



**ASSESSMENT OF THE OBJECTIVELY ASSESSED HOUSING NEED
(OAN) IN HARROGATE COUNCIL'S HOUSING AND ECONOMIC
DEVELOPMENT NEEDS ASSESSMENT (HEDNA)**

FOR PANNAL AND BURNBRIDGE PARISH COUNCIL

OCTOBER 2018

Conyngham Hall Knaresborough Yorkshire HG5 9AY (01423) 869547 info@aapanning.co.uk

Arrowsmith Associates LLP is a limited liability partnership registered in England No. OC375369
Registered office: Conyngham Hall, Knaresborough, Yorkshire.
Partners: George Arrowsmith BA(hons), MCD, MRTPI & Richard Clark BA(hons), DipTP, MRTPI.
Associate: Mike Croft MA, DipTP, MRTPI.

CONTENTS

1. INTRODUCTION
2. BACKGROUND
3. ANALYSIS OF THE HEDNA REPORT INSOFAR AS IT RELATES TO OBJECTIVELY ASSESSED HOUSING NEED
4. SUMMARY ASSESSMENT OF HEDNA REPORT INSOFAR AS IT RELATES TO OBJECTIVELY ASSESSED HOUSING NEED
5. ADDITIONAL COMMENT ON HOW THE OAN IS USED IN THE SUBMISSION DRAFT OF THE DISTRICT PLAN

1. INTRODUCTION

This report follows an earlier report to the Parish Council in September of this year.

It is an analysis of those parts of the HEDNA that relate to the objectively assessed housing need (OAN). As such it requires extensive cross-referencing to the HEDNA itself. A general appreciation of our conclusions can be gained without reading the third section of this report – the analysis itself.

2. BACKGROUND

The 2016 Draft Local Plan for Harrogate District included a district-wide housing requirement of 557 dwellings per annum (dpa). The HEDNA (updating this figure) makes two separate assessments of objectively assessed housing need (OAN). These are:

Based on demographic evidence: 410dpa (i.e. over the period 2015-2035)

Employment led assessment: 669dpa

In addition, the HEDNA considers two further assessments of OAN. The figure of 669dpa is calculated using economic activity rates derived from Experian. One of the further assessments is calculated using activity rates derived from the Government's Office for Budget Responsibility (OBR). The other is calculated using employment rate data derived from Oxford Economics (OE), who also provided the HEDNA employment forecasts. These further assessments are:

OBR derived: 785dpa

OE derived: 460dpa

Since the publication of the HEDNA, the latest 2016-based household projections from the Office for National Statistics (ONS) – published in September 2018 - show a 24% decrease in the number of additional households per annum when compared with the 2014-based projections which were published in 2016.

The recently revised National Planning Policy Framework (NPPF) says (in paragraph 60) that to determine the **minimum** number of homes needed in an area, strategic policies should be informed by a local housing needs assessment conducted using the standard method described in national planning guidance.

This standard method was described in an appendix to our September Report. Application of the standard method, as described in another appendix to our September Report gives a minimum requirement of 432dpa¹. It is nevertheless important to recognise that the standard method is intended to define a minimum requirement and that local planning authorities may plan for higher levels of housing provision if they are justified by local circumstances, including economic growth strategies.

We repeat our understanding (from our previous report) that, where a plan is based on an assessment of local housing need in excess of that which the standard method would provide, Planning Inspectors are advised to work on the assumption that the approach adopted is sound unless there are compelling reasons to indicate otherwise. We also repeat our reference to paragraph 214 in the revised National Planning Policy Framework (NPPF), which says that the policies in the previous NPPF will apply for the purpose of examining plans, where those plans are submitted on or before 24 January 2019. Since Harrogate Council submitted their Local Plan before that date they do not intend to revise the OAN derived from the HEDNA.

There is clearly significant uncertainty about the housing requirement underpinning the Local Plan. This report has been prepared in the context of that uncertainty. Our clients do not have the financial resources to produce an independent estimate of housing need. However, the assessment set out in this report demonstrates a number of concerns over the OAN the HEDNA sets out and therefore the soundness of the submitted plan which it underpins. We conclude that there is enough uncertainty about that need for the approach of the plan to be reconsidered.

The main part of this report will concentrate on the HEDNA methodology and our reservations about its reliability. Our comments will follow the structure of the HEDNA report using its chapter headings and its paragraph table and figure numbering. It is important to emphasise that our report is concerned only with those aspects of the HEDNA that affect its assessment of housing need.

¹ Calculation based on published household projections for Harrogate District from a 2014 base. These were the projections which were extant at the time the HEDNA was produced. Our calculations were based on published household data, which are rounded to the nearest thousand. Estimate of housing need are therefore approximate. In September 2018 the Office for National Statistics produced projections from a 2016 base. Superficially, these suggest a reduced OAN but this should be viewed with caution because of rounding errors. Our understanding is that the HEDNA assessments are based on computer modelling, which used more detailed unrounded data.

3 ANALYSIS OF THE HEDNA REPORT INSOFAR AS IT RELATES TO OBJECTIVELY ASSESSED HOUSING NEED

Chapter 1: Introduction

No comment

Chapter 2: Interrogating Demographic Trends

Table 5 and paragraphs 2.36 – 2.38 also Tables 7 & 8 and para 2.48

The comment in para 2.36 that the lower growth shown in the SNPP (sub national population projections) is influenced by recent past under-delivery of housing seems valid. In this context the decision to take forward the 10-year migration trends seems reasonable, as does the later decision to uplift headship formation rates for the 25-34 age group (see HEDNA para 2.48 and tables 7 & 8). When compared to the 2014 based SNPP projection of 296dpa, the 10-year migration trend estimate of 360dpa represents an increase of 21%. The further increase to the same 10-year migration trend from uplifting the headship formation rate for the 25-34 age group is a further 14%. The application of the two corrective factors to give a 39% total uplift to 410dpa is a very substantial adjustment, but one we do not challenge.

General comment on chapter 2

HEDNA chapter 6 (Housing Market Dynamics and Market Signals) identifies affordability problems that could justify increasing the OAN beyond the 296dpa suggested by the 2014 based SNPP. However, the adjustments discussed above are a response to these past problems, and lead to the HEDNA's eventual demographic based OAN of 410dpa. The question of whether the past affordability problems justify a further uplift to the demographically derived OAN is not resolved by the HEDNA because its preference for a much higher employment led OAN makes the issue irrelevant.

Chapter 3: The Economy and Labour Market

No comment

Chapter 4: Employment Forecasts

Table 13 and paras 4.16 – 4.25

The increase from the OE forecast of 11,400 jobs between 2014 and 2035 (see HEDNA para 4.11) to 12,200, appears to be aspirational, based on the aims of two Local Enterprise Councils and Harrogate District Council. We have no evidence of concrete policy measures to achieve this increase.

Chapter 5: Employment Led Housing Need

This is the centrally important part of the HEDNA, at least as far as housing need is concerned.

Figure 27 and paras 5.11 – 5.16

HEDNA Paragraph 5.13 and Figure 27 suggest that there was a 6,100 growth in jobs in Harrogate District between 2014 and 2016. The HEDNA says that this compares with a forecast growth in jobs of just over 4,700 over the same period, although no source is given for this figure. Paragraph 5.16 then says that the jobs growth forecast for the remaining 2016-2035 period is 8,766 additional jobs. The justification for this figure is opaque. The additional jobs forecast for the period 2014-2035 is 12,200 (table 13). If 6,100 of these jobs had been created by 2016, one would expect the additional jobs to be created over the remaining period from 2016-2035 also to be 6,100 (i.e. 12,200 - 6,100).

A significant aspect of Figure 27 is that it shows that the increase in jobs from 2014 to 2016 was accompanied by an increase in the employment rate. This suggests that it did not lead to any increase in the number of households, although the number of households could have changed for other reasons (see further discussion below).

Paragraph 5.16 is confusing. It says: *"the analysis below has modelled the population growth and housing need required to meet the job growth forecast for the 2016-35 period – this is 8,766 additional jobs. The outputs are still provided for the 2014-35 period, with data from 2014-16 being taken from the SNPP and CLG (Communities and Local Government) household projections (including an adjustment for the 2015 MYE" (Mid-Year Estimate).* The quote does not explain how data for the two periods – 2016-2035 and 2014-2016 – are to be combined to produce a coherent output. We have not found a cogent explanation anywhere in the HEDNA (but see also our general comment on paragraph 5.33 and Tables 17 & 18 below).

Table 16 & paras 5.19-5.23

Table 16 shows that, when adjustments are made to the 8,766 figure to account for in-commuting and double jobbing, the growth in economically active residents required to meet the job forecast reduces to 8,233. By way of comparison, a similar adjustment to the 6,100 figure we have calculated above would result in a requirement for 5,729 economically active residents.

Paragraphs 5.24-5.31, Table 17 and Figures 29 and 30

Para 5.24 says: "Having studied the likely level of job growth and the required changes to the economically active population the next stage is to estimate the change in the resident labour supply". This appears to be mis-statement because, as the first sentence of paragraph 5.23 makes clear, the economically active population is the same as the resident labour supply. In fact, paragraphs 5.24-5.31 appear to be concerned with converting an economically active population to a total population aged 16 and above, as shown in Figure 30.

Figure 30 – which, from our reading, forecasts an economic activity rate of 61% at 2035 - is based on forecast age and sex specific activity rates derived at national level and provided by Experian. Since Figure 30 (and the contributory Figure 29 and Table 17) projects the economic activity rate to 2035, we assume that the HEDNA must have used projected age/sex data for 2035, which could have been obtained from SNPP data. However, this is not stated in the HEDNA.

The population aged 16 and above required to service the forecast increase in jobs is not stated. Our understanding is that the modelling used to forecast the required change in households uses the activity rate information to calculate the future population in each age/sex category, as opposed to an overall population. HEDNA paragraph 5.28 merely says that the activity rates have been adjusted on the basis of census data to match actual age/sex specific data for Harrogate District.

Para 5.32

Para 5.32 refers to data sources, other than Experian, (i.e. OBR and OE) which allow the HEDNA to produce alternative estimates of housing need.

Para 5.33 and Table 17 & 18

Table 18 forecasts the total number in households in 2035. The relationship between this figure and the preceding paragraphs 5.16 to 5.33 is obscure. The intermediate stages in deriving Table 18 are not specified, beyond the HEDNA saying that they entail using the Experian derived economic activity rates and CLG (Communities and Local Government) headship rates.

We assume that calculating the figures in Table 18 involved processing disaggregated data through computer modelling. Through this process the application of the activity

rates in Table 17 to an age structure relevant to 2035 could have derived Figure 30. The activity rate in figure 30 could then have been used to convert the 8,766 job increase in paragraph 5.16 to a population aged 16 and above. Finally, the application of CLG headship rates could have converted the 16+ population to the related number of households.

What is unclear is how an estimate of the number of households required to service a job increase from 2016 to 2035 could have been adjusted to an increase of the number of total households from 2014 to 2035. Lacking any information on HEDNA's adjustment we have made our own cursory analysis using data in the Experian report. The analysis follows:

- With a 61% activity rate (from Figure 30) a job increase of 8,233 would equate to a population age 16 and over of 13,497.
- Application of the same 61% figure to the alternative 5,729 increase (calculated in our comment on Table 16 & paras 5.19-5.23) would equate to a population age 16 and over of 9,392.
- Based on the 2014 based SNPP projections for Harrogate District (as used in the HEDNA) the population aged 16 and over in 2035 will be 83.5% of the total. On this basis a 13,497 population aged 16 and over would equate to a total population of 16,164 whereas a 9,392 population aged 16 and over would equate to a total population of 11,248.
- Based on the same 2014 based SNPP projections, average household size in Harrogate District in 2034 (output not available for 2035) will be 2.13 persons. Applying this figure, the additional number of households required to service an 8,233 increase in job would be $16,164 \div 2.13 = 7,589$ households. The additional number of households required to service a 5,729 increase in jobs would be $11,248 \div 2.13 = 5,281$ households.
- The figures in the preceding bullet point would be the change in households attributed to employment growth over the period 2016-2035.
- According to Figure 27 in the HEDNA report the 6,100 increase in employment in Harrogate District from 2014 to 2016 was accompanied by an approximately 6.4% rise in the employment rate. This suggests that it did not result in any increase in households, although the Office for National Statistics mid-year rounded estimate suggests an increase of 1,000
- Adding the mid-year estimate of 1,000 additional households between 2014 and 2016, gives a total employment-led household change from 2014 to 2035 of between 6,281 and 8,589. Since we question HEDNA's estimate of an 8,766 job increase from 2016 to 2035 was derived, a requirement for internal consistency leads us to favour the lower figure, which is based on our own calculation of a 6,100 increase in jobs over that period.
- Our estimate of the employment led change in households per annum from 2014 to 2035 is therefore only 299 ($6,281 \div 21$ years).

The above analysis is not put forward as estimate of OAN. Instead it is an alternative estimate of the number of households required to service HEDNA's forecast increase in employment from 2014 to 2035, ignoring all other factors affecting housing need.

In the absence of supporting information in the HEDNA, it appears that the 2035 household figure in Table 18 has been calculated on the assumption that additional households will be required to service the whole of the 12,200 anticipated job increase from 2014 to 2035. Certainly, if the 12,200 job increase was fed into our cursory analysis we would obtain a figure of 11,246 change in households, almost identical to the 11,787 increase forecast in Table 18.

It might be that, despite the indications in paragraphs 5.24 -5.31, the input to the HEDNA model was not an increase in jobs but the total number of jobs in 2035. The significant increase in employment from 2014 to 2016 and the effect this had on household formation would then be irrelevant to the model. If this is the approach taken by the HEDNA, it is logically consistent. However, the issue then becomes the relevance of Harrogate's spurt in employment between 2014 and 2016 to the data input to the HEDNA model. The possibility that it suggests a higher job forecast appears to have been discounted, and we assume was taken into account by Oxford Economics. However, the effect on the Experian derived economic activity rates cannot be discounted, especially because they were derived at national level.

Figure 27 summarises the economic activity data. What is significant is that the Experian driven data suggests a departure from the historic trend. The trend for Harrogate District (i.e. the red line in Figure 30) suggests a smaller decline in the overall economic activity rate, and therefore a lower household need, than that forecast by combining Experian activity rates with SNPP and CLG forecasts. This does not mean that an estimate of future households derived using the Experian data is necessarily wrong, but it raises the possibility that it might not reflect local conditions. In this context, the evidence of Figure 27 that the employment growth from 2014 to 2016 did not generate a growth in households cannot be discounted

If the 6,100 increase in jobs from 2014 to 2016 did not generate an increase in households, the only way of rationalising the HEDNA household forecast is that the 11,787 increase from 2015 to 2035 will be needed partly to service the residual job increase from 2016 to 2035 (whether that is 6,100 or 8766 jobs) and partly to fill the gap in the employment market arising from a significantly decreasing activity rate. At the very least this is a contentious scenario.

Table 18 also gives alternative projections of housing need based on OBR and OE data.

The OBR figure, which is significantly higher than the HEDNA figure, is rejected because it envisages a lower level of employment growth than that envisaged by the HEDNA. Reflecting a lower level of employment growth, the OBR data assumes that economic activity rates also will be lower. If these lower activity

rates were then applied to the more optimistic HEDNA employment data they would suggest that a disproportionately high number of households would be required to provide the workers to take the additional jobs. This would be logically inconsistent because the HEDNA job estimates and the OBR activity rates are based on different economic scenarios. We therefore agree that the HEDNA correctly discards the OBR projection.

The HEDNA gives no clear reason for dismissing the OE projection. It says, *"The OE data as an output of the baseline modelling and is to some extent 'flexed' to allow for a range of variables within the model to be consolidated"*.

The HEDNA gives no indication of how the OE data was used to provide an estimate of household change and it is therefore difficult to appraise the housing need projection derived from it. However, given our concerns at what we see as inconsistencies and lack of clarity in the HEDNA report and the HEDNA's recognition that the OE data is based on a consolidated model, we are not convinced by the HEDNA's preference for what it describes as the 'Experian rates' projection. In fact, the 'Experian rates' projection is essentially a HEDNA projection which uses Experian data as part of its input.

The information in the HEDNA does not allow us to appraise the OE estimate of OAN. We have contacted Oxford Economics who have provided us with a copy of the 'headline results' they provided to G L Hearn (the authors of the HEDNA). These headline results contain information that could be used as part of a process of estimating the required change in the number of households. It does not of itself however contain enough information to estimate that change. Oxford Economics inform us that G L Hearn produced the housing number and that Oxford Economics cannot comment on their results or how they have calculated them.

We have considered whether we should use the OE headline data with HEDNA data to check HEDNA's OE based estimates of household change. We have not done so because of the uncertainties that would be involved. We note however that OE forecast a resident employment rate of 68% for Harrogate District in 2035. This is not directly comparable with the 61% figure in HEDNA Figure 30 (which relates to the economic activity rate of all persons aged 16 and over). In addition, we do not know whether the OE employment rate relates to all persons aged 16 and over or to those aged 16-64. Even so, the discrepancy between the 61% and 68% figures suggests a possible explanation of the difference between the Experian and OE based estimates. It is further evidence that the HEDNA might have overestimated the OAN.

The HEDNA does not explain why Table 18 uplifts its household change figures to produce a somewhat higher forecast dwelling need per annum. However, by analogy with Chapter 2, we assume that is to reflect the anticipated vacancy rate, which is a reasonable adjustment

Paragraphs 5.35 & 5.36 and Table 19

The HEDNA uplifts the change in dwellings and required number of dwellings by around 10% to reflect historic suppression of household formation (as reflected in SNPP projections) for the 25-34 age group. This reflects the uplift made to the demographic housing need projection. We do not question it.

Chapter 6: Housing Market Dynamics and Housing Market Signals & Chapter 7: Affordable Housing Need

Although these are important issues which affect planning policy and would need to be considered in formulating any alternative OAN, they do not affect HEDNA's OAN and therefore are not considered in this report.

Chapter 7: Objectively Assessed Housing Need

This chapter is a summary of the more detailed analysis in HEDNA chapters 2-5.

The remainder of the HEDNA is not concerned with the objectively assessed housing need.

4. SUMMARY ASSESSMENT OF HEDNA REPORT INSOFAR AS IT RELATES TO OBJECTIVELY ASSESSED HOUSING NEED

The decision to base the OAN on forecast employment growth raises a policy issue that is not debated in the submitted plan, the HEDNA itself nor, as far as we are aware, in discussion leading to Harrogate Council basing its Local Plan on the OAN. The OAN exceeds the minimum requirement calculated using the Government's standard method by a significant amount. It must be recognised that:

- government advice allows local planning authorities to plan for higher levels of housing provision if they are justified by local circumstances, including economic growth strategies, and that
- the revised National Planning Policy Framework (NPPF) says that the policies in the previous NPPF (which do not require the application of the standard method) will apply for the purpose of examining plans, where those plans are submitted on or before 24 January 2019.

Nevertheless, the degree to which the HEDNA derived OAN exceeds that from the standard method – i.e. 67% - raises the issue of whether the scale of land release, and the consequent environmental harm required by the employment led OAN justifies maximising employment growth. In formulating the Local Plan, and especially in adding further development allocations in 2017 the Council appear to have interpreted the OAN as a truly objective measure and have failed to address this policy issue.

Even within its own terms we are not convinced that the HEDNA decision to uplift the OE forecast of a 11,400 job increase from 2014 to 2035, to reflect the aspirations of two LECs and the District Council, is justified.

The way the HEDNA calculates the residual job increase of 8,766 from 2016 to 2035 is unclear.

The steps taken to derive the 2035 household figure in HEDNA Table 18 from the job increase of 8,766 from 2016 to 2035, the activity rates summarised in Figure 30 and CLG headship rates are unclear. A particular problem is that HEDNA's chain of logic up to that point appears to depend on linking a job **increase** from **2016** to 2035 to the **total** number of households in 2035 and a change in the number of households from **2014** to 2035. This is especially concerning since it is not clear how the HEDNA deals with the 6,100 job increase from 2014 to 2016 and its effect on the number of households.

The available evidence suggests (although with some uncertainty) that the HEDNA modelling was actually based on the total forecast increase in jobs from 2014 to 2035. This was then converted to a related increase in households using SNPP population projections, nationally derived Experian data on activity rates and CLG projections of household formation rates. We have reservations

about the validity of the Experian data given the significant differences between Harrogate and national conditions. A particular concern is that the reported 6,100 increase in jobs from 2014 to 2016 does not appear to have resulted in any significant increase in households.

Our difficulty in understanding how the figures in Table 18 were derived has led us to make our own cursory estimates of the number of households required to service the increase in jobs from 2016 to 2035. In making these estimates we used the HEDNA derived economic activity rates in Table 30 plus SNPP projections for the age structure and average household size in Harrogate District in 2035. These figures are significantly lower than those projected in HEDNA Table 18 for the change from 2014 to 2016.

Four factors therefore lead us to question the figures in HEDNA Table 18

- our uncertainty about how the residual job increase from 2016 to 2018 was derived,
- HEDNA's failure to clarify how the housing need based on that residual increase was translated into a need for the longer period from 2014 to 2035. Our own naïve analysis
- the apparent evidence that the 6,100 job increase from 2016 to 2035 did not lead to any significant increase in households and the HEDNA's failure to explain how this affected the figures in Table 18. Our own naïve analysis suggests that, if the position in 2016 is taken as a base, the change in households over the period 2014 to 2035, is significantly lower than that forecast by the HEDNA.
- Doubt about the applicability of the nationally derived Experian data on changes to age/sex specific activity rates in the light of differences between Harrogate and national conditions.

Our reservations about the HEDNA derived OAN are supported by other figures in Table 18. These suggest alternative estimates of household change based on OBR (Office for Budget Responsibility) and OE (Oxford Economics) data. We agree with the HEDNA that the OBR based estimate can be discounted because it is based on a lower level of economic growth than that assumed in the HEDNA forecasts for Harrogate District. However, the OE estimates cannot be dismissed so easily. In fact, the HEDNA says: "*The OE data as an output of the baseline modelling and is to some extent 'flexed' to allow for a range of variables within the model to be consolidated*". It is also relevant that the job forecasts from which the HEDNA derives its favoured OAN are themselves derived from an OE model. The HEDNA offers no convincing reason for discounting the OE estimate beyond noting that Oxford Economics do not publish age and sex specific data about how economic activity rates might change.

It is relevant that the OE rates projection in Table 18 is closer to our cursory analysis of household change than it is to HEDNA's favoured projection.

In conclusion we are not satisfied that the HEDNA amounts to proportionate evidence sufficient to support the Local Plan's housing requirement.

5. ADDITIONAL COMMENT ON HOW THE OAN IS USED IN THE SUBMISSION DRAFT OF THE DISTRICT PLAN

For context we reproduce below appendix 3 to our September 2018 Preliminary Appraisal of the HEDNA Housing Assessment describing how the HEDNA OAN feeds into the Plan's allocation strategy (slightly edited to remove typing errors). (Text of the appendix in italics)

Over the 2014-2935 plan period the amount of housing required in accordance with the HEDNA derived OAN is 14,049 (i.e. 669 X 21) (see table with paragraph 10.31 of the publication draft of the Plan. To compare this figure with the capacity of the sites allocated in the Plan it is necessary to:

- *add 972 homes to make up for a shortfall in supply*
- *subtract 1035 for the homes completed between 2014 and 2017*
- *subtract 5938 for homes which are either under construction or have planning permission, and*
- *subtract a 1455 windfall allowance from as yet unidentified sites over the plan period*

Paragraph 10.36 in the submission draft says that the Plan makes provision for 16077 dwellings over the plan period. On the assumption that this figure includes completions from 2014-2017 and expected windfalls, this is 14.4% above the HEDNA derived OAN. If one excludes the 972 homes required to make up for the shortfall at the beginning of the plan period, the net provision reduces to 15,105, an excess over the HEDNA figure of 1056 homes, or 7.5%. The 15,105 total is nevertheless 67% higher than the 9072 figure derived from the Government's standard method (i.e. 432 (annual need) X 21 (years in plan period)).

In view of the uncertainty about the HEDNA derived OAN, the plan could be judged not to meet the tests of soundness for not being:

Positively prepared

or

Justified

We certainly have not been able to identify a robust evidence base in support of the OAN set out in the HEDNA and consider further justification or a revision of the figure to be appropriate.

If no acceptable replacement is identified, the Plan could be revised to incorporate phasing. Without phasing, following the Plan's adoption, there would be a presumption in favour of developing any allocated site. This would be especially damaging in the case of those sites where development entails acknowledged social and environmental costs but where the site has been allocated to meet assumed needs.

Phasing could identify those sites that would only need to be developed later in the plan period if their release is required to meet emerging housing needs as assessed through the monitoring of delivery and updating of the OAN. To avoid unnecessary commitment, it would be possible to identify the longer-term possibility as 'Areas of Search', an approach adopted by some other planning authorities.

Arrowsmith Associates

October 2018