

Commercial Consolidator Appendix

1. Summary

This is the Commercial Consolidator Appendix to the Board's determination under Section 175(5) of the Act in respect of the 2020/21 Levy Year. Unless defined in this Appendix, expressions defined in the rules set out in the determination (the "Rules") shall have the same meanings as set out therein.

This Appendix applies to a Commercial Consolidator as defined in the Rules. It provides the formulae for calculating the RBL for such schemes.

For the purposes of this Appendix:

A "Recognised Buffer Arrangement" means:

- (1) a buffer fund arrangement established in connection with a Commercial Consolidator which provides for Buffer Assets to become available in whole or in part to the Scheme trustee for the purposes of the Scheme, in specified circumstances; or
- (2) such other arrangement as the Board considers to be designed to have substantially the same effect as the above,

(a "Buffer Fund");

and which in either case (i) in respect of which the Board has received such information, opinions or certifications as it considers appropriate, and (ii) in the opinion of the Board satisfies such conditions as the Board may from time to time specify in published guidance and having regard to any guidance published by tPR. Such guidance may require (without limitation):

- (a) appropriate mechanisms to preserve the value of the Buffer Fund prior to the trigger of any payment from the Buffer Fund to the Scheme, including appropriate provisions for payments into the Buffer Fund, management and control of risk, and for disposal of Buffer Assets;
- (b) an appropriate and enforceable mechanism for the transfer of funds from the Buffer Fund to the Scheme;
- (c) appropriate parameters for determining the asset allocation for the Buffer Fund and governance terms concerning the role of scheme trustees in relation to changes to the Buffer Fund asset allocation; and
- (d) appropriate terms providing for the governing law and jurisdiction that can apply to the Buffer Fund and in respect of the jurisdiction to determine disputes relating to the Buffer Fund;

but in respect of which, the Board's requirements under the Levy Rules for recognition of the arrangement as a Contingent Asset would not be met, were a submission relating to the arrangement to be made pursuant to Part G of the Levy Rules and the Contingent Asset Appendix and if Rule C6.4 was disregarded.

"Buffer Assets" – are assets, held within the Buffer Fund, that the Board is satisfied would, if those assets transferred to the Commercial Consolidator:

- (1) be capable of inclusion in the Commercial Consolidator's Section 179 Valuation by virtue of Regulations 3 and 5 of the Pension Protection Fund (Valuation) Regulations 2005 (SE 2005/672); and
- (2) are not assets representing the value of any rights in respect of money purchase benefits under the Scheme rules.

An "Acceptable Wind-Up Trigger" is an arrangement or arrangements in relation to a Commercial Consolidator that the Board is satisfied meets the following criteria (having regard to any guidance issued by the Board and by tPR):

- (1) an appropriate percentage level of Scheme funding, on a Section 179 Valuation basis at which the events described in (2) below are intended to take place (the "Trigger Funding Level");
- (2) a legally enforceable arrangement is in place to provide that, as a direct result of the Trigger Funding Level being reached, an Insolvency Event (as defined in s121 of the 2004 Act) of the Employer will take place within a period deemed acceptable by the Board;
- (3) appropriate measures are in place for monitoring the funding level of the Scheme (and of any Buffer Fund) at appropriate times; and
- (4) any power to amend the relevant parts of the documentation that satisfy criteria (1) – (3) above is appropriately limited.

Subject to any adjustments made pursuant to Rule C6 of the Rules, the RBL for a Commercial Consolidator is the higher of RBL_0 and POP, where:

- a) RBL_0 is the RBL calculated as if the provisions of this Appendix (and for the avoidance of doubt, the provisions of the SWOSS Appendix) did not apply, with the exception of those provisions applicable to Recognised Buffer Arrangements that are required for the purposes of this calculation of RBL_0 , but based on:
 - a single employer structure, with the employer placed in Levy Band 10;
 - no application of the RBL cap;
 - assets including any Recognised Buffer Arrangement;
 - a bespoke stress analysis or analyses covering assets including any Recognised Buffer Arrangement and Submitted in accordance with the provisions of Rules D3.1(c) and D3.2 of the Rules¹; and
 - no allowance for voluntary certifications.

For the avoidance of doubt, RBL_0 does not allow for any adjustment to reflect understatement of risk for older valuation submissions set out in section 3 below, or any deduction from the scheme assets to reflect potential ongoing capital extraction set out in section 8 below.

- b) POP is the value of a one year European put option calculated using the Garman-Kohlhagen formula, where:
- the strike price is the value of the scheme's protected liabilities on an adjusted basis, rolled forward or backward to the Output Date; and
 - the spot price of the underlying asset is the market value of the scheme's assets plus the market value of any Recognised Buffer Arrangement, with the total rolled forward or backward to the Output Date, but reduced by an allowance to reflect potential ongoing capital extraction where this facility is available to the consolidator.

Any deduction from the assets to reflect potential ongoing capital extraction will be determined as the value of a one year European call option calculated using the Garman-Kohlhagen formula, where:

- the strike price is the threshold above which the consolidator is able to extract capital, expressed as a percentage of the value of the scheme's protected liabilities on an adjusted basis, rolled forward or backward to the Output Date; and
- the spot price of the underlying asset is the market value of the scheme's assets plus the market value of any Recognised Buffer Arrangement, with the total rolled forward or backward to the Output Date.

Because POP is assumed to be paid from the scheme's assets, it is technically an input to the put option formula as well as the output of that formula. This is allowed for by calculating POP using an iterative approach. The output of the n th iteration, POP_n , is deemed to reduce the scheme's assets used for input to the $(n+1)$ th iteration, until the difference between $POP_{(n+1)}$ and POP_n has converged below a specified threshold.

2. Inputs

Where information is required by the Board as specified in this Appendix and/or as the Board requires in accordance with any Ongoing Governance Arrangement in order to calculate RBL_0 and POP in accordance with this Appendix, and such information is Submitted in accordance with Rules A2.2(5) and A2.3(6) of the Rules in a form and on terms acceptable to the Board, that information will be used for the purposes of that calculation. In the absence of one or more items of such information, whether due to the absence of an Ongoing Governance Arrangement or otherwise, Rule B1 will apply.

¹ Where separate bespoke stress analyses are Submitted in respect of the scheme and any Recognised Buffer Arrangement, they must be carried out at the same effective date.

Liability data

The Section 179 Valuation results which have been Submitted for use in this calculation, rolled forward or backward to the Output Date without smoothing or stressing in accordance with the Transformation Appendix². If the Output Date specified under this Appendix differs from the Output Date under the Transformation Appendix (31 March 2020), the Transformation Appendix should be applied as if the Output Date were the same as specified under this Appendix.

In addition, if the Submitted Section 179 Valuation results were prepared in accordance with version A9 (or any future version) of the Section 179 assumptions, the results are not converted to A8.³

• Liabilities in respect of pensions in payment	S179PL
• Liabilities in respect of deferred members	S179DL
• Liabilities in respect of active members	S179AL
• Estimated wind-up costs (excluding benefit installation/payment)	S179WUExp
• Estimated expenses of benefit installation/payment	S179PayExp
• External liabilities	S179ExLiab
• Total value of protected liabilities	S179TL

The Section 179 Valuation results which have been Submitted for use in this calculation, rolled forward or backward to the Output Date with stressing but without smoothing in accordance with the Transformation Appendix⁴. If the Output Date specified under this Appendix differs from the Output Date under the Transformation Appendix (31 March 2020), the Transformation Appendix should be applied as if the Output Date were the same as specified under this Appendix.

² Paragraph 4.8 of the Transformation Appendix sets out the process for calculating smoothed but unstressed liability values. Unsmoothed, unstressed liability values are calculated by applying these provisions and also taking each Smoothed Yield (A(ii), B(ii), C(i), C(iii), D(i) or D(ii)) at the Output Date (as set out in paragraph 4.3 of the Transformation Appendix) to be equal to the corresponding unsmoothed yield.

³ In these circumstances, the various assumptions underlying the annuity factors '@OutputDate' and '@S179Input Date' set out in paragraph 4.3.3 of the Transformation Appendix should be set to be consistent with version A9 (or such future version as applies) of the Section 179 assumptions guidance, together with the rollforward rates 'i' and 'j' set out in paragraph 4.4.1 of the Transformation Appendix.

⁴ Stressed but unsmoothed liability values are calculated by applying the provisions of footnote 2 above and also applying the liability stress factors at the values shown in paragraph 4.2 of the Transformation Appendix, rather than zero.

In addition, if the Submitted Section 179 Valuation results were prepared in accordance with version A9 (or any future version) of the Section 179 assumptions, the results are not converted to A8.³

• Stressed liabilities in respect of pensions in payment	S179PLStressed
• Stressed liabilities in respect of deferred members	S179DLStressed
• Stressed liabilities in respect of active members	S179ALStressed

Asset data

Combined asset information for the Scheme and any Recognised Buffer Arrangement Submitted for use in this calculation and rolled forward or backward to the Output Date without smoothing or stressing in accordance with the Transformation Appendix. If the Output Date specified under this Appendix differs from the Output Date under the Transformation Appendix (31 March 2020), the Transformation Appendix should be applied as if the Output Date were the same as specified under this Appendix.

• Assets	S179Ass
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Combined asset information for the Scheme and any Recognised Buffer Arrangement underlying the bespoke stress analysis or analyses Submitted for use in this calculation (asset amounts at the calculation date of the bespoke stress analysis or analyses, before applying the bespoke asset stress factors)¹:

• UK quoted equities	AS1
• Overseas developed market quoted equities	AS2
• Emerging Market quoted equities	AS3
• Unquoted/private equity	AS4
• Property	AS5
• Hedge funds	AS6
• Commodities	AS7
• Fixed interest government bonds – short maturity	AS8
• Fixed interest government bonds – medium maturity	AS9
• Fixed interest government bonds – long maturity	AS10

• Inflation-linked bonds – short maturity	AS11
• Inflation-linked bonds – medium maturity	AS12
• Inflation-linked bonds – long maturity	AS13
• Fixed-interest non-government bonds – UK short and medium dated investment grade	AS14
• Fixed-interest non-government bonds – UK long-dated investment grade	AS15
• Fixed-interest non-government bonds – overseas short and medium dated investment grade	AS16
• Fixed-interest non-government bonds – overseas long-dated investment grade	AS17
• Fixed-interest non-government bonds – global sub-investment grade	AS18
• Cash and net current assets	AS19
• Annuities	AS20
• Insurance funds	AS21
• Other	AS22

Combined sensitivities of derivatives for the Scheme and any Recognised Buffer Arrangement to interest rates and inflation rates underlying the bespoke stress analysis or analyses Submitted for use in this calculation (amounts at the calculation date of the bespoke stress analysis or analyses)¹:

• Overall sensitivity of derivatives to a one basis point increase in interest rates	PV01
• Overall sensitivity of derivatives to a one basis point increase in inflation rates	IE01

3. Parameters

Factors to convert liabilities to the adjusted basis, where an Acceptable Wind-Up Trigger applies:

Factors to convert liabilities in respect of:		
• Pensions in payment	ConvFacPen	1.00
• Deferred pensioners and active members	ConvFacNonPen	0.88
• Estimated wind-up costs (excluding benefit installation/payment)	ConvFacWUExp	1.00
• Estimated expenses of benefit installation/payment	ConvFacPayExp	0.50
• External liabilities	ConvFacExLiab	1.00

For the avoidance of doubt, if an Acceptable Wind-Up Trigger does not apply, ConvFacPen, ConvFacNonPen, ConvFacWUExp, ConvFacPayExp and ConvFacExLiab are all 1.00.

Factors to reflect understatement of risk for older valuation submissions

Adjustment to total liabilities	LiabAdjFac	0% if the effective date of the Section 179 Valuation Submitted for use in this calculation is on or after 1 January 2018, and 5% in all other circumstances.
Applicable time period	TimePeriod	The period from the effective date of the Section 179 Valuation Submitted for use in this calculation, to 31 March 2020, measured in years and complete months.

Stress factors

Risk factor stresses		
Interest rate risk factor stress	d_rates (basis points)	-75
Inflation risk factor stress	d_inf (basis points)	-14

Asset stress factors		Positive stresses (Str_i^+)	Negative stresses (Str_i^-)
UK quoted equities	Str1	0%	-19%
Overseas developed market quoted equities	Str2	0%	-16%
Emerging Market quoted equities	Str3	0%	-16%
Unquoted/private equity	Str4	0%	-19%
Property	Str5	0%	-5%
Hedge funds	Str6	0%	-3%
Commodities	Str7	0%	-14%
Fixed interest government bonds - short maturity	Str8	+2%	0%
Fixed interest government bonds - medium maturity	Str9	+6%	0%
Fixed interest government bonds - long maturity	Str10	+15%	0%
Inflation-linked bonds - short maturity	Str11	+1%	0%
Inflation-linked bonds - medium maturity	Str12	+5%	0%
Inflation-linked government bonds - long maturity	Str13	+18%	0%
Fixed-interest non-government bonds - UK short and medium dated investment grade	Str14	+4%	-2%
Fixed-interest non-government bonds - UK long-dated investment grade	Str15	+10%	-5%
Fixed-interest non-government bonds - overseas short and medium dated investment grade	Str16	+4%	-2%

Fixed-interest non-government bonds – overseas long-dated investment grade	Str17	+10%	-5%
Fixed-interest non-government bonds – global sub-investment grade	Str18	+2%	-8%
Cash and net current assets	Str19	0%	0%
Annuities	Str20	+16%	0%
Insurance funds	Str21	0%	-19%
Other	Str22	0%	-19%

Other parameters

Longevity volatility	LongVol	2.5%
Volatility adjustment	VolAdj	2.6%
Risk-free rate of return on assets	rA	Bank of England 12 month Overnight Index Swap (OIS) spot rate ⁵
Risk-free rate of return on liabilities	rL	rA
Convergence threshold for successive iterations of POP	T	£1

⁵ The Overnight Index Swap (OIS) spot rate to use for 2020/21 will be the figure as at 29 November 2019 and will be confirmed in the December Policy Statement. As an indication, the OIS spot rate used for 2019/20 was 0.79% as at 30 November 2018.

4. Calculation of the standard Risk-Based Levy with adjustments (RBL_0)

RBL_0 is the RBL calculated in accordance with the provisions of the Rules (except Rules C5 and C6) and the Appendices (except (i) the SWOSS Appendix, and (ii) the provisions of this Appendix that are not applicable to Recognised Buffer Arrangements and are accordingly not required for the purposes of this calculation of RBL_0), but using the information Submitted in accordance with Rules A2.2(5) and A2.3(6) of the Rules (or in accordance with any discretion exercised by the Board pursuant to Rule C6.7 of the Rules), and based on the following assumptions:

- the Scheme has a single Employer;
- the LR of the Employer is the LR of Levy Band 10 and, for the avoidance of doubt, that LR will not be treated as an Appealable Score;
- Rule C3.1 (the RBL cap) is dis-applied;
- assets include any Recognised Buffer Arrangement;
- the Scheme has Submitted the information specified in the Investment Risk Appendix, covering assets including any Recognised Buffer Arrangement in accordance with the provisions of Rules D3.1(c) and D3.2 of the Rules¹; and
- Parts F, G and H of the Rules are dis-applied.

For the avoidance of doubt, RBL_0 does not allow for any adjustment to reflect understatement of risk for older valuation submissions set out in section 3 above, or any deduction from the scheme assets to reflect potential ongoing capital extraction set out in section 8 below.

5. Calculation of Call Option Strike Price (COSP)

If the Commercial Consolidator has a Section 179 Capital Extraction Threshold, denoted for the purposes of this Appendix as $S179CET\%$:

$$COSP = S179CET\% \times S179TL$$

If the Commercial Consolidator does not have a Section 179 Capital Extraction Threshold but does have a Non-Section 179 Capital Extraction Threshold, the Board shall calculate the Levies pursuant to Rule B1.

For the purposes of this paragraph 5:

“Section 179 Capital Extraction Threshold” is the funding level contained in any Ongoing Governance Arrangement, in respect of which the terms of operation of a Commercial Consolidator provide for payment of a return at or above such funding level (other than to Members by way of defined benefit pension payments, and other than the ordinary expenses of an occupational pension scheme) during the 2020/21 Levy Year and before any buyout of liabilities, provided:

- (a) such funding level is determined by reference to assets which include any Recognised Buffer Arrangement;
- (b) such funding level is ascertainable by the Board by reference to a Section 179 funding level; and

- (c) S179Ass specified in section 2 above has not been reduced to allow for the payment of any such return.

If the Commercial Consolidator satisfies the requirements for a Section 179 Capital Extraction Threshold save for the requirement set out in sub-paragraph (c) above, the Board may determine that such requirement should be waived.

“Non-Section 179 Capital Extraction Threshold” is the funding level contained in any Ongoing Governance Arrangement, in respect of which the terms of operation of a Commercial Consolidator provide for payment of a return at or above such funding level (other than to Members by way of defined benefit pension payments, and other than the ordinary expenses of an occupational pension scheme) during the 2020/21 Levy Year, and before any buyout of liabilities, provided:

- (d) such funding level is determined by reference to assets which include any Recognised Buffer Arrangement;
- (e) such funding level is not ascertainable by the Board by reference to a Section 179 funding level; and
- (f) S179Ass specified in section 2 above has not been reduced to allow for the payment of any such return.

If the Commercial Consolidator satisfies the requirements for a Non-Section 179 Capital Extraction Threshold save for the requirement set out in sub-paragraph (f) above, the Board may determine that such requirement should be waived.

6. Calculation of aggregate stresses

6.1. Calculation of Asset and Liability Stresses (AS_+ , AS_- , LBS)

Positive asset stress (AS_+)

AS_+ is obtained by applying all the positive stresses Str_i^+ (as shown in the third column of the asset stress factors table in section 3 above) to the corresponding assets of the scheme including any Recognised Buffer Arrangement, and then adding the impacts of the risk factor stresses on the derivative holdings of the Scheme and any Recognised Buffer Arrangement.

$$AS_+ = \sum_{i=1}^{22} (AS_i \times Str_i^+) + (PV01 \times d_rates) + (IE01 \times d_inf)$$

AS_+ is expected to be positive other than for exceptional cases (for example with significant negative asset allocations within the summation).

Negative asset stress (AS_-)

AS_- is obtained by applying all the negative stresses Str_i^- (as shown in the fourth column of the asset stress factors table in section 3 above) to the absolute

(or modulus) value of the corresponding assets of the scheme including any Recognised Buffer Arrangement.

$$AS_- = \sum_{i=1}^{22} (|AS_i| \times Str_i^-)$$

By construction AS_- is a negative number.

Liability Stress (LbS)

LbS is obtained by applying the interest rate and inflation stresses to the liability value (excluding expenses and external liabilities) on an adjusted basis. It is calculated by taking the difference between the stressed and unstressed values after roll forward or backward to the Output Date and then adjusting this difference to reflect the relevant conversion factors and any adjustment in respect of understatement of risk for older valuation submissions as set out in section 3 above.

$$LiabAdj = [S179PL \times ConvFacPen + (S179DL + S179AL) \times ConvFacNonPen + S179WUExp \times ConvFacWUExp + S179PayExp \times ConvFacPayExp + S179ExLiab \times ConvFacExLiab] \times (1 + LiabAdjFac)^{TimePeriod}$$

$$LbS = \{ (S179PLStressed - S179PL) \times ConvFacPen + [(S179DLStressed - S179DL) + (S179ALStressed - S179AL)] \times ConvFacNonPen \} \times (1 + LiabAdjFac)^{TimePeriod}$$

By construction LbS is a positive number.

6.2. Calculation of first level aggregate stress including risk due to over-hedging or under-hedging interest rates (X_1)

The first level aggregate stress is given by the formula:

$$X_1 = \sqrt{AS_-^2 + \text{Max}(0, AS_+ - LbS)^2} - \text{Min}(0, AS_+ - LbS)$$

This can be simplified by deconstructing the formula to differentiate between schemes which are over-hedged on the adjusted basis (liability stress smaller than the overall positive asset stress) and under-hedged on the adjusted basis (liability stress greater than the overall positive asset stress).

If $LbS < AS_+$:

$$X_1 = \sqrt{AS_-^2 + (AS_+ - LbS)^2}$$

Else:

$$X_1 = |AS_-| - AS_+ + LbS$$

6.3. Calculation of second level aggregate stress including longevity risk (X_2)

This calculation aggregates the effect of the investment risk factor stresses with a longevity shock (*LongShock*). It assumes that longevity risk and investment risk are independent.

$$LongShock = LongVol \times LiabAdj$$

$$X_2 = \sqrt{X_1^2 + LongShock^2}$$

7. Calculation of volatility estimate (*VolEst*)

$$VolEst = \frac{X_2}{S179Ass} + VolAdj$$

8. Calculation of the call option price (*COP*)

First calculate the volatility adjusted distances to the call option strike price (d_{1C} and d_{2C}).

$$d_{1C} = \frac{\ln\left(\frac{S179Ass}{COSP}\right) + (rA - rL + VolEst^2/2)}{VolEst}$$

$$d_{2C} = d_{1C} - VolEst$$

The price of the call option (*COP*) is given by the formula:

$$COP = S179Ass \times e^{-rL} \times N(d_{1C}) - COSP \times e^{-rA} \times N(d_{2C})$$

where:

"*e*" is Euler's number, a mathematical constant⁶;

" $\ln(x)$ " denotes the natural logarithm of x , i.e. the power to which e would have to be raised to equal x ;

$N(\cdot)$ denotes the cumulative standard normal distribution function, given by the formula:

$$N(x) = \int_{-\infty}^x \frac{e^{-t^2/2}}{\sqrt{2\pi}} dt; \text{ and}$$

" π " is a mathematical constant, the ratio of a circle's circumference to its diameter.⁷

For the avoidance of doubt, if the Commercial Consolidator has neither a Section 179 Capital Extraction Threshold nor a Non-Section 179 Capital Extraction Threshold, $COP = 0$.

⁶ For the purposes of information only, "*e*", to 10 decimal places is: 2.7182818285

⁷ For the purposes of information only, " π ", to 10 decimal places is: 3.1415926536

9. Calculation of the first iteration of the put option price (**POP₁**)

First calculate the spot price, which is the assets after deducting *COP*.

$$S179AssAdj = S179Ass - COP.$$

Repeat the calculations in sections 6 and 7 above based on input assets and spot price of *S179AssAdj* rather than *S179Ass*. For this purpose the assets are assumed to retain the same proportionate breakdown and the same values of PV01 and IE01.

The outcome of this process is a revised value of *VolEst*, *VolEstAdj*.

Next, calculate the volatility adjusted distances to the put option strike price (d_{1P} and d_{2P}).

$$d_{1P} = \frac{\ln\left(\frac{S179AssAdj}{LiabAdj}\right) + (rA - rL + VolEstAdj^2 / 2)}{VolEstAdj}$$

$$d_{2P} = d_{1P} - VolEstAdj$$

The first iteration of the price of the put option (**POP₁**) is given by the formula:

$$POP_1 = LiabAdj \times e^{-rA} \times N(-d_{2P}) - S179AssAdj \times e^{-rL} \times N(-d_{1P})$$

10. Calculation of successive iterations of the put option price (**POP_n**)

The calculations in section 9 above are repeated to calculate successive iterations of the put option price. For all values of *n* greater than or equal to two but less than or equal to 100, the *n*th iteration, **POP_n**, is calculated as **POP_{n-1}** but with the input assets and spot price, *S179AssAdj_n*, taken as the corresponding figure from the first iteration, *S179AssAdj*, reduced by **POP_{n-1}**. For this purpose the assets are assumed to retain the same proportionate breakdown and the same values of PV01 and IE01 in each successive iteration.

$$\partial n = |POP_n - POP_{n-1}|$$

For all values of *n* from 2 to 99 inclusive:

If:

- $\partial n \leq T$; and
- $POP_n < S179Ass - SBL$

$$POP = POP_n$$

Else if $POP_n \geq S179Ass - SBL$

$$POP = S179Ass - SBL$$

Else proceed to the (*n*+1)th iteration.

If $POP_{100} < S179Ass - SBL$,

$POP = POP_{100}$
else
 $POP = S179Ass - SBL$

11. Calculation of the Risk-Based Levy (**RBL**)

Subject to any adjustments made pursuant to Rule C6 of the Rules, RBL for a Commercial Consolidator is the greater of:

- (a) the standard risk-based levy calculated in accordance with the Rules (except Rules C5 and C6) and Appendices (except this Appendix and the SWOSS Appendix), but using the information Submitted in accordance with Rules A2.2(5) and A2.3(6) of the Rules (or in accordance with any discretion exercised by the Board pursuant to Rule C6.7 of the Rules), and based on the assumptions described in section 4 above; and
- (b) the put option price calculated in section 10 above.

$$RBL = \text{Max}(RBL_0, POP)$$