

CAUSE

Infrastructure First

Small is Beautiful

(focusing on West Tey)

1. Summary

This note addresses one simple but over-looked point. There are significant scale diseconomies in building big new towns. The bigger the town, the longer it takes to build, and the higher the cost per dwelling. It is vital to “do the numbers” and identify these problems early. We illustrate this with the numbers from the Hyas appraisal for West Tey, a 23,660 dwelling garden community proposed on 13sq kms of countryside in North Essex. But the same conclusions will apply to big settlements elsewhere.

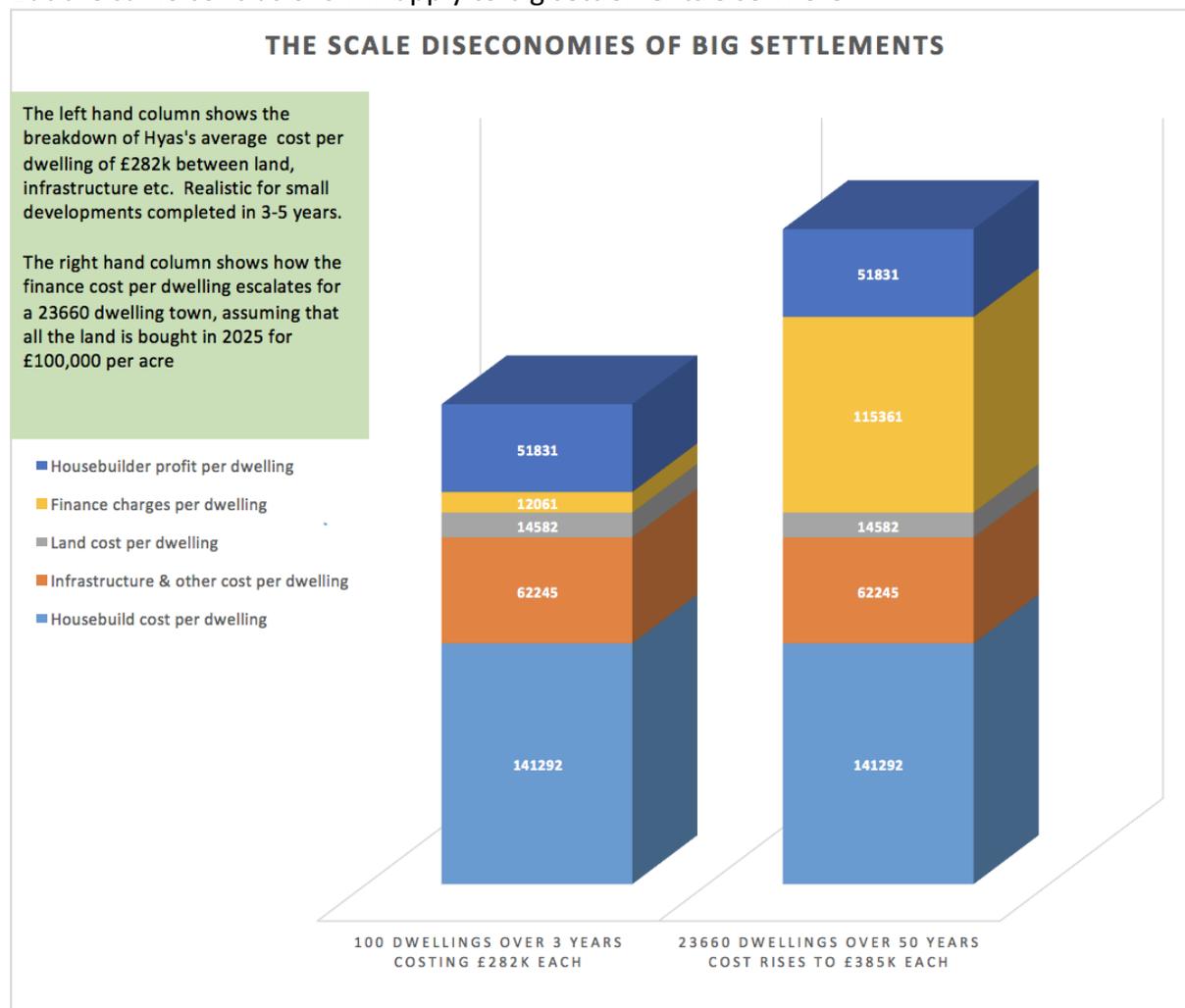


Figure 1

2. The Hyas study

Hyas appraised the three North Essex Garden Communities which together comprise 28% of the Government’s national garden communities programme. The Hyas study was originally presented as evidence to support the Local Plan’s viability and deliverability, but it ignores the funding cost of buying the land – a massive error akin to buying a house without budgeting the mortgage payments. When just this error is corrected West Tey, the biggest of the three, becomes unviable.

CAUSE uses the Hyas numbers not because we agree with them – the cost assumptions are optimistic and there isn’t enough contingency. We use them because we want to illustrate our point with third party numbers.

3. Why is West Tey not viable?

One would expect large scale housing at West Tey to be viable. It is in a commuter area where houses sell well. There is sufficient farm land to accommodate a large-scale settlement and some scale economies on infrastructure might be expected. Three Dragons show that a “one hectare development” will produce a residual value of c£1.5m per hectare even with 30% social housing.¹ Clearly viable.

But the corrected Hyas numbers² show that 23,660 dwellings built on 1300 hectares is unviable³. Why? The table below compares the cost per dwelling for a large settlement to a small one.

<u>Cost per dwelling for small and large settlements</u>		
	£ per unit	£ per unit
		23660
	100	dwellings
	dwellings	over 50
	over 3 years	years cost
	costing	rises to
	£282k each	£385k each
Housebuild cost per dwelling	141292	141292
Infrastructure & other cost per dv	62245	62245
Land cost per dwelling	14582	14582
Finance charges per dwelling	12061	115361
Housebuilder profit per dwelling	51831	51831
Total	282011	385310

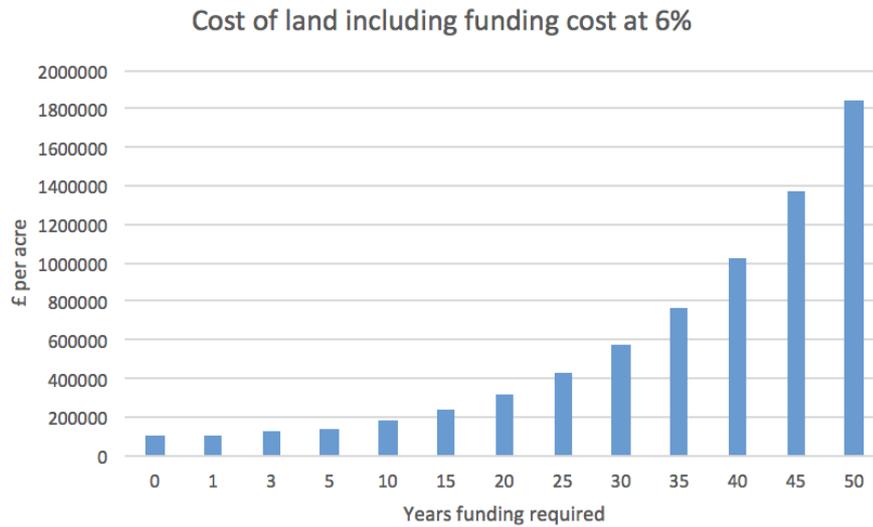
Figure 2

¹ See Colchester Economic Viability Study by Three Dragons and Troy Planning June 2017 CBC0001 page 27. It shows residual values of over £1.5m per hectare in the “Tiptree and Rural” area which includes West Tey.

² After inclusion of land funding costs at 6%

³ Explained in more detail in CAUSE’s West Tey viability note updated Feb 2018, available on the CAUSE website.

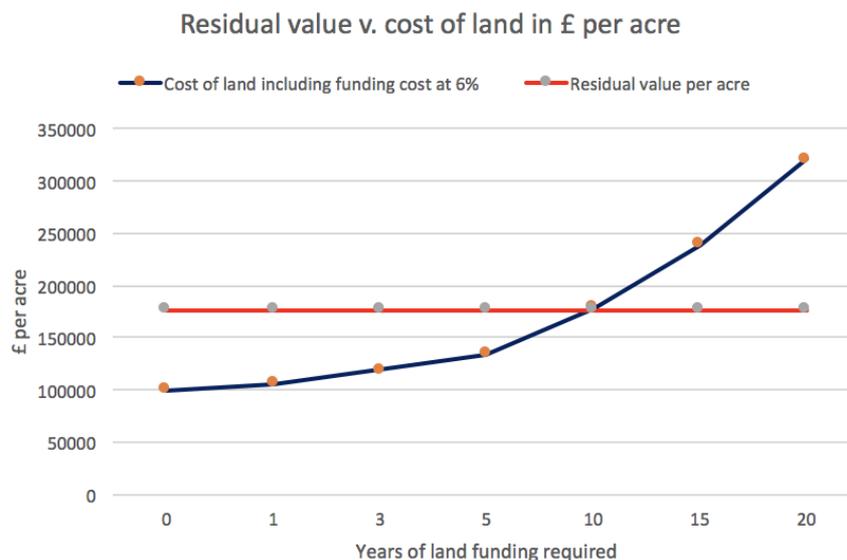
The dramatic cost increase arises because of the finance costs on land. The increase in total land costs as the holding period increases is astounding. Land bought now for £100,000 per acre escalates to £179,000 after 10 years and £1.8m after 50 years.



4. What is the optimal scale for new settlements?

Economic modelling can help us think clearly about the optimum size. The key is to maximise the capture of land value uplift. Extra acres should be bought until the marginal cost equals the marginal revenue. The marginal cost is the cost of the land, plus the funding costs which increase with time. The marginal revenue is the extra housing value realised by extra acre.

We illustrate this with the Hyas numbers for West Tey which show a crossover at 10 years: if land is bought at £100,000 per acre and generates £177,600 per acre on average as in the Hyas appendix, then funding cost at 6% will make it pointless buying more land than can be used within 10 years. Indeed extra land will weigh down the appraisal and reduce the surplus available for infrastructure and social housing.



Once the crossover is established we can calculate the optimal settlement size. Again using Hyas numbers this is about 2000 dwellings. This assumes that the land is bought 2 years before the first houses are delivered – remember that it is vital to buy the land early if any uplift is to be harvested. Houses are then delivered at 240 dpa, the maximum rate advised by Cushman and Wakefield⁴ and equivalent to the average for the first 6 years in the Hyas appraisal.

These figures (about 2000 houses over 10 years) are not inconsistent with the actual housing market: housebuilders rarely buy land which will take more than 10 years to build out.

4. Scale economies?

In theory big settlements might benefit from scale economies. It might be possible to build a sewage works or power supply at a lower cost per dwelling for a 24000 settlement than for a 2000 one. But we have seen no evidence that this is the case and we therefore ignore it.

The only claim to scale economies made during the recent Examination of the North Essex Garden Communities plan related to education. The NEAs variously⁵ suggested that settlement sizes of 5000 and 15,000 are needed to support an optimum number of secondary schools. No detail was provided, and CAUSE would argue that secondary schools can be provided every bit as efficiently in smaller well connected urban extensions as in large standalone new towns. Our thinking derives from Nicholas Falk's Wolfson prize-winning essay where he argues that standalone settlements are unlikely to be viable, and that well connected urban extensions provide a better solution.

The West Tey education budget (for building both primary and secondary schools) is about £9000 per dwelling. Even if a scale economy of 10% or £900 per dwelling could be achieved the saving would be dwarfed by the extra finance cost associated with a 20 year project which we estimate at £6000 per dwelling.

Small settlements can be efficient if they are properly located and connected to existing centres. CAUSE's Metro Plan, which the NEAs rejected on grounds of insufficient scale, is an example of how this might work.

5. Assumptions

Figures 1 and 2 use the weighted average cost per dwelling, including 30% social housing. These are CAUSE calculations derived from Hyas assumptions.

Other key assumptions, all drawn from either the Hyas and Aecom reports, are:

⁴ See AECOM feasibility study. There is a limit on the number of houses that builders are willing to build and sell each year due to the financial risks. C&W assume 3 outlets selling 60dpa each + another 60 social houses.

⁵ The North Essex Authorities were represented by David Lock Associates at the Examination in Public Jan 2018 where they used schools as the justification for the 15,000 minimum size for West Tey. Significantly more than the Essex County Council guidelines indicate that 3000-5000 homes are needed to support a secondary school.

- NEGC buys the land, adds infrastructure and master-planning and sells to housebuilders at £91,800 per plot
- Land purchase price £100,000 per acre + 5% SDLT and 2.5% for fees and other
- Housebuild cost taken from Hyas and reconciled back
- Infrastructure cost taken from Hyas and reconciled back. Includes 15% contractor profit
- Finance charges in the left hand column include cost incurred by both the housebuilder and the infrastructure provider
- Finance charges in the right hand column come from CAUSE’s model, cumulated at 6% per annum over the period until 2065. They would increase further if the 5810 plot sales in 2063 were spread over the period to 2073 as they realistically should.⁶
- Housebuilder profit is assumed to be “payable” as the dwellings are completed.

6. The delivery model

The model adopted by the NEAs assumes that NEGC and its subsidiary LDVs buy the land, do the master planning work and sell it on to housebuilders two years later at £91,801 per plot. The Housebuilder model is workable as has been confirmed through consultation with some developers. It is the NEGC infrastructure provider model which is clearly unviable.

NEGC			Housebuilder model		
	HYAS £m	CAUSE view		HYAS £ per home	CAUSE view
Sales of serviced plots at £91801 each	2,214	OK but risky	Sells house at av price of	291,533	5% too high
Land at £177,602 per acre (note 2)	(570)		Building costs & fees	(141,292)	£19k too low
Infrastructure costs £50k per plot	(1,182)	s/b £1.8bn	Land costs	(91,801)	Just credible
Fees	(106)		Finance & other costs	(6,609)	OK
Contingency 5%	(57)	s/b £515m	Housebuilder profit	18% <u>51,831</u>	OK
Finance costs at 6%	(129)	s/b £965m			
NEGC profit	7.7% <u>171</u>	Too low			

Sells serviced plots for £91,801 each (1)

Demonstrably Undeliverable

Marginal viability

7. Is it right to assume that all the land must be acquired up front?

A new town needs to capture land value uplift in order to fund its infrastructure – this is a fundamental principle behind garden communities⁷. But it is easier said than done. In practice the land needs to be owned from the earliest possible date, preferably before consideration for inclusion in the local plan⁸. If it isn’t then much of the benefit from infrastructure investment will find its way into land values – a transfer from the public purse to landowners.

⁶ We have ignored this 10 year extension not because we think it is possible to sell 5810 plots in one year – that clearly isn’t realistic. But because it would be difficult to explain the numbers objectively without using DCF techniques. We would too easily fall into the same trap as Hyas by comparing future values with present values.

⁷ See TCPA “Garden City Principles” first bullet point “Land Value capture for the benefit of the community”.

⁸ This point was identified as a key risk by the NEAs when the setup of NEGC was approved. The NEAs have weakened their commercial position vis a vis the landowners by including the land in the local plan before they control it.

Land could be controlled through an option or conditional contract rather than purchase. Such an arrangement is common for projects of up to 5-10 years, but would be unprecedented for a 50 year project such as West Tey. The longer the option the bigger the premium needed and buying a 50 year call option would be very expensive indeed. See CAUSE's paper on the "deal for landowners"⁹.

8. Compulsory purchase?

The authorities are considering compulsory purchase, but this will be difficult to achieve in practice. CAUSE has Counsel's opinion on this, and it seems that there are three major obstacles:

- Human rights: If the land is to be bought at existing use value (about £10,000 per acre for agricultural land) it is necessary to show that the public interest outweighs the landowner rights. The West Tey landowners have been promoting their own housebuilding schemes for many years, and the public interest will be hard to prove¹⁰.
- Market Value: CPO must be at market value, which for land earmarked for development in North Essex is significantly in excess of agricultural value, even assuming a "no scheme" world.
- Uncertainty: large scale CPO will be very difficult to fund due to the time taken by the land tribunals and uncertainty as to market values in a no scheme world. This type of legal uncertainty is unattractive to both debt and equity investors

Some politicians are now advocating a change to the 1961 Land Compensation Act to allow land to be purchased at Existing Use Value rather than Market Value. CAUSE is advised that changes will also be needed to the 1996 Human Rights Act and the European Convention on Human rights and that it will be highly controversial and damaging to force through. It is likely that the search for a fair way of sharing land value uplift will continue for many years.

9. Is 6% pa the right finance charge?

It has been suggested that 6% is too high, and that cheaper borrowing would be available from the Public Works Loan Board at 2.5%. On the other hand 6% is below the rates conventionally used in housebuilder appraisals – we know of one that uses 7.5%.

Both 2.5% and 7.5% are shortcuts. For major projects like this we need to calculate a weighted average cost of capital (WACC) for raising market funding for the project and use that. This approach is well understood by utility regulators and might well result in a pre-tax real WACC of 5-10% based on 50% debt at c. 3% and 50% equity at 15%.

It is important to note that acquiring land without a committed buyer is a risky venture that will only attract market capital at a high cost. CAUSE is able to do more research on this on request.

⁹ CAUSE consultation response 6th August 2017 page 83

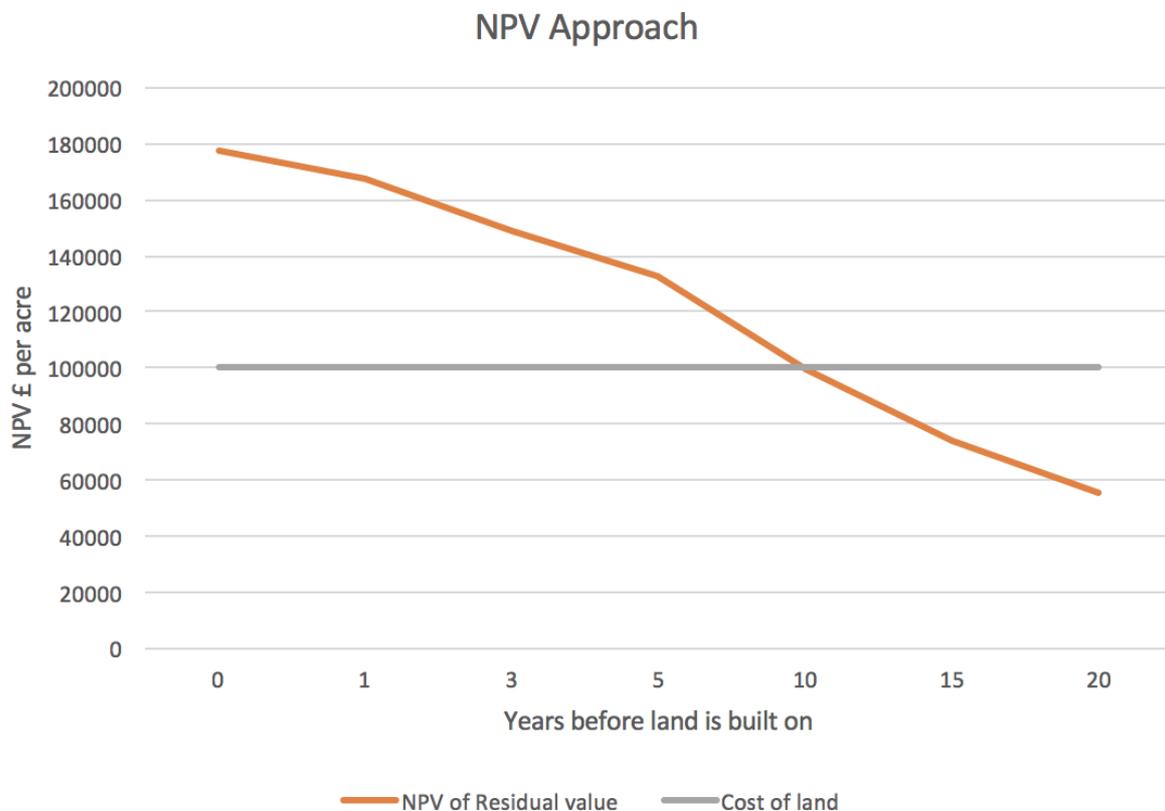
¹⁰ Some politicians are advocating a change to the 1961 Land Compensation Act to allow land to be purchased at EUV rather than Market Value. CAUSE's barrister advises that changes will also be needed to the 1996 Human Rights Act and the European Convention on Human rights if this is to be achieved.

6% is the figure chosen by Hyas, and we keep to that for simplicity and clarity.

10. Are these figures realistic?

The figures are future values, just like the ones used by Hyas and by s106 advisers. They look big compared to today's values. Drawing conclusions from them over 50 years is risky - the temptation to compare future values with current values is hard to resist.

CAUSE believes that such long projects should be appraised using DCF/NPV¹¹ techniques. The chart below shows how an NPV produces exactly the same conclusion, but with more understandable figures:



11. Why has no-one noticed this before?

It is well known that big settlements are difficult to deliver, but very few interested parties appear to have looked properly at the numbers. Although the error we have identified is huge the underlying model is clear and usable, and Hyas are to be congratulated for putting it into the public domain.

It is remarkable that such a spectacular error has been acknowledged since July 2017 but remains uncorrected by the North Essex Authorities. Taxpayers can have no confidence in

¹¹ DCF = Discounted Cash Flow. NPV = Net Present Value

the public sector's decision-making processes on this basis. They risk having to fund massive errors in

- Choice of settlement size
- Location of settlements
- Negotiation of land purchase arrangements with landowners and promoters

It is even more disappointing to hear decision makers saying that financial analysis is too difficult because the future is uncertain. This is a lazy approach to stewardship of taxpayer money: used properly the financial models bear important messages about both size and location – “Small is beautiful” is just one. They also confirm the lessons from the past¹² to which we should listen.

12. Conclusion

Small settlements that can be delivered within shorter periods will capture more land value uplift per dwelling. The figures for West Tey indicate that the cut-off is about 2000 dwellings. Small is indeed beautiful.

This conclusion is vital for the government's garden communities programme. If they want to deliver housing fast they need to concentrate on garden villages in the right locations and linked to existing centres. They should abandon large standalone new towns before further money is wasted on projects that will never happen without disproportionate subsidy.

CAUSE does not expect decision makers to accept such an important conclusion without checking. We therefore ask that they instruct a financially qualified third party to examine the issue and take heed of the results.

William Sunnucks 1 March 2018

William Sunnucks has a degree in economics from Cambridge University. He trained as a chartered accountant with Peat Marwick Mitchell and later did a two year full time MBA course at the London Business School. Since then he has worked as finance director for large companies in the property, banking and railway industries. He has experience of PFI and regulatory WACC negotiations and is currently involved in a number of property schemes including one to build 270 flats over a shopping centre on 1.7 acres in London

¹² See <http://www.cause4livingessex.com/new-towns-learning-from-the-past>. Also DCLG report “Transferable Lessons from the New Towns (2006)”. See also “Is it possible to Build Financially Successful New Towns? The Milton Keynes Experience “ by Richard B Peiser and Alain Chang.

Attachment - Sensitivities

This sheet illustrates the impact of the key inputs

	Base case	Increase delivery rate	Reduce funding rate	Reduce land price	To justify 15000	To justify 24000
D = Delivery rate after the first 2 years (dpa)	240	350	240	240	1900	3000
R = residual value per acre	177600	177600	177600	177600	177600	177600
L = cost of land per acre	100000	100000	100000	50000	100000	100000
r = funding rate (%)	6%	6%	3%	6%	6%	6%
Number of years = $n = \log(R/L) / \log(1+r)$	9.9	9.9	19.4	21.8	9.9	9.9
Maximum Efficient Size = $MES = (n-2) \times D$	1886	2750	4183	4741	14929	23571
Rounded to	2000				15000	24000

Delivery (D)

Delivery per Hvas starts in 2025

Then 50,150,250,30,350 for five years, 400, 450, 500 until 2065 when it increases to 5810

240 per annum is average of first 6 years of Hvas delivery. It is also the Cushman & Wakefield figure

This model assumes that no houses are delivered for the first 2 years - the land must be bought before planning permission

Residual value per acre ®

Hvas residual is £570m on 1300 hectares = £177,600 per acre.

This comes from their appendix which we treat as their base case.

It assumes 23660 dwellings sold at a 5% premium, with 5% contingency, 30% affordable etc.

In includes £129m of interest on infrastructure costs, but none on land.

Cost of land per acre (L)

Hvas are vague about the viability threshold, stating only that £177,600 is greater

We use the AECOM assumption of £100,000 per acre

Maximum Efficient Size (MES)

MES occurs when the cost of buying an extra acre (including funding cost) = the extra residual value per acre

For 24000 dwellings (as proposed by the NEAs) to be an efficient size there needs to be delivery at 3000 dpa

Sensitivity conclusion

The sensitivity analysis above demonstrates that extraordinary delivery assumptions of up to 3000 dwellings per annum will be needed to demonstrate that 23,660 is the optimum size based on the Hvas numbers for West Tey.