A167 Corridor

Option Development and Transport Modelling Results

Durham County Council

Project number: 60559275

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Quality information

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Revision	Revision date	Details	Authorised	Name	Position
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1. Introduction

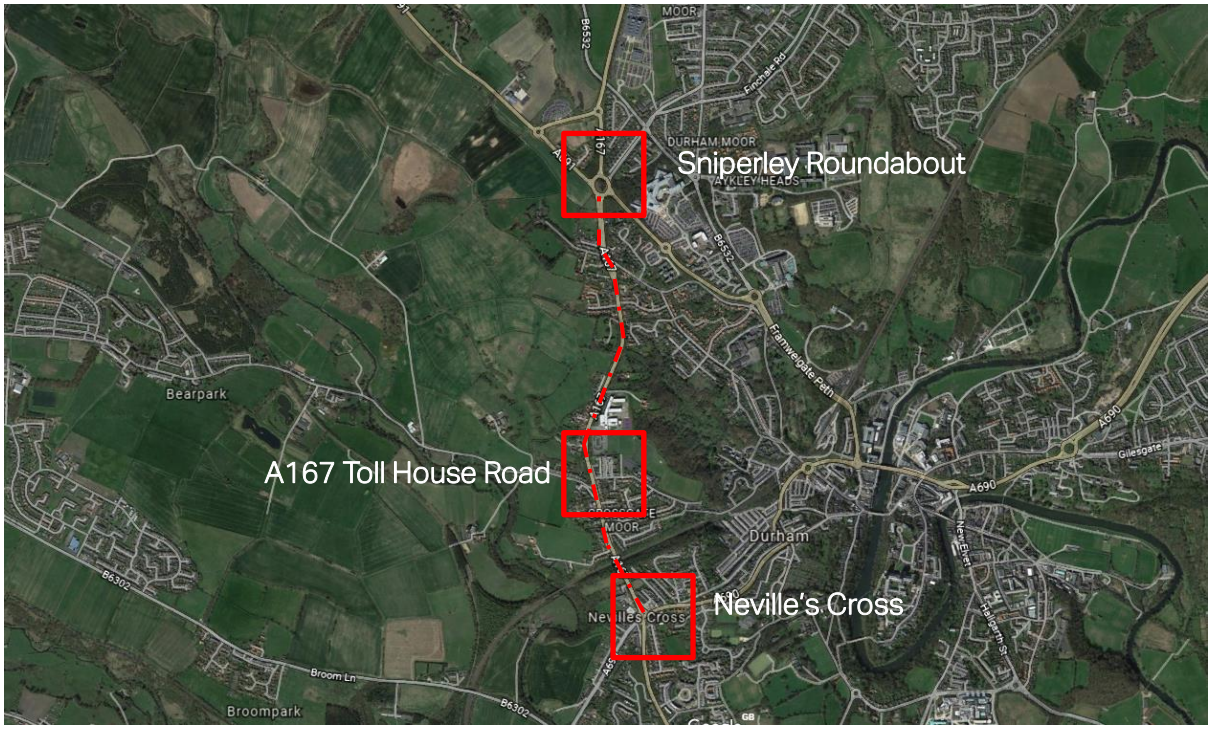
1.1 Overview

In 2013, AECOM built, calibrated and validated a S-Paramics microsimulation model of the A167 corridor in Durham. The model was used to test the impacts of the Durham Local Plan and a western relief road, which is being proposed to address current and forecast traffic congestion issues. However, the Western Relief Road has received a number of objections and Durham County Council (DCC) is now considering proposals to improve the A167 corridor either as an interim, before the Western Relief Road is constructed, or as an alternative. AECOM has been asked to undertake feasibility design work of the key junctions along the corridor and to test the impact of these proposals in the existing S-Paramics model. The remaining sections of this report set out the work that has been undertaken.

1.2 Background

The A167 corridor is a key north south route, which connects Newcastle-upon- Tyne with the City of Durham. The area of interest is the section of carriageway between Neville's Cross and Sniperley roundabout, which already suffers from peak hour congestion with the junction of the A167 and Toll House Road being a known constraint. Given current levels of predicted growth, this congestion is expected to worsen. The extents of the corridor under consideration are shown in Figure 1-1 below, with the key junctions highlighted.

Figure 1-1: A167 Corridor Extents



To try and address existing issues on the A167 and to accommodate future growth aspirations, DCC has aspirations to build a western relief road, which would see construction of a 60mph single carriageway road running parallel to the west of the A167. However, funding for the scheme is still to be agreed and the proposals have been subject to a number of objections from the general public. DCC is therefore keen to explore any on-line measures that could be implemented on the A167 that would alleviate the current congestion and accommodate some level of future traffic growth.

1.3 Paramics Modelling

In 2013, AECOM constructed a S-Paramics microsimulation model of the A167 and localised road network to model the impacts of the proposed Western Relief Road when compared to the existing highway network. Paramics models how individual vehicles interact with each other and is a useful tool in showing how the performance of individual junctions can impact on other junctions in the highway network. The model that was constructed had a base year of 2013 and modelled the AM peak period of 0730-1000 and the PM peak period of 1600-1830; a half hour warm up period was included in advance of the modelled periods to ensure the network was populated with vehicles before any outputs from the model were extracted. Further information on the construction of the Paramics model and the calibration and validation of the model can be found in *A167 Western Relief Road Modelling Report, AECOM, April 2014.*

Although the model is nearing five years old, there have been no significant developments in the study area that would impact on traffic flows along the A167 corridor. It has therefore been agreed to use the model to test the impact of proposed A167 corridor improvements on existing traffic conditions; a future forecast year of 2027 has also been modelled. To provide confidence in the validity of the 2013 model for testing current transport problems, a site visit has also been undertaken to ensure the problems modelled in the original model are still relevant to the study area; the information collected on site has also informed the option development process.

1.4 Report Structure

Following this introductory chapter, the report has been prepared with the following structure:

- Site Review: Summary of observations made on site and how this compares to the original model build;
- Option Development: Outlines the highway improvement options that have been considered;
- Modelling Results: Outlines the results of the traffic modelling and appraisal;
- Summary: Summarises the outcomes of the option appraisal exercise.

2. Site Visit Summary

2.1 Introduction

The A167 corridor is a key north-south route connecting Newcastle-upon-Tyne with the City of Durham. Due to the large volume of traffic it serves in both directions, it currently suffers from peak period traffic congestion. In order to design highway improvement measures to try and alleviate this congestion, as well as accommodating future traffic growth, it is necessary to understand where the constraints on the highway network lie. It is also essential that these issues are replicated in the traffic model so that the appraisal of the proposed highway improvement measures presents a realistic representation of what might happen on-site if the measures are implemented. A site visit of the study area was therefore undertaken during the AM and PM peak periods in November 2017. The observations from this site visit are summarised in this chapter of the report.

2.2 Site Visit Overview

Site visits were undertaken in the study area between 0730 – 1030 and 1530-1830 on Wednesday 29th November 2017. Three members of AECOM staff walked the study corridor making observations on the performance of the highway network and the cause of the traffic congestion that was observed. There were no adverse weather conditions or network incidents during the site visits that would have impacted on traffic conditions and driver behaviour.

2.3 Site Visit Observations

The A167 corridor is busy in both directions in each of the peak periods. However, dominant traffic flows would be a northbound direction in the AM peak and a southbound direction in the PM peak. The corridor is also intersected by a number of busy side roads between the Neville's Cross and Sniperley roundabout junctions; much of this traffic is suspected to be 'rat-running' from the centre of Durham to avoid traffic congestion on the main highway network. Traffic is slow moving along the corridor and the traffic on the mainline often gives way to traffic approaching from the side arms.

Site visit observations from each of the key junctions in the study area are summarised below.

A690/A167 Neville's Cross

This junction is a four-armed signalised junction, which forms the intersection of the A167 and the A690. The junction is illustrated in Figure 2-1,

Figure 2-1: A167 Neville's Cross

All four-arms of the junction were observed to be busy, with the following key points observed:

- In the AM peak, there is a heavy left turn on the give-way from the western arm, which queues back as it merges directly into northbound traffic. As a result, there are long queues on the westbound arm;
- In the AM peak, traffic on the western arm is delayed by the school crossing supervisor. This results in westbound traffic blocking back through the Neville's Cross junction;
- To the north of the junction, the northbound traffic merges from two lanes into one. In both the AM and PM peaks, the merging vehicles cause a rolling queue on the northbound A167 carriageway;
- On the southern A167 approach, the road markings allow two lanes straight ahead. However, in the AM peak, there is an underutilisation of the inside lane, which is possibly attributed to the high volume of traffic from the western arm that will merge into this lane;
- In the PM peak, there is a high volume of traffic from the northern arm turning right. This traffic queues back and blocks the straight ahead movement;
- Long queues were observed in the PM peak on the eastern arm.

A selection of photographs in Table 2-1 illustrates the issues that were observed. The photographs have been compared to visual outputs form the Paramics model.

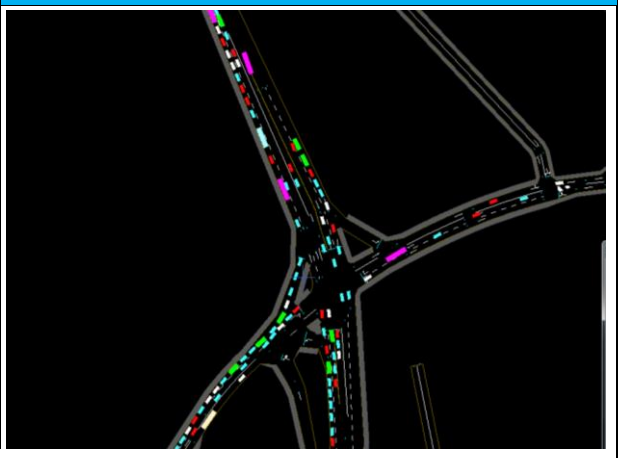
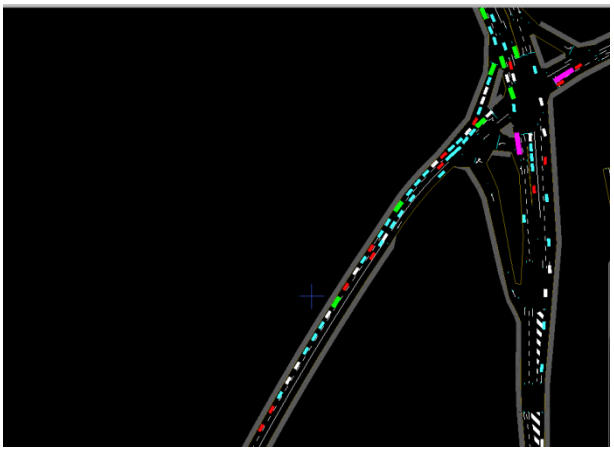
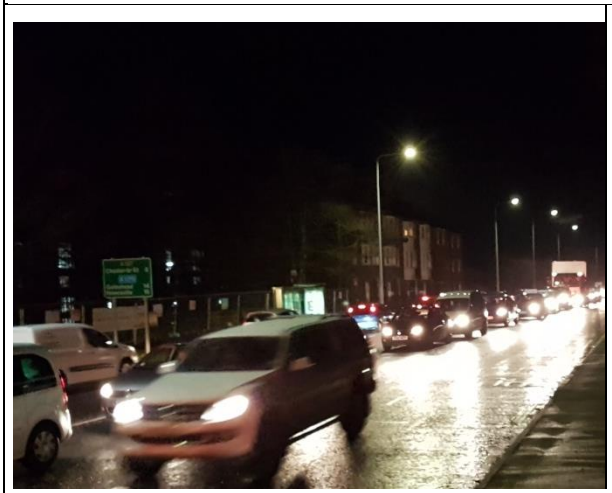
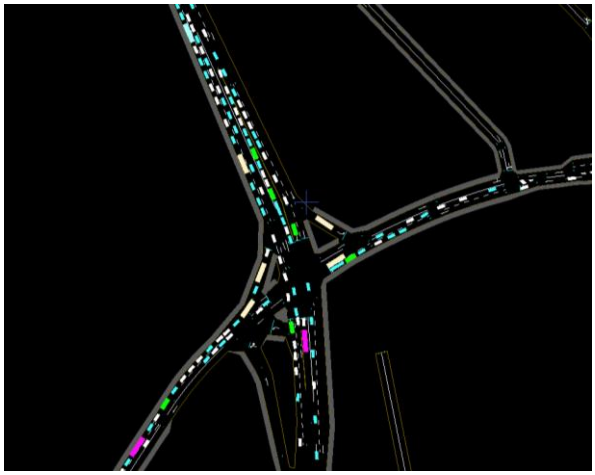
A167/Toll House Road

The A167 Toll House Road junction is a three arm signalised junction. However, there is a priority junction immediately north of the Toll House Road junction, which impacts on its operations. The layout of the junction is shown in Figure 2-2.

Figure 2-2: Toll House Road Junction

Toll House Road serves the major Bearpark development; Redhills Lane serves residential development but also provides a through route to Durham city centre.

Table 2-1: Observed and Modelled Issues at the A167 Neville's Cross Junction

Observed Issue	Modelled Issue
	
Queuing traffic on the A167 northbound and southbound carriageways in the AM peak	
	
Queuing traffic on the A690 western arm in the AM peak	
	
Queuing traffic on the A167 southbound in the PM peak	

Key observations from the Toll House Road junction were as follows:

- In both the AM and PM peak, this junction is the key constraint for traffic travelling northbound and southbound, resulting in long queues on the A167 carriageway. The junction restricts the flow of traffic southbound to the Neville's Cross junction and northbound to the Sniperley roundabout;
- In the AM peak, there are long queues on Toll House Road. Due to the steep incline, vehicles are slow to exit this arm, resulting in large headways between vehicles;
- In the PM peak, there is a large demand for traffic wanting to right turn from the A167 southbound into Toll House Road. This traffic was observed to block the straightahead movement;
- In the PM peak, there is a large volume of traffic exiting Redhills Lane, with the majority of these vehicles observed turning into Toll House Road;
- In both peak periods, vehicles were observed to travel slowly through the junction, regardless of the traffic conditions either side of the junction.
- It was observed, in both peaks, that the footbridge to the north of the junction is very seldom used.

The queuing at the junction is shown in
Table 2-2 below.

Table 2-2: Toll House Road Observations

Observed Issue	Modelled Issue
	
Right turning traffic into Toll House Road queued on network	

Sniperley Roundabout

Sniperley roundabout is a five arm at-grade roundabout, which forms the intersection of the A167, the A691 and Dryburn Park. The layout of the junction is shown in Figure 2-3.

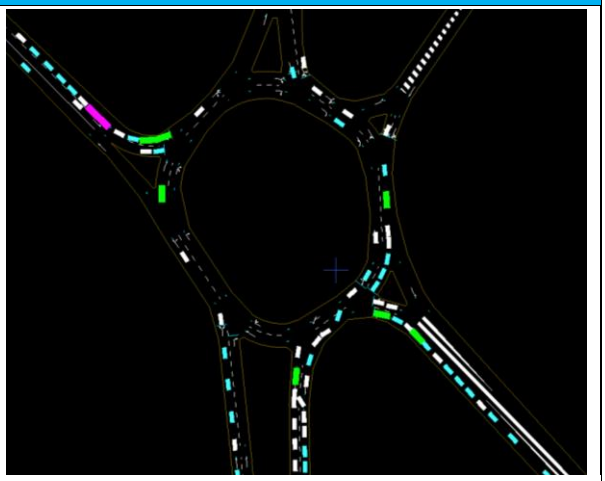
Figure 2-3: Sniperley Roundabout

Key observations from the Sniperley Roundabout were as follows:

- In the AM peak, long queues were observed on the A691 south-eastbound approach to the junction and the A167 southbound approach to the junction. Vehicles on both approaches struggled to exit onto the roundabout due to the volume of traffic circulating the roundabout;
- Rolling queues were observed in the AM peak on the A691 south-eastbound exit from the junction;
- In the PM peak, traffic on the A167 southbound queued back through the roundabout, blocking the exit for the A691 and Dryburn Park
- The southbound merge on the A167 exit from the roundabout was observed to be used, but early merging was taking place.

The queuing on the southbound A167 is shown in Table 2-3 below.

Table 2-3: Queuing on Sniperley Roundabout

Observed Issue	Modelled Issue
	
Queuing on the A167 southbound queuing back through Sniperley Roundabout	

3. Option Development

3.1 Introduction

AECOM was asked to consider highway improvements to the A167 corridor, between the junctions of Neville's Cross and Sniperley roundabout., to provide additional capacity and accommodate traffic growth in Durham City. The overall scheme objectives were centred on improving journey times and reducing congestion levels throughout the corridor extents. Details of the scheme design, and decisions made in its production, are presented in this chapter of the report. The information should be read in conjunction with drawings 60559275-AEC-GEN-L0-DR-ZX-00_001 to 006, which can be found in Appendix A. The cost estimate for the proposed scheme has also been provided.

3.2 Design

This section outlines the proposed design changes, or retained features, defining the Feasibility Design for the A167 scheme.

Section 1 – A167 Neville's Cross Junction to South of A167 Toll House Road Junction

- The scheme ties in to the existing Neville's Cross junction cross-section immediately north of the junction; the southern, eastern and western arms are heavily constrained and no physical improvements are proposed. The only exception to this is the introduction of a 30mph speed limit on the A167 to start to the south of the junction. The speed limit proposal is based on the presence of schools and new at-grade crossings, and the constriction in lane widths required to provide additional lanes throughout the corridor.
- Northbound A167 merge has been extended to south of the A167 rail bridge to reduce observed blocking through the Neville's Cross junction and separate the merge from the entry from Neville's Cross Bank, which currently results in three lanes reducing to one immediately after the junction. This is facilitated by widening in to the western verge by a maximum of approximately 6m to provide two northbound lanes (3.5m nearside and 3.2m offside) and associated merge taper. The widening within the western verge also enables the southbound carriageway changes described below, whilst retaining the existing eastern kerb line as existing.
- North of the northbound merge, the carriageway reverts to a single lane of 3.5m minimum lane width. This is due to pinch points at Toll House Road, Moor Edge, and Whitesmocks Avenue preventing extension of two lanes northbound, and minimising widening through verges separating the existing carriageway and properties adjoining the A167.
- A167 southbound has been widened to two lanes between Sniperley Roundabout and Neville's Cross junction, including the length of this section. Existing eastern kerb line and footway has been retained throughout the section south of the A167 rail bridge.
- The southbound approach flare prior to the Neville's Cross junction has been extended. Three lanes of 3.7m, 3.2m and 3.2m are provided at the stop line. The diverge feeding the nearside lane has been relocated upstream by approximately 90m. This arrangement promotes better utilisation of the inside two southbound lanes, as there is reduced risk of access being curtailed as a result of queues which extend beyond the existing diverge.
- Further widening up to 1.5m in to the western and eastern verge has been carried out through the rail bridge section. The proposed western kerb line ties in to the existing kerb line north of St Bede's Close. Beyond the A167 rail bridge the eastern kerb line widening is more extensive, with the kerb line tying in to the exiting kerb line north of Toll House Road junction up to a maximum of 2.6m adjacent to Viewforth Villas. This widening is to facilitate the additional southbound lane, and includes the requirement for the barrier protection across the bridge section to be relocated to provide a reduced offset from the edge of the carriageway.
- Northbound reservoirs of 2.5m width are provided for accessing St Bede's Close, St Monica Grove and Lyndhurst Drive as per the existing provision. Southbound 2.5m width right turn reservoirs are provided at Quarry House Lane, Neville Dene and to access the supermarket south of Toll House Road Junction (revised entrance as per detail below).
- The existing controlled crossing north of St Bede's Close is retained. A central refuge island is provided at the crossing point to provide protection given the additional southbound lane.
- The existing footbridge south of St Bede's Close is to be removed.

- South of Toll House Road junction, the entrance and exit to the supermarket is to be reversed to provide sufficient visibility for exiting vehicles when a bus is stationary in the adjacent bus stop, which is retained in its existing position.
- The offline southbound bus stop south of Toll House Road junction is replaced with an on-carriageway facility. This is to reduce the required widening. An on-carriageway facility is possible as, following the provision of an additional southbound lane vehicles are able to use the offside lane to pass when occupied.
- The shared use facility on the eastern side south of Toll House Road junction is to be retained.

Section 2 – Toll House Road Junction

- Traffic signals are to be amended at Toll House Road junction to incorporate the revised junction layout.
- Opportunities for increasing capacity are limited at this junction due to the topography and width restrictions. A left turn flare on the northbound approach to Toll House Road junction has been introduced to increase capacity. The flare starts at the entrance to the existing bus stop, which also forms the revised supermarket exit.
- To facilitate the northbound flare, as well as due to visibility concerns when exiting the junction whilst a bus is stationary in the bus stop, the side road at this location is restricted to entry only from A167.
- Northbound through the Toll House Road junction a single exit lane is retained. This is due to a number of pinch points north of Toll House Road, described in the following sections, as well as a significant level difference to the west of the northbound kerb line beyond the exiting pavement extents.
- Two southbound lanes are provided at the Toll House Road junction approach. The outside lane is delineated as ahead and right, the existing right turn only flare ahead of the stop line has been removed.
- Formal southbound offline right turn storage within the junction has been increased by relocating the southbound stop line north. This has been enabled as a result of movement restrictions on Redhills Lane.
- Redhills Lane access and egress is restricted to left turn in only due to close proximity to the signal controlled junction. The current access and egress arrangement was observed to affect the capacity of the signalised junction as, amongst other movements which conflict with the mainline flow, a significant volume of rat-running vehicles exit left at Redhills Lane and immediately right turn to continue down Toll House Road. Local traffic is to be redirected onto St Monica Grove. This new arrangement is hoped to reduce rat-running across the A167, as well as reduce conflict between movements.
- A small left turn flare is introduced to increase capacity, albeit marginally, on Toll House Road. The flare has a capacity of approximately one passenger car unit. The western kerb line of Toll House Road/ A167 Durham Road has been widened at the junction mouth to accommodate the flared approach. Widening at this location is limited to a maximum of 3.5m due to level differences. The scheme does not impact on the existing safety barrier in this location which is identified as a pinch point in the network.
- A single 3.5m A167 Durham Road northbound exit lane is provided as existing due to the aforementioned level difference pinch point.
- The 0.75m cycle lane on Toll House Road is to be retained. It is proposed to terminate the cycle lane before the stop line and direct cyclists on to the existing footway via a dropped kerb. The existing footway is to be designated as a shared pedestrian and cycle footway.
- The signalised pedestrian junction facility on Toll House Road has been retained and upgraded through the provision of a larger refuge island.

Section 3 – North of A167 Toll House Road Junction to South of A167 Sniperley Roundabout

- North of the A167 Toll House Road Junction, the western kerb line ties in to the existing kerb line north of the pedestrian footbridge adjacent to Neville Terrace. The existing eastern kerb line is retained until a point north of the pedestrian footbridge adjacent to Neville Terrace.
- The two southbound lanes provided are of 3.5m and 3.2m. Throughout this section the provision off the additional southbound lane is achieved through the combination of the reduction in width of the existing central hatching, and sympathetic widening of the eastern and western kerb lines. Widening of the existing kerb line has been minimised and attempts made to select the most appropriate side so as to limit disruption, cost and the impact on the corridor and urban realm.
- The existing footbridge north of Redhills Lane Close is to be removed. The existing uncontrolled crossing south of Durham Johnston School is to be replaced with a controlled toucan crossing to provide an improved facility in this critical location.
- An informal right turn reservoir supporting access to Moor Edge residential properties has been removed due to alignment constraints when providing the controlled toucan crossing south of Durham Johnston School.
- The offline parking area south of Durham Johnston School to the west of the A167 is to be retained to aid school drop off for northbound vehicles.
- The shared used eastern footway is to be maintained. Short sections of carriageway widening are required to meet carriageway widths in the vicinity of the school. Existing verge behind the footway is utilised to maintain the shared use footway width.
- A northbound 2.5m right turn reservoir assisting access to the school is retained.
- The uncontrolled crossing north of the school is maintained for pedestrians assessing north and southbound bus stops in this location.
- The existing southbound bus stop north of the school is relocated on carriageway as there is insufficient width to maintain as an offline bay without constraining the shared use footway facility.
- North of Crossgate Moor Gardens the existing eastern kerb line and footway is retained until a point south of Club Lane.
- North of Crossgate Moor Gardens widening of the kerb line of approximately 1.5m is proposed in to the existing western verge. The footway width and back of the footway is retained.
- The existing southbound offline bus stop south of Spring Well Road is relocated on carriageway as there is insufficient width to maintain as an offline bay without narrowing the shared use footway facility.
- The existing uncontrolled crossing north of Spring Well Road is to be retained.
- A southbound 30mph speed limit is to be introduced north of the uncontrolled crossing north of Spring Well Road. At this point the speed limit reverts to the existing 40mph speed limit. This location also marks the end of the northbound 30mph limit proposed south of Neville's Cross.
- The northbound bus stop north of Whitesmocks Avenue is retained with minor amendments to the western and eastern kerb lines to facilitate the additional southbound lane though this section.
- The Whitesmocks Road/ A167 junction is realigned to provide sufficient carriageway space for two southbound lanes. The realignment allows for the provision of a wider storage area within the junction, capable of providing refuge for a pantechnicon vehicle when accessing or egressing Whitesmocks Road without affecting the north bound or southbound lanes. The eastern kerb line is relocated approximately 4.5m east, and some alternations to central islands are made to achieve these improvements.
- Lane markings and hatching are amended adjacent to St Nicholas Drive to improve clarity and provide a formalised right turn facility.
- An existing physical gap in the refuge area delineating the A167 north and southbound carriageways south of Sniperley Roundabout has been closed. This gap currently provides for a right turn movement in to a small number of residential properties. Closure avoids conflict with two lane southbound traffic operation. Residents wishing to access properties whilst travelling northbound can continue to Sniperley Roundabout and gain access via the southbound carriageway.

3.3 Cost Estimate

The estimated cost of the scheme is £6.9 million in 2020 prices. The build-up of this cost estimate is shown in Table 3-1.

Table 3-1: Cost Estimate for A167 Scheme

Cost Element	Total Cost
Roadworks	£3,107,632
Structures	£117,500
Preliminaries and Contingencies	
- Works contingency allowance o f10%	£322,513
- Utilities allowance of 25%	£806,283
- Temporary traffic management allowance of 10%	£322,513
Inflation ((Q2 2017 to Q2 2020) OF 11.3%)	£505,106
Design (at 10% of costs, including inflation)	£505,523
Contract Management (at 2% of costs, including inflation)	£101,105
Land	-
Sub Total	£5,788,176
Risk Allowance	£1,157,635
Total	£6,945,812

4. Modelling Results

4.1 Introduction

The option identified in the previous chapter has been coded into the Paramics model and tested under two growth scenarios; 2013 base model traffic flows and a future year of 2027. LinSIG modelling undertaken as part of the option development has been used to inform the coding of the scheme in Paramics. The results have been compared against an existing highway network situation by extracting journey times along the A167 and levels of queuing at key junctions. The results of the traffic modelling are presented in this chapter of the report.

4.2 Traffic Growth

The base year of the Paramics model is 2013. Given that there are existing issues of traffic congestion along the A167 corridor, it was agreed to test the scheme using the base year traffic flows, to understand whether the scheme will address existing traffic issues. However, given current and predicted demand for increased housing and employment, the long term expectation is for growth in the City of Durham, which will increase traffic levels and exacerbate current congestion issues. A future year of 2027 has therefore been modelled to understand whether the proposed scheme will also accommodate forecast future traffic growth. Traffic for 2027 has been forecast by uplifting the 2013 demand using TEMPro 7.2 forecasts; TEMPro uses the National Trip End Model and provides local growth factors, which take into account local demographic change, socioeconomic variation and changes in modes, as well as other factors that affect the growth of traffic within a locality. The TEMPro factors used in the appraisal of the A167 scheme are for the area of County Durham and are shown in Table 4-1 below.

Table 4-1: TEMPro (7.2) Car Driver Growth Factors for County Durham

	AM Peak 2013-2017		PM Peak 2013-2017	
Area	Origin	Destination	Origin	Destination
County Durham	1.0646	1.0722	1.0669	1.0628

4.3 Traffic Modelling Results

Journey time results have been extracted from the model for the A167 corridor between Neville's Cross and Sniperley roundabout. To understand where the delay on the corridor occurs, the journey time routes have been split into the following sections:

- Neville's Cross to Toll House Road (northbound);
- Toll House Road to Neville's Cross (southbound);
- Toll House Road to Sniperley Roundabout (northbound);
- Sniperley Roundabout to Toll House Road (southbound).

To ensure the delay through the junctions is captured in the results, the journey time route starts and ends prior to, and after, the junctions at the extents of the corridor. The routes are shown Figure 4-1.

Figure 4-1: Journey Time Routes

The journey time results extracted from the Paramics model are shown in Table 4-2 to Table 4-5 below.

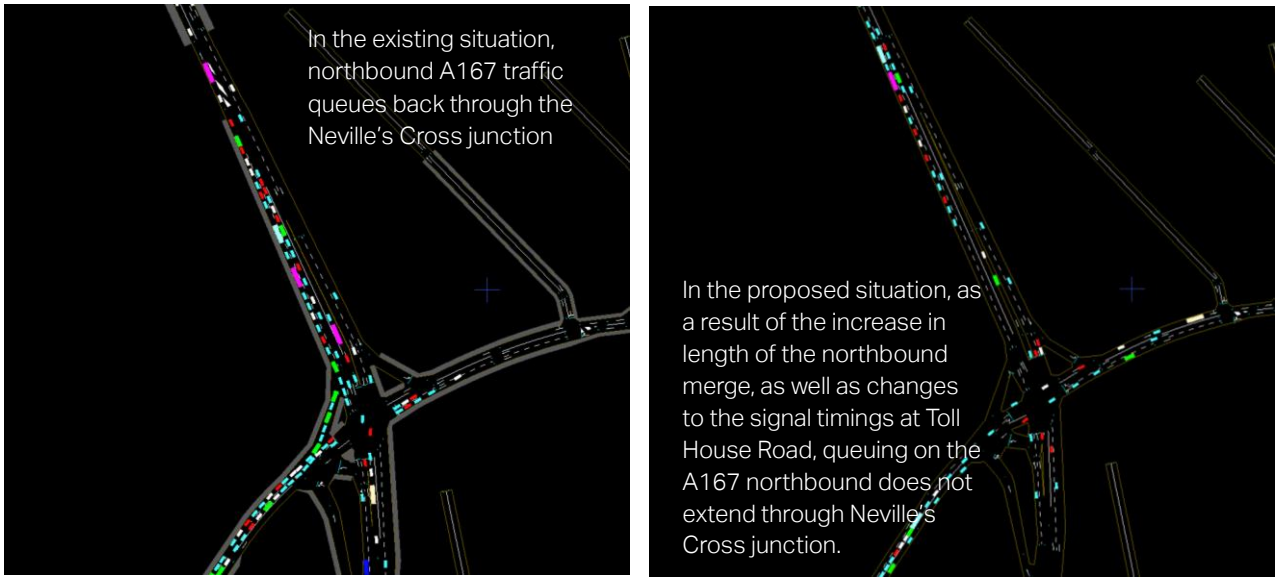
Table 4-2: Journey Time Results 2013 AM Peak

	Journey Time Results in Seconds			
Route	Existing	Proposed	Difference	Percentage Difference
Neville's Cross to Toll House Road	262	152	-110	-42%
Toll House Road to Sniperley Roundabout	129	142	13	10%
Sniperley Roundabout to Toll House Road	342	185	-157	-46%
Toll House Road to Neville's Cross	101	102	1	1%
Neville's Cross to Sniperley Roundabout	392	294	-98	-25%
Sniperley Roundabout to Neville's Cross	443	287	-156	-35%

The results in the table above show that, as a result of the proposed scheme, there is a reduction in journey time along both the northbound and southbound A167 carriageway in the 2013 AM peak,

In a northbound direction, the journey time results occur on the section of carriageway between Neville's Cross and Toll House Road; this section benefits from an increase in the northbound merge, north of Neville's Cross, and changes to the signal timings at Toll House Road, which reduce the cycle time, giving less green time to the Toll House Road arm. The impact of the changes on queuing at the Neville's Cross junction are shown in Figure 4-2.

Figure 4-2: Queuing on the Northbound A167 North of Neville's Cross



In a southbound direction, the journey time benefits occur on the section of carriageway between Sniperley Roundabout and Toll House Road. This section benefits from an increase in capacity to two lanes throughout its extents.

Table 4-3: Journey Time Results 2013 PM Peak

	Journey Time Results in Seconds			
Route	Existing	Proposed	Difference	Percentage Difference
Neville's Cross to Toll House Road	201	117	-84	-42%
Toll House Road to Sniperley Roundabout	156	320	164	105%
Sniperley Roundabout to Toll House Road	323	144	-179	-55%
Toll House Road to Neville's Cross	125	109	-16	-13%
Neville's Cross to Sniperley Roundabout	357	436	79	22%
Sniperley Roundabout to Neville's Cross	448	253	-195	-44%

In the PM peak, the journey time results extracted from the traffic model show a noticeable journey time saving in a southbound direction along the A167 corridor. Similar to the AM peak, the saving occurs on the section of carriageway between Sniperley Roundabout and Toll House Road, which benefits from an increase in capacity.

In a northbound direction however, the journey time results shown an overall increase in the journey time along the A167 carriageway as a result of the proposed scheme. Whilst the section of carriageway between Neville's Cross and Toll House Road benefits from a lengthening of the northbound merge and changes to the traffic signal timings at Toll House Road, at Sniperley roundabout, northbound vehicles struggle to exit the junction due to an increase in circulating traffic that was previously blocked from entering onto the junction by the A167 southbound queuing traffic. The issue is illustrated in Figure 4-3.

Figure 4-3: Traffic Queuing at Sniperley Roundabout with Proposed Scheme

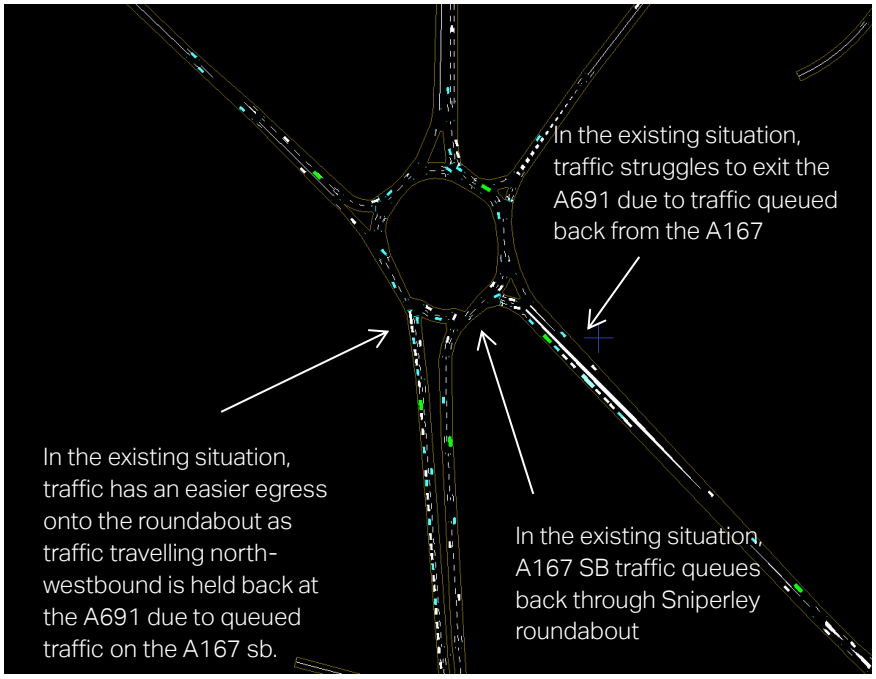


Table 4-4: Journey Time Results 2027 AM Peak

	Journey Time Results in Seconds			
Route	Existing	Proposed	Difference	Percentage Difference
Neville's Cross to Toll House Road	292	186	-106	-36%
Toll House Road to Sniperley Roundabout	131	152	21	16%
Sniperley Roundabout to Toll House Road	585	204	-381	-65%
Toll House Road to Neville's Cross	101	102	1	1%
Neville's Cross to Sniperley Roundabout	423	338	-85	-20%
Sniperley Roundabout to Neville's Cross	686	306	-380	-55%

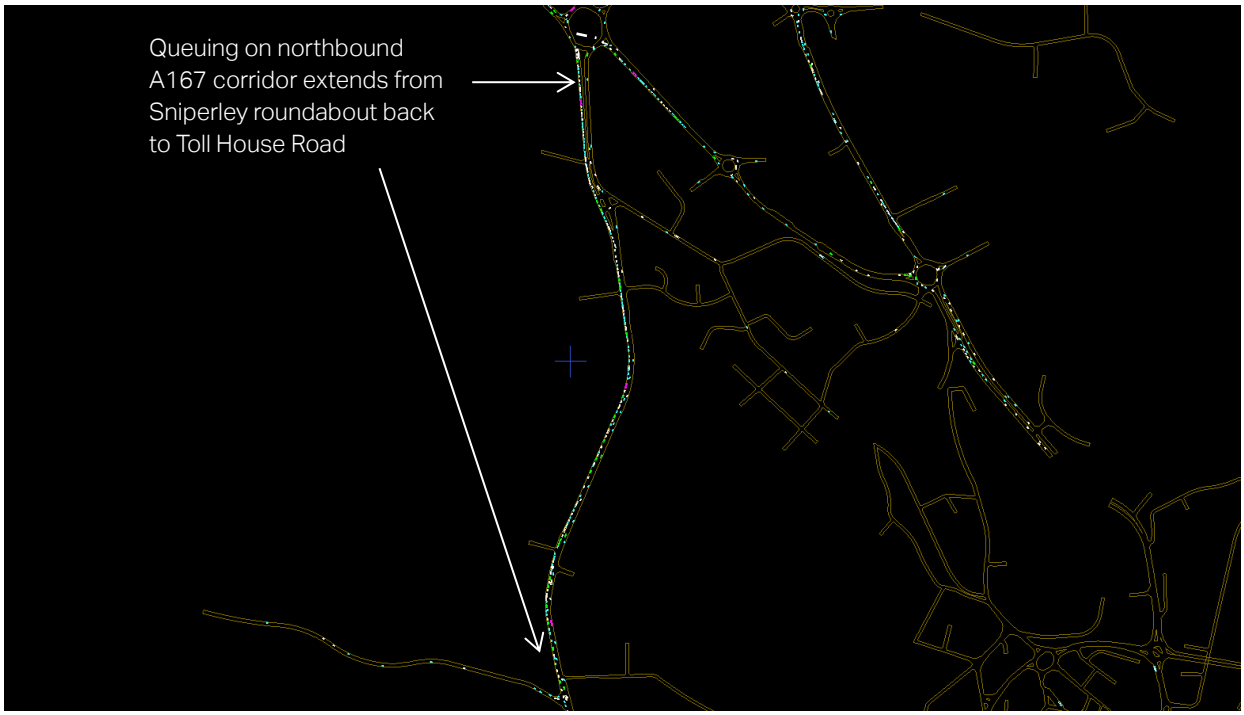
Similar to the 2013 AM situation, the journey time results for the 2027 AM peak show a journey time benefit as a result of the scheme in both a northbound and southbound direction. It is noticeable that the journey time saving in a southbound direction is much higher than that observed in the 2013 scenario. In the existing situation, congestion in a southbound direction is not to the level of the PM peak. However, as demand increases in the future year, queuing is observed stretching back from Toll House Road through Sniperley roundabout. This section of carriageway therefore benefits significantly from the proposed scheme.

Table 4-5: Journey Time Results 2027 PM Peak

	Journey Time Results in Seconds			
Route	Existing	Proposed	Difference	Percentage Difference
Neville's Cross to Toll House Road	322	287	-35	-11%
Toll House Road to Sniperley Roundabout	163	621	458	281%
Sniperley Roundabout to Toll House Road	557	164	-393	-71%
Toll House Road to Neville's Cross	126	122	-4	-3%
Neville's Cross to Sniperley Roundabout	485	908	423	87%
Sniperley Roundabout to Neville's Cross	684	286	-398	-58%

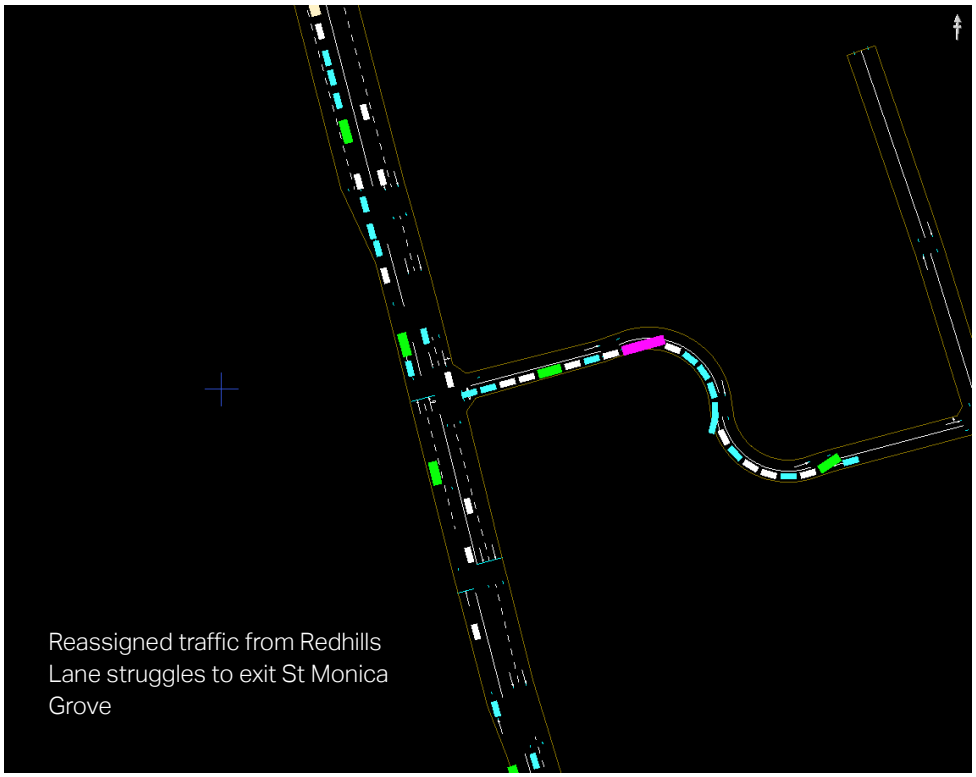
Similar to the 2013 results, the results for the PM peak show a noticeable journey time saving in a southbound direction as a result of the scheme. However, there is an increase in the journey time in a northbound direction, which is more than the journey time saving in a southbound direction. Consideration has been given to whether the Sniperley roundabout could be signalised to try and mitigate the issue. However, this has been ruled out due to the complexities of the junction and competing traffic flows, which would likely lead to delay on other approaches. Further consideration was given to whether two lanes could be provided northbound through the Sniperley roundabout, but this was also ruled out due to constraints north of Sniperley roundabout, which would not allow two lanes in a northbound direction, without reducing the number of lanes in a southbound direction. The queuing extends back to the Toll House Road junction, as illustrated in Figure 4-4.

Figure 4-4: Queuing on the A167 Northbound Approach to Sniperley Roundabout



As well as the issues identified by analysis of the journey time results, the proposed changes to the A167 corridor rationalise the side road egresses onto the A167 corridor. Of particular note, is the closure of the Redhills Lane exit, with traffic reassigned onto the exit of St Monica Grove. The traffic modelling shows that vehicles struggle to exit the junction with long queues observed. This is most notable in the PM peak, as illustrated in Figure 4-5 below.

Figure 4-5: Queueing on St Monica Grove as a Result of Proposed Scheme



It is suspected that some of the existing traffic using Redhills Lane is 'rat-running' traffic from the centre of Durham. The changes proposed to the Redhills Lane exit may result in traffic diverting via other routes rather than using St Monica Grove. This would put additional pressure on alternative junctions on the highway network that has not been assessed as part of this appraisal.

4.4 Summary

The results of the traffic modelling of the proposed highway improvements to the A167 corridor in Durham show a reduction in journey times in the AM peak along both the northbound and southbound carriageways. However, in the PM peak, whilst there is a reduction in the journey time on the southbound carriageway, there is a noticeable increase in the journey time on the northbound carriageway. This increase in journey time is due to northbound A167 traffic struggling to exit onto Sniperley roundabout, as traffic from the A691 travelling north-westbound gets an easier exit onto the roundabout, which the A167 traffic must give-way to. Due to constraints on available land and level differences north of Sniperley roundabout, no improvement measures to the junction have been identified at this stage in the design process.

5. Summary

5.1 Overview

In 2017, Durham County Council commissioned AECOM to undertake feasibility design of highway improvements to the A167 corridor, between the junctions of Neville's Cross and Sniperley roundabout. The objectives of the design were to improve journey times and reduce traffic congestion, whilst facilitating future growth in the City of Durham. The proposals have been tested in an existing S-Paramics model of the study area.

Due to physical constraints along the extents of the corridor, a decision had to be taken whether to prioritise the southbound or northbound carriageways. Given that the greatest traffic congestion issue appeared to be in a southbound direction in the PM peak, focus was given to identifying a solution that would address this issue. As a result, an option was designed that facilitated two lanes in a southbound direction along the A167 corridor between Sniperley roundabout and Neville's Cross. The northbound carriageway benefitted from a lengthening of the northbound merge, north of Neville's Cross, changes to signal timings to prioritise the north-south movement through Toll House Road and rationalisation of side road access and egresses onto the A167 corridor.

The results of the traffic modelling have shown that, in the AM peak, the proposed highway improvement measures result in journey time savings in both a northbound and southbound direction along the A167 corridor. Savings occur in both the 2013 base year of the model and the 2027 forecast year. In the PM peak, there is also a noticeable reduction in the southbound A167 journey time in both the 2013 base year and 2027 forecast year. However, the traffic modelling results show an increase in the journey result in a northbound direction, which is higher than the saving in a southbound direction in the 2027 PM peak. The increase in journey time is caused by queuing at the Sniperley Road roundabout as northbound traffic struggles to exit the junction; in the existing situation, there are more gaps in circulating traffic due to the A167 southbound traffic queuing back through Sniperley roundabout and blocking the A691 and Dryburn Park exits onto the junction.

As a result of the proposed highway improvement measures, which prioritise the northbound and southbound A167 traffic movements, there is an increase in queuing on side road approaches to the A167 as some side road accesses and egresses have been restricted.

The traffic modelling results do not demonstrate an overall improvement to the current or future traffic issues along the A167 corridor. The proposed scheme has been shown to provide and mix of benefit to some movements and disbenefits to others with no overall improvement to the performance of the corridor. The cost estimate for the scheme is £6.9 million, which is a noticeable investment cost when benefits of the scheme are not evident for all key movements.

APPENDICES

Appendix A – Scheme Drawings

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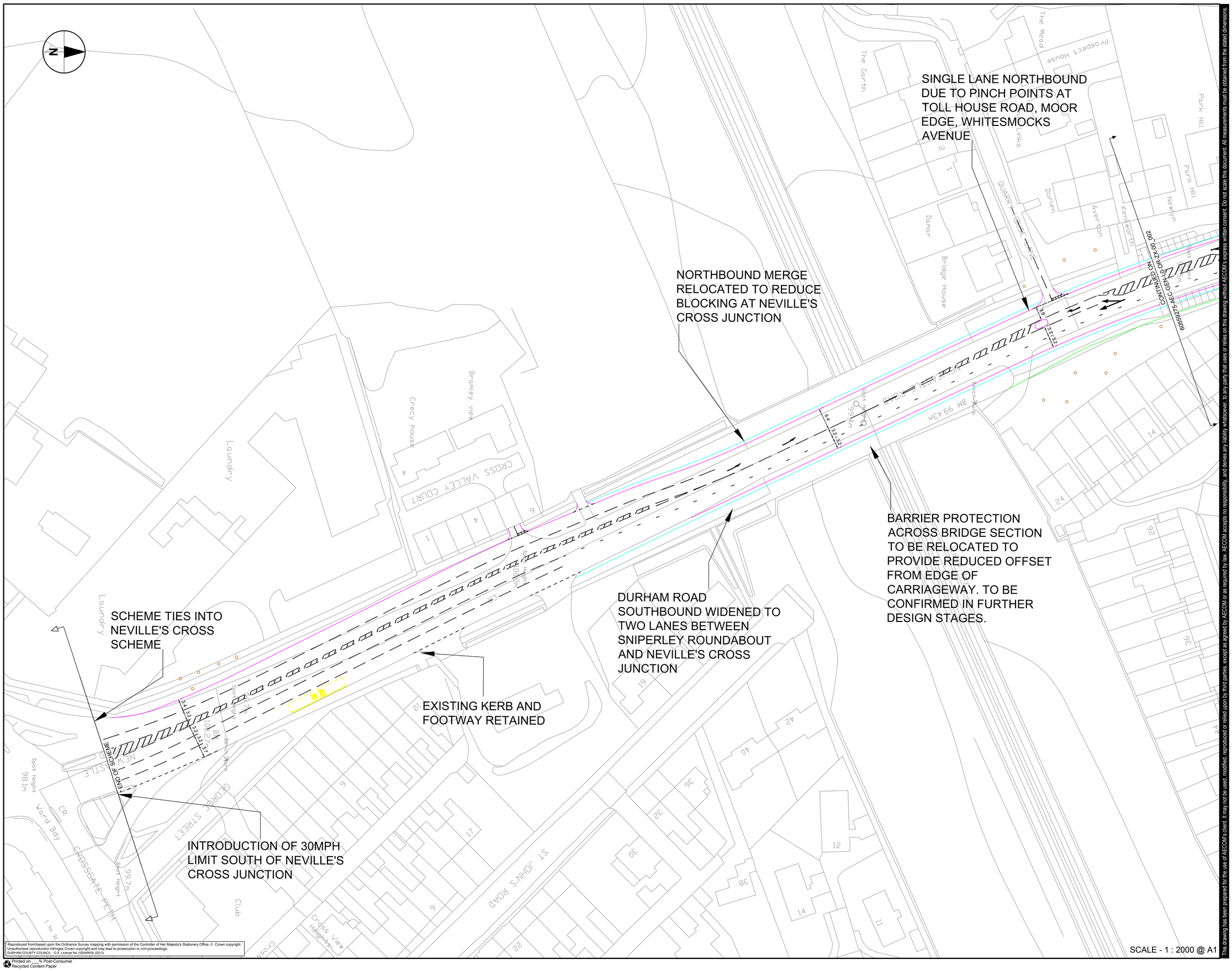

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PROJECT

A167 DURHAM ROAD

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A167 SCHEME FEASIBILITY DESIGN
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CONSULTANT

AECOM

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SIDE ROAD RESTRICTED TO ENTRY ONLY FROM DURHAM ROAD DUE TO VISIBILITY CONCERNS WHEN EXITING JUNCTION WHILE A BUS IS STATIONARY IN THE BUS STOP

SMALL LEFT TURN FLARE INTRODUCED TO INCREASE JUNCTION CAPACITY

PINCH POINT IN NETWORK TO PROVIDE TWO LANES IN EACH DIRECTION. LEVEL DIFFERENCE AT EXTENTS OF PAVEMENT.

ENTRANCE AND EXIT TO SUPERMARKET REVERSED PROVIDING SUFFICIENT VISIBILITY FOR EXITING VEHICLES PAST A BUS STATIONARY IN THE BUS STOP

LEFT TURN FLARE INTRODUCED TO INCREASE CAPACITY

EXISTING KERBS AND FOOTWAYS RETAINED ON WESTERN SIDE IN THIS LOCATION

EXISTING FOOTBRIDGE TO BE REMOVED

EXISTING CONTROLLED CROSSING RETAINED

PINCH POINT TO PROVIDING FIVE LANES INCLUDING RIGHT TURN POCKET WITHOUT WIDENING TO PROPERTY BOUNDARIES

OFFLINE BUS STOP REPLACED WITH ON CARRIAGEWAY FACILITY REDUCING THE EFFECT OF WIDENING ON SHARED USE FACILITY AND VERGE. VEHICLES TO USE OFFSIDE LANE TO PASS WHEN OCCUPIED.

SHARED USE FACILITY RETAINED ON EAST SIDE

TRAFFIC SIGNALS UPGRADED AT TOLL HOUSE ROAD JUNCTION TO INCORPORATE NEW JUNCTION LAYOUT

REDHILLS LANE ACCESS AND EGRESS RESTRICTED TO LEFT TURN IN ONLY DUE TO CLOSE PROXIMITY TO SIGNAL CONTROLLED JUNCTION. CURRENT ACCESS AND EGRESS ARRANGEMENT REDUCING CAPACITY OF SIGNAL CONTROLLED JUNCTION. LOCAL TRAFFIC REDIRECTED ONTO ST MONICA GROVE. NEW ARRANGEMENT IS EXPECTED TO REDUCE RAT-RUNNING ACROSS DURHAM ROAD.

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EXISTING UNCONTROLLED CROSSING REPLACED WITH CONTROLLED TOUCAN CROSSING

PARKING AREA RETAINED NEXT TO SCHOOL

EXISTING FOOTBRIDGE TO BE REMOVED

SHARED USE FACILITY MAINTAINED ON EASTERN SIDE

EXACT ALIGNMENT OF SCHOOL ACCESS AND EGRESS UNKNOWN FROM OS BASE. EXTRACTED LOCATION FROM AERIAL PHOTOGRAPHY.

SHARED USE FACILITY BETWEEN BUS STOP AND SCHOOL ENTRANCE MAINTAINED

UNCONTROLLED CROSSING MAINTAINED FOR PEDESTRIANS ACCESSING BUS STOPS

EXISTING OFFLINE BUS STOP RELOCATED ON CARRIAGEWAY, INSUFFICIENT WIDTH TO MAINTAIN AS OFFLINE BAY

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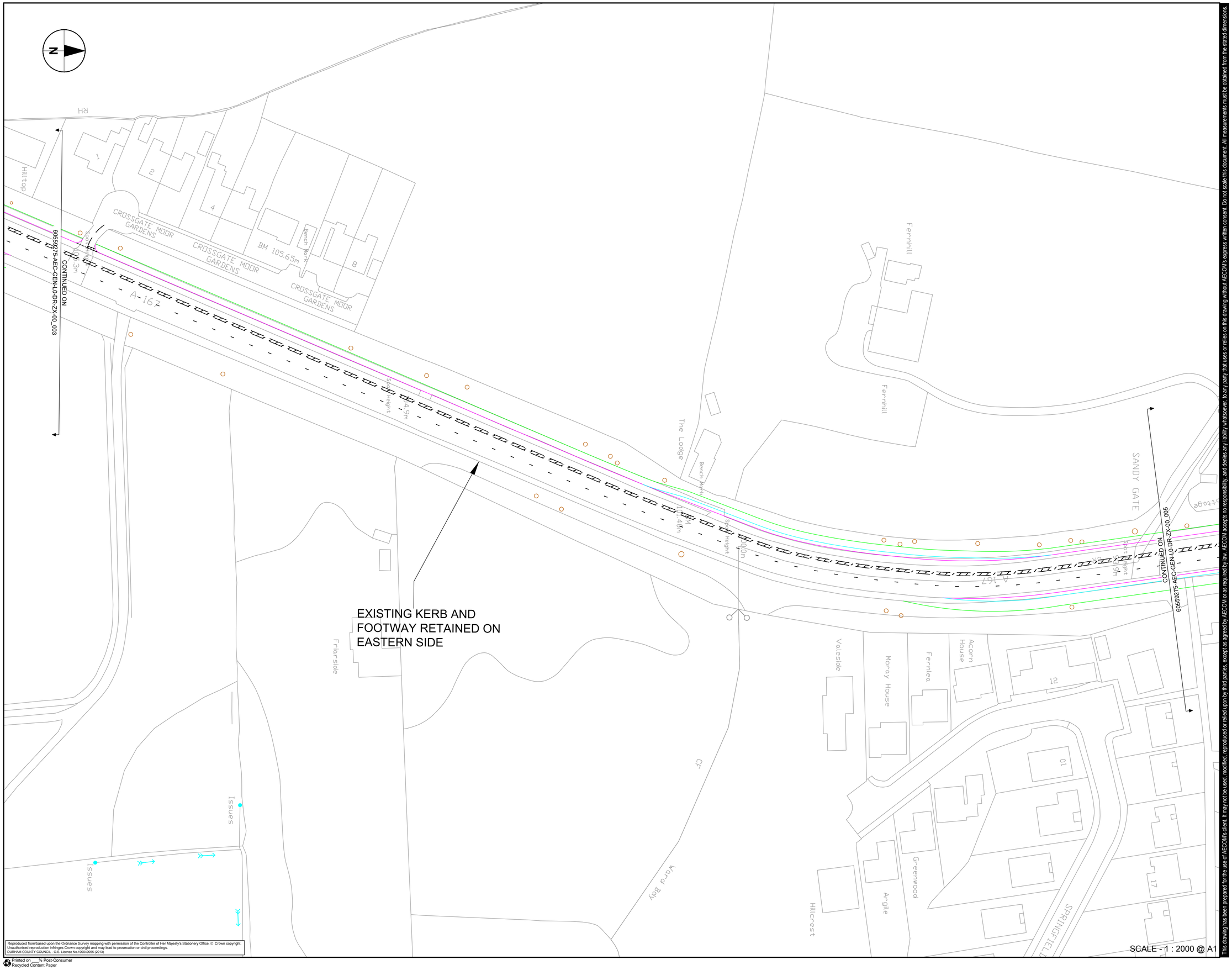

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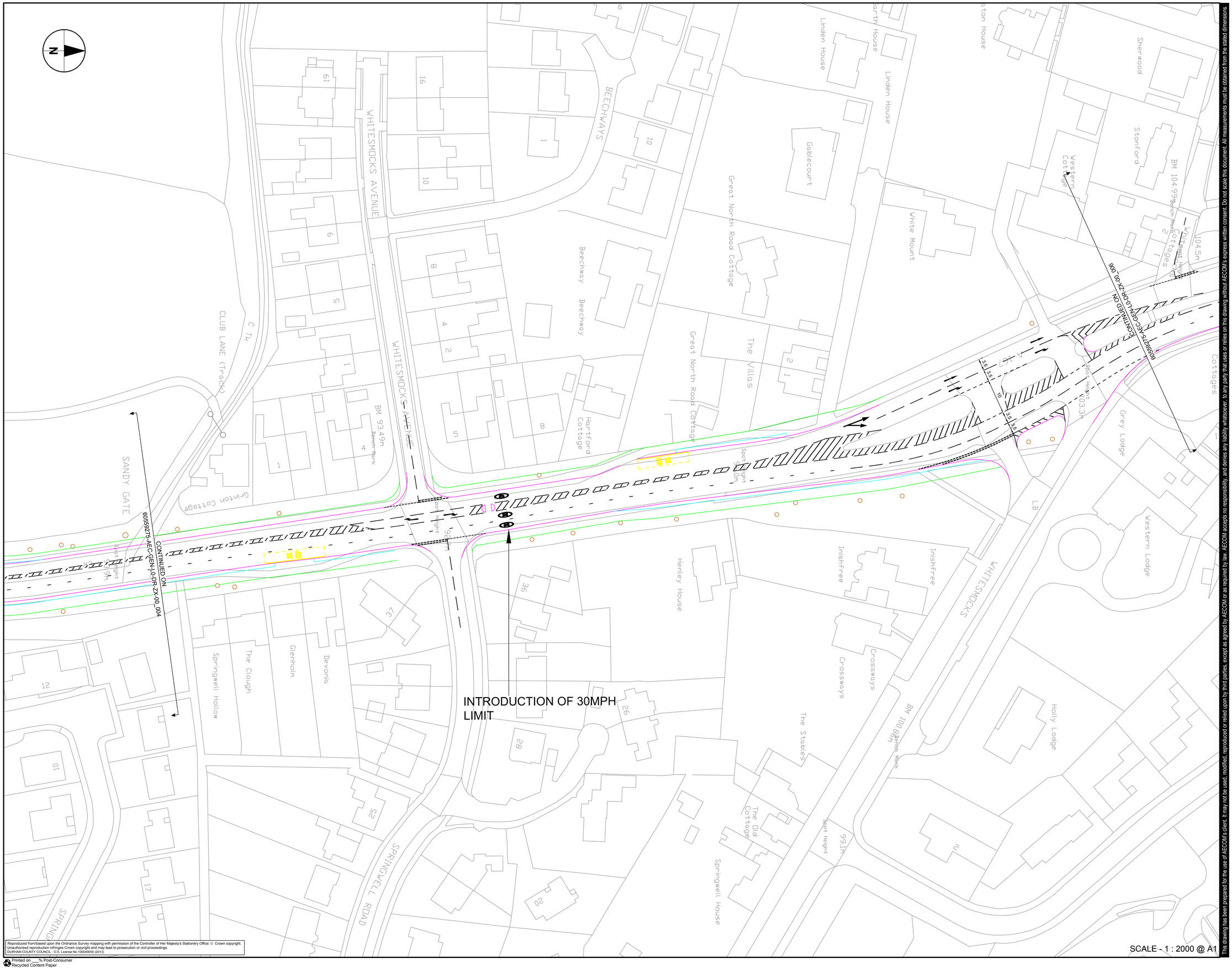

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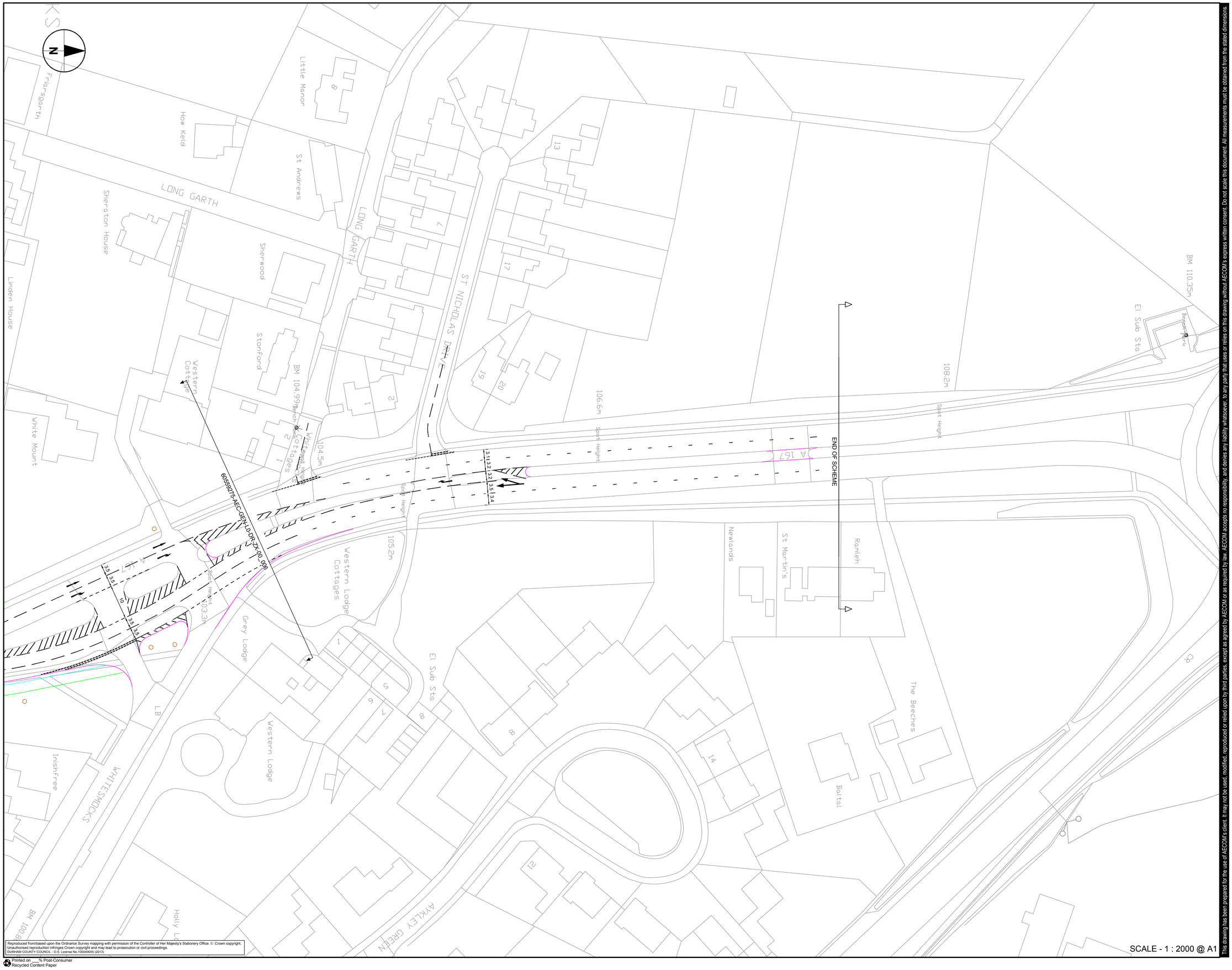

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