



transport for quality of life

CWIS Active Travel Investment Models: Model structure and evidence base

Technical appendix 2: Defining the counterfactuals

Technical appendix 3: Potential effect of housing
development and land use on the counterfactual

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September 2019

Document name:	Technical appendix 2: Defining the counterfactuals Technical appendix 3: Potential effect of housing development and land use on the counterfactual
Project name:	CWIS Investment Model – Additional analysis and reports WP1-817
Paper number:	Technical appendices 2 and 3
Client:	Department for Transport
Date:	September 2019

This report was delivered through the SPaTS Framework Lot 1, by the Arup supplier group.

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Technical appendix 2: Defining the counterfactuals

1. Introduction

This appendix describes the counterfactuals that were developed for the three CWIS models: that is, the change in cycling, walking and walking to school that it is assumed will happen anyway between the baseline year of 2013 and 2040, even if there is no additional investment. The counterfactuals take account of change in active travel that has already happened since 2013; change that is expected to happen as a result of funding (from a variety of sources) that has already been committed; and change that is expected to happen as a result of current land use planning policy.

2. Overview of the cycling counterfactual

For the cycling model, the counterfactual has the following components:

For non-London LADs with significant cycling growth:

- Actual growth in cycle stages per person per year (pppa) between the baseline year of 2013 and 2017, projected to 2019
- Forecast growth in cycle stages pppa from 2020-2025, based on committed investment (compared to historic investment)
- No change in cycle stages pppa from 2025 onwards
- Population growth.

For London LADs:

- Estimated growth in cycle stages pppa between the baseline year of 2013 and 2019, based on projection of historic trends (validated by comparison with actual London-wide trends)
- Forecast growth in cycle stages pppa from 2020-2025, based on TfL planned investment and Business Plan forecast
- No change in cycle stages pppa from 2025 onwards
- Population growth.

For all other LADs:

- Population growth
- Estimated growth in cycle stages as a result of Local Growth Fund (LGF) investment.

2.1 Non-London LADs with significant cycling growth

Thirteen non-London LADs were identified as likely to experience significant cycling growth, on the basis of evidence from Census data (increase in cycling mode share for travel to work between 2001 and 2011), supplemented by 1-1 contact with the LAD to understand recent trends.

The LADs in this group were Birmingham, Bradford, Brighton & Hove, Bristol, Cambridge, Leeds, Liverpool, Manchester, Oxford, Salford, South Cambridgeshire, South Gloucestershire and Stockport. Three other LADs (Bournemouth, Newcastle and Sheffield) were considered for inclusion in this group on the basis of their Census data, but excluded following discussion with local authority officers which suggested that past growth in cycling was unlikely to be sustained.

We used the following approach:

- Reviewed automatic cycle counter data and manual cordon and screenline count data to assess the actual change in cycling levels between 2013 and 2017¹
- Adjusted this for population growth to give an estimate of the change in cycle stages pppa
- Projected this trend to 2019
- Sought information on committed future investment to assess whether the growth rate was likely to be higher, the same, or lower during 2020-2025 than in the period to 2019
- Assumed that there would be no change in cycle stages pppa from 2025 onwards, because LADs did not have committed funding for cycling schemes beyond that date
- For the whole period covered by the model (2013 to 2040), calculated total cycle stages per annum for each LAD for each year (i.e. cycle stages pppa in year N multiplied by population in year N).

The investment identified by LADs for the period 2020-2025 came from a variety of sources, including Integrated Transport Block, Local Growth Fund, and S106. The information supplied by LADs suggested that growth may be somewhat lower during 2020-2025 than during 2013-2019 for some LADs (e.g. Birmingham, Bristol); and higher than in the previous period for LADs in Greater Manchester.

2.2 London LADs

For London, LAD-level ACC or manual count data was not available, so we used data on London-wide cycling trends (reported by TfL in 'Travel in London'), a TfL Business Plan forecast of expected London-wide growth in cycling between 2017 and 2024, and a TfL target for 2024 (from the 2018 Cycling Action Plan).

We adopted the following approach:

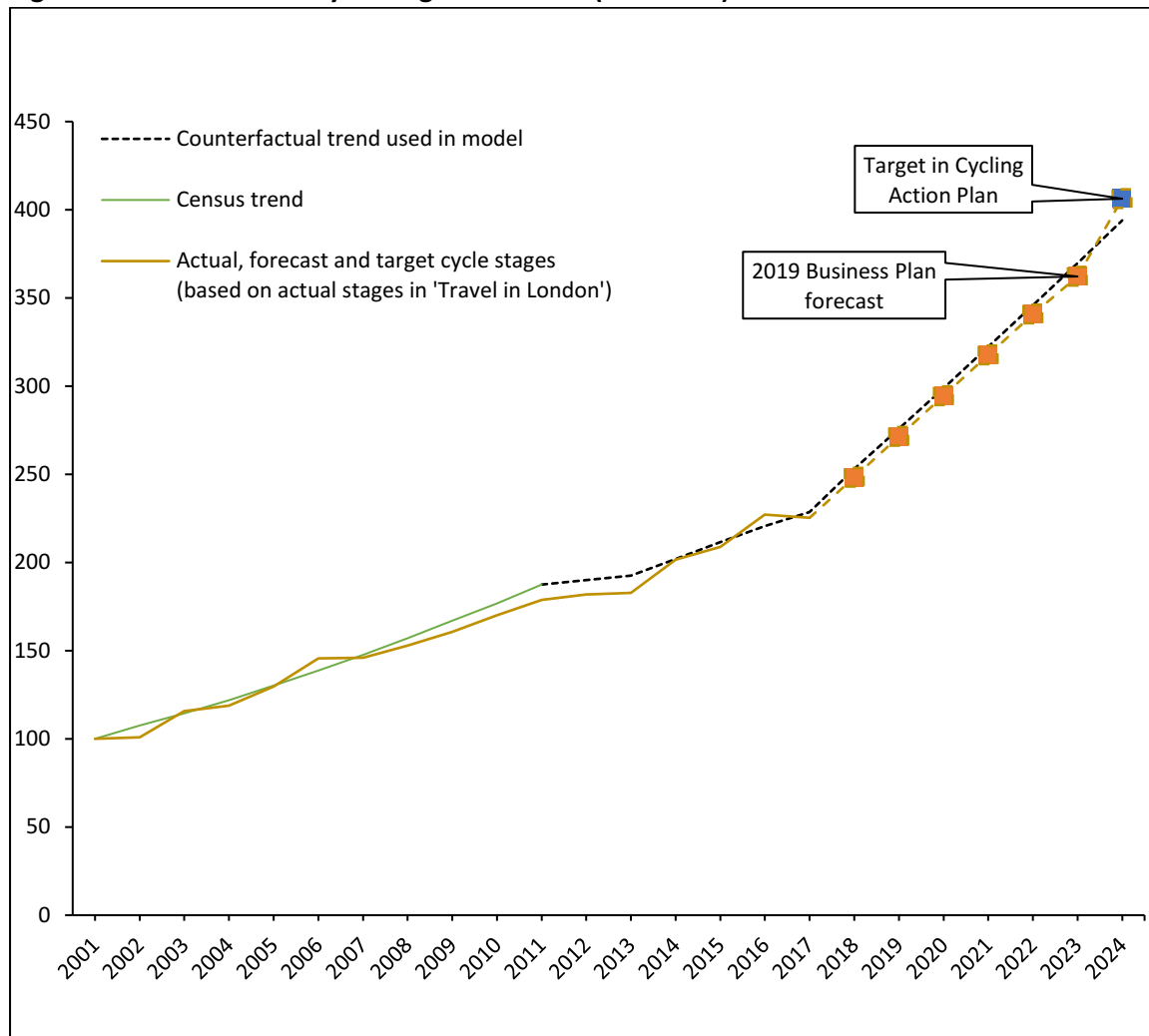
- Calculated the per capita cycling growth rate in each LAD between 2001 and 2011 from Census data
- Assumed that *relative* per capita cycling growth rates in each borough will match these historic trends i.e. boroughs where cycling (per capita) increased most between 2001 and 2011 will continue to experience the fastest growth
- Applied a factor to the growth rate in each borough that, when combined with population growth rates, produced a pan-London growth rate in cycle stages that matched the actual growth rate (from 'Travel in London') for the period from 2013 to 2017
- Applied a (different) factor to the growth rate in each borough to produce a pan-London growth rate that matched the forecast growth rate (from the latest TfL Business Plan) for the period from 2017 to 2024.
- Assumed that there would be no change in cycle stages pppa from 2025 onwards, because funding for cycling schemes beyond that date is not known.
- For the whole period covered by the model (2013 to 2040), calculated total cycle stages per annum for each LAD for each year (i.e. cycle stages pppa in year N multiplied by population in year N).

Figure 1 shows how the counterfactual used in the model aligns with the actual pan-London cycling trend (to 2017) and the TfL forecast (to 2024). The counterfactual gives an overall increase in cycle stages across London of 72% between 2017 and 2024.

¹ For Brighton & Hove and Bradford, we did not have access to count data, and therefore relied on forward projection of trends shown by Census data between 2001 and 2011.

It should be noted that there is a risk that the London counterfactual may overstate the increase in cycle stages, as it is based on an ambitious forecast. This means that there is also a risk that the investment required to achieve the national target to double cycling will be underestimated by the model.

Figure 1: Indexed annual cycle stages in London (2001=100)



Graph shows counterfactual trend used in model, compared to Census trend for cycle commuting (2001-2011); trend for all cycle stages shown by 'Travel in London'; TfL Business Plan forecast, and TfL Cycling Action Plan target

Note: The TfL Business Plan (2019/20 to 2023/24) states that “levels of cycling are forecast to increase by approximately 40% by the end of the plan to an average of 1.2 million journeys per day”. The TfL Cycling Action Plan (2018) includes a target “to almost double the number of cycle trips made every day in London (from 0.7 million in 2017 to 1.3 million in 2024)”. The implication of the target and forecasts is that TfL expects the growth rate for cycling to be higher between 2017 and 2024 than it has been in the recent past. TfL clarified that the target in the Cycling Action Plan includes an assumed effect from activity by partners across London (as well as an effect from TfL’s investment); while the forecast in the Business Plan is based only on TfL’s investment. TfL officers consider that the Business Plan forecast is “the current and most accurate forecast for future cycling journey stages, based on the current level of investment” (correspondence with officers, May 2019).

2.3 All other LADs

For all other LADs, Census data showed little change in cycle commuting between 2001 and 2011. For these LADs, our approach was as follows:

- Assumed that in the absence of additional investment, the ‘no change’ trend would continue indefinitely, and cycle stages pppa would stay constant
- For the whole period covered by the model (2013 to 2040), calculated total cycle stages per annum for each LAD for each year (i.e. cycle stages pppa in year N multiplied by population in year N)
- Took account of expected investment in cycling using Local Growth Fund in the period between 2015 and 2021.

A survey undertaken by DfT suggests that about £334 million LGF funding has been allocated to cycling schemes. Of this, we used local authority survey returns to DfT to estimate that about £78 million was being invested in LADs with significant cycling growth, and had therefore already been taken into account in estimating the forecast growth rate in these LADs. This left an expected £255 million LGF investment in all other LADs.

Although information is available at the LEP-level about the estimated amount of LGF investment in cycling, this is not broken down to LAD-level. We therefore adopted the simplifying assumption that the balance of LGF investment (i.e. £255 million) would be in urban areas and would involve a package of capital schemes (area-wide cycle networks, flagship cycling schemes and cycle parking at stations). We created an appropriate investment package (‘Cycling Counterfactual LGF Investment’) and applied this to all urban LADs (with RUC code 3, 4, 5 or 6) *apart* from those in London and those with significant cycling growth. We also made the simplifying assumption that all investment would be during Control Period 0, equally split between the five years 2015 to 2019.

3 Overview of the walking counterfactual

For the walking model, the counterfactual has the following components:

For non-London LADs with significant walking growth:

- Estimated growth in walk stages pppa between the baseline year of 2013 and 2019, based on projection of historic trends
- Forecast growth in walk stages pppa from 2020-2025 (based on projection of historic trends), as a result of investment and land use policies.

For London LADs:

- Estimated growth in walk stages pppa between the baseline year of 2013 and 2019, based on projection of historic trends (validated by comparison with actual trends in London)
- Forecast growth in walk stages pppa from 2020-2025, as a result of Healthy Streets investment and land use policies.

For all other LADs:

- Forecast change in walk stages pppa from 2013-2025 as a result of new housing development
- Estimated growth in walk stages as a result of Local Growth Fund (LGF) investment.

3.1 Non-London LADs with significant walking growth

Fifteen non-London LADs were identified as likely to experience significant walking growth, on the basis of evidence from Census data (increase in walking mode share for travel to work between 2001 and 2011), supplemented by 1-1 contact with the LAD to understand recent trends.

The LADs in this group were Birmingham, Bradford, Brighton & Hove, Bristol, Exeter, Hull, Leeds, Leicester, Liverpool, Manchester, Nottingham, Oxford, Salford, Sheffield and South Gloucestershire. Ten other LADs (Bournemouth, Derby, Ipswich, Lincoln, Newcastle, Plymouth, Portsmouth, Southampton, Southend and York) were considered for inclusion in this group on the basis of their Census data, but excluded following discussion with local authority officers which suggested that past growth in walking was unlikely to be sustained.

We used the following approach:

- Calculated LAD-level population-adjusted walk commuting growth rates from Census data in 2001 and 2011
- Projected this trend to 2019
- Sought information on committed future investment to assess whether the growth rate was likely to be higher, the same, or lower during 2020-2025 than in the period to 2019
- Assumed that there would be no change in walk stages pppa from 2025 onwards, because LADs did not have committed funding for walking schemes beyond that date
- For the whole period covered by the model (2013 to 2040), calculated walk stages pppa for each LAD for each year.

We had relatively little evidence of committed investment in walking beyond 2020, but we concluded that for this group of LADs, walking was a sufficiently high policy priority that it is plausible they will achieve a continuation of their historic growth in walk stages pppa during the period 2020-2025. This could be a result of investment in walking schemes (from Integrated Transport Block, S106, LGF or other sources), or due to 'pro-walking' land use or traffic restraint policies, which are evident in some LADs (e.g. Bristol, where the new Joint Spatial Plan is intended to encourage 'urban living'; and Hull, where significant public realm improvements are planned as part of 'City of Culture').

3.2 London LADs

For London LADs, we used the same approach as described above for non-London LADs with significant walking growth, that is:

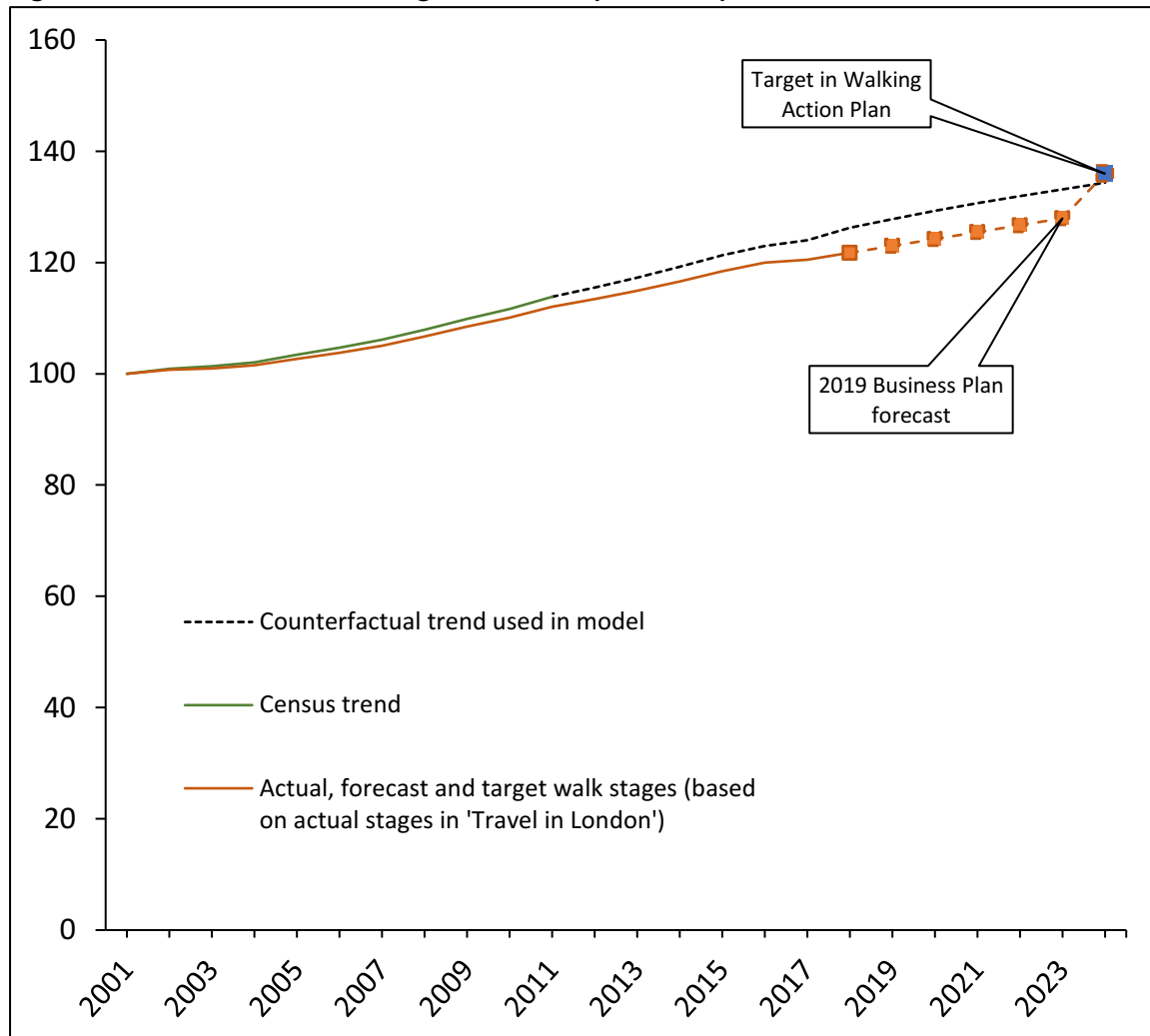
- Calculated LAD-level population-adjusted walk commuting growth rates from Census data in 2001 and 2011
- Projected this trend to 2019
- Sought information on committed future investment to assess whether the growth rate was likely to be higher, the same, or lower during 2020-2025 than in the period to 2019
- Assumed that there would be no change in walk stages pppa from 2025 onwards, because LADs did not have committed funding for walking schemes beyond that date
- For the whole period covered by the model (2013 to 2040), calculated walk stages pppa for each LAD for each year.

For the period from 2013 to 2017, the rate of growth generated by this method matched well with the actual pan-London growth rate (from 'Travel in London').

For the period from 2018 to 2024, the TfL Business Plan forecast shows an increase in total walk stages between 2018/19 and 2023/24 (Figure 2), but the rate of increase is the same as the rate of increase in the London population i.e. the TfL assumption is that walk stages per person will stay the same. This seems quite pessimistic, given past trends and the amount of effort and investment that is going into Healthy Streets in London. However, the more stretching walking target for 2024 in the TfL Walking Action Plan fits well with our counterfactual. We therefore concluded that Healthy Streets investment

and 'pro-walking' land use policies mean that it is plausible that walk stages pppa in London LADs will show similar rate of change during the period 2019-2025 as in the previous period.

Figure 2: Indexed annual walk stages in London (2001=100)



Graph shows counterfactual trend used in model, compared to Census trend for walk commuting (2001-2011); trend for all walk stages shown by 'Travel in London'; TfL Business Plan forecast, and TfL Walking Action Plan target

3.3 All other LADs

For all other LADs, we were concerned that new housing development may be more car-dependent (and less conducive to walking) than existing housing, and that this could affect the LAD-level walk stages pppa.

We therefore adopted the following approach:

- Assumed that in the absence of significant new housing development and/or additional investment, walk stages pppa would stay constant
- Made adjustments (described in Appendix 3) for the period to 2025, for the possible effect of new housing in those LADs where population growth is forecast
- Took account of expected investment in walking using Local Growth Fund in the period between 2015 and 2021.

A survey undertaken by DfT suggests that about £350 million LGF funding has been allocated to walking schemes. Of this, we estimated that about £98 million was being invested in LADs with significant walking growth, and had already been taken into account in estimating the forecast growth rate in these LADs. This left an expected £250 million LGF investment in all other LADs.

Although information is available at the LEP-level about the estimated amount of LGF investment in walking, this is not broken down to LAD-level. We therefore adopted the simplifying assumption that the balance of LGF investment (i.e. £250 million) would be in urban areas and would involve a package of capital schemes (town centre walking infrastructure schemes, flagship walking links and neighbourhood traffic calming schemes). We created an appropriate investment package ('Walking Counterfactual LGF Investment') and applied this to all urban LADs (with RUC code 3, 4, 5 or 6) *apart* from those in London and those with significant walking growth. We also made the simplifying assumption that all investment would be during Control Period 0, equally split between the five years 2015 to 2019.

4 Overview of the walk to school counterfactual

For the Walk to School Investment Model, no LAD-level data were available to enable walk stages per pupil per annum to be forecast in the absence of additional investment.

The model therefore simply assumes a counterfactual in which walk stages per pupil per annum remain constant over time, in all LADs.

Technical Appendix 3: Potential effect of housing development and land use on the counterfactual

The evidence overview (Appendix 4) found that levels of walking are strongly influenced by various built environment characteristics, such as density, proximity to public transport, and proximity to shops and services. At a sub-LAD level (e.g. at the scale of a large housing development), the amount of walking for travel varies by about a factor of two as a result of these characteristics.

Analysis of LAD-level walk stages pppa by Rural-Urban Category shows a lower bound of about 220 walk stages pppa and a median of about 300 pppa in all RUC area types, but an upper bound which varies by RUC, from 440 pppa in RUC6 to 360 pppa in RUC1, 2 and 3 (Table 1). Thus, the LAD-level variation is about a factor of two in RUC6, but somewhat less than this in other RUC categories.

Table 1: Typical range in walk stages pppa by RUC

Rural-Urban Category (RUC)		Number of LADs	Walk stages pppa		
			Lower bound	Median	Upper bound
6	Conurbations incl London	74	220	300	440
4,5	City / minor conurbation	106	220	300	380
1,2,3	Small towns / rural	144	220	300	360

Source: LAD-level baseline data created for the Walking Investment Model (see Technical Appendix 1 for details).

Because of the likelihood that new housing development may be more car-dependent (and less conducive to walking) than existing housing, we made allowance in the Walking Investment Model counterfactual for declining average walk stages pppa in areas of population and housing growth. This reflects the evidence that densities of new housing outside London are low compared to typical densities of existing dwellings, and evidence that new edge-of-town and greenfield housing is often highly car-dependent².

This adjustment was only applied to non-London ‘other’ LADs. In London and LADs outside London where there is significant walking growth, it was assumed that pro-walking land use policies are more likely to be in place, and that new housing is no less (or more) walkable than the LAD-level average.

The Walking Investment Model counterfactual assumes an average of 220 walk stages pppa for residents of new housing development in non-London ‘other’ LADs. In practice, some housing developments will have lower levels of walking (since the LAD-level ‘lower bound’ is an average for all residents in the LAD, including those in older ‘traditional’ residential areas and town centres).

In LADs with forecast population growth, the proportion of the population that will be ‘additional’ in each year to 2025 was calculated (relative to the baseline year of 2013). A LAD-level weighted average walk stages pppa was then calculated. For example, if the increase in population in year N compared to 2013 was n% of the population in year N, and the baseline stages pppa in 2013 was 300, the

² Average density of new housing stock in 2017/18 in ‘all other LADs’ was 27 dwellings (addresses) per hectare (MHCLG 2019 [Land use change statistics 2017-18 residential address based change table P331](#)). Existing housing stock typically includes some housing with considerably higher densities (e.g. Victorian/ Edwardian terraces at around 80-100dph; 1930s housing estates at around 30-40dph), so average density of existing housing stock is likely to be significantly higher than that of new housing. Foundation for Integrated Transport (2018) [Transport for New Homes](#) documents the lack of provision for walking in new edge-of-town and greenfield housing.

weighted average stages pppa in year N would be $(220 \times n\%) + (300 \times [1-n\%])$. This approach generated 'Counterfactual A' in the Walking Model.

Two alternative counterfactuals, B and C, are also included in the model. In Counterfactual B, new housing development is assumed to have the same walk stages pppa as the average for the LAD in which it is located (i.e. housing development has no effect on walk stages pppa). In Counterfactual C, new housing development is assumed to have walk stages pppa at the upper bound of LAD-level walk stages pppa for the RUC area-type, as shown in Table A3.1.

These alternative counterfactuals can be used to assess the potential for walk stages pppa to be positively affected if new housing development is designed to favour walking, in a 'Favourable Land Use Planning' Scenario.