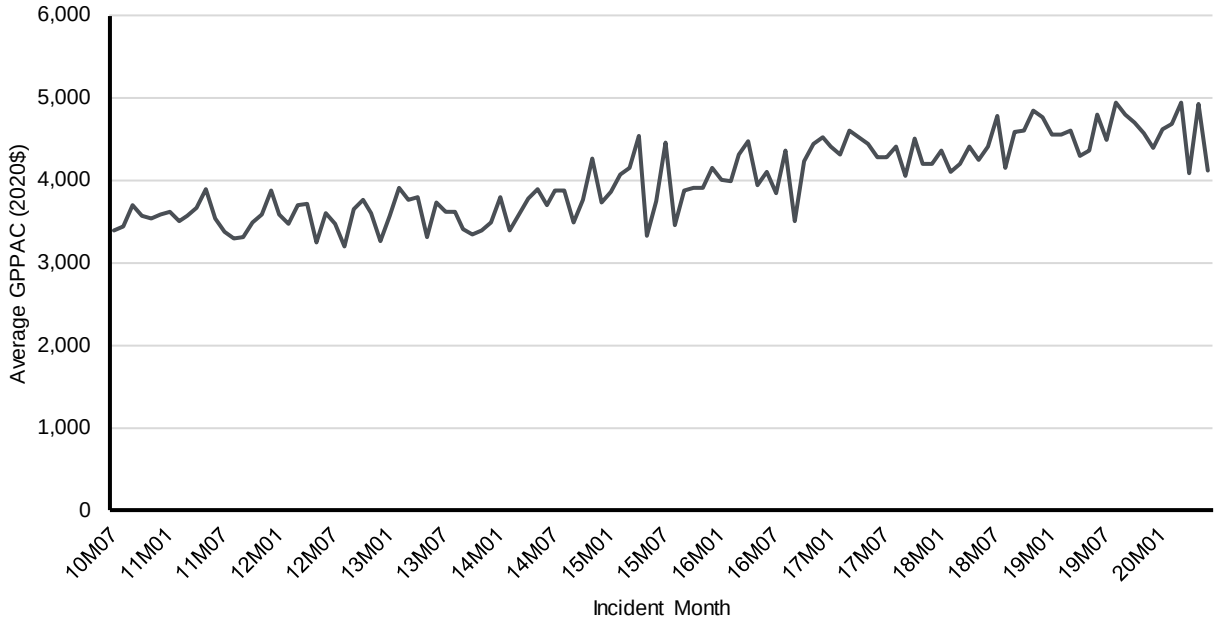
The benefit proportions have been reasonably stable over time and the averages over the most recent two year period have been chosen as the assumption going forward. The fall after around development month 22 reflects a limited number of claims and so I have substantially ignored that volatility in setting the assumption for later development months.

B.7.5 Gross Payments per Active Claim

Using the above selections, gross (of recoveries) payments per active claims (GPPAC) by incident and development month are then able to be projected, as shown in Figure 55.

The GPPACs are then applied to the active claim projections to produce gross real benefit payments and projected inflation as at each July 1 is then added to produce gross benefit payments by incident and development month.

Figure 55 Average Gross Payments per Active Claim (GPPAC) by Incident Month



B.7.6 Recoveries

Recoveries mostly relate to payments reclaimed from members where overpayments have occurred due to unreported changes in members' status. Previously, some recoveries were made in the event of WorkCover payments; however, changes in the administrative processes over time have reduced these overpayments substantially.

Recoveries in the future have explicitly been allowed for by basing the analysis on claim payments gross of recoveries and applying an assumed rate of recoveries to apply to future gross payments excluding contribution replacement. Table 62 shows recoveries as a proportion of gross payments for the last several payment years.

Table 62 Recoveries

Payment Year	Gross Claim Payments (excl Contribution Replacement) ($m)	Recoveries ($m)	Recoveries as a Proportion of Gross Claim Payments
2010-11	30.6	0.6	1.9%
2011-12	30.4	0.4	1.3%
2012-13	29.0	0.6	1.9%
2013-14	26.2	0.5	2.0%
2014-15	26.4	0.2	0.9%
2015-16	27.7	0.4	1.4%
2016-17	30.5	0.4	1.4%
2017-18	36.0	0.4	1.2%
2018-19	37.9	0.5	1.5%
2019-20	38.1	0.2	0.6%
6 Year Weighted Average (pa.)			**1.1%**
3 Year Weighted Average (pa.)			**1.1%**

The long term experience has shown that recoveries are around 1.5% of gross claim payments, with some volatility over time. Given the delay in recognition of some recoveries, I am hesitant to overemphasise the most recent lower experience, although the level of recoveries does appear to be lower than our previous assumption of 2.0% and so I have decided to reduce the assumption to 1.5%.

B.7.7 Outstanding Claim Payments

The actual and projected claim payments for income protection based on the PPAC model described above are shown in Table 63. The outstanding claims payments in Table 63 exclude contribution replacement benefits.

Table 63 Actual and Projected Income Protection Claims (excl Contribution Replacement)

Incident Year	Development Year Paid 1	2	3	4+	Total	PV of Outstanding Claims
2010-11	13.8	14.3	3.2	-	31.3	-
2011-12	11.9	12.7	2.4	-	27.1	-
2012-13	11.7	11.6	2.9	0.0	26.3	-
2013-14	10.4	10.9	2.4	0.0	23.8	-
2014-15	11.7	12.9	3.8	0.0	28.4	-
2015-16	11.1	13.7	4.5	0.1	29.4	-
2016-17	11.1	16.8	5.4	0.0	33.2	0.0
2017-18	12.7	16.7	5.8	0.0	35.2	0.2
2018-19	13.3	19.4	6.5	0.0	39.1	6.5
2019-20	10.6	13.3	4.1	0.0	28.0	17.1

The payments made after development year two relate to back payments for members where the claim approval process was lengthened due to pre-existing conditions, late claim lodgements or claims with broken benefit periods, i.e. go off claim and restart at a later period but related to the same incident (generally teachers around school holidays). Some development beyond the maximum two year benefit period has been allowed for as these “late” payments do occur although they are relatively small.

B.7.8 Number of Ultimate Claims

The ultimate numbers of Income Protection claims are required to calculate claim frequencies as part of the decomposition of the ultimate claims cost. These have been derived using the chain ladder projection method, as follows:

Development factors of the form:

$$M_{i,t} = \frac{C_{i,t}}{C_{i,t-1}}$$

where $C_{i,t}$ are the cumulative claim numbers at time t for incident period i

are derived from the historical experience. Development factor selections are then made for each development period. Projected cumulative claim numbers at the end of each development period are

then projected by applying the appropriate development factor. Incremental claim numbers can then be derived by taking the difference of successive cumulative values.

The incidence of claim numbers has also been considered in addition to the payments shown above. This will assist in the decomposition of overall claims cost into its constituent components as well as demonstrating the changes in underlying claim frequency over time, as shown in Table 64.

Table 64 Actual and Projected Income Protection Claim Numbers

Incident Year	Development Year Paid 0	1	2	3	4+	Ultimate	Claim Frequency
2010-11	956	69	4	-	-	1,029	1.52%
2011-12	900	63	-	-	-	963	1.54%
2012-13	823	31	4	-	-	858	1.53%
2013-14	722	41	-	-	-	763	1.52%
2014-15	726	39	1	2	-	768	1.65%
2015-16	662	32	1	1	-	696	1.59%
2016-17	663	35	2	-	-	700	1.70%
2017-18	672	45	1	1	-	719	1.86%
2018-19	705	37	2	1	-	745	2.05%
2019-20	466	30	1	1	-	497	1.47%

B.7.9 Components of Income Protection Cost

To understand the cost in more detail, the various components of the income protection benefit have been examined and these are shown in Table 65.

Table 65 Components of Income Protection Costs (incl Contribution Replacement Benefit)

Incident Year	Ultimate Claim Frequency	Salary Relativity^	Benefit as Proportion of Salary	Ultimate Claim Duration (weeks)	Overall Claim Cost (as % of salary)
2010-11	1.52%	0.88	63.8%	35.8	0.60%
2011-12	1.54%	0.89	62.3%	32.9	0.55%
2012-13	1.53%	0.89	63.3%	34.7	0.59%
2013-14	1.52%	0.89	63.1%	33.8	0.57%
2014-15	1.65%	0.91	65.2%	37.3	0.71%
2015-16	1.59%	0.90	64.2%	42.7	0.77%
2016-17	1.70%	0.90	62.4%	48.2	0.90%
2017-18	1.86%	0.88	64.2%	47.5	0.98%
2018-19	2.05%	0.86	66.3%	49.1	1.13%
2019-20	1.47%	0.86	59.5%	57.3	0.84%

^ This is the relativity of the average salary of claimants to that of all members covered for Income Protection benefits.

The claim cost for the 2019-20 incident year shown above may, for example, be decomposed as follows:

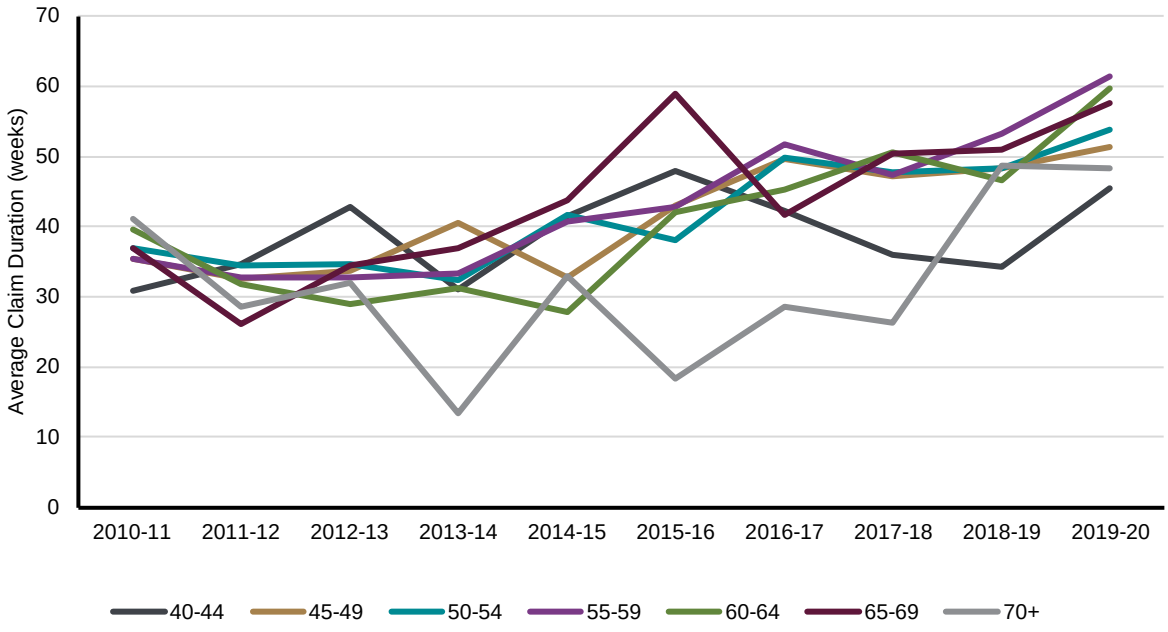
$$0.84\% = 1.47\% \times 0.86 \times 59.5\% \times (57.3/52.18) \times (1+CRB) \times \text{PV Factor}$$

where *CRB* is the Contribution Replacement Benefit loading of 0.067 i.e. 5%/75%; and

PV Factor is the factor to discount the benefits to the average date of the premium receipt and is approximately 95.7% for 2019-20. Periods during which benefits are suspended (e.g. school holidays for teachers) have been excluded in the calculations of claims duration.

Table 65 shows that the main driver of the increase in claims costs has been a combination of increasing claim duration and claim frequency, with salary relativity and rehabilitation rates (which directly impact the benefit proportion) reasonably stable. Whilst it is not surprising that claim frequency should rise over time in line with the increasing average age of the remaining membership, the increase in claim duration is curious. The average claim durations over time for each age group represented in every year are shown in Figure 56, which demonstrates that, whilst there is some volatility within each age group, there has been a general rising trend across all age groups since around 2014-15. The reasons underlying this trend have not been examined in detail but the trend may reflect increasingly serious conditions amongst the remaining members or potentially lower claim administration intensity of the Defined Benefit Category claims.

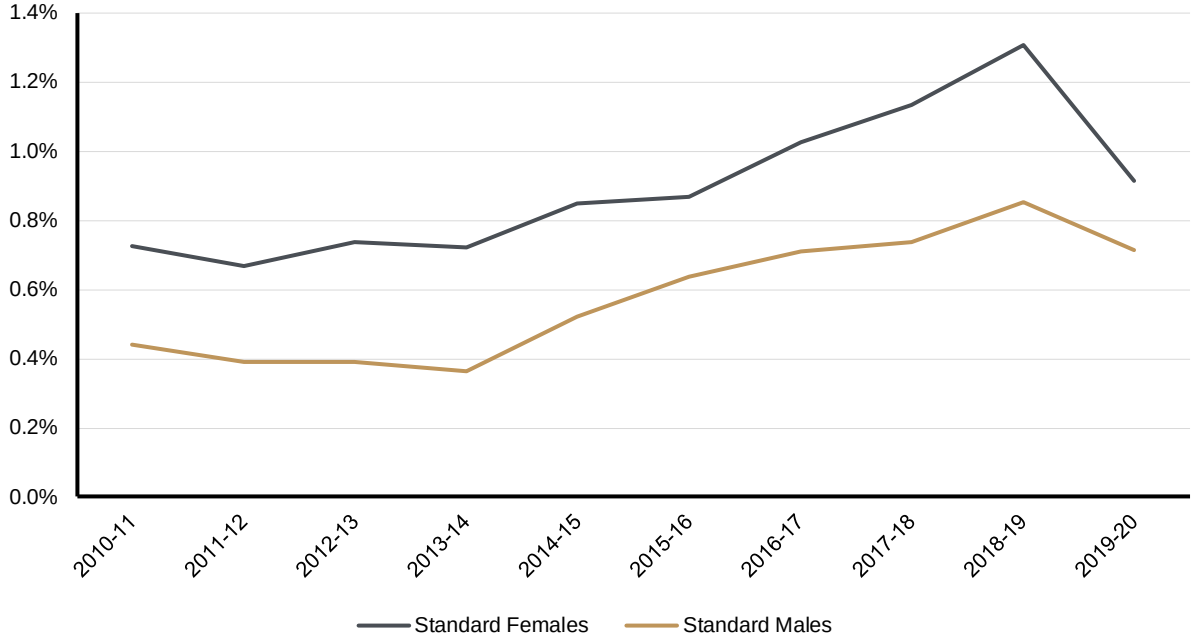
Figure 56 Income Protection Claim Durations Over Time by Age Group



B.7.10 Gender Specific Rates

As noted above, the incurred cost of the income protection benefit has been assessed separately for Standard Males and Females, as they exhibit materially different costs. Whilst the analysis shown above has been aggregated for simplicity, the claims costs for the last several years for each gender are shown in Figure 57.

Figure 57 Cost of Standard Defined Benefit Category Income Protection Benefit



Given that the insured population has been ageing over time and the increases observed within the broader group life market over recent years, the increases in overall claims costs for both genders is not surprising. As has been observed in past Reviews, Standard Females have significantly higher claim costs than Standard Males. We have followed up the apparent anomalous cost (driven by a drop in claim frequency) observed in 2019-20 with QSL and have confirmed that the underlying claims data and our processing of it is correct. The drop may be partially caused by the effects of Covid-related lockdowns on both underlying claim propensity and administration in the latter part of 2019-20 although it is obviously difficult to be definitive. In any event, we have not been overly influenced by the 2019-20 experience in determining our assumption going forward.

Analysis of the claims for the current investigation period showed that whilst costs increase in line with age, the rate of increase is significantly less than expected for salary continuance benefits offered in the wider market. As discussed in previous Reviews, this is due to the likely correlation between the level of sick leave accrued and the member's age. Given the cross subsidisation that occurs in a defined benefit scheme and the relative stability of the costs versus age, the complexity of having the costs vary by age does not seem warranted.

The cost of the Income Protection benefit over the investigation period, including an allowance for the cost of foregone member contributions whilst in payment, was 0.77% of salaries for Standard Males and 1.12% of salaries for females. This compares with the assumed rates at the last Review of 0.60% and 0.90% respectively.

In light of the trends illustrated in Figure 57 and analysis described above, it has been decided to increase the allowance for the cost of the income protection benefit to 1.00% for Standard Males and 1.50% for Standard Females.

It should be noted that Police members of the Standard Defined Benefit Category and members of the Police Category do not have access to the income protection benefit.

At the previous Review it was assumed that the cost of the income protection benefit paid to members of the State Category would be 1.30% of salaries. There are comparatively few income protection claims for the State Category due its relatively small and declining membership. Furthermore, the impact on overall QSuper liabilities is trivial and a detailed analysis was therefore not undertaken. I have used a simple chain ladder method to determine the ultimate claims cost, as shown in Table 66.

Table 66 Estimated Cost of State Category Income Protection Benefit

Incident Year	Development Year Paid 1	2	3	4+	Total	Ultimate Net Claims	Salary Exposure	Net Income Protection Cost
2010-11	0.1	0.1	0.0	-	0.1	0.1	51.9	0.3%
2011-12	0.2	0.2	0.1	0.1	0.6	0.6	50.2	1.2%
2012-13	0.0	0.1	0.0	0.0	0.1	0.1	45.8	0.3%
2013-14	0.1	0.0	0.0	0.0	0.2	0.2	40.8	0.4%
2014-15	0.2	0.2	0.2	0.1	0.7	0.6	37.7	1.7%
2015-16	0.0	0.0	0.0	0.0	0.1	0.1	35.8	0.3%
2016-17	0.1	0.1	0.0	0.0	0.3	0.3	34.1	0.8%
2017-18	0.2	0.2	0.2	0.1	0.7	0.6	31.9	2.0%
2018-19	0.1	0.1	0.1	0.0	0.3	0.3	29.8	0.9%
2019-20	0.1	0.1	0.1	0.1	0.4	0.4	27.9	1.4%

The average cost of the income protection benefit has been relatively volatile, which is unsurprising given the small and declining number of remaining contributing members. Whilst costs would be expected to generally rise with the ageing of the membership, there is little evidence of any trends and noting the impact of this assumption on the overall actuarial balance sheet, I have decided to retain the previous assumption of 1.30%.

B.8 Death/TPD Outstanding Claims

In a similar manner to Income Protection benefits, death and TPD claims can have significant delays between their occurrence, reporting to QSuper and eventual payment. These delays are more prevalent for TPD claims as it can take some time for the validity of the claim to be determined and subsequently paid. It has taken considerable time for QSuper to be able to compile the historical data from which to calibrate these delays and consequently allow us to include an estimate of outstanding claims at the reporting date. This section describes the models used to determine that liability.

We were provided with historical death and TPD benefit payment data with various dates (event, report, payment etc) and payment amounts, including TPD exits where the member selected the pension benefit (see Section A.1.7). Due to various system changes over the years, the incident date had to be estimated and it was difficult to extract the amounts payable from the Defined Benefit Category only. We have not been able to independently verify the information provided but believe that it will provide a materially reasonable estimate, at least within the context of the actuarial balance sheets displayed in Section 6. We have been cognisant of that materiality and the data issues when selecting our model for claim development below.

Similar to the numbers of Income Protection claims in Section B.7.8, we have utilised a chain ladder model to estimate the ultimate claims cost and therefore the outstanding claim liabilities for death and TPD separately.

Development factors of the form:

$$DF_{i,t} = \frac{CP_{i,t}}{CP_{i,t-1}}$$

where $CP_{i,t}$ are the cumulative claim payments at time (year) *t* for incident period *i*

are derived from the historical experience. Development factor selections are then made for each development period. Projected cumulative claim payments at the end of each development period are then projected by applying the appropriate development factor. Incremental payment amounts can then be derived by taking the difference of successive cumulative values.

Pensions are capitalised using the factors derived to value pensions in payment in this Review (see Section B.6). Consideration was given to using the prevailing pension factors at the time of payment however the additional complexity was not deemed justified.

The development factors observed and selected for death and TPD are shown in Figure 58 and Figure 59 below. As can be clearly observed from these development factors, payments are finalised reasonably quickly for death benefits whilst TPD benefits can take many years before an incident year is finalised.

Figure 58 Cumulative Payment Development Factors - Death

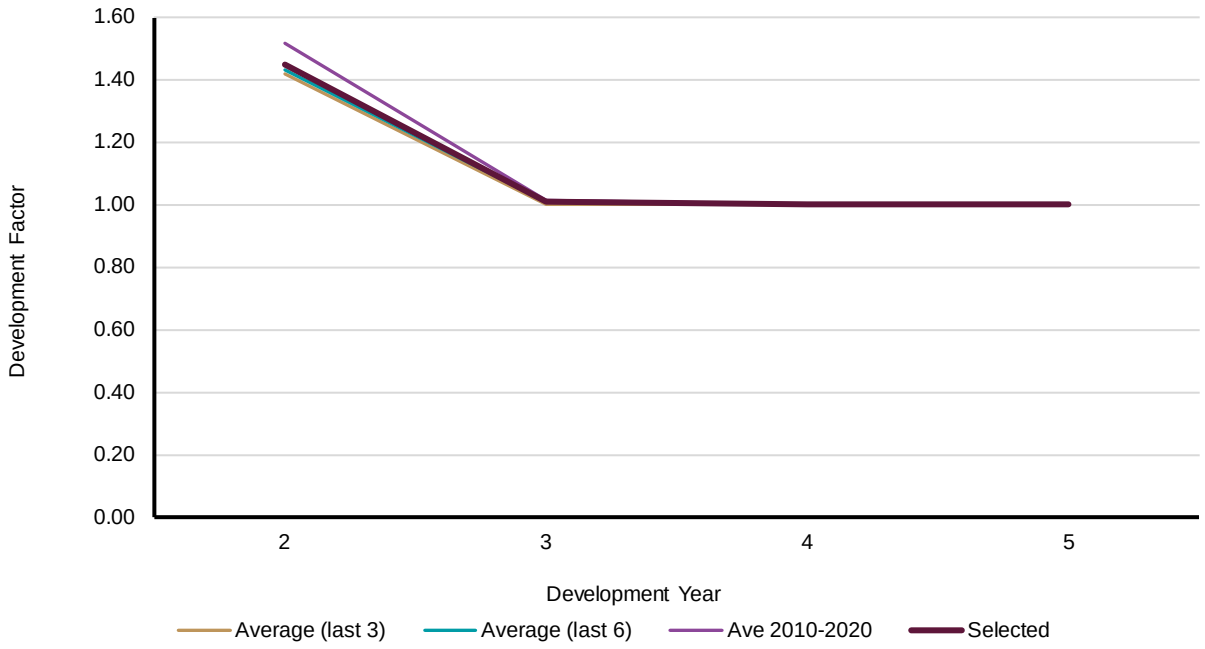
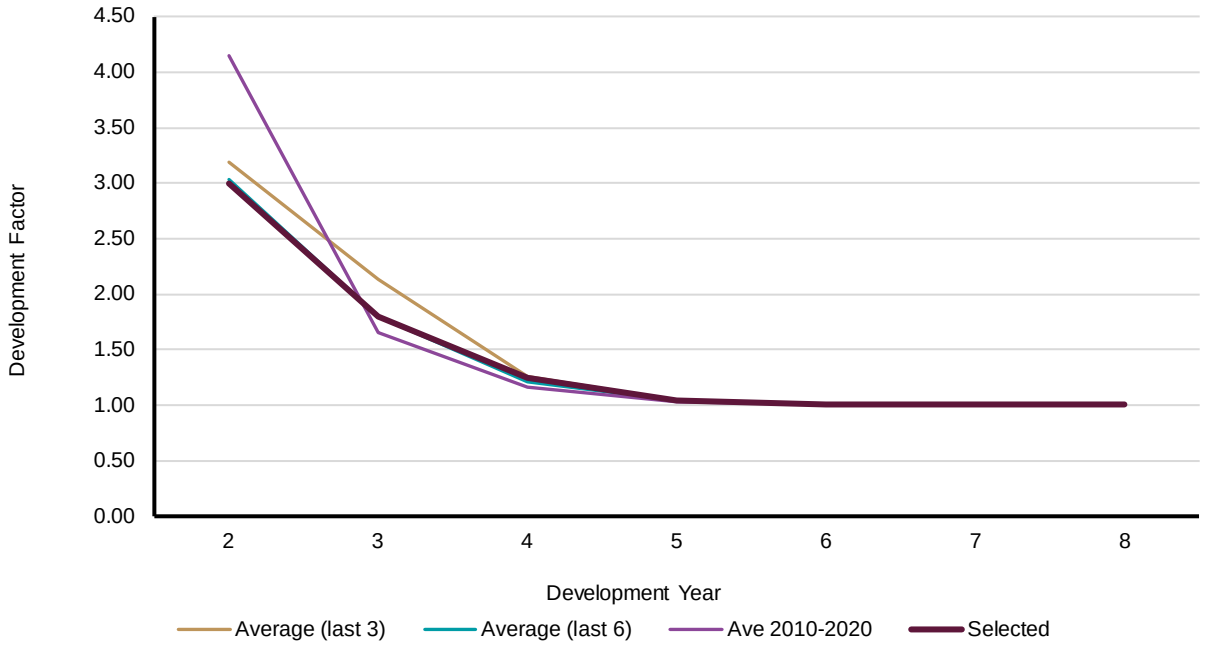


Figure 59 Cumulative Payment Development Factors - TPD



The application of these development factors to the cumulative payments made to date for each incident year then yields the projected payments for death and TPD benefits shown in Table 67 and Table 68 below.

Table 67 Actual and Projected Benefit Payments by Incident Year and Development Year - Death

Incident Year	Development Year Paid				Total	PV of Outstanding Claims
	1	2	3	4+		
2010-11	13.0	13.7	0.9	-	27.6	-
2011-12	8.8	6.2	0.6	-	15.5	-
2012-13	21.6	5.6	-	-	27.2	-
2013-14	10.7	6.6	1.2	-	18.5	-
2014-15	13.1	5.2	-	-	18.3	-
2015-16	18.0	5.6	-	-	23.5	-
2016-17	20.4	6.0	-	-	26.4	-
2017-18	15.6	6.4	-	-	22.0	-
2018-19	16.3	9.1	0.3	-	25.6	0.2
2019-20	23.4	10.5	0.3	-	34.2	10.7
Total	160.7	74.8	3.4	-	238.9	10.9

Table 68 Actual and Projected Benefit Payments by Incident Year and Development Year - TPD

Incident Year	Development Year Paid 1	2	3	4+	Total	PV of Outstanding Claims
2010-11	5.7	24.9	23.6	13.9	68.0	-
2011-12	4.9	29.2	23.6	10.6	68.3	-
2012-13	18.3	28.4	23.2	18.7	88.5	-
2013-14	9.7	24.7	16.5	9.9	60.8	0.1
2014-15	9.8	18.1	12.2	13.5	53.6	0.2
2015-16	7.8	9.9	19.8	11.8	49.4	0.6
2016-17	4.1	11.1	19.6	12.0	46.9	2.3
2017-18	8.6	13.0	21.3	13.6	56.5	13.2
2018-19	8.1	19.5	22.1	15.8	65.5	36.6
2019-20	7.9	15.8	18.9	13.5	56.0	45.7
Total	85.1	194.5	200.8	133.3	613.6	98.7

The present values of these outstanding claim payments have been obtained by discounting using the rates for each actuarial basis discussed in Section B.2. Noting the materiality of the liability and the data issues described above, I have decided to round the implied outstanding claims liabilities to the nearest $10 million, as shown in Table 69.

Table 69 Outstanding Death and TPD Liabilities as at 30 June 2020 ($ million)

	Basis: Funding	AASB 119
Death	10	10
TPD	100	100
Total	110	110

Again on the grounds of materiality, I have used the liabilities relating to the experience review period as reasonable estimates of those applying as at the valuation date, as shown in Table 13, Table 14 and Table 15.

It will also be noted that the liabilities displayed in the actuarial balance sheets in Section 6 labelled “Other Former Members” includes a component related to “Leaver Unpaids”. These represent members provided with the Contributor data (see Section 3.1) who have left the scheme, but their benefits have not been paid as at the review date. As the type of exit is not yet known, we have previously reserved for these members on the assumption that they receive their vested entitlement. As we are now able to directly estimate the outstanding death and TPD benefit payment liabilities, we have reduced the liabilities in respect of Leaver Unpaids by 8% to reflect the likelihood that a proportion of them will eventually be classified as death or TPD payments; i.e. to avoid a double counting of these liabilities. We calibrated this adjustment by considering the past experience, shown in Table 70.

Table 70 Proportion of Leaver Unpaid Vested Benefit that Eventually Emerges as Death/TPD Benefits

	2014-15	2015-16	2016-17	2017-18	2018-19
Leaver Unpaids Total Vested Benefits	97,797	99,946	71,164	59,633	105,458
Vested Benefits of those Eventually Death/TPD	8,075	7,144	7,074	6,163	5,957
Proportion	8.3%	7.1%	9.9%	10.3%	5.6%

B.9 Expenses

I have continued the practice of the previous Review in which administration expenses have been analysed separately for pensions and other benefits, with non-pension expenses expressed relative to defined benefit payments and pension, death/TPD and income protection expenses relative to the corresponding benefit payments. This is the first Review where we have separately estimated death/TPD administration expenses as we have finally been able to obtain the necessary historical data from which to calibrate outstanding death/TPD claim liabilities (see Section B.8).

As noted in my previous Review, QSuper have undertaken a detailed review of their internal cost attribution methodology and are now providing direct estimates of the expenses allocated to the Defined Benefit Categories, as shown in Table 72.

Table 71 QSuper Administration Expenses Attributed to Defined Benefit Categories

($'000)

Year Ending 30 June	Income Protection	Death/TPD Payments	Pension Payments	Other Administration Expenses
2018	2,996	2,389	3,465	56,806
2019	3,469	3,225	2,985	45,957
2020	4,206	4,683	2,942	43,387

These costs were then compared with the annual benefit payments of the relevant types to observe their relativity, as shown in Table 72. Based on the trends observed and the previous assumptions, I have selected prospective ratios to apply to projected benefit payments in order to estimate future administration expenses, as shown in Table 73.

Table 72 Observed Administration Expense Ratios by Benefit Type

Year Ending 30 June	Non-pension Administration Expenses as Proportion of Annual Benefit Payments	Pension Administration Expenses as Proportion of Annual Pension Payments	Income Protection Administration Expenses as Proportion of Annual Income Protection Benefits	Death/TPD Administration Expenses as Proportion of Annual Death/TPD Benefits
2018	4.0%	3.8%	8.6%	3.0%
2019	2.8%	3.2%	9.6%	4.2%
2020	2.6%	3.1%	11.4%	5.0%

Table 73 Selected Administration Expense Ratios by Benefit Type

	Selected Ratio
Non-pension Administration Expenses as Proportion of Annual Benefit Payments	3.00%
Pension Administration Expenses as Proportion of Annual Pension Payments	3.50%
Income Protection Administration Expenses as Proportion of Annual Income Protection Benefits	10.00%
Lump Sum Administration Expenses as Proportion of Annual Death/TI/TPD Benefits	5.00%

Appendix C Investigation Assumptions

C.1 Financial Assumptions

C.1.1 Investment Returns

The assumed long term earning rate on the fund's assets after tax and investment expenses is 4.50% p.a., which is used to discount expected future cash flows in the funding basis.

For consistency with the Budget framework, within which funding decisions are to be considered (see Section 5.2), the asset projections utilised in Sections 6.6, 8.1.3 and 8.4 are based on the Budget assumption of 6.5% p.a..

C.1.2 Salary Growth

Long term salary growth due to inflation and changes in Average Weekly Ordinary Time Earnings are assumed to be at the rate of 3.1% p.a.

Salary growth due to promotion is assumed to be in accordance with the salary scale set out in the service tables (Table 79, Table 80 and Table 81).

C.1.3 Inflation

This assumption is relevant for the purpose of valuing pensions that are increased in line with changes in the CPI. Pensions in payment have been assumed to increase at the rate of 2.1% p.a.

C.1.4 Financial Assumptions Underlying Accounting Basis

The responsibility for selection of the key assumptions underlying employee entitlement liabilities under AASB 119 rests with the reporting entity. The assumptions chosen by the Government, based on my advice, necessary to derive figures in accordance with AASB 119 as at 30 June 2021 were as follows:

- The gross discount rate for all the Government's employee entitlement schemes is the annually convertible yield of a notional duration matched Commonwealth Government nominal bond at the relevant date. As at 30 June 2021, this was 1.5%.
- A net discount rate of 1.4% was used to determine the non-pension defined benefit obligations of QSuper as at 30 June 2021. This produced substantially the same total obligation as an explicit allowance for investment tax when added onto the liability valued at the gross discount rate.
- The level of price inflation was 2.1%.
- The level of salary inflation for QSuper was an amount 1.0% p.a. above the level of the price inflation assumption. As at 30 June 2021, this was 3.1%.

In summary, the financial assumptions are shown in Table 74.

Table 74 Summary of Financial Assumptions

	Basis	
	Funding	Accounting
Discount Rate	4.50%	1.40%
Salary Inflation	3.10%	3.10%
Price (CPI) Inflation	2.10%	2.10%
	2021-22	2022-23+
Net Investment Return (Asset Projections)	6.50%	6.50%

C.2 Demographic Assumptions

C.2.1 Active Members

The decrement rates used for the Defined Benefit Category are based on the scheme's own experience and are illustrated in the service tables (Table 79, Table 80 and Table 81). The decrement rates for the State, Police and Parliamentary Categories are based on these rates where appropriate.

It is assumed that 4.0% of resigning Defined Benefit Category members choose the investment linked option (ILO). Subsequent conversions to an ILO and early payment on death and total and permanent disablement were not explicitly modelled, although a loading was estimated to allow for the implicit insurance provided and the ILO option. In practice, the loading was found to be negligible and so no further adjustment was made.

The assumption as to the probability of leaving at future elections for the Parliamentary Category is shown in Table 75.

Table 75 Parliamentary Category – Proportion Assumed to Leave at Future Elections

Years of Service at Election	Probability of Exit at Election
0-11	n/a
11+	50%

C.2.2 Deferred Members

The decrement rates used for the Deferred Retirement Benefit Category are based on the scheme's own experience and are illustrated in Table 82.

C.2.3 Pensioners

The base mortality rates for all Defined Benefit, State, Police and Parliamentary Category pensioners are those of Queensland Life Tables 2017-19 (Males or Females, as appropriate) with age ratings varying by the type of pension as shown in Table 76.

Table 76 Mortality Age Ratings

Type of Pension	Males	Females
Age Retirement	- 2 years	- 2 years
Ill-Health Retirement	+ 4 years	+ 4 years
Spouse	- 2 years	- 2 years

Mortality improvement has been incorporated in the value of pensions consistent with the last 25 years of population mortality experience in the Australian Life Tables 2015-17, as shown in Table 77.

Table 77 Mortality Improvement Rates

	Annual Percentage Improvement in Mortality	
Age	Male	Female
20	3.13	2.65
25	2.83	2.41
30	2.12	1.60
35	1.42	0.82
40	0.96	0.77
45	0.97	1.01
50	1.48	1.41
55	2.05	1.80
60	2.55	2.16
65	2.97	2.43
70	2.99	2.40
75	2.77	2.33
80	2.35	2.03
85	1.61	1.45
90	0.89	0.80
95	0.52	0.34

It has also been assumed that males are three years older than their spouses and that all pensioners are married. Regarding the option to select or commute pension benefits, the following has been assumed:

- Defined Benefit Category – 50% of total and permanent disablement exits will take the pension
- State Categories – 50% of age retirees, 80% of ill-health retirees and 50% of pensioner spouses will take the pension
- Police Categories – 50% of age retirees, ill-health retirees and pensioner spouses will take the pension
- Parliamentary Category – 75% of eligible members and 100% of eligible spouses will take the pension

C.3 Child and Orphan Benefits

Child and orphan benefits have been allowed for by increasing the costs of lump sum death benefits by 2.0%.

C.4 Expenses

It has been assumed that administration expenses for various classes of benefits are as shown in

Table 78 Administration Expenses

	Selected Ratio
Non-pension Administration Expenses as Proportion of Annual Benefit Payments	3.00%
Pension Administration Expenses as Proportion of Annual Pension Payments	3.50%
Income Protection Administration Expenses as Proportion of Annual Income Protection Benefits	10.00%
Lump Sum Administration Expenses as Proportion of Annual Death/TI/TPD Benefits	5.00%

C.5 Income Protection Benefit

The income protection benefit is expected to cost 1.00% of salaries for Standard Males and 1.50% of salaries for Standard Females in the Defined Benefit Category. The income protection benefit is assumed to cost 1.30% of salaries for members of the State Category. There is no income protection benefit for Police Category members or Police members of the Defined Benefit Category.

C.6 Member Contribution Rates

It was assumed that average member contribution rates for the active members at the investigation date would be maintained in the future.

C.7 Superannuation Guarantee

It was assumed that additional payments resulting from the application of the minimum requisite benefit test specified in the Superannuation Guarantee Certificate would be approximately 0.15% of Defined Benefit Category benefit payments.

C.8 Service and Decrement Tables

Table 79 Service Table – Standard Male Members

		Number leaving within one year of attaining age x as a result of					
Age x	Number Attaining Age x	Retrenchment/ Age Retirement	Death	TPD	Resignation/ Transfer to Accumulation	Salary Scale	Family Law/ TtR Rate
16	100,000	0	4	0	4,726		0.0000
17	95,270	0	4	0	4,122		0.0000
18	91,144	0	5	0	3,651		0.0000
19	87,489	0	4	0	3,274		0.0000
20	84,210	0	5	1	2,966		0.0000
21	81,238	0	5	1	2,717		0.0000
22	78,516	53	5	2	2,512		0.0000
23	75,944	155	6	2	2,322		0.0000
24	73,459	235	6	3	2,168		0.0000
25	71,047	298	7	3	2,026		0.0000
26	68,712	346	7	4	1,891		0.0001
27	66,464	381	8	5	1,772		0.0001
28	64,298	405	8	7	1,644		0.0001
29	62,233	420	9	8	1,514		0.0002
30	60,281	428	9	9	1,394		0.0002
31	58,440	430	10	12	1,286		0.0002
32	56,702	427	11	13	1,188		0.0003
33	55,063	421	12	15	1,083	100	0.0004
34	53,532	413	13	17	989	102	0.0004
35	52,099	404	14	20	910	104	0.0005
36	50,751	393	15	23	851	107	0.0006
37	49,470	384	16	25	795	109	0.0006
38	48,251	374	17	28	746	111	0.0007
39	47,086	366	18	31	701	113	0.0008
40	45,971	360	19	34	662	115	0.0009
41	44,897	356	20	37	628	117	0.0009
42	43,856	354	22	40	593	119	0.0010
43	42,848	356	23	43	560	121	0.0010
44	41,865	361	24	46	534	123	0.0011
45	40,900	370	26	50	506	125	0.0011
46	39,949	382	28	53	482	127	0.0011
47	39,004	399	29	56	460	128	0.0011
48	38,060	420	31	59	439	130	0.0011
49	37,111	445	33	62	419	131	0.0010
50	36,152	474	35	65	399	132	0.0010
51	35,179	507	37	68	381	133	0.0010
52	34,186	544	38	71	364	134	0.0009
53	33,169	585	40	74	347	135	0.0009
54	32,123	628	42	76	331	136	0.0009
55	31,046	930	44	78	0	137	0.0008
56	29,995	1,197	45	79	0	137	0.0025
57	28,673	1,431	46	80	0	137	0.0025
58	27,117	1,623	47	79	0	138	0.0025
59	25,368	1,898	47	78	0	138	0.0025
60	23,346	3,265	44	0	0	138	0.0025
61	20,036	2,402	41	0	0	138	0.0100
62	17,593	2,284	39	0	0	138	0.0100
63	15,270	2,135	36	0	0	138	0.0100
64	13,099	2,616	32	0	0	138	0.0100
65	10,451	2,505	26	0	0	138	0.0100
66	7,920	1,740	22	0	0	138	0.0313
67	6,158	1,229	18	0	0	138	0.0313
68	4,910	980	16	0	0	138	0.0313
69	3,914	860	13	0	0	138	0.0000
70	3,042	3,042	0	0	0	138	0.0000

Table 80 Service Table – Standard Female Members

		Number leaving within one year of attaining age x as a result of					
Age x	Number Attaining Age x	Retrenchment/ Age Retirement	Death	TPD	Resignation/ Transfer to Accumulation	Salary Scale	Family Law/ TtR Rate
16	100,000	0	2	0	16,636		0.0000
17	83,362	0	2	0	11,286		0.0000
18	72,074	0	1	1	8,116		0.0000
19	63,956	0	2	1	6,111		0.0000
20	57,843	0	2	0	4,769		0.0000
21	53,072	0	2	1	3,830		0.0000
22	49,239	0	2	1	3,164		0.0000
23	46,072	39	2	2	2,665		0.0000
24	43,364	72	2	2	2,287		0.0000
25	41,000	97	2	3	1,988		0.0000
26	38,911	115	2	3	1,747		0.0001
27	37,043	129	2	4	1,544		0.0001
28	35,364	138	2	5	1,358		0.0001
29	33,860	144	3	6	1,195		0.0002
30	32,513	147	3	7	1,044		0.0002
31	31,312	149	3	8	922		0.0002
32	30,230	149	3	9	822		0.0003
33	29,247	147	3	10	727	100	0.0004
34	28,360	145	4	11	648	102	0.0004
35	27,553	142	4	13	585	103	0.0005
36	26,809	138	4	14	538	104	0.0006
37	26,114	135	4	16	495	105	0.0006
38	25,464	132	5	17	457	107	0.0007
39	24,854	129	5	19	424	108	0.0008
40	24,277	126	6	20	395	109	0.0009
41	23,731	123	6	22	368	110	0.0009
42	23,211	122	6	23	344	111	0.0010
43	22,716	121	7	25	326	112	0.0010
44	22,237	121	7	27	308	113	0.0011
45	21,774	122	8	28	289	114	0.0011
46	21,326	125	8	30	273	115	0.0011
47	20,890	128	9	32	260	116	0.0011
48	20,461	133	9	34	246	117	0.0011
49	20,039	140	10	35	234	118	0.0010
50	19,620	147	11	37	222	119	0.0010
51	19,204	156	11	38	212	120	0.0010
52	18,786	167	12	40	201	120	0.0009
53	18,366	179	13	41	192	121	0.0009
54	17,942	192	13	43	184	122	0.0009
55	17,510	524	14	44	0	122	0.0008
56	16,928	676	15	44	0	123	0.0025
57	16,193	808	15	45	0	123	0.0025
58	15,325	918	15	44	0	124	0.0025
59	14,348	934	15	43	0	124	0.0025
60	13,356	1,869	15	0	0	125	0.0025
61	11,472	1,261	14	0	0	125	0.0100
62	10,197	1,121	13	0	0	125	0.0100
63	9,063	1,177	13	0	0	125	0.0100
64	7,873	1,259	11	0	0	125	0.0100
65	6,603	1,385	10	0	0	125	0.0100
66	5,207	988	9	0	0	125	0.0313
67	4,211	799	7	0	0	125	0.0313
68	3,404	612	7	0	0	125	0.0313
69	2,785	529	6	0	0	125	0.0000
70	2,251	2,251	0	0	0	125	0.0000

Table 81 Service Table – Police Members

		Number leaving within one year of attaining age x as a result of					
Age x	Number Attaining Age x	Retrenchment/ Age Retirement	Death	TPD	Resignation/ Transfer to Accumulation	Salary Scale	Family Law/ TtR Rate
16	100,000	0	0	28	279		0.0000
17	99,689	0	0	28	287		0.0000
18	99,377	0	0	28	295		0.0000
19	99,054	0	0	28	303		0.0000
20	98,723	0	0	32	323		0.0000
21	98,368	0	0	32	343		0.0000
22	97,993	0	0	36	351		0.0000
23	97,606	0	0	36	391		0.0000
24	97,175	0	0	40	451		0.0000
25	96,684	0	0	40	539		0.0000
26	96,101	0	0	48	662		0.0001
27	95,395	0	0	48	782		0.0001
28	94,565	0	0	52	910		0.0001
29	93,603	0	4	56	1,018		0.0002
30	92,525	0	4	60	1,109		0.0002
31	91,352	0	8	68	1,173		0.0002
32	90,099	0	8	76	1,209		0.0003
33	88,806	0	8	84	1,205	100	0.0004
34	87,505	0	12	96	1,205	102	0.0004
35	86,196	0	12	108	1,177	103	0.0005
36	84,899	0	16	116	1,093	105	0.0006
37	83,674	0	16	120	1,030	106	0.0006
38	82,505	0	20	128	970	108	0.0007
39	81,387	4	20	140	934	110	0.0008
40	80,290	4	24	148	898	111	0.0009
41	79,216	8	24	160	862	112	0.0009
42	78,159	16	28	168	818	114	0.0010
43	77,133	24	28	184	774	115	0.0010
44	76,123	36	32	196	718	117	0.0011
45	75,142	56	32	208	658	118	0.0011
46	74,184	84	36	223	611	119	0.0011
47	73,234	124	36	239	559	120	0.0011
48	72,276	176	40	255	511	122	0.0011
49	71,295	251	44	271	475	123	0.0010
50	70,253	351	44	287	443	124	0.0010
51	69,128	483	48	303	399	125	0.0010
52	67,894	658	48	319	355	126	0.0009
53	66,514	878	52	335	315	127	0.0009
54	64,933	1,157	52	347	291	128	0.0009
55	63,082	1,257	52	363	0	129	0.0008
56	61,410	3,061	56	371	0	130	0.0025
57	57,926	4,502	52	367	0	131	0.0025
58	53,009	5,807	52	351	0	131	0.0025
59	46,799	6,525	48	323	0	132	0.0025
60	39,907	39,907	0	0	0	133	0.0025

Table 82 Decrement Table – DRB Members

	Rate of leaving as a result of		
Age	Death	TPD	Transfer to Accumulation
21	0.0001	0.0000	0.0150
22	0.0001	0.0000	0.0150
23	0.0001	0.0000	0.0150
24	0.0002	0.0000	0.0150
25	0.0002	0.0000	0.0150
26	0.0002	0.0000	0.0150
27	0.0002	0.0000	0.0150
28	0.0003	0.0000	0.0150
29	0.0003	0.0001	0.0150
30	0.0003	0.0001	0.0150
31	0.0003	0.0001	0.0150
32	0.0003	0.0001	0.0150
33	0.0003	0.0001	0.0150
34	0.0003	0.0002	0.0150
35	0.0004	0.0002	0.0150
36	0.0004	0.0002	0.0150
37	0.0004	0.0002	0.0150
38	0.0004	0.0003	0.0150
39	0.0005	0.0003	0.0150
40	0.0005	0.0004	0.0150
41	0.0005	0.0004	0.0150
42	0.0005	0.0005	0.0150
43	0.0006	0.0006	0.0150
44	0.0006	0.0007	0.0150
45	0.0007	0.0008	0.0150
46	0.0007	0.0009	0.0150
47	0.0008	0.0010	0.0150
48	0.0009	0.0012	0.0150
49	0.0009	0.0014	0.0150
50	0.0010	0.0016	0.0150
51	0.0011	0.0018	0.0150
52	0.0013	0.0020	0.0150
53	0.0014	0.0023	0.0150
54	0.0016	0.0026	0.0150

Appendix D Pension Factors for Funding Purposes

As noted in Section 6.5, as new pensions emerge for the defined benefit categories, they are funded by a transfer from the Employer Fund equal to 92% of the present value of the pension liability. This liability is in turn calculated as the annual value of the pension multiplied by a pension factor intended to approximate the value of $1 per annum payable for the life of the pensioner and any subsequent reversionary spouse.

These pension factors are shown in the following tables, depending on the method of indexation applicable to the pension, the pension type (age, ill-health, spouse) and the age last birthday of the member at retirement or death. For members aged over 100, the age 100 factor should be used.

Table 83 Pension Factors to Determine Value of New Pensions for Funding Purposes (to age 60)

	CPI Indexed			Salary Indexed		
Age Last Birthday	Age Retirement Pension with 2/3 Reversion	Ill Health Pension with 2/3 Reversion	Spouse	Age Retirement Pension with 2/3 Reversion	Ill Health Pension with 2/3 Reversion	Spouse
16	36.029	35.538	35.186	48.499	47.518	46.936
17	35.853	35.349	34.985	48.129	47.130	46.534
18	35.674	35.156	34.781	47.753	46.736	46.129
19	35.491	34.958	34.573	47.373	46.337	45.719
20	35.303	34.754	34.362	46.988	45.931	45.306
21	35.111	34.546	34.147	46.598	45.518	44.889
22	34.915	34.332	33.928	46.202	45.100	44.467
23	34.714	34.112	33.703	45.801	44.676	44.039
24	34.508	33.887	33.473	45.394	44.245	43.604
25	34.297	33.656	33.237	44.980	43.808	43.164
26	34.080	33.419	32.996	44.561	43.363	42.717
27	33.858	33.177	32.748	44.135	42.913	42.263
28	33.630	32.928	32.494	43.703	42.456	41.803
29	33.396	32.673	32.234	43.265	41.992	41.336
30	33.157	32.412	31.967	42.820	41.521	40.862
31	32.911	32.144	31.693	42.368	41.044	40.381
32	32.659	31.869	31.412	41.910	40.560	39.894
33	32.400	31.588	31.125	41.444	40.069	39.399
34	32.136	31.299	30.831	40.972	39.570	38.897
35	31.864	31.004	30.530	40.494	39.065	38.390
36	31.586	30.701	30.223	40.008	38.552	37.875
37	31.301	30.390	29.908	39.515	38.031	37.353
38	31.009	30.072	29.585	39.015	37.503	36.824
39	30.710	29.746	29.255	38.509	36.968	36.288
40	30.404	29.412	28.917	37.995	36.425	35.746
41	30.090	29.070	28.572	37.473	35.875	35.196
42	29.768	28.720	28.218	36.944	35.317	34.638
43	29.438	28.362	27.857	36.408	34.751	34.074
44	29.100	27.994	27.487	35.864	34.178	33.501
45	28.754	27.618	27.108	35.312	33.597	32.922
46	28.400	27.233	26.722	34.754	33.008	32.336
47	28.038	26.839	26.327	34.187	32.411	31.743
48	27.666	26.436	25.923	33.612	31.807	31.143
49	27.286	26.023	25.511	33.031	31.195	30.536
50	26.897	25.602	25.090	32.442	30.575	29.922
51	26.500	25.172	24.660	31.845	29.949	29.302
52	26.093	24.732	24.222	31.240	29.315	28.674
53	25.677	24.283	23.775	30.628	28.675	28.041
54	25.252	23.826	23.319	30.009	28.028	27.401
55	24.818	23.359	22.856	29.383	27.374	26.756
56	24.375	22.883	22.384	28.749	26.714	26.105
57	23.923	22.398	21.904	28.110	26.049	25.450
58	23.461	21.905	21.417	27.463	25.377	24.791
59	22.991	21.402	20.923	26.811	24.699	24.127
60	22.513	20.890	20.422	26.152	24.015	23.460

Table 84 Pension Factors to Determine Value of New Pensions for Funding Purposes (over age 60)

	CPI Indexed			Salary Indexed		
Age Last Birthday	Age Retirement Pension with 2/3 Reversion	Ill Health Pension with 2/3 Reversion	Spouse	Age Retirement Pension with 2/3 Reversion	Ill Health Pension with 2/3 Reversion	Spouse
61	22.025	20.369	19.914	25.488	23.326	22.791
62	21.529	19.839	19.399	24.818	22.632	22.118
63	21.024	19.301	18.879	24.143	21.934	21.443
64	20.511	18.755	18.353	23.464	21.231	20.767
65	19.990	18.201	17.820	22.779	20.526	20.088
66	19.459	17.641	17.280	22.089	19.818	19.406
67	18.920	17.074	16.734	21.395	19.109	18.723
68	18.373	16.502	16.183	20.697	18.399	18.039
69	17.820	15.925	15.627	19.996	17.688	17.354
70	17.259	15.344	15.068	19.293	16.978	16.671
71	16.692	14.760	14.505	18.588	16.272	15.989
72	16.119	14.173	13.940	17.882	15.567	15.310
73	15.542	13.585	13.374	17.176	14.868	14.635
74	14.961	12.998	12.808	16.472	14.174	13.965
75	14.377	12.413	12.243	15.771	13.488	13.302
76	13.792	11.832	11.681	15.073	12.811	12.646
77	13.206	11.256	11.121	14.380	12.145	11.999
78	12.621	10.687	10.567	13.693	11.493	11.362
79	12.038	10.128	10.018	13.014	10.855	10.736
80	11.458	9.579	9.477	12.344	10.233	10.122
81	10.884	9.043	8.946	11.685	9.631	9.524
82	10.317	8.522	8.426	11.039	9.048	8.943
83	9.759	8.017	7.919	10.406	8.486	8.379
84	9.211	7.531	7.427	9.791	7.947	7.834
85	8.677	7.064	6.951	9.193	7.434	7.311
86	8.157	6.620	6.493	8.617	6.948	6.810
87	7.655	6.200	6.055	8.062	6.490	6.334
88	7.172	5.804	5.638	7.532	6.059	5.883
89	6.710	5.431	5.244	7.028	5.657	5.458
90	6.270	5.081	4.873	6.550	5.280	5.060
91	5.855	4.754	4.527	6.101	4.928	4.690
92	5.466	4.446	4.207	5.681	4.600	4.350
93	5.101	4.153	3.914	5.291	4.289	4.039
94	4.762	3.882	3.647	4.928	4.001	3.757
95	4.448	3.636	3.403	4.594	3.741	3.499
96	4.156	3.413	3.177	4.285	3.506	3.261
97	3.890	3.208	2.971	4.004	3.291	3.046
98	3.644	3.020	2.781	3.744	3.093	2.847
99	3.414	2.848	2.601	3.503	2.913	2.659
100	3.206	2.691	2.439	3.285	2.749	2.490

Appendix E Data Integrity Checks and Adjustments

This Appendix lists the checks undertaken on the membership data provided by QSuper as well as any adjustments that have been made in order to provide the best assessment of the scheme's liabilities.

The following data files were supplied in respect of each Category of membership within QSuper.

Table 85 List of Data Sources

Name of File	Date Received	Category	Description
Contributors			
Appendix 1 - Defined Benefit Category - Active Members 2020-2021 (Updated) 2.txt	2/08/2021	Defined Benefit	Membership details of active members at 30 June 2021
Defined Benefit 1 July 2021 salaries extracted 29-07-2021.xlsx	30/07/2021	Defined Benefit	1 July 2021 review date salaries of active members
Appendix 11 - Defined Benefit Category - SALRED file 2020-2021 - Updated.txt	12/08/2021	Defined Benefit	Details of members who had salary reduction benefits at 30 June 2021
Appendix 4 - Police Category - Active Members 2020-2021 (updated).txt	2/08/2021	Police	Membership details of active members at 30 June 2021
Appendix 3 - State Category - Active Members 2020-2021.txt	27/07/2021	State	Membership details of active members at 30 June 2021
Actuary data - Appendix 5 - Active Members 30-6-21 Final.xls	13/07/2021	Parliamentary	Membership details of active members at 30 June 2021
Pensioners			
Appendix 12 - Defined Benefit Category - Pensioners 2020-2021.txt	13/07/2021	Defined Benefit	Pensions in payment at 30 June 2021 and pensioner movements in 2020-21 financial year
Actuary Data - Appendix 14 - Parliamentary Category - Pensioners 30-06-21 Final .xls	13/07/2021	Parliamentary	Pensions in payment at 30 June 2021 and pensioner movements in 2020-21 financial year
Appendix 12 - Police Category - Pensioners 2020-2021.txt	13/07/2021	Police	Pensions in payment at 30 June 2021 and pensioner movements in 2020-21 financial year
Appendix 12 - State Category - Pensioners 2020-2021.txt	13/07/2021	State	Pensions in payment at 30 June 2021 and pensioner movements in 2020-21 financial year
Appendix 13 - Fire Category - Pensioners 2020-2021.txt	6/07/2021	Fire	Pensions in payment at 30 June 2021 and pensioner movements in 2020-21 financial year
Appendix 12 - Commuters 2021 (Updated).xls	30/07/2021	State & Police	Pensions in payment at 30 June 2021 and pensioner movements in 2020-21 financial year
Deferred Members			
Appendix 10 - Deferred Retirement Category - Members 2020-2021.txt	8/07/2021	Defined Benefit	Membership details at 30 June 2021
Preserved Members			
Actuary Data - Appendix 8 - Preserved Members 30-06-21 Final.xls	30/06/2021	Parliamentary	Membership details at 30 June 2021
Appendix 6 - State Category - Preserved Members 2020-2021.txt	27/07/2021	State	Membership details at 30 June 2021
Appendix 7 - Police Category - Preserved Members 2020-2021.txt	27/07/2021	Police	Membership details at 30 June 2021
Assets			
QSuper Annual Financial Report for the year ended 30 June 2021 FINAL SIGNED.pdf	1/10/2021		Audited financial statements as at 30 June 2021
QIC QTC balances for SAO 20 21.xlsx	2/08/2021		Consolidated fund assets as at 30 June 2021
QSuper Asset Rec to SAO FY 2021 - FS updated.xlsx	12/10/2021		QSuper assets by sub-plan as at 30 June 2021

A number of checks were performed on the data to ensure that it was of sufficient quality to be relied upon. These checks are summarised below by Category of membership.

Deferred Members Actives at 30 June 2021

Checking the validity of values in the fields of the files (e.g. unknown values, blank cells), particularly:

- Invalid Gender
- Date Commenced after Valuation Date
- Missing Date Commenced, Date of Birth
- AWOTE Benefit less than zero
- Low (15) or High (55) Age at 30 June 2021

Pensioners - DB, State, Police, & Parliamentary

Checking the validity of values in the fields of the files (e.g. unknown values, blank cells), particularly:

- Invalid Pension Type, Gender, Commencement Code or Termination Code
- Missing Date of Birth, Date Commenced

- Missing or Zero Pension or Reversion Amount
- Date Terminated outside period 1 July 2020 to 30 June 2021
- Commencement Code but no Date Commenced in period
- Termination Code but no Termination Date, and vice versa
- Date Terminated before Date Commenced
- Compare pension amount at start indexed with pension increases with actual pension amount at end
- Low ($20 per f/n) or High ($4.5k per f/n) Pension Amount or Reversion Amount
- Low (16 Child, 55 Pensioner) or High (25 Child, 100 Pensioner) Pension Age

Reconciliation of new pensioners, exits and pensioners in payment at the end of the year with the corresponding pensioner data at the beginning of the year.

Preserved Members - State, Police Actives at 30 June 2021

Checking the validity of values in the fields of the files (e.g. unknown values, blank cells), particularly:

- Invalid Gender
- Missing Date of Birth
- Missing, Zero or Negative Preserved Balance at 30 June 2021

Defined Benefit Category Members - Actives at 30 June 2021

Checking the validity of values in the fields of the files (e.g. unknown values, blank cells), particularly:

- Invalid Gender, Previous Scheme Indicator, TTR Indicator, FL Indicator
- Missing Date of Birth, Date Joined DB Plan
- Low (15) or High (70) Age at 30 June 2021
- Missing Date Joined Previous Scheme if Previous Scheme indicator was not blank
- Date Joined Previous Scheme later than Date Joined DB Plan
- Date Joined Previous Scheme later than Police Closure Date if Previous Scheme Indicator equal to P
- Date Joined Previous Scheme later than State Closure Date if Previous Scheme Indicator equal to S
- Date Joined DB Plan later than DB Closure Date
- Missing or Zero 1 July 2021 and three prior Review Date Salaries and 2021 OTE Salary

- Low ($5k) or High ($1m) 1 July 2021 and three prior Review Date Salaries and 2021 OTE Salary
- High (100%) DB Salary Increase in last three financial years
- Missing or High (9.45 DB Standard, 11 DB Police, 2.0 ATM) Accrued Multiple & ATM at 30 June 2021
- Missing ATM where Previous Scheme Indicator is S or P
- Zero, Low (2% DB Standard, 3% DB Police) or High (8% DB Standard, 9% DB Police) Member Contribution Rate
- Missing or Zero FTE Ratio
- Missing or Zero Career FTE Ratio
- FTE Ratio or Career FTE Ratio greater than 1.0
- Missing, Zero or High Service (1.1 times Service) for Prospective Benefit
- Missing or Zero Member Contribution Balance at 30 June 2021
- High ($1.5m) Voluntary Contribution Balance at 30 June 2021
- Missing or Zero TTR Multiple if TTR Indicator = Y
- Missing or Zero FL Multiple if FL Indicator = Y
- Missing Date of TTR if TTR Indicator = Y
- Missing Date of FL if FL Indicator = Y
- TTR Multiple greater than Accrued Multiple at TTR Date if TTR Indicator = Y
- FL Multiple greater than Accrued Multiple at FL Date if FL Indicator = Y

Aggregate checks were performed on the main components of the liability to confirm that the movement in the liability was reasonable.

Adjustments made to the data include:

- Duplicate membership records due to secondments or multiple part-time memberships were combined to a single record for each life
- Removal of membership records in relation to an agency redundancy program that were incorrectly included in the actives data
- If missing or zero Member Contribution Rate, assume member is on Leave Without Pay

- Where FTE Ratio is less than zero, set to be equal to Career FTE Ratio if Career FTE Ratio reasonable, otherwise Impute an average equal to the non-zero average FTE Ratio
- Where Career FTE Ratio is less than zero, set to be equal to FTE Ratio if FTE Ratio reasonable, otherwise Impute an average equal to the non-zero average Career FTE Ratio
- Imputed the maximum Member Contribution Rate if Member Contribution Rate was greater than the maximum allowable
- Imputed the standard Member Contribution Rate if Member Contribution Rate was less than the minimum allowable
- If Service for Prospective Benefit is greater than calculated Service, amend Date Joined field
- If Low or Missing Salary, use the previous years' Salary, otherwise impute an average Salary
- If Low OTE Salary, use the 1 July Review Date Salary
- If High Salary Growth in year, impute Salary at start of year equal to Salary at start of previous year if Salary at start of year is greater than Salary at end of year
- Removal of membership records created for administrative purposes e.g. late/additional benefit payments

Police Category Members - Actives at 30 June 2021

- Low (18) or High (60) Age at 30 June 2021
- Date Joined Fund after Police Plan Closure Date
- Low (15) Age at Date Joined Fund
- Invalid Gender, Section 24A Indicator
- Missing Section 24A Rate if Section 24A Indicator = Y
- Missing Additional Contribution Rate if member has Additional Service years
- Low ($10k) or High ($150k) Salary at 30 June 2021
- Low ($10k) OTE Salary at 30 September 2021
- Low ($500) Accumulation Balance at 30 June 2021
- High ($90k) Annual Pension Amount at 30 June 2021
- High ($900k) Lump Sum Payable on Retirement at 30 June 2021
- Missing or Zero Vested Benefit at 30 June 2021
- Retirement Benefit provided but member is below Retirement Age

- Retirement Benefit not provided but member is above Retirement Age
- Resignation Benefit provided but member is above Retirement Age
- Resignation Benefit not provided but member is below Retirement Age

Aggregate checks were performed on the main components of the liability to confirm that the movement in the liability was reasonable.

State Category Members - Actives at 30 June 2021

- Low (16) or High (65) Age at 30 June 2021
- Date Joined Fund after State Plan Closure Date
- Low (15) Age at Date Joined Fund
- Invalid Gender, Section 24A Indicator
- Low ($10k) or High ($250k) 30 June 2021 Review Date Salary
- Low ($10k) OTE Salary at 30 September 2021
- Low ($500) Accumulation Balance at 30 June 2021
- Low ($0) Member Contribution Balance at 30 June 2021
- High Portability Service (15), Reduced Service (12) or Additional Service (25) at 30 June 2021
- Missing Additional Contribution Rate if member has Additional Service years
- High ($120k) Annual Pension Amount or Lump Sum Payable on Retirement ($1.2m) at 30 June 2021
- Missing or Zero Vested Benefit at 30 June 2021
- Retirement Benefit provided but member is below Retirement Age
- Retirement Benefit not provided but member is above Retirement Age
- Resignation Benefit provided but member is above Retirement Age
- Resignation Benefit not provided but member is below Retirement Age

Aggregate checks were performed on the main components of the liability to confirm that the movement in the liability was reasonable.

Parliamentary Category

- Low (18) or High (70) Age at 30 June 2021
- Low (18) Age at Election Date

Members - Actives at 30 June 2021

- Missing Date of Birth, Date of Entry
- Election Date after Valuation Date
- Invalid Member Category
- Low (<$Backbencher) or High Own Salary ($300k) at 30 June 2021
- Low ($1m) or High ($3m) Accumulated Own Salary at 30 June 2021
- Low ($1m) or High ($3m) Accumulated Backbencher Salary at 30 June 2021
- Total Accumulated Own Salary is less than Total Accumulated Backbencher Salary as at 30 June 2021

Aggregate checks were performed on the main components of the liability to confirm that the movement in the liability was reasonable.

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