

Affordable Housing Viability Study



City of York Council

**Affordable Housing
Viability Study
Annex
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Fordham
RESEARCH

Annex

- 1.1 This document is designed as an Annex to the **Affordable Housing Viability Study Report** produced for the City of York by Fordham Research and dated April 2010.
- 1.2 It provides a replacement for the final parts of that Report (Chapter 9 and Appendix 4). Chapters 1 to 8 and Appendices 1 to 4 are unchanged.

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9. Dynamic Viability results

- 9.1 This final chapter moves on from the results of the viability analysis, the first stage, to suggest a basis for policy which would help to ensure deliverable affordable housing targets through the plan period.

What Dynamic Viability does

- 9.2 The Dynamic Viability approach is designed to provide affordable targets which are robust at all phases of the housing market during the plan period. However both the mechanism to achieve this, and the full range of potential future targets, must be provided at the Core Strategy Examination, so that the Examination can consider and decide on the level of target setting for the whole plan period.
- 9.3 The mechanism builds upon the viability assessment, based on the residual valuations carried out as part of the Viability Study for the representative range of sites.

Dynamic Viability mechanism

- 9.4 The mechanism links future changes in target levels to published indexes. This means that the process of target setting through the plan period is entirely transparent. It is set up prior to the Core Strategy Examination, is assessed and approved in whatever form during that Examination, and afterwards is entirely dependent on three published indexes:
- **Price change:** We use the Halifax Price Index (HPI)
 - **Building costs change:** The building cost data service which RICS publish, BCIS, provides market price rates based upon analysis of tenders, and also a general index of building costs
 - **Alternative use value:** The appropriate measure would depend on the specific alternative use for the individual site, but most often comes from the Valuation Office Agency's (VOA) Property Market Report.
- 9.5 The set of indices is based on the assessment that, of the many financial assumptions in the appraisal that could change over time, there are three key variables which in practice dominate the outcome. Price and build cost are the key figures which determine the residual value result, but even without these, significant movements in alternative use value will also move the site into or out of viability.
- 9.6 It would be impractical to alter every appraisal undertaken for this study in line with the various indices. We therefore use a 'benchmark' site, chosen to be as representative as possible of the whole City.

Benchmark site

- 9.7 The benchmark site is selected from the full range of sites identified within the City. It should be reasonably typical of development patterns across the area.
- 9.8 It should also be adjusted to reflect the generally deliverable target. This means that small changes are made to it (sale prices revised up or down) so that its viability exactly reflects the affordable target level that is deliverable in that area. It can then be used to model how the target level should change, as market changes impact upon development viability.
- 9.9 After careful consideration and discussion with the Council, it was agreed that the site that would best serve as an indicator in this way would be:

Site 5 – Manor School

- 9.10 This site was in fact still viable at 30%, and would only have turned marginal between 30% and 40%. Since the benchmark site needs to be just viable at 25%, a synthetic site was created using the characteristics of site 5, but with slightly lower market prices that reduced the viability ‘tipping point’ to exactly 25%.
- 9.11 Site 5’s alternative use is as a combination of industrial land and open space. Changes in alternative use value are to be determined by movements in the industrial value.
- 9.12 The following table shows the indices and starting figures for each of these three ‘dimensions’. An expanded version in Appendix 4 provides source information (with on line source) for the three indices.

Table 9.1 Indices for automatic updating of Dynamic Viability		
Variable	Proposed index	Starting value
House Price	Halifax House Price Index National (Monthly, Seasonally Adjusted)	November 2009 = 542.0
Build cost	BCIS General Building Cost Index	December 2009 = 287.3
Alternative use value	Valuation Office Agency Property Market Report Value of Industrial Land for <u>Leeds</u>	January 2010 = £600k per ha

Source: Fordham Research AHVS 2010

- 9.13 A version of the appraisal for the (adjusted) benchmark site is used to assess what affordable target is achievable for any given combination of new values for price, cost and alternative use value that may emerge from future movements in the housing market as reflected in the indices. There are in principle an infinite number of combinations of these three indices, and the affordable housing targets they imply. To produce a manageable result, we have to use banding. This then covers a reasonable range without producing an unreasonably large number of target outcomes, and generating trivially small changes in the target.

Figure 9.1 Dynamic Viability: Summary Matrix

COARSE MATRIX	YORK CHANGE TO PRICE (HPI)																
	-20%	-10%	0%	+10%	+20%	+30%	+40%	+50%	+60%								
CHANGE TO COST (BCIS)	-20%	27% 25% 22%	24% 40% 38%	51% 58%	52% 59%	50% 56%	49% 54%	48% 54%	60% 60%	60% 60%	60% 60%	60% 60%	60% 60%	60% 60%			
	-10%	19% 7% 3%	18% 6% 1%	16% 4% 1%	34% 25% 23%	34% 47% 38%	46% 39% 36%	46% 48% 46%	54% 47% 46%	59% 58%	58% 56%	60% 60%	60% 60%	60% 60%	60% 60%		
	0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%		
+10%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%			
+20%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%			
+30%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%			
+40%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%			
+50%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%	0% 0% 0%			
KEY	Change to AUV =										-30%	-20%	-10%	+10%	+20%	+30%	+40%

Source: Fordham Research AHSV update 2009

- 9.14 Even so, the range of possible future movements in price, cost, and alternative use value make for an extremely large table. This Full Matrix is set out in Appendix 4. It shows how the proposed affordable target of 20% would change as changes in price and cost, and in alternative use value, arise in future. The Full Matrix considers price variations from -20% through to +60%, and cost variations from -20% to +50%, each at 2% intervals. Changes in alternative use are considered from -30% to +40%, at 10% intervals because viability is somewhat less sensitive.
- 9.15 With this many intervals, giving almost 12,000 potential future target percentages, the resulting table is indeed very extensive. In order to illustrate the principles, an extract from the Full Matrix is set out below as Table 9.2. In addition, a Summary Matrix is provided at Figure 9.1; this shows the same spread of values as in the Full Matrix, but with only 10% intervals for price and cost, rather than the 2% intervals in the Full Matrix.

Table 9.2 Extract from Full Matrix

		<i>Price Change HPI</i>								
		-2%			0%			+2%		
Cost Change BCIS Index	%									
	0%		25%	24%	23%	28%	27%	26%	30%	29%
			22%	21%		25%	24%		28%	27%
		20%	19%	18%	23%	22%	21%	26%	25%	24%
+2%		22%	21%	20%	25%	24%	23%	28%	27%	26%
			19%	18%		22%	21%		25%	24%
		17%	16%	15%	20%	19%	18%	23%	22%	21%
+4%		20%	18%	17%	22%	21%	20%	25%	24%	23%
			16%	15%		19%	18%		22%	21%
		14%	13%	12%	17%	16%	15%	20%	19%	18%
		KEY			-30%	-20%	-10%			
		<i>Change in alternative</i>				0%	+10%			
		<i>use value =</i>			+20%	+30%	+40%			

Note: each cell of the table represents a combination of price and cost levels, and contains eight percentage target figures which represent the deliverable target for each of eight levels of alternative use value.

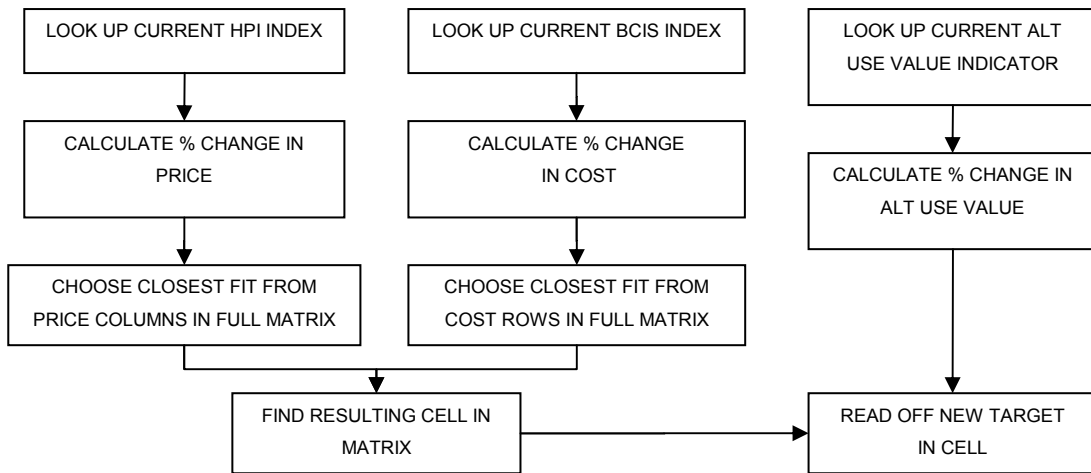
Source: Fordham Research AHVS 2010

- 9.16 The base cell (in both tables, the outlined cell coloured yellow) shows the situation for 0% change in either price or cost. This cell contains, in bold in the centre of the cell, a target figure of 25% – the maximum affordable housing target at current price and cost, and current alternative use value (AUV). There are seven other target figures in this cell; these show how the achievable target changes with movements in AUV alone. With price and cost unchanged, if AUV falls by 10% (right hand figure of top row), the target increases to 26%; with a 30% fall (left hand figure, top row) 28% becomes achievable. Conversely a rise of 10% in AUV (right hand figure, middle row) drops the achievable target to 24%. With rises of 20%-40% (bottom row) it drops further, to between 21-23%.
- 9.17 Adjoining cells in each table show what affordable target would be achievable with various combinations of price and cost change. Figure 9.1 makes it quite clear that if price moved sufficiently ahead of cost, it would become possible to increase the 25% target significantly. For instance, with a 20% increase in price but only 10% increase in cost, a target of 35% would become achievable (unless alternative use value also changed, when it could be in the range 32-37%). On the other hand, with a 10% cost increase and no change in prices, the target would drop to 12% (or indeed the range 8-15%).
- 9.18 Towards the top right of Figure 9.1, where price significantly outstrips cost, the percentages have been capped for reasons of practicability, with 60% being the maximum. All cells with 55% plus targets are coloured green. Towards the bottom left, where cost gets well ahead of price, the target falls to zero. All cells with less than 5% target are coloured blue; it is assumed a target of less than 5% would probably not be worthwhile - though that is a matter for the Council to decide.
- 9.19 The wide price and cost intervals in the Summary Matrix mean that the target changes quite abruptly from one cell to the next. However it does provide a useful overview. In the Full Matrix, as the extract in Table 9.2 shows, the changes are much smaller and allow the affordable target levels to be fine tuned – as they should be, since this is what should be used in practice to adjust the target as the index numbers change with the housing market in future.

Updating the target: worked example

- 9.20 The procedure for updating the target using the index figures set out in Table 9.1 is straightforward. A worked example is provided in Appendix 4. For convenience the process is summarised in Figure 9.2 below.

Figure 9.2 Summary of updating procedure

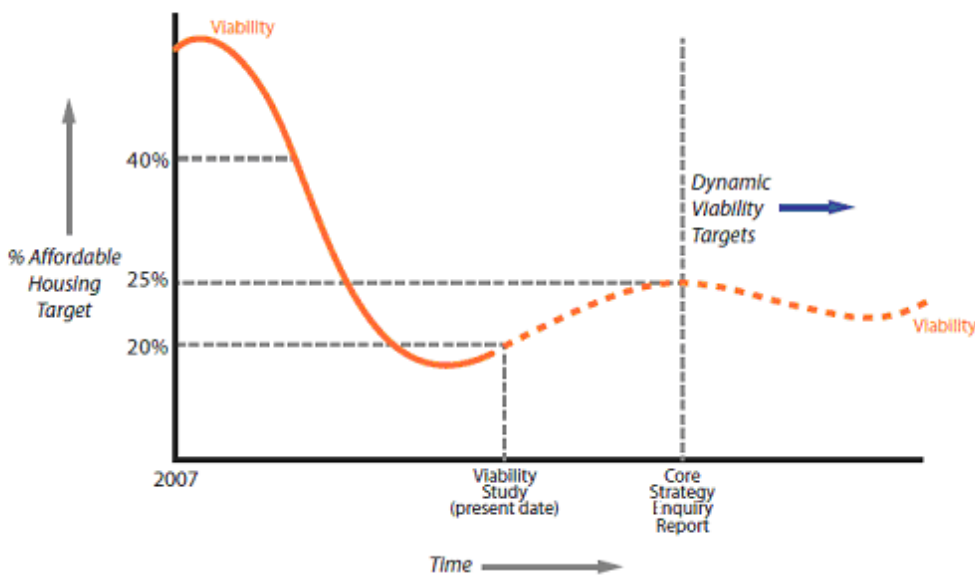


Source: Fordham Research AHVS 2010

Implementing Dynamic Viability

- 9.21 The Viability study which is the input into Dynamic Viability is part of the preparation of the Core Strategy Affordable Housing Policy. There will then be some delay until the actual Examination. During that period there may well be changes in the market.
- 9.22 It may be desirable to carry out an updating process such as summarised above immediately before the Examination, so that the Examination in Public has the benefit of the most up-to-date affordable target. The diagram below illustrates this general principle.

Figure 9.3 Implementing Dynamic Viability

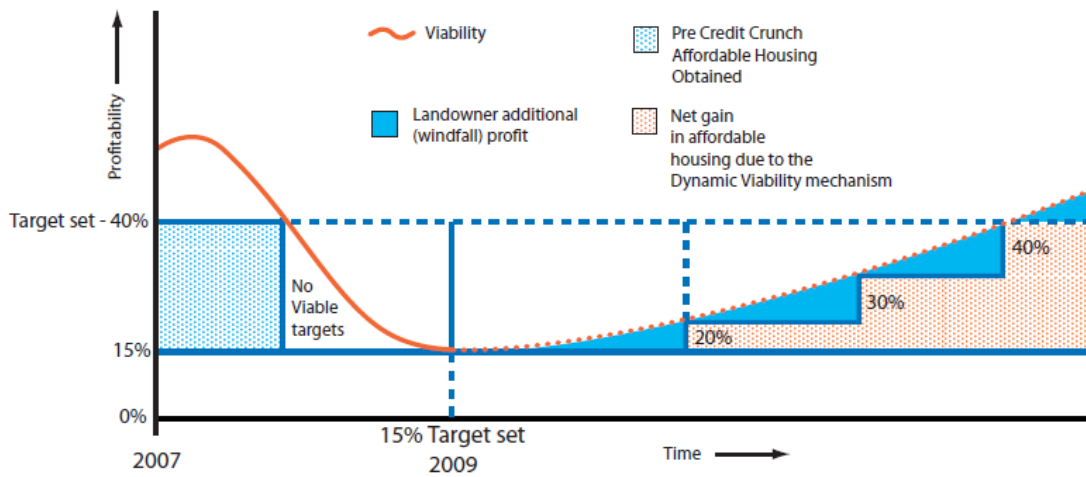


Source: Fordham Research AHVS 2010

9.23 The Inspector at the EIP may wish, on hearing the evidence, to revise the target level. Whether or not this is done, the EIP will determine the starting target for the plan period, and the future target evolution will then follow automatically from changes in the indexes, as illustrated in the diagram below.

9.24 Figure 9.4, not specific to York, shows that the landowners/developers will still have something to gain from any uplift in the market. The basic viability assessment assures the landowner and the developer of a reasonable return. When the market goes up, the private sector will gain a windfall profit (shown by the blue areas under the viability curve) and the public interest will gain affordable housing as the targets are periodically altered.

Figure 9.4 Gain of Affordable Housing from Dynamic Viability



Source: Fordham Research AHVS 2010

Appendix 4. Dynamic Viability details for updating

Benchmark site

- A4.1 It is proposed that the benchmark site appraisal be based upon an amended version of Site 5, Manor School Acomb. The minimal amendment is necessary to ensure it is just viable at the proposed target level of 25%.
- A4.2 The alternative use value for site 5 is as a combination of industrial/warehousing land and open space. Changes in alternative use value are to be determined by movements in the industrial value.

Updating and index values

- A4.3 The periodic review would be initiated by either an annual trigger point or whatever alternative is indicated by the LDF Inspector. It would involve establishing current values of the indices in the table below. For information the table shows the 'starting' values as at November/December 2009.

Table A4.1 Update indices		
Variable	Proposed index	Starting Value
House Price	Halifax House Price Index National (Monthly, Seasonally Adjusted) http://www.lloydsbankinggroup.com/media1/research/halifax_hpi.asp	Nov 2009 = 542.0
Build cost	BCIS General Building Cost Index http://www.bcis.co.uk/online	Dec 2009 = 287.3
Alternative use value	Valuation Office Agency Property Market Report Value of Industrial Land for <u>Leeds</u> http://www.voa.gov.uk/publications/property_market_report/pmr-jan-2010/index.htm	January 2010 = £600k per ha

Source: Fordham Research AHVS 2010

Matrix tables

- A4.4 The results from the sequence of appraisals were used to construct a Full Matrix which is set out in tables at the end of this Appendix. The Matrix provides for the full range of possible targets against a range of future possible changes in price, cost and Alternative Use Value.
- A4.5 Their use in updating the target is described in the Manual below.



Manual for Updating Dynamic Viability Targets

- A4.6 The Dynamic Viability procedure is designed to permit variations in the affordable target to ensure both that it remains broadly deliverable, and at the same time is adjusted to changing market conditions. It is based on three published indexes of house price, cost and alternative use value. It uses one of the sample sites as a representative benchmark site which provides the base target. This is set within a matrix of possible alternatives, triggered by index value changes.
- A4.7 The three stages set out in Table A4.2, and explained via a worked example overleaf are what is involved in updating Dynamic Viability. The inputs are the Full Matrix tables (set out at the end of Appendix 4), which are derived from analysis of the benchmark site, and the three indexes listed in Table A4.1. Two of the indices are free online and the third, BCIS, is an RICS product available on subscription, though Fordham Research can pass it on, as can most developers.
- A4.8 This description begins by summarising the tabulations. There are two schedules – a Full Matrix, and a Summary version. Each of these schedules contains a series of individual cells representing particular combinations of Price and Cost index values. In each cell there are eight affordable percentage targets, which correspond to eight possible values for the Alternative Use Value.
- A4.9 The **Full Matrix** is the one that is used in practice to update the affordable target. It therefore has to cover the widest range of possible changes in price and cost over the plan period. Furthermore it uses narrow (2%) intervals in the key price and cost indexes, in order to allow reasonably fine variations in the target. Because of this the Full Matrix is an extremely large table. It contains almost 1,500 cells and about 11,800 potential future targets.
- A4.10 The **Summary Matrix** covers the same spread of possible price and cost changes, but in much less detail, with only 10% intervals of price and cost. This allows a much more manageable table since there now only 72 cells and 576 potential future targets.
- A4.11 The summary table, provided as Figure 9.1 of this Annex, represents a useful overall summary. The additional cells in the Full Matrix simply provide targets for intervening points within the Summary Matrix. This means that the Summary Matrix could be used to represent the Full Matrix in some planning documents where it would be inconvenient or inappropriate to provide the Full Matrix.

Table A4.2 Updating the affordable target	
Step 1	
<p>The starting point is the Full Matrix table. Ascertain the update values for the HPI and BCIS. Calculate the percentage changes in the HPI and the BCIS. If either or both of these has changed by more than 1%, then the target cell will change.</p> <p>Find the HPI column that is closest to the change in the HPI, and the BCIS row that is closest to the change in the BCIS. Locate the cell where these intersect. It contains eight potential targets.</p>	
Step 2	
<p>Consider the percentage change to the Alternative Use Value. If this is greater than 5% then the starting value (% figure in centre of cell, in bold) is no longer correct and one of the other seven target figures in the cell will be closer. Choose the one that is closest.</p>	
Step 3	
<p>Publish the change in some suitable format such as the Annual Monitoring report.</p>	

Source: Fordham Research AHVS 2010

Worked example: York

- A4.12 This is designed to illustrate the (annual) updating process. The base indexes are as shown in Table A4.1 of this Appendix. The process for a notional future update is described below. It uses only the Full matrix outputs. These are related to the Benchmark site, derived from Site 5: Manor School.
- A4.13 **Step 1: Check the HPI and BCIS.** The base position for HPI (as at November 2009) is 542.0. The appropriate updating mechanism, as stated in Table 9.1, is the HPI (Halifax Price Index). The appropriate figure is in the Seasonally Adjusted National time series, from the Halifax website shown. Let us suppose that the update figure as at our future date is 636.3. Price has therefore risen by 17.4% [$636.3/542.0 = 117.4\%$].
- A4.14 BCIS base position is 287.3 (as at December 2009). The update mechanism is BCIS' General Building Cost Index. Figures for the current month will have Forecast status, those for the recent past few months Provisional. Let us suppose that for our future notional update, the appropriate update figure is 324.1. So cost has risen 12.8% [$324.1/287.3 = 112.8\%$].
- A4.15 Turning to the Full Matrix, find the Price column which is closest to the price change of +17.4%: it is the +18% column. Find the Cost row nearest to the cost change of +12.8%: it is the +12% row.
- A4.16 The Cell at the intersection of the +18% column and +12% row contains eight percentage targets. These are shown below; they range from 34% down to 28%.

34%	33%	32%
	31%	31%
30%	29%	28%

A4.17 The key to the Full Matrix (A4.22 below) shows how these eight percentage targets correspond to changes in alternative use value from -30% to +40%.

A4.18 **Step 2: Change to Alternative Use Value.** The Alternative Use Value of the site is determined by its use as agricultural land. The value of the Alternative Use Value indicator as at the base date was taken from the VOA’s Property Market Report January 2010. It shows a value for mixed vacant equipped agricultural land in Leeds at January 2010 at £600k per ha.

A4.19 Let us suppose the value has risen to £725k per acre at our notional update. It has therefore risen by 20.8% [$£725k/£600k = 120.8\%$]. The nearest available option is for an increase of 20% in alternative use value. Looking at the key, the appropriate target is in the bottom row, left hand side. This gives a figure of **30%** for the affordable target.

A4.20 **Step 3: Publicise target** Once a formal review point is reached, the target (whether changed or unchanged) should be put into a formal Council document.

Full Matrix tables

A4.21 The Full Matrix is set out as six tables. The key below may help navigation between individual tables.

Price	-20% to +6%	+8% to +34%	+36% to +60%	
Cost	-20% to +14%	Table 1	Table 3	Table 5
	+16% to +50%	Table 2	Table 4	Table 6

A4.22 Each price/cost cell in the Full Matrix contains eight different percentage targets. These relate to variations in alternative use value within each price/cost combination. The key below shows the percentage change in alternative use value which corresponds to each of the targets in the cell.

-30%	-20%	-10%
	No Change	+10%
+20%	+30%	+40%

A4.23 The six tables follow below.

Table A4.2 Full Matrix table (1 of 6)

CHANGE TO PRICE (HPI)

		-20%	-18%	-16%	-14%	-12%	-10%	-8%	-6%	-4%	-2%	0%	2%	4%	6%	
-20%	-20%	27%	25%	24%	30%	28%	27%	33%	31%	30%	36%	34%	33%	38%	37%	0%
	-18%	22%	21%	20%	26%	24%	23%	29%	27%	26%	32%	30%	29%	35%	34%	39%
-16%	-16%	19%	17%	16%	22%	20%	19%	25%	24%	23%	29%	27%	26%	32%	31%	36%
	-14%	15%	14%	13%	19%	18%	17%	23%	22%	21%	27%	25%	24%	30%	29%	34%
-12%	-12%	11%	10%	9%	15%	14%	13%	19%	18%	17%	23%	21%	20%	26%	25%	30%
	-10%	7%	6%	5%	11%	10%	9%	15%	14%	13%	19%	17%	16%	22%	21%	26%
-8%	-8%	3%	2%	1%	7%	6%	5%	11%	10%	9%	15%	13%	12%	18%	17%	22%
	-6%	0%	0%	0%	4%	3%	2%	8%	7%	6%	12%	10%	9%	15%	14%	19%
-4%	-4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	-2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
8%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	+10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
12%	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	14%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

CHANGE TO COST (BCIS)

Table A1.2 Full Matrix table (2 of 6)

CHANGE TO PRICE (HPI)

	-20%	-18%	-16%	-14%	-12%	-10%	-8%	-6%	-4%	-2%	0%	2%	4%	6%
16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
18%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
+20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
22%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
24%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
26%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
28%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
+30%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
32%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
34%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
36%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
38%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
+40%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
42%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
44%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
46%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
48%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
+50%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

CHANGE TO COST (BCIS)

Table A1.2 Full Matrix table (3 of 6)

CHANGE TO PRICE (HPI)		CHANGE TO COST (BCIS)																																																						
		8%	+10%	12%	14%	16%	18%	+20%	22%	24%	26%	28%	+30%	32%	34%																																									
-20%	58%	57%	56%	55%	54%	53%	52%	51%	50%	49%	48%	47%	46%	45%	44%	43%	42%	41%	40%	39%	38%	37%	36%	35%	34%	33%	32%	31%	30%	29%	28%	27%	26%	25%	24%	23%	22%	21%	20%	19%	18%	17%														
-18%	55%	54%	53%	52%	51%	50%	49%	48%	47%	46%	45%	44%	43%	42%	41%	40%	39%	38%	37%	36%	35%	34%	33%	32%	31%	30%	29%	28%	27%	26%	25%	24%	23%	22%	21%	20%	19%	18%	17%	16%	15%	14%	13%	12%	11%	10%	9%	8%	7%	6%	5%	4%	3%	2%	1%	0%
-16%	53%	52%	51%	50%	49%	48%	47%	46%	45%	44%	43%	42%	41%	40%	39%	38%	37%	36%	35%	34%	33%	32%	31%	30%	29%	28%	27%	26%	25%	24%	23%	22%	21%	20%	19%	18%	17%	16%	15%	14%	13%	12%	11%	10%	9%	8%	7%	6%	5%	4%	3%	2%	1%	0%		
-14%	51%	50%	49%	48%	47%	46%	45%	44%	43%	42%	41%	40%	39%	38%	37%	36%	35%	34%	33%	32%	31%	30%	29%	28%	27%	26%	25%	24%	23%	22%	21%	20%	19%	18%	17%	16%	15%	14%	13%	12%	11%	10%	9%	8%	7%	6%	5%	4%	3%	2%	1%	0%				
-12%	49%	48%	47%	46%	45%	44%	43%	42%	41%	40%	39%	38%	37%	36%	35%	34%	33%	32%	31%	30%	29%	28%	27%	26%	25%	24%	23%	22%	21%	20%	19%	18%	17%	16%	15%	14%	13%	12%	11%	10%	9%	8%	7%	6%	5%	4%	3%	2%	1%	0%						
-10%	47%	46%	45%	44%	43%	42%	41%	40%	39%	38%	37%	36%	35%	34%	33%	32%	31%	30%	29%	28%	27%	26%	25%	24%	23%	22%	21%	20%	19%	18%	17%	16%	15%	14%	13%	12%	11%	10%	9%	8%	7%	6%	5%	4%	3%	2%	1%	0%								
-8%	45%	44%	43%	42%	41%	40%	39%	38%	37%	36%	35%	34%	33%	32%	31%	30%	29%	28%	27%	26%	25%	24%	23%	22%	21%	20%	19%	18%	17%	16%	15%	14%	13%	12%	11%	10%	9%	8%	7%	6%	5%	4%	3%	2%	1%	0%										
-6%	43%	42%	41%	40%	39%	38%	37%	36%	35%	34%	33%	32%	31%	30%	29%	28%	27%	26%	25%	24%	23%	22%	21%	20%	19%	18%	17%	16%	15%	14%	13%	12%	11%	10%	9%	8%	7%	6%	5%	4%	3%	2%	1%	0%												
-4%	41%	40%	39%	38%	37%	36%	35%	34%	33%	32%	31%	30%	29%	28%	27%	26%	25%	24%	23%	22%	21%	20%	19%	18%	17%	16%	15%	14%	13%	12%	11%	10%	9%	8%	7%	6%	5%	4%	3%	2%	1%	0%														
-2%	39%	38%	37%	36%	35%	34%	33%	32%	31%	30%	29%	28%	27%	26%	25%	24%	23%	22%	21%	20%	19%	18%	17%	16%	15%	14%	13%	12%	11%	10%	9%	8%	7%	6%	5%	4%	3%	2%	1%	0%																
0%	37%	36%	35%	34%	33%	32%	31%	30%	29%	28%	27%	26%	25%	24%	23%	22%	21%	20%	19%	18%	17%	16%	15%	14%	13%	12%	11%	10%	9%	8%	7%	6%	5%	4%	3%	2%	1%	0%																		
2%	35%	34%	33%	32%	31%	30%	29%	28%	27%	26%	25%	24%	23%	22%	21%	20%	19%	18%	17%	16%	15%	14%	13%	12%	11%	10%	9%	8%	7%	6%	5%	4%	3%	2%	1%	0%																				
4%	33%	32%	31%	30%	29%	28%	27%	26%	25%	24%	23%	22%	21%	20%	19%	18%	17%	16%	15%	14%	13%	12%	11%	10%	9%	8%	7%	6%	5%	4%	3%	2%	1%	0%																						
6%	31%	30%	29%	28%	27%	26%	25%	24%	23%	22%	21%	20%	19%	18%	17%	16%	15%	14%	13%	12%	11%	10%	9%	8%	7%	6%	5%	4%	3%	2%	1%	0%																								
8%	29%	28%	27%	26%	25%	24%	23%	22%	21%	20%	19%	18%	17%	16%	15%	14%	13%	12%	11%	10%	9%	8%	7%	6%	5%	4%	3%	2%	1%	0%																										
10%	27%	26%	25%	24%	23%	22%	21%	20%	19%	18%	17%	16%	15%	14%	13%	12%	11%	10%	9%	8%	7%	6%	5%	4%	3%	2%	1%	0%																												
12%	25%	24%	23%	22%	21%	20%	19%	18%	17%	16%	15%	14%	13%	12%	11%	10%	9%	8%	7%	6%	5%	4%	3%	2%	1%	0%																														
14%	23%	22%	21%	20%	19%	18%	17%	16%	15%	14%	13%	12%	11%	10%	9%	8%	7%	6%	5%	4%	3%	2%	1%	0%																																

Table A1.2 Full Matrix table (4 of 6)

	8%	+10%	12%	14%	16%	18%	+20%	22%	24%	26%	28%	+30%	32%	34%
16%	19% 18% 17%	22%	20%	24%	26%	27%	28%	30%	31%	32%	33%	34%	35%	36%
18%	16% 14% 13%	17%	18%	19%	20%	21%	22%	23%	24%	25%	26%	27%	28%	29%
+20%	10% 9% 8%	13%	12%	11%	10%	9%	8%	7%	6%	5%	4%	3%	2%	1%
22%	8% 6% 5%	10%	9%	8%	7%	6%	5%	4%	3%	2%	1%	0%	0%	0%
24%	6% 5% 4%	8%	7%	6%	5%	4%	3%	2%	1%	0%	0%	0%	0%	0%
26%	4% 3% 2%	6%	5%	4%	3%	2%	1%	0%	0%	0%	0%	0%	0%	0%
28%	2% 1% 0%	4%	3%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%
+30%	0% 0% 0%	3%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
32%	0% 0% 0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
34%	0% 0% 0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
36%	0% 0% 0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
38%	0% 0% 0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
+40%	0% 0% 0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
42%	0% 0% 0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
44%	0% 0% 0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
46%	0% 0% 0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
48%	0% 0% 0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
+50%	0% 0% 0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

CHANGE TO COST (BCIS)



Table A1.2 Full Matrix table (6 of 6)

CHANGE TO COST (BCIS)	CHANGE TO PRICE (HPI)																						
	36%	38%	+40%	42%	44%	46%	48%	+50%	52%	54%	56%	58%	+60%										
16%	42%	41%	43%	43%	44%	45%	46%	47%	48%	48%	49%	49%	50%	50%	51%	51%	52%	52%	53%	53%	54%	54%	
18%	40%	40%	41%	41%	42%	43%	43%	44%	45%	45%	46%	47%	47%	48%	48%	49%	49%	50%	50%	51%	51%	52%	52%
+20%	39%	39%	40%	40%	41%	42%	42%	43%	43%	44%	44%	45%	45%	46%	46%	47%	47%	48%	48%	49%	49%	50%	50%
22%	41%	40%	42%	42%	43%	43%	44%	44%	45%	45%	46%	46%	47%	47%	48%	48%	49%	49%	50%	50%	51%	51%	52%
24%	38%	39%	40%	40%	41%	42%	42%	43%	43%	44%	44%	45%	45%	46%	46%	47%	47%	48%	48%	49%	49%	50%	50%
26%	36%	36%	37%	37%	38%	38%	39%	39%	40%	40%	41%	41%	42%	42%	43%	43%	44%	44%	45%	45%	46%	46%	47%
28%	34%	34%	35%	35%	36%	36%	37%	37%	38%	38%	39%	39%	40%	40%	41%	41%	42%	42%	43%	43%	44%	44%	45%
+30%	33%	32%	33%	33%	34%	34%	35%	35%	36%	36%	37%	37%	38%	38%	39%	39%	40%	40%	41%	41%	42%	42%	43%
32%	35%	34%	35%	35%	36%	36%	37%	37%	38%	38%	39%	39%	40%	40%	41%	41%	42%	42%	43%	43%	44%	44%	45%
34%	33%	32%	33%	33%	34%	34%	35%	35%	36%	36%	37%	37%	38%	38%	39%	39%	40%	40%	41%	41%	42%	42%	43%
36%	30%	29%	30%	30%	31%	31%	32%	32%	33%	33%	34%	34%	35%	35%	36%	36%	37%	37%	38%	38%	39%	39%	40%
38%	29%	28%	29%	29%	30%	30%	31%	31%	32%	32%	33%	33%	34%	34%	35%	35%	36%	36%	37%	37%	38%	38%	39%
+40%	27%	26%	27%	27%	28%	28%	29%	29%	30%	30%	31%	31%	32%	32%	33%	33%	34%	34%	35%	35%	36%	36%	37%
42%	24%	23%	24%	24%	25%	25%	26%	26%	27%	27%	28%	28%	29%	29%	30%	30%	31%	31%	32%	32%	33%	33%	34%
44%	22%	21%	22%	22%	23%	23%	24%	24%	25%	25%	26%	26%	27%	27%	28%	28%	29%	29%	30%	30%	31%	31%	32%
46%	19%	18%	19%	19%	20%	20%	21%	21%	22%	22%	23%	23%	24%	24%	25%	25%	26%	26%	27%	27%	28%	28%	29%
48%	17%	16%	17%	17%	18%	18%	19%	19%	20%	20%	21%	21%	22%	22%	23%	23%	24%	24%	25%	25%	26%	26%	27%
+50%	15%	14%	15%	15%	16%	16%	17%	17%	18%	18%	19%	19%	20%	20%	21%	21%	22%	22%	23%	23%	24%	24%	25%
	14%	13%	14%	14%	15%	15%	16%	16%	17%	17%	18%	18%	19%	19%	20%	20%	21%	21%	22%	22%	23%	23%	24%

Source: Fordham Research AHVS 2010