# Middlesbrough Council and Redcar & Cleveland Borough Council

# **Strategic Housing Sites**

Model Assessment Report

224125-22

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This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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# **Executive Summary**

#### Context

Arup was commissioned by Middlesbrough Council and Redcar and Cleveland Borough Council to evaluate the impact of future housing sites on the transport network within the Middlesbrough and Redcar and Cleveland areas.

The outputs from this work provide an insight into how well the future highway network would cope with the development traffic and provides recommendations for where additional measures may be required to minimise the impact of the developments.

## **Methodology**

Middlesbrough Council and Redcar and Cleveland Borough Council provided a database of sites suitable for residential development up to 2035. The database contains details of the type (houses or flats) and number of dwellings. To test the impact of the housing proposals on the highway network the Tees Valley Multi-Modal model, a strategic transport model developed by Tees Valley Unlimited, was used.

Prior to testing the impact, the anticipated number and pattern of trips that each development would generate was ascertained and their anticipated change input into the model for the future years. The growth assumptions already in the model were reviewed and revised where necessary. All updates entered into the model were benchmarked against national traffic growth forecasts to generate three realistic development scenarios:

- A Do-Minimum scenario comprising the housing development proposals with existing and committed infrastructure;
- A Do-Something scenario comprising the housing development proposals but with additional highway infrastructure improvements; and
- A Do-Something scenario comprising the housing development proposals
  with additional highway infrastructure improvements but without one of the
  proposed infrastructure improvements the Stainton Way Eastern Extension.
  It is uncertain whether this scheme will be deliverable in future years and
  therefore it was considered necessary to review the consequences of removing
  this element of mitigation from the model.

# **Study Findings**

Following the model tests a number of conclusions were made and are covered in further detail in the report. In summary, the key findings show:

Housing growth is predominately focussed in south and south west
Middlesbrough. There are a number of existing infrastructure schemes put
forward which should mitigate the impact of these developments locally but
there are impacts on the wider network that are not mitigated.

- In relation to the above point, further work is recommended to improve conditions on Cargo Fleet Lane, at Swans Corner and at Greystones Roundabout.
- The Longlands to Prissick Link provides additional capacity to the south of Middlesbrough town centre but is not expected to be implemented until 2025.
   The results suggest capacity is needed sooner than this to minimise the burden of new housing sites on Marton Road.
- There is an increase in trips into central Middlesbrough but it is recommended that measures to discourage car travel within the central area are explored prior to developing new highway infrastructure schemes.
- Improvements are proposed on the A174 south of Redcar but the study has
  found that additional improvement will be necessary by 2030 on the A174
  around the Skelton and Brotton area. This will be required if the forecast
  development traffic from housing sites in the east of the study area is to be
  accommodated without having a detrimental effect on the existing network
  conditions.
- Whereas the Stainton Way Eastern Extension shows some future benefits in relation to reduced traffic impact on the adjacent road network, namely Guisborough Road, discussions with Redcar and Cleveland Borough Council have revealed that it will not be possible to deliver the road scheme. As a result it is not proposed to include the Stainton Way Eastern Extension in the list of improvements to support the housing delivery.

## 1 Introduction

# 1.1 Purpose of the Study

Arup was commissioned by Middlesbrough Council (MC) and Redcar & Cleveland Borough Council (R&C) to evaluate the impact of proposed strategic housing sites on the transport network within the Middlesbrough and Redcar and Cleveland areas. The evaluation has been carried out using a transport model which incorporates the housing sites and infrastructure proposals and reviews the resultant impact on traffic flows, speeds and journey times throughout the modelled area.

The findings from this work identify the impact of the proposed highway mitigation measures and determine what additional improvements are necessary to accommodate the strategic housing sites on the local highway network.

#### This report includes:

- An overview of the Tees Valley Multi Modal Model in Section 2 and why it is appropriate for the study;
- Section 3 outlines the various housing growth scenarios put forward and how the scenarios that have been modelled have been reviewed and validated;
- The results of the model analysis are presented in Section 4, and Section 5 reviews the appropriateness of the proposed mitigation schemes and whether any additional improvements are required; and
- Section 6 summarises the key findings and recommendations from the study.

# 2 Tees Valley Multi-Modal Model

## 2.1 Introduction

A database of the proposed strategic housing sites within the Middlesbrough and Redcar and Cleveland area, which could be delivered up to 2035, was provided. Data was supplied regarding the type, extent and anticipated rate of development up to 2035. A copy of the database and maps showing the location of the housing sites is contained in **Appendix A**.

To test the impact of the proposed strategic housing sites, the Tees Valley Multi Modal Model (TVM) was chosen as the most appropriate tool to use. This section provides an overview of the TVM. Additional information on how the database was adapted, and scenarios formed for testing, is provided in Section 3.

## 2.2 Suitability of the TVM

It should be noted that the TVM was developed as a strategic model in order to test, amongst other things, major highway schemes and to investigate the traffic impacts of major developments on the highway network. In early 2010 the Department for Transport (DfT) commissioned a review of existing strategic models which judged the TVM to be suitable for the assessment of only the most broad-brush highway interventions.

The model does include junction detail and junction delay at all significant junctions in the network. This detail is sufficient to provide a realistic level of overall delay along a corridor. However, as no effort has been made to validate the delays at each individual junction, model outputs should be treated with a level of caution.

Each development is assigned to a zone within the TVM to test the impact of the development on the highway network. Where a development site crosses zone boundaries, an assessment is made as to which zone the development should be assigned to.

As the model has been developed as a Tees Valley wide tool, it is has not been calibrated in detail to the local level in Middlesbrough or Redcar and Cleveland, including the usage of the highway and public transport network. As such, the results generated by the model should be considered in general terms only, and should not be used to assess localised impacts.

# 2.3 Base Year TVM Trip Making

Prior to importing the Middlesbrough and Redcar and Cleveland developments into the base model, the strategic TVM was interrogated to highlight current and predicted levels of trip making in Middlesbrough and Redcar and Cleveland. Firstly, regarding baseline conditions in 2005 (the base year of the model), it is considered important to understand if there is a net gain or loss in commuting trips into the two areas. **Table 1** shows the total number of arrivals and departures in the TVM in 2005.

Table 1 AM Peak Trip Totals in 2005 TVM (made by people with car available)

<b>Local Authority Area</b>	Arrivals	Departures	<b>Commuting Gain or Loss</b>
Hartlepool	17153	16919	1% (Gain)
Stockton - on - Tees	34149	36104	-6% (Loss)
Middlesbrough	30258	25657	16% (Gain)
Darlington	27393	26779	2% (Gain)
Redcar & Cleveland	23143	24795	-7% (Loss)

The model data summarised in **Table 1** shows that, in the Tees Valley as a whole, Middlesbrough is the major attraction in terms of jobs as there are 16% more arrivals into Middlesbrough than departures. On the other hand, Redcar and Cleveland experiences a net loss of 7%.

#### 2.4 TEMPRO

The TEMPRO software provides summaries of National Trip End Model (NTEM) forecast data for transport planning purposes. The forecasts include population, employment, households by car ownership and trip ends. The TVM uses TEMPRO forecasts to predict future traffic patterns. Further details of how TEMPRO has been used to inform the development scenarios is presented in Section 3.

# 2.5 Future Year Trip Projections

The current TVM projections, as maintained by Tees Valley Unlimited for future years, are aligned to TEMPRO v6.2 growth. The TEMPRO projections for Middlesbrough are shown in **Table 2**.

Table 2 TEMPRO Projections for Middlesbrough

	Population	Households	Jobs	Workers	Trips Produced				
TEMPRO Totals									
2010	138,130	56,022	61,723	53,094	52,649				
2015	140,186	57,933	62,241	53,759	54,126				
2020	142,478	60,051	63,218	54,895	55,667				
2025	144,567	61,840	64,837	56,135	57,066				
2030	146,513	63,652	66,331	57,399	58,415				
2035	147,943	65,349	68,045	58,992	59,910				
		Absolute Gro	wth from 2015						
2015-2020	2,292	2,119	977	1135	1,541				
2015-2025	4,380	3,907	2,596	2,376	2,940				
2015-2030	6,326	5,719	4,090	3,640	4,289				
2015-2035	7,756	7,416	5,804	5,232	5,784				
Percentage Growth from 2015									
2015-2020	2%	4%	2%	2%	3%				

	Population	Households	Jobs	Workers	Trips Produced
2015-2025	3%	7%	4%	4%	5%
2015-2030	5%	10%	7%	7%	8%
2015-2035	6%	13%	9%	10%	11%

The TEMPRO projections for Redcar and Cleveland are shown in **Table 3.** 

Table 3 TEMPRO Projections for Redcar and Cleveland

	Population	Households	Jobs	Workers	Trips Produced
		TEMPR	O Totals		
2010	137,505	59,068	46,328	54,211	51,542
2015	139,106	61,003	46,475	53,865	52,284
2020	139,777	62,367	47,430	54,438	53,114
2025	141,257	64,040	48,395	55,430	54,116
2030	142,117	65,389	49,196	55,962	54,724
2035	142,348	66,492	50,297	56,656	55,379
		Absolute Grov	wth from 2015		
2015-2020	671	1,364	955	573	830
2015-2025	2,151	3,037	1,921	1,566	1,832
2015-2030	3,011	4,386	2,722	2,098	2,440
2015-2035	3,242	5,489	3,822	2,791	3,095
		Percentage Gro	wth from 2015		
2015-2020	0%	2%	2%	1%	2%
2015-2025	2%	5%	4%	3%	4%
2015-2030	2%	7%	6%	4%	5%
2015-2035	2%	9%	8%	5%	6%

In 2015, the TEMPRO data shows that there will be approximately 58,000 households in Middlesbrough. This is forecast to grow by around 10%, or just under 6,000 (absolute growth) households, by 2030. By 2035 the absolute growth in households would be over 7,000. However, the growth in population of around 6,000 by 2030 represents a percentage population growth of only 5%. The data demonstrates that the growth in the number of households will exceed the growth in population as a consequence of decreasing household size. In addition, the relationship between growth in jobs and workers can be seen in **Figure 1**.

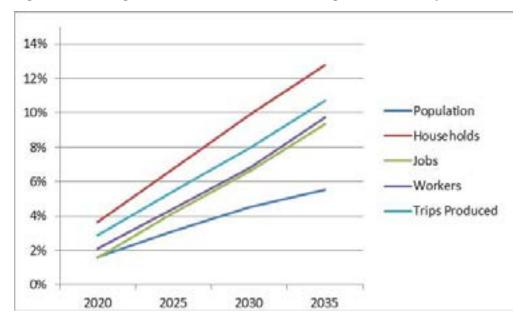


Figure 1 Percentage Growth from 2015 (Middlesbrough TEMPRO Projections)

A similar, but more pronounced effect can be seen in Redcar and Cleveland, where the growth in households is 7% by 2030 compared to a population increase of 2%

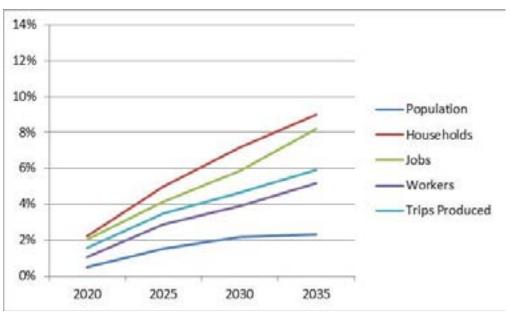


Figure 2 Percentage Growth from 2015 (Redcar & Cleveland TEMPRO Projections)

The TVM projections for trip end growth are based on these TEMPRO projections and are displayed in **Table 4**. The table shows total trips produced (i.e. trips directly related to housing and population growth) in the AM peak hour from Middlesbrough and Redcar and Cleveland.

**Table 4 TVM Trips Produced** 

	T-4-1 O-	• - •	Growth from 2015				
	Total Origins		Absol	ute	Percentage		
	Middlesbrough	Redcar and Cleveland	Middlesbrough	Redcar and Cleveland	Middlesbrough	Redcar and Cleveland	
Year							
2015	29,368	26,871					
2020	30,424	27,197	1,056	327	4%	1%	
2025	31,135	27,734	1,767	863	6%	3%	
2030	32,049	28,184	2,681	1,313	9%	5%	
2035	33,882	29,437	4,514	2,566	15%	10%	

The table shows that the total growth in trips within the current version of the TVM based on the TEMPRO projections is around 15% between 2015 and 2035 in Middlesbrough and 10% in Redcar and Cleveland.

In summary, the data contained within this section provides the context to the existing TVM. The following sections outline how the model has been reviewed and revised where necessary to bring it in line with the aspirations of Middlesbrough Council and Redcar and Cleveland Borough Councils.

# 3 Scenario Development

#### 3.1 Introduction

This section outlines the various processes that were undertaken to update the TVM for use on this study. The model has been adapted to ensure the growth predictions in the future years (2020, 2025, 2030 and 2035) represent realistic scenarios.

## **3.2** Forecasting Growth

A database of strategic housing sites was provided at the outset of the study. This contained details of the type of residential development proposed at each site (houses or flats and the percentage of affordable units) and the forecast number of units that would be developed in each of the modelled years (2020, 2025, 2030 and 2035). It also included details of any demolition works that were programmed that needed to be accounted for in each growth scenario.

The trip generation of each development site was calculated based on average trip rates. The average trip rates applied were those already utilised in the TVM which are presented in **Table 5**.

Table 5	Aver	age	Residentia	ıl Trip K	lates	(Vehicles)

	AM		IP		PM	
Type	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures
Mixed Housing	0.24	0.83	0.34	0.33	0.62	0.38
Flats	0.10	0.49	0.24	0.15	0.41	0.16

The trip generation forecasts were added to the database and it was then necessary to review the database to ensure that the resultant traffic forecasts in future years were representative of the likely future scenarios. As outlined in Section 2, the TVM already contains growth assumptions for the area and these growth assumptions had to be reviewed before the updated database could be taken forward.

Within Middlesbrough, the database forecast that an additional 5,120 houses (and 925 flats) would be delivered between 2015 and 2030. Based on the average trip rates, this would result in an additional 4,321 highway trips in the AM peak hour. This compares reasonably well with the existing model database that forecasts that 5,201 houses will be delivered up to 2030, generating 3,884 trips. Similarly, the database also correlates well with TEMPRO that predicts an additional 5,719 houses up to 2030 and 4,289 trips. **Figure 3** shows the close correlation between all three sources of information and confirms the level of growth that is assumed to be generated by the strategic housing sites compared with the baseline condition. Given the close correlation between all sources of information, the Middlesbrough forecasts were considered to be an accurate representation of future growth.

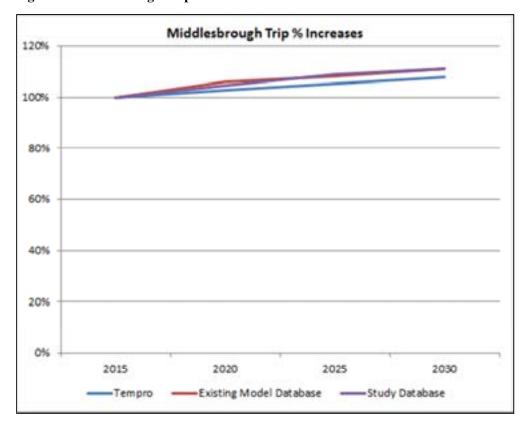


Figure 3 Middlesbrough Trip % Increases

In Redcar and Cleveland however, the different sources showed much greater differences in the number of new houses forecast up to 2030. The database provided for the study forecast an additional 4,361 units that would generate 3,314 highway trips. In comparison, the existing model database forecast just 2,404 houses generating 1,827 trips. TEMPRO forecasts predicted 6,321 properties and 2,440 trips. These differences are illustrated in **Figure 4**. It can be seen from **Figure 4** that the application of average trip rates (used in the study database) exceeds the other predictions. The TEMPRO forecasts for example include more houses (6,321) but fewer trips, assuming that travel characteristics in Redcar and Cleveland are much different to those in Middlesbrough. For the purposes of this study, it was considered appropriate to apply the average trip rates across both areas as the most robust scenario, rather than vary the trip rate by area. The model has therefore been updated with the forecasts in the study database. It is however acknowledged that the impact of the development sites within Redcar and Cleveland could be slightly over-estimated.

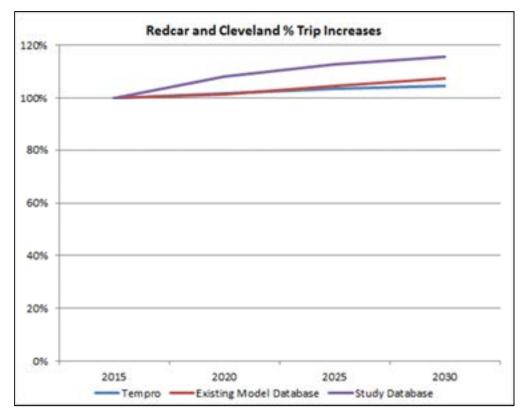


Figure 4 Redcar and Cleveland Trip % Increases

# 3.3 Location of Development

Once the level of trip generation associated within each site was established, it was necessary to assign development sites to zones within the TVM. This was done by plotting the centroid of the development sites within GIS and selecting the zone that the greatest proportion (if not all) of the development site was most likely to fall into.

**Appendix B** contains maps showing the change in trip origins by zone for each model year (2020, 2025, 2030 and 2035). Trip destinations were assigned based on existing distributions in the model. The figures show that:

- In 2020 there are growth peaks in the northern, eastern and western areas of the model; and
- By 2025 and more so by 2030 / 2035 the growth is more dispersed but there is a clear concentration of housing growth in south-west Middlesbrough and the zones on the east coast that include the Brotton and Skelton areas.

**Table 6** shows the housing growth for the two local authority areas by period. It shows that the greatest amount of growth is forecast in the first modelled period, 2020, with the level of housing growth decreasing up to 2030.

**Table 6 Housing Growth by Period** 

Authority	2020	2025	2030	Total
Middlesbrough (Housing)	2,165	1,860	1,095	5,120
Middlesbrough (Flats)	125	450	350	925
Redcar and Cleveland	1,487	1,582	1,292	4,361
Total (Units)	3,777	3,982	2,727	10,406

# 3.4 Infrastructure Planning

In order to develop a 'do-minimum' scenario, any scheme that has either been built since 2010, is currently under construction, or can be reasonably be foreseen to be built by 2015, (or 2020) has been included within the 'do-minimum' modelled networks across the Tees Valley. The schemes in Middlesbrough and Redcar and Cleveland are shown in **Table 7**.

**Table 7 Committed Infrastructure** 

G 1	]	Model Year		
Scheme	2010	2015	2020-2030	
Network Changes Middlesbrough		•		
A19/A174 Highways Agency Parkway Pinch Point works	No	Yes	Yes	
Western Gateway	No	No	Yes	
Prissick Link	No	Yes	Yes	
Stainton Way widening (West)	No	No	Yes	
Stainton Way widening (East)	No	No	Yes	
Stokesley Road dualling	No	No	Yes	
Middlesbrough Bus Network Improvement	nts	•	•	
Newport Road / Bus Station junction based improvements	No	Yes	Yes	
Middlesbrough Town Centre junction based improvements	No	No	Yes	
Newport Road bus priority	No	Yes	Yes	
Stockton Road widening	No	Yes	Yes	
Cranmore Road / Cargo Fleet Lane junction based improvements	No	Yes	Yes	
College Road / Cargo Fleet Lane junction based improvements	No	Yes	Yes	
Marton Road / Broadwell Road junction based improvements	No	Yes	Yes	
Marton Road / Broughton Avenue junction based improvements	No	Yes	Yes	
Marton Crossroads junction / bus lane improvements	No	Yes	Yes	
Albert Road improvements	No	Yes	Yes	
Network Changes Redcar & Cleveland		•	•	
Low Grange Farm improvements	No	Yes	Yes	

Scheme		Model Year			
		2015	2020-2030		
Ormesby oundabout junction based improvements	No	Yes	Yes		
Redcar Interchange	No	Yes	Yes		
West Dyke Road / Corporation Road junction based improvements	No	Yes	Yes		
West Dyke Road / Kirkleatham Lane junction based improvements	No	Yes	Yes		
Kirkleatham widening	No	Yes	Yes		
Guisborough Market Place bus lane based improvements	No	Yes	Yes		
Normanby Road / Trunk Road improvements	No	Yes	Yes		

A number of additional highway improvement schemes have been developed that could add highway capacity on the future network to accommodate the traffic generated by the strategic housing sites. These schemes need to be tested to identify the scale of mitigation that is afforded by the infrastructure.

The schemes, and when they are forecast to be complete, are shown in **Table 8**. Assumptions on the years in which all schemes will be completed are based upon the timeframes suggested in the draft Tees Valley Local Major Scheme Prioritisation List.

**Table 8 Infrastructure Proposals** 

Scheme Name	Scheme Description	Year Complete
Portrack Relief Road	New link road between Marston Road in Portrack (connected to Portrack Lane) and the Newport Bridge approach.	2020
Manhattan Gate	New road to support the Middlehaven development.	2020
A174 Parkway Extension	The improvements would upgrade the existing single carriageway road to a dual carriageway with associated junction improvements to provide additional capacity.	2020
Stainton Way Western Extension	New Link between A174 Parkway / A1044 Low Lane Junction and the A19 / A1130 Acklam Road Junction	2025
Longlands to Prissick Link	New Link adjacent to Ormesby Beck between B1380 Ladgate Lane and the A172 / A1085 Longlands Road Roundabout	2025
Greystones Roundabout	Junction improvements to provide additional capacity at the roundabout	2025
A174 / A19 Capacity Improvements	Junction Improvement, which provides additional circulatory carriageway widening afforded by the rebuilding of the A19 overbridges. This is in addition to the currently committed Pinchpoint Scheme.	2030
A174 Dualling (Redcar)	Dualling of existing road south of Redcar	2030
Stainton Way Eastern Extension	New Link between Stainton Way and A171 / A1043 Swans Corner Roundabout.	2030

The location of the infrastructure schemes are shown in **Appendix B**. The schemes have also been overlaid on the plans showing the location of forecast housing growth contained within **Appendix B**. It can be seen that up to 2020, the delivery of the Portrack Relief Road and the Parkway Extension (both schemes within the borough of Stockton on Tees) will assist in providing additional capacity to support the growth peaks in south-west and west Middlesbrough. There is also growth forecast in Middlehaven and the Manhattan Gate scheme will deliver the necessary infrastructure. However, there are no proposals to support the forecast housing growth in the eastern extent of the study area.

By 2025, the Stainton Way Western Extension is forecast for delivery and this would support the housing growth in south Middlesbrough. Similarly, the improvements to the Greystones Roundabout would be delivered to support the housing growth that is forecast in the Eston and Lazenby areas. There are however no highway proposals to support the growth that is illustrated in the Redcar area.

By 2030, improvements to the A174 south of Redcar would facilitate growth in this area but there are no proposals for additional infrastructure in other areas of growth within the Redcar and Cleveland area. The assessment of the model scenarios (see Section 4.2) recommends that some highway infrastructure improvements will be necessary in the areas in the south-east of the study area by 2030 if the development traffic is to be accommodated without having a detrimental effect on the existing network conditions.

The Stainton Way Eastern Extension is also forecast to be built by 2030 which would provide a link between Stainton Way and the A171 / A1043 Swans Corner roundabout. This infrastructure improvement would however require significant land take and there are housing developments proposed in this area that may be constructed before 2030. The deliverability of this improvement is therefore questionable and a sensitivity test has been run in the model to review the impact of this mitigation proposal and the consequences if the proposal cannot be delivered.

#### 3.5 Model Scenarios

Having established the scale of housing development within the local area over future years and the highway schemes that have been put forward to date to provide additional highway capacity, three scenarios have been taken forward for testing within the model in each of the future years:

- 1) The Do-Minimum scenario comprising the strategic housing development proposals with existing and committed infrastructure (see **Table 7**);
- 2) The Do-Something scenario comprising the development proposals but with all the highway infrastructure improvements added; and
- 3) The Do-Something scenario comprising the development proposals and the highway infrastructure improvements with the exception of the Stainton Way Eastern Extension.

# 4 Scenario Appraisal

The number of trips generated from each strategic housing site, together with background traffic growth, was input into the TVM for the projected modelled years 2015, 2020, 2025, 2030 and 2035. This section reports the results of the TVM outputs for the model scenarios for each of the future years. The results give an indication of the impacts that the proposed housing sites could be expected to have on the highway and the effect of the proposed highway mitigation.

# **4.1** Traffic on Key Screen Lines

A number of screen lines have been identified within the model to determine the change in traffic patterns over the modelled years across the screen lines. The screen lines (shown in **Appendix C**) are as follows:

- Outer Cordon of Middlesbrough, which is simply the local authority boundary and allows for comparisons in traffic flows across the Middlesbrough boundary including those flows in and out of Redcar and Cleveland;
- Inner Cordon of Middlesbrough representing the area that is generally regarded as Middlesbrough town centre;
- South Middlesbrough screen line which dissects Middlesbrough north of the A174; and
- Junction screen lines at the following locations (and chosen as they represent the main junctions at each of the four corners of the Middlesbrough local authority boundary)
  - o A66 / A19 junction;
  - A19 / A174 junction;
  - A174 / Greystone Road (Greystones Roundabout); and
  - o A66 / Greystone Road junction.

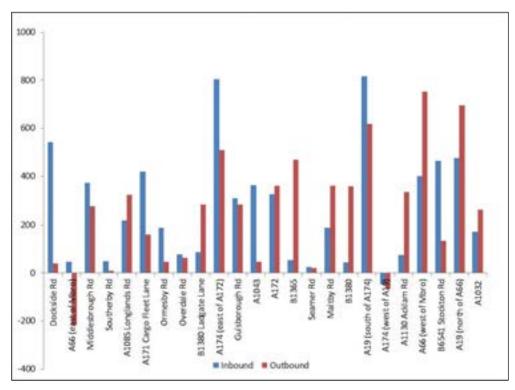
**Appendix C** provides data regarding traffic flows and speeds on the links across each screen line in the modelled years. The following sections provide a summary of what the results indicate.

## **Outer Cordon of Middlesbrough**

- In the Do Minimum scenario the total inbound traffic flow across the Middlesbrough Outer Cordon is forecast to grow by 18% by 2030 with the outbound flow growing by 19%. This increases to 22% and 21% respectively by 2035.
- The total inbound traffic flow across the Middlesbrough Outer Cordon in the Do Something scenario is slightly less by 2030 than the Do Minimum scenario as additional routes are added that are not included in the screen line analysis (e.g. Stainton Way Western Extension).

- The highest absolute inbound increases by 2035 in the Do Minimum scenario occur on the A19 south of the A174 (817 vehicles) and on the A174 to the east of the A172 (805 vehicles). The largest outbound increases also occur on these roads and also the A66 west of Middlesbrough (751 vehicles).
- **Figure 5** shows the change in traffic flows forecast during the AM peak at the outer Middlesbrough screen line between the base year (2015) and the 2035 Do Minimum Scenario

Figure 5 Change in Traffic Flow across Outer Middlesbrough Cordon 2015 – 2035 (Do Minimum)



- The screen line data in **Appendix C** shows that the largest percentage increases tend to occur on roads with lower flows, i.e. less than 500 vehicles. This suggests that as the network gets closer to its capacity, traffic is rerouting onto lower order roads in order to avoid the congestion on the busier routes.
- As traffic is forecast to increase, speeds decrease on most routes analysed across the outer Middlesbrough screen line. A reduction in speed is a reasonable indication that the route is becoming more congested as flows increase. The highest percentage decreases in inbound speeds are forecast to occur on Guisborough Road and Cargo Fleet Lane between 2015 and 2030. Figure 6 shows the forecast speed (kph) in 2015 and 2030 for each route on an inbound direction in the Do Minimum scenario. It can be seen that thelow speeds on Guisborough Road and Cargo Fleet Lane decrease further in 2030.

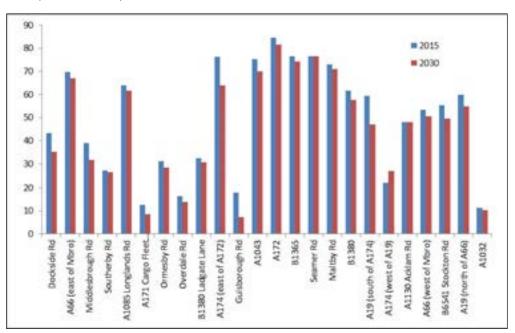


Figure 6 Change in Inbound Speed across Outer Middlesbrough Cordon 2015 – 2030 (Do Minimum)

• **Figure 7** shows the change in traffic flows forecast during the AM peak at the outer Middlesbrough screen line between the base year (2015) and the 2035 Do Something scenario. The large traffic flow increases that were seen on the A19 and the A174 in the Do Minimum scenario are reduced, to some extent, in the Do Something Scenario (through the addition of the Stainton Way eastern and western extensions).

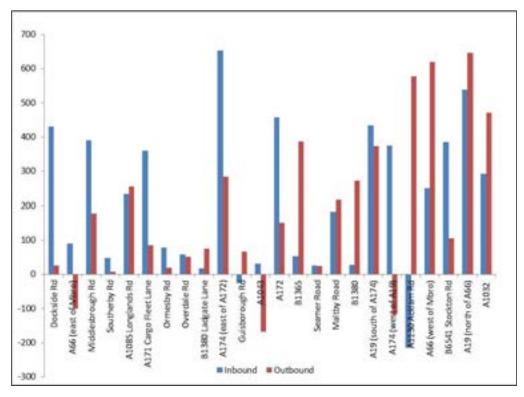


Figure 7 Change in Traffic Flow across Outer Middlesbrough Cordon 2015 - 2035 (Do Something)

- The Do Something scenario results show that even with the infrastructure improvements, some routes will still experience congestion as traffic flows increase but no measures are put forward to mitigate. For example, the inbound flow on Cargo Fleet Lane in the AM peak increases by 17% by 2030 in the Do Something scenario which results in a ratio of flow to capacity ratio on the link of 1.75. This link is however congested in the base with a ratio of flow to capacity ratio of 1.5 in 2015. Junction improvements are included on Cargo Fleet Lane as part of the Bus Network Improvements but the results indicate the link is still congested.
- The speeds in the Do Something scenario still decrease on some routes as traffic flows increase. However, **Figure 8** shows that by 2030, when all infrastructure proposals would be in place, some routes benefit from an increase in speed including Guisborough Road and the A1043 Nunthorpe bypass.

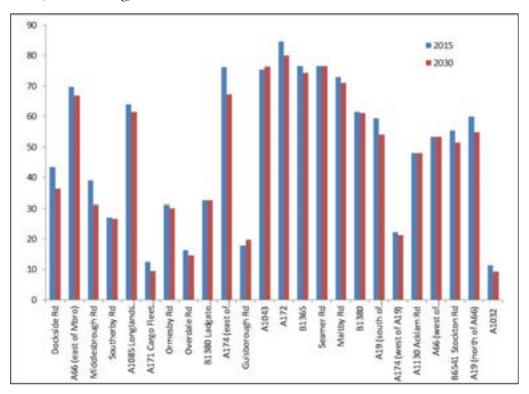


Figure 8 Change in Inbound Speeds across Outer Middlesbrough Cordon 2015 - 2030 (Do Something)

- Without the Stainton Way Eastern Extension the main impact is on Guisborough Road where speeds are forecast to decrease inbound across the Middlesbrough Outer Cordon by 58% by 2030 without the extension. The 2015 base speed is 18kph and this decreases to 8kph in 2030. With the extension included, the speed was forecast to increase slightly from a base of 18kph to approximately 20kph by 2030. Note however that the maps in **Appendix B** show that housing development in this part of the study area starts to grow significantly from 2020 onwards, however the Stainton Way Eastern Extension is not forecast for implementation until 2030. The impact of this is shown in the results of the Do Something scenario where inbound traffic speeds on Guisborough Road across the Middlesbrough Outer Cordon are forecast to decrease to an average of 12kph by 2025.
- Inbound speeds would also decrease on the A1043 Nunthorpe bypass without
  the Stainton Way Eastern Extension compared to the Do Something scenario.
  Outbound speeds are also forecast to decrease on Guisborough Road and the
  A1043 without the Eastern Extension but to a lesser extent.
- The ratio of flow to capacity on Guisborough Road inbound across the Middlesbrough Outer Cordon, without the Eastern Extension, would be 1.4 compared with 0.64 in the Do Something scenario in 2030. However, and as noted above, capacity issues are expected to be experienced before 2030 with housing growth in 2025 resulting in a ratio of flow to capacity of 1.04 on Guisborough Road.

- The analysis suggests that by 2025 some links are experiencing high flows and subsequent speed decreases, even in the Do Something scenario. The Stainton Way Eastern Extension was previously forecast to mitigate these impacts by 2030 but if the infrastructure is not delivered, alternative options will need to be explored to minimise the impact of development traffic on Guisborough Road.
- The percentage change in traffic flows at the eastern boundary of the outer Middlesbrough screen line where traffic crosses the Middlesbrough and Redcar and Cleveland boundary can be seen in **Table 9**. The percentage change is the 2030 conditions compared with the base (2015).

Table 9 Change in Traffic Flows (between 2015 and 2030) across MC / R&C Boundary

Route	Do Minimum		Do Son	nething	Do Something (no Stainton Way Eastern Extension)	
	Westbound Flow	Eastbound Flow	Westbound Flow	Eastbound Flow	Westbound Flow	Eastbound Flow
A66	3%	-6%	3%	-3%	3%	-4%
Middlesbrough Road	79%	49%	86%	22%	88%	25%
Longlands Road	17%	26%	18%	26%	18%	30%
Ormesby Road	18%	23%	8%	13%	11%	16%
A174	41%	23%	31%	13%	37%	25%
Guisborough Road	47%	64%	-18%	0%	45%	42%
A1043	41%	1%	-6%	-35%	38%	-3%

- It can be seen that the main differences between the scenarios are:
  - O Guisborough Road and the A1043 Nunthorpe bypass—there are reductions to the increase in traffic in both directions in the Do Something scenario largely due to the introduction of the Stainton Way Eastern Extension which provides an alternative route. Without the Stainton Way Eastern Extension the traffic flow increases are similar to the Do Minimum Scenario on Guisborough Road and the A1043, although traffic increases less in an eastbound direction.
  - Similarly, Ormesby Road would benefit from the Stainton Way Eastern
    Extension and the increase in flow reduces in both directions in the Do
    Something scenario.
  - Likewise, the increase in flow reduces on the A174 in the Do Something scenario, particularly in an outbound (eastbound) direction.

- The change in vehicle speeds (kph) between 2015 and 2030 across the outer Middlesbrough screen line is shown in **Table 10**. It can be seen that the routes that benefit from the Stainton Way Eastern Extension, Guisborough Road and the A1043, show an increase in vehicle speeds for the Do Something scenario suggesting that the routes are less congested in future years. The A174 westbound (into Middlesbrough) sees a reduction in speeds without the Stainton Way Eastern Extension, with speeds on this link anticipated to be the same as in the Do Minimum scenario if the mitigation is not implemented. Speeds still decrease in the Do Something scenario on other routes, but generally to a lesser extent than in the Do Minimum scenarios.
- The benefits of the Stainton Way Eastern Extension need to be considered against the possible problems with delivery of the scheme as detailed in the last paragraph of Section 3.4 above. It must also be stated that no detailed local modelling of the Swans Corner roundabout has been undertaken as part of this study. This modelling work would be required to determine if a solution is possible for an improvement to Swans Corner roundabout. This improvement, including the addition of a fifth arm on the roundabout, would be necessary to accommodate the Stainton Way Eastern Extension. There has been doubt expressed towards the possibility of such a solution being found so this is clearly an area for further more detailed study.

Table 10 Change in Speeds (between 2015 and 2030) across MC / R&C Boundary

Route	Do Minimum		Do Something		Do Something (no Stainton Way Eastern Extension)	
	Westbound Speed (kph)	Eastbound Speed (kph)	Westbound Speed (kph)	Westbound Speed (kph)	Westbound Speed (kph)	Westbound Speed (kph)
A66	-2.7	0	-2.7	0	-2.7	0
Middlesbrough Road	-7.4	-2.8	-7.8	-0.7	-8.2	-1.4
Longlands Road	-2.5	0	-2.5	0	-2.5	0
Ormesby Road	-2.8	-1.2	-1.2	-1.2	-1.8	-1.2
A174	-12.3	-8.9	-9	-4.3	-10.2	-8.9
Guisborough Road	-10.6	-3.6	2.0	0	-10.2	-2.4
A1043	-5.4	-0.8	1.0	8.8	-4.5	1.6

## **Inner Cordon of Middlesbrough**

• Within the inner cordon (i.e. Middlesbrough town centre) traffic growth is still forecast to grow into central Middlesbrough by 17% by 2030 and 23% by 2035. The development of sites within the central area does however generate some outbound trips from the town centre during the morning peak with a 12% outbound growth in the Do Minimum scenario by 2030 and growth by a similar extent in the Do Something scenario.

• Across the inner cordon, inbound congestion is experienced on Marton Road, Park Vale Road, Linthorpe Road, Newport Road, the A66 and Riverside Park Road. Junction improvement works within the town centre are incorporated into the model from 2025 onwards. However, the results suggest that further measures are necessary on the town centre network to support the forecast growth in traffic across the inner cordon (17% by 2030).

#### A66 / A19 Junction

• This junction experiences a 10% increase in traffic growth between 2015 and 2030 in the Do Minimum scenario and a 9% increase in the Do Something scenario in both directions. The assessment shows that the junction is approaching capacity by 2030 in all scenarios. Traffic speeds across this screen line would decrease by 18.2% inbound and 20.5% outbound between 2015 and 2030 in the Do Something scenario. The changes in speed are less apparent in 2025 (12.7% and 11.4%) suggesting that the congestion exacerbates from 2025 onwards.

### A19 / A174 Junction

• A concentration of housing growth is forecast in south-west Middlesbrough which results in an 18% increase in flows at the A19/A174 junction screen line in the Do Minimum scenario by 2030 and a 25% increase by 2035. By 2020, in the Do Minimum scenario, the approaches to this junction are starting to operate close to capacity. With the proposed infrastructure improvements, the benefits are realised at the junction which still experiences growth by 2030 (9%) but the flow to capacity ratios are much improved.

#### A174 / Greystone Road (Greystones Roundabout)

- Junction improvements are forecast by 2025 at the Greystones roundabout (A174 / Greystone Road). However, given the increase in traffic flows on the A174, both inbound and outbound, the ratio of flow to capacity on the east and west approaches increases and is actually higher in the Do Something scenario compared with the Do Minimum scenario. In the Do Something scenario the traffic travelling to and from Middlesbrough increases by 17% by 2030 in both directions. In the Do Minimum scenario the growth is just 12% in each direction. The traffic growth through the junction largely occurs between 2020 and 2025 and by 2030 speeds are forecast to have decreased by 10 11%.
- As the east / west approaches are at capacity from 2025 onwards it is anticipated that additional work will be required in the longer term to mitigate the impact of the housing developments that generate traffic on the A174.

#### A66 / Greystone Road Junction

• This junction experiences a 14% increase in inbound traffic and 15% growth in outbound traffic between 2015 and 2030 in the Do Something scenario. Similar increases are experienced in the Do Minimum scenario. Speeds do not however decrease substantially by 2030 (4.8% decrease inbound and 2.4% decrease outbound) suggesting that the junction operation is relatively unaffected by the traffic growth.

## 4.2 Traffic Flow and Speed on Network Links

**Appendix D** contains plots showing the change in traffic flow and speeds for the AM peak in each of the future years compared with the base. Plots showing absolute speed are also shown. The thickness of each line represents the level of change. The findings show:

- By 2020, in the Do Minimum scenario, many routes experience a small
  decrease in traffic speed. This is to be expected as additional traffic is added
  to the network with only minor improvements. With the addition of
  infrastructure improvements, namely the Portrack Relief Road, A174 Parkway
  and Stainton Way improvements, there are speed increases on Portrack Lane,
  Stainton Way and within Middlehaven as illustrated in the 2020 Do
  Something scenario.
- Within the 2020 Do Something scenario there is a large decrease in speed on the A171 to the east of the Swans Corner roundabout between Ormesby Bank and Flatts Lane. By 2020 there is forecast to be an additional 115 units as part of the Swans Corner development and the results indicate that the development will impact on traffic speeds through the junction.
- By 2025 the benefits of the Stainton Way Western Extension and the Longlands to Prissick Link can be clearly seen with large increases in speeds concentrated where improvements have been implemented. This is to be expected as they offer new connections on the network. There is however a continued decrease in speed on the A174 and A171. Flows decrease on Marton Road as traffic is diverted onto the Longlands to Prissick Link. In the Do Minimum scenario it can be seen that flows increase and speeds decrease on Marton Road without the East Middlesbrough improvements.
- By 2030 the Stainton Way Eastern Extension increases speeds on Stainton Way, Guisborough Road and the A1043 Nunthorpe bypass but speeds still decrease on Ormesby Bank and the A171 approach to the Swans Corner roundabout. Traffic flows are forecast to increase on Ormesby Bank in the Do Something scenario, without the Stainton Way Eastern Extension, which shows that the level of traffic increase on Ormesby Bank is more or less the same with and without the Stainton Way Eastern Extension.
- The dualling of the A174 south of Redcar provides additional highway capacity in the 2030 Do Something scenario. However, the majority of housing developments in the vicinity are expected to come forward by 2025. Speeds on the A174 south of Redcar in the 2015 base are 73kph southbound and 57kph northbound. In 2020, the results show that speeds on this link would reduce, but just by a maximum of 3kph in the northbound direction (73kph and 54kph respectively in the Do Something Scenario). By 2025, when the majority of local housing developments are expected to be built out, speeds on the A174 decrease, but not to a large extent (69kph and 49kph). In the 2030 Do Something scenario, when the road is dualled, speeds increase substantially to 103kph and 94kph suggesting that the mitigation provides improvements over and above the base scenario. Whilst dualling the A174 does appear to over mitigate the impact on this route, it does result in a decrease in traffic flow on alternative routes to the south of the A174 including routes through New Marske. The dualling of the A174 would therefore be to the benefit of those living on local routes.

- There are a number of housing sites located in the south-east of the study area and no major infrastructure proposals have been put forward. The traffic flow diagrams show that the A174 is expected to experience large increases in traffic flows on the links past Skelton and Brotton. The speed to the east of the A174 / Marske Lane roundabout is approximately 77kph westbound and 72 kph eastbound in the base (2015) in the morning peak. By 2020, when many of the local housing sites are expected to have come forward, speeds decrease westbound to 59kph, suggesting the route is becoming more congested. By 2030 this has decreased further to 46kph (40% decrease). The speed reductions indicate congestion on the route and suggest that improvements to provide additional capacity are likely to be required on this section of the A174 by 2030.
- By 2030 there are large increases in traffic flows on the A19, A66 and A174 in the Do Minimum scenario. The Do Something scenario shows increases on the same routes but to a lesser extent in all areas except the A19 at the junction with the A174. The Stainton Way Western Extension provides additional capacity for vehicles in south-west Middlesbrough and alleviates impacts on the A19 and A174.

## **4.3 Journey Time Changes**

**Appendix E** contains maps showing how journey times into central Middlesbrough are affected by changes on the network. The following points should be noted:

- In the 2015 AM peak base, most zones north of the A174 are within 20 minutes journey time of Middlesbrough. In each of the future year scenarios the extent of the 20 minute journey time recedes and by 2030, journey times from zones in outer Middlesbrough to central Middlesbrough have increased by up to 10 minutes. In the south-west corner of the study area, where significant housing growth is forecast, the journey time in the Do Minimum scenario is estimated to increase to over 30 minutes.
- In the Do Something scenario, the journey time into Middlesbrough is maintained within 30 minutes within the zones to the south and south-west as a result of the infrastructure improvements. Journey times from the west are however relatively unaffected.
- The removal of the Stainton Way Eastern Extension is not shown to have any significant impact on journey times into central Middlesbrough.

#### 4.4 Vehicle Kilometres Travelled

The following tables provide a summary of the change in vehicle kilometres travelled in Middlesbrough and Redcar and Cleveland for each of the two main scenarios in the morning peak. It also provides an indication of average vehicle speeds across the network during the morning peak. The speeds are averaged across the whole network and do not therefore represent the average speed travelled on the majority of routes; they do however provide an indication on the wider network performance.

Table 11 Middlesbrough - Change in Vehicle Kilometres Travelled

	Do Minimum			]	Do Something	
	Vehicle KM	Total Vehicle Hours	Average Speed (kph)	Vehicle KM	Total Vehicle Hours	Average Speed (kph)
2015	307,075	10,345	29.7	NA	NA	NA
2020	330,109	11,773	28.0	326,211	11, 405	28.6
2025	352,690	13,792	25.6	350,724	12,908	27.2
2030	372, 872	16,028	23.3	371,183	14,644	25.3
2035	395,462	18,183	21.7	394,665	16,534	23.9

Table 12 Redcar and Cleveland - Change in Vehicle Kilometres Travelled

	Do Minimum			Do Something		
	Vehicle	Total Average		Vehicle	Total	Average
	KM	Vehicle Hours	Speed (kph)	KM	Vehicle Hours	Speed (kph)
2015	262,073	6,729	38.9	NA	NA	NA
2020	283,214	7,720	36.7	280,797	7,571	37.1
2025	303,961	8,891	34.2	301,067	8,564	35.2
2030	322,919	10,211	31.6	324,674	9,782	33.2
2035	341,241	11,421	29.9	341,683	10,867	31.4

#### The results in **Table 11** and **Table 12** show:

• By 2030 in Middlesbrough, there would be a 21% increase in vehicle kilometres travelled in the Do Minimum scenario and this would increase further to 29% by 2035. Speeds would decrease by a similar proportion. However, with the implementation of the infrastructure proposals, the change is minimised in each of the future year scenarios. The measures appear to show that with each incremental five year increase in growth the effect on the network with mitigation is off-set by 5 years e.g. in 2030 the Do Something Scenario results in an average network vehicle speed of 25.3kph in Middlesbrough. In comparison, five years earlier (2025) the average network speed in the Do Minimum scenario was 25.6kph and decreases to 23.3kph by 2030.

• By 2035, in Redcar and Cleveland, there would be a 30% increase in vehicle kilometres travelled in both the Do Minimum and Do Something scenarios. The effect of the infrastructure improvements is therefore much less demonstrated in Redcar and Cleveland. The improvements do however have some benefit as there is a higher average network speed in the 2035 Do Something scenario compared with the Do Minimum scenario. It is also notable that the average speeds are approximately 8kph faster in Redcar and Cleveland than in Middlesbrough in 2035, although this is to be expected as Middlesbrough has more urban routes where lower speeds can be expected.

# 5 Mitigation

A number of highway improvement schemes were put forward for inclusion in the Do Something modelling scenario. These were highway schemes that have previously been considered and could provide additional highway capacity on the future network to accommodate the traffic generated by the strategic housing sites. This section reviews the current mitigation proposals and recommends those that should be taken forward and those areas where additional work is required.

# **5.1** Mitigation Costs

The estimated costs for the highway schemes proposed for construction beyond 2015 are shown in **Table 13** below.

**Table 13 Infrastructure Costs** 

Scheme Name	Estimated Costs	Comments
Stainton Way Widening (West)	£0.9m	Assumes adding an extra lane onto Stainton Way (westbound) between Newham Way and B1365 Stokesley Road, a distance of just under a kilometre
Stainton Way Widening (East)	£1.1m	Widening of Stainton Way to 2-lanes between Newham Way and A172 Dixons Bank in the eastbound direction
Stokesley Road Dualling	£1.2m	Dualling of B1365 between Stainton Way and Newham Way, a distance of 0.5km
Portrack Relief Road	£9.8m	From Tees Valley Local Major Scheme Prioritisation
Manhattan Gate	£5m	From Tees Valley Local Major Scheme Prioritisation
A174 Parkway Extension	£3.3m	From Tees Valley Local Major Scheme Prioritisation – this cost is just for the dualling of the A174 extension between the new UK Land roundabout serving the Teesside Industrial Estate and the A174/A1044 junction. The rest of the extension (east of the roundabout) to be funded by the Highways Agency
Stainton Way Western Extension	£8m	From Tees Valley Local Major Scheme Prioritisation
Longlands to Prissick Link	£11m	From Tees Valley Local Major Scheme Prioritisation
Greystones Roundabout	£0.5m	Assumes 1 lane widening on circulatory carriageway and 1 lane on signal controlled entries. Nominal widening on uncontrolled entries.
A174 / A19 Capacity Improvements	£6m	From Tees Valley Local Major Scheme Prioritisation
A174 Dualling (Redcar)	£5.5m	Assumes single carriageway to dual carriageway upgrade over a length of 3 kilometres

Stainton Way Eastern extension	£4m	Assumes 1.6km of new single carriageway with major roundabout improvement at Swans
		Corner

It should be noted that all infrastructure costs are estimates only and further work would be required to determine more accurate cost estimates.

# **5.2** Impact of Existing Proposals

The infrastructure proposals have been incorporated into the model and the results show:

- Whilst housing development is focussed in the south and south-west of Middlesbrough, there are a number of existing proposals (including the A174 Parkway Extension, Stainton Way Western Extension and A19 / A174 junction improvements) that mitigate the development impact. Some approaches at the A19 / A174 junction would still be operating close to capacity in 2030 but the mitigation effectively ensures that the junction is operating in 2030 under similar conditions as it is operating in the base (2015).
- A sensitivity test has been carried out in the model to isolate the impact of the Stainton Way Eastern Extension. This improvement may not be deliverable, particularly if land close to Swans Corner roundabout comes forward for development prior to the road scheme being built. Also, as detailed in Section 4.1 above, more detailed local modelling work would be required to determine if a solution is possible for an improvement to Swans Corner roundabout. However, the results of the sensitivity test show that there are benefits of building the Stainton Way Eastern Extension as it reduces traffic on Guisborough Road, the A1043 Nunthorpe bypass and Ormesby Road, in both directions. If the Stainton Way Eastern Extension is not delivered, alternative options will need to be explored to minimise the impact of development traffic on Guisborough Road.
- However, it is recognised that Ormesby Bank experiences congestion in the morning peak and conditions on Ormesby Bank would be relatively unaffected by the Stainton Way Eastern Extension. The coding of the Stainton Way Eastern Extension improvement into the traffic model has included for a new Swans Corner roundabout with additional capacity. However, the results indicate that traffic continues to experience congestion on the westbound approach during the morning peak. As the majority of housing is expected to be built by 2025, with many developments actually coming forward by 2020, traffic speeds are seen to decrease on the approaches to the Swans Corner roundabout from 2020 onwards. As this study is being undertaken at a strategic level, and as stated previously, it is recommended that further work is undertaken at a more local, detailed level to determine if a solution is possible for an improvement to Swans Corner roundabout prior to 2020.
- The larger developments (over 100 houses) in the south and south-west of Middlesbrough that would benefit from the proposed improvements in south-west Middlesbrough, and the scale of each development, are as follows:

Hemlington Grange (1230 houses) Newham Hall Farm (500 houses)

South of Guisborough Road (300 Adjacent Cunningham House (345)

houses)

Grey Towers Farm (295 houses) Longbank Farm (320 houses)

Rose Cottage Farm (105 houses) Land at Strait Lane (220 houses)

Low Gill (140 houses) Swans Corner (115 houses)

Stainsby Hall Farm (1250 houses) St David's (115 houses)

• The Longlands to Prissick Link relieves capacity on Marton Road and without the improvement, the Do Minimum scenario shows that flows would increase on Marton Road (by 20% outbound by 2030) and speeds would decrease. The improvement is not expected to be delivered until 2025 but the results indicate that Marton Road starts to become more congested by 2020 with an 11% growth in northbound flows and 8% growth in southbound flows. This is because there are a number of large sites (100 houses plus) within this area of Middlesbrough that are forecast to be implemented before 2020, including:

Grove Hill (230 houses by 2020) Clairville (120 houses by 2020)

Scholars Rise (195 houses by 2020) Prissick Depot (100 houses by 2020)

Brackenhoe East (100 houses by 2020)

It is therefore recommended that if the above developments are built out as forecast by 2020, funding should sought from the developments to bring forward the Longlands to Prissick Link to accommodate the development traffic. Other developments that would benefit from the improvement but which are smaller in scale are Land south of James Cook University Hospital, Tennis World, Cornforth Avenue, Land north of Marton Avenue and Beechwood. Should the funding for the Longlands to Prissick Link not come forward until after 2020 then consideration could be given to delaying the house build out rates across the 5 developments mentioned above.

- Providing additional capacity by dualling the A174 south of Redcar has been shown to over mitigate the impact of development traffic but it does add benefit by increasing vehicle speeds and reducing traffic on parallel routes. The evidence therefore suggests that it is not necessary to support the current list of potential housing sites but would be of benefit to the wider area in the longer term.
- The results from the model show that, due to the increase in traffic flows generated by the development sites, there is still congestion at the Greystones roundabout, despite the Do Something scenario including junction improvements from 2025 onwards. It is therefore suggested that additional

work will be required in the longer term to mitigate the impact of the housing developments. The main adverse effect appears to come from developments that generate traffic on the A174 and the further work would be required to ascertain which developments should contribute towards additional improvements, subject to the amount of traffic that is forecast to travel through the junction according to a Transport Assessment.

Following a review of the model findings, **Table 14** presents a summary of the impact of each infrastructure proposal and a suggested delivery year.

**Table 14 Summary of Infrastructure Proposals** 

Scheme Name	Scheme Description	Model	Comments	Suggested Delivery Year
Portrack Relief Road	New link road between Marston Road in Portrack (connected to Portrack Lane) and the Newport Bridge approach.	2020	Within the Stockton on Tees borough boundary but the scheme does assist in providing additional capacity to support the growth peaks in south-west and west Middlesbrough	2020
Manhattan Gate	New road to support the Middlehaven development.	2020	Scheme necessary to support the forecast growth in Middlehaven.	2020
A174 Parkway Extension	The improvements would upgrade the existing single carriageway road to a dual carriageway with associated junction improvements to provide additional capacity.	2020	Within the Stockton on Tees borough boundary but the scheme does assist in providing additional capacity to support the growth peaks in south-west and west Middlesbrough.	2020
Stainton Way Western Extension	New Link between A174 Parkway / A1044 Low Lane Junction and the A19 / A1130 Acklam Road Junction	2025	Necessary to support the housing growth in south Middlesbrough.	2020
Longlands to Prissick Link	New Link adjacent to Ormesby Beck between B1380 Ladgate Lane and the A172 / A1085 Longlands Road Roundabout	2025	Effective in relieving capacity on Marton Road but needs to be delivered sooner as nearby housing sites are forecast to be built out by 2020.	2020
Greystones Roundabout	Junction improvements to provide additional capacity at the roundabout	2025	Improvements as currently proposed do not fully relieve congestion issues on this part of the network. The development sites result in congestion on the A174 approaches to the roundabout.	2025
A174 / A19 Capacity Improvements	Junction Improvement, provides additional circulatory carriageway widening afforded by the rebuilding of the A19 overbridges. In addition to the currently committed Pinchpoint Scheme.	2030	Necessary to support the housing growth in south and south-west Middlesbrough	2030
A174 Dualling (Redcar)	Dualling of existing road south of Redcar	2030	Dualling the A174 over mitigates the impact of the housing sites but does have wider benefits by removing traffic off local roads.	2030

Scheme Name	Scheme Description	Model	Comments	Suggested Delivery Year
Stainton Way Eastern Extension	New Link between Stainton Way and A171 / A1043 Swans Corner Roundabout.	2030	Scheme does not fully mitigate the impact of development traffic on Swans Corner roundabout and conditions still worsen on Ormesby Bank and the A171 approach to the roundabout. Shows benefits on Guisborough Road and the Nunthorpe By-pass. RCBC have confirmed that the road improvement scheme is unlikely to be deliverable due to land constraints.  Due to the inability to deliver the scheme, a sensitivity test has been run in the model to review the impact without the scheme and the results show that the level of traffic increase on Ormesby Bank is more or less the same with and without the scheme. Without the scheme, traffic conditions worsen on the local road network, namely Guisborough Road. As it is likely that the scheme will not be delivered and because it doesn't appear to do anything to relieve impacts on Ormesby Bank, the scheme will not be included as an infrastructure scheme to support the housing delivery.  It is recommended that further work be undertaken to determine suitable improvements at Swans Corner roundabout, and along Guisborough Road, to mitigate the impacts of the new housing proposed in this area of the Boroughs.	Not to be delivered

# **5.3** Additional Mitigation

In addition to the infrastructure proposals that have already been put forward, the model results indicate that other mitigation will be required to support housing growth:

- The results show that congestion on routes that cross the inner Middlesbrough corridor increases as a result of the development traffic. Town centre junction improvements were included in the model but the results suggest additional measures are required. Given that this study has looked at housing sites only (i.e. the origin of the trip) we would expect to see growth in areas of trip attraction such as town centres. Whilst additional highway mitigation measures may be applicable, it should be noted that alternative forms of mitigation may be more appropriate within central Middlesbrough. The application of average trip rates for all sites will overestimate the impact of sustainable sites on the highway network. Nevertheless, public transport improvements or measures to promote walking and cycling for short journeys may relieve highway capacity within the central area without the need for costly highway infrastructure.
- Cargo Fleet Lane, a key distributor route, remains congested in the Do Something scenario. There are a number of developments that will utilise this route and prior to commencement of these developments; further work should

be carried out to ascertain how the development traffic could be mitigated. The developments are:

Land Adjacent to MTLC (150 houses) Land at MTLC (30 houses)

Former Erimus Training Centre (100 Roworth Road (130 houses)

houses)

Beresford Crescent (50 houses) Fulbeck Road (20 houses)

The results indicate that the approach to the Swans Corner roundabout from
the east is experiencing congestion in future years. The proposed
infrastructure schemes also do little to improve conditions on Ormesby Bank.
There are a number of large housing sites nearby that it would be reasonable
to assume are affecting the operation of the junction, including:

Swans Corner (115 houses) Morton Carr Lane (32 houses)

Longbank Farm (189 houses) Gypsy Lane (10 houses)

South of Guisborough Road (300 houses)

All of the above sites are not expected to fully complete until after 2030. However, it would be prudent to explore ways of providing additional capacity at the junction prior to the commencement of each development.

- The modelling that has been undertaken for the 2035 future year has not identified any apparent additional mitigation that is required for any house build post 2030. The work has suggested that the mitigated highway network performs almost as well in 2035 as it does in 2030. However, some areas of additional mitigation that could be considered, and that are over and above the mitigation schemes listed in **Table 8**, are for Cargo Fleet Lane, Greystones Roundabout and Swans Corner. This is specifically the case for the Swans Corner roundabout which could be affected by traffic associated with the house build traffic beyond 2030, as detailed above.
- The model has not considered the potential impact of Park and Ride which could be considered as an additional mitigation measure in future years. However a study in 2009 found that based on current conditions, a Park and Ride site would not remove many highway trips from the network. The study was commissioned by Tees Valley Unlimited (then Tees Valley Joint Strategy Unit) to consider the feasibility of the East Middlesbrough Transport Corridor. One element of this study considered the proposed Park and Ride site south of Nunthorpe where the Middlesbrough Whitby rail line crosses the A1043 Nunthorpe bypass. This study considered the attractiveness of the Park and Ride site in terms of modelled journey times towards Middlesbrough town centre and James Cook University Hospital. The journey time analysis indicated that only trips from south of Middlesbrough would realistically be able to use the Park and Ride service as driving through the suburbs of Middlesbrough (for instance from places including Nunthorpe itself, Coulby

Newham or Hemlington) to access the site on the edge of town seemed unrealistic given the journey time comparisons. Furthermore, the study considered that the feasibility of a Park and Ride would be dependent upon substantial parking charges being implemented within central Middlesbrough. Based on current conditions, the work found that for most users the choice between car and Park and Ride would be a straightforward choice of using the car, unless further incentives could be offered to the Park and Ride users.

### 6 Conclusions

This study has verified the housing growth scenario for Middlesbrough and Redcar and Cleveland and assessed the impact that the associated traffic would have on the local highway network with and without additional infrastructure measures.

The key findings from the study are as follows:

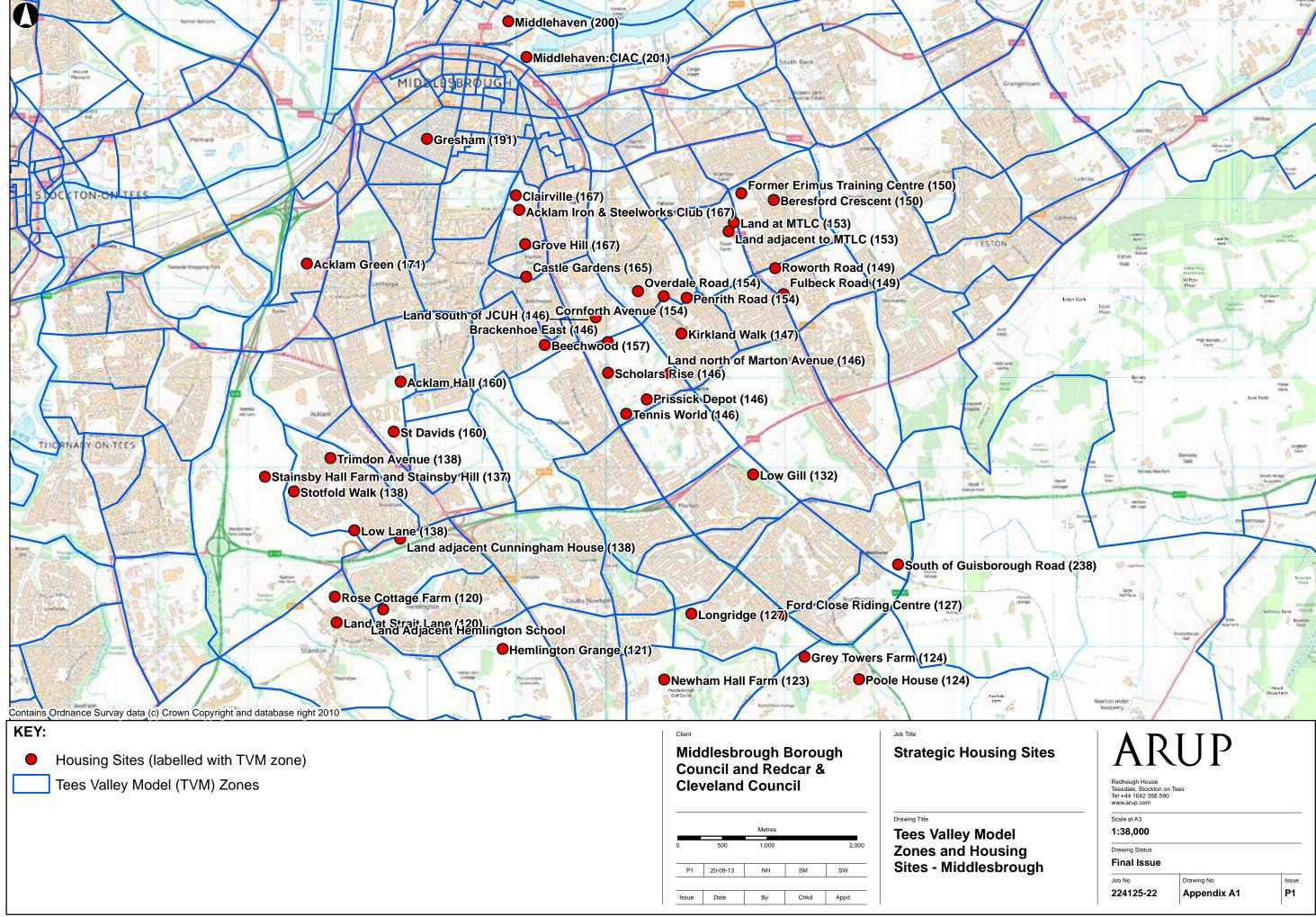
- The housing forecasts show significant growth in areas in south-west Middlesbrough. There are already existing proposals to provide additional capacity in this area of the borough and these appear to be sufficient to accommodate most of the traffic demand.
- However, the growth in the south and south-west corner of the study area has a knock on effect elsewhere on the network. The Greystones Roundabout on the A174 experiences congestion in future years, even with improvements, and further work is required to ascertain how the junction could accommodate the anticipated increase in traffic flows on the A174 which provides the main link through south and south-west Middlesbrough.
- Whereas the Stainton Way Eastern Extension shows some future benefits in relation to reduced traffic impact on the adjacent road network, namely Guisborough Road, discussions with Redcar and Cleveland Borough Council have revealed that it will not be possible to deliver the road scheme. As a result it is not proposed to include the Stainton Way Eastern Extension in the list of improvements to support the housing delivery. Alternative options will therefore need to be explored to minimise the impact of development traffic on Guisborough Road.
- The Longlands to Prissick Link provides additional capacity to the south of Middlesbrough town centre but is not expected to be implemented until 2025.
   The results suggest capacity is needed sooner than this to minimise the burden of new housing sites on Marton Road.
- There is expected to be a large increase in inbound traffic growth into central Middlesbrough. However, consideration for how public transport and other sustainable transport modes could relieve highway capacity within the central area should be investigated.
- Without the proposed infrastructure improvements, journey times from the south and south-west of Middlesbrough into central Middlesbrough increase by up to 10 minutes by 2030. The number of vehicle kilometres travelled also increases.
- The improvements to the A174 south of Redcar provide additional highway capacity over and above what is likely to be required by 2035.
- Highway infrastructure improvements will be necessary by 2030 on the A174
  around the Skelton and Brotton area if the forecast development traffic from
  housing sites in the east of the study area is to be accommodated without
  having a detrimental effect on the existing network conditions.

## Appendix A

Development Database & Maps

			<u>Nu</u>	mber of Dw	ellings on S	<u>ite</u>
Site Name	Authority	Zone	2020	2025	2030	2035
Hemlington Grange	Middlesbrough	121	250	500	750	1230
Coulby Newham: Newham Hall Farm	Middlesbrough	123	0	250	500	1140
Middlehaven:CIAC	Middlesbrough	201	50	50	50	50
Middlehaven:Middlehaven	Middlesbrough	200	150	350	550	805
Brookfield : Land adjacent Cunningham House	Middlesbrough	138	300	345	345	345
Brookfield : Low Lane	Middlesbrough	138	75	75	75	75
Brookfield: Stainsby Hall Farm and Stainsby Hill	Middlesbrough	137	0	250	500	1250
Inner Middlesbrough:Castle Gardens	Middlesbrough	165	-75	-75	-75	-75
Inner Middlesbrough:Grove Hill	Middlesbrough	167	125	375	530	530
Inner Middlesbrough:Gresham	Middlesbrough	191	-175	-50	0	0
Inner Middlesbrough:Acklam Green	Middlesbrough	171	100	225	325	325
Nunthorpe:Grey Towers Farm	Middlesbrough	124	165	295	295	295
Nunthorpe:South of Guisborough Road	Middlesbrough	238	0	105	300	300
Nunthorpe:Poole House	Middlesbrough	124	15	15	15	15
Nunthorpe:Ford Close Riding Centre	Middlesbrough	127	0	0	50	50
Prissick:Scholars Rise	Middlesbrough	146	195	195	195	195
Prissick:Land south of James Cook University Hospital	Middlesbrough	146	65	65	65	65
Prissick:Tennis World	Middlesbrough	146	50	50	50	50
Prissick:Prissick Depot	Middlesbrough	146	100	100	100	100
Prissick:Land north of Marton Avenue	Middlesbrough	146	0	50	50	50
Prissick:Brackenhoe East	Middlesbrough	146	100	100	100	100
Stainton:Rose Cottage Farm	Middlesbrough	120	105	105	105	105
Stainton:Land at Strait Lane	Middlesbrough	120	0	175	220	220
Land at MTLC	Middlesbrough	153	0	30	30	30
Land adjacent to MTLC	Middlesbrough	153	150	150	150	150
Low Gill	Middlesbrough	132	140	140	140	140
Roworth Road	Middlesbrough	149	0	130	130	130
Clairville	Middlesbrough	167	120	120	120	120
St Davids	Middlesbrough	160	0	115	115	115
Longridge	Middlesbrough	127	80	80	80	80
Acklam Hall	Middlesbrough	160	0	55	55	55
Stotfold Walk	Middlesbrough	138	0	0	55	55
Trimdon Avenue	Middlesbrough	138	50	50	50	50
Beresford Crescent	Middlesbrough	150	50	50	50	50
Former Erimus Training Centre	Middlesbrough	150	0	100	100	100
Land adjacent Hemlington Hall School	Middlesbrough	135	30	30	30	30
Acklam Iron & Steelworks Club	Middlesbrough	167	0	30	30	30
Beechwood	Middlesbrough	157	0	0	40	40
Cornforth Avenue	Middlesbrough	154	25	25	25	25
Fulbeck Road	Middlesbrough	149	20	20	20	20
Kirkland Walk	Middlesbrough	147	10	10	10	10
Overdale Road	Middlesbrough	154	10	10	10	10
Penrith Road	Middlesbrough	154	10	10	10	10
Marske Inn Farm Strategic Site	Redcar and Cleveland	221	50	325	700	1000
Low Grange Strategic Site	Redcar and Cleveland	205	50	150	310	810
Swan's Corner	Redcar and Cleveland	238	45	115	115	115
Gypsy Lane	Redcar and Cleveland	237	10	10	10	10
Morton Carr Lane	Redcar and Cleveland	239	0	0	32	32

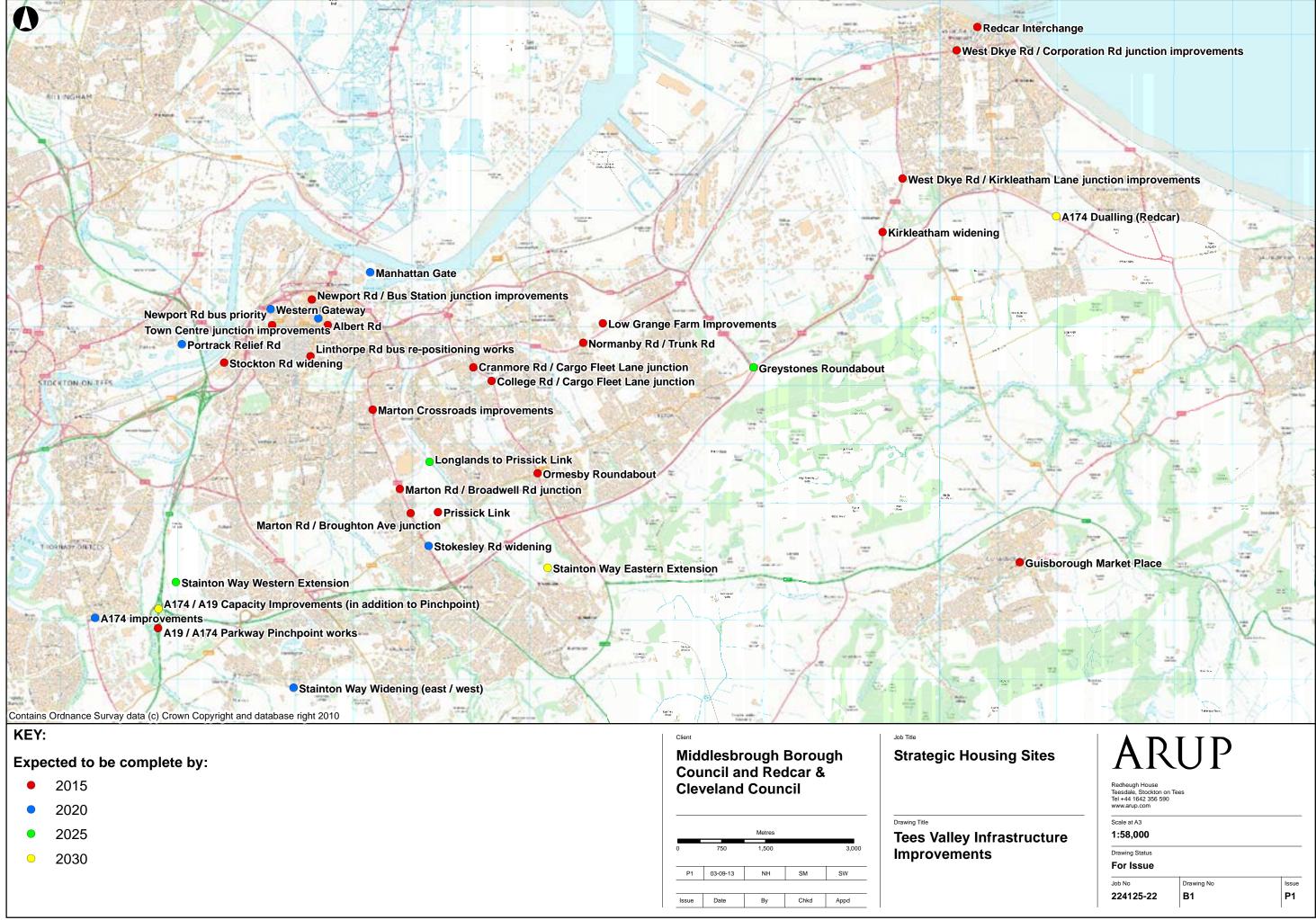
			Nu	mber of Dw	ellings on S	ite
Site Name	Authority	Zone	2020	2025	2030	2035
Longbank Farm	Redcar and Cleveland	236	0	75	225	320
Spencerbeck Farm	Redcar and Cleveland	236	20	20	20	20
Normanby Hall	Redcar and Cleveland	235	0	25	25	25
Town Hall Complex & Surplus School Site	Redcar and Cleveland	228	50	150	150	150
Adult Education Centre	Redcar and Cleveland	217	89	89	89	89
Former Mersey Road RC Schools	Redcar and Cleveland	217	0	96	96	96
St. Hilda's	Redcar and Cleveland	218	0	30	30	30
Wheatacres / Bylands	Redcar and Cleveland	224	0	40	40	40
Connexions Campus (S)	Redcar and Cleveland	223	0	87	87	87
Adj. Ryehills Sch.	Redcar and Cleveland	220	0	0	32	32
Land at Newcomen School	Redcar and Cleveland	217	27	27	27	27
Windy Hill Lane	Redcar and Cleveland	245	18	18	18	18
Wilton Lane	Redcar and Cleveland	252	15	15	15	15
Former Jackson's Field Allotments	Redcar and Cleveland	256	73	73	73	73
Middlesbrough Rd (S)	Redcar and Cleveland	254	22	22	22	22
Chaloner	Redcar and Cleveland	252	22	22	22	22
Luke Senior House	Redcar and Cleveland	253	0	40	40	40
Enfield Chase	Redcar and Cleveland	256	30	30	30	30
W. of Pine Hills	Redcar and Cleveland	254	0	0	100	100
Galley Hill Farm	Redcar and Cleveland	254	85	260	350	350
Whitby Av. Field	Redcar and Cleveland	256	0	32	32	32
N. of Skelton High St	Redcar and Cleveland	248	90	205	262	262
Home Farm	Redcar and Cleveland	249	30	30	30	30
Stanghow Road	Redcar and Cleveland	248	0	10	10	10
Long Acre Sidings (west)	Redcar and Cleveland	248	0	0	105	304
Former Saltburn Junior Sch.	Redcar and Cleveland	246	12	12	12	12
Kilton Lane	Redcar and Cleveland	247	0	30	180	270
Rosecroft School	Redcar and Cleveland	264	51	51	51	51
Cragg Hall Farm	Redcar and Cleveland	262	46	46	46	46
Hummersea Hills	Redcar and Cleveland	264	40	90	131	131
Mallinson Park	Redcar and Cleveland	235	36	36	36	36
High Farm	Redcar and Cleveland	229	120	196	196	196
Pasture Rise	Redcar and Cleveland	226	30	30	30	30
Connexions Campus (N)	Redcar and Cleveland	223	158	158	158	158
Closes Redevelopment(net remaining)	Redcar and Cleveland	218	111	162	162	162
Spring Lodge	Redcar and Cleveland	254	33	33	33	33
Castle View	Redcar and Cleveland	249	70	70	70	70
Former Saltburn Infants Sch.	Redcar and Cleveland	246	22	22	22	22
Hunley Manor Phase II	Redcar and Cleveland	247	32	32	32	32

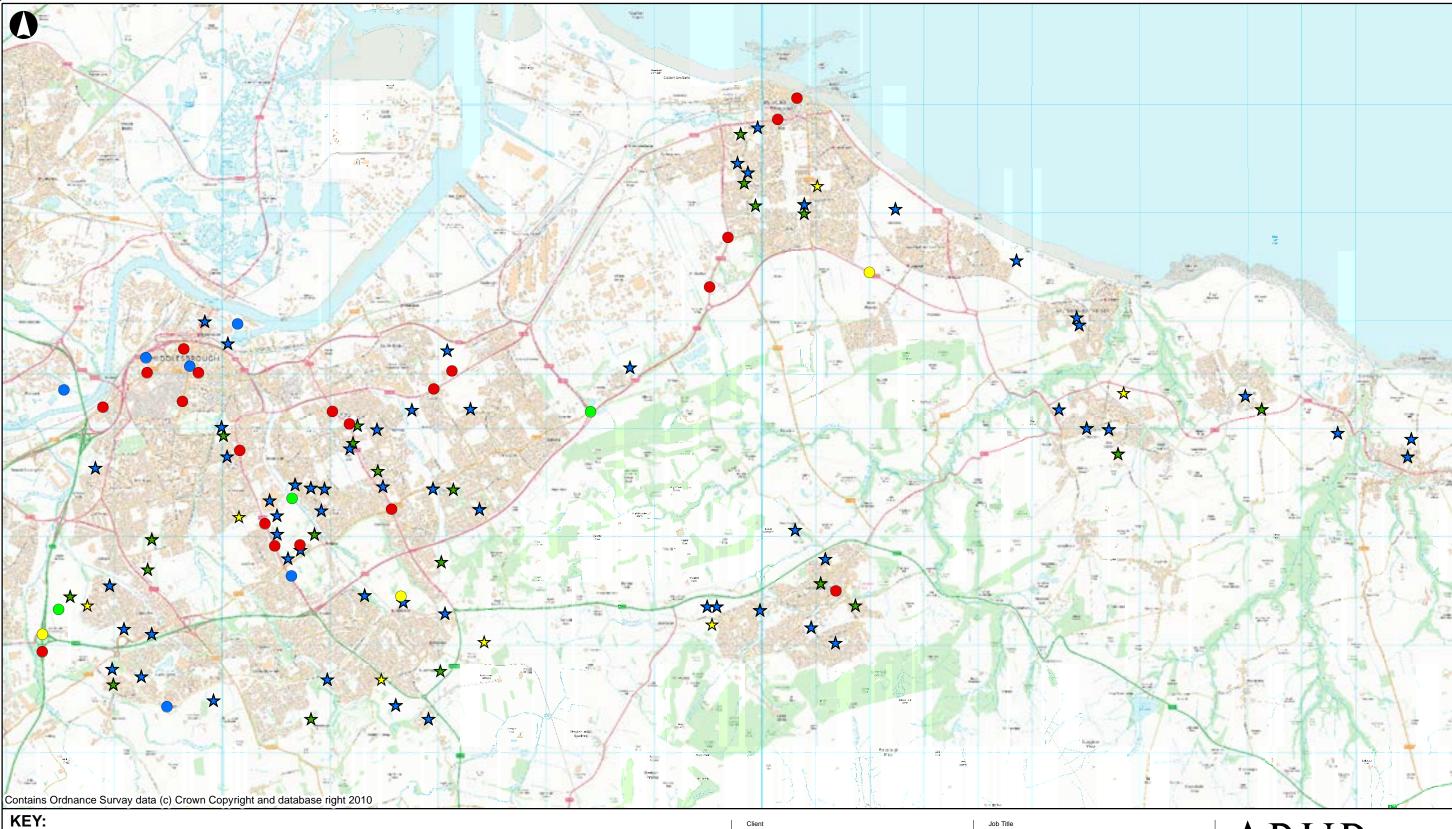


## Appendix B

Location of Development and Infrastructure Proposals







Expected to be complete by: Housing site - 2020

- Infrastructure 2015
  - Infrastructure 2020
- Infrastructure 2025
- Infrastructure 2030
- Housing site 2025
- Housing site 2030

### Middlesbrough Borough Council and Redcar & **Cleveland Council**

		Metres		
0	900	1,800		3,600
P1	20-09-13	NH	SM	SW
Issue	Date	By	Chkd	Appd

## **Strategic Housing Sites**

Tees Valley Housing Sites & Infrastructure Improvements

Scale at A3

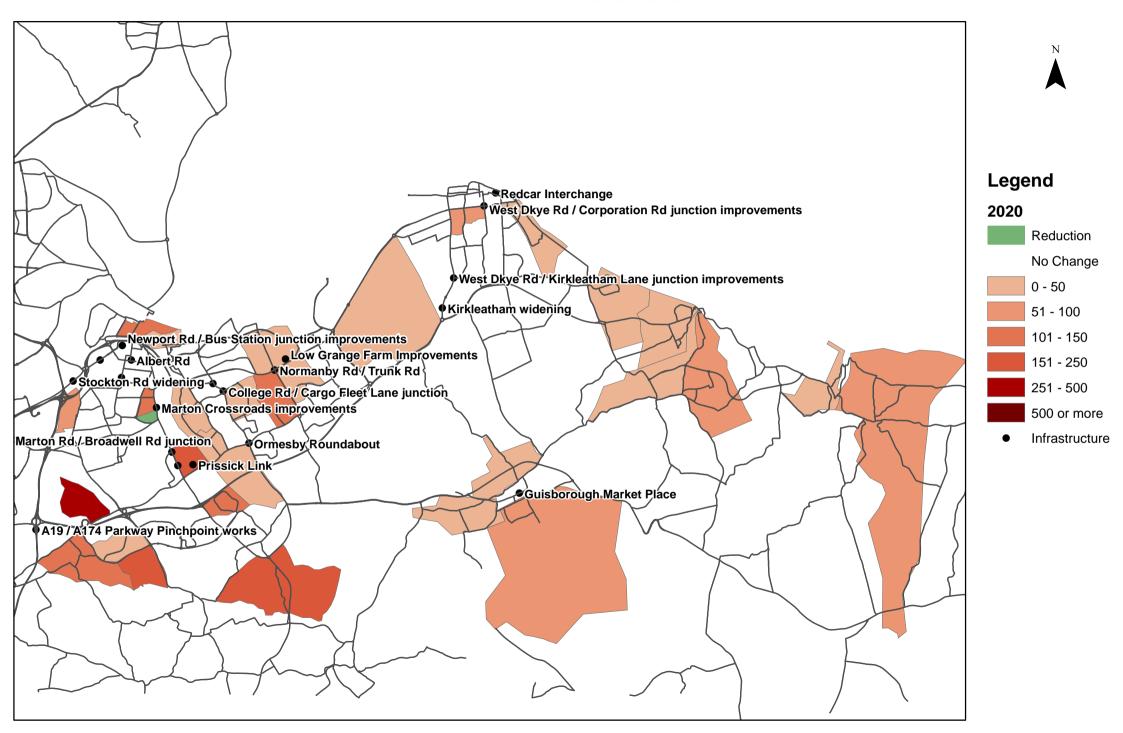
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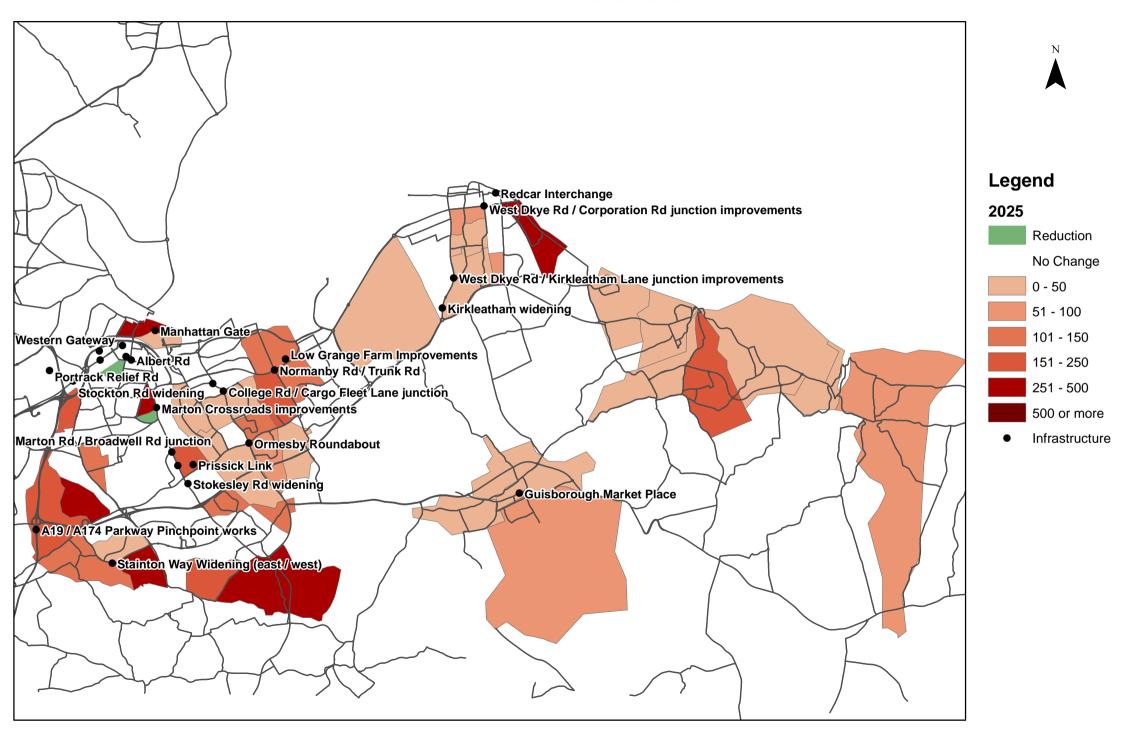
Drawing Status

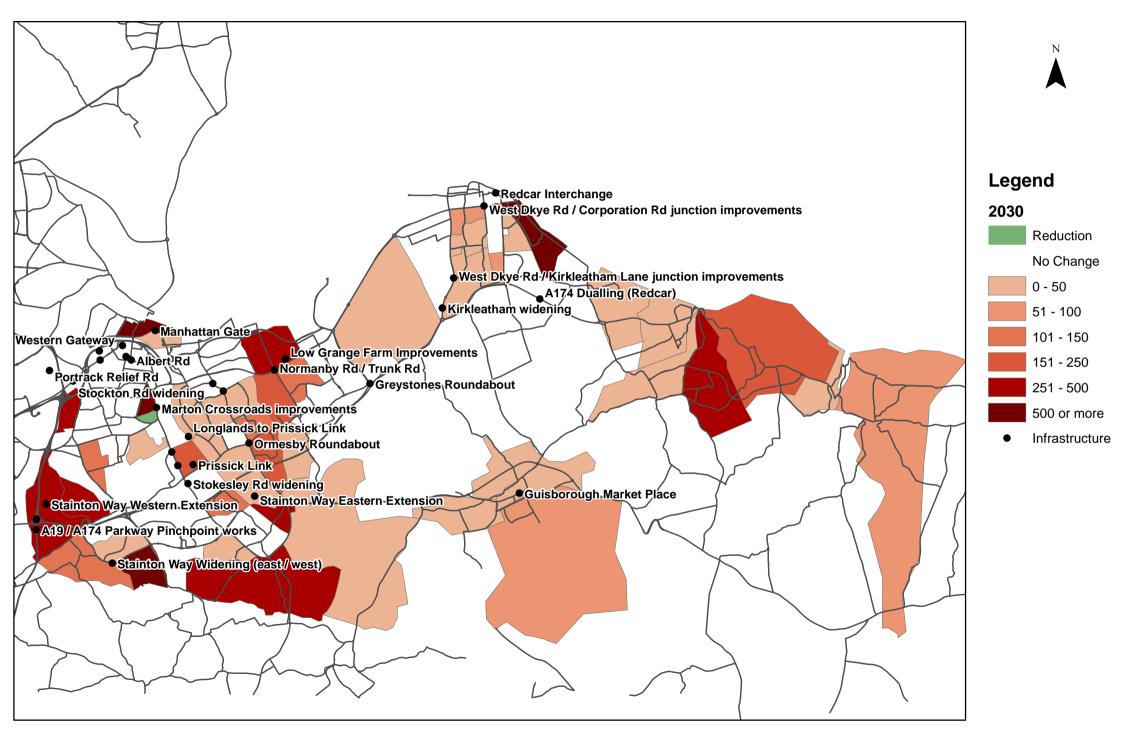
Revised Issue

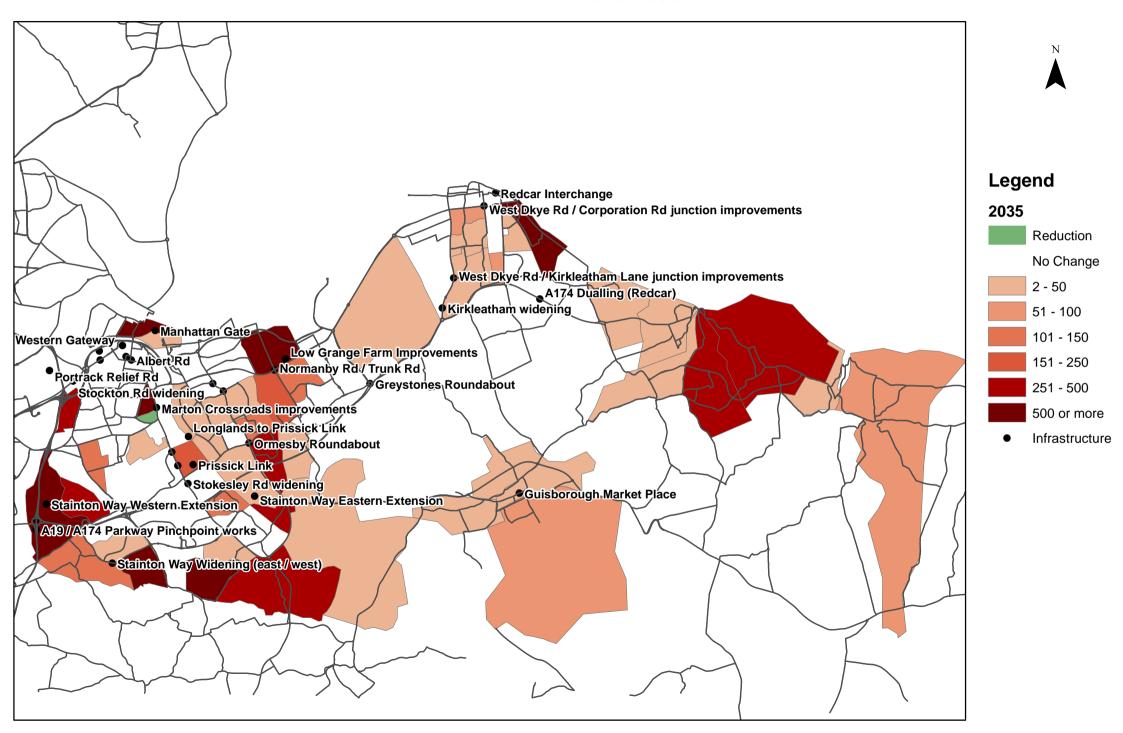
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Appendix B2



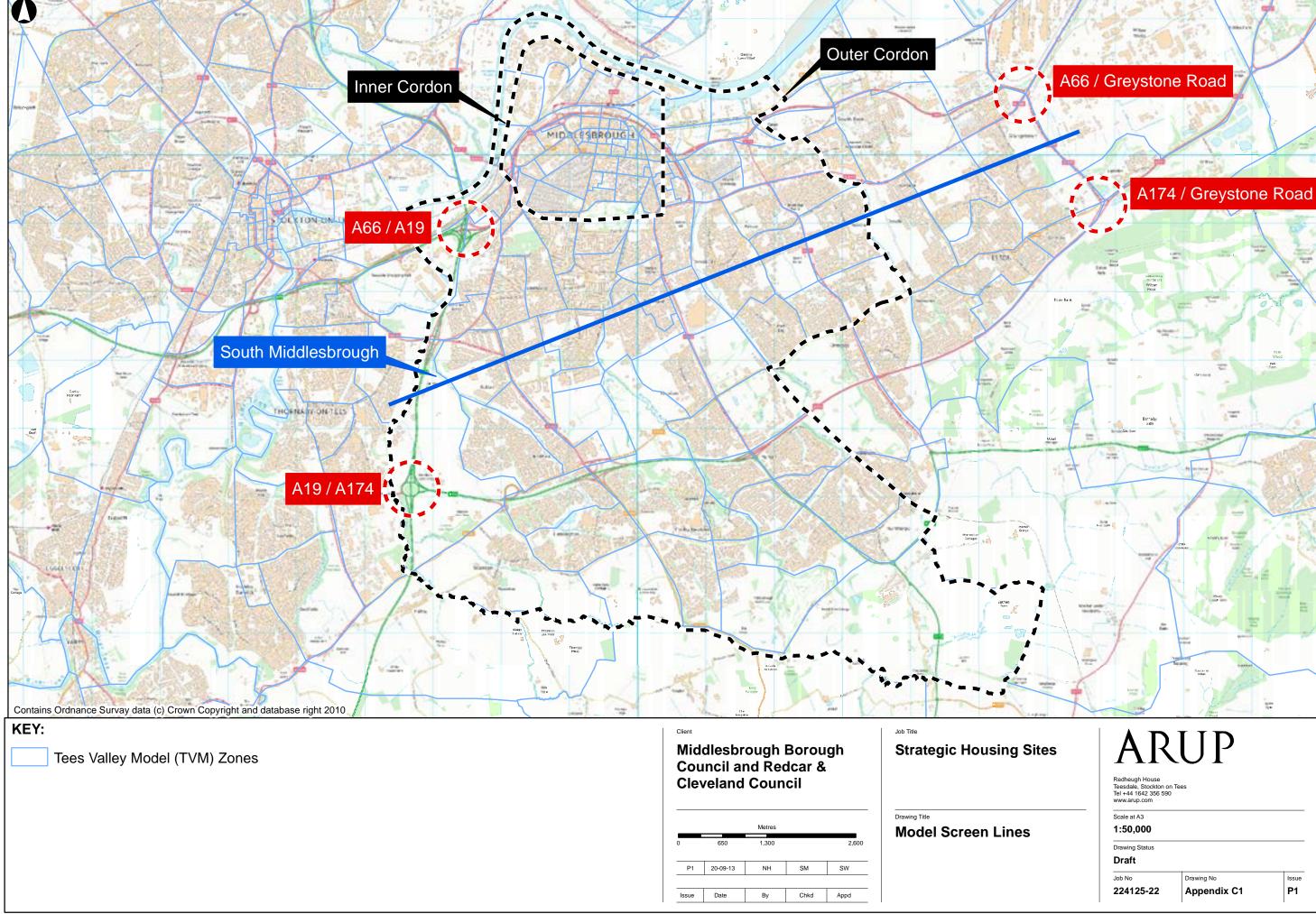






# **Appendix C**

Screen line Data



#### Middlesbrough Outer Cordon

Inbound AM

AM peak hour traffic flow

									percentage		percentage		percentage		percentage
			2020 Do	2025	5 Do 2030	Do	2035 Do	growth from							
		2015 Base	Minimum	Mini	imum Minii	mum	Minimum	2015 to 2020	2015 to 2020	2015 to 2025	2015 to 2025	2015 to 2030	2015 to 2030	2015 to 2035	2015 to 2035
	Dockside Road	1	75	234		489	719	59	34%	-175	-100%	313	179%	543	310%
	A66	23	80	2453	2453	2451	2425	74	3%	74	3%	71	. 3%	46	5 2%
	Middlesbrough Road	3	45	450	555	618	718	105	31%	210	61%	273	79%	373	108%
	Southerby Road		53	57	81	88	102	4	7%	28	53%	34	64%	48	91%
	A1085 Longlands Road	12	26	1334	1397	1437	1447	107	9%	171	14%	210	17%	220	18%
zt z	A171 Cargo Fleet Lane	15	04	1600	1731	1832	1923	96	6%	227	15%	329	22%	420	28%
Ea	Ormesby Road	6	36	673	699	750	824	37	6%	63	10%	114	18%	189	30%
	Overdale Road	4	04	424	438	461	481	20	5%	33	8%	57	14%	77	19%
	B1380 Ladgate Lane	5	84	617	651	660	671	33	6%	67	11%	76	13%	86	15%
	A174	15		1853	1992	2201	2365	293							
	Guisborough Road	5	89	655	772	867	897	66	11%			279	47%	308	
	A1043	6	55	757	826	924	1018	102	16%	172	26%	270	41%	364	56%
	A172	4	01	448	540	593	728	47	12%	139	35%	192			81%
ج	B1365	6	13	660	687	756	668	47	8%	74	12%	143	23%	55	9%
outh	Seamer Road		12	14	15	18	38	2	21%	. 4	31%	7	57%	26	228%
S	Maltby Road		82	215	277	323	369								
	B1380		96	887	905	895	841	91							
	A19	24		2694	2911	3088	3262								
	A174	12		1233	1217	1208	1204								
to	A1130 Acklam Road		05	834	795	809	880						0%		
Š.	A66	43		4422	4483	4624	4702								
_	B6541 Stockton Road	10		1144	1298	1432	1521	89							
	A19	49		5032	5162	5309	5378								
	A1032 Tees Bridge Approach	19		1971	2014	2077	2137		0%						
	total	288	38 3	30662	31900	33909	35317	1824	6%	3062	11%	5071	. 18%	6479	22%

#### Middlesbrough Inner Cordon

Inbound

ilibouliu	Aivi peak flour	traffic flow												
								percentage		percentage		percentage		percentage
		2020 Do	2025 Do	2030 Do	2035 Do	gı	rowth from	growth from						
	2015 Base	Minimum	Minimum	Minimum	Minimum	20	015 to 2020	2015 to 2020	2015 to 2025	2015 to 2025	2015 to 2030	2015 to 2030	2015 to 2035	2015 to 2035
Windward Way	4	08	564	709	941	1244	150	389	6 30	1 749	6 53	3 1319	6 8	36 205%
A66 Borough Road	23	43 2	2379	2460	2443	2563	30	5 29	6 11	7 5	6 10	0 49	6 2	19 9%
□ Borough Road	8	50 1	1039	1171	1284	1320	179	9 219	6 31	0 36	6 42	4 49%	6 4	59 53%
A1085 Longlands Road	14	76 1	1592	1663	1704	1728	11	7 89	6 18	7 13	6 22	8 159	6 2	53 17%
A172 Marton Road	11	69 1	1245	1326	1414	1478	7	5 69	6 15	7 13	6 24	5 219	6 3	08 26%
∠ Park Vale Road	9	81 1	1016	1125	1171	1210	3	5 49	6 14	4 15	6 19	0 199	6 2	29 23%
Einthorpe Road	8	45	956	1053	1086	1141	11	139	6 20	8 25	6 24	1 299	6 2	96 35%
Ayresome Street	6	30	630	627	631	659		09	-	3 0	6	1 09	6	29 5%
Carlow Street	2	75	303	348	366	376	2:	9 109	6 7	3 27	6 9	1 339	6 1	01 37%
B6541 Newport Road	16	09 1	1634	1620	1645	1666	2	5 29	6 1	1 1	6 3	6 29	6	57 4%
§ ∀96	49	52 5	5046	5330	5485	5697	9	1 29	6 37	7 8'	6 53	3 119	6 7	44 15%
Riverside Park Road	140	5	1500	1552	1648	1745	9	95 7	'% 1	47 10	)% 24	43 17	%	340 24%
total	169	54 17	7905	18984	19817	20827	95	L 69	6 203	0 12	6 286	4 179	% 38	73 23%

#### South Middlesbrough Screenline

Northbound

AM peak hour tra AM peak hour traffic flow

								percentage		percentage		percentage		percentage
		2020 Do	2025 Do	2030 Do	2035 Do	grow	th from	growth from	growth from	growth from	growth from	growth from	growth from	growth from
	2015 Base	Minimum	Minimum	Minimum	Minimum	2015	to 2020	2015 to 2020	2015 to 2025	2015 to 2025	2015 to 2030	2015 to 2030	2015 to 2035	2015 to 2035
A19	5-	127	5786	6071	6282	6647	36	) 7	7%	544 12	% 85	5 16%	122	1 22%
Acklam Road	1	104	1537	1627	1741	1860	13	3 9	9%	222 16	% 33	6 24%	45	5 32%
Marton Road	1	310	1449	1502	1517	1558	13	9 11	1%	191 15	% 20	7 16%	24	7 19%
Otmeasby Road		328	879	913	952	1020	5	L 6	5%	85 10	% 12	4 15%	19	2 23%
A171 Cargo Fleet Lane		976	1025	1098	1199	1314	49	9 5	5%	122 13	% 22:	3 23%	33	8 35%
Normanby Road	1	279	1386	1438	1493	1603	10	7 8	3%	159 12	% 21	4 17%	32	4 25%
Church Lane		105	493	605	686	730	8	3 22	2%	200 49	% 28	1 69%	32	5 80%
Greystone Road	2	275	2232	2180	2109	2052	-4	3 -2	2%	-95 -4	% -16	6 -7%	-22	4 -10%
total	13	905	14789	15434	15979	16784	884	1 6	5% 1!	529 11	% 207	4 15%	287	9 21%

#### Junction Screenline

		2020 Do	2025 Do	2030 Do	2035 Do	ı	growth from	percentage growth from						
Inbound	2015 Base	Minimum	Minimum	Minimum	Minimur	m	2015 to 2020	2015 to 2020	2015 to 2025	2015 to 2025	2015 to 2030	2015 to 2030	2015 to 2035	2015 to 2035
Junction 1: A66/A19	19268	3 201	106	20702	21273	21801	8	38	4% 1	434	'% 200	5 10%	253	3 13%
Junction 2: A19/A174	10075	5 107	723	11254	11873	12590	6	18	6% 1	178 1	179	8 18%	251	4 25%
Junction 3: A174/Greystone Road	6842	2 72	227	7437	7678	7873	3	35	6%	595	1% 83	7 12%	103	1 15%
Junction 4: A66/Greystone Road	5310	55	550	5827	6022	6146	2	10	5%	516 10	1% 71	1 13%	83	5 16%

#### Middlesbrough Outer Cordon

Outbound

AM peak hour traffic flow

									percentage		percentage		percentage		percentage
			2020 Do	202	25 Do :	2030 Do	2035 Do	growth from							
		2015 Base	Minimum	Min	nimum	Minimum	Minimum	2015 to 2020	2015 to 2020	2015 to 2025	2015 to 2025	2015 to 2030	2015 to 2030	2015 to 2035	2015 to 2035
	Dockside Road	1	37	139	147	14	9 176	;	! 1%	5 10	7%	12	9%	40	27%
	A66	14	07	1360	1376	132	1191	48	3 -3%	-32	-2%	-88	-6%	-217	-16%
	Middlesbrough Road	2	25	217	258	33	5 502	8	-4%	34	15%	111	49%	277	83%
	Southerby Road		60	58	62	6					3%	5	9%		,.
	A1085 Longlands Road	9	79	1058	1171	123		! 79				255			
st	A171 Cargo Fleet Lane		44	768	867	87						135			
Ea	Ormesby Road		89	220	228	23:	3 236	3:	16%	38	20%	44	23%	47	
	Overdale Road	2	02	207	220	24	1 266	5	3%			39			
	B1380 Ladgate Lane	11		1217	1254	131						203			
	A174			2197	2279	244						458			
	Guisborough Road		30	359	448	54						211			
	A1043		74	912	938	98						8	1%		
	A172		03	602	741	80						298			
ج	B1365		59	492	561	64						289			
<u>a</u>	Seamer Road		65	70	75	8						16			
S	Maltby Road		01	241	286	41						212	105%		
	B1380		90	954	1106	112						339			
	A19			1865	2034	217						412			
	A174		67	277	249	25						-112			
tz.	A1130 Acklam Road			1133	1245	132							31%		
Š.	A66	44		4704	4901	506									
_	B6541 Stockton Road		05	348	382	41									
	A19	57		6038	6214	629						584	10%		
	A1032 Tees Bridge Approach		90	377	482	58							51%		
	total	242	74 2	5812	27525	2892	30405	1539	6%	3251	. 13%	4655	19%	6131	21%

#### Middlesbrough Inner Cordon

Outhound

Outboullu	Aivi peak nour	traffic flow												
								percentage		percentage		percentage		percentage
		2020 Do	2025 Do	2030 Do	2035 Do	g	growth from							
	2015 Base	Minimum	Minimur	n Minimum	Minimun	n 2	2015 to 2020	2015 to 2020	2015 to 2025	2015 to 2025	2015 to 2030	2015 to 2030	2015 to 2035	2015 to 2035
Windward Way	g	37	1028	1042	1165	1170	9	2 109	6 10	5 119	6 22	8 249	% 2	33 20%
₹ A66	30	30	3193	3314	3336	3453	16	3 59	6 28	4 99	6 30	6 109	% 4	23 13%
<sup>™</sup> Borough Road	4	62	294	400	376	460	-16	-379	6 -6	3 -149	6 -8	6 -199	%	-2 0%
A1085 Longlands Road	g	76	1046	1122	1127	1121	7	) 79	6 14	5 159	6 15	1 159	% 1	45 13%
A172 Marton Road	g	68	1000	1057	1059	1100	3	2 39	6 8	8 99	6 9	1 99	% 1	32 12%
Park Vale Road	2	38	242	251	268	259		5 29	6 1	.3 59	6 3	0 139	%	21 8%
E Linthorpe Road	3	64	396	432	398	428	3	2 99	6 Θ	8 199	6 3	5 109	%	65 16%
Ayresome Street	2	22	290	368	350	370	6	7 309	6 14	6 669	6 12	8 589	% 1	48 42%
Carlow Street		54	55	60	61	68		2 39	6	7 139	6	7 139	%	15 24%
B6541 Newport Road	7	15	749	866	920	933	3	4 59	6 15	2 219	6 20	5 299	% 2	18 24%
∞ A66	35	13	3623	3646	3695	3721	11	39	6 13	3 49	6 18	2 59	% 2	08 6%
Riverside Park Road	205	i	299	337	384	424		94 46	5% 1	.32 64	1% 1	79 8	7%	218 57%
total	116	83	12215	12894	13138	13508	53	2 59	6 121	1 109	6 145	5 129	% 18	25 14%

#### South Middlesbrough Screenline

Southbound

AM peak hour traffic flow

								percentage		percentage		percentage		percentage
		2020 Do	2025 Do	2030 Do	2035 Do	growt	h from	growth from						
	2015 Base	Minimum	Minimum	Minimum	Minimum	2015 t	to 2020	2015 to 2020	2015 to 2025	2015 to 2025	2015 to 2030	2015 to 2030	2015 to 2035	2015 to 2035
A19	3	667	3855	3931	4185	4359	188	5	% 2	64 7	6 517	14%	69	92 17%
Acklam Road		582	566	532	478	477	-116	-17	% -1	50 -22	6 -204	-30%	6 -20	)5 -43%
Marton Road		981	1060	1142	1181	1249	79	8	% 1	60 169	6 200	20%	6 26	58 23%
Otmeasby Road		481	501	505	512	532	20	4	%	24 59	6 32	7%	i 5	10%
A171 Cargo Fleet Lane		339	349	385	394	428	10	3	%	46 149	6 55	16%	3 6	39 23%
Normanby Road		599	624	670	663	670	25	4	%	71 12	6 64	11%	5 7	70 11%
Church Lane		197	201	209	242	291	5	2	%	13 69	6 46	23%	, <u> </u>	94 39%
Greystone Road		798	782	865	822	811	-17	-2	%	66 89	6 24	3%	<u>نا</u>	13 2%
total	7	744	7937	8238	8478	8816	193	2	% 4	93 69	6 734	9%	6 107	72 13%

#### Junction Screenline

							percentage		percentage		percentage		percentage
		2020 Do	2025 Do	2030 Do	2035 Do	growth from							
Outbound	2015 Base	Minimum	Minimum	Minimum	Minimum	2015 to 2020	2015 to 2020	2015 to 2025	2015 to 2025	2015 to 2030	2015 to 2030	2015 to 2035	2015 to 2035
Junction 1: A66/A19	19352	20190	20786	21357	21885	838	3 4	143	1 79	2005	5 10%	253	12%
Junction 2: A19/A174	10085	10733	11264	11883	12600	648	: 6	5% 117	3 129	1798	18%	251	1 21%
Junction 3: A174/Greystone Road	6870	7255	7465	7706	7901	385	. 6	59	5 99	837	12%	103	13%
Junction 4: A66/Greystone Road	5322	5568	5851	6050	6180	246	5 5	53	10%	728	14%	85	3 14%

#### Middlesbrough Outer Cordon

Inbound

AM peak hour traffic speed on links

Percentage change in link change in

						change in		inge in link	change in link					
													•	speed from 2015
		2015	2020	2025	2030	2035 to 2020				to 2025	to 2030	to 2030	to 2035	to 2035
	Dockside Road	43.4	41.9	39.3	35.2	29.1	-1.5	-3.4%	-4.1	-9.4%	-8.1	-18.8%	-14.3	-32.9%
	A66	69.6	66.9	66.9	66.9	66.9	-2.7	-3.8%	-2.7	-3.8%	-2.7	-3.8%	-2.7	-3.8%
	Middlesbrough Road	39.0	36.0	33.4	31.6	29.3	-3.0	-7.7%	-5.6	-14.3%	-7.4	-18.9%	-9.8	-25.0%
	Southerby Road	27.0	27.0	26.6	26.5	26.2	0.0	0.0%	-0.4	-1.5%	-0.5	-2.0%	-0.8	-3.0%
	A1085 Longlands Road	64.0	63.2	62.3	61.5	61.5	-0.8	-1.3%	-1.7	-2.6%	-2.5	-3.8%	-2.5	-3.8%
ts	A171 Cargo Fleet Lane	12.6	11.4	9.7	8.5	7.3	-1.2	-9.5%	-2.8	-22.5%	-4.1	-32.7%	-5.2	-41.7%
Ea	Ormesby Road	31.2	30.6	29.4	28.4	26.4	-0.6	-2.0%	-1.8	-5.7%	-2.8	-9.1%	-4.8	-15.3%
	Overdale Road	16.4	15.5	14.9	13.9	13.0	-0.9	-5.3%	-1.4	-8.8%	-2.5	-15.0%	-3.4	-20.5%
	B1380 Ladgate Lane	32.5	31.7	31.0	30.7	30.3	-0.7	-2.3%	-1.5	-4.5%	-1.8	-5.6%	-2.1	-6.6%
	A174	76.2	70.7	68.3	63.9	60.9	-5.4	-7.1%	-7.9	-10.3%	-12.3	-16.1%	-15.2	-20.0%
	Guisborough Road	17.8	16.7	12.5	7.2	6.4	-1.1	-6.2%	-5.3	-30.0%	-10.6	-59.6%	-11.4	-64.3%
	A1043	75.4	73.5	72.6	70.0	64.6	-1.9	-2.5%	-2.8	-3.7%	-5.4	-7.1%	-10.8	-14.3%
	A172	84.6	83.8	82.2	81.5	78.6	-0.8	-0.9%	-2.3	-2.8%	-3.1	-3.7%	-6.0	-7.1%
ے	B1365	76.6	75.8	75.0	74.2	75.8	-0.8	-1.1%	-1.6	-2.1%	-2.4	-3.1%	-0.8	-1.1%
ort	Seamer Road	76.6	76.6	76.6	76.6	76.1	0.0	0.0%	0.0	0.0%	0.0	0.0%	-0.6	-0.7%
Š	Maltby Road	73.0	73.0	71.1	71.1	69.2	0.0	0.0%	-1.9	-2.6%	-1.9	-2.6%	-3.7	-5.1%
	B1380	61.5	58.1	56.7	57.6	60.5	-3.5	-5.6%	-4.8	-7.9%	-3.9	-6.4%	-1.0	-1.7%
	A19	59.4	54.7	50.6	47.1	39.0	-4.7	-7.9%	-8.9	-14.9%	-12.3	-20.7%	-20.5	-34.5%
	A174	22.2	22.7	24.7	26.8	27.9	0.5	2.1%	2.5	11.5%	4.6	20.7%	5.7	
+=	A1130 Acklam Road	48.0	48.0	48.0	48.0	48.0	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	
V es	A66	53.3	53.3	53.3	50.5	50.5	0.0	0.0%	0.0	0.0%	-2.8	-5.3%	-2.8	-5.3%
_	B6541 Stockton Road	55.4	53.3	51.4	49.7	48.0	-2.1	-3.7%	-4.0	-7.1%	-5.7	-10.3%	-7.4	-13.3%
	A19	60.0	57.3	54.8	54.8	52.5	-2.7	-4.5%	-5.2			-8.7%	-7.5	
	A1032 Tees Bridge Approach	11.3	11.2	10.8	10.2	9.7	0.0	-0.4%	-0.5	-4.6%	-1.1	-9.8%	-1.6	-14.3%
	average	49.5	48.0	46.8	45.5	44.1	-1.4	-2.9%	-2.7	-5.4%	-3.9	-8.0%	-5.4	-10.9%

#### Middlesbrough Inner Cordon

Inbound

AM peak hour traffic speed on links

Percentage
change in link
change in

						percer	reage	pere	ciitage	pere	ciitage		percentage
					change in	link change	e in link chang	e in link chan	ige in link chan	ge in link chan	ge in link ch	nange in link	change in link
					speed fro	m 2015 speed	from 2015 speed	from 2015 spee	d from 2015 spee	d from 2015 spee	d from 2015 sp	eed from 2015	speed from 2015
	2015	2020	2025	2030	2035 to 2020	to 202	0 to 202	25 to 20	025 to 20	030 to 20	030 to	2035	to 2035
Windward Way	48.0	48.0	48.0	47.5	18.8	0.0	0.0%	0.0	0.0%	-0.5	-1.0%	-29.3	-60.9%
tg A66	49.2	48.2	46.4	46.4	43.9	-1.0	-2.0%	-2.8	-5.7%	-2.8	-5.7%	-5.3	-10.7%
Borough Road	44.0	42.6	41.3	38.8	38.8	-1.4	-3.2%	-2.8	-6.3%	-5.2	-11.8%	-5.2	-11.8%
A1085 Longlands Road	37.0	35.7	34.9	34.5	34.1	-1.3	-3.6%	-2.2	-5.8%	-2.6	-6.9%	-2.9	-8.0%
A172 Marton Road	20.6	18.7	16.7	14.4	12.9	-1.9	-9.1%	-3.8	-18.6%	-6.2	-30.0%	-7.7	-37.5%
_ Park Vale Road	32.1	24.5	21.8	20.6	19.6	-7.6	-23.6%	-10.4	-32.3%	-11.5	-35.9%	-12.6	-39.1%
Einthorpe Road	22.5	19.5	16.7	15.9	14.5	-3.0	-13.3%	-5.8	-25.8%	-6.6	-29.4%	-8.0	-35.7%
Ayresome Street	17.0	17.0	17.0	17.0	16.6	0.0	0.0%	0.0	0.0%	0.0	0.0%	-0.4	-2.6%
Carlow Street	17.1	15.9	14.1	13.4	12.9	-1.2	-6.8%	-3.0	-17.4%	-3.7	-21.6%	-4.1	-24.3%
B6541 Newport Road	10.1	9.9	10.0	9.8	9.4	-0.3	-2.5%	-0.1	-1.3%	-0.4	-3.8%	-0.7	-7.2%
§ A66	6.8	6.5	5.6	5.2	4.8	-0.4	-5.2%	-1.2	-18.0%	-1.6	-23.7%	-2.1	-30.3%
Riverside Park Road	14.6	12.6	12.0	10.8	9.6	-2.0	-13.9%	-2.6	-18.0%	-3.8	-26.3%	-5.1	-34.7%
average	26.6	24.9	23.7	22.9	19.6	-1.7	-6.3%	-2.9	-10.9%	-3.7	-14.0%	-7.0	-26.1%

#### South Middlesbrough Screenline

Northbound	AM peak hour tra AM	peak hour traffic flo	ow										
	•					perce	entage		percentage		percentage		percentage
					change	in link chan	ge in link o	change in link					
					speed t	rom 2015 spee	d from 2015 s	speed from 2015					
	2015	2020	2025	2030	2035 to 2020	to 20	)20 t	to 2025	to 2025	to 2030	to 2030	to 2035	to 2035
A19	52.4	47.8	41.2	30.2	21.6	-4.7	-8.9%	-11.2	-21.4%	-22.2	-42.3%	-30.9	-58.9%
Acklam Road	37.8	36.4	35.2	34.0	32.9	-1.3	-3.6%	-2.6	-6.9%	-3.8	-10.0%	-4.9	-12.9%
Marton Road	39.1	37.3	36.5	36.5	35.7	-1.7	-4.4%	-2.5	-6.5%	-2.5	-6.5%	-3.3	-8.5%
Otmeasby Road	26.3	24.9	24.1	23.1	21.5	-1.4	-5.4%	-2.2	-8.3%	-3.2	-12.1%	-4.8	-18.3%
A171 Cargo Fleet Lane	33.9	24.3	22.6	19.9	17.0	-9.6	-28.3%	-11.4	-33.6%	-14.1	-41.4%	-17.0	-50.0%
Normanby Road	17.8	15.1	13.8	12.7	11.3	-2.7	-15.2%	-4.0	-22.6%	-5.1	-28.8%	-6.5	-36.5%
Church Lane	37.5	34.9	32.3	30.0	28.8	-2.6	-7.0%	-5.2	-14.0%	-7.5	-20.0%	-8.7	-23.1%
Greystone Road	62.6	63.7	64.8	65.9	67.1	1.0	1.7%	2.1	3.4%	3.3	5.2%	4.4	7.1%
average	38.4	35.6	33.8	31.5	29.5	-2.9	-7.5%	-4.6	-12.1%	-6.9	-17.9%	-9.0	-23.3%

	AM peak hour traffic	speed on links											
						percer	ntage		percentage		percentage		percentage
					change ir	link change	e in link	change in link	change in link	change in link	change in link	change in link	change in link
					speed fro	m 2015 speed	from 2015	speed from 2015					
Inbound	2015	2020	2025	2030	to 2020	to 202	.0	to 2025	to 2025	to 2030	to 2030	to 2030	to 2030
Junction 1: A66/A19	54.7	50.7	46.4	42.8		-4.0	-7.3%	-8.3	-15.2%	-11.9	-21.8%	-50.4	-108.6%
Junction 2: A19/A174	61.5	59.0	57.3	55.5		-2.5	-4.1%	-4.2	-6.8%	-6.0	-9.7%	-59.8	-104.4%
Junction 3: A174/Greystone Road	60.5	58.7	58.2	56.4		-1.8	-2.9%	-2.3	-3.8%	-4.1	-6.8%	-59.9	-103.0%
Junction 4: A66/Greystone Road	58.8	58.1	56.9	56.2		-0.6	-1.1%	-1.8	-3.1%	-2.6	-4.4%	-57.€	-101.1%

#### Middlesbrough Outer Cordon

	Outbound	AM peak hour traffic s	peed on links											
							percen	tage	р	ercentage		percentage		percentage
						change in	n link change	in link chang	ge in link c	hange in link	change in link	change in link	change in link	change in link
						speed fro	m 2015 speed	from 2015 speed	from 2015 s	peed from 2015	speed from 2015	speed from 2015	speed from 2015	speed from 2015
		2015	2020	2025	2030	2035 to 2020	to 2020	0 to 202	25 to	2025	to 2030	to 2030	to 2035	to 2035
	Dockside Road	44.4	44.4	44.1	44.1	43.4	0.0	0.0%	-0.3	-0.6%	-0.3	-0.6%	-1.0	-2.3%
	A66	82.9	82.9	82.9	82.9	82.9	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
	Middlesbrough Road	41.8	42.5	41.1	39.0	34.9	0.8	1.8%	-0.7	-1.8%	-2.8	-6.7%	-6.9	-16.4%
	Southerby Road	26.9	27.0	26.9	26.9	26.8	0.1	0.5%	0.0	0.0%	0.0	0.0%	-0.1	-0.5%
	A1085 Longlands Road	64.0	64.0	64.0	64.0	63.2	0.0	0.0%	0.0	0.0%	0.0	0.0%	-0.8	-1.3%
z	A171 Cargo Fleet Lane	48.0	48.0	48.0	48.0	48.0	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Ea	Ormesby Road	43.3	42.2	42.2	42.2	42.2	-1.2	-2.7%	-1.2	-2.7%	-1.2	-2.7%	-1.2	-2.7%
	Overdale Road	25.1	24.9	24.4	23.5	22.3	-0.2	-0.8%	-0.8	-3.0%	-1.6	-6.5%	-2.8	-11.0%
	B1380 Ladgate Lane	19.2	16.6	15.7	14.2	12.6	-2.5	-13.3%	-3.5	-18.2%	-4.9	-25.8%	-6.6	-34.2%
	A174	68.0	64.8	62.8	59.1	58.3	-3.2	-4.8%	-5.2	-7.7%	-8.9	-13.0%	-9.7	-14.3%
	Guisborough Road	22.2	21.9	20.3	18.6	17.4	-0.3	-1.4%	-1.9	-8.8%	-3.6	-16.1%	-4.8	-21.5%
	A1043	67.6	70.8	69.2	66.8	64.6	3.3	4.8%	1.6	2.4%	-0.8	-1.1%	-3.0	-4.4%
	A172	83.0	80.7	78.6	77.2	75.9	-2.3	-2.7%	-4.4	-5.3%	-5.8	-7.0%	-7.1	-8.5%
ے	B1365	80.9	79.1	77.4	75.8	72.7	-1.8	-2.2%	-3.5	-4.3%	-5.1	-6.3%	-8.2	-10.1%
outh	Seamer Road	75.5	75.5	75.5	75.5	75.5	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Š	Maltby Road	73.0	73.0	71.1	69.2	65.9	0.0	0.0%	-1.9	-2.6%	-3.7	-5.1%	-7.1	-9.8%
	B1380	61.5	54.5	46.5	45.3	41.4	-7.0	-11.4%	-15.1	-24.5%	-16.3	-26.4%	-20.2	-32.8%
	A19	72.5	70.6	67.3	64.8	60.8	-1.9	-2.6%	-5.2	-7.2%	-7.8	-10.7%	-11.7	-16.2%
	A174	85.3	72.0	72.0	72.0	70.4	-13.3	-15.6%	-13.3	-15.6%	-13.3	-15.6%	-14.8	-17.4%

-3.6

-5.1

0.0

-6.5

0.0

-1.9

-14.3%

-9.5%

0.0%

-13.2%

0.0%

-3.3%

-6.3

-12.9

-2.8

-15.3

-1.8

-3.9

-25.0%

-24.0%

-4.3%

-31.3%

-3.1%

-8.1

-25.4

-2.8

-19.6

-3.5

-5.6

-32.4%

-47.2%

-4.3%

-40.0%

-6.1%

-10.1%

-8.8

-35.5

-7.6

-35.1%

-66.1%

-4.3%

-52.2%

-13.7%

16.2

18.2

62.6

23.5

53.5

48.0

#### Middlesbrough Inner Cordon

25.0

53.7

65.5

49.1

58.1

55.7

21.4

48.6

65.5

42.6

58.1

53.8

18.8

40.8

62.6

33.8

56.3

51.7

16.9

28.3

62.6

29.5

54.5

50.0

A1130 Acklam Road

B6541 Stockton Road

A1032 Tees Bridge Approach

A66

average

	Wildulesbrough hiller Col	luon												
	Outbound	AM peak hour traffic sp	eed on links											
							perc	entage		percentage		percentage		percentage
						change ii	n link chan	nge in link	change in link	change in link	change in link	change in link	change in link	change in link
						speed fro	om 2015 spee	ed from 2015	speed from 201	speed from 2015	speed from 2015	speed from 2015	speed from 2015	speed from 2015
		2015	2020	2025	2030	2035 to 2020	to 20	020	to 2025	to 2025	to 2030	to 2030	to 2035	to 2035
	Windward Way	48.0	24.2	23.9	20.8	20.7	-23.8	-49.5%	-24.	1 -50.2%	-27.2	-56.7%	-27.3	-56.9%
st	A66 Borough Road	34.2	30.4	27.6	27.3	24.6	-3.8	-11.1%	-6.	5 -19.1%	-6.8	-20.0%	-9.6	-28.0%
Е	Borough Road	48.9	48.9	48.9	48.9	48.9	0.0	0.0%	0.	0.0%	0.0	0.0%	0.0	0.0%
	A1085 Longlands Road	42.9	42.3	41.1	41.1	41.1	-0.6	-1.4%	-1.	8 -4.1%	-1.8	-4.1%	-1.8	-4.1%
	A172 Marton Road	36.9	24.8	23.6	23.6	22.5	-12.1	-32.8%	-13.	-36.1%	-13.3	-36.1%	-14.4	-39.1%
ے	Park Vale Road	48.2	48.2	48.2	48.2	48.2	0.0	0.0%	0.	0.0%	0.0	0.0%	0.0	0.0%
öf	Linthorpe Road	36.0	35.2	33.8	35.2	33.8	-0.8	-2.2%	-2.	-6.3%	-0.8	-2.2%	-2.3	-6.3%
Š	Ayresome Street	24.2	22.9	21.7	22.1	21.7	-1.3	-5.5%	-2.	5 -10.3%	-2.1	-8.8%	-2.5	-10.3%
	Carlow Street	25.8	25.8	25.5	25.5	25.1	0.0	0.0%	-0.	4 -1.4%	-0.4	-1.4%	-0.7	-2.7%
	B6541 Newport Road	28.9	27.9	25.2	23.6	23.6	-1.0	-3.6%	-3.	<mark>7</mark> -12.9%	-5.3	-18.2%	-5.3	-18.2%
Ves	A66	64.9	64.9	63.2	63.2	63.2	0.0	0.0%	-1.	7 -2.6%	-1.7	-2.6%	-1.7	-2.6%
>	Riverside Park Road	48.4	48.4	48.4	48.4	48.4	0.0	0.0%	0	0 0.09	6 0.0	0.09	6 0.	0.0%
	average	40.6	37.0	35.9	35.7	35.1	-3.6	-8.9%	-4.	7 -11.5%	-4.9	-12.2%	-5.5	-13.4%

#### South Middlesbrough Screenline

Southbound	AM peak hour traffic	speed on links											
						pe	rcentage		percentage		percentage		percentage
					change	in link cha	ange in link	change in link	change in link	change in link	change in link	change in link	change in link
					speed f	rom 2015 spe	ed from 2015	speed from 2015					
	2015	2020	2025	2030	2035 to 2020	to	2020	to 2025	to 2025	to 2030	to 2030	to 2035	to 2035
A19	75.8	72.8	72.1	68.8	66.4	-2.9	-3.9%	-3.6	-4.8%	-7.0	9.29	6 -9.4	4 -12.4%
Acklam Road	46.4	48.6	48.6	48.6	48.6	2.2	4.8%	2.2	4.8%	2.2	4.89	6 2.5	2 4.8%
Marton Road	43.1	42.0	41.0	41.0	40.0	-1.1	-2.5%	- <b>2.</b> 1	-4.9%	- <b>2.</b> 1	1 -4.9%	√6 -3.1	1 -7.1%
Otmeasby Road	35.4	34.9	34.7	34.5	34.1	-0.4	-1.3%	-0.7	-1.9%	-0.9	-2.59	-1.3	-3.7%
A171 Cargo Fleet Lane	48.0	48.0	48.0	48.0	48.0	0.0	0.0%	5.0	0.0%	5.0	0.09	6 0.0	0.0%
Normanby Road	48.3	48.3	48.3	48.3	48.3	0.0	0.0%	5.0	0.0%	5.0	0.09	% 0.0	0.0%
Church Lane	42.9	42.9	42.3	41.7	40.5	0.0	0.0%	-0.6	-1.4%	-1.2	2 -2.89	√6 -2.3	-5.4%
Greystone Road	94.2	94.2	94.2	94.2	94.2	0.0	0.0%	5.0	0.0%	5.0	0.09	6 0.0	0.0%
average	54.2	54.0	53.6	53.1	52.5	-0.3	-0.5%	-0.6	-1.19	6 -1.1	1 -2.19	6 -1.7	7 -3.2%

	AM peak hour traffic	speed on links											
							percentage		percentage		percentage		percentage
					ch	ange in link	change in link	change in link					
					sp	eed from 2015	speed from 201	5 speed from 2015					
Outbound	2015	2020	2025	2030	2030 to	2020	to 2020	to 2025	to 2025	to 2030	to 2030	to 2030	to 2030
Junction 1: A66/A19	48.7	45.5	40.1	34.8	0.0	-3.1	-6.5%	-8.6	-17.6%	-13.9	-28.6%	-43.	2 -107.8%
Junction 2: A19/A174	67.1	60.8	57.8	53.2	0.0	-6.4	-9.5%	-9.3	-13.8%	-13.9	-20.7%	-64.	2 -111.0%
Junction 3: A174/Greystone Road	f 59.9	57.8	56.9	55.1	0.0	-2.1	-3.6%	-3.0	-5.1%	-4.8	-8.1%	-59.	0 -103.7%
Junction 4: A66/Greystone Road	61.1	60.5	60.0	59.5	0.0	-0.6	-1.0%	-1.1	-1.8%	-1.6	-2.6%	-60.	7 -101.0%

### Middlesbrough Outer Cordon Inbound

AM peak hour traffic speed on links

										percentage		percentage		percentage		percentage
								change ir		change in link	change in link	change in link	change in link	change in link	change in link	change in link
				2020 Do	2025 Do	2030 Do	2035 Do		om 2015							speed from 2015
	anode b	node id	2015 Base	Something	Something	Something	Something	to 2020		to 2020	to 2025	to 2025	to 2030	to 2030	to 2035	to 2035
Dockside Road	2052	2053 2052-2053	43.4	4.	2.1	10.1	36.2	32.1	-1		6 -3.i	-7.5%	-7.1	-16.4%	-11.	-26.1%
A66	2309	2308 2309-2308	69.6	6	5.9	6.9	66.9	66.9	-2.	7 -3.89	6 -2.:	7 -3.8%	-2.7	-3.8%	-2.	-3.8%
Middlesbrough Road	2515	2759 2515-2759	39.0	31	5.0	33.4	31.2	28.5	-3.0	<mark>)</mark> -7.79	6 -5.6	-14.3%	-7.8	-20.0%	-10.	-26.8%
Southerby Road	2756	2757 2756-2757	27.0	2	7.0	26.2	26.6	26.2	0.	0.09	6 -0.8	3 -3.0%	-0.4	-1.5%	-0.8	-3.0%
A1085 Longlands Road	2786	2785 2786-2785	64.0	6	3.2	52.3	61.5	61.5	-0.	-1.39	6 -1.	-2.6%	-2.5	-3.8%	-2.	
A171 Cargo Fleet Lane	2880	2348 2880-2348	12.6			10.8	9.5	8.1	-1.							
Ormesby Road	2674	2347 2674-2347	31.2	3	1.2	80.6	30.0	29.4	0.	0.09	6 -0.6			-3.8%	-1.8	-5.7%
Overdale Road	2468	2826 2468-2826	16.4				14.7	13.8	-0.							
B1380 Ladgate Lane	2467	2876 2467-2876	32.5	3:	L.7 :		32.5	32.1	-0.						-0.4	
A174	2513	2446 2513-2446	76.2	70	).7	9.5	67.1	63.9	-5.			7 -8.8%	-9.0	-11.9%	-12.	-16.1%
Guisborough Road	2386	2511 2386-2511	17.8	1	7.4	11.9	19.8	18.2	-0.	4 -2.29	6 -5. <u>9</u>	-33.1%	2.0	11.0%	0.4	2.2%
A1043	2510	1567 2510-1567	75.4				76.4	75.4	-1.							
A172	1569	1568 1569-1568	84.6				80.0	75.9	0.							
£ B1365	1624	4069 1624-4069	76.6				74.2	75.8	-0.							
Seamer Road	2506	2520 2506-2520	76.6				76.6	76.1	0.							41170
Maltby Road	1622	2521 1622-2521					71.1	69.2	0.							
B1380	2522	1666 2522-1666	61.5				61.0	61.0	-0.							
A19	2438	2443 2438-2443	59.4				54.1	51.2	-4.							
A174	2524	1560 2524-1560	22.2				21.2	20.6	0.							
₩ A1130 Acklam Road	2619	5593 2619-5593					48.0	48.0	0.							
ĕ A66	2914	2525 2914-2525	53.3				53.3	50.5	3.							2 2 2 2 2
B6541 Stockton Road	1762	2526 1762-2526					51.4	49.7	-2.							
A19	2527	2276 2527-2276	60.0				54.8	52.5	-2.							2.27
A1032 Tees Bridge Approach	1920	2636 1920-2636				9.7	9.3	8.8	-1.							
average			49.5	4:	3.4	17.0	47.0	45.6	-1.0	-2.19	6 -2.4	-4.9%	-2.5	-5.0%	-3.8	-7.7%

#### Middlesbrough Inner Cordon

Inbound AM peak hour traffic speed on links

									percentage		percentage		percentage		percentage
								change in link	change in link	change in link	change in link	change in link	change in link	change in link	change in link
				2020 Do 2	025 Do	2030 Do	2035 Do	speed from 20	15 speed from 2	15 speed from 20	15 speed from 201	5 speed from 2015	speed from 2015	speed from 201	5 speed from 2015
	anode b	node id	2015 Base	Something S	omething	Something	Something	to 2020	to 2020	to 2025	to 2025	to 2030	to 2030	to 2035	to 2035
Windward Way	2185	2204 2185-2204	48.0	48.0	48.0	48.	.0	10.3	0.0 0	0%	0.0	% 0.0	0.09	6 -7.	7 -16.0%
Ke A66  Borough Road	2307	2661 2307-2661	49.2	50.2	47.3	48.	2	17.3	1.0 2	0% -:	1.9 -3.8	% -1.0	-2.09	6 -1.	-3.8%
Borough Road	2380	2754 2380-2754	44.0	42.6	41.3	40.	.0	10.0	1.4 -3	2%	<del>2.8</del> -6.3	% -4.0	-9.1%	6 -4.	9.1%
A1085 Longlands Road	2784	2305 2784-2305	37.0	35.3	34.1	34.	1	34.9 -	1.7 -4	7% -2	<mark>2.9</mark> -8.0	% -2.9	-8.0%	6 -2.	2 -5.8%
A172 Marton Road	2868	2867 2868-2867	20.6	18.9	24.4	22.	9 :	20.3	1.6 -7	9%	18.6	% 2.:	11.19	<del>6</del> -0.	-1.4%
_ Park Vale Road	1586	1584 1586-1584	32.1	26.0	24.8	23.	3	21.4 -	<mark>6.2</mark> -19	2% -:	<mark>7.4</mark> -22.9	% -8.9	-27.69	6 -10.	7 -33.3%
E Linthorpe Road	1652	1651 1652-1651	22.5	20.3	19.8	18.	2 :	17.1	2.3 -10	0% -2	2.7 -12.2	% -4.	-19.19	6 -5.	4 -24.2%
Ayresome Street	1690	1868 1690-1868	17.0	17.3	17.0	17.	3	17.5	0.2 1	4%	0.0	% 0.:	2 1.49	6 0.	5 2.8%
Carlow Street	1690	1865 1690-1865	17.1	16.5	15.1	14.	4	13.6 -	0.6 -3	5% -:	1.9 -11.4	% -2.0	-15.59	6 -3.	-20.4%
B6541 Newport Road	2617	1859 2617-1859	10.1	10.3	10.5	10.	.5	10.0	0.1 1	3% (	).4 4.1	% 0.4	4.19	6 -0.	-1.3%
§ A66	2638	2648 2638-2648	6.8	6.4	6.0	5.	6	5.1 -	0.4 -6	1% -0	).9 -12.8	<del>%</del> -1.:	-18.49	6 -1.	7 -25.2%
> Riverside Park Road??	2939	2942 2939-2942	14.6	11.5	11.2	10.	5	9.8	<mark>3.1 -21</mark>	5%	3.4 -23.5	% -4.:	-28.69	6 -4.	32.8%
average			26.6	25.3	25.0	24	4	23.1 -	13 -5	0%	-6.2	% -2	-8.29	6 -3	-13.1%

### South Middlesbrough Screenline Northbound

AM peak hour tra AM peak hour traffic flow

												percentage		percentage		percentage		percentage
											change in link	change in link	change in link	change in link	change in link	change in link	change in link	change in link
					2020 1	Do	2025 Do	2030 Do	2035 Do		speed from 201	5 speed from 2015	speed from 2015	speed from 201	5 speed from 2015			
	anode	bnode	id	2015 Base	Somet	thing	Something	Somethi	ng Somethi	ing 1	to 2020	to 2020	to 2025	to 2025	to 2030	to 2030	to 2035	to 2035
A19	2440	0 26	26 2440-2626		52.4	46.6		48.4	46.3	35.7	-5.	9 -11.29	· -4.	1 -7.7	% -6.:	-11.79	% -16.	.7 -31.9%
Acklam Road	167	5 24	69 1675-2469		37.8	36.4		42.5	40.8	39.2	-1.	.3 -3.69	4.	7 12.5	% 3.0	8.09	6 1.	.5 3.8%
Marton Road	1604	4 28	71 1604-2871		39.1	37.3		42.0	41.0	40.0	-1.	.7 -4.49	% <b>2</b> .	9 7.5	% 1.5	4.99	6 0.	.9 2.4%
Otmeasby Road	2830	0 28	29 2830-2829		26.3	25.7		25.0	23.8	22.7	-0.	.6 -2.39	% -1.	3 -5.0	% -2.	-9.5%	6 -3.	.6 -13.6%
A171 Cargo Fleet Lane	283	4 28	33 2834-2833		33.9	24.7		23.8	22.6	19.9	-9.	.2 -27.29	% -10.	1 -29.8	% -11.4	-33.69	% -14.	.1 -41.4%
Normanby Road	234	9 27	88 2349-2788		17.8	15.5		14.9	14.2	12.1	-2.	.3 -12.99	% -2.	9 -16.3	% -3.0	-20.49	% -5.	.8 -32.3%
Church Lane	2840	0 32	56 2840-3256		37.5	35.7		31.6	30.0	29.1	-1.	.8 -4.89	% -5.	9 -15.8	% -7.5	-20.09	% -8.	.4 -22.3%
Greystone Road	554:	1 27	91 5541-2791		62.6	63.3		58.8	60.0	61.0	0.	.7 1.19	· -3.	9 -6.2	% -2.	-4.29	6 -1.	.7 -2.7%
average					38.4	35.7		35.9	34.8	32.5	-2.	.8 -7.29	% -2.	6 -6.7	% -3.0	-9.49	6 -6.	.0 -15.5%

#### Junction Screenlines

AM peak hour traffic speed on links

	Aivi peak flour tra	ne speed on min	.3										
							percentage		percentage		percentage		percentage
						change in li	nk change in lir	k change in link	change in link	change in link	change in link	change in link	change in link
		2020 Do	2025 Do	2030 Do	2035 Do	speed from	2015 speed from	2015 speed from 2015	5 speed from 201	5 speed from 201!	speed from 2015	speed from 201	5 speed from 2015
Inbound	2015 Base	Something	Something	Something	Something	to 2020	to 2020	to 2025	to 2025	to 2030	to 2030	to 2035	to 2035
Junction 1: A66/A19	54.7	51.	8 4	47.7	44.7	41.9	-2.9	5.3% -7.	0 -12.7	% -10.	-18.2%	-12.	8 -23.4%
Junction 2: A19/A174	61.5	60.	0 6	50.3	58.8	56.5	-1.5	2.5% -1.	2 -2.0	% -2.	<mark>7</mark> -4.4%	-5.	0 -8.1%
Junction 3: A174/Greystone Road	60.5	59.	1 5	57.0	53.5	50.4	-1.4	2.3% -3.	<mark>4</mark> -5.7	% -6.	-11.5%	-10.	1 -16.7%
Junction 4: A66/Greystone Road	58.8	57.	8 5	56.7	56.0	55.4	-1.0	1.6% -2.	-3.6	% -2.	-4.8%	-3.	3 -5.6%

#### Middlesbrough Outer Cordon

Outbound AM peak hour traffic speed on links

											percentage		percenta	ge		percentage		percentage
										change in link	change in link	change in linl	change ir	link	change in link	change in link	change in link	change in link
					2020 Do	2025 Do	2030 Do	2035 Do		speed from 2015	speed from 20	15 speed from 2	015 speed fro	m 2015	speed from 201	5 speed from 201	.5 speed from 201	5 speed from 2015
		anode bn	ode id	2015 Base	Something	Something	Something	Something		to 2020	to 2020	to 2025	to 2025		to 2030	to 2030	to 2035	to 2035
	Dockside Road	2053	2052 2053-2052		14.4	44.1	44.1	43.9	43.9	-0.	3 -0	6%	-0.3	-0.6%	-0.	5 -1.2	% -0.	-1.2%
	A66	2308	2309 2308-2309	)	32.9	82.9	82.9	82.9	82.9	0.		0%	0.0	0.0%				
	Middlesbrough Road	2759	2515 2759-2515	i	41.8	42.5	42.5	41.1	37.1	0.	3 1	8%	0.8	1.8%	-0.	7 -1.8	% -4.	6 -11.1%
	Southerby Road	2757	2756 2757-2756		26.9	27.0	26.9	26.9	26.8	0.		5%	0.0	0.0%				
	A1085 Longlands Road	2785	2786 2785-2786		64.0	64.0	64.0	64.0	64.0	0.		0%	0.0	0.0%				
	A171 Cargo Fleet Lane	2348	2880 2348-2880		48.0	48.0	48.0	48.0	48.0	0.		0%	0.0	0.0%				
East	Ormesby Road	2347	2674 2347-2674	1	43.3	42.2	42.2	42.2	42.2	-1.	2 -2	7%	-1.2	-2.7%	-1.	2 -2.7	% -1	
	Overdale Road	2826	2468 2826-2468		25.1	25.3	24.5	23.8	23.0	0.			-0.6	-2.3%				
	B1380 Ladgate Lane	2876	2467 2876-2467		19.2	17.6	16.9	18.8	17.4	-1.			<mark>-2.2</mark>	-11.7%				
	A174	2458	2729 2458-2729	)	68.0	65.8	61.8	63.8	62.8	-2.	<mark>2</mark> -3		<del>-6.2</del>	-9.1%	-4.	<del>3</del> -6.3	% -5.	
	Guisborough Road	2511	2386 2511-2386		22.2	22.2	20.8	22.2	21.0	0.	0 0	0%	-1.4	-6.4%	0.	0.0	% -1	2 -5.2%
	A1043	1567	2510 1567-2510		57.6	70.8	70.0	76.4	72.6			8%	2.4	3.6%				
	A172	1568	1569 1568-1569		33.0	81.5	80.0	81.5	80.0	-1.			-3.0	-3.6%				
£	B1365	4069	1624 4069-1624		30.9	79.1	78.3	78.3	74.2	-1.			-2.6	-3.3%				
, oc	Seamer Road	2520	2506 2520-2506		75.5	75.5	75.5	75.5	75.0	0.0		0%	0.0	0.0%				
0,	Maltby Road	2521	1622 2521-1622		73.0	73.0		71.1	69.2	0.			-1.9	-2.6%				
	B1380	1666	2522 1666-2522		51.5	56.7	53.3	50.0	48.6				<del>-8.2</del>	-13.3%				
	A19	2442	2437 2442-2437		72.5	70.9	69.8	68.5	65.4	-1.			-2.7	-3.7%				
	A174	1560	2524 1560-2524		35.3	83.1	81.0	83.1	83.1	-2.			-4.3	-5.0%				
ts	A1130 Acklam Road	5593	2619 5593-2619		25.0	19.0	15.8	12.9	11.5	-6.			-9.2	-36.8%				
West	A66	2720	2909 2720-2909		53.7	51.0	48.6	40.8	26.8				-5.1	-9.5%				
	B6541 Stockton Road	2526	1762 2526-1762		55.5	65.5	62.6	62.6	62.6	0.			-2.8	-4.3%				
	A19	2275	2721 2275-2721		49.1	45.0		31.2	26.1	-4.			13.1	-26.7%				
	A1032 Tees Bridge Approach	2636	1920 2636-1920		58.1	57.4		52.4	49.5				<del>-3.5</del>	-6.1%				
	average				55.7	54.6	53.0	52.6	50.6	-1.	1 -2	0%	-2.7	-4.9%	-3.	1 -5.6	% -5.	1 -9.2%

### Middlesbrough Inner Cordon

Outbound AM peak hour traffic speed on links

									p	ercentage		percentage		percentage		percentage
								chai	nge in link c	hange in link	change in link	change in link	change in link	change in link	change in link	change in link
				2020 Do	2025 Do	2030 Do	2035 Do	spee	ed from 2015 s	peed from 201	speed from 201	5 speed from 20	15 speed from 20	15 speed from 20	15 speed from 20:	5 speed from 2015
	anode br	node id	2015 Base	Something	Something	Something	Something	to 2	.020 t	o 2020	to 2025	to 2025	to 2030	to 2030	to 2035	to 2035
Windward Way	2204	2185 2204-218	48.0	48.0	48	3.0	48.0	48.0	0.0	0.09	6 0	.0 0.	0%	0.0	0% (	.0 0.0%
tg A66	2304	2841 2304-284	34.2	37.8	37	7.3	33.7	32.4	3.7	10.89	6 3	.1 9.	1%	0.5 -1.	1% -1	.8 -5.3%
<sup>™</sup> Borough Road	2754	2380 2754-238	48.9	48.9	48	3.9	48.9	48.9	0.0	0.09	6 0	.0 0.	0%	0.0	0%	.0 0.0%
A1085 Longlands Road	2305	2784 2305-278	42.9	42.9	40	0.0	40.5	40.5	0.0	0.09	6 -2	<mark>.9</mark> -6.	7% -	2.3 -5.	1% -2	.3 -5.4%
A172 Marton Road	2867	2868 2867-286	36.9	27.7	48	3.0	48.0	48.0	-9.2	-25.09	6 11	.1 30.	0% 1	1.1 30.	0% 11	.1 30.0%
Park Vale Road	1584	1586 1584-158	48.2	48.2	48	3.2	48.2	48.2	0.0	0.09	6 0	.0 0.	0%	0.0	0%	.0 0.0%
E Linthorpe Road	1651	1652 1651-165	36.0	36.8	36	5.8	36.8	35.2	0.8	2.39	6 0	.8 2.	3%	0.8 2.	3% -0	-2.2%
Ayresome Street	1868	1690 1868-169	24.2	22.9	22	2.5	21.7	21.7	-1.3	-5.59	6 -1	.7 -7.	1%	2.5 -10.	3% -2	.5 -10.3%
Carlow Street	1865	1690 1865-169	25.8	25.8	25	5.8	25.8	25.5	0.0	0.09	6 0	.0 0.	0%	0.0	0% -0	-1.4%
■ B6541 Newport Road	1859	2617 1859-261	28.9	28.9	26	5.0	26.0	25.2	0.0	0.09	6 -2	<mark>.9</mark> -10.	0% -	2.9 -10.	O% -3	.7 -12.9%
% A66	2647	2639 2647-263	64.9	63.2	63	3.2	63.2	63.2	-1.7	-2.69	6 -1	.7 -2.	6% -	1.7 -2.	5% -1	.7 -2.6%
Riverside Park Road??	2942	2939 2942-293	48.4	48.4	48	3.4	48.4	48.4	0.0	0.09	6 0	.0 0.	0%	0.0	0% (	.0 0.0%
average			40.6	40.0	41	.1	40.8	40.4	-0.6	-1.69	6 0	5 1	2%	0.2	1% -(	-0.4%

### South Middlesbrough Screenline Southbound

AM peak hour traffic speed on links

											percentage		percentage		percentage		percentage
										change in link	change in link	change in link	change in link	change in link	change in link	change in link	change in link
					2020 Do	2025 Do	2030 Do	203	5 Do	speed from 201	5 speed from 20	L5 speed from 201	5 speed from 2015	5 speed from 2015	speed from 2015	speed from 2015	speed from 2015
	anode	bnode	id	2015 Base	Something	Something	Something	Som	ething	to 2020	to 2020	to 2025	to 2025	to 2030	to 2030	to 2035	to 2035
A19	2625	244	1 2625-2441		75.8	75.8	81.5	77.9	77.9	0.	0.0	1% 5.	8 7.69	6 2.2	2.9%	2.2	2.9%
Acklam Road	2469	167	5 2469-1675		46.4	48.6	46.4	46.4	46.4	2.	2 4.8	3% 0.	0 0.09	6 0.0	0.0%	0.0	0.0%
Marton Road	2871	160	4 2871-1604		43.1	42.0	45.4	44.2	44.2	-1.	1 -2.5	3% 2.	3 5.49	6 1.1	. 2.6%	1.1	2.6%
Otmeasby Road	2829	283	2829-2830		35.4	35.2	34.9	34.7	34.7	-0.	2 -0.6	i% -0.	4 -1.39	6 -0.7	-1.9%	-0.7	-1.9%
A171 Cargo Fleet Lane	2833	283	4 2833-2834		48.0	48.0	48.0	48.0	48.0	0	0.0	0.	0 0.09	6 0.0	0.0%	0.0	0.0%
Normanby Road	2788	234	9 2788-2349		48.3	48.3	48.3	48.3	48.3	0.	0.0	1% 0.	0 0.09	6 0.0	0.0%	0.0	0.0%
Church Lane	3256	284	3256-2840		42.9	42.9	43.5	42.3	41.1	0.	0.0	1% 0.	6 1.49	-0.€	-1.4%	-1.8	-4.1%
Greystone Road	2791	554	1 2791-5541		94.2	94.2	94.2	93.4	93.4	0.	0.0	1% 0.	0 0.09	-0.8	-0.8%	-0.8	-0.8%
average	total				54.2	54.4	55.3	54.4	54.3	0	1 0.2	!% 1.	0 1.99	6 0.2	0.3%	0.0	0.0%

#### **Junction Screenlines**

AM peak hour traffic speed on links

					change in	link change in	link change	in link change in	n link change in	link change in lin	nk change in link	change in link
	20	20 Do 2025 D	o 2030 Do	2035 Do	speed from	m 2015 speed fro	m 2015 speed fr	rom 2015 speed fro	om 2015 speed fro	m 2015 speed from	2015 speed from 201	15 speed from 2015
Outbound	2015 Base So	mething Someti	ing Someth	ng Somethi	ng to 2020	to 2020	to 2025	to 2025	to 2030	to 2030	to 2035	to 2035
Junction 1: A66/A19	48.7	46.5	43.1	38.7	33.1	-2.2	-4.5%	-5.5	-11.4%	-10.0 -2	20.5% -15	-32.0%
Junction 2: A19/A174	67.1	63.6	64.5	70.9	67.2	-3.5	-5.2%	-2.6	-3.9%	3.8	5.6% 0	0.1%
Junction 3: A174/Greystone Road	59.9	58.5	55.3	54.0	52.2	-1.4	-2.3%	-4.6	-7.8%	-5.9	-9.8% -7	·.7 -12.8%
Junction 4: A66/Greystone Road	61.1	60.6	60.4	59.7	59.3	-0.5	-0.8%	-0.8	-1.2%	-1.5	-2.4% -1	-3.1%
Junction 1: A66/A19 Junction 2: A19/A174 Junction 3: A174/Greystone Road	2015 Base So 48.7 67.1 59.9	46.5 63.6 58.5	43.1 64.5 55.3	38.7 70.9 54.0	33.1 67.2 52.2	-2.2 -3.5 -1.4	to 2025 -4.5% -5.2% -2.3%	-5.5 -2.6 -4.6	-11.4% -3.9% -7.8%	to 2030 -10.0 -2 3.8 -5.9	to 2035 20.5% -15 5.6% 0 -9.8% -7	to 2035 5.6 -32. 0.1 0. -12.

### Middlesbrough Outer Cordon Inbound

AM peak hour traffic speed on links

	Dockside Road A66 Middlesbrough Road Southerby Road A1085 Longlands Road	2052 2309 2515 2756 2786	2053 2308 2759 2757 2785	id 2052-2053 2309-2308 2515-2759 2756-2757 2786-2785	2015 Base 43 69 39 27 64	.6 6 0 3 .0 2	to 2030 6.1 -7. 6.9 -2. 0.8 -8. 6.6 -0. 1.5 -2.	7 -3.8% 2 -21.1% 4 -1.5% 5 -3.8%
East	A171 Cargo Fleet Lane Ormesby Road Overdale Road B1380 Ladgate Lane	2880 2674 2468 2467	2347 2826	2880-2348 2674-2347 2468-2826 2467-2876	12 31 16 32	2 2	9.2 -3. 9.4 -1. 4.6 -1. 1.4 -1.	5.7% 8 -10.8%
	A174 Guisborough Road	2513 2386	2446	2513-2446 2386-2511	76 17	.2 6	6.0 -10. 7.6 -10.	-13.3%
	A1043	2510	1567	2510-1567	75		0.8 -4.	
	A172	1569		1569-1568	84		2.2 -2.	
£	B1365	1624		1624-4069	76		2.7 -3.	
South	Seamer Road	2506		2506-2520	76		6.6 0.	
٥,	Maltby Road	1622		1622-2521	73		1.1 -1.	
	B1380	2522		2522-1666	61		1.0 -0.	
	A19	2438		2438-2443	59		3.8 -5.	
	A174 A1130 Acklam Road	2524		2524-1560	22		0.9 -1.	
West	A1130 ACKIAM ROAD	2619 2914		2619-5593 2914-2525	48 53		8.0 0. 3.3 0.	
š	B6541 Stockton Road	1762		1762-2526	55		1.4 -4.	
	A19	2527		2527-2276	60		4.8 -5.	
	A1032 Tees Bridge Approach	1920		1920-2636	11		9.3 -2.	
	average	1320	2030	1020 2000	49		6.1 -3.	
	·							

### Middlesbrough Inner Cordon

Inbound AM peak hour traffic speed on links

					-			percentage
							change in link	change in link
						2030 Do	speed from 2015	speed from 2015
		anode	bnode	id	2015 Base	Something	to 2030	to 2030
	Windward Way	2185	2204	2185-2204	48.0	) 48.0	0.0	0.0%
East	A66	2307	2661	2307-2661	49.2	47.3	-1.9	-3.8%
ű	Borough Road	2380	2754	2380-2754	44.0	40.0	-4.0	-9.1%
	A1085 Longlands Road	2784	2305	2784-2305	37.0	33.	-3.3	-9.0%
	A172 Marton Road	2868	2867	2868-2867	20.6	5 22.5	1.9	9.4%
ے	Park Vale Road	1586	1584	1586-1584	32.:	1 23.5	-8.7	-27.0%
South	Linthorpe Road	1652	1651	1652-1651	22.5	5 17.8	-4.7	-20.9%
S	Ayresome Street	1690	1868	1690-1868	17.0	17.3	0.2	1.4%
	Carlow Street	1690	1865	1690-1865	17.:	14.2	-2.9	-16.8%
ta	B6541 Newport Road	2617	1859	2617-1859	10.:	10.4	0.3	2.7%
West	A66	2638	2648	2638-2648	6.8	5.6	-1.3	-18.6%
-	Riverside Park Road??	2939	2942	2939-2942	14.6	10.3	-4.3	-29.6%
	average				26.0	5 24.2	-2.4	-9.0%

### Screenline Data - Change In Speed - Do Something No Stainton Way Eastern Extension

#### South Middlesbrough Screenline

Northbound AM peak hour traffic speed on links

average					38.4	34.7	-3.7	-9.7%
Greystone Road	5541	2791	5541-2791		62.6	60.0	-2.6	-4.2%
Church Lane	2840	3256	2840-3256		37.5	30.0	-7.5	-20.0%
Normanby Road	2349	2788	2349-2788		17.8	13.7	-4.1	-23.2%
A171 Cargo Fleet Lane	2834	2833	2834-2833		33.9	21.8	-12.1	-35.7%
Otmeasby Road	2830	2829	2830-2829		26.3	23.8	-2.5	-9.5%
Marton Road	1604	2871	1604-2871		39.1	41.0	1.9	4.9%
Acklam Road	1675	2469	1675-2469		37.8	40.8	3.0	8.0%
A19	2440	2626	2440-2626		52.4	46.6	-5.9	-11.2%
	anode	bnode	id	2015 Base	2030 Do Something		speed from 2015	change in link speed from 2015 to 2030

#### Junction Screenlines

AM peak hour traffic speed on links

		2030 Do		percentage change in link speed from 2015
Inbound	2015 Base	Something	to 2030	to 2030
Junction 1: A66/A19	54	.7 44.9	-9.8	-17.9%
Junction 2: A19/A174	61	.5 58.6	-2.9	-4.7%
Junction 3: A174/Greystone Road	60	.5 54.8	-5.7	-9.5%
Junction 4: A66/Greystone Road	58	.8 56.0	-2.8	-4.8%

#### No Stainton Way Eastern Extension

#### Middlesbrough Outer Cordon Outbound

AM peak hour traffic speed on links

									percentage
								change in link	change in link
						2030 Do		speed from 2015	speed from 2015
		anode	bnode	id	2015 Base	Something		to 2030	to 2030
	Dockside Road	2053	2052	2053-2052		44.4	43.9	-0.5	-1.2%
	A66	2308	2309	2308-2309		82.9	82.9	0.0	0.0%
	Middlesbrough Road	2759	2515	2759-2515		41.8	40.3	-1.4	-3.4%
	Southerby Road	2757	2756	2757-2756		26.9	26.9	0.0	0.0%
	A1085 Longlands Road	2785	2786	2785-2786		64.0	64.0	0.0	0.0%
	A171 Cargo Fleet Lane	2348	2880	2348-2880		48.0	48.0	0.0	0.0%
East	Ormesby Road	2347	2674	2347-2674		43.3	42.2	-1.2	-2.7%
_	Overdale Road	2826	2468	2826-2468		25.1	24.0	-1.1	-4.4%
	B1380 Ladgate Lane	2876	2467	2876-2467		19.2	16.0	-3.2	-16.8%
	A174	2458	2729	2458-2729		68.0	59.1	-8.9	-13.0%
	Guisborough Road	2511	2386	2511-2386		22.2	19.8	-2.4	-11.0%
	A1043	1567	2510	1567-2510		67.6	69.2		
	A172	1568		1568-1569		83.0	78.6		0.070
Æ	B1365	4069		4069-1624		80.9	76.6		2 2 2 2 2
South	Seamer Road	2520	2506	2520-2506		75.5	75.5	0.0	0.0%
S	Maltby Road	2521		2521-1622		73.0	71.1		
	B1380	1666	2522	1666-2522		61.5	50.7		
	A19	2442		2442-2437		72.5	67.8		
	A174	1560		1560-2524		85.3	83.1		
to	A1130 Acklam Road	5593		5593-2619		25.0	13.3		-46.7%
West	A66	2720		2720-2909		53.7	39.2		2.2.2.2.
_	B6541 Stockton Road	2526		2526-1762		65.5	62.6		
	A19	2275		2275-2721		49.1	31.2		2.2.2.1
	A1032 Tees Bridge Approach	2636	1920	2636-1920		58.1	52.9		-8.8%
	average					55.7	51.6	-4.1	-7.3%

#### Middlesbrough Inner Cordon Outbound

AM peak hour traffic speed on links

								percentage
							change in link	change in link
						2030 Do	speed from 2015	speed from 2015
		anode	bnode	id	2015 Base	Something	to 2030	to 2030
	Windward Way	2204	2185	2204-2185	48.	0 48	.0 0.0	0.0%
East	A66	2304	2841	2304-2841	34.	2 33	.2 -0.9	-2.7%
ŭ	Borough Road	2754	2380	2754-2380	48.	9 48	.9 0.0	0.0%
	A1085 Longlands Road	2305	2784	2305-2784	42.	9 40	.0 -2.9	-6.7%
	A172 Marton Road	2867	2868	2867-2868	36.	9 48	.0 11.1	30.0%
ے	Park Vale Road	1584	1586	1584-1586	48.	2 48	.2 0.0	0.0%
South	Linthorpe Road	1651	1652	1651-1652	36.	0 36	.0 0.0	0.0%
S	Ayresome Street	1868	1690	1868-1690	24.	2 21	.7 -2.5	-10.3%
	Carlow Street	1865	1690	1865-1690	25.	8 25	.8 0.0	0.0%
ti	B6541 Newport Road	1859	2617	1859-2617	28.	9 25	.2 -3.7	-12.9%
West	A66	2647	2639	2647-2639	64.	9 63	.2 -1.7	-2.6%
>	Riverside Park Road??	2942	2939	2942-2939	48.	4 48	.4 0.0	0.0%
	average				40.	6 40	.6 -0.1	-0.1%

## Screenline Data - Change In Speed - Do Something No Stainton Way Eastern Extension

### South Middlesbrough Screenline Southbound

AM peak hour traffic speed on links

							percentage
						change in link	change in link
					2030 Do	speed from 2015	speed from 2015
	anode	bnode	id	2015 Base	Something	to 2030	to 2030
A19	2625	2441	2625-2441	75.8	78.9	3.2	4.2%
Acklam Road	2469	1675	2469-1675	46.4	46.4	0.0	0.0%
Marton Road	2871	1604	2871-1604	43.1	45.4	2.3	5.4%
Otmeasby Road	2829	2830	2829-2830	35.4	34.7	-0.7	-1.9%
A171 Cargo Fleet Lane	2833	2834	2833-2834	48.0	48.0	0.0	0.0%
Normanby Road	2788	2349	2788-2349	48.3	48.3	0.0	0.0%
Church Lane	3256	2840	3256-2840	42.9	42.3	-0.6	-1.4%
Greystone Road	2791	5541	2791-5541	94.2	94.2	0.0	0.0%
average	total			54.2	54.8	0.5	1.0%

#### **Junction Screenlines**

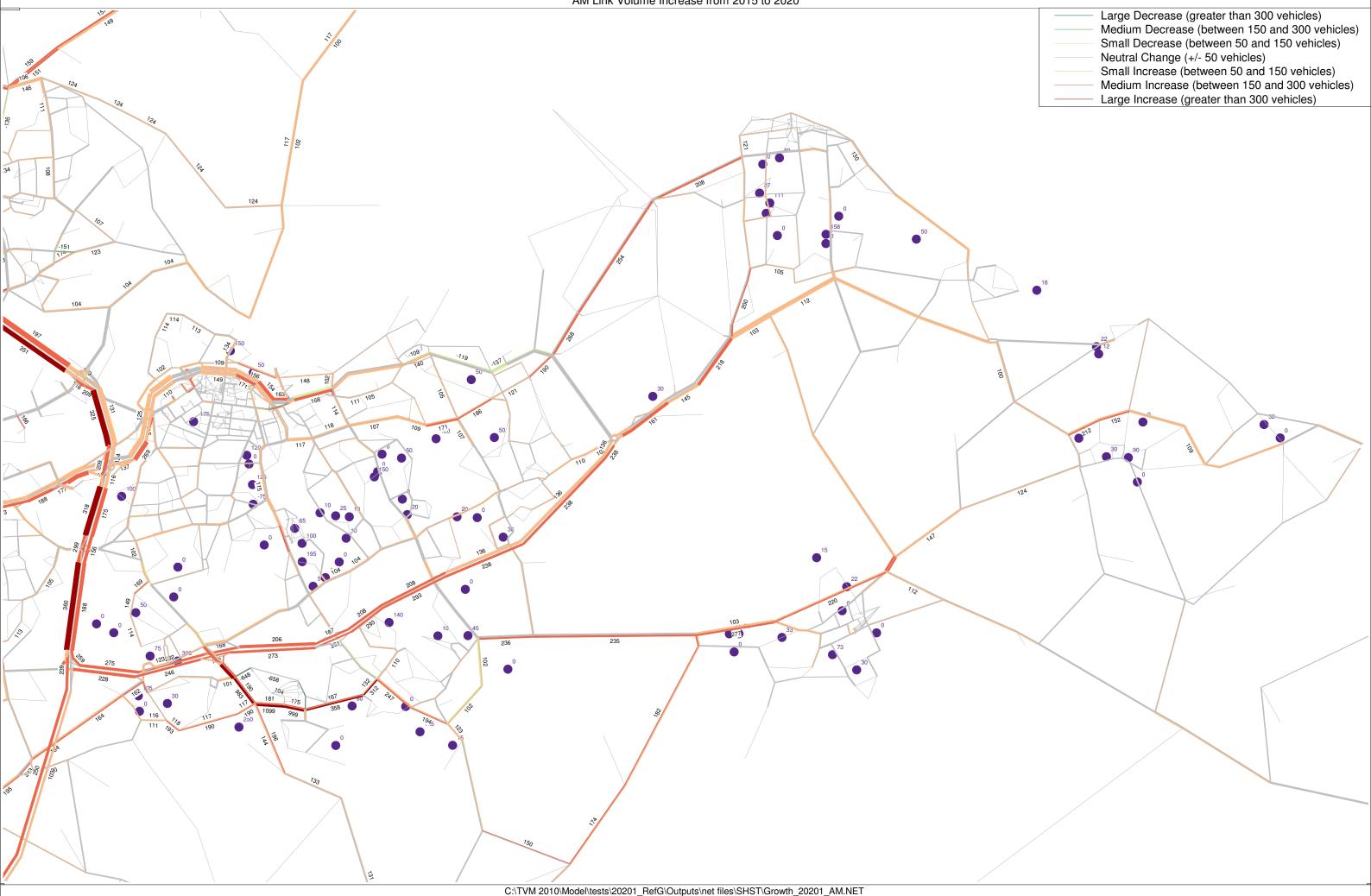
AM peak hour traffic speed on I	IINK	C:
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Outbound	2015 Base	2030 Do Something		change in link speed from 2015 to 2030	change in link speed from 2015 to 2030
Junction 1: A66/A19		48.7	38.3	-10.3	-21.2%
Junction 2: A19/A174		67.1	71.1	4.0	5.9%
Junction 3: A174/Greystone Road		59.9	53.2	-6.7	-11.1%
Junction 4: A66/Greystone Road		61.1	59.8	-1.3	-2.2%

# Appendix D

Difference Plots

Middlesbrough and Redcar & Cleveland Strategic Housing Sites TVM Model Output Do Minimum Network AM Link Volume Increase from 2015 to 2020

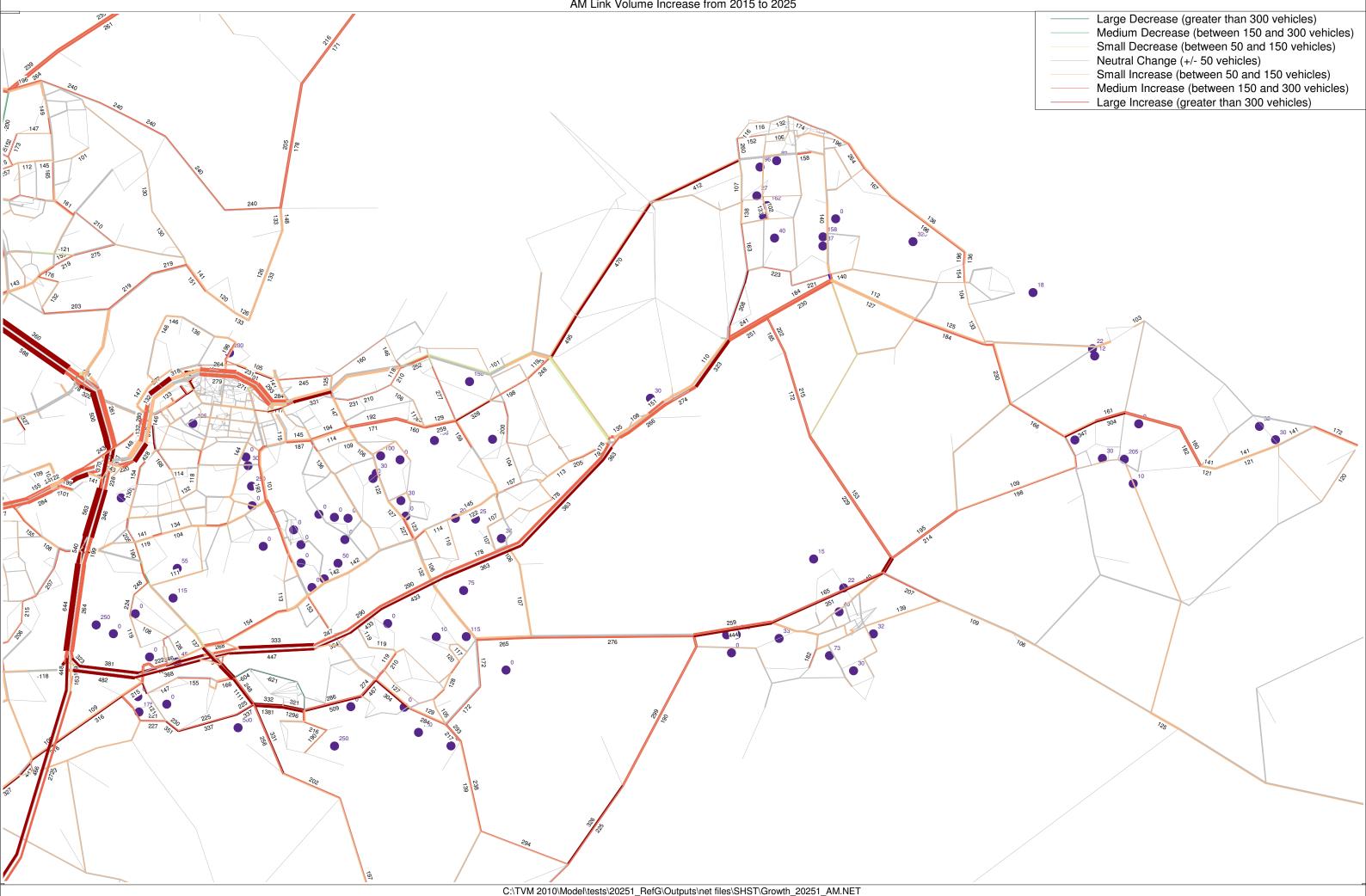


Middlesbrough and Redcar & Cleveland Strategic Housing Sites

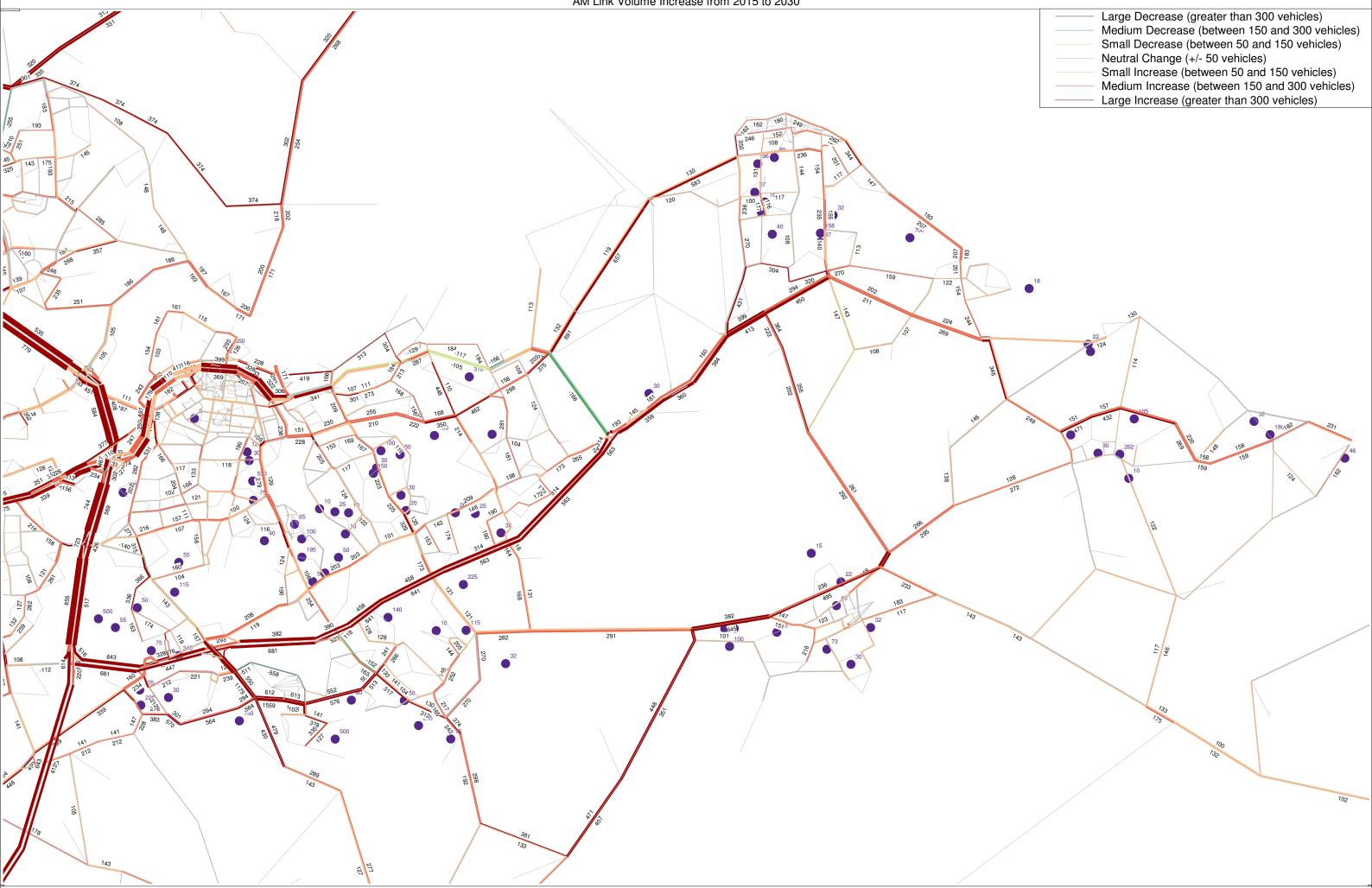
TVM Model Output

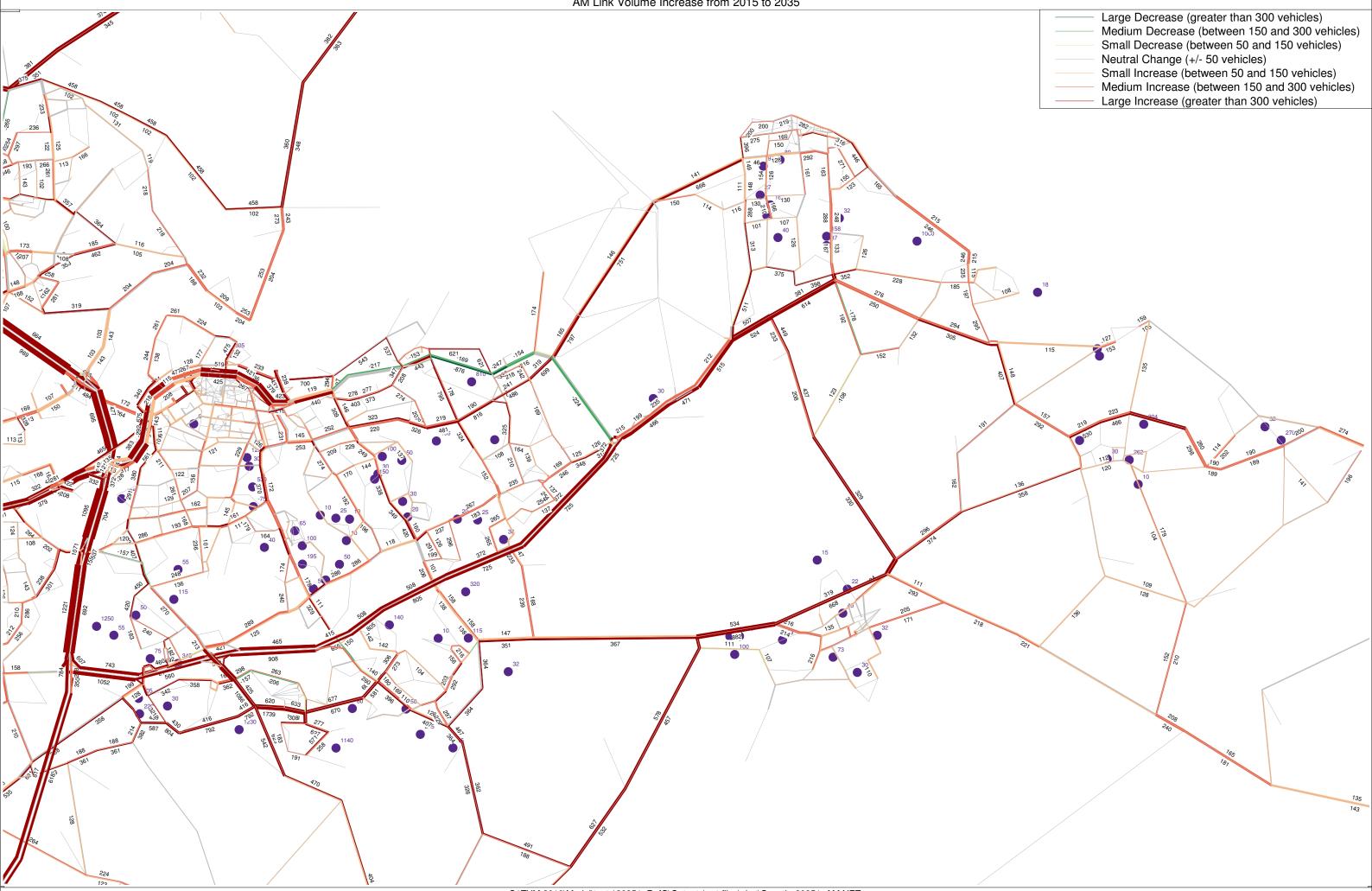
Do Minimum Network

AM Link Volume Increase from 2015 to 2025



Middlesbrough and Redcar & Cleveland Strategic Housing Sites
TVM Model Output
Do Minimum Network
AM Link Volume Increase from 2015 to 2030



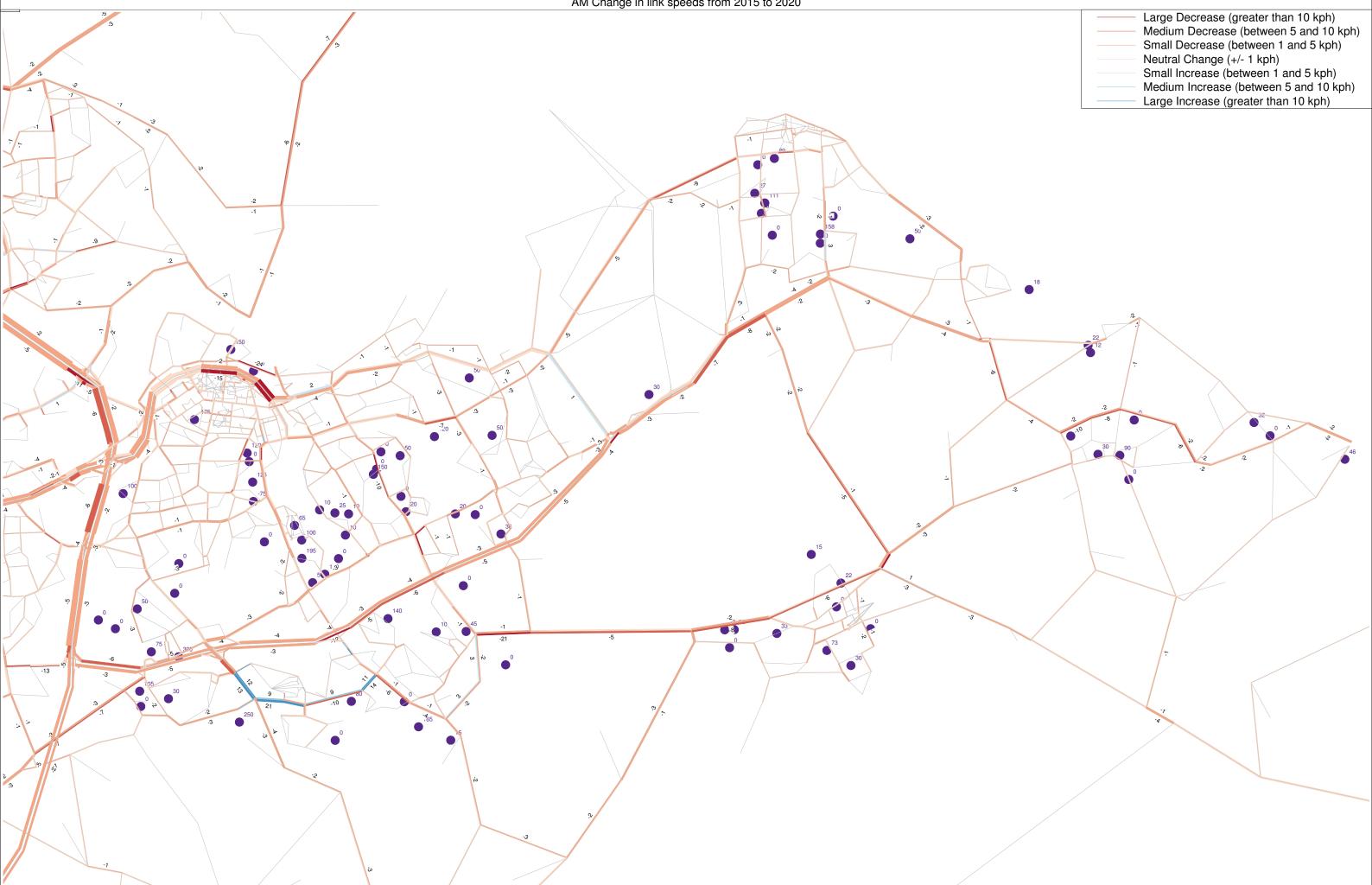


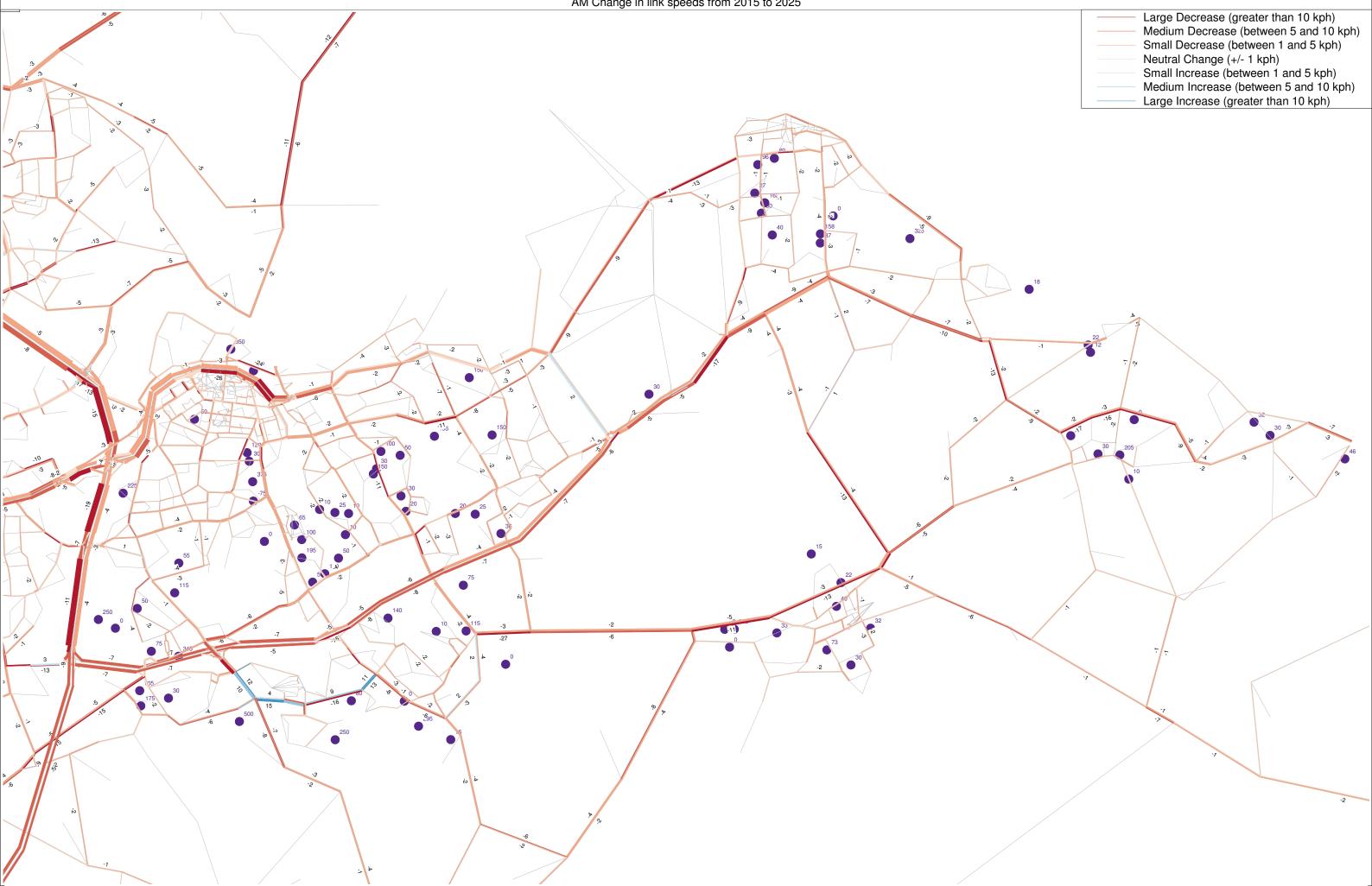
Middlesbrough and Redcar & Cleveland Strategic Housing Sites
TVM Model Output
Do Minimum
Link Speeds 2020 link speed greater than 70 kph link speed between 60 and 70 kph link speed between 50 and 60 kph link speed between 40 and 50 kph link speed between 30 and 40 kph link speed less than 30 kph

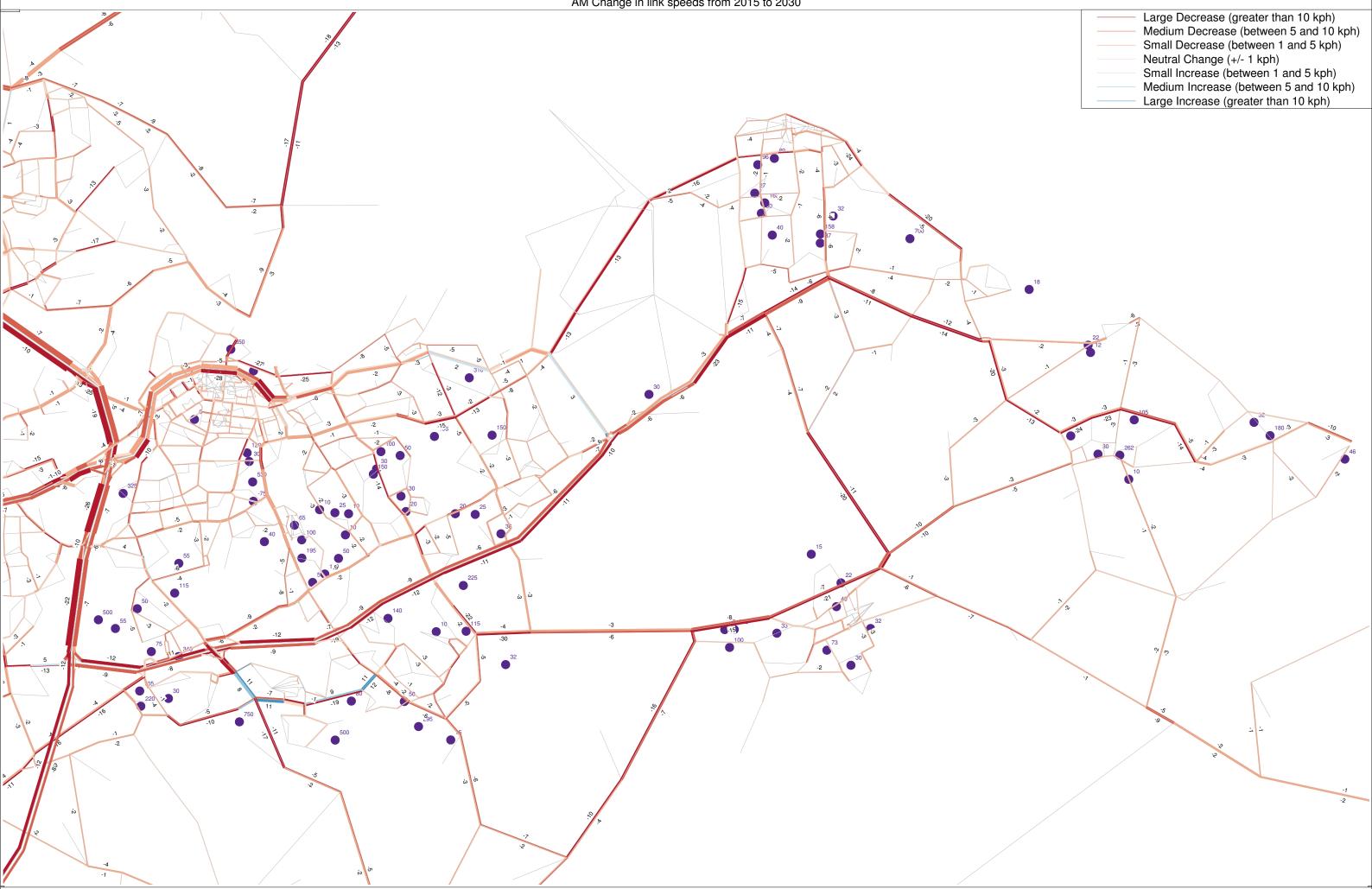
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Middlesbrough and Redcar & Cleveland Strategic Housing Sites
TVM Model Output
Do Minimum
Link Speeds 2025 link speed greater than 70 kph link speed between 60 and 70 kph link speed between 50 and 60 kph link speed between 40 and 50 kph link speed between 30 and 40 kph link speed less than 30 kph Middlesbrough and Redcar & Cleveland Strategic Housing Sites
TVM Model Output
Do Minimum
Link Speeds 2030 link speed greater than 70 kph link speed between 60 and 70 kph link speed between 50 and 60 kph link speed between 40 and 50 kph link speed between 30 and 40 kph link speed less than 30 kph

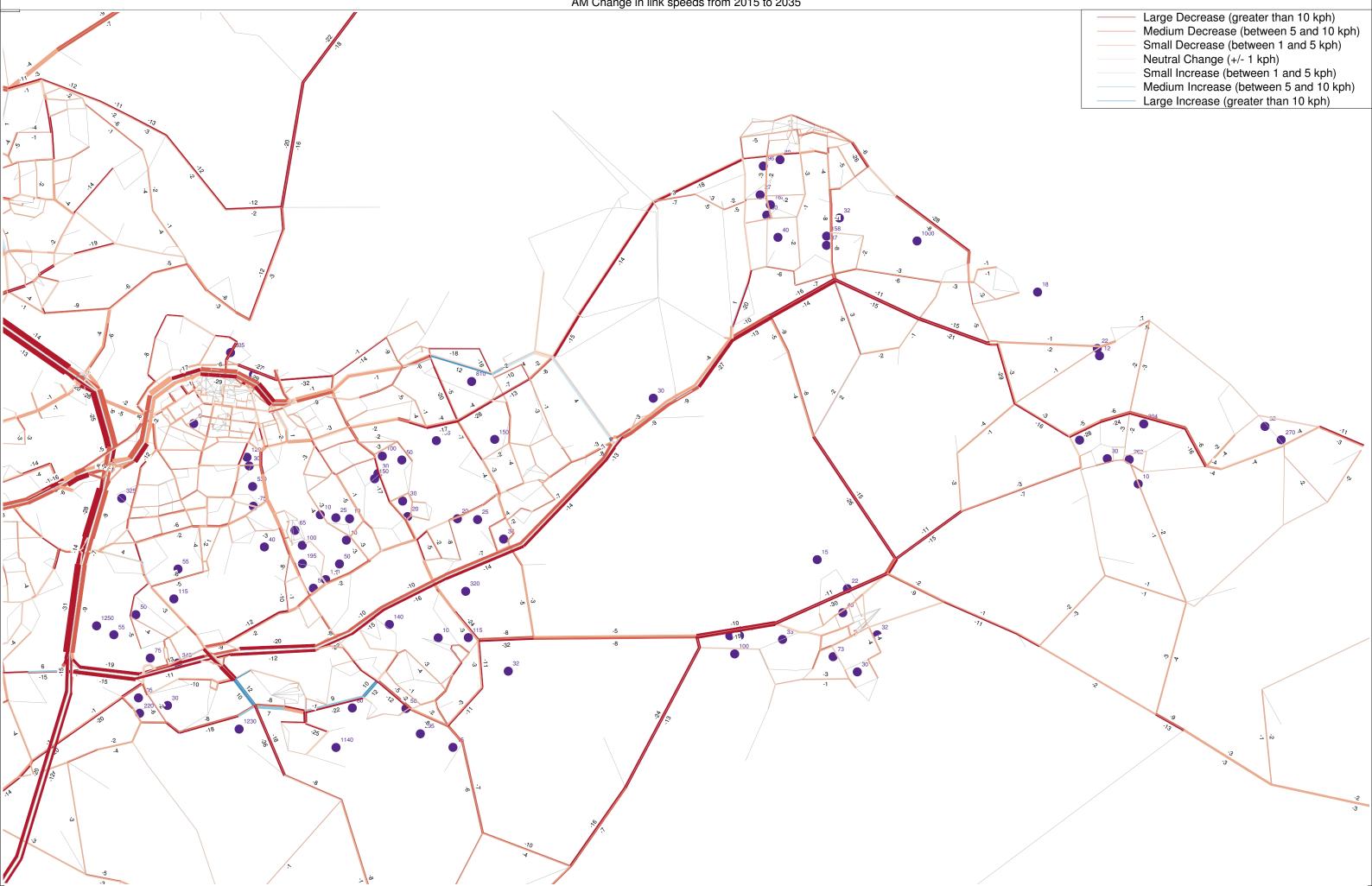
Middlesbrough and Redcar & Cleveland Strategic Housing Sites
TVM Model Output
Do Minimum
Link Speeds 2035 link speed greater than 70 kph link speed between 60 and 70 kph link speed between 50 and 60 kph link speed between 40 and 50 kph link speed between 30 and 40 kph link speed less than 30 kph C:\TVM 2010\Model\tests\20351\_RefG\Outputs\net files\shst\Growth\_20351\_AM.NET



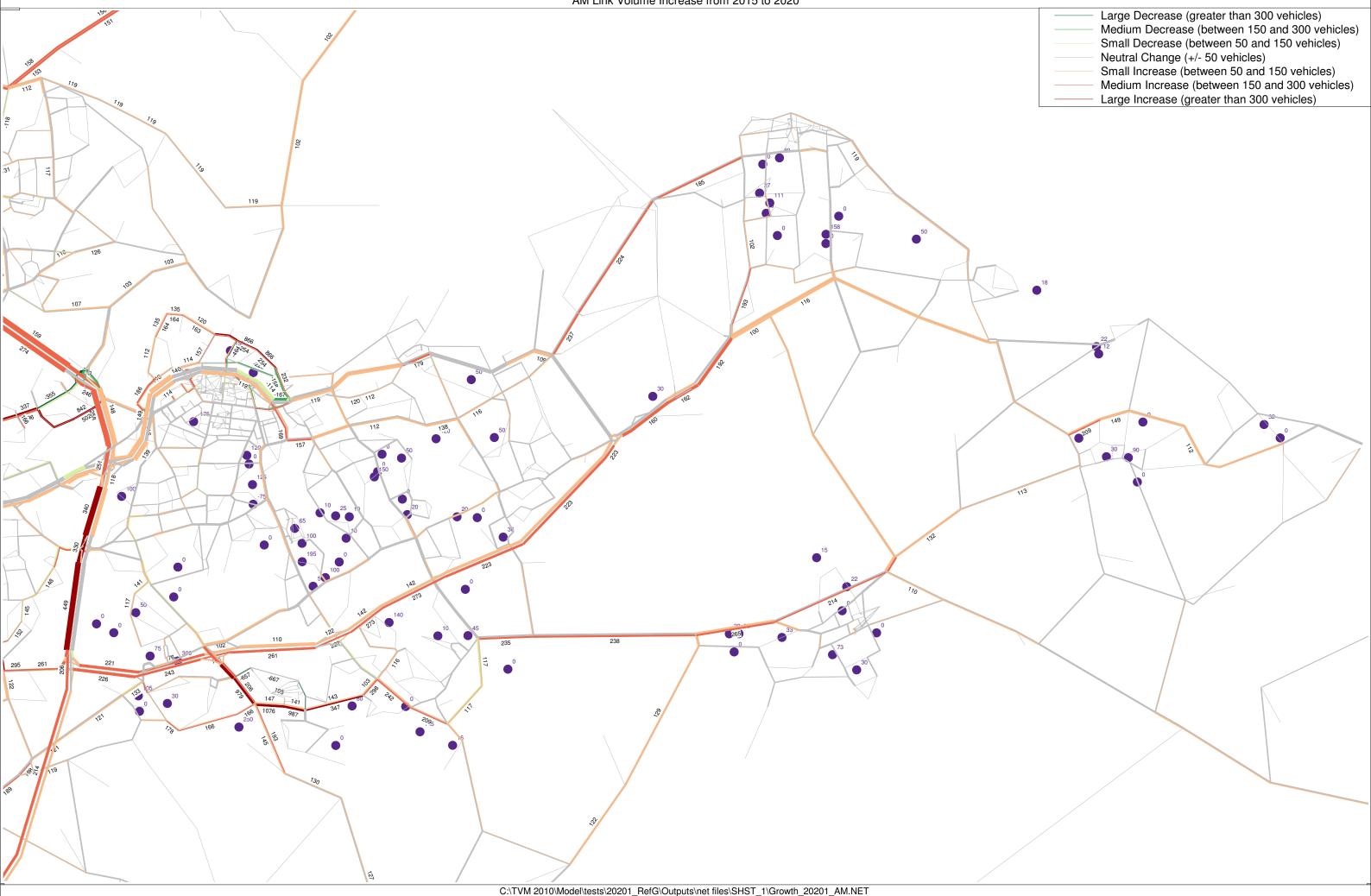


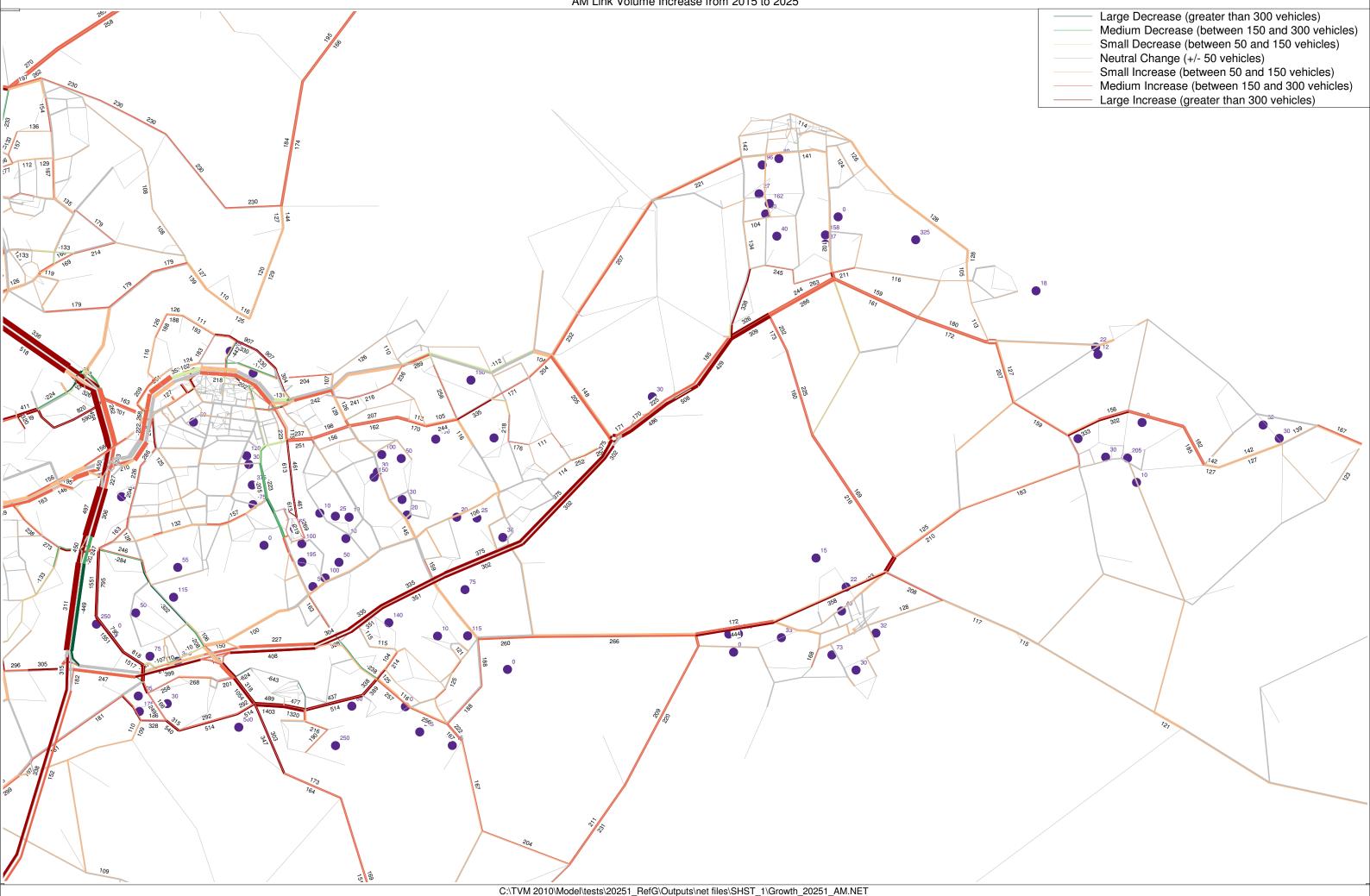


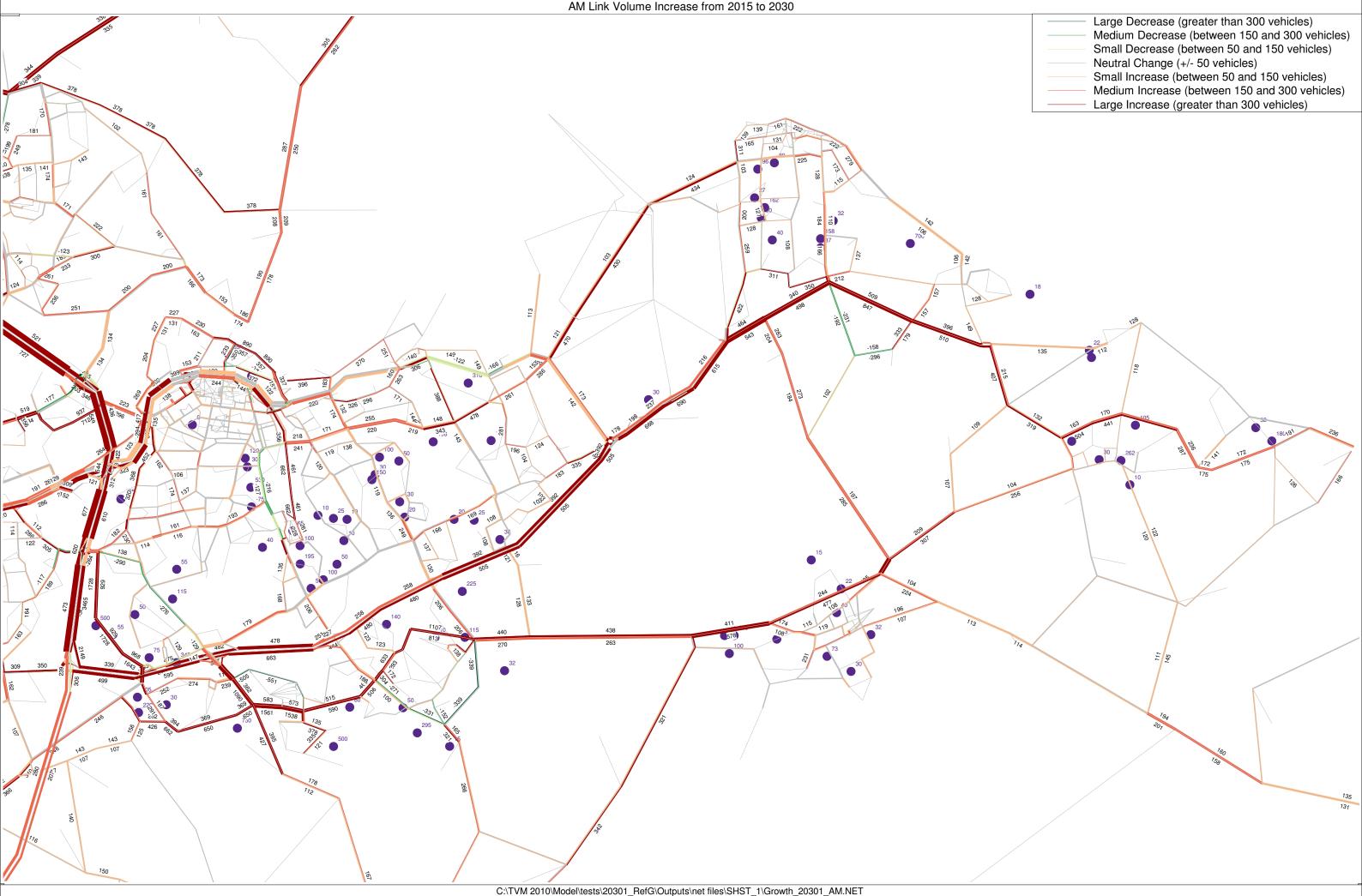
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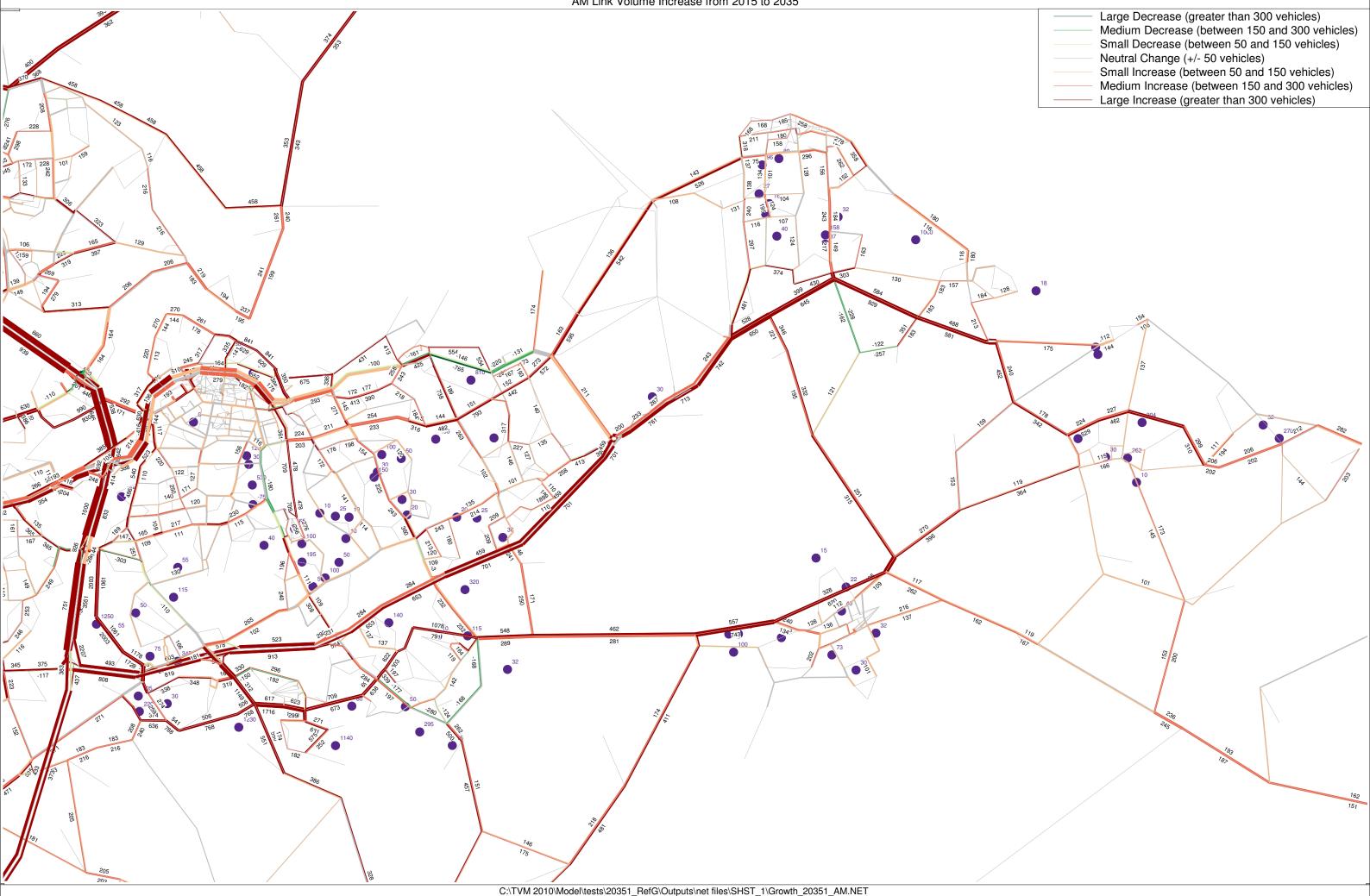


cube







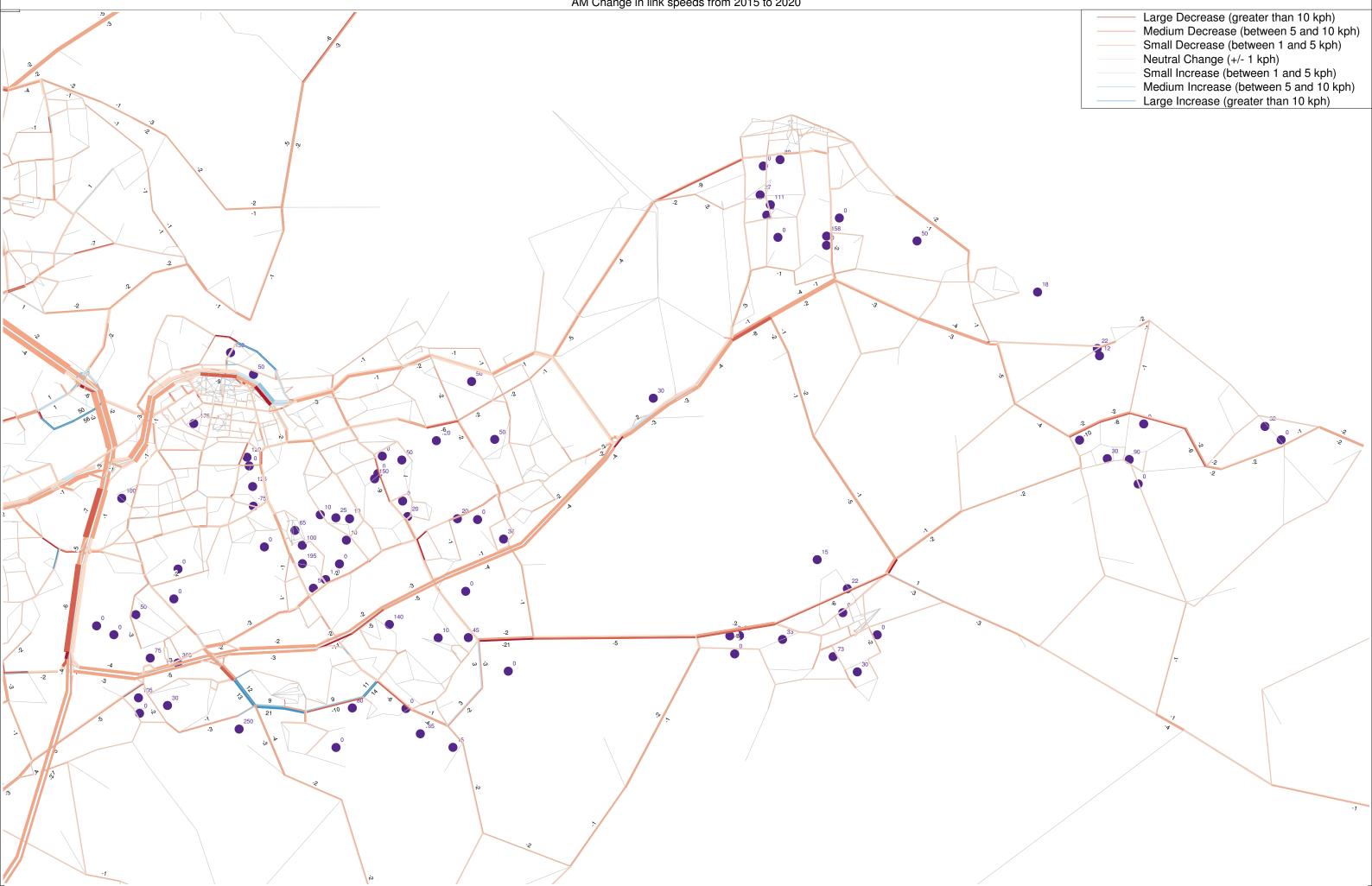


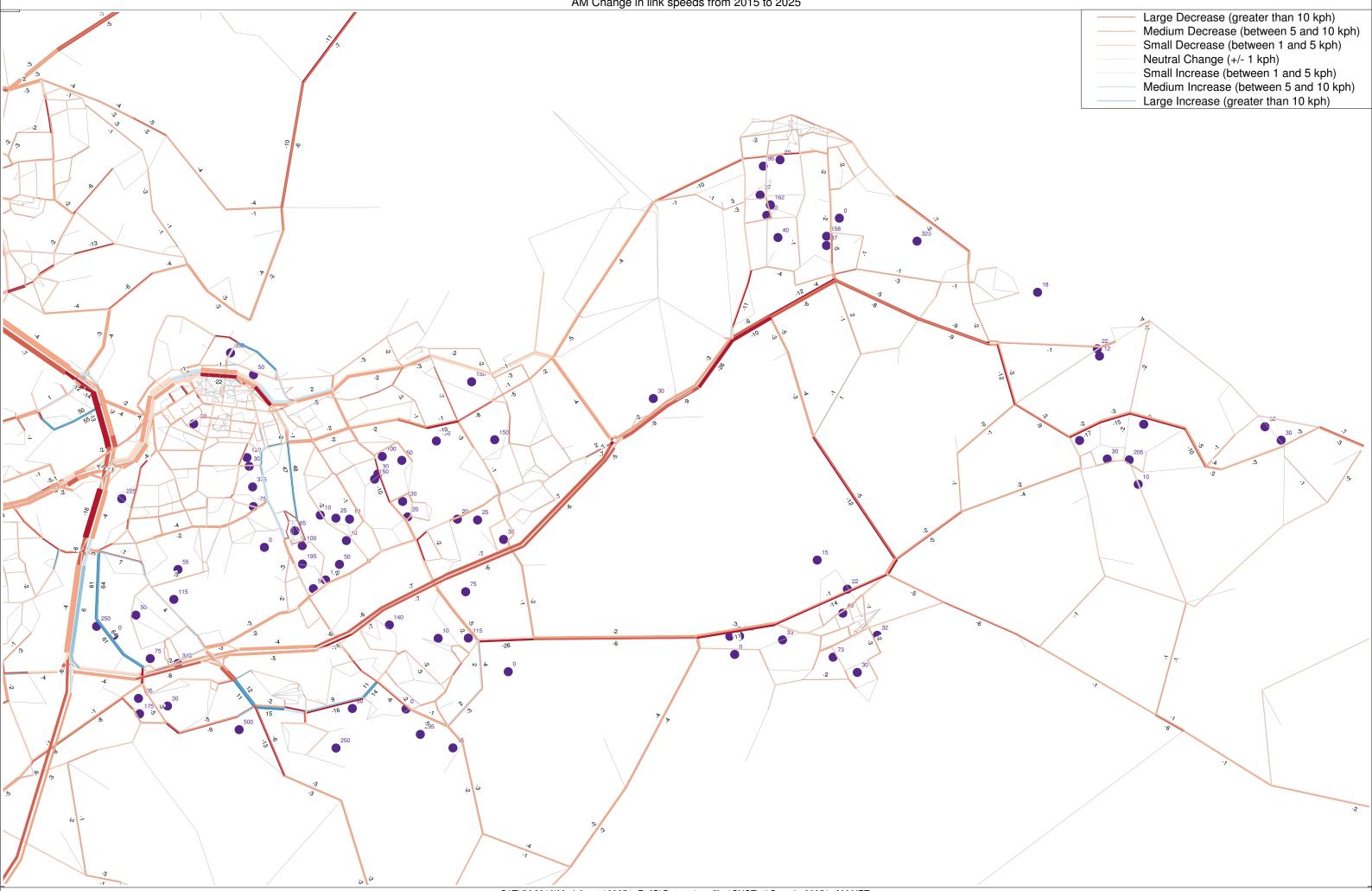
Middlesbrough and Redcar & Cleveland Strategic Housing Sites
TVM Model Output
Do Something
Link Speeds 2020 link speed greater than 70 kph link speed between 60 and 70 kph link speed between 50 and 60 kph link speed between 40 and 50 kph link speed between 30 and 40 kph link speed less than 30 kph 48 8 47 C:\TVM 2010\Model\tests\20201\_RefG\Outputs\net files\SHST\_1\Growth\_20201\_AM.NET

Middlesbrough and Redcar & Cleveland Strategic Housing Sites
TVM Model Output
Do Something
Link Speeds 2025 link speed greater than 70 kph link speed between 60 and 70 kph link speed between 50 and 60 kph link speed between 40 and 50 kph link speed between 30 and 40 kph link speed less than 30 kph C:\TVM 2010\Model\tests\20251\_RefG\Outputs\net files\SHST\_1\Growth\_20251\_AM.NET

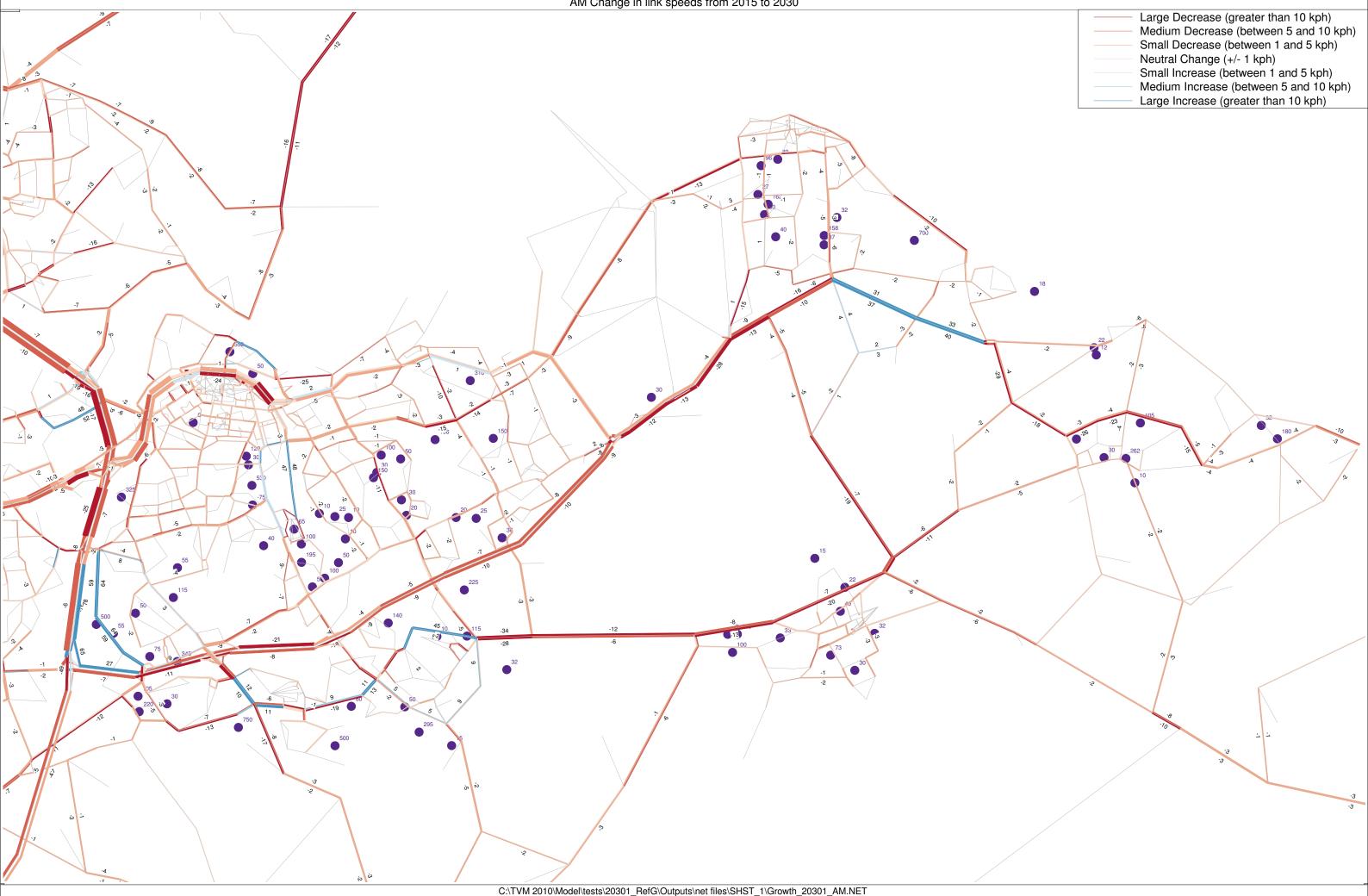
Middlesbrough and Redcar & Cleveland Strategic Housing Sites
TVM Model Output
Do Something
Link Speeds 2030 link speed greater than 70 kph link speed between 60 and 70 kph link speed between 50 and 60 kph link speed between 40 and 50 kph link speed between 30 and 40 kph link speed less than 30 kph 48 47 45 C:\TVM 2010\Model\tests\20301\_RefG\Outputs\net files\SHST\_1\Growth\_20301\_AM.NET

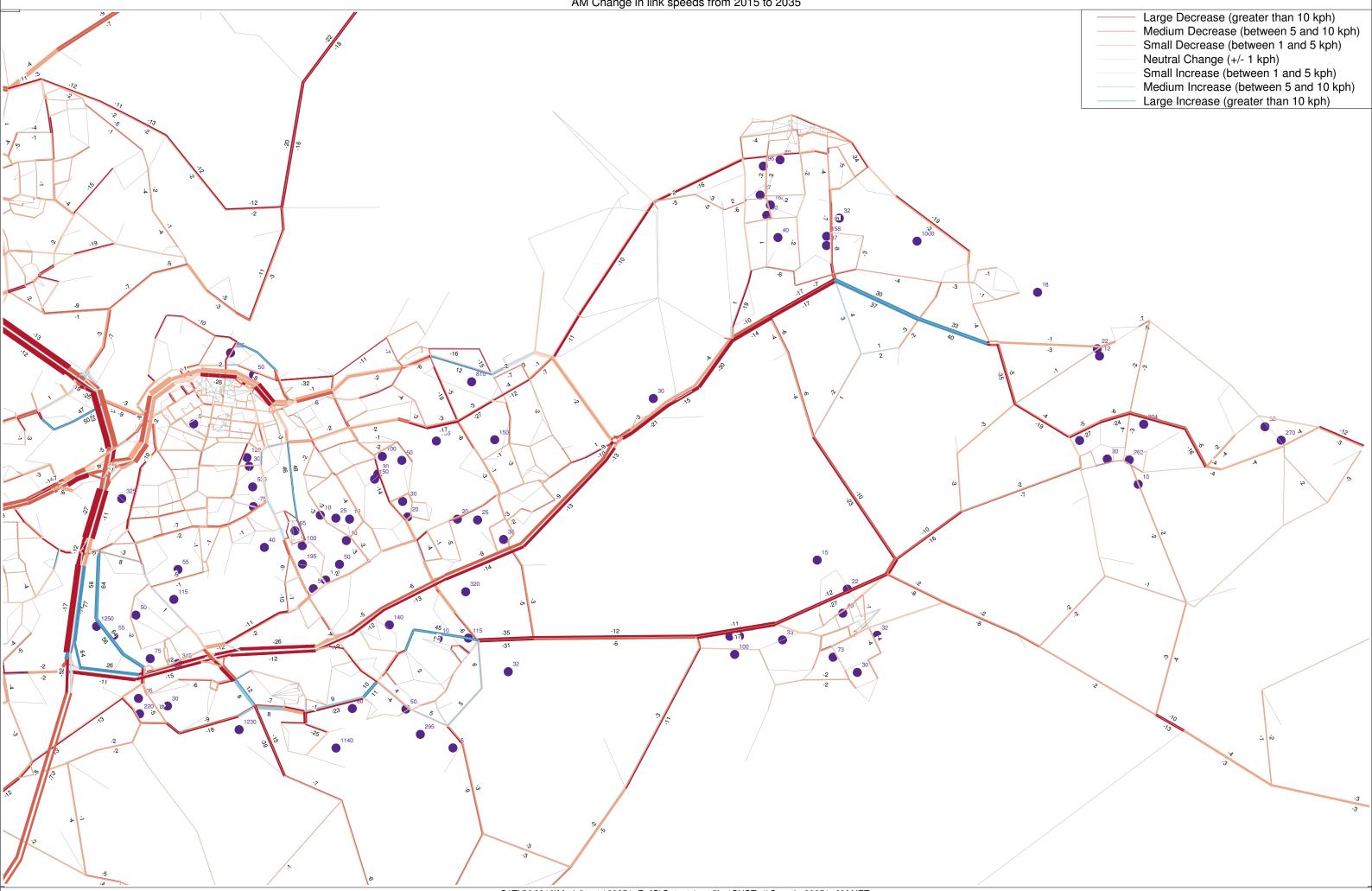
Middlesbrough and Redcar & Cleveland Strategic Housing Sites
TVM Model Output
Do Something
Link Speeds 2035 link speed greater than 70 kph link speed between 60 and 70 kph link speed between 50 and 60 kph link speed between 40 and 50 kph link speed between 30 and 40 kph link speed less than 30 kph 48 <sup>47</sup> 48 C:\TVM 2010\Model\tests\20351\_RefG\Outputs\net files\SHST\_1\Growth\_20351\_AM.NET



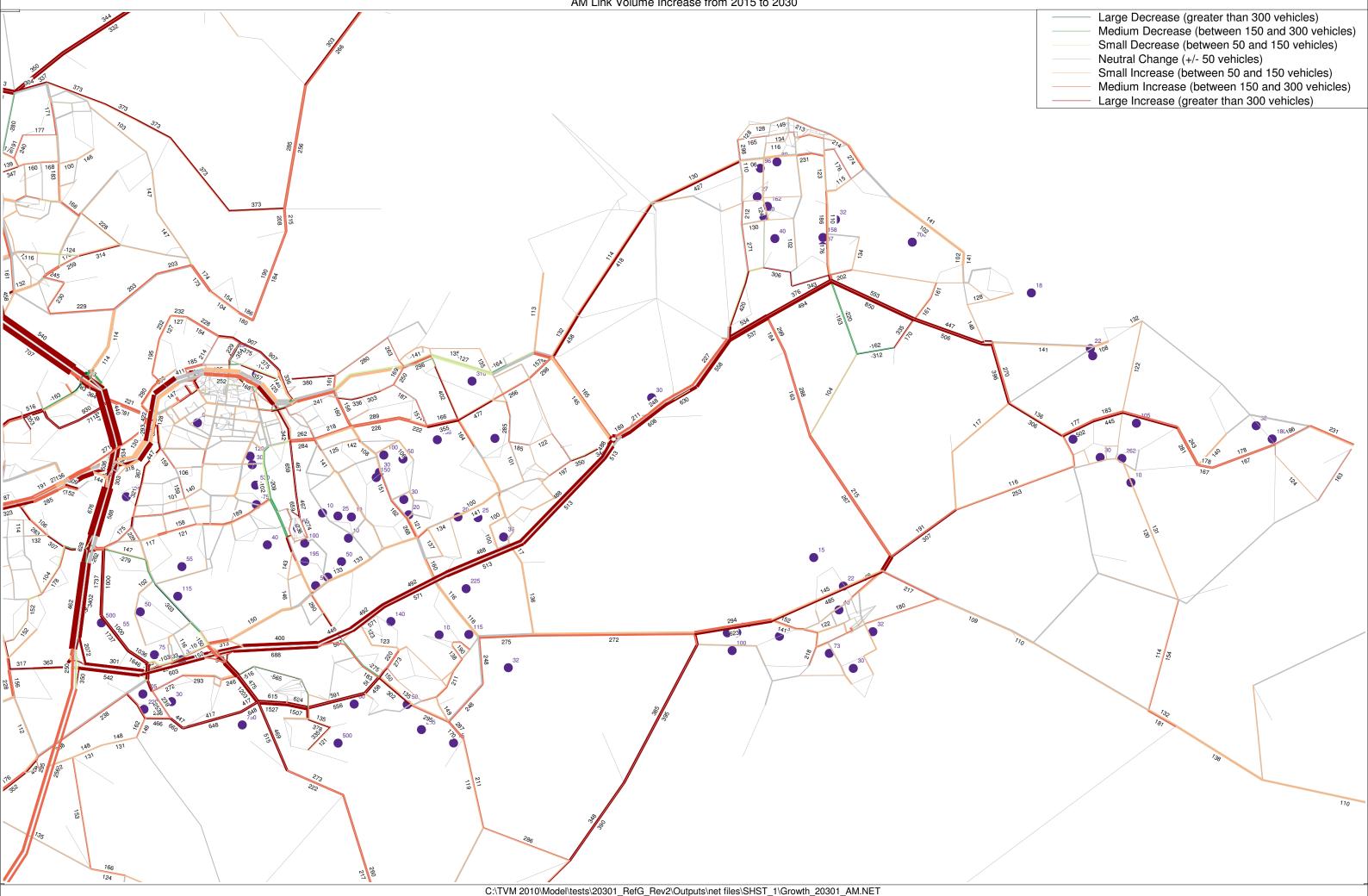


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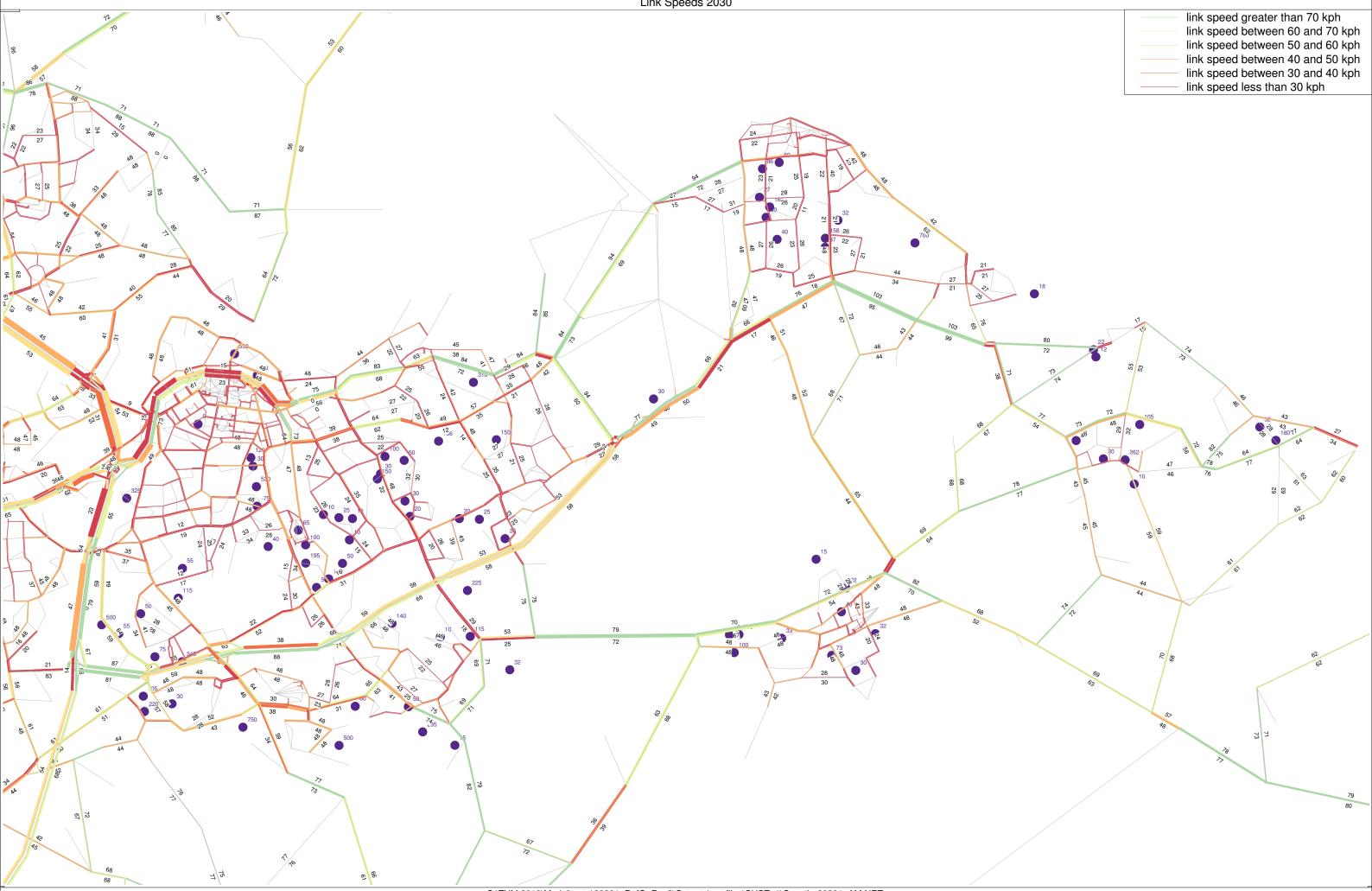


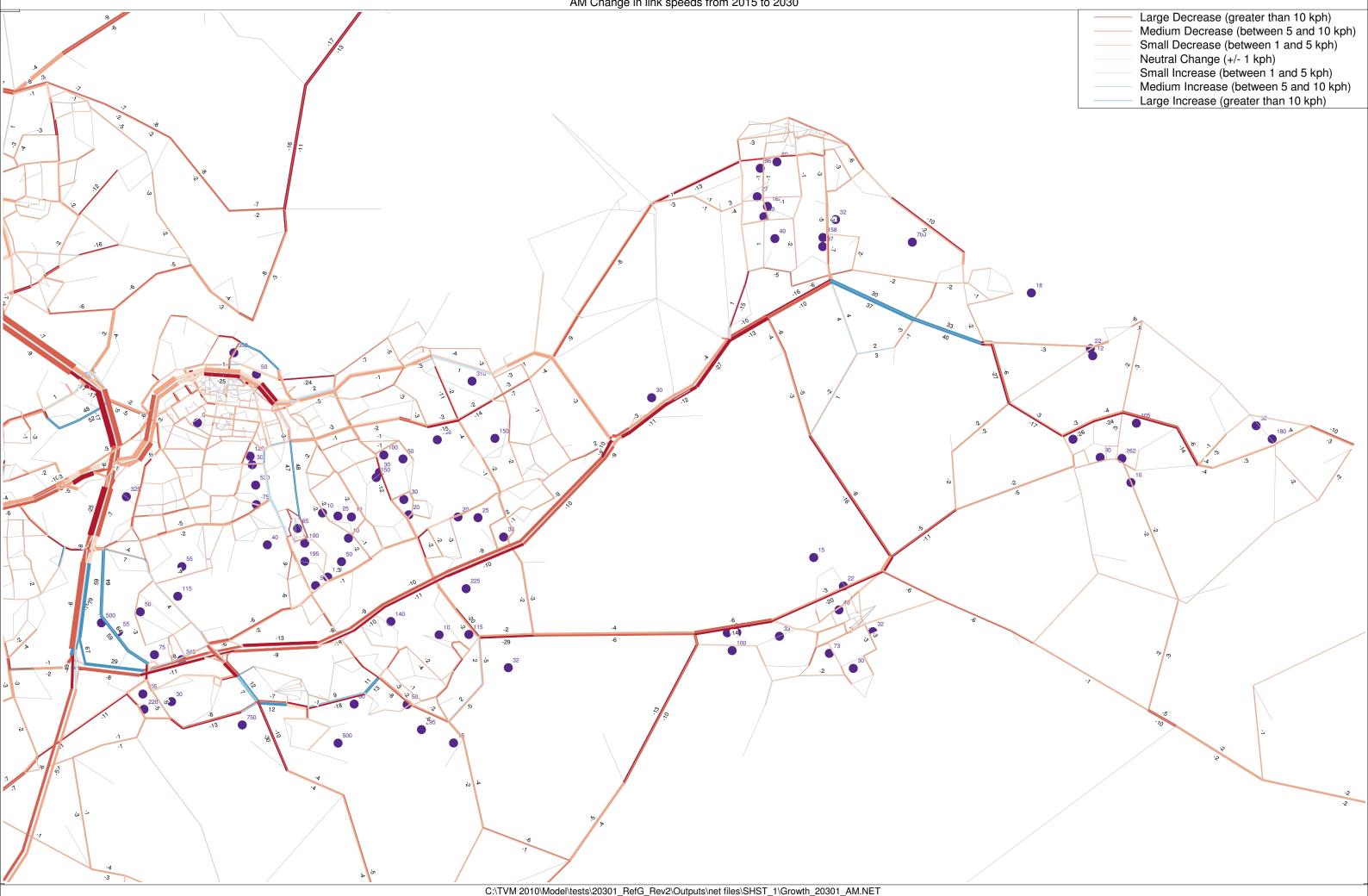


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Middlesbrough and Redcar & Cleveland Strategic Housing Sites TVM Model Output Do Something (No Stainton Way East) Link Speeds 2030

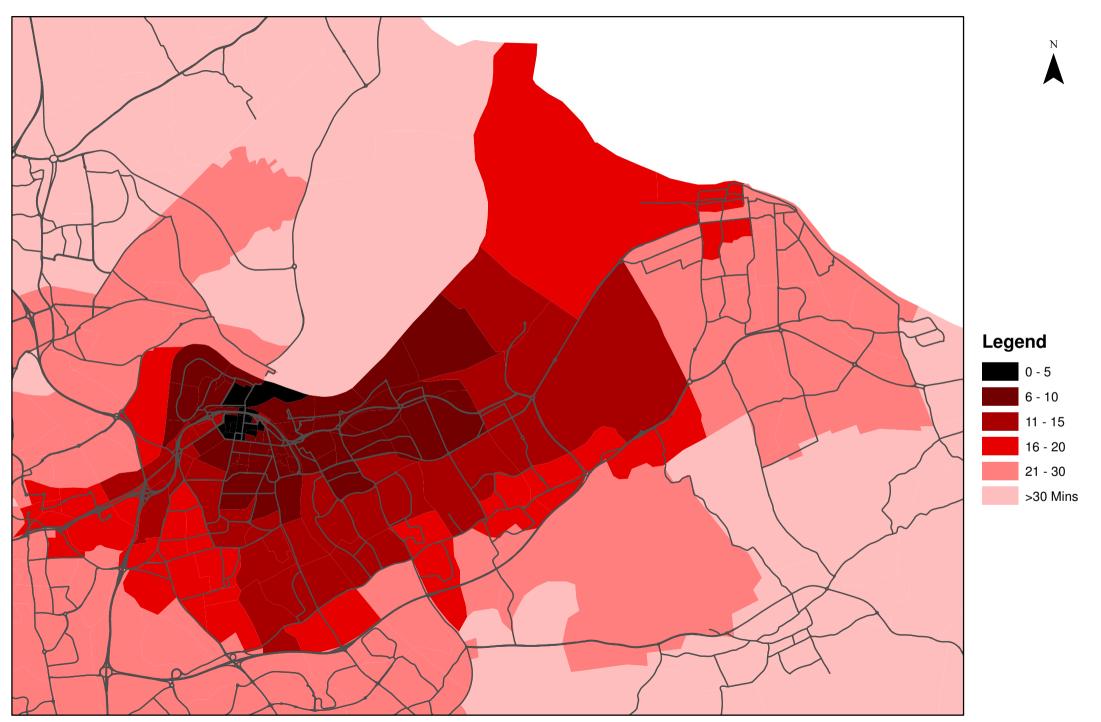




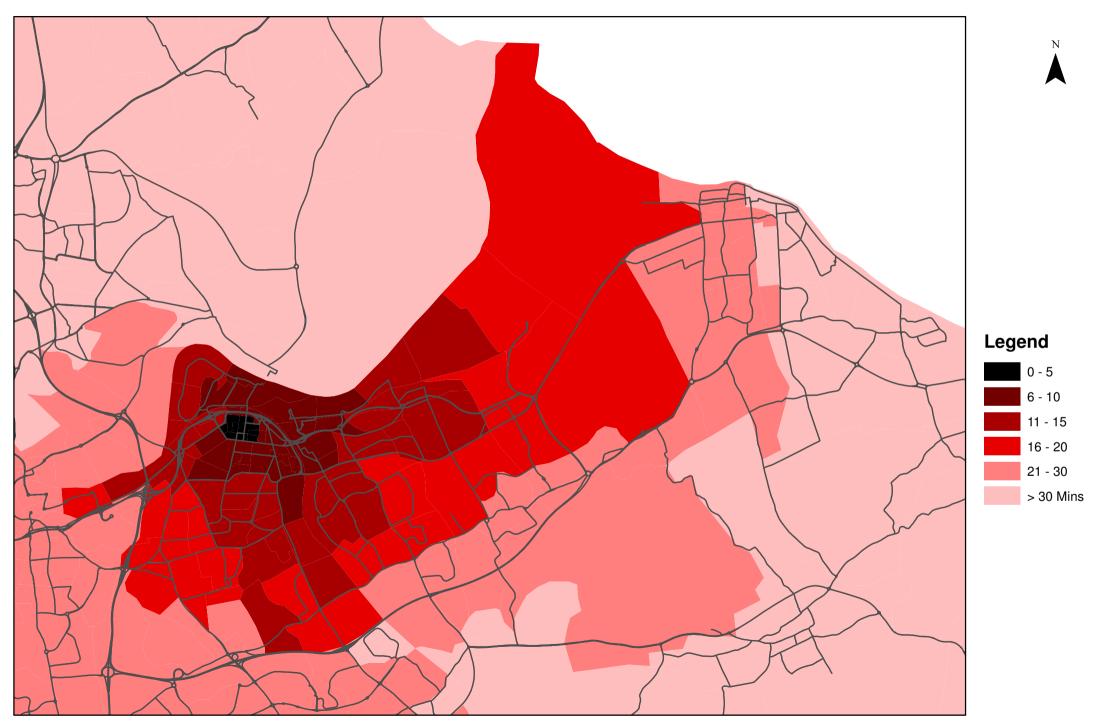
## Appendix E

Journey Time Plots

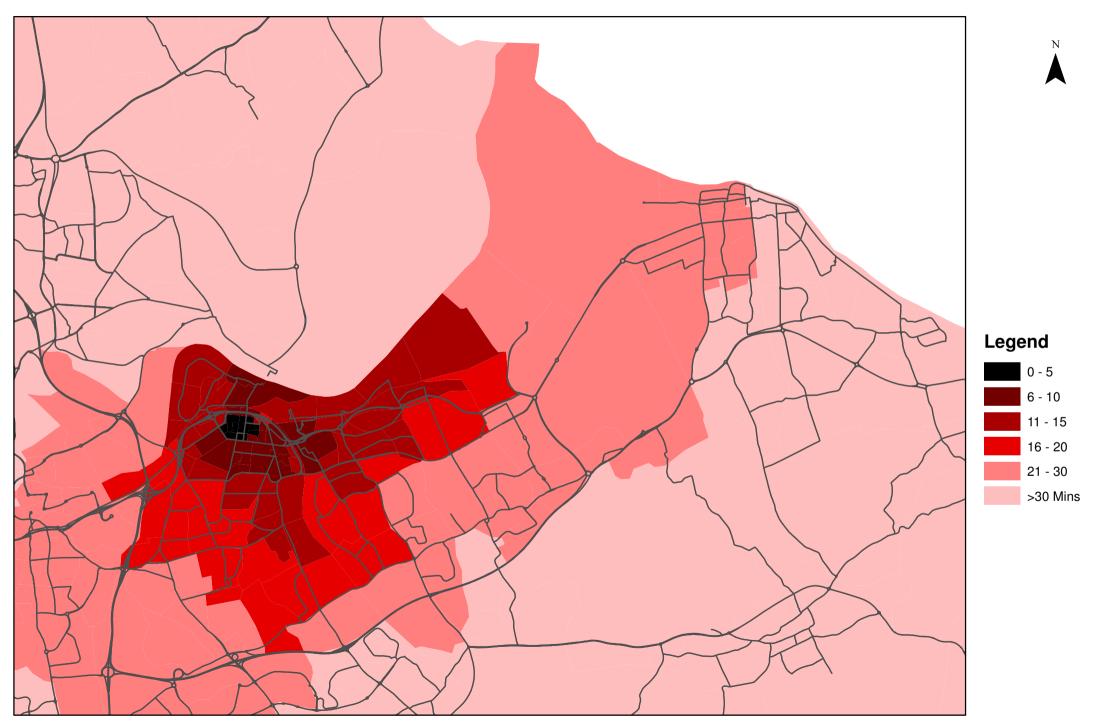
Modelled Highway Time to Central Middlesbrough. 2015 AM Peak Hour



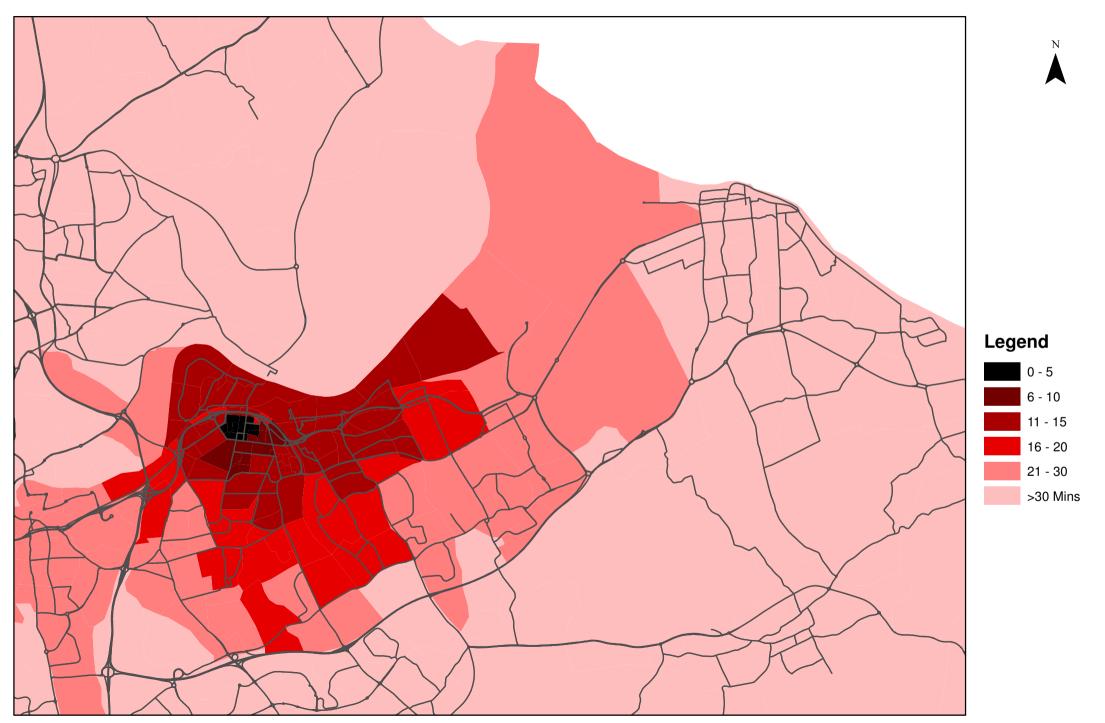
Modelled Highway Time to Central Middlesbrough. 2020 AM Peak Hour



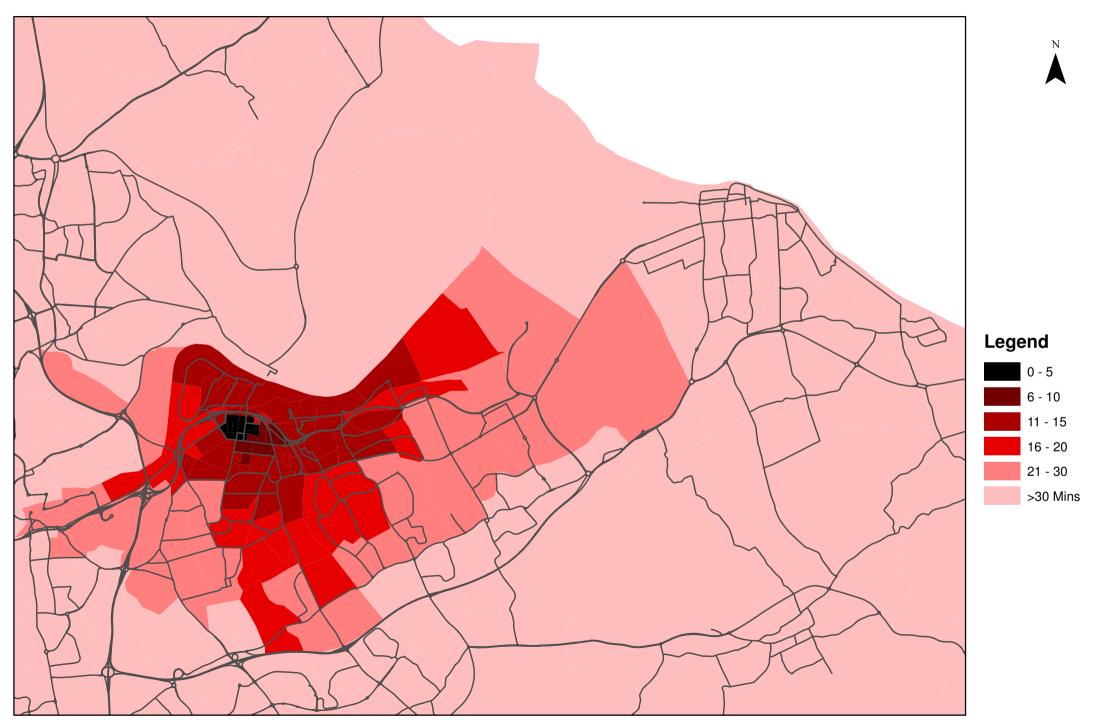
Modelled Highway Time to Central Middlesbrough. 2025 AM Peak Hour



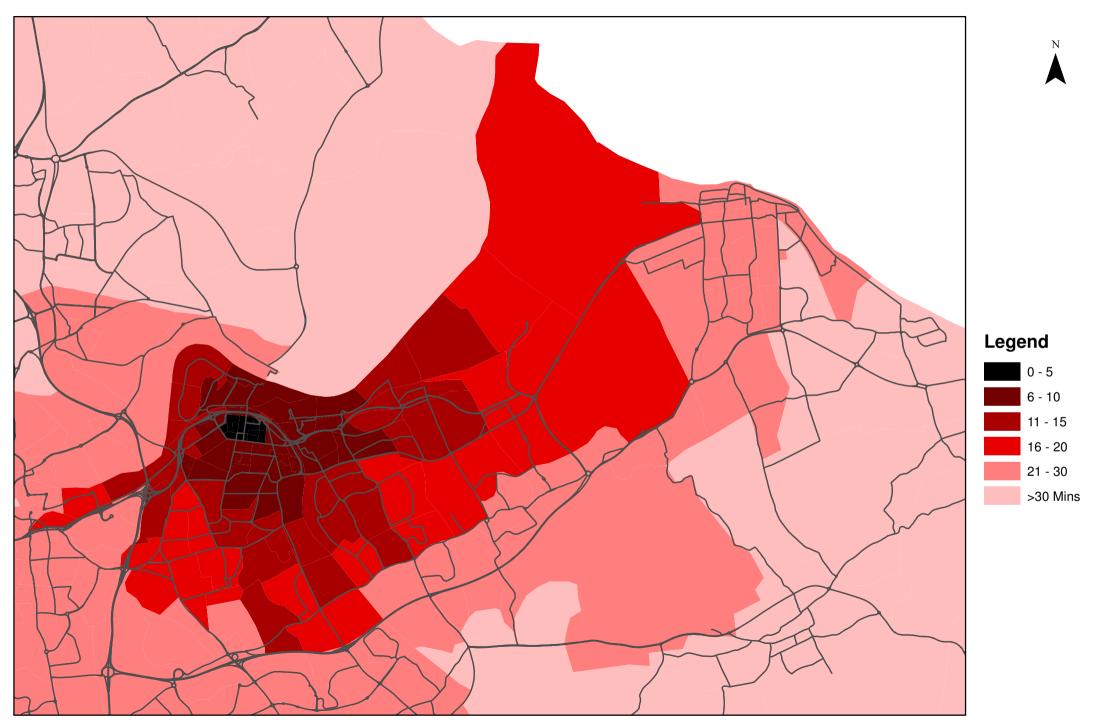
Modelled Highway Time to Central Middlesbrough. 2030 AM Peak Hour



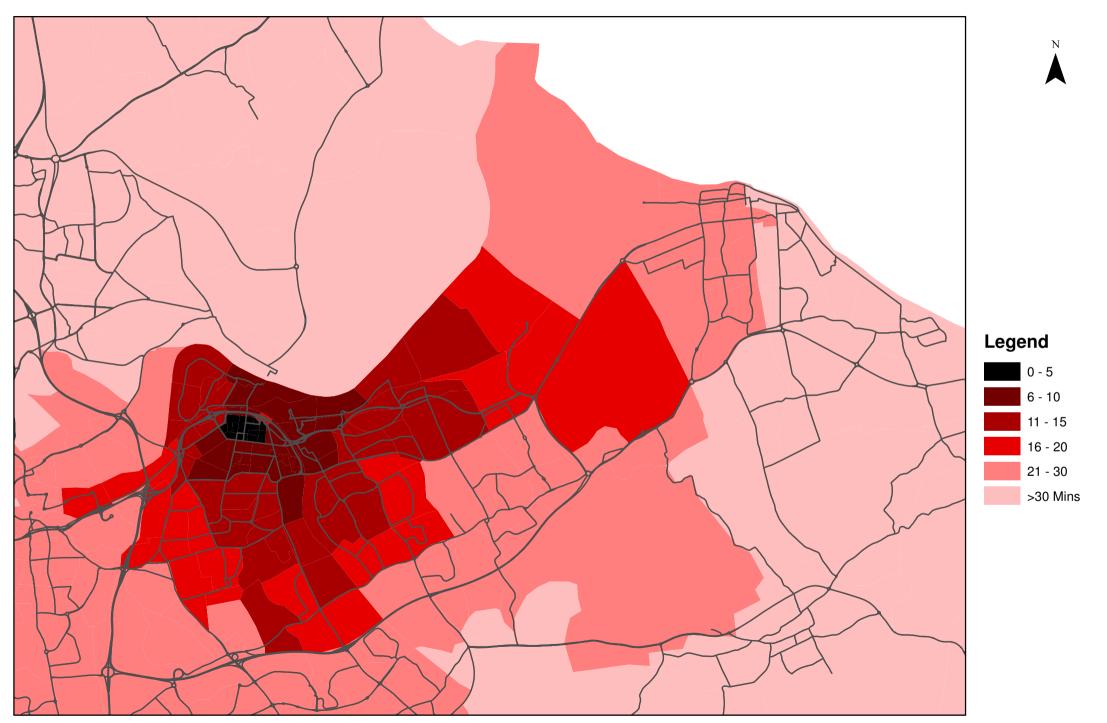
Modelled Highway Time to Central Middlesbrough. 2035 AM Peak Hour



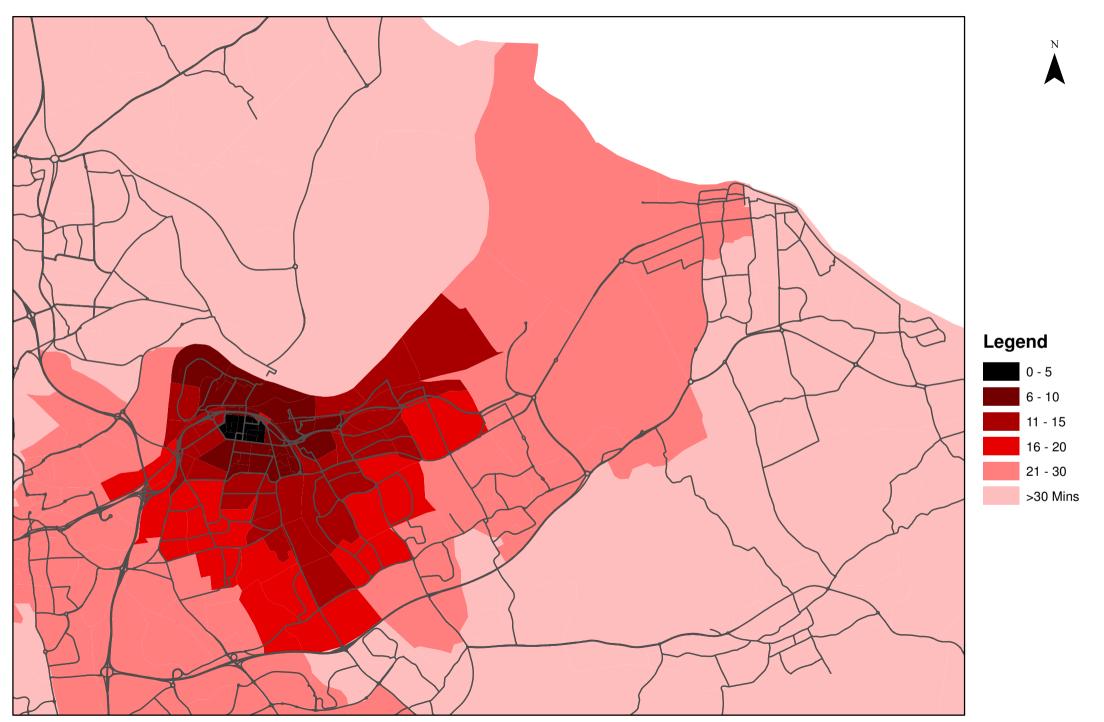
Modelled Highway Time to Central Middlesbrough. 2020 AM Peak Hour - Do Something



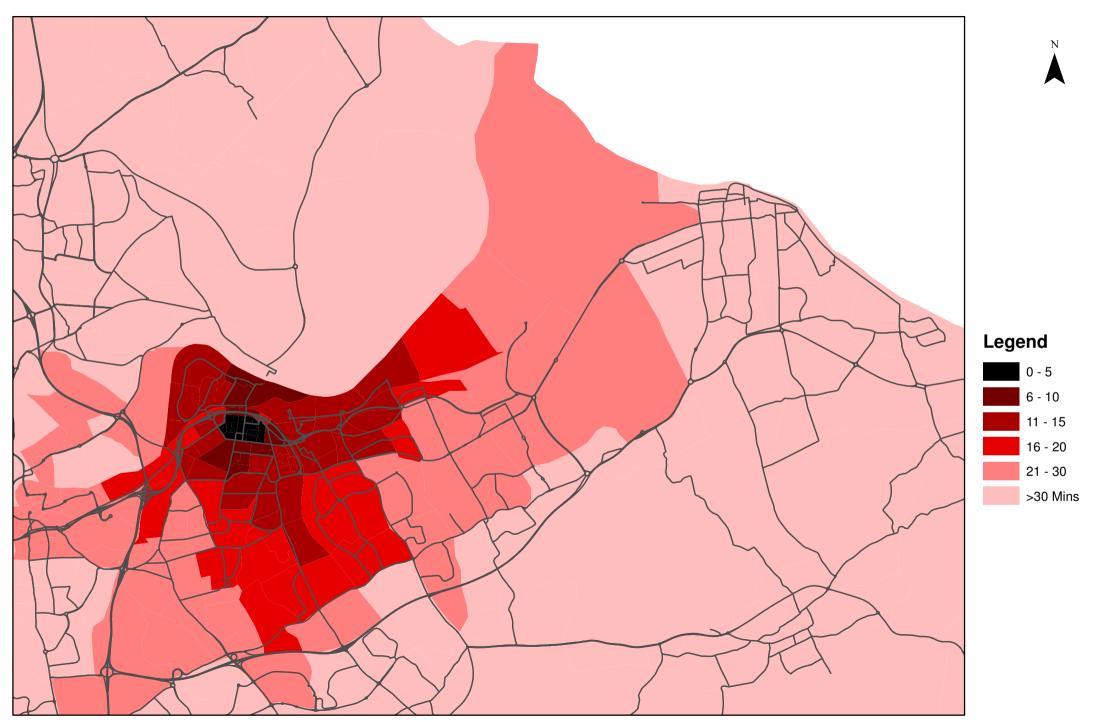
Modelled Highway Time to Central Middlesbrough. 2025 AM Peak Hour - Do Something



Modelled Highway Time to Central Middlesbrough. 2030 AM Peak Hour - Do Something



Modelled Highway Time to Central Middlesbrough. 2035 AM Peak Hour - Do Something



Modelled Highway Time to Central Middlesbrough. 2030 AM Peak Hour - Do Something - No Stainton Way

