



Reviewing the evidence on population growth resulting from provision of new homes in the Tees Catchment

April 2023

SUMMARY OF KEY POINTS

Natural England has taken an assumption that each new home will result in an extra 2.4 persons resident in the local area

The local planning authorities in the Tees Catchment commissioned ORS to consider the weight to be placed on that assumption and prepare an evidence-based review of the relationship between population growth and provision of new homes

The review first considered the relationship nationally, and then considered relevant details about the local circumstances in the Tees Catchment

Based on the evidence, ORS concluded that the annual change in dwelling stock has very limited influence on annual population nationally – building either more or less homes across England is unlikely to result in higher or lower population growth

There is a clear correlation between the change in population and dwelling stock by local area: larger increases in stock tended to result in larger increases in population, lower increases in stock resulted in lower population increases

Four fifths of all local areas had an average that was lower than the Natural England assumption of 2.4 persons

The resident population living in the Tees Catchment increased by 24,800 persons over the intercensal period 2011 to 2021 and the stock increased by 41,000 dwellings, equivalent to an average gain of 0.60 persons per dwelling across the area

Allowing for natural population change and a reduction of residents living in communal accommodation increased this average to 0.71 persons per dwelling

Further analysis of the population data demonstrated that a baseline of new housing provision was needed to accommodate changes to the local population, with further provision enabling migrant population to move to the area

As a consequence, the relationship between population growth and the provision of new homes is non-linear – and considering the evidence for the Tees Catchment, the average number of persons per dwelling is sensitive to the overall rate of delivery

Based on the evidence about the specific area within the Tees Catchment boundary, the increases in population for the individual LPAs range from 0.05 persons up to 1.31 persons per dwelling on average

These averages provide the most appropriate starting point for each local area

Setting the Context

1. The Local Planning Authorities (LPAs) covering the Tees Catchment are working in partnership and have commissioned Opinion Research Services (ORS) to undertake an evidence-based review of the relationship between population growth and the provision of new homes. More specifically, the Councils want to understand the weight that can be placed on the assumption by Natural England that each new home will result in an extra 2.4 persons resident in the area.
2. Given that context, the review first establishes the relationship nationally, and then considers the local circumstances. It is important to note that the review does not seek to reassess the housing market or wider housing need in the area, but considers evidence based on previous population growth resulting from the provision of new homes in the Tees Catchment.

Assessing Nutrient Neutrality

3. Natural England has issued advice to help ensure that new developments do not harm internationally protected Habitats Sites. This advice comes with tools and guidance to help demonstrate “Nutrient Neutrality”.¹
4. The Nutrient Neutrality advice requires LPAs in affected areas to assess the additional burden of nutrients arising as a consequence of new development. This relates to all types of development that result in a net increase in population served by a wastewater system, including new homes and other accommodation.
5. As part of their advice, Natural England published a “Nutrient Neutrality Generic Methodology” which provides guidance to LPAs that are required to prepare assessments (page 6):

This practical methodology sets out an approach to calculating how nutrient neutrality can be achieved. This methodology is based on best available scientific knowledge and will be subject to revision as further evidence becomes available. It is our advice to local planning authorities to take a precautionary approach in line with existing legislation and case law when addressing uncertainty and calculating nutrient budgets.

6. The methodology includes a “Nutrient Budget Calculator” and it is recommended that this is used to generate nutrient budgets for each development (page 8):

The nutrient neutrality calculation includes key inputs and assumptions that are based on the best available scientific evidence and research. It has been developed as a pragmatic tool. However, for each input there is a degree of uncertainty. For example, there is uncertainty associated with predicting occupancy levels and water use for each household in perpetuity.

7. The nutrient budget calculation is set out in four stages, and step 1 of the first stage calculates the increase in population due to the development. The aim is to identify the total additional

¹ <http://publications.naturalengland.org.uk/file/4929269741649920>

population (number of people) that will result from the development, based on the following calculation (page 10):

No. of new dwellings/units x residents per dwelling value (number of people)

8. Further details on this step of the calculation are set out on pages 13-17 of the guidance, which identifies that that (page 13):

The increase in population is calculated using a residents per dwelling/unit value that is multiplied by the number of dwellings within the development

The residents per dwelling value can be derived from national data providing it reflects local conditions

When using national occupancy data, the Office of National Statistics (ONS) national average value for the number of residents per dwelling of 2.4 is recommended

If national data does not yield a residents per dwelling/unit value that reflects local occupancy levels then locally relevant data should be used instead

Appropriate Assessments [should] specifically include justification for why the competent authority has decided upon the occupancy rate that has been used.

9. The guidance provides further specific advice with regard to locally relevant occupancy data (page 14):

If a Local Planning Authority decides to use a locally relevant value, that value needs to be supported by robust and sufficient evidence

A local / regional average occupancy rate can be used provided that it is from a robust source which can show trends over a protracted period of time

Figures derived from data collected over short periods of time will not be acceptable as short-term data is unlikely to provide the required degree of certainty

A local / regional average occupancy rate would therefore need to be based on figures over at least a 5-year period

The figure of 5 years has been chosen as the minimum period of time over which occupancy rates can be calculated from as local plans and WRMPs are reviewed every 5 years, so represents a long enough period of time to capture any trends or changes.

10. However, there is an apparent disconnect between the “residents per dwelling/unit value” and the overarching objective. The detailed calculation that is proposed provides a robust basis for determining the **overall** population that is likely to be resident in the new development, whereas the guidance sets out at the outset that “this input determines the **additional** population that will result from a new residential development” (page 13, emphasis added).
11. Whilst the overall population could, in some circumstances, be the same as the additional population, this would depend on all of the new residents having migrated to the area. If any residents were already living in the area, then they would not form **additional** population despite being counted in the **overall** population.

12. This difference has been considered by the High Court,² and subsequently the Court of Appeal.³ Both Judgments are detailed and address a number of different issues. However, the appeal was dismissed, and the original Judgment can still be relied upon.
13. The appeal Judgement summarises the judge's conclusions on the "appropriate assessment" grounds (emphasis added):

37. Jay J. was **critical of the approach to occupancy rates in Natural England's technical guidance note**, and of the council's use of an occupancy rate of 2.4 persons per dwelling in this case. But adopting the degree of deference he thought right in the circumstances, and approaching the matter on a Wednesbury basis, he concluded that the use of the 2.4 occupancy rate was sufficiently precautionary. He concentrated, in particular, on two "precautionary elements" of the appropriate assessment that could "legitimately be brought into account": first, that "the relationship [between occupancy rates and water usage] is not one of direct proportionality", and second, that **"the algorithm assumes 100% migration to the area"** (paragraph 84 of his judgment). He was "satisfied that there was an adequate precautionary leeway afforded by [these] two key factors" (paragraph 86). He added, however, that the technical guidance note would need to be reviewed in the light of his judgment (paragraph 87).

14. This conclusion had been based on the following point as summarised in the original Judgement (emphasis added):

68. Seventhly, the 2.4 figure is additionally protective because **it assumes that all occupants of each new dwelling are moving into the affected catchments, which does not reflect the real world.**

15. In the context of this specific case, the consequence of these conclusions was that the assumed occupancy rate of 2.4 persons was likely to be higher than the total additional population (number of people) that would result from the development, and it was therefore not necessary to assume an even higher figure (as was being argued).
16. Although Mr Justice Jay accepted the use of the 2.4 person assumption on the basis that it was sufficiently precautionary (and dismissed the need for a higher figure) the fact that he rightly acknowledged that "the algorithm assumes 100% migration to the area" (and that this evidently does not reflect the real world) is clearly an important consideration when establishing locally relevant data that is robust and provides the required degree of certainty.
17. Given this context, it is appropriate to note that the appeal Judgement confirmed that in relation to the 2.4 person assumption (emphasis added):

125. I would make two observations on what is said in these paragraphs. First, Natural England's recommendation is that **this occupancy rate should be "considered"** by competent authorities, **not that its use is in any way mandatory.** It is described as no

² [Wyatt v Fareham and Natural England \[2021\] EWHC 1434 \(Admin\)](#)

³ [Wyatt v Fareham Borough Council \[2022\] EWCA Civ 983](#)

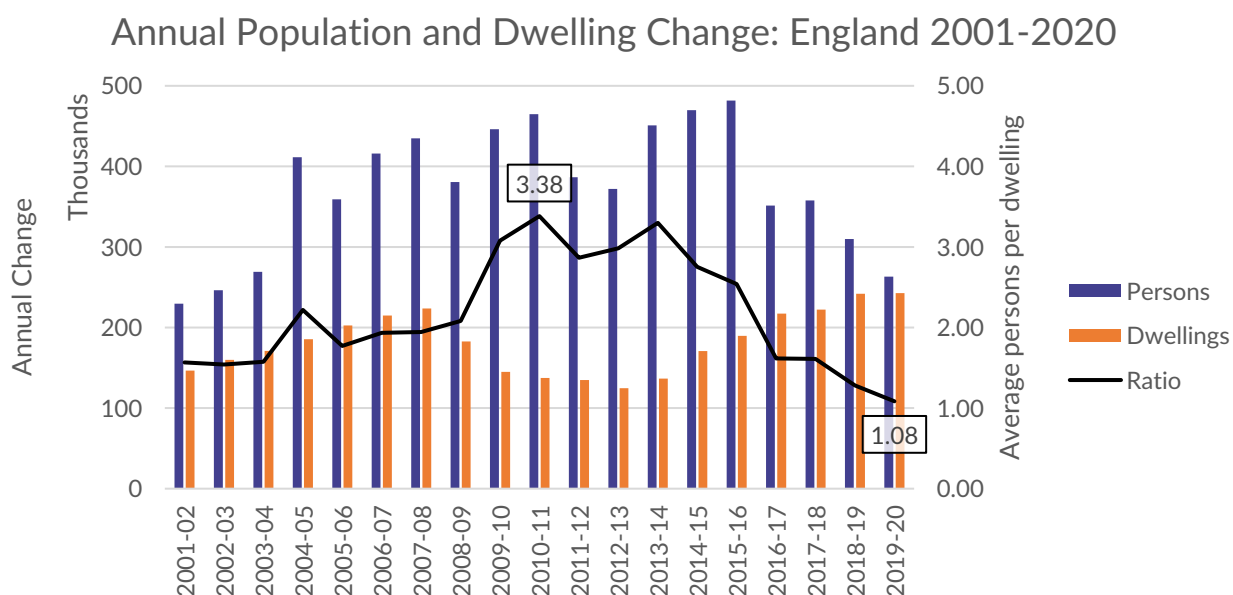
more than **“a starting point”**. Second, the Advice states that competent authorities “may” choose to adopt a different rate, tailored to a particular area or particular scheme, but that where they do so, **the occupancy rate adopted must be evidence-based, clearly explained and consistent with other calculations used** in relation to the proposed development.

18. On this basis, the following review considers the national occupancy rate in the context of local circumstances. It then establishes the most appropriate local value to use at step 1 of the first stage of the calculation, supported by robust and sufficient evidence, in order to determine “the **additional** population that will result from a new residential development” in this area.

New Homes and Population Growth in England

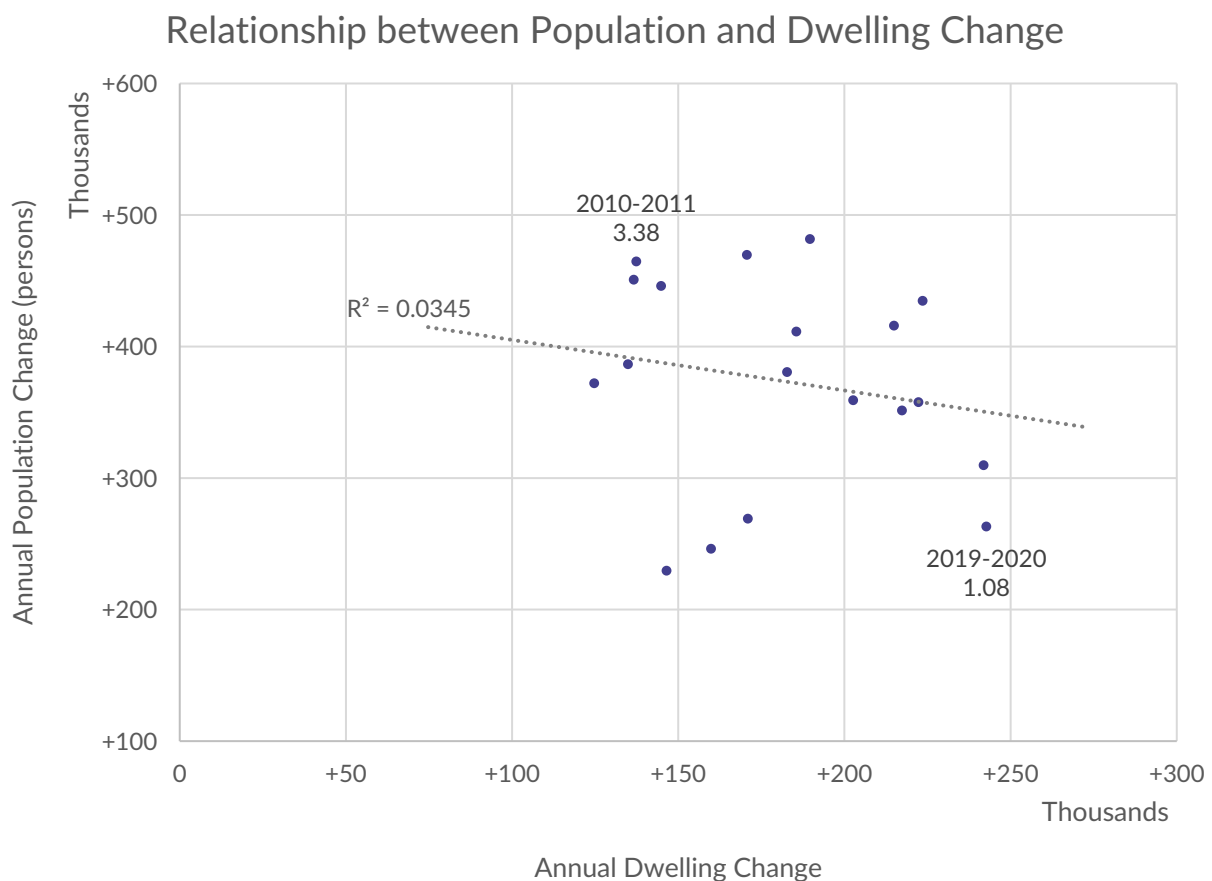
19. Data from the Census shows that the population for England increased from 53.0 million to 56.5 million persons over the 10-year period 2011-2021, with a growth of 3.48 million persons over the period. Over the same period, Government data confirms that the dwelling stock increased from 23.0 million to 24.9 million homes, with an additional 1.90 million dwellings provided over the period. Given this context, we can conclude that there was an average of 1.83 persons for each additional dwelling provided at a national level across England.
20. The rate of population growth over the decade 2011-2021 was lower than the previous intercensal period 2001-2011 (3.48 cf. 3.87 million) whilst the number of new homes provided was higher (1.90 cf. 1.77 million). As a consequence, there was an average of 2.19 persons for each additional dwelling provided nationally over the period 2001-2011.
21. Whilst the Census is considered to provide the most robust estimate of population growth, the Office for National Statistics (ONS) publish estimates of population growth each year. The following charts show the annual changes each year over the period 2001 to 2020.

Fig 1 Annual Population and Dwelling Change for England 2001 to 2020 (Source: Mid-year Population Estimates, ONS; Net additional dwellings by local authority district, Live Table 122)



22. The data shows that there was a notable increase in population growth from 2004-2005 which was the year in which the A10 accession countries joined the European Union. This higher rate of growth was broadly sustained until 2015-2016, but there have been lower rates of growth since the Brexit referendum in 2016 and more recently as a result of the Covid pandemic.
23. Dwelling delivery increased over the decade from 2001, but progressively reduced following the financial crisis in 2008. Since the introduction of the National Planning Policy Framework in 2012, the number of new homes delivered annually has increased year-on-year.
24. Considering the data on an annual basis, the number of persons for each additional dwelling peaked at an average of 3.38 persons in 2010-2011, but the latest data shows a notably lower average of 1.08 persons for 2019-2020. On the basis of data, we can therefore conclude that the relationship between housing delivery and population growth varies over time, even at a national level.
25. The following chart plots the relationship between annual population and dwelling change. The R^2 value identifies the strength of correlation between the figures. An R^2 value of 1.0 means that they are perfectly correlated, whereas an R^2 value of 0.0 means that there is no correlation. The relationship between annual population and dwelling change for England for the 19 years 2001-2002 to 2019-2020 has an R^2 value of 0.03 which means that there is extremely limited correlation between the figures.

Fig 2 Relationship between Annual Population and Dwelling Change for England 2001 to 2020 (Source: Mid-year Population Estimates, ONS; Net additional dwellings by local authority district, Live Table 122)

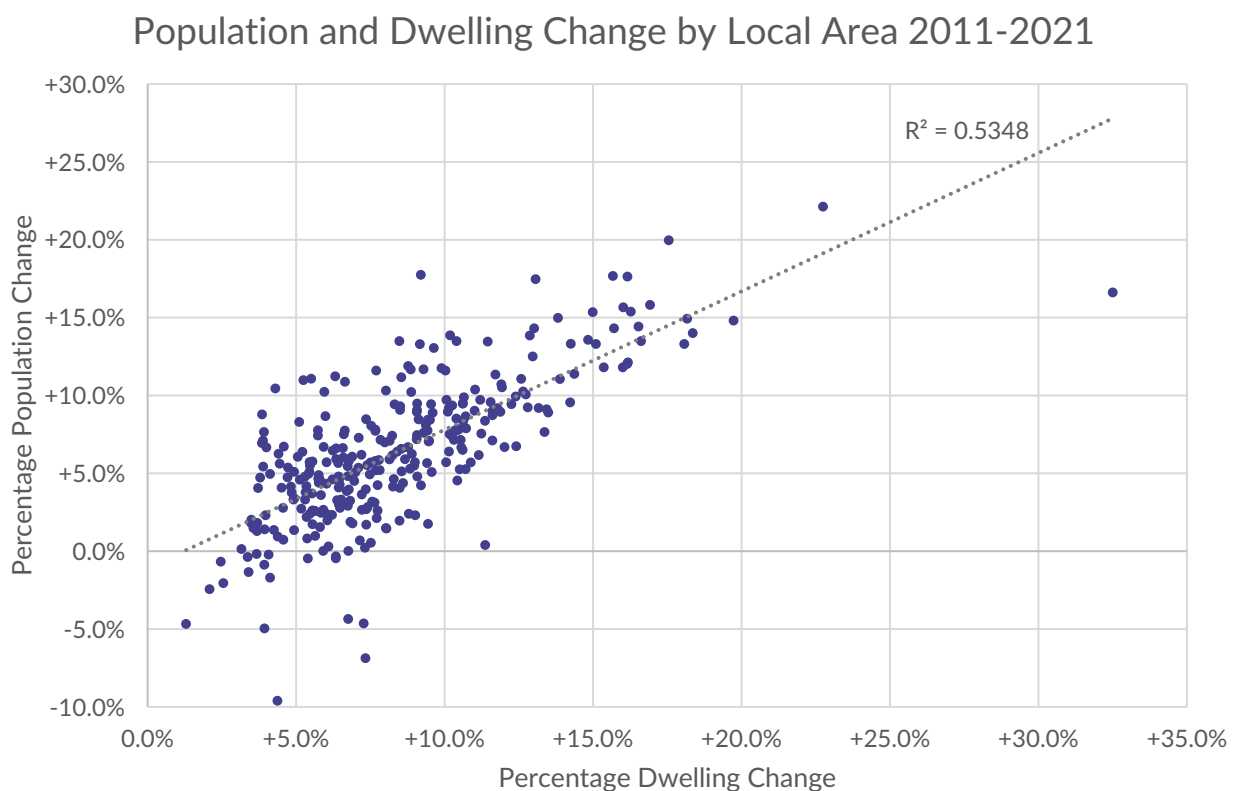


26. Given this context, we can conclude that the annual change in dwelling stock has very limited influence on annual change in population at a national level – in other words, building more new homes is unlikely to result in higher population growth nationally across England, and building fewer new homes is unlikely to result in lower population growth nationally.
27. However, the evidence demonstrates that the average number of persons for each additional dwelling provided nationally has ranged from a minimum of 1.08 persons to a maximum of 3.38 persons each year over the period 2001-2020, with a median (mid-point) of 1.94 persons. Therefore, even if it was possible to assume that population growth was dependent on the number of new homes provided, the evidence does not support the Natural England assumption that each new home will result in an extra 2.4 persons resident.
28. Census data identifies an average of 1.83 additional persons for each additional dwelling provided over the last decade at a national level across England, whereas the median annual figure identifies an average of 1.94 persons for each additional dwelling. The Natural England assumption of 2.4 persons on average is between 24% and 31% higher than the data for England.

New Homes and Population Growth by Local Area

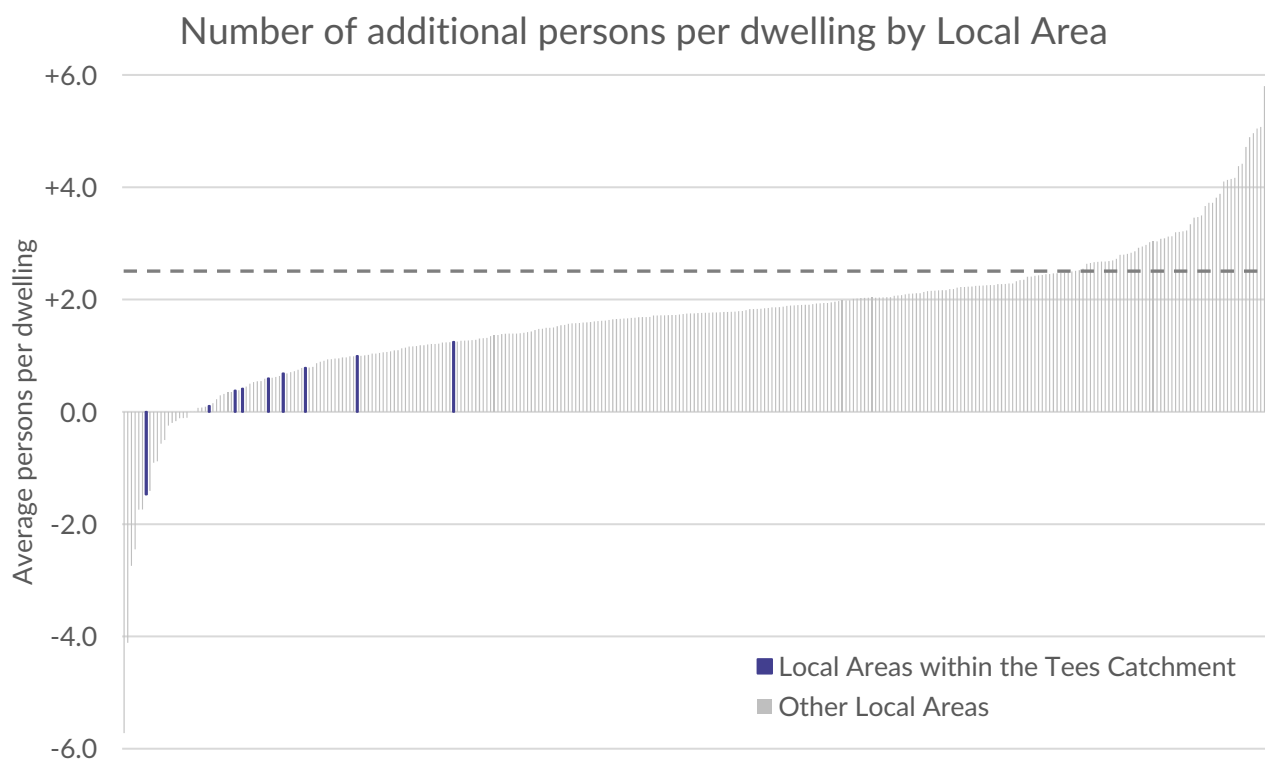
29. Whilst the number of new homes has a very limited influence on the population growth from year-to-year at a national level, it may still influence the geographic distribution of where the population are usually resident. It is therefore appropriate to consider the data for local areas.

Fig 3 Relationship between percentage Population and Dwelling Change for Local Areas in England 2011-21
(Source: Total population, Census; Net additional dwellings by local authority district, Live Table 122)



30. The relationship between the percentage population change and the percentage dwelling stock change for each local authority area over the 10-year period 2011 to 2021 has an R^2 value of 0.53 which means that there is correlation between these two figures. Local areas that had a larger proportionate increase in dwellings stock tended also had a larger proportionate increase in resident population, whilst those with a smaller proportionate increase in dwellings had a smaller proportionate increase in resident population.
31. When considering the number of additional persons for each additional dwelling provided over the last decade for each local authority area, the average ranges from a gain of 5.80 persons per additional dwelling to a loss of 5.72 persons per dwelling – albeit that relatively few areas (18 out of 309) recorded a loss of population, and none recorded a loss of dwelling stock. The figure for the median area shows an average gain of 1.74 persons for each additional dwelling. Just over a fifth of all local areas (65 out of 309) had an average gain of 2.4 persons or more (i.e. the gain assumed by Natural England for all additional dwellings) whereas almost four fifths of all local areas (244 out of 309) had an average gain below this number of persons.

Fig 4 Relationship between Annual Population and Dwelling Change for England 2001 to 2020 (Source: Total population, Census; Net additional dwellings by local authority district, Live Table 122)



32. Census data shows that the population for the nine local authorities within the Tees Catchment (excluding the National Park) increased from 1.370 million to 1.394 million persons over the 10-year period 2011-2021, an increase of 24,800 persons over the decade. Over the same period, the dwelling stock in the same areas increased from 616.3 thousand to 657.3 thousand homes, an additional 41,000 dwellings. We can therefore conclude that there was an average of 0.60 persons for each additional dwelling provided over the decade across the whole area covered by the nine local authorities. However, the change ranged from a gain of 1.25 persons in Middlesbrough to a loss of 1.47 persons in Richmondshire.

Components of Population Change

33. Reviewing the more detailed ONS population estimates for 10-year period 2011-2021 the data shows that there was a total of 145,700 births and 146,100 deaths recorded in the whole area. This suggests that natural population change (i.e. births minus deaths) led to an reduction of around 400 persons over the period.
34. As overall population growth totalled 24,800 persons and natural population change led to 400 fewer residents, we can conclude that there was a net gain of around 25,200 persons moving from elsewhere to dwellings in the area.
35. We can therefore conclude that over the decade 2011-2021, the provision of 41,000 dwellings resulted in a total gain of 25,200 additional residents in the nine local authorities within the Tees Catchment, which represents an average gain of 0.61 persons per dwelling.
36. Evidently, this is well below the Natural England assumption that each new home will result in an extra 2.4 persons resident in the area. Nevertheless, it is important to recognise that this is not the number of residents occupying new homes. Instead, it is the number of **extra** persons living in the area as a result of new homes being provided.

Changes to the Local Population

37. Many of the people occupying new homes would have already been residents living within the local area. In choosing to move to a new home, they would not have added to the number of people living in the area. The provision of new dwellings simply allowed the same residents to live in a different home. Had these new homes not been provided, it is unlikely that this would have had any material impact on the natural population change – there would still have been broadly the same number of births and deaths recorded over the decade, so the same number of local residents. However, those residents would have lived in larger households.
38. Without any new dwelling provision, the reduction of 400 residents following natural change would have led to no change in the average number of persons per dwelling at 2.222 persons (based on the 2011 Census); but the provision of new homes led to the average reducing to 2.121 persons over the 10-year period. This reduction is consistent with long-term national and local trends, largely due to population ageing.
39. Many older persons tend to live as couples or single person households, and this increase in one- and two-person households results in a fall to the average size overall. The death of elderly household members over the decade would have led to many existing households getting smaller, but additional homes were still needed for new households to form. Without those additional homes, the number of concealed households would have increased resulting in more larger households, including some that would have been overcrowded.
40. To accommodate natural population change whilst allowing the ratio of persons to dwellings to reduce required around 29,100 homes to be provided. This is more than two thirds (71%) of all new homes delivered over the decade.

Communal Establishment Population

41. Whilst the majority of the population live as a household, there are a number of residents who live in communal establishments.
42. Data from the Census shows that the overall communal establishment population for the nine local authorities within the Tees Catchment (excluding the National Park) reduced from 29.9 thousand to 26.0 thousand persons over the 10-year period 2011-2021, a reduction of 3,900 persons over the decade.
43. Whilst the area's overall population increased by 24,800 persons, this reduction in the number of residents living in communal establishments means that the household population increased by 28,700 persons. As the overall household population growth totalled 28,700 persons and natural population change led to 400 fewer residents, there was a net gain of around 29,100 persons moving to dwellings in the area from elsewhere. We can therefore conclude that over the decade 2011-2021, the **provision of 41,000 dwellings** resulted in a total gain of **29,100 additional residents** across the nine local authority areas within the Tees Catchment, which represents an average gain of **0.71 persons per dwelling**.
44. These changes also impact on the number and proportion of new homes needed for the local population. As the ratio of household population to dwellings averaged 2.174 persons in 2011, natural population change would have led to this average reducing to 2.173 persons had no additional dwellings been provided. Given that the ratio of household population reduced to 2.082 persons per dwellings by 2021, this would have required around 27,000 homes to be provided for the local population living in households – fewer than the 29,100 homes identified when considering the change in ratio across the whole population, but still representing around two thirds (66%) of all new homes delivered over the decade.

Impact of New Homes on the Population

45. The relationship between the provision of new homes and the number of extra residents in the area will fundamentally depend on household population change resulting from net migration; but there is a non-linear relationship between population growth and provision of new homes.
46. We have established that 41,000 dwellings were provided over the decade 2011-2021, and of these around 27,000 dwellings were needed to accommodate the local population living in smaller households, thereby reducing the ratio of persons to dwellings. It is reasonable to conclude that the remaining 14,000 dwellings would have enabled migrant population to move to the area, thereby increasing the net change in population and resulting in extra persons resident in the area (Fig 5).
47. The consequence of the non-linearity of the relationship is that the number of additional persons per dwelling will vary dependent on the total number of dwellings that are provided. This relationship is illustrated in the following chart, which demonstrates that the higher the number of dwellings provided, the higher the gain in terms of the average number of additional persons per dwelling (Fig 6).

Fig 5 Relationship between population change and ratio of average persons to dwellings, to dwelling provision for the Tees Catchment based on trends from 2011 to 2021

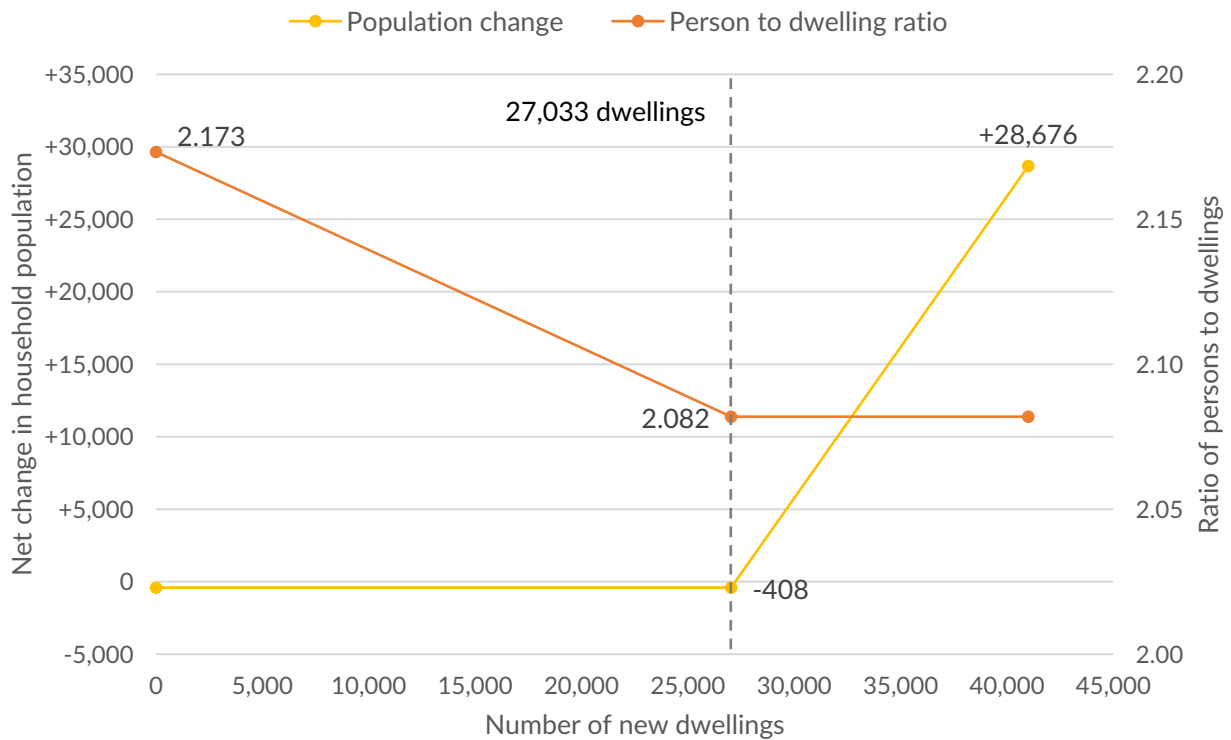
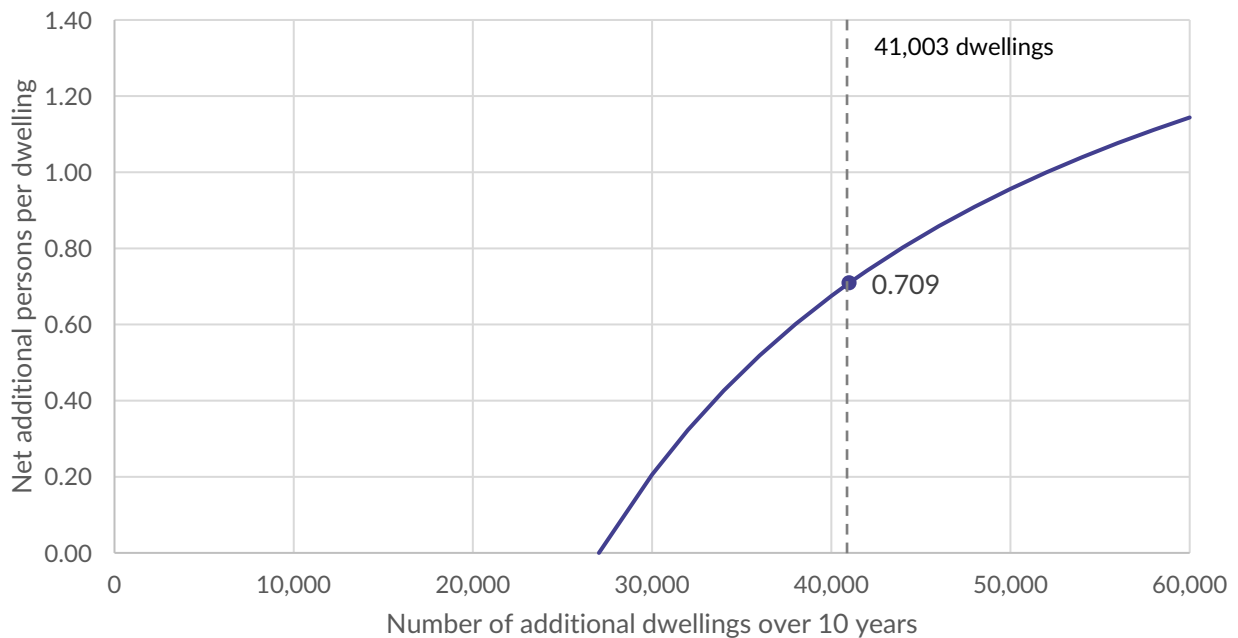


Fig 6 Average net additional persons per dwelling by overall dwelling provision over a 10-year period for the Tees Catchment based on trends from 2011 to 2021



48. Whilst the precise number of additional persons is likely to vary to some extent based on the number of dwellings provided, the primary conclusion is that over the decade 2011 to 2021, the **overall provision of 41,000 dwellings** resulted in a total gain of **29,100 additional residents** living in households across the nine local authority areas within Tees Catchment, which represents an average gain of **0.71 persons per dwelling**.

49. In terms of the variance, we can infer that had the number of net additional dwellings been 10% lower than were actually delivered (a total of around 36,900 dwellings) then the gain would have averaged 0.557 persons per dwelling (equivalent to a reduction of 22%) whereas had the number of net additions been 10% higher than delivered in practice (around 45,100 dwellings) then the gain would have averaged 0.834 persons per dwelling (equivalent to an increase of 18%). On this basis, we can conclude that the average number of persons is relatively sensitive to the overall rate of housing delivery.
50. Over the period from 2001-02 to 2020-21, annual net dwelling additions have ranged from a minimum gain of 2,344 dwellings to maximum gain of 5,934 dwellings. When considering periods of sustained dwelling delivery, the highest 5-year average was 4,902 dpa which yields a gain of 0.934 persons per dwelling. Whilst this remains well below the Natural England assumption that each new home will result in an extra 2.4 persons resident in the area, it illustrates that assuming a rate of 0.709 persons per dwelling could underestimate the number of extra persons resident in the area depending on future rates of housing provision.
51. Given this context, it is necessary to take a judgement about the realistic future rate of delivery when determining the most appropriate assumption to use for the number of extra persons resident in the area following the provision of new homes. On balance, we would consider the highest 5-year average of dwelling delivery based on past trends for over 20 years to provide a reasonable upper-end estimate, giving a range from 0.709 to 0.934 persons per dwelling.

Summary by Local Area

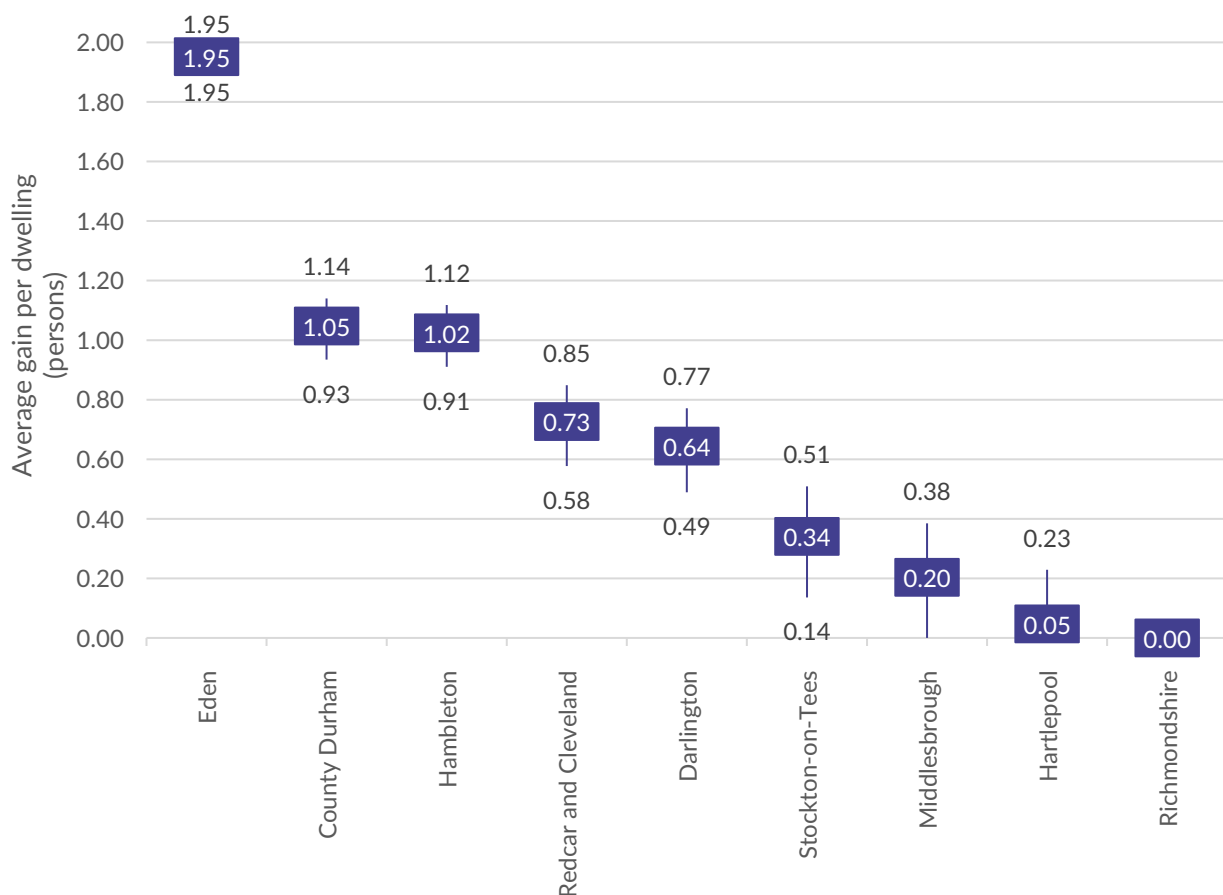
52. The relevant figures for each of the nine local areas within the Tees Catchment are summarised in the following table (Fig 7). Whilst the average gain in all areas is lower than the 2.4 persons assumed by Natural England, the local averages range from a gain of 1.93 persons in Eden to a net loss of persons overall (therefore zero gain) in Richmondshire.

Fig 7 Components of population change, dwelling net additions, and average population gain per dwelling 2011 to 2021 for the Tees Catchment by local area (Note: Hambleton and Richmondshire Councils were combined in April 2023 as part of the newly formed North Yorkshire County Council)

Local Area	Total population change	Natural change	Communal residents change	Household migration	Dwelling net additions	Average gain per dwelling
Eden	+2,171	-1,390	-632	+4,193	+2,148	1.95
County Durham	+8,826	-5,103	+352	+13,577	+12,960	1.05
Hambleton	+1,550	-1,598	-713	+3,861	+3,768	1.02
Redcar and Cleveland	+1,354	-1,168	-17	+2,539	+3,494	0.73
Darlington	+2,235	+289	-472	+2,418	+3,753	0.64
Stockton-on-Tees	+4,985	+3,649	-836	+2,172	+6,370	0.34
Middlesbrough	+5,514	+4,368	+249	+897	+4,406	0.20
Hartlepool	+310	+259	-70	+121	+2,564	0.05
Richmondshire	-2,189	+286	-1,781	-694	+1,540	-
TOTAL	+24,756	-408	-3,920	+29,084	+41,003	0.71

53. Considering the variance for each of the nine areas, the following chart identifies the average population gain based on the number of additional dwellings being 10% higher and 10% lower than the number that was delivered over the 10-year period 2011-2021.
54. It is evident that in areas with a relatively high baseline for population gain, varying the number of dwellings has little impact on the average: for example, the 10% sensitivity figures for Eden do not change when presented to 2 decimal places, though at 4 decimal places the baseline is 1.9520 with the two scenarios yielding 1.9548 and 1.9487 respectively (all rounding to 1.95).
55. However, areas with a relatively low baseline have a much greater sensitivity: for example, Hartlepool increases from 0.05 to 0.23 (equivalent to a 385% increase) based on net additions increasing by only 10% (from 256 dpa to 282 dpa).

Fig 8 Sensitivity testing the average net additional persons per dwelling based on overall dwelling provision over a 10-year period for the Tees Catchment local authorities based on trends from 2011 to 2021 (Note: Hambleton and Richmondshire Councils were combined in April 2023 as part of the newly formed North Yorkshire County Council)



56. Over the period from 2001 to 2021, overall net dwelling additions have ranged from 2,344 to 5,934 dwellings each year across the combined area. When considering periods of sustained dwelling delivery, the highest 10-year average over the period was 4,100 dpa (from 2011-21) and 5-year average over the period was 4,902 dpa (from 2016-21). The gain for 2011-2021 has already been established at 0.71 persons per dwelling, and if housing supply was sustained at 4,902 dpa then the gain would be 0.93 persons per dwelling.

57. Evidently, both fall well below the Natural England assumption that each new home will result in an extra 2.4 persons resident in the area, but they also clearly illustrate that assuming current rates will continue unchanged could underestimate the number of extra persons resident in the area depending on future rates of housing provision.
58. The average annual net additions for the baseline period (2011-2021) together with the highest 10-year and 5-year average trends are summarised below for each of the local areas (Fig 9) together with the current annual housing requirement which provides the basis for likely future supply. The average gain of persons per dwelling is also identified for the various rates of provision.
59. Given this context, it is necessary to take a judgement about the realistic future rate of delivery when determining the most appropriate assumption to use for the number of extra persons resident in the area following the provision of new homes. This would need to take account of both previous trends and planned future provision.

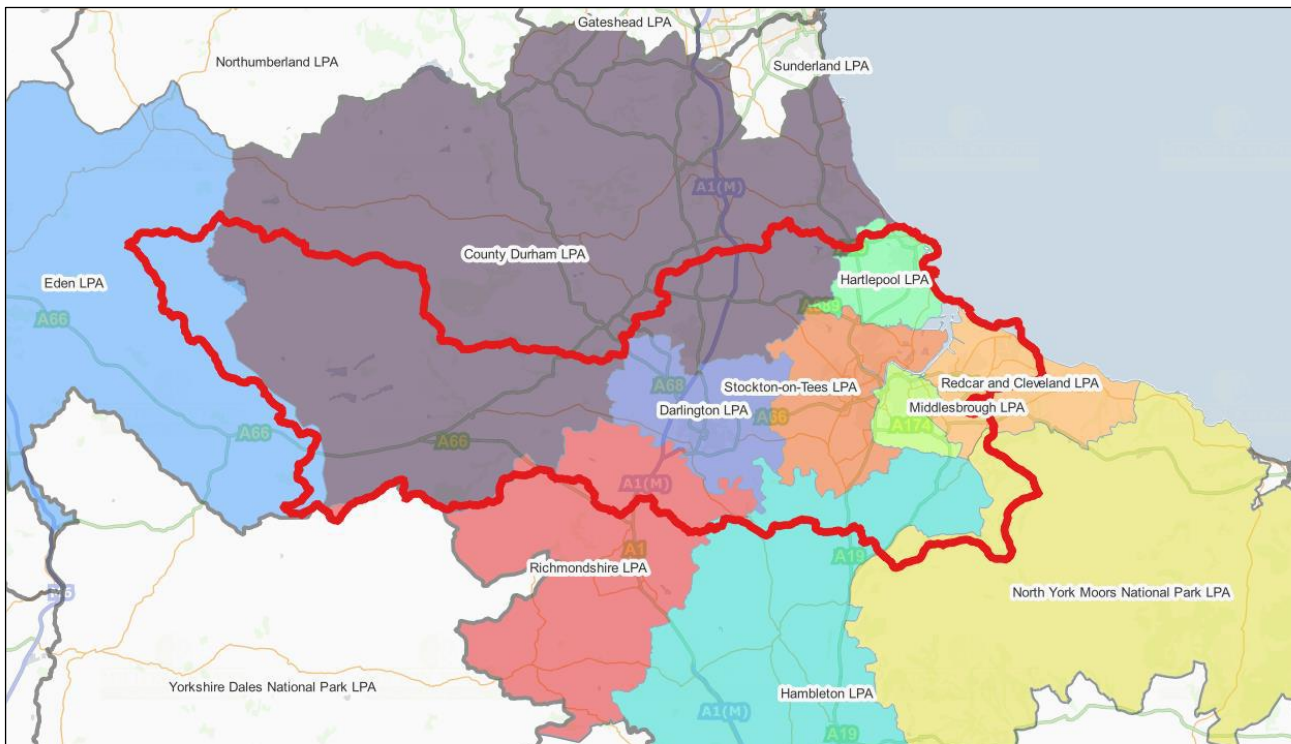
Fig 9 Trends in annual net dwelling additions from 2001 to 2021, and adopted annual housing requirement by local area (Note: Hambleton and Richmondshire Councils were combined in April 2023 as part of the newly formed North Yorkshire County Council)

Local Area	Baseline period 2011-2021	Highest 10-year average	Highest 5-year average	Adopted annual housing requirement
Average net additions				
Eden	215	215	270	242
County Durham	1,296	1,646	2,022	1,308
Hambleton	377	377	535	315
Redcar and Cleveland	349	349	440	234
Darlington	375	433	557	492
Stockton-on-Tees	637	637	824	677
Middlesbrough	441	441	544	410
Hartlepool	256	292	345	410
Richmondshire	154	154	264	180
COMBINED AREA	4,100	4,100	4,902	4,268
Average gain per dwelling				
Eden	1.95	1.95	1.96	1.96
County Durham	1.05	1.26	1.41	1.06
Hambleton	1.02	1.02	1.33	0.82
Redcar and Cleveland	0.73	0.73	1.00	0.06
Darlington	0.64	0.83	1.10	0.98
Stockton-on-Tees	0.34	0.34	0.76	0.45
Middlesbrough	0.20	0.20	0.58	0.05
Hartlepool	0.05	0.29	0.56	0.80
Richmondshire	-	0.88	1.10	-
COMBINED AREA	0.71	0.71	0.93	0.76

Areas within and outside the Tees Catchment

60. The previous analysis has considered the data based on whole local authority areas. However, some of the nine local authority areas do not fall entirely within the Tees Catchment as illustrated below (Fig 10).

Fig 10 Tees Catchment plan and Local Planning Authority areas (Note: the solid red line denotes the boundary of the Tees Catchment area. Hambleton and Richmondshire Councils were combined in April 2023 as part of the newly formed North Yorkshire County Council)



61. Based on the above boundary, we have separated the outputs for each LA to identify figures for the areas within the Tees catchment and for those areas outside the catchment.
62. The area allocation uses Lower-level Super Output Areas (LSOAs) as the building block, as this is the lowest level geography at which the data on births and deaths is published. Data on total population and communal establishment residents is available by LSOA for 2011 and 2021, and dwelling stock data is available by LSOA for 2011. The data on dwelling stock for 2021 was based on the Live Table figures which are published by LA, but we have derived LSOA estimates using data from the Valuation Office Agency about the number of residential properties on the Council Tax list in each LSOA as the basis for apportioning the stock.
63. Each LSOA has been classified as being within or outside the catchment area based on the population weighted centroid, which provides a “best fit”. Whilst there isn’t a perfect match between the geography covered by the selected LSOAs and the catchment boundary, it provides a reasonable approximation to the area and the figures are more relevant than estimates for the whole LA. Note that there are no LSOAs in Eden with a population centroid within the catchment (as the areas of the district within the catchment are predominantly rural) hence all of the Eden figures within the catchment are zero.

64. Total population and dwelling estimates for 2021 for each of the nine local areas within the Tees Catchment, together with estimates of the number and proportion of population and dwellings within the catchment area are summarised in the following table (Fig 11).

Fig 11 Total population and dwelling estimates 2021 and population and dwellings within the Tees Catchment by local area (Note: Hambleton and Richmondshire Councils were combined in April 2023 as part of the newly formed North Yorkshire County Council)

Local Area	Total population 2021	Population within catchment	% population within catchment	Total dwellings 2021	Dwellings within catchment	% dwellings within catchment
Eden	54,735	0	0.0%	27,453	0	0.0%
County Durham	522,068	82,188	15.7%	246,445	39,687	16.1%
Hambleton	90,690	16,259	17.9%	43,664	8,222	18.8%
Redcar and Cleveland	136,531	85,808	62.8%	65,393	40,914	62.6%
Darlington	107,799	107,799	100.0%	52,397	52,397	100.0%
Stockton-on-Tees	196,595	196,595	100.0%	88,607	88,607	100.0%
Middlesbrough	143,926	143,926	100.0%	64,362	64,362	100.0%
Hartlepool	92,338	92,338	100.0%	44,666	44,666	100.0%
Richmondshire	49,776	5,208	10.5%	24,337	2,517	10.3%
TOTAL	1,394,458	730,121	52.4%	657,324	341,372	51.9%

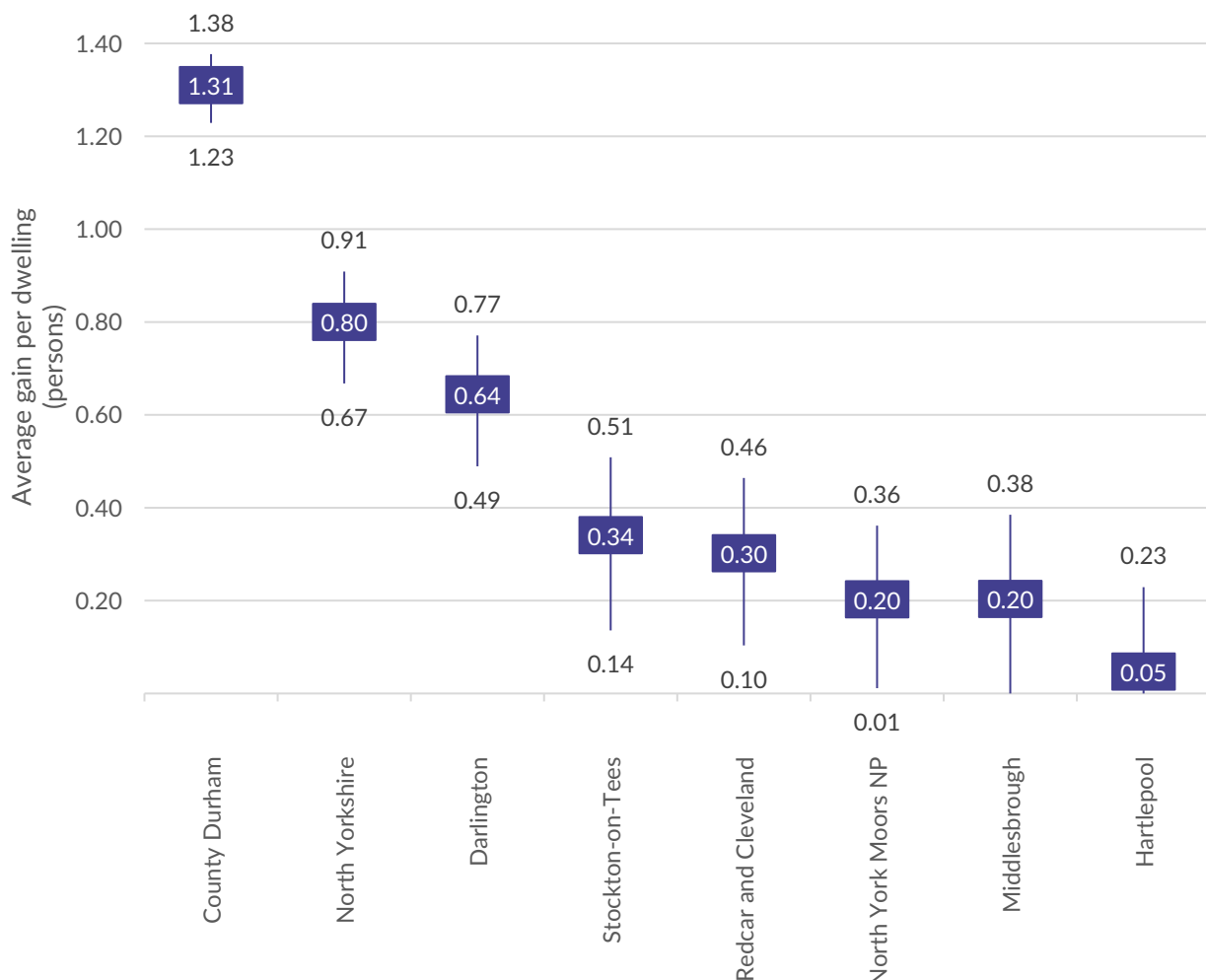
65. The figures as previously discussed are summarised in the following table, based only on those parts of the Local Planning Authority (LPA) areas within the Tees Catchment boundary (Fig 12). Note that the areas currently within Hambleton and Richmondshire have been combined as both will form part of the new North Yorkshire County Council.
66. The table also separates the outputs for areas within the North York Moors National Park. Given that the National Park is relatively sparsely populated, only one LSOA has its population centroid within the catchment. Therefore, the National Park boundary uses a “best fit” to Output Areas (OAs) which form the smallest statistical geography. Where data is not published by OA, the relevant LSOA data has been apportioned pro rata to the constituent OA population within and outside the National Park.

Fig 12 Components of population change, dwelling net additions, and average population gain per dwelling 2011 to 2021 for areas within the Tees Catchment boundary by Local Planning Authority area

Local Planning Authority Area	Total population change	Natural change	Communal residents change	Household migration	Dwelling net additions	Average gain per dwelling
County Durham	-191	-1,859	-410	+2,078	+1,586	1.31
North Yorkshire	-71	-552	+2	+479	+599	0.80
Darlington	+2,235	+289	-472	+2,418	+3,753	0.64
Stockton-on-Tees	+4,985	+3,649	-836	+2,172	+6,370	0.34
Redcar and Cleveland	+575	-57	+49	+583	+1,930	0.30
North York Moors NP	-20	-49	0	+29	+143	0.20
Middlesbrough	+5,514	+4,368	+249	+897	+4,406	0.20
Hartlepool	+310	+259	-70	+121	+2,564	0.05

67. When considering the area within the Tees Catchment boundary, six of the eight LPAs have a lower average gain per dwelling than the overall gain that was identified for the whole of the nine local areas combined (0.71 persons). The averages for the areas of the individual LPAs within the Tees Catchment boundary range from 0.05 persons up to 1.31 persons.
68. Whilst we can estimate the number of annual net additions for areas within the Tees Catchment boundary using detailed data from the Census, we do not have data about the number of additions within these areas for each individual year. Similarly, the annual housing requirement identified by adopted Local Plans is not apportioned for areas within and outside the boundary. As a consequence, there is no evidence-based approach for testing the variance for each area and we therefore have to rely on assumptions.
69. Given this context, the following chart identifies the average population gain based on the number of additional dwellings being 10% higher and 10% lower than the number that was delivered over the 10-year period 2011-2021 (Fig 13). As before, varying the number of dwellings in areas with a relatively high baseline for population gain has little impact on the average whilst areas with a relatively low baseline have a much greater sensitivity.

Fig 13 Sensitivity testing the average net additional persons per dwelling based on overall dwelling provision over a 10-year period for the area of each Local Planning Authority within the Tees Catchment boundary based on trends from 2011 to 2021



Conclusions

70. When considering population gain for the purposes of assessing Nutrient Neutrality, the most appropriate assumption will depend on the individual circumstances of each local area.
71. Natural England has provided a “starting point” which recommends using the national average value for the number of residents per dwelling of 2.4 persons, providing that this reflects local conditions. However, following a High Court challenge, the Judgement from Mr Justice Jay was critical of this approach due to the algorithm assuming 100% migration to the area.
72. Although the detailed calculation proposed by Natural England provides a robust basis for determining the **overall** population that is likely to be resident, it is the **additional** population that has to be assessed when seeking to establish the additional burden of nutrients arising as a consequence of each new development.
73. It is important to consider the intrinsic assumption that all occupants of each new dwelling will be moving into the affected catchment area in the context of the local area. The analysis has identified that over the 10-year period 2011-2021 the dwelling stock across the combined study area increased by 41,000 dwellings (paragraph 32).
74. Based on the Natural England assumption that each new dwelling would yield 2.4 persons, the area’s population would have increased by almost 100 thousand persons over the same period; however, Census data shows that the actual increase was fewer than 25 thousand persons. The “starting point” assumption is clearly not appropriate in this local area, due to many new homes being occupied by people who were already resident in the area.
75. The analysis has also identified that the ratio of household population to dwellings was around 2.1 persons per dwelling at the time of the 2021 Census (paragraph 44). This figure is broadly equivalent to the national average of 2.4 persons per dwelling at the time of the 2011 Census. However, whilst this is based on local circumstances and reflects the most up-to-date estimate, it makes no allowance for migration.
76. In seeking to identify “the **additional** population that will result from a new residential development” which is the input that is required at step 1 of the first stage of the nutrient budget calculation, we would suggest that the average gain per dwelling as set out in Fig 12 and Fig 13 is likely to provide the most appropriate starting point, based on data for the 10-year period 2011-2021 for the part of each LPA within the Tees Catchment boundary.
77. These figures are based on the most robust data that is available, and take account of trends over a protracted period of time – the 10-year intercensal period being double the 5-year minimum identified by the Natural England guidance. However, assuming that current rates of housing delivery will continue unchanged could underestimate the number of extra persons resident in the area (depending on future rates of housing provision) and it is necessary to take a sufficiently precautionary approach to the value that is assumed.

78. Where there is local evidence to suggest that the average number of new homes delivered during this baseline period is lower than planned for future years, it would be necessary to consider increasing the average gain per dwelling above the identified starting point. Conversely, if the number of new homes delivered is considerably higher than planned for future years, it may be appropriate to consider a lower gain per dwelling – providing that this is justified by the evidence.
79. The extent of any precautionary adjustment should be considered in the context of the sensitivity tests presented above:

For those local areas that are only partly within the Tees Catchment boundary, it is likely that the sensitivity tests presented at Fig 13 will be most relevant. However, if the future number of new homes is likely to be greater than 10% higher or lower than delivered during the baseline period, it is important to recognise that the average gain per dwelling will also be higher or lower than the identified range.

For those local areas that are fully within the Tees Catchment boundary, it is likely that the sensitivity tests presented at Fig 9 will be most relevant, as these are based on detailed information about the whole of each LPA. On balance, we would normally consider the highest 5-year average of dwelling delivery based on past trends for 20 years to provide a reasonable upper-end estimate, although this should still be considered in the context of the planned rates for future delivery.

80. Whilst all of the identified rates are considerably lower than the 2.4 persons assumed by Natural England, all are based on detailed analysis of the evidence currently available for each local area. Nevertheless, it will be important to continue monitoring relevant population data to ensure that the assumptions taken for each local area remain appropriate.