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NTC Local Plan

Transport Impacts Report
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Quality Management

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1. Introduction

1.1 Background

Capita has developed a strategic SATURN model covering the entire North Tyneside Borough to allow testing of North Tyneside Council's (NTC) emerging Local Plan for the 15 year period between 2017 and 2032. The model has been used to quantify the impacts of the preferred Local Plan options as these evolve and also to test the impacts of the proposed strategic sites at Killingworth Moor and Murton

Testing the impacts of these specific strategic sites reduces the number of options taken forward and subsequently modelled using the micro-simulation (VISSIM) models developed for the Murton and Killingworth Moor strategic development sites.

The SATURN model has also been used to establish when the highway infrastructure mitigation is required across 5 year periods of the Local Plan.

In addition to the traffic modelling, which is being undertaken to support the Local Plan and associated Infrastructure Delivery Pan (IDP), Capita are also developing complementary strategies for active travel and public transport provision for the two strategic sites.

It was agreed early in the Local Plan process that the council would seek to adopt the strategy of providing high quality level of service for active travel and public transport, particularly at the strategic sites, where the opportunity to influence travel behaviour is greatest.

It is recognised however that not all travel demand generated at the strategic sites can be managed and or mitigated through active and public transport travel improvements. Our approach is however to maximise the opportunity for more sustainable travel and seek to mitigate residual traffic impacts through more traditional highway capacity improvements.

Adopting this approach to traffic forecasting and modelling, we need to be mindful that any dilution to the active and public transport level of service will increase travel demand by other motorised vehicles and by association increase the likely geographical spread and severity of traffic impacts on the highway network.

1.2 Purpose of the Report

This report seeks to build upon the previous work undertaken, namely the SATURN modelling to establish the overall impact on the highway of delivering the Plan, the mitigation, phasing of the mitigation required and budgetary costing.

It is recognised that strategic modelling in SATURN in an appropriate tool for highway impact and mitigation identification, however it is considered crude for developing mitigation designs in detail. Subsequently a micro-simulation model (Vissim) has been developed to understand the highway impacts of the plan in, more detail and inform the highway mitigation designs.

This report details the outcome of the micro-simulation of the network and the detailed modelling of the mitigation measure. The report also provides concept designs of the mitigation measures and more detailed costing, to a level adequate to inform the development of the IDP.

1.3 Structure of the Report

The report is structured into the following sections:

- Chapter 2 of the report will summarise the work undertaken to date which has informed the Vissim Modelling and development of the highway mitigation design, costing and phasing.
- Chapter 3 provides the outcomes of the SATURN modelling for Killingworth Moor strategic site, including the identification of the preferred options to mitigate the impacts the development.
- Chapter 4 summaries the approach and outcomes of the highway infrastructure phasing testing for Killingworth Moor.
- Chapter 5 provides the development of the preferred highway mitigation options to the concept design and costing for Killingworth Moor.
- Chapter 6 summaries our approach to the Vissim modelling, the testing of the preferred mitigation identified and the evidence that the infrastructure designed is appropriate for the Killingworth Moor strategic site.
- Chapter 7 provides the outcomes of the SATURN modelling for Murton strategic site, including the identification of the preferred options to mitigate the impacts the development.
- Chapter 8 summaries the approach and outcomes of the highway infrastructure phasing testing for the Murton strategic site.
- Chapter 9 provides the development of the preferred highway mitigation options to the concept design and costing for the Murton strategic site.
- Chapter 10 summaries our approach to the Vissim modelling, the testing of the preferred mitigation identified and the evidence that the infrastructure designed is appropriate for the Murton strategic site.

- Chapter 11 outlines the work undertaken to date on determining the wider potential highway impacts associated with the strategic sites. This considers impacts on both the strategic and local road network.

- Chapter 12 summaries the work undertaken to date to understand the potential "cross boundary" impacts associated with NTC delivering their Local Plan and the impacts of adjoining authorities delivering their Local Plan's.

- Chapter 13 introduces the proposed approach to determining highway development contributions.

- Chapter 14 provides the conclusions, recommendations and next steps.

2. SATURN Model Development

2.1 The Base Network Development

The local highway in North Tyneside is subject to significant investment in coming years as a consequence of several successful bids to the NELEP. In addition to these major highway schemes, there are also several major highway improvements being delivered as part of S.278 agreements associated with consented planning applications for sites at Scaffold Hill, West Shiremoor, Station Road East, and Whitehouse Farm.

Highway improvements associated with the delivery of major schemes and consented planning applications have been coded into the SATURN model to represent a new baseline from which Local Plan (Central Case) impacts were compared to and assessed. A summary of these improvements is provided below.

LEP/DfT Major Schemes

- A19 Silverlink Interchange improvements – A19 Underpass;
- A1058 Coast Road Billy Mill Junction – Replace roundabout with signals and widen Beach Road towards Coast;
- A1058 Coast Road Norham Road Bridge – Replacement of widened bridge and signalisation of full junction including slip roads;
- Four Lane Ends Junction – Removal of roundabout and full signalisation;
- Goathland Avenue / A188 Benton Lane - Removal of roundabout and full signalisation;
- Quorum Business Park Access – Signalisation of roundabout;
- A1056 Sandy Lane / Great North Road junction – removal of roundabout and provision of westbound bypass lane, provision of two eastbound lanes along A1056;
- A1056 / A189 Weetslade Roundabout – Full signalisation and widening of circulatory to provide three lanes;
- Widening of A191 New York Road between Cobalt and A19 to provide two lanes in both directions;
- Widening of all approaches and circulatory at A19 Holystone Interchange; and
- Re-alignment of A191 / Tyneview Park junction to remove stagger arrangement and remark highway to provide two lane westbound to A191 Coach Lane.

S.278 Schemes

- Dualling of A191 Holystone Bypass to provide two lanes in both directions;
- Reconfiguration of A191 Wheatsheaf roundabout to allow two eastbound lanes for the A191 and a westbound bypass lane;
- Provision of existing westbound lane between A191 Wheatsheaf roundabout and ASDA junction;
- ASDA / A191 Whitely Road junction – Removal of roundabout and provision of signalised crossroads;

- A186 Station Road / Mullen Road – localised widening of A186 approaches; and
- A186/ A1058 Station Road junction – Eastbound Coast Road slip road widening, and A186 Station Road approach widened, removal of Wiltshire Gardens Roundabout.

2.2 Updates to the Base Network

Since the initial NTC Local Plan run of the SATURN model, several revisions to the network and some of the coding of the model have been undertaken. Most notably these included the following:-

- Reducing Backworth Lane through the village to a 20mph speed limit;
- Reducing Killingworth Lane through the village to a 20mph speed limit;
- Re-optimised signal timings in AM/PM peaks;
- Introduced internal link from REME site to Killingworth Moor Link Road; and

Alterations to KM/MG site access arrangements to reflect current masterplan options.

2.3 NTC Base Testing (Central Case)

Capita on behalf of NTC have assessed the current preferred Local Plan options using the strategic SATURN model. This central case will be used as a reference to allow comparison of the various scenario and phasing testing carried out for the strategic Killingworth Moor and Murton Gap sites. The central case for the local plan assumes that the Killingworth Moor Site could accommodate 2,000 homes and Murton Gap 3,000 homes.

2.4 Trip Generation

The trip rates applied to the strategic sites earmarked for residential development as part of the emerging Local Plan were taken from the recently approved Station Road East planning application and are shown in Table 1 below.

Table 1 Trip Generation from Station Road East Planning Consent

Peak	Arrivals	Departures
AM	0.156	0.397
PM	0.351	0.209

These trip rates represent a best case scenario with regards to access to sustainable transport modes and assume a minimum of 25% of trips would be made using public transport.

NTC have carried out some further analysis of observed trip rates at recently completed residential sites within the borough to better understand the relationship between access

to public transport / sustainable transport links and the generation of car based trips. Table 2 below summarises the observed AM outbound car trip rates at several residential sites in North Tyneside with notes on factors that have likely affected these rates.

Table 2 Residential Trip rates for Housing Estates in North Tyneside

Location	Households	Trips (AM Outbound)	Trip Rate	PT Access
Greenhills (Killingworth)	177	123	0.695	Poor
Forest Gate (Killingworth Moor)	210	107	0.510	Poor Bus (1%), Good Metro (20%)
Hastings Drive (Earsdon View)	416*	245	0.589	Poor Bus, Good Metro
Algernon Drive (Northumberland Park)	384	142	0.370	Good Metro (27%)

*completed and occupied homes at time of traffic survey

Following further analysis on the bus services that serve each of the residential sites in Table 2, the poor performance of Forest Gate and Greenhills becomes more understandable. The bus services that serve these estates were local link-up services requiring an interchange onto another service/Metro to reach key employment areas. Hastings Drive (Earsdon View) performs worse than expected given its proximity to Shiremoor Metro station but again this can be partly attributed to the limited employment areas that the local bus services route towards.

The emphasis is therefore, not just on access to public transport but to transport services that access major employment areas. In all examples above, the bus modal share is disappointing and highlights the need for strategic bus routes linking large residential areas to major employment sites in the region/borough. Any new/diverted bus services should complement and not compete with those employment areas already served by the Metro.

As part of both development sites, a new Metro station is proposed along with new and diverted bus services serving the development sites and major employment sites to address the observations made above. Furthermore, new schools are proposed at the development sites which will alter existing travel patterns between residential areas and schools potentially reducing the distance travelled. Improved walking and cycling routes are provided within the developments encouraging the use of sustainable transport over the private car for both employment and school based trips. This is discussed further in the Public Transport and Pedestrian / Cycling studies.

Based upon these factors it is considered appropriate to use the trip rates from the approved Station Road East site which compare well to the survey of the Algernon Drive site.

2.5 Strategic Site Access Arrangements Assumptions

The NTC Strategic SATURN Model has been tested with the full Local Plan proposals with the following assumptions for site access points at the strategic sites:

Killingworth Moor

- Forest Gate signalised junction with 2 lane exit;
- A1056 Killingworth Way / New Access Roundabout (3-arm);
- B1317 Killingworth Lane / New Access roundabout (south of A19 bridge); and
- A19 Underpass link to A186.

Murton Gap

- A191 / Norham Road Roundabout (5-arm with widened entry/exits);
- A191 Rake Lane / Hospital Roundabout (4-arm); and
- A186 / New Access Roundabout (4-arm).

2.6 Trip Distribution

The trips generated by each development site were separated into the key journey purposes experienced during the AM and PM peaks. These were commuting trips, school trips, and retail/leisure trips. Each journey purpose results in a different trip distribution and accordingly separate gravity models for each journey type were developed.

The commuting trip gravity model used census 2011 Journey to Work data which was adjusted to include the predicted job growth from the Local Plan at each of the existing employment areas within North Tyneside.

The education trips were distributed based on distance to the nearest primary/secondary school without consideration toward the potential capacity of each school. The proposed primary schools and secondary school on the Killingworth Moor and Murton Gap sites have been included in the gravity model which results in a reduction in trips leaving the sites during the AM peak.

The retail/leisure trip gravity model also assumes trips are distributed based on proximity to their nearest amenities. This includes the local amenities proposed on the Killingworth Moor and Murton Gap sites.

Cross boundary impacts have been picked up through the gravity model of employment trips. Trips to employment land in North Tyneside are assumed to remain at 51% from within the borough with the remainder originating from neighbouring authorities in the same proportions as indicated in the 2011 census.

On review of the emerging and adopted Local Plans of neighbouring authorities there is unlikely to be a significant shift in where outbound North Tyneside trips are destined. Newcastle city centre remains the next most attractive employment area after North

Tyneside and as such, the 2011 census data represents this trend. Inbound trips to jobs within North Tyneside from neighbouring authorities are not expected to change significantly either.

Employment areas in Newcastle and Northumberland are predicted to grow but no significant stand-alone/new employment areas are proposed that would lead to significant changes in outgoing trip distributions from North Tyneside. For example, the majority of Newcastle's job growth is within the Stephenson Quarter within the city centre which already represents the primary destination of outbound North Tyneside trips that leave the borough.

North Tyneside's two largest employment areas (Cobalt and Quorum Business Parks) are both served well by trips from Northumberland and Newcastle respectively with 20% of trips to Cobalt originating from south east Northumberland and 28% of trips to Quorum travelling from Newcastle. This trend has been factored into the gravity model with adjustments made to the Cobalt and Quorum distributions accordingly.

3. Killingworth Moor Strategic Modelling

3.1 Baseline Strategic Modelling

Prior to detailed strategic modelling of the Killingworth Moor strategic site in line with phasing intervals of the proposed development, a preliminary modelling exercise was undertaken in SATURN to provide an indication of the traffic impact that could be anticipated as a result of housing development at Killingworth Moor. This included modelling a baseline position of the Killingworth highway network and undertaking sensitivity testing to identify areas of the highway network that would need consideration during detailed modelling of future positions in SATURN and Vissim.

3.2 Strategic Modelling Results & Sensitivity Testing

Table 3 below highlights the varying operational performance of several key junctions on the local highway network adjacent to the Killingworth Moor site. The Base scenario represents the current highway network with 2012 traffic flows for reference. The Local Plan "LP" scenario represents the NTC preferred option with all known/committed highway network improvements schemes in place. Highway improvements associated with the strategic development sites are not considered in these results.

The S1 scenario assumes the full NTC Local Plan preferred option comes forward at all other sites with an increased number of residential units provided at the Killingworth Moor strategic site.

Table 3 Killingworth Moor Development Preliminary Impacts on Key Junctions

Junction	Arm	AM			PM		
		Base	LP	S1	Base	LP	S1
A19 Killingworth Interchange	A19 NB Off-slip	90%	103%	101%	90%	101%	101%
	A19 SB Off-slip	51%	57%	87%	51%	72%	88%
	A1056 EB	89%	95%	101%	89%	100%	98%
	A1056 WB	38%	71%	79%	38%	100%	100%
B1505 Great Lime Road / B1317 Killingworth Lane	Killingworth Lane	101%	104%	106%	105%	100%	102%
	Great Lime Road WB	75%	103%	104%	102%	103%	103%
	Forest Hall Road	112%	108%	110%	105%	106%	107%
	Great Lime Road EB	101%	117%	117%	119%	102%	102%
A191 / B1505 Wheatsheaf Roundabout	Great Lime Road	97%	104%	106%	73%	104%	105%
	Holystone Village	31%	38%	39%	24%	36%	32%
	Holystone Bypass	56%	61%	61%	30%	41%	35%
	Whitley Road	22%	63%	64%	59%	104%	103%

In the base network testing it can be seen that only the A19 Killingworth Interchange currently operates just within operational capacity in the Base scenario, and therefore, any significant increases in traffic at this junction would require mitigation. The A191 / B1505 Wheatsheaf Roundabout is approaching capacity in the AM peak period on the Great Lime Road arm in the Base scenario with the remainder of the arms operating efficiently. The B1505 Great Lime Road / B1317 Killingworth Lane junction operates over capacity in the Base scenario.

The impact of both scenarios is reduced capacity at all junctions. In the case of the Killingworth Interchange, the junction operates over capacity due to the development traffic. It is of note that the figures reduce in the S1 scenario compared to the LP scenario on the A19 northbound off-slip and A1056 eastbound, it is assumed that this is due to a reassignment of traffic due to congestion elsewhere on the network.

In the case of the Wheatsheaf Roundabout the developments result in the Whitley Road arm operating over capacity in the PM peak and the issues on the Great Lime Road arm are exasperated. Therefore, this junction operates over capacity in the full build out of the developments.

For the B1505 Great Lime Road / B1317 Killingworth Lane junction, there is a fluctuation in whether the junction improves or not due to the development traffic. This is attributable to the different distribution that SATURN applies when the junction is at capacity. It should therefore, be taken that this junction operates over capacity in all scenarios, including the Base scenario.

Table 4 below summarises the remaining locations on the local highway network where the Killingworth Moor development trips have an impact. Again, the S1 scenario assumes the full NTC Local Plan preferred option comes forward at all other sites with an increased number of residential units provided at the Killingworth Moor site.

Table 4 Killingworth Moor Impacts on the Wider Highway Network

Junction /Arm	Base		S1	
	AM	PM	AM	PM
A1056 Killingworth Way/ Station Road Camperdown WB	72%	86%	105%	58%
A1056 Killingworth Way/ Station Road Camperdown EB	62%	48%	68%	100%
A189/ A188 West Moor Benton Rd NB	41%	37%	54%	97%
A191 Front St/ Coach Lane EB Ahead	60%	42%	105%	54%
Holystone Roundabout A191 EB From Bypass	42%	41%	61%	50%

Table 5 below summarises the proportion of traffic generated by the Killingworth Moor site that is likely to utilise each access point. The traffic flows associated with S1 have been used in this assessment as they represent a worst case scenario, with the junction envisaged to have the worst case impact reported in the table.

Table 5 Modelling Results for Killingworth Moor Access Points

Access Point	Proportion	Max Degree of Saturation	
		AM	PM
A1056 Killingworth Way Roundabout	28%	69%	69%
B1505 Forest Gate Signalised Junction	28%	103%	109%
B1317 Killingworth Lane Junction	15%	26%	31%
A19 Underpass	29%	31%	28%

The table demonstrates that three of the four proposed access points into the Killingworth Moor site will operate within capacity in the higher S1 traffic flow scenario. The B1505 Forest Gate signalised junction is shown to not operate within capacity when a larger volume of residential units are modelled to access the Killingworth site.

3.3 Killingworth Moor Impacted Junctions & Causation

3.3.1 A19 / A1056 Killingworth Interchange

Changes in access arrangements into the Killingworth Moor site translate directly into impacts on different movements at the junction. For example, during phases 3 and 4 where no underpass is provided there is an increased impact upon the A1056 westbound approach (from Backworth Village). This is due to traffic destined for the A19 choosing to join at the Killingworth Interchange rather than at Holystone due to difficulties in reaching Holystone via the Wheatsheaf roundabout. The underpass serves as an alternative route for site traffic to access the Holystone Interchange (via the A186) which reduces the impact at the Killingworth Interchange. The existing layout of Killingworth Interchange is shown in Figure 1 below.

Figure 1 Killingworth Interchange

3.3.2 A191/B1505 Wheatsheaf Roundabout

The Wheatsheaf roundabout, shown in Figure 2 below, represents a significant constraint to development along Great Lime Road. The Base scenario suggests that the Great Lime Road arm already operates above the recommended design capacity. At this location, there are significant impacts from other large residential developments associated with the Local Plan of which some have already been consented (Scaffold Hill, West Shiremoor, Station Road East). These committed developments generate additional trips through the junction on the A191 arms which in the AM peak make it difficult to join the roundabout from the Great Lime Road approach. In the PM peak the traffic returning to Killingworth Moor from the direction of the A19 Holystone junction reduce the opportunity for eastbound A191 traffic to travel through the junction resulting in this arm operating at up to 107% of its design capacity.

The SATURN model network has been coded to include the improvements from the consented development, however these improvements only mitigate the consented development. Further modelling, design and costing work is required to understand how the Local Plan impacts can be mitigated / managed.

Figure 2 Wheatsheaf Roundabout

3.3.3 B1505 Great Lime Road / B1317 Killingworth Lane

The SATURN model has great difficulty in accurately replicating the operation of the proposed MOVA enabled signals at this junction. As a consequence, the “optimised” timings result in significant capacity issues even in the Base scenario. This junction was recently modelled in LinSig as part of the REME site planning application which showed the current capacity to be at around 93% in the AM and PM peaks. The results reported above therefore, are still useful for performing a cross analysis between scenarios but

the reported operational capacity is likely to be overstated. Further phasing work summarised later in this report has identified when this junction is likely to exceed its design capacity. The existing layout of this junction is shown in Figure 3 below.

Figure 3 B1505 Great Lime Road / B1317 Killingworth Lane Junction

3.3.4 Other Key Junctions

The A19 Holystone Interchange, shown in Figure 4 below, operates within design capacity with all scenarios; however, the traffic demand to access the A19 from the Killingworth Moor site is hampered by the congestion at the Wheatsheaf roundabout which causes consequential redistribution of local traffic.

Figure 4 A19 Holystone Interchange

As a sensitivity test Scenario 1, which represents the highest trip generation option, was re-run applying an improvement to the Great Lime Road approach of the A191 Wheatsheaf roundabout. The improvement represents an increase in capacity from 800 veh/hr to 2,200 veh/hr. This would equate approximately to providing a two lane flared approach on the Great Lime Road arm. The results of this improvement are shown in Table 6 below.

Table 6 Modelling Results for Improvements to the A191 / B1505 Wheatsheaf Roundabout

Junction	Arm	AM				PM			
		Base	LP	S1	S1 Rev	Base	LP	S1	S1 Rev
A191 / B1505 Wheatsheaf Roundabout	Great Lime Road	97%	104%	106%	89%	73%	104%	105%	90%
	Holystone Village	31%	38%	39%	90%	24%	36%	32%	53%
	Holystone Bypass	56%	61%	61%	54%	30%	41%	35%	37%
	Whitley Road	22%	63%	64%	65%	59%	104%	103%	106%

The revised operation of the junction shows that the performance of the Great Lime Road approach is greatly improved but during the PM peak there is still concern for the A191 Whitley Road eastbound approach.

3.4 A19 Underpass Impacts

As part of the master-planning discussion surrounding the Killingworth Moor site it has been identified that an underpass of the A19 linking the site to the West Shiremoor site would help limit off-site impacts upon the local highway network.

Providing the underpass link reduces the traffic impact on the Wheatsheaf roundabout by up to 10% degree of saturation on the Great Lime Road arm. With the underpass in place the level of mitigation required at the Wheatsheaf roundabout is greatly reduced and becomes achievable without the need to reduce the scale of the development. In addition to this, the re-distribution of local traffic due to the capacity constraints at Wheatsheaf roundabout, generates unwanted impacts at the A191/Tyneview Park junction causing this to exceed capacity by a further 5%.

Without an A19 underpass, the Forest Gate access junction in its proposed improved layout (two lane exit and left out/right in filter stage) operates at 103% degree of saturation. It therefore, may require further consideration to enable any increase in development scale, as without the underpass link it operates at 107% degree of saturation.

The impact upon the Great Lime Road /Killingworth Lane junction is not fully mitigated by the link roads as some traffic is still travelling towards Forest Hall and the A191/Tyneview Park junction. This is caused by the number of units that can directly

access Killingworth Lane adjacent the consented REME site. The SATURN model allows all Killingworth Moor development traffic to access Killingworth Lane via the REME site but this could be constrained to manage the impact upon the Killingworth Lane / Great Lime Road junction. If constrained this would instead force traffic to join Great Lime Road via the Forest Gate junction where demand can be better managed and increased capacity provided.

Furthermore, Killingworth Lane between Great Lime Road and Killingworth Village is not appropriate for the volume of traffic predicted to use it due to its narrow construction and soft verges.

The estimated cost for providing the underpass is £2M.

3.5 Killingworth Link Road

As part of the Killingworth Moor development site it is proposed to provide a new link road that will join the A1056 Killingworth Way with the B1505 Great Lime Road and provide access to the entire site. The need for a link road developed through the concept masterplanning process where the constraints of the local highway network were identified.

The predicted impacts of the development site traffic upon the A19 Holystone and Great Lime Road / Killingworth Lane junctions were a primary concern due to the limited options to mitigate at these locations. The A19 Holystone junction is already subject to a major highway capacity improvement to enable the future development of Cobalt Business Park and surrounding consented housing developments. The highway improvement scheme proposed maximises the capacity of the junction within existing highway land. Further capacity improvements at the junction would be difficult to achieve without exploring grade separation and the associated prohibitive costs.

The B1505 Great Lime Road / Killingworth Lane junction already operates at capacity during peak periods. The close proximity of existing properties, protected trees, and limited available highway land make any significant mitigation difficult.

The link road provides the opportunity for development traffic to join the local and strategic highway network without impacting either of these junctions significantly. The link also provides appropriate vehicular access to all areas within the development site and allows the impacts upon the local highway network to be better managed.

4. Development Phasing Testing for Killingworth Moor

4.1 Introduction

The initial transport modelling work undertaken to establish the impacts of the Killingworth Moor strategic site upon the local highway network assumes the full delivery of the draft NTC Local Plan. This has identified locations on the network where mitigation and management of development impacts will be necessary.

Further work has now been undertaken to identify when key highway infrastructure is necessary. This chapter outlines the assumptions made in the phasing assessment, the results of the assessment and the implication the results have on the phasing of the highway mitigations.

4.2 Local Plan Delivery Phases

The NTC Local Plan is proposed to be adopted in 2018 and provide for a 15 year period up to 2032. There is also an interim period for the delivery of already consented development up to adoption of the plan in 2018. The development phasing testing that has been undertaken for the Killingworth Moor site splits the delivery of the Local Plan and the interim period leading up to this into four periods including:-

Phase 0 – 2014 to 2017
Interim period representing traffic growth associated with already consented and partly constructed developments across the borough as well as the delivery of major infrastructure improvements programmed for delivery by 2018.

Phase 1 – 2018 to 2022
Initial 5 year delivery period of the Local Plan with completion of already consented developments as well as the first phase of the Killingworth Moor site.

Phase 2– 2023 to 2027
Second 5 year delivery period of the Local Plan with completion of the second phase of the Killingworth Moor site.

Phase 3– 2028 to 2032
Final 5 year delivery period of the Local Plan with completion of the third phase of the Killingworth Moor site.

The phasing assumes that employment growth is proportionately delivered in line with the housing delivery trajectory. The delivery of housing at the Killingworth Moor site has been taken from phasing proposals submitted by the respective landowner consortium. This includes information on which development cells/land parcels are likely to build-out first and where these would likely access the local highway network.

4.3 Housing & Infrastructure Delivery at Killingworth Moor

The chart in Figure 5 below summarises the assumed delivery of housing units per annum at the Killingworth Moor site across the plan period, shown in blue against the green total.

Figure 5 Annual Delivery of Housing Units at Killingworth Moor for the Local Plan Period

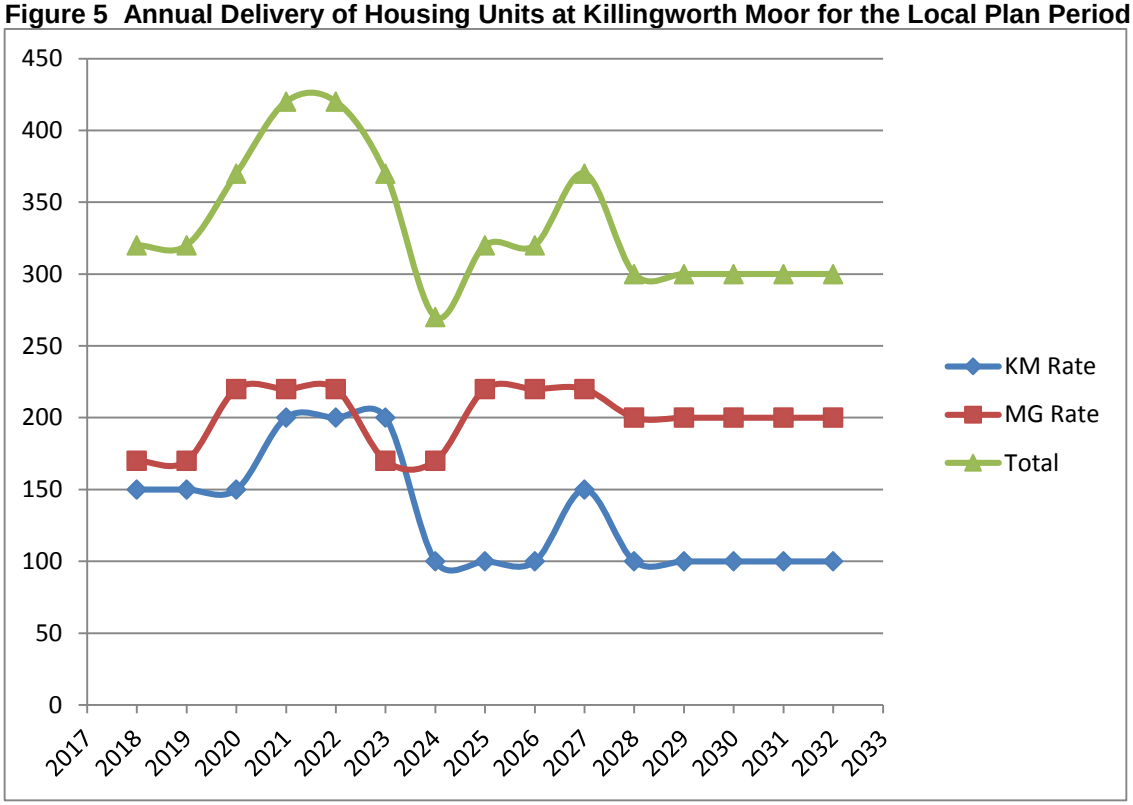


Table 7 below provides the total number of units predicted to be delivered at the Killingworth Moor site across each Local Plan phase.

Table 7 Total Housing Units for the Killingworth Moor Strategic Site per Plan Phase

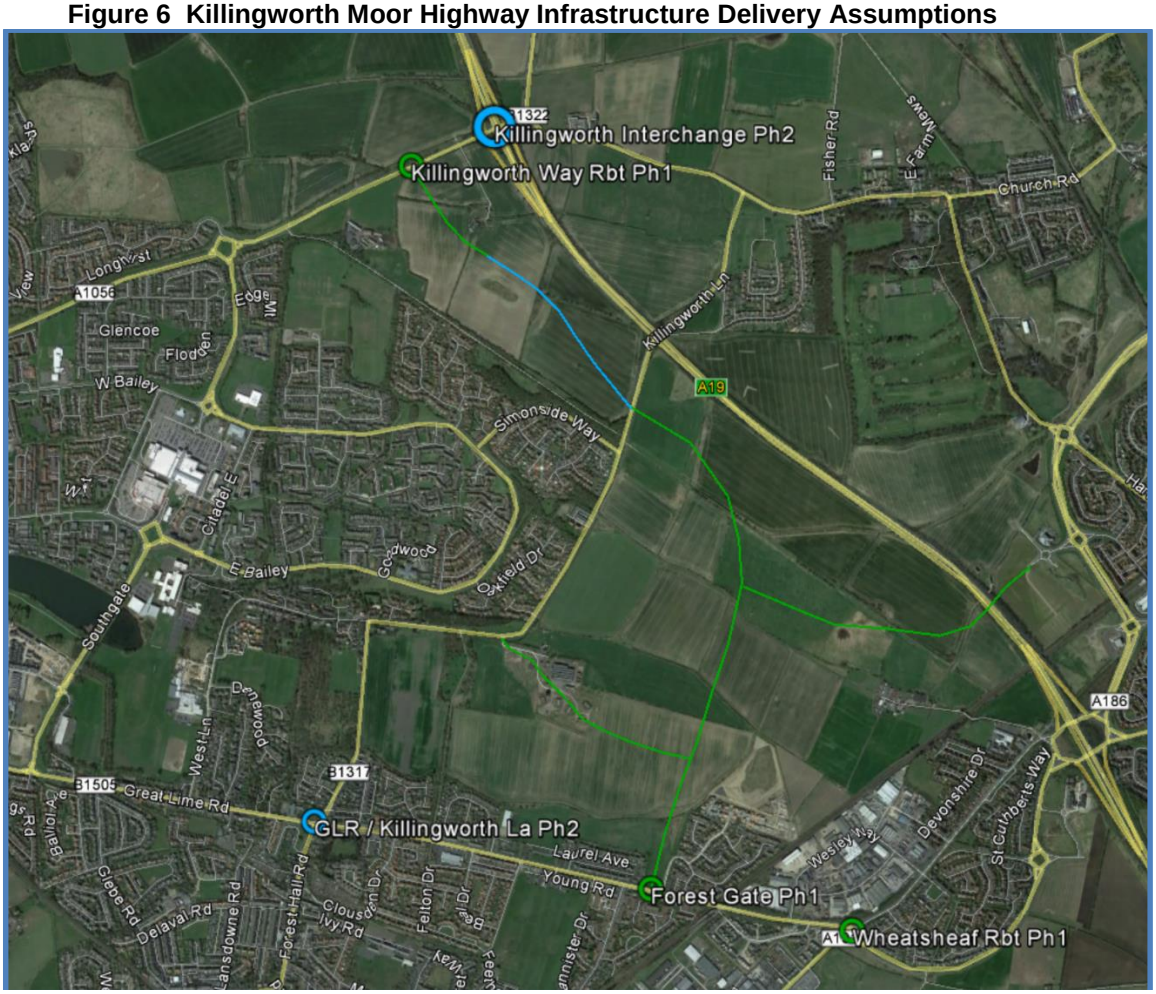
	Phase 1	Phase 2	Phase 3
	2018-22	2023-27	2028-32
KM	850	650	500

In conjunction with the housing delivery predictions and suggestions made by the landowners, NTC have made assumptions on what the minimum highway infrastructure improvement requirements are during each Local Plan phase. The assumptions are shown in Figure 6 below in which Phase 1 is highlighted in green and Phase 2 is highlighted in blue.

The highway infrastructure phasing assumptions are based on the current proposed phasing plan for the development site. Should the phasing assumptions change this may alter the timescales of delivering some of the key highway infrastructure. Acceptable

trigger points for each onsite and offsite highway improvement will be agreed with developers as part of any pre-application advice.

Figure 6 Killingworth Moor Highway Infrastructure Delivery Assumptions



4.4 SATURN Modelling Results

The development phasing tests have highlighted those junctions on the highway network that become strained by the increased traffic associated with the Killingworth Moor strategic site proposals. In some cases, junctions reach operational capacity during Phase 0 as a consequence of already consented development. Table 8 below shows the modelling results of the four Local Plan delivery phases for the Killingworth Moor development.

Table 8 Development Phasing Testing Strategic Modelling Results for Killingworth Moor

Junction	Arm	AM				PM			
		Ph 0	Ph 1	Ph 2	Ph 3	Ph 0	Ph 1	Ph 2	Ph 3
A19 Killingworth Interchange	A19 NB Off-slip	100%	98%	41%	40%	102%	101%	73%	74%
	A19 SB Off-slip	59%	58%	37%	38%	82%	76%	56%	56%
	A1056 EB	103%	103%	85%	85%	101%	103%	52%	52%
	A1056 WB	39%	46%	46%	47%	40%	46%	31%	31%
B1505 Great Lime Road / B1317 Killingworth Lane	Killingworth Lane	105%	106%	107%	107%	105%	108%	104%	105%
	Great Lime Road WB	101%	102%	103%	103%	108%	105%	102%	102%
	Forest Hall Road	107%	107%	110%	110%	104%	104%	104%	104%
	Great Lime Road EB	106%	110%	117%	117%	104%	103%	103%	103%
A191 / B1505 Wheatsheaf Roundabout	Great Lime Road	57%	76%	85%	87%	89%	68%	60%	60%
	Holystone Village	71%	95%	101%	101%	41%	57%	41%	41%
	Holystone Bypass	52%	51%	49%	49%	28%	29%	34%	34%
	Whitley Road	44%	53%	57%	58%	89%	101%	98%	98%
Forest Gate	Forest Gate	38%	87%	96%	97%	96%	104%	104%	104%
	Great Lime Road EB	100%	100%	100%	100%	75%	83%	87%	88%
	Great Lime Road WB	58%	62%	46%	46%	47%	69%	74%	75%
Killingworth Way	KM Link Road	-	10%	37%	36%	-	6%	66%	68%
	Killingworth Way EB	-	60%	103%	103%	-	79%	87%	87%
	Killingworth Way WB	-	82%	65%	65%	-	101%	89%	90%

There are clear associations with linking the delivery of large highway infrastructure on the Killingworth Moor site to reduce/mitigate the impact upon the wider highway network. This includes the timing of the underpass in conjunction with the proposed secondary school in 2021. This reduces the pressure on the Great Lime Road approach to the Wheatsheaf roundabout as well as removing local trips from the A19 Holystone Interchange.

The provision of the link road section between Great Lime Road and Killingworth Lane does not sufficiently mitigate the impacts upon Killingworth Village according to the modelling outputs. However, this is partly due to the SATURN model allowing all site traffic to utilise the link through the REME site which could be controlled. The SATURN modelling has not as yet tested the impacts of severing the route through Killingworth Village which should have significant benefits to the operation of the Killingworth Lane/Great Lime Road junction allowing changes to be made to signal staging and timings.

4.4.1 A19 / A1056 Killingworth Interchange

The results for the Killingworth Interchange highlight that the Killingworth Moor development has a direct impact upon the operation of this junction. The modelling results show that until the junction improvement is delivered during Phase 2, the operational capacity is exceeded despite only 250 units being built and accessed off Killingworth Way.

Nevertheless, the operation of the junction does not significantly worsen from Phase 0 which represents all known consented development. Once the highway improvement scheme is delivered all operational capacity concerns at this junction are addressed for the remained of the Local Plan period.

4.4.2 A191/B1505 Wheatsheaf Roundabout

The modelling has considered the improvement scheme associated with Scaffold Hill is delivered within Phase 0 which provides additional capacity. The Great Lime Road arm operates within capacity during Phases 1 to 3 due to the widening of this approach being delivered during Phase 1. However, there are other approaches which begin to operate above capacity that will need to be considered, which includes traffic from the Station Road West development impacting upon the A191 EB approach which is expected to commence later during the Local Plan period.

4.4.3 B1505 Great Lime Road / B1317 Killingworth Lane

The junction exceeds its operational capacity during Phase 0 as a consequence of committed development at the REME, Norgas House, and Chan building sites. The junction is likely to require mitigation/constraints on the Killingworth Moor site to limit the number of trips that can access Killingworth Lane at this location. A further phasing test will be undertaken (Phase 1b) to assess the impacts of severing the through route along Killingworth Lane through Killingworth Village which would force more traffic towards the Forest Gate and Killingworth Way junctions.

4.4.4 Forest Gate Site Access

The Forest Gate access has an improvement scheme delivered within Phase 1 of the Killingworth Moor development build-out which the strategic modelling suggests will operate beyond capacity. However as this junction will operate on MOVA (dynamic signal timings) which is beyond the capability of SATURN to replicate, the Vissim modelling will better inform the true operational capacity of this junction.

4.4.5 Summary

The initial assumptions for infrastructure delivery associated with the Killingworth Moor strategic site appear accurate, such that, junction capacity improvements have been delivered during/in advance of major increases in traffic flows. However, the Great Lime

Road/Killingworth Lane junction remains a concern and testing the additional Phase 1b scenario will provide a better understanding of how the impacts on this part of the local network can be mitigated/managed. The Vissim modelling remains the most conclusive assessment of the operational capacity of this junction and has been used to validate the mitigations/access proposals.

The impact of the Killingworth Moor development upon each junction is discussed in further detail in the following chapter.

4.5 Conclusions

Improving the capacity of the Great Lime Road arm of the A191 Wheatsheaf Roundabout resolves the possible re-distribution impacts that manifest downstream on the Station Road arm at the A191 Tyneview Park junction. The Killingworth Moor site should seek to encourage/enable traffic to join the A191 via the Wheatsheaf junction and minimise the trips travelling through Forest Hall.

The operation of the Forest Gate junction requires detailed modelling in micro-simulation before a firm conclusion of its operational capacity can be established. This caveat applies to all junctions with signal control that operate above capacity in the SATURN model, e.g. Killingworth Lane/ Great Lime Road, and A191 Tyneview Park.

The A19 underpass serves AM employment trips from the A19 Holystone Interchange and via the A186 Shiremoor bypass which significantly reduces the impact upon the Holystone Interchange.

The impact upon the Great Lime Road / Killingworth Lane signalised junction appears severe due to the increased number of trips across all arms. This junction is situated in a constrained location making mitigation very difficult, therefore, consideration should be given towards reducing/re-distributing some of the traffic demands.

This may include severing the B1317 between its junction with Simonside Way and Killingworth Village. This would redistribute through traffic on Killingworth Lane onto the link road leading to Forest Gate reducing the demand on the Killingworth Lane substantially. This reduced demand would allow green time at the junction to be reallocated to the Great Lime Road and Forest Hall Road arms where it is needed. Residents of Killingworth Village would still be able to travel in both directions but would have to join the Killingworth Moor link road via the REME development site.

5. Strategic Site Access and Highway Design Development for Killingworth Moor

5.1 Introduction

As part of the analysis undertaken to assess the impacts of the Killingworth Moor strategic site upon the local highway network, appropriate site access junction arrangements have been developed. These designs have subsequently been tested within the micro-simulation Vissim model of Killingworth to ensure they provide adequate capacity and minimise any adverse traffic impacts upon the local highway network.

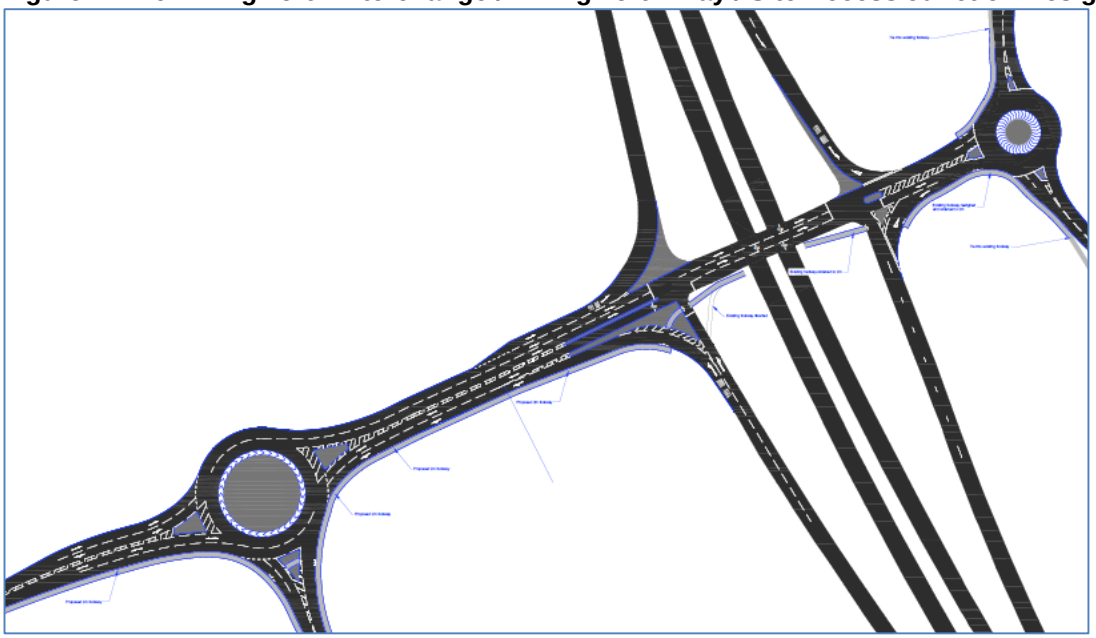
The junctions have been designed to tie into the existing highway network at the most appropriate locations as to minimise impacts and congestion caused to existing highway traffic. Access arrangements onto the link road have been designed such to encourage the redistribution of traffic away from constrained parts of the local highway network (Killingworth Lane).

The designs represent acceptable highway arrangements to NTC, however, alternatives/variations that deliver the same operational capacity and appropriate provision for pedestrians/cyclists will be considered. All drawings are included in Appendix A.

5.2 A19 Killingworth Interchange / Killingworth Way / Site Access

The A19 Killingworth Interchange and Killingworth Way site access junctions have been designed as a combined scheme due to the constraints on road space at the Killingworth Interchange. The limited space to widen the junction has pushed the design solution towards restricting some movements at the junction and locally diverting those drivers via new roundabouts either side of the A19 junction. The design is shown in Figure 7 below.

Figure 7 A19 Killingworth Interchange / Killingworth Way / Site Access Junction Designs



The proposed scheme has been assessed in both the SATURN strategic model and the Vissim micro-simulation model of Killingworth Moor. Both models have confirmed that the proposed junction improvement will greatly improve capacity at the Killingworth Interchange junction and the short diversions for right turning traffic onto the A19 northbound and from the A19 southbound are minimal. The introduction of a westbound lane gain arrangement from the A19 northbound off-slip onto Killingworth Way removes the potential for traffic to queue back onto the A19 mainline. This combined with the introduction of traffic signals for the A19 northbound off-slip right turn movement addresses the road safety concerns that led to HE developing a LNMS at this location. The junction improvements are estimated to cost £5M with £1.5M for the site access roundabout and £3.5M for the Interchange works.

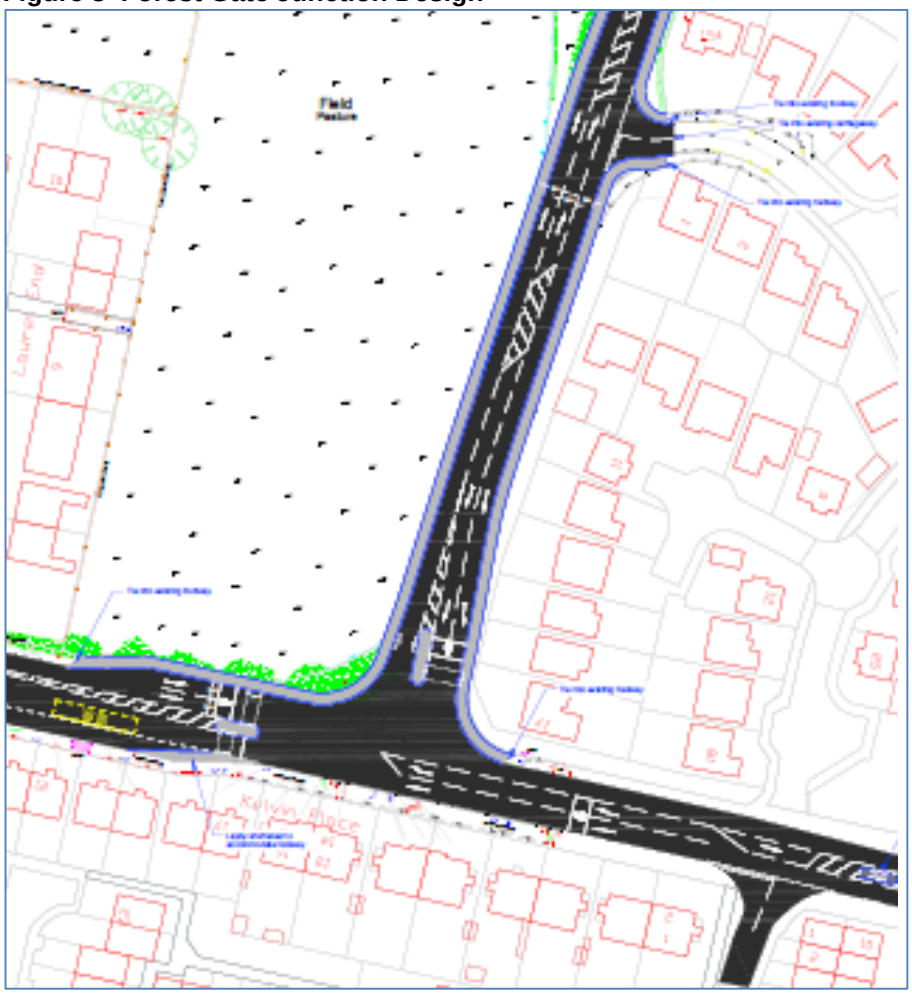
The proposed new layout for Killingworth Interchange has been modelled in Vissim. Future AM and PM traffic flows for phase 3 of the Local Plan have been assigned to the modelled Vissim network through dynamic assignment.

From reviewing the Vissim micro-simulation of the AM and PM peaks, the proposed interchange design accommodates the anticipated traffic flows through the junction. The new layout and signal operation provides sufficient stacking capacity, road space, and green time to clear the majority of queuing traffic in one cycle of the signals. Notably, the A19 slips onto the Killingworth Interchange were seen to experience shorter queues that those currently seen in the baseline situation.

5.3 Forest Gate

The Forest Gate site access will form the start of the link road that will run through the whole Killingworth Moor site and effectively bypass Killingworth. The existing junction is signal controlled and residential properties are close to the highway on Great Lime Road, limiting options to change the physical junction arrangement. Therefore, the existing signal controlled junction will be upgraded to provide the additional capacity necessary to serve the whole Killingworth Moor site and any redistribute local traffic. The junction design is shown in Figure 8 below.

Figure 8 Forest Gate Junction Design



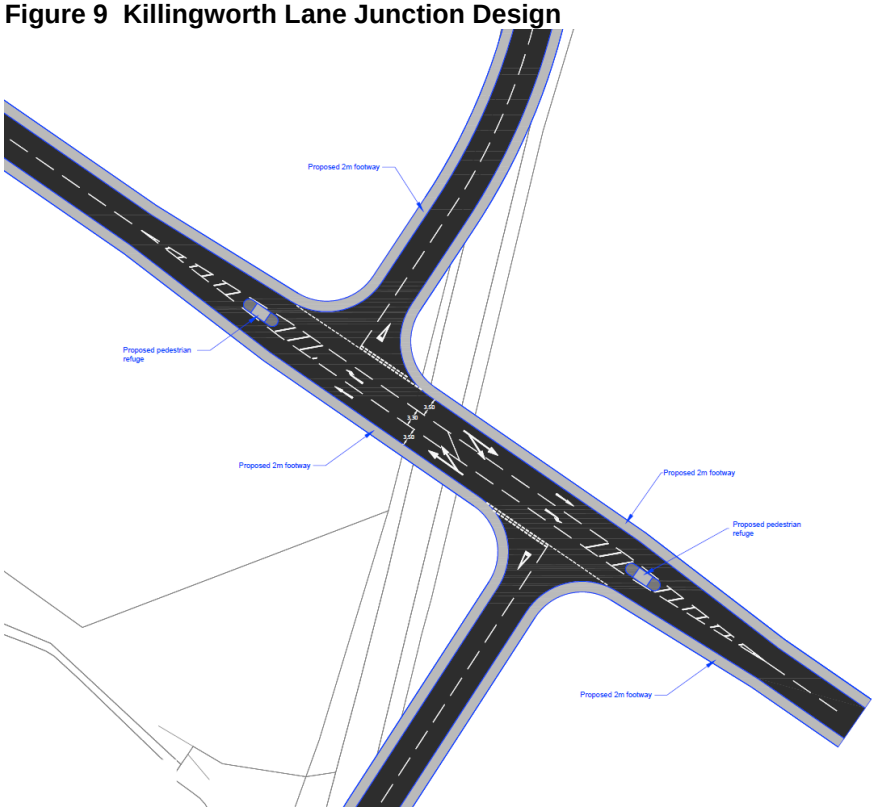
The required works would see the Forest Gate arm of the junction widened to accommodate two lanes on this approach and also widening of the eastbound Great Lime Road approach. These alterations will allow the junction to operate more efficiently with the use of filter stages and maximise the operational capacity. The estimated cost of this scheme (upgrade) would be £250K.

Whilst this improvement will improve the operation of the junction the current SATURN modelling estimates that the Forest Gate arm of the junction will operate over capacity (104%) by the delivery of phase 1. Whilst all other arms operate within capacity some additional mitigation design and tested should be undertaken through the Local Plan process to ensure another appropriate option is deliverable.

5.4 B1317 Killingworth Lane / Link Road junction

The Killingworth Moor link road will cross the existing B1317 Killingworth Lane at which point a new junction will be required. The design of this junction has been developed by the Killingworth Moor consortium's own transport consultants and was tested within the modelling exercises. The junction design proposed aims to encourage traffic to utilise the new link road to join the B1505 Great Lime Road rather than Killingworth Lane and thus reduce the volume of traffic travelling through Killingworth Village. The proposed junction design is shown in Figure 9 below and the estimated cost of these works is £400k.

Figure 9 Killingworth Lane Junction Design



5.5 A191 / B1505 Wheatsheaf junction

The A191 / B1505 Wheatsheaf junction will require localised widening to the Great Lime Road approach to complement the already committed works being undertaken at the junction associated with the Scaffold Hill development. The widening will extend the two lane approach on the Great Lime Road arm by 70 metres allowing approximately 14

vehicles to queue in each lane. This is significant improvement from the current provision which only allows 2 vehicles to queue side by side. The cost of this widening is estimated at £400k.

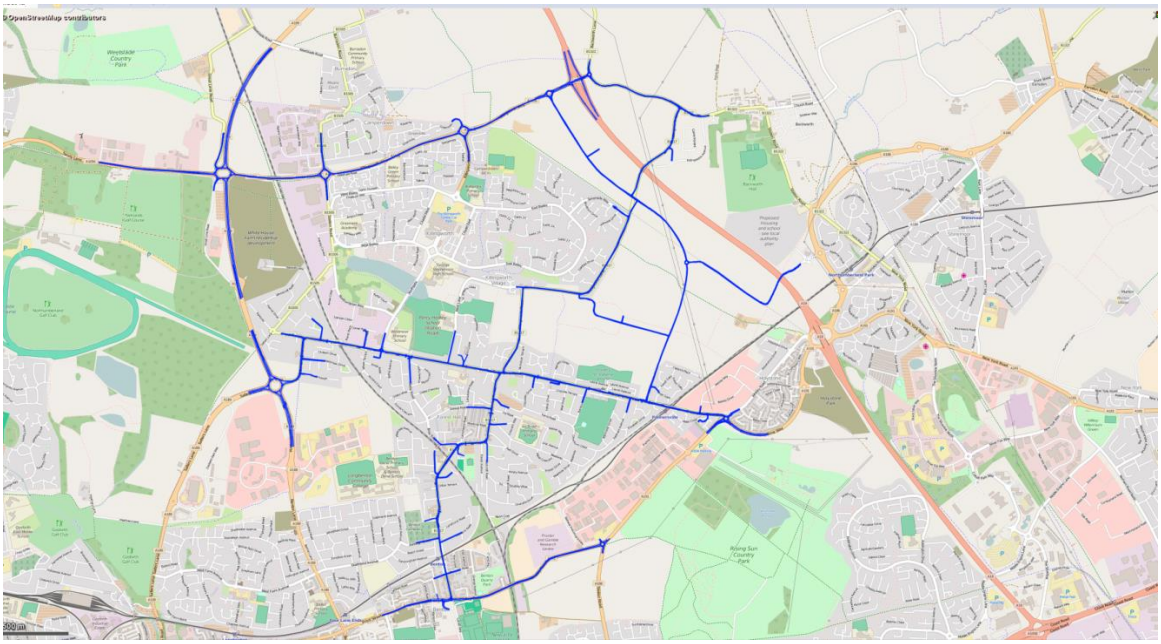
6. Micro-simulation Model Testing for Killingworth Moor

6.1 Killingworth Moor

This section of the report summarises the outputs of phasing testing showing changes to average journey times along key routes surrounding the Killingworth Moor site. VISSIM micro-simulation modelling software has been used to analyse the operation of key junctions in greater details in terms of capacity and with the inclusion of committed development in the future years.

The area of assessment for Killingworth Moor is shown in Figure 10 highlighted by the blue line and includes all of the junctions; Weetslade, Killingworth Interchange, Backworth, and Killingworth Moor roundabout, Forest Hall, Wheatsheaf and Tyneview Park.

Figure 10 Killingworth Moor VISSIM Model Extent



The design year has been taken as 2032 as this is the date proposed for completion of the housing allocations including all network improvements for both the Killingworth Moor site.

The design year has been modelled in Vissim, which also incorporates the local plan committed development including Weetslade and West Moor roundabouts and allows for some sensitivity testing of the key junctions under these conditions, and will give a measure of capacity and saturation with traffic arising from local housing growth.

6.2 Scenarios

The scenarios that have been tested in VISSIM which were identified during initial discussions with NTC include the following, and are summaries in Table 9 below:

Scenario 1 (S1) – Base Model. This scenario include the base traffic flows obtained through traffic surveys on the highway network. These models constituted the calibrated and validated models of the existing situation during the AM and PM peak periods for the Murton Gap and Killingworth Moor strategic sites. The networks coded in VISSIM reflect the road layouts currently found on the ground.

Scenario 2 (S2) – Do Minimum. This scenario included phase 3 traffic flows from the strategic SATURN model, which incorporates traffic for 100% build out of the strategic Murton Gap and Killingworth Moor sites, as well as all committed development traffic flows generated outside of the Local Plan sites. The networks coded in VISSIM include the existing road layouts and highway improvements being delivered by committed developments outside of the Local Plan proposals and improvements.

Scenario 3 (S3) – Do Something. This scenario included phase 3 traffic flows from the strategic SATURN model, which incorporates traffic for 100% build out of the strategic Murton Gap and Killingworth Moor sites, as well as all committed development traffic flows generated outside of the Local Plan sites. The networks coded in VISSIM include existing road layouts, highway improvements being delivered by other committed developments, and the highway improvements that will be delivered to mitigate the traffic impact of the Murton Gap and Killingworth Moor strategic sites.

Table 9 Vissim Modelling Scenarios for the Killingworth Moor Strategic Site

Scenario		Description
S1	Base	Base traffic flow surveys on the highway network. Current road layouts
S2	2032 Do minimum	Future 2032 + Committed developments network outside of the Local Plan proposals + Proposed development traffic
S3	2032 Do Something	Future 2032 + Committed developments network + Highway improvement + Proposed development traffic

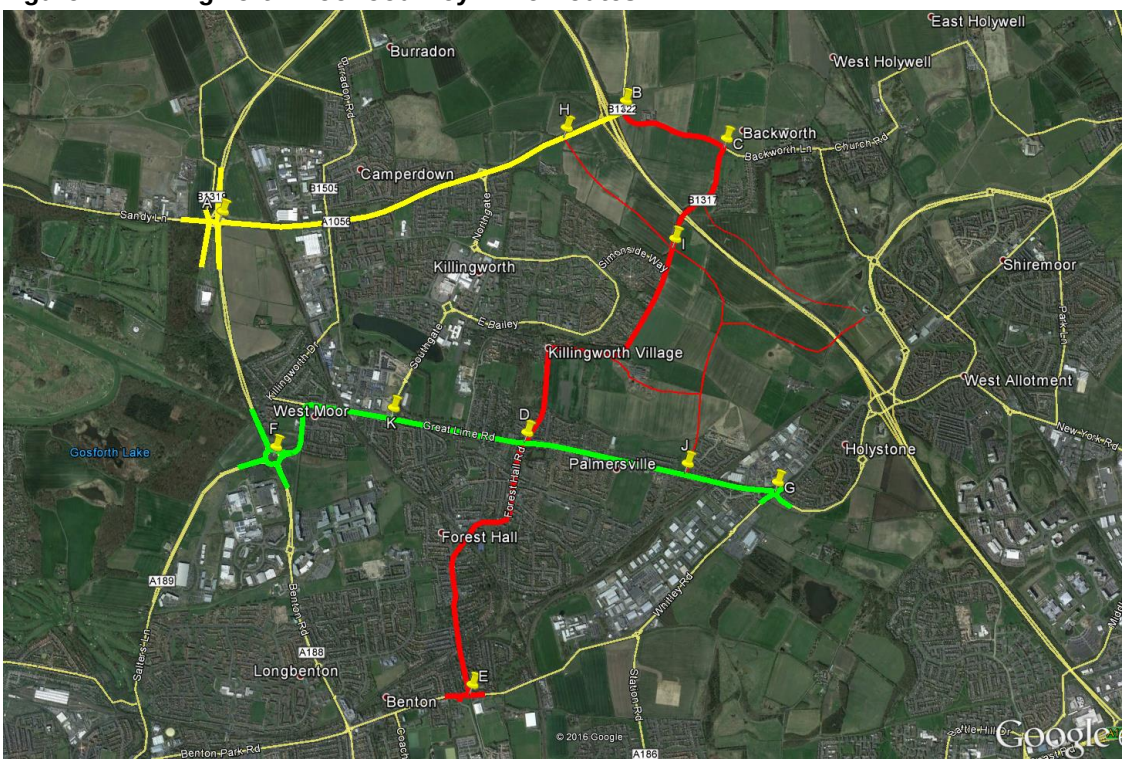
6.3 Journey Time Routes

Journey travel times has been collected on three crucial routes through the modelled Killingworth network, including routes along Killingworth Way, Great Lime Road, and Station Road in both directions. This has generated six sets of journey time data for the assessment of the Killingworth Moor strategic site scheme on journey time and delay. The journey time routes are shown in Figure 11 below and include the following:

- **Yellow Route –** AHB, A1056 - Killingworth Way between A19 / Killingworth Interchange and Weetslade;
- **Green Route** – FKDJG, B1505 - Great Lime Road between West Moor and Wheatsheaf roundabout; and

- **Red Route** – CIDE, B1317 - Killingworth Lane and Station Road between Backworth and Tyneview Park.

Figure 11 Killingworth Moor Journey Time Routes



6.4 Average Journey Time Analysis

A summary of the average journey times for the three modelled scenarios including results for the baseline model for the AM and PM peaks, are shown in Table 10 and Table 11 below. The average journey times are based upon data collected in 10 runs of the modelled network for each peak period.

Table 10 AM Average Journey Times for Killingworth Moor

AM Peak Summary of Travel Times (secs)					
Route	**Direction**	**Base**	**2032 Do Minimum**	**2032 Do Something**	**2032 DS Killingworth Lane Severed**
Killingworth Way (AHB)	**EB**	193	192	462	305
	WB	287	358	371	360
Great Lime Road (FKDJG)	**EB**	346	604	393	367
	WB	418	1873	453	409
	NB	239	302	227	206

Killingworth Rd/Station Rd (CIDE)	**SB**	212	209	212	214

Table 11 PM Average Journey Times for Killingworth Moor

PM Peak Summary of Travel Times (secs)					
Route	**Direction**	**Base**	**2032 Do Minimum**	**2032 Do Something**	**2032 DS Killingworth Lane Severed**
Killingworth Way (AHB)	**EB**	205	406	380	413
	WB	281	382	361	394
Great Lime Road (FKDJG)	**EB**	385	591	600	401
	WB	398	958	884	431
Killingworth Rd/Station Rd (CIDE)	**NB**	216	463	460	264
	SB	212	185	193	185

6.5 2032 Do Minimum

The traffic for 2032 levels has been derived from the strategic SATURN model and includes the committed development traffic. Considering the AM model, the results show similar journey times through A1056 Killingworth Way when compared to the base model. This is due to comparable demand in an east bound direction in the AM peak. Despite longer journey times, the VISSIM model demonstrates that the improved highway network will be able to accommodate a greater volume of vehicles within the corridor in a west bound direction. This is the result of improvements to the Weetslade roundabout including signalisation of the junction resulting in shorter travel times and shorter queue lengths.

Moreover, the model highlights that significant delay along Great Lime Road (WB) and Killingworth Lane (SB) due to increase in traffic can be expected. Therefore, heavy queuing is demonstrated in the model along the B1317 (Killingworth Lane) in a south bound direction from the Forest Hall junction all the way back. Long queuing on Forest Gate is increased as a result of posing flow within Great Lime Road. This is causing an increase in the number of vehicles queuing off the network at the end of the model simulation period, meaning vehicles cannot load into the model due to queuing traffic.

6.6 2032 Do Something

Due to having the new link road through the Killingworth Moor site, physical network capacity and road space will be increased. The link road manages the impacts upon the local highway network such that there are only modest increases in journey time along sensitive commuting corridors. This scenario does result in an unacceptable impact along the Great Lime Road corridor as a consequence of additional traffic at the

Killingworth Lane/ Great Lime Road junction which is the main cause of the increased journey times.
A further sensitivity test was therefore undertaken to limit the access of development traffic and through traffic on Killingworth Lane which is summarised in the following section.

6.7 2032 Do Something Killingworth Lane Severed

Due to the impact upon journey times at the Killingworth Lane / Great Lime Road junction which causes the substantial delays along the Great Lime Road and Killingworth Road/Station Road corridors a sensitivity test was undertaken. The sensitivity test severed the network north of Killingworth Village such that only minimal development site traffic and Killingworth Village residents could access Great Lime Road from Killingworth Road/Lane. The existing through traffic and majority of the development traffic was subsequently forced to redistribute via Killingworth Way or join Great Lime Road at the Forest Gate junction.

The results of the sensitivity test when compared to the Base performance are encouraging with only minor increases to AM and PM journey times along Great Lime Road and Station Road (Forest Hall) corridors. Severing the link though Killingworth Village has allowed the signal timings at the Killingworth Road / Great Lime Road junction to be re-optimised to give more time to East-West traffic. The impact upon the Forest Gate junction can be accommodated within the existing highway design proposed, again with minor alterations to signal timings/phasing.

However there is an increase in journey times along the A1056 Killingworth Way which require further analysis specifically for westbound traffic. The Camperdown roundabout has already been identified as a concern and the additional traffic may also impact the A189 Weatslade junction.

The sensitivity test has been successful in accommodating the predicted site traffic on Great Lime Road without the need for further mitigation along this corridor.

6.8 Network Performance

Figures 12 and 13 below provide a summary of the journey times for the AM and PM peak models. Considering scenario three, all of the journey times in the AM model are shorter with the exception of A1056 Killingworth Way east bound when compared to the scenario 2 results. This is the result of introducing the new three arm roundabout access into the Killingworth Moor site, as well as the opposing traffic departing the strategic site and because of the introduction of u-turn movements from Backworth. However, the highway scheme delivered as part of the strategic site will contribute significant benefit during scenario 3.

Overall journey times collected for scenario 3 during the PM peak are shorter when compared to the journey time results for scenario 2.

Figure 12 AM Travel Times for Killingworth Moor

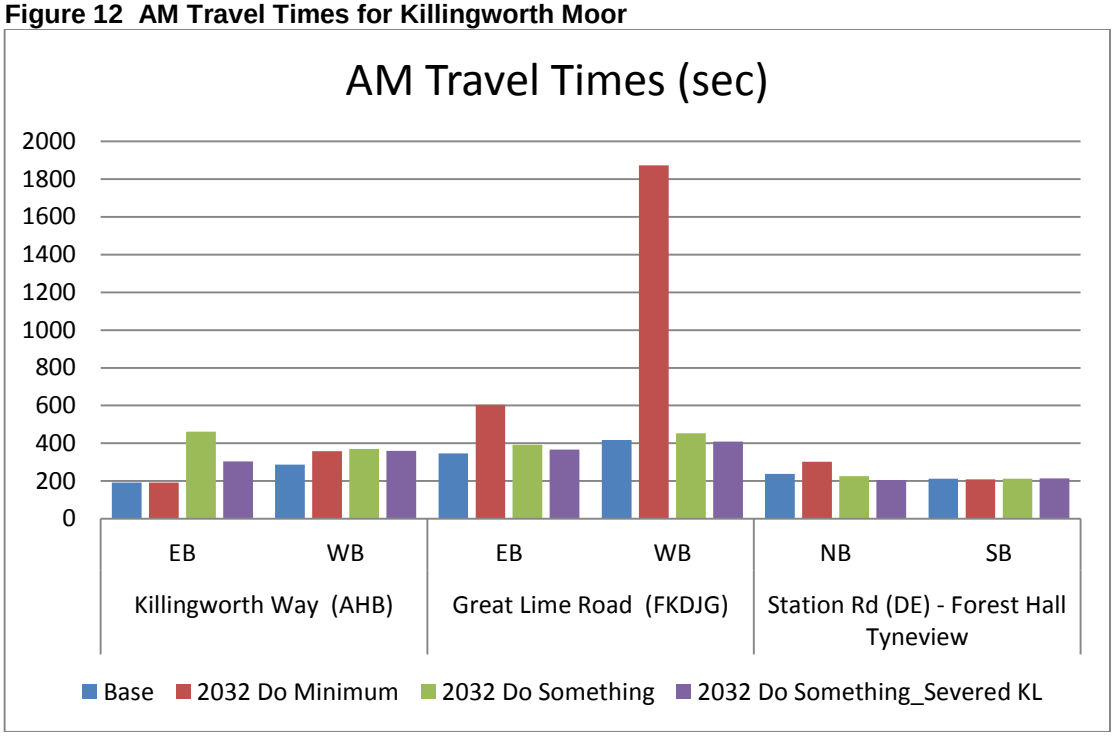
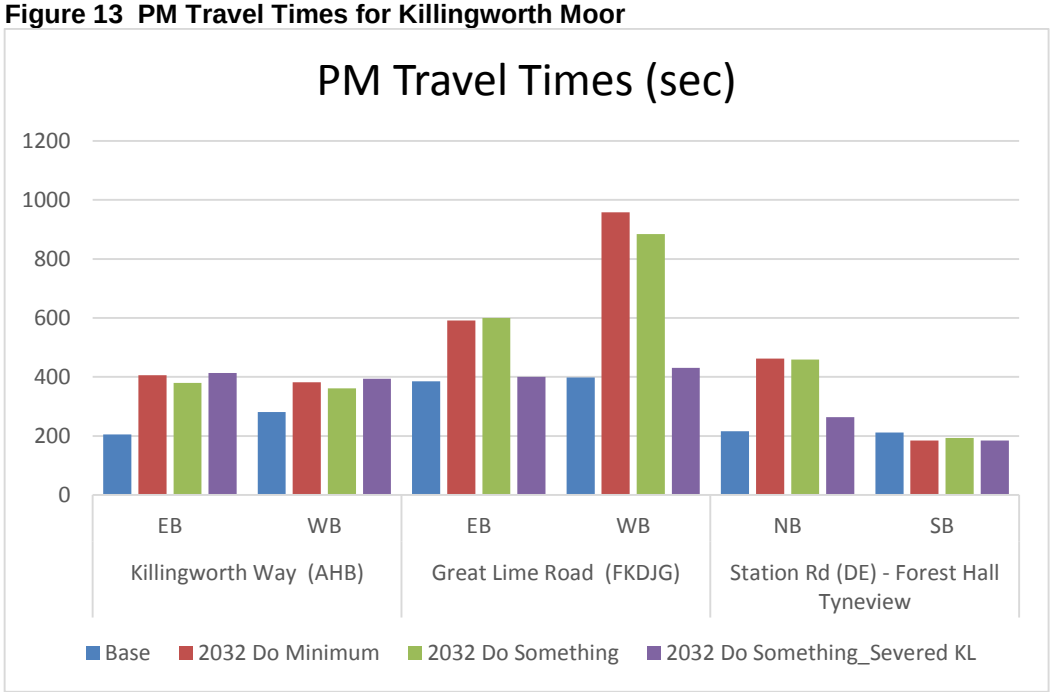


Figure 13 PM Travel Times for Killingworth Moor



In the AM model, the volume of vehicle has increased by 17 percent in scenario 3 when compare to the base network traffic flows. This indicates that the proposed highway improvements and scheme deliverables for the Killingworth Moor site will increase the available network capacity and reduce the delay time for individual vehicles from 113 seconds in the base scenario to 66 seconds in scenario 3.

There has been an increase in the number of vehicles within the modelled network for the PM model but to a lesser extent that the AM model, as shown in Figure 13 below. This is due to the opposing traffic along Killingworth Way and Great Lime Road corridors which has prevented new traffic generated from the Killingworth Moor site from accessing the highway network in the model and then failing to be loaded into the network. This caused extensive network queuing and delay of 285 seconds which is 37 percent higher when compared to the network delay recoded in the AM model, as shown in Figure 15 below.

Figure 14 Volume of Traffic Entering the Modelled Network

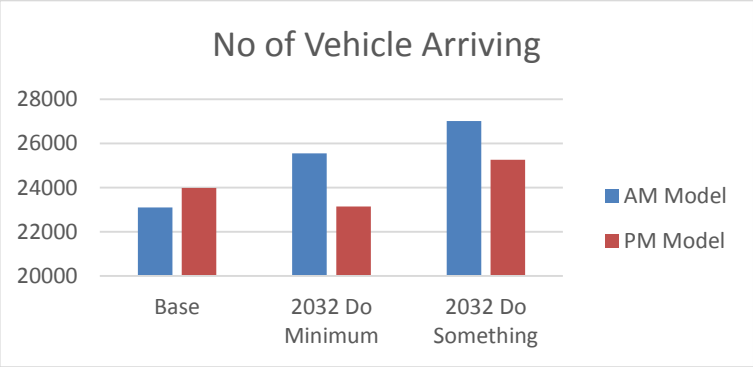
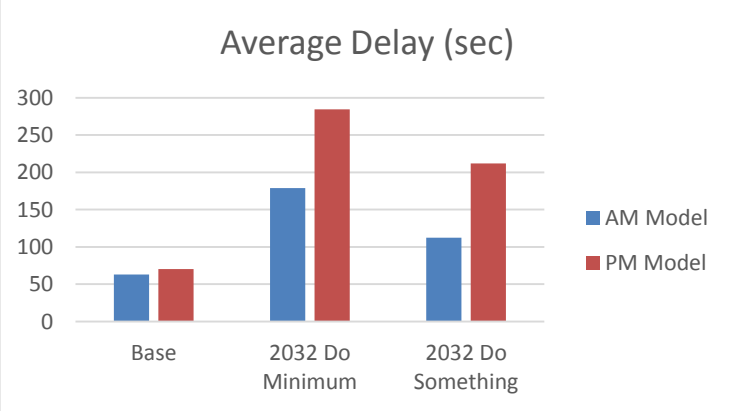


Figure 15 Average Delay from the Modelled Network



7. Murton Gap Strategic Modelling

7.1 Baseline Strategic Modelling

Prior to detailed strategic modelling of the Murton strategic site in line with phasing intervals of the proposed development, a preliminary modelling exercise was undertaken in SATURN to provide an indication of the traffic impact that could be anticipated as a result of housing development at the Murton strategic site. This included modelling a baseline position of the Murton highway network and undertaking sensitivity testing to identify areas of the highway network that would need consideration during detailed modelling of future positions in SATURN and Vissim.

7.2 Murton Gap Strategic Modelling results

Table 12 below summaries the varying operational performance of several key junctions on the local highway network adjacent the Murton Gap strategic site. The Base scenario represents the current highway network with 2012 traffic flows for reference. The Local Plan "LP" scenario represents the NTC preferred option with all known/committed highway network improvements schemes in place.

Table 12 Murton Gap Development Impacts on Key Junctions

Junction	Arm	AM		PM	
		Base	LP	Base	LP
Norham Road / A191*	New York Road	13%	46%	13%	65%
	A191 WB	25%	51%	25%	49%
	Norham Road	23%	37%	24%	57%
	Silver Fox Way	14%	23%	15%	76%
	A191 EB	32%	53%	32%	59%
Park Lane / A191	Park Lane	46%	59%	46%	53%
	A191 EB	30%	34%	31%	57%
	A191 WB	51%	65%	51%	80%
A19 Holystone Interchange	A186	31%	46%	31%	28%
	A191 WB	52%	63%	52%	45%
Proposed Roundabout / A186	A186 WB	63%	87%	63%	51%
	Murton Lane	15%	51%	15%	39%
	A186 EB	31%	50%	31%	77%
Foxhunters Roundabouts	A192 Seatonville Rd	50%	58%	50%	50%
	A191 Hillheads Rd SB	38%	46%	38%	45%
	A191 NB	54%	60%	54%	55%
	A191 SB	89%	99%	89%	97%
	A192 Preston Road NB	98%	101%	98%	102%
	A191 Rake Lane EB	76%	95%	76%	89%

A192/ A1056 Tynemouth Pool	A192 SB	99%	104%	99%	103%
	A1058 WB	102%	107%	102%	95%
	A192 NB	81%	83%	81%	86%
	A1058 EB	81%	95%	81%	106%

*assumes junction improvements are deliverable on site

In the base network it can be seen that the Fox Hunters roundabout and the A192 / A1056 Tynemouth Pool junctions operate near at or above capacity on a number of the junction arms. Any significant increases in traffic at this junction would require mitigation.

Of particular concern on the Foxhunters roundabout is the A192 Preston Road arm in both the AM arm PM, which are close to operational capacity (98% saturation) in the base. With the Local Plan traffic forecasts included, the junctions are predicted to operate above capacity (101% AM and 102% PM).

For the A192 / A1056 Tynemouth Pool, all arms apart from the A192 NB are near or over capacity when the Local Plan forecast traffic is modelled and as such mitigation would be expected in order to deliver the Murton strategic site. An anomaly occurs

The A191 southbound junction is currently operating at 89% saturation. When considering junction design and mitigation, where possible junctions are designed to provide to a minimum of 85% saturation demand. This allows for future traffic growth. When modelling the traffic growth associated with the Local Plan any spare capacity and these junctions is almost exhausted (99% saturation AM and 97% PM). Given how close these junction are to theoretical capacity and the sensitivity of strategic modelling outputs, this junction should be considered for detailed modelling and mitigation works. The A191 Rake Lane junction is also approaching theoretical capacity in the AM with Local Plan traffic growth and should also be subject to the above further assessment.

Consideration must be given to the traffic forecasting underpinning the modelling results. As outlined in chapter 2, the traffic forecasts are based on low trip rates due to the proposed high level of public transport, walking and cycling provision for the Murton site. Should this level of provision not be provided then the robustness of the trip rates used could be questioned. Using higher trip rates is likely to widen the geographical extent of the highway impacts and the severity.

The causation of the impacts on the junctions above are discussed in more detail in the following chapter.

7.3 Murton Gap Impacted Junctions & Causation

7.3.1 A191 / A192 Foxhunters & A192 / A1058 Beach Road Roundabouts

The impact of the Murton Gap traffic upon the operation of the ‘Foxhunters’ roundabouts is significant. AM traffic travelling towards Newcastle turns left out of the proposed site access on the A191 Rake Lane opposite North Tyneside General Hospital, and travels east onto the A192 Preston Road North which leads to the A1058 Beach Road / Coast

Road. The existing layout of the 'Foxhunters' roundabouts are shown in Figure 16 below and A1058 Beach Road/Coast Road is shown in Figure 17 below.

Figure 16 Foxhunters' Roundabouts

The AM Murton Gap traffic represents the majority of the future traffic growth anticipated as part of the full Local Plan impacting upon this traffic route. This route is especially sensitive to any increase in traffic flow as the two roundabouts currently operate at around 98% of capacity. The volume of traffic impacting upon these roundabouts is large as the proposed site access on the A191 Rake Lane provides access to the entire site.

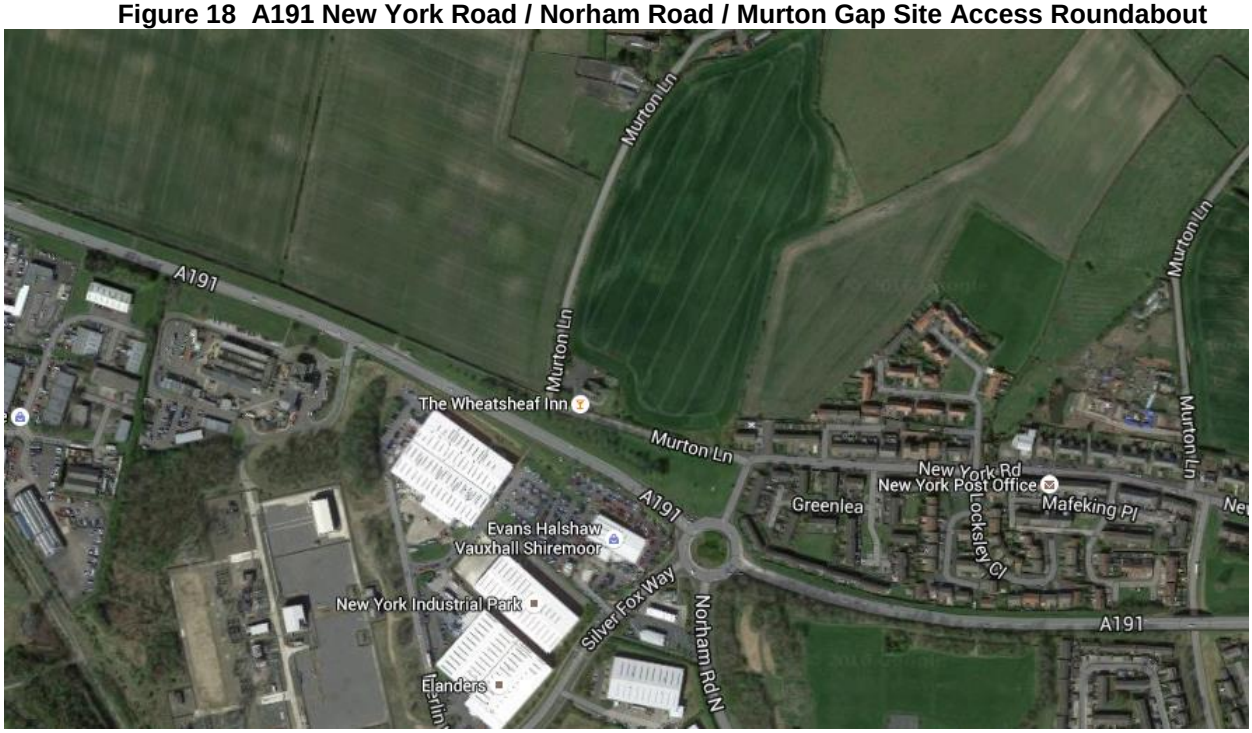
The PM impacts are similar as the base operation is also close to capacity. There is also likely to be an additional congestion point created at the site access due to the volume of right turning traffic into the site. This would exacerbate the existing queuing issues on the A191 Rake Lane eastbound during the PM peak.

Figure 17 A1058 Beach Road / Coast Road Roundabout

7.3.2 A191 New York Road / Norham Road / Murton Gap Site Access

This junction has been modelled to provide the significant improved operational capacity necessary to accommodate Murton Gap traffic and diverted link road trips through the site. These capacity improvements include widening the A191 approaches to the junction to provide two lanes on entry and exit allowing two ahead lanes in both directions. The improvements would also require the site access / link road to provide a two lane approach to the junction. Without these alterations the SATURN model was unable to load all of the Murton Gap and link road traffic into the model. Had this not been remedied it would have understated the impact upon the wider highway network. The existing layout of the A191 New York Road/Norham Road roundabout is shown in Figure 18 below.

Figure 18 A191 New York Road / Norham Road / Murton Gap Site Access Roundabout



The AM outbound traffic from the site splits between the A191 westbound towards the A19 and onto Norham Road towards the Coast Road and Newcastle. There are also significant volumes of vehicular trips travelling into Cobalt (Silver Fox Way) but these are likely to reduce once more detailed trip generation for the site has been undertaken and opportunities for sustainable travel are considered in more detail.

The link road through the Murton Gap site reduces the future traffic flow along the A192 Earsdon Road/Seatonville Road and Park Lane by approximately 19%. These existing trips are redistributed along the link road from north to south with the majority destined for Cobalt. The roundabout accommodates approximately 4250 vehicles during the AM peak hour and 3750 in the PM peak. These represent a 50% and 30% increase in traffic volumes respectively.

The traffic increase along Norham Road is substantial and utilises the majority of the additional capacity provided by the Coast Road local major scheme at the Norham Road / Coast Road junction. The Coast Road scheme is currently being constructed and is planned to be completed by the end of 2016/17. In particular the southbound right turn onto the Coast Road in the AM peak and left turn from the eastbound Coast Road off-slip during the PM peak.

During the PM peak the outbound Cobalt traffic on Silver Fox Way and inbound Murton Gap traffic on Norham Road and A191 eastbound are in direct conflict. These approaches will likely experience significant queuing and delays.

7.3.3 A191 New York Road / Park Lane

This junction benefits significantly from the provision of a north-south link road through the Murton Gap site. The provision of the link road significantly redistributes forecast traffic away from this junction during the AM peak the southbound traffic volumes reduce such that the dominant A191 east-west flows can be allocated increased green time. This helps mitigate the congestion caused by the increased traffic volumes generated by the Murton Gap site. This junction is shown in Figure 19 below.

The predicted traffic flows along the A191 between Norham Road and Park Lane may necessitate additional lanes to be provided in each direction. The Park Lane junction itself is unlikely to require any significant improvements once the Murton Gap link road is operational.

Figure 19 A191 New York Road / Park Lane Junction

7.3.4 A186 / Site Access & A192 Red Lion Roundabouts

The northern site access junction with the A186 for Murton Gap will operate within its design capacity but with pressure on the A186 westbound approach during the AM traffic peak. This situation will reverse onto the A186 eastbound during the PM traffic peak. The SATURN model highlighted that queue lengths were in excess of the physical space between the two junctions for westbound traffic in the AM and eastbound traffic in the PM. As concept designs are prepared for the northern access junction the interaction between the two roundabouts needs consideration. The existing junction layouts are shown in Figure 20 below.

Figure 20 A186 / A192 Red Lion Roundabout

7.4 Murton Link Road Benefits

The need for a strategic link road through the Murton Gap site emerged as part of the concept master planning exercise. The sensitivity of the A191 Rake Lane and A192 Seatonville Road to significant increases in traffic volumes was raised as a constraint on the development site. As such vehicular site access points were identified which avoided and minimised the likelihood of development traffic routing along these roads.

The link road forces the vast majority of site traffic to join the A191 New York Road along a section where its impacts can be adequately mitigated. Furthermore the link road represents a “Monkseaton Bypass” as it links the A186 close to Earsdon with the A191 adjacent Cobalt/New York. There a significant number of existing trips that route along the A192 and A191 to reach Cobalt and the Coast Road for which the new link road would represent are more direct and quicker alternative.

The redistribution of trips from the North East of the borough and also trips originating from South East Northumberland reduces the pressure upon the A192 and A191 adjacent the Murton Gap site. The link road would also significantly reduce the volume of traffic travelling along Park Lane of which the majority are destined for Cobalt Business Park. The link road would represent are more direct and quicker alternative route.

Furthermore the link road would cross the Metro line within the Murton Gap site enabling access to a new station for which the whole development site could access.

7.5 Conclusions

The major traffic impacts of the strategic Murton Gap site manifest along the A191 corridor with some at the eastern end adjacent North Tyneside General Hospital, but also more significantly at the A191 New York Road/Norham Road roundabout. Discussions are ongoing with the landowners and master-planners to agree/identify appropriate access points into the site. In capacity terms NTC also have concerns regarding the operation of the A191 New York Road/Norham Road roundabout and the feasibility of delivering the required capacity improvements.

An alternative arrangement for the southern link road access junction may be to provide a new junction with the A191 further west of Norham Road. This access arrangement would still likely impact the operation of the A191 New York Road/Norham Road roundabout but mitigation would be more feasible. If delivered in combination with road widening along the A191 between Park Lane and Norham Road, this is likely to resolve the predicted congestion issues on this part of the network.

The traffic impacts generated due to the site access opposite North Tyneside General Hospital contributes to two junctions operating above capacity. The 'Foxhunters' roundabouts and A192 / A1058 'Tynemouth Pool' junctions would both require mitigation which would likely be at significant cost. It is NTC's recommendation that rather than allowing the full Murton Gap site to be accessed via Rake Lane, a maximum threshold be applied limiting the number of houses on this phase that can access the local highway network at Rake Lane.

From a strategic perspective NTC would advocate utilising an alternate route to the A1058 Coast Road via Norham Road from the Murton Gap site. The proposed north-south link road would then provide a direct route from the A186/A192 to the A1058 Coast Road and effectively bypass Monkseaton and Shiremoor. Complementary highway improvements would likely be required along Norham Road to facilitate the increased traffic, but the improvements proceeding at Norham Road Bridge would likely be sufficient.

The northern access junction should be sited opposite the existing access into Earsdon Village to significantly improve local residents' access onto the A186. The current highway arrangement is poor with traffic needing to turn across the central reservation of a dual carriageway. Furthermore, this would leave approximately 200 metres between the 'Red Lion' roundabout and the new site access into Murton Gap which should be sufficient to accommodate any queuing during peak periods.

8. Development Phasing Testing for Murton Strategic Site

8.1 Introduction

The initial transport modelling work undertaken to establish the impacts of the Murton strategic site upon the local highway network assumes the full delivery of the draft NTC Local Plan. This has identified locations on the network where mitigation and management of development impacts will be necessary. Further work has now been undertaken to identify when key highway infrastructure is necessary. This chapter outlines the assumptions made in the phasing assessment, the results of the assessment and the implication the results have on the phasing of the highway mitigations.

8.2 Local Plan Delivery Phases

As discussed in the Killingworth Moor development phasing testing chapter, the NTC Local Plan is proposed to provide for a 15 year period up to 2032, with an interim period for the delivery of consented development. The phasing testing that has been undertaken for the Murton Gap site splits the delivery of the Local Plan into four periods which include the following:

Phase 0 – 2014 to 2017
Interim period representing traffic growth associated with already consented and partly constructed developments across the borough as well as the delivery of major infrastructure improvements programmed for delivery by 2018.

Phase 1 – 2018 to 2022
Initial 5 year delivery period of the Local Plan with completion of already consented developments as well as the first phase of the Murton Gap strategic site.

Phase 2– 2023 to 2027
Second 5 year delivery period of the Local Plan with completion of the second phase of the Murton Gap strategic site.

Phase 3– 2028 to 2032
Final 5 year delivery period of the Local Plan with completion of the third phase of the Murton Gap strategic site.

The phasing assumes that job growth is proportionately delivered in line with the housing delivery trajectory. The delivery of housing at the strategic site has been taken from phasing proposals submitted by the respective landowner consortium.

8.3 Housing & Infrastructure Delivery at Murton Strategic Site

The chart in Figure 21 below summarises the assumed delivery of housing units per annum at the Murton Gap site across the plan period, shown in blue against the green total.

Figure 21 Annual Delivery of Housing Units at Murton Gap for the Local Plan Period

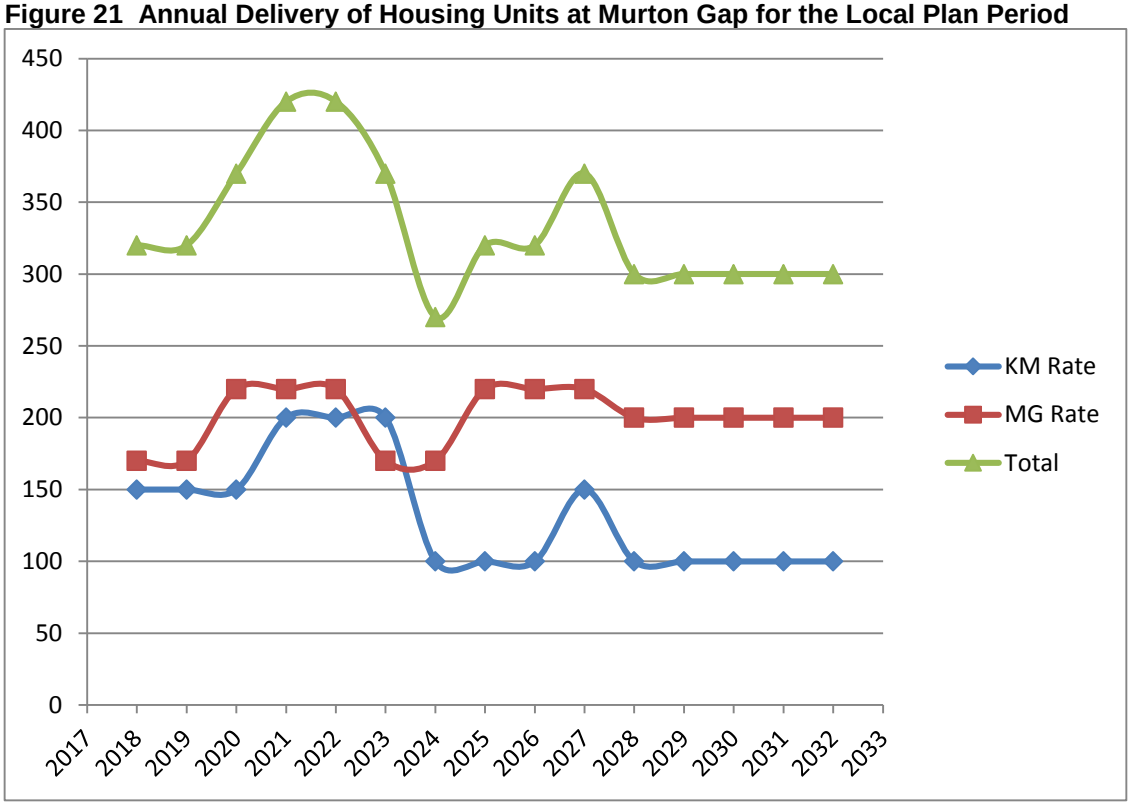


Table 13 below provides the total number of units predicted to be delivered at the Murton Strategic site across each Local Plan phase.

Table 13 Total Housing Units for the Murton Gap Strategic Site per Plan Phase

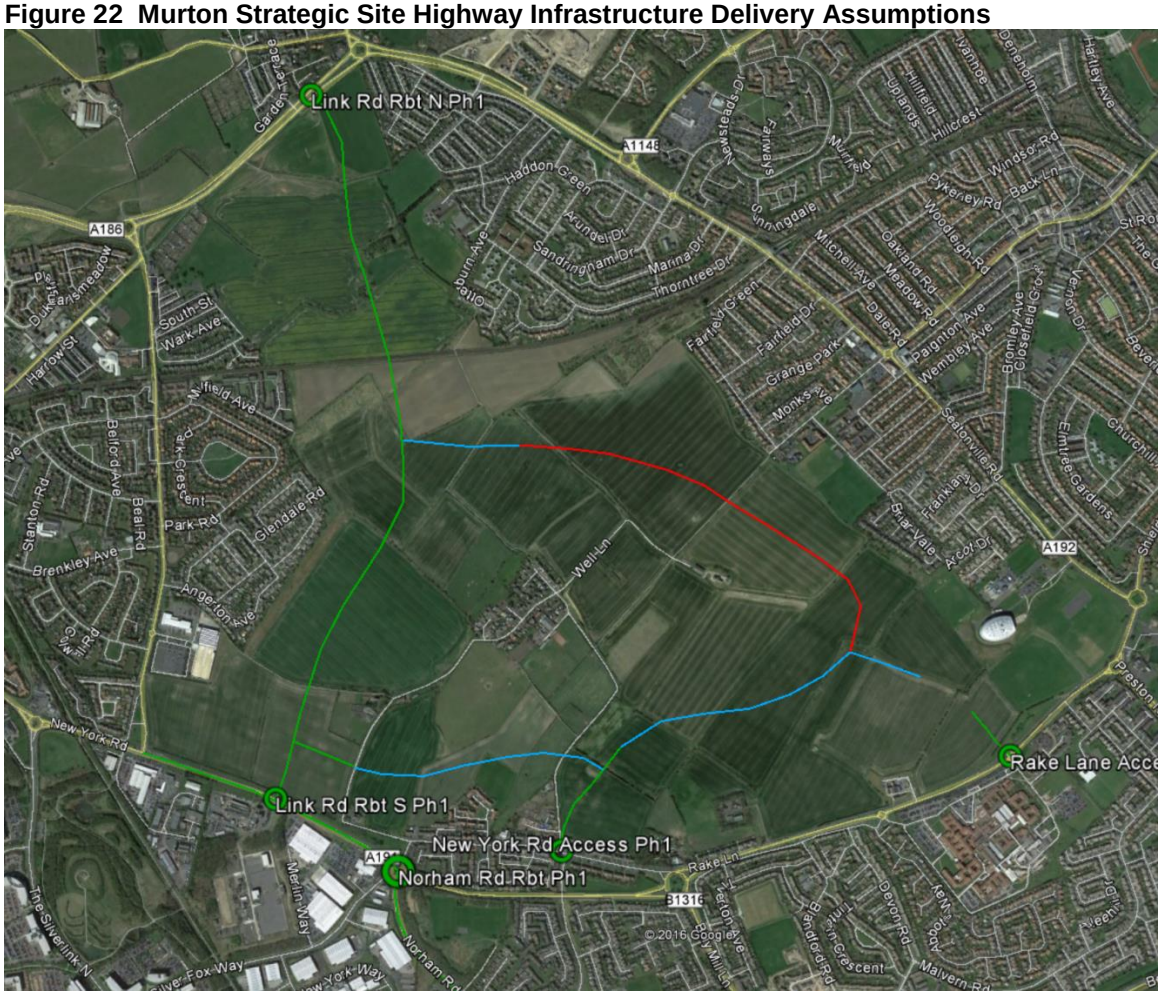
	Phase 1	Phase 2	Phase 3
	2018-22	2023-27	2028-32
MG	1020	718	1155

In conjunction with the housing delivery predictions and suggestions made by the landowners, NTC have made assumptions on what the minimum highway infrastructure improvement requirements are during each Local Plan phase. The assumptions are shown in Figure 21 below in which Phase 1 is shown in green, Phase 2 in blue, and Phase 3 in red. Figure 22 provides the phasing of the site access and internal link infrastructure, and al external mitigation is required within stage1.

The highway infrastructure phasing assumptions are based on the current proposed phasing plan for the development site. Should the phasing assumptions change this may alter the timescales of delivering some of the key highway infrastructure. Acceptable

trigger points for each onsite and offsite highway improvement will be agreed with developers as part of any pre-application advice.

Figure 22 Murton Strategic Site Highway Infrastructure Delivery Assumptions



8.4 Murton Strategic Site Development Phasing Analysis

8.4.1 Modelling Results

The development phasing tests have highlighted those junctions on the highway network that become strained by the increased traffic associated with the Murton strategic site proposals across the 5 year delivery phases. In some cases junctions reach operational capacity during Phase 0 as a consequence of already consented development. Table 14 below shows the modelling results of the four Local Plan delivery phases for the Murton strategic site development.

Table 14 Development Phasing Testing Strategic Modelling Results for Murton Gap

Junction	Arm	AM				PM			
		Ph 0	Ph 1	Ph 2	Ph 3	Ph 0	Ph 1	Ph 2	Ph 3
A191 / Norham Road Roundabout	A191 WB	76%	56%	74%	81%	53%	28%	28%	27%
	Norham Road	47%	15%	20%	19%	64%	42%	35%	36%
	Silver Fox Way	12%	8%	8%	8%	94%	96%	100%	100%
	A191 EB	38%	35%	53%	55%	30%	11%	11%	11%
Park Lane / A191	Park Lane	102%	101%	50%	48%	64%	58%	52%	52%
	A191 EB	56%	75%	89%	90%	63%	78%	74%	69%
	A191 WB	31%	50%	50%	48%	101%	79%	103%	103%
MG Link Road South / A191	MG Link Road	-	52%	83%	86%	-	14%	15%	15%
	A191 EB	-	60%	71%	72%	-	19%	17%	17%
	A191 WB	-	48%	41%	41%	-	100%	96%	96%
MG Link Road North / A186	MG Link Road	-	28%	26%	27%	-	15%	13%	13%
	A186 WB	-	75%	75%	76%	-	38%	38%	39%
	A186 EB	-	50%	51%	52%	-	76%	77%	77%
Foxhunters Roundabouts	A192 Seatonville Rd	62%	59%	59%	60%	51%	51%	50%	50%
	A191 Hillheads Rd SB	43%	43%	44%	44%	43%	43%	43%	43%
	A191 NB	45%	47%	47%	47%	39%	43%	45%	46%
	A191 SB	103%	102%	102%	102%	101%	101%	100%	100%
	A192 Preston Road NB	100%	101%	101%	101%	101%	101%	101%	101%
	A191 Rake Lane EB	33%	34%	34%	33%	27%	30%	31%	32%
A192 / A1056 Tynemouth Pool	A192 SB	96%	102%	103%	103%	101%	102%	102%	102%
	A1058 WB	105%	106%	107%	107%	85%	94%	92%	93%
	A192 NB	81%	77%	78%	80%	75%	76%	79%	80%
	A1058 EB	76%	90%	91%	90%	104%	107%	105%	105%

There are clear associations with linking the delivery of large highway infrastructure on the Murton Gap site to reduce/mitigate the impact upon the wider highway network. Most significantly this includes the full delivery of the north-south link road during Phase 1. This allows traffic to redistribute away from Park Lane, Seatonville Road, and A191 Rake Lane and reduces the traffic capacity impact on the new access roundabout on Rake Lane.

8.4.2 A191/A192 Foxhunters & A192/A1058 Tynemouth Pool Roundabouts

The 'Foxhunters' roundabouts currently operate over capacity but due to the restrictions on access from the Murton strategic site onto the A191 Rake Lane, the operation of the junction does not worsen, although remains over capacity. Spare capacity is provided through the provision of the link road ("Monkseaton bypass"). The 250 residential units

accessed off Rake Lane takes up all of the spare capacity provided by the link road at this location and as such the junction remains at / overcapacity. As such further physical mitigation works at the Foxhunters junction would not be necessary subject to the number of properties accessible from the Rake Lane access not exceeding 250.

The 'Tynemouth Pool' roundabout currently also operates close to capacity and is pushed over through the delivery of Phase 1 of the Murton Gap site. This can be seen clearly in the AM peak with the increase in degree of saturation from 96% to 102% on the A192 southbound approach to the junction, and the PM return route via the A1058 eastbound approach. It will therefore be necessary to mitigate the impact at this junction.

8.4.3 A191 New York Road / Norham Road, A191 Park Lane, and A191 Site Access Roundabout

The A191 between Park Lane and Norham Road will be subject to a significant increase in traffic by Phase 3 of the Murton Gap development. During peak times this section is already under significant pressure as a consequence of traffic associated with Cobalt Business Park. During Phase 0 there is expected to be a further increase in Cobalt traffic which puts pressure on the A191 Park Lane junction and A191 Norham Road roundabout. When the full link road is provided through the Murton Gap site, this pressure subsides as traffic is likely to redistribute. However, this assumes that the A191 between Park Lane and Norham Road is widened to accommodate two lanes in both directions.

8.4.4 Summary

The initial assumptions for infrastructure delivery associated with the Murton Gap strategic site appear quite accurate, such that, junction capacity improvements have been delivered during/in advance of major increases in traffic flows. The 'Foxhunters' and 'Tynemouth Pool' junctions remain a concern but the restriction on the number of units accessible from A191 Rake Lane appears to have limited the impact.

9. Strategic Site Access & Highway Mitigation Design for Murton Strategic site

9.1 Introduction

As part of the analysis undertaken to assess the impacts of the Murton strategic site upon the local highway network, site access arrangements have been developed. These designs have subsequently been tested within the micro-simulation Vissim model of Murton to ensure they provide adequate capacity and minimise any adverse traffic impacts upon the local highway network.

The junctions have been designed to tie into the existing highway network at the most appropriate locations as to minimise impacts and congestion caused to existing highway traffic. Access arrangements onto the link road have been designed such to encourage the redistribution of traffic away from constrained parts of the local highway network (A192 Seatonville Road).

The designs represent acceptable highway arrangements to NTC, however, alternatives/variations that deliver the same operational capacity and appropriate provision for pedestrians/cyclists will be considered through the Plan Process, adoption and when individual applications come forward. All drawings are included in Appendix B.

9.2 Costing of the Design Proposals

The cost breakdown for the following mitigation is provided within Appendix C. The costs presented in the report include the full costs from design to construction. The schemes are currently at concept design stage as such the level of “cost certainty” is relatively low. As the schemes progress through the design stages we would expect cost certainty to increase as more detailed investigative surveys are undertaken and delivery constraints and challenges are revealed.

In order to manage the low level of cost certainty at this stage, we would generally have applied an optimism bias of 44%. When developing major schemes for funding either through the Department for Transport (DfT) or through the Local Enterprise Partnerships (LEP), 44% optimism considered to be an appropriate level at concept design & cost stage. The cost within the main body of the report do not include optimism bias, although do include a risk allowance. For comparison, the cost breakdown within Appendix C include the optimism bias.

9.3 New York Road / Westminster Avenue

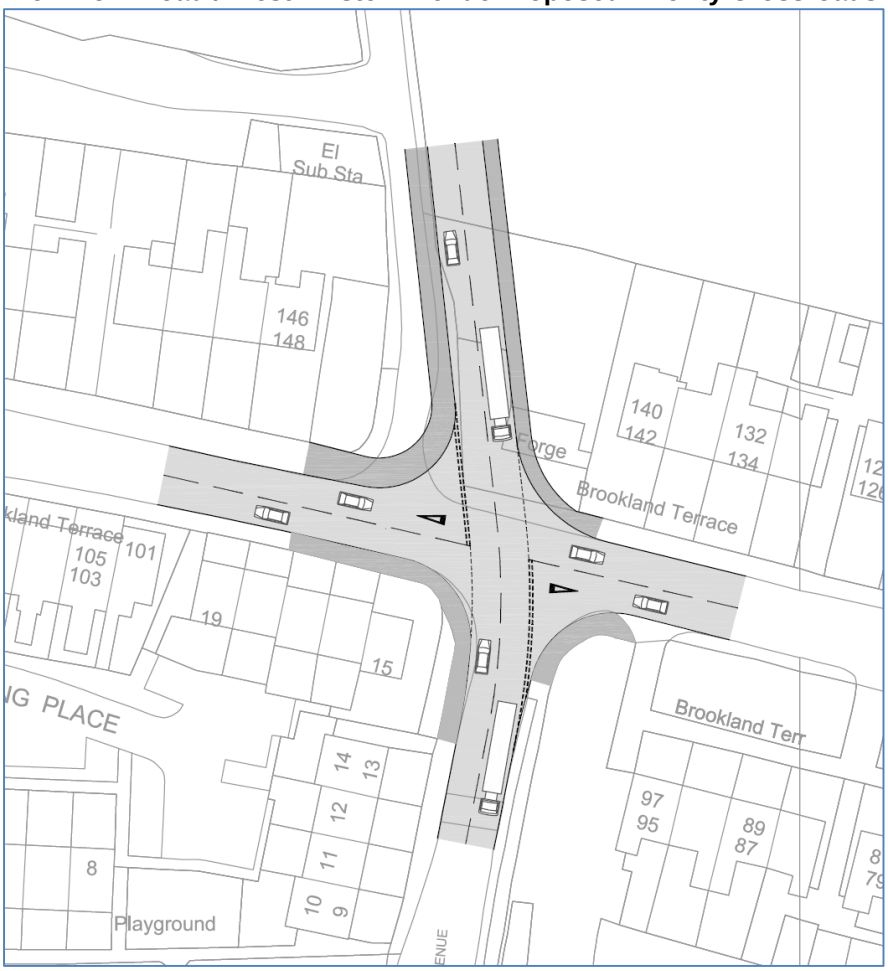
The New York Road / Murton Lane access is proposed to be a simple priority crossroads with priority altered to lead Westminster Avenue directly into the Murton strategic site. The reason the priorities have been altered is due to the alterations at the A191 New York Road/Norham Road roundabout which sees the stopping up of access into New

York Village from the roundabout. Consequently, the resultant through route would take traffic into the Murton strategic site and join the new link road allowing them to join the A191 further west. The priority crossroads has been modelled in the Vissim model of Murton and alterations to the priority rules at the junction are not fixed as the modelling has shown that either arrangement would operate satisfactorily.

The proposed junction arrangement requires the demolition of the Forge building which is within the ownership of the Murton strategic site consortium. This is to enable widening of the existing Murton Lane and removal of the current stagger arrangement of the junction. This allows pedestrian and cyclist crossing provision to be better accommodated. The estimated cost of the works is £0.9M. The proposed priority crossroad layout is shown in Figure 23 below.

The proposed new 4-arm priority crossroads at New York Road / Westminster Avenue that will provide a southern access into the Murton development has been modelled in Vissim. The junction provides priority to north-southbound flows from Westminster Avenue into Murton Lane. Future AM and PM traffic flows for phase 3 of the Local Plan have been assigned to the modelled Vissim network, and from the Vissim model simulation, the junction is not expected to experience any significant traffic queuing or delay on the New York Road approaches to the crossroads. Natural gaps in the north-southbound traffic flows at the junction, that will be the result of traffic being platooned on other areas of the highway network, appear to provide sufficient gaps for east-westbound traffic on New York Road to clear the junction without any unreasonable delay.

Figure 23 New York Road / Westminster Avenue Proposed Priority Crossroads

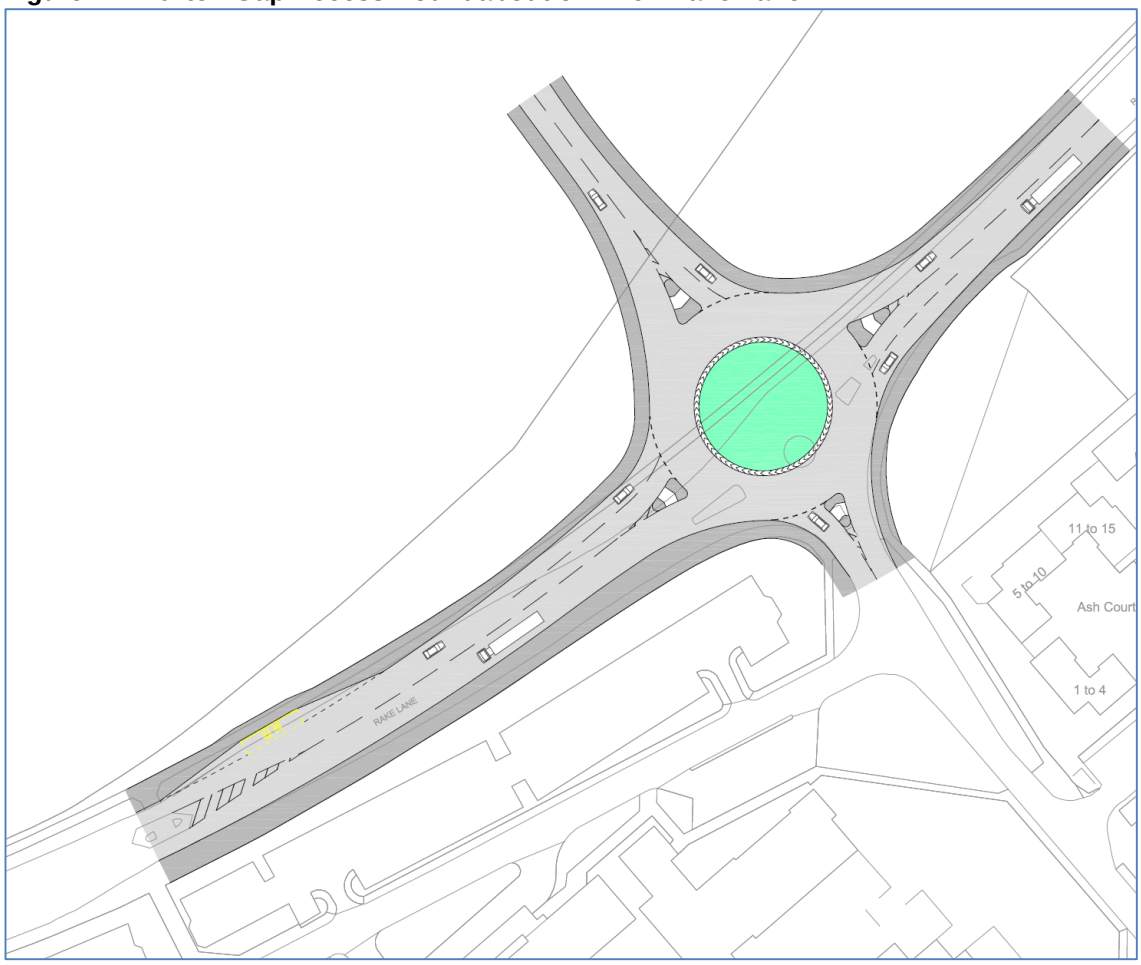


9.4 Murton Gap Access on A191 Rake Lane

The Murton Gap access from the A191 Rake Lane requires careful consideration given the high volumes of traffic that already travel along the A191. The proposed access arrangement therefore, provides a new larger roundabout at the same location as the current hospital access. The roundabout requires enlarging to ensure adequate deflection is achieved for eastbound traffic. The larger roundabout would allow vehicles exiting the hospital and the Murton Gap site to turn concurrently providing improved capacity. The existing roundabout does not enable this and operates more akin to a mini-roundabout thus, introducing increased hesitation and delay which leads to queuing of the eastbound/westbound traffic flows during peak periods.

The Murton Gap site access arm will need to accommodate a high quality cycle crossing as the north site of the A191 Rake Lane is a segregated off-road cycle route which should retain priority over side roads. The junction is also likely to accommodate buses turning into the Murton Gap site and as such, requires a sufficiently large roundabout to do so. The estimated cost of the works is £2.09M. The proposed roundabout layout is shown in Figure 24 below.

Figure 24 Murton Gap Access Roundabout on A191 Rake Lane



9.5 A191 New York Road / Link Road (South)

The A191 New York Road access will serve as the main entrance to the Murton Gap site and forms the strategic link to the A186 at the north of the site. As such, the link road needs to provide a high standard highway arrangement to encourage traffic to transfer to the link road from the A192 Seatonville Road and Park Lane routes.

To encourage this redistribution the site access will provide a left turn bypass lane allowing ease of movement towards Norham Road and more strategically to the Coast Road and away from A19 Holystone Interchange. This design feature is also likely to encourage traffic travelling to Cobalt to use the link road to access the business park via Silver Fox Way as opposed to The Silverlink North, which is already congested during peak periods.

The new roundabout is large and can accommodate two lanes on the eastbound and westbound approaches which will tie into the subsequent junctions at Park Lane and Norham Road respectively. The section of the A191 New York Road fronting the Murton Gap site between Park Lane and Norham Road would be subject to widening to

accommodate two lanes in both directions. This can be undertaken with minimal land take as the existing road is wide and the highway verge is generous on the north side of the carriageway.

The complementary works to the A191 New York Road/Norham Road roundabout are also essential to encourage traffic to distribute away from the A19 Holystone Interchange and utilise less congested parts of the local highway network. As mentioned in the New York Road access section, the access to New York Village will be stopped up and this traffic will instead join the new link road just north of the proposed site access roundabout. This alteration is crucial to remove the conflict between Murton Gap trips originating from the Murton House Farm area of the site and the western development plots. These two junctions would cost approximately £5.7M and represent a mitigation of the main development impacts upon the local highway network.

The proposed new 4-arm roundabout at that will provide a southern access into the Murton Gap development on the A191 and the A191 / Norham Road junctions have been modelled in Vissim. Future AM and PM traffic flows for phase 3 of the Local Plan have been assigned to the modelled Vissim network, and from the Vissim model simulation, the junctions are not expected to experience any significant traffic queuing or delay on full occupation of the site.

The proposed layout of the Murton Gap southern access roundabout is shown in Figure 25 below, and the proposed new layout of the A191/Norham Road roundabout is shown in Figure 26 below.

Figure 25 Murton Gap Southern Access on A191

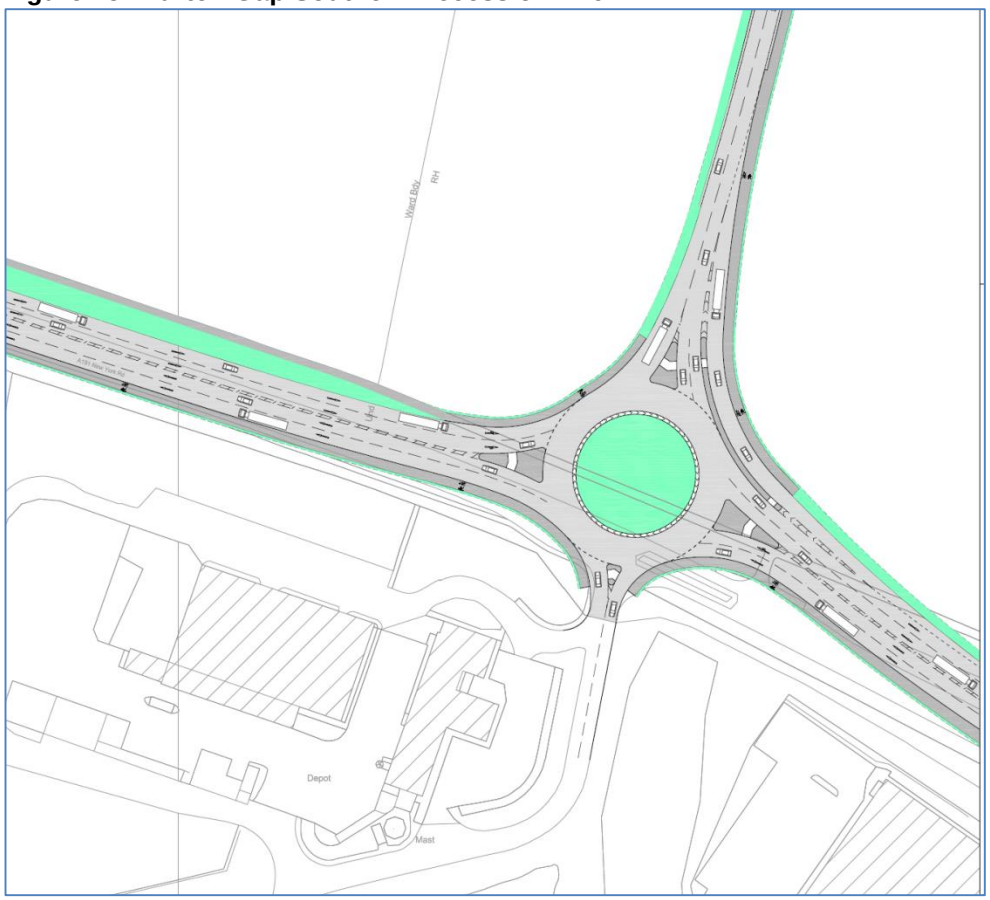
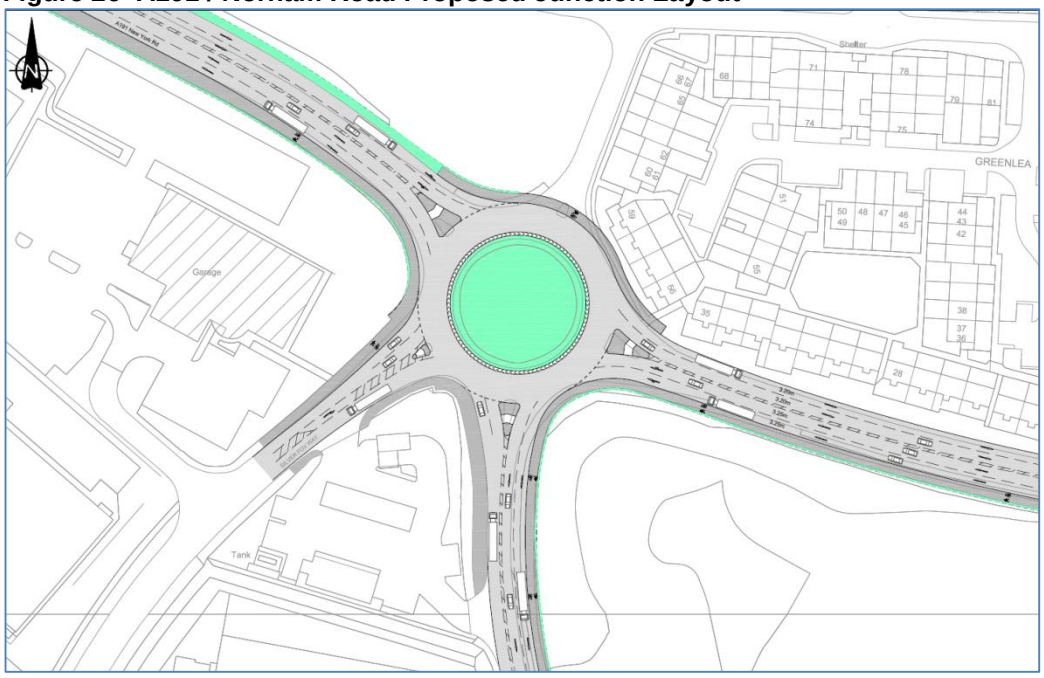


Figure 26 A191 / Norham Road Proposed Junction Layout



9.6 A186 Earsdon Road / Link Road (North)

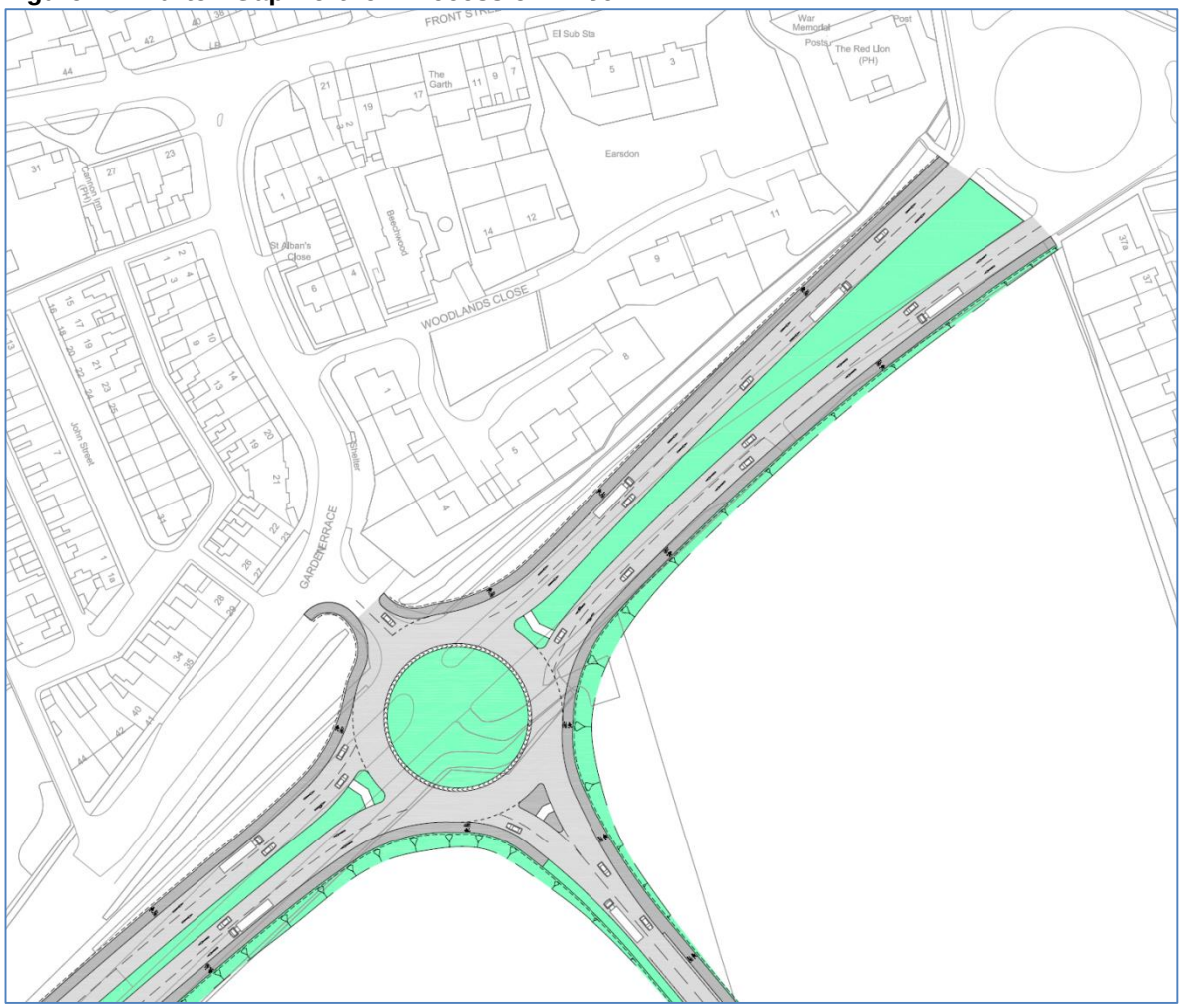
The A186 Earsdon Road/Link Road (North) access has been designed to be optimally located to improve the road safety of traffic entering/exiting the site, traffic entering/exiting Earsdon Village, as well as being a sufficient distance away from the existing “Red Lion” roundabout that any queuing would not interact between the two junctions.

The proposed roundabout is a comparable size to the existing “Red Lion” junction but still close enough to represent a more attractive route than the A192 Seatonville Road and Park Lane for traffic travelling towards Cobalt.

The junction has been sited opposite the existing Garden Terrace access into Earsdon. This approach seeks to minimise the land take and cost of delivering the roundabout. There is existing verge area adjacent Garden Terrace that can be utilised to achieve the necessary deflection for eastbound A186 traffic and minimise the realignment of the A186. The proximity of the new junction to the existing Red Lion roundabout remains a concern. However, the micro-simulation model showed that the subsequent queuing did not interact between the two junctions despite the high traffic flows on the A186. The estimated cost of the junction is £3.6M. The proposed layout of the Murton Gap northern access is shown in Figure 27 below.

The proposed new 4-arm roundabout that will provide a northern access into the Murton Gap development on the A186 junctions have been modelled in Vissim. Future AM and PM traffic flows for phase 3 of the Local Plan have been assigned to the modelled Vissim network, and from the Vissim model simulation, the junctions are not expected to experience any significant traffic queuing or delay on full occupation of the site.

Figure 27 Murton Gap Northern Access on A186



Alternate arrangements and designs for the northern access into the Murton Gap site have recently been proposed and these are being reviewed by NTC. They will be modelled in the Murton Vissim model to assess the impacts upon the local highway network.

9.7 Norham Road / Westminster Avenue

Due to the increased traffic associated with the proposed New York Road / Westminster Ave site access the arrangements at the Norham Road junction will need to be amended. The existing junction is a simple priority arrangement with Westminster Avenue giving way as the side road. During the AM peak there will be a significant increase in left turners out of Westminster Avenue and during the PM peak an increase in right turners into Westminster Avenue.

Therefore to accommodate the increased demand of these movements the flare length of the Westminster Avenue approach should be widened and extended to allow two vehicles to safely wait to turn right without blocking left turners. The junction will also

require a right turn pocket on Norham Road so that waiting traffic does not block ahead traffic travelling Northbound on Norham Road. The estimated cost for this work is £300k.

9.8 A191 East / A192 (Foxhunters) Corridor Access Improvements

The impacts of the Murton Strategic site discussed in section 9 can be mitigated through the following improvements.

- Localised Widening of Beach Road on the westbound exit. This will provide an additional westbound traffic lane to increase capacity;
- Minor alterations to the westbound approach to the roundabout. This involves the reduction of the splitter island; and
- Localised widening and traffic signals at the Foxhunters interchange in Whitley Bay, the junction of Rake lane / Hillheads road (A192) and Seatonville road /Preston road (A192).

The above improvements have been designed to be complemented with enhanced cycling and walking facilities. This will enable greater walking and cycling accessibility to the strategic site and key services and opportunities. The requirements for the enhanced cycling and walking infrastructure are provided within the complementary walking and cycling study.

The proposed layout of the A191/A192 widening and the Beach Road widening are shown on Figures 28 and 29 respectively.

The estimated cost of the improvements along this corridor have been identified at £3.23M.

Additional modelling (Vissim) is required along the Foxhunters / Tynemouth Pool corridor to ensure that the proposals being put forward are the most appropriate. This will be undertaken in the next stage of the Local Plan process.

Figure 28 A191 / A192 (Foxhunters) Widening

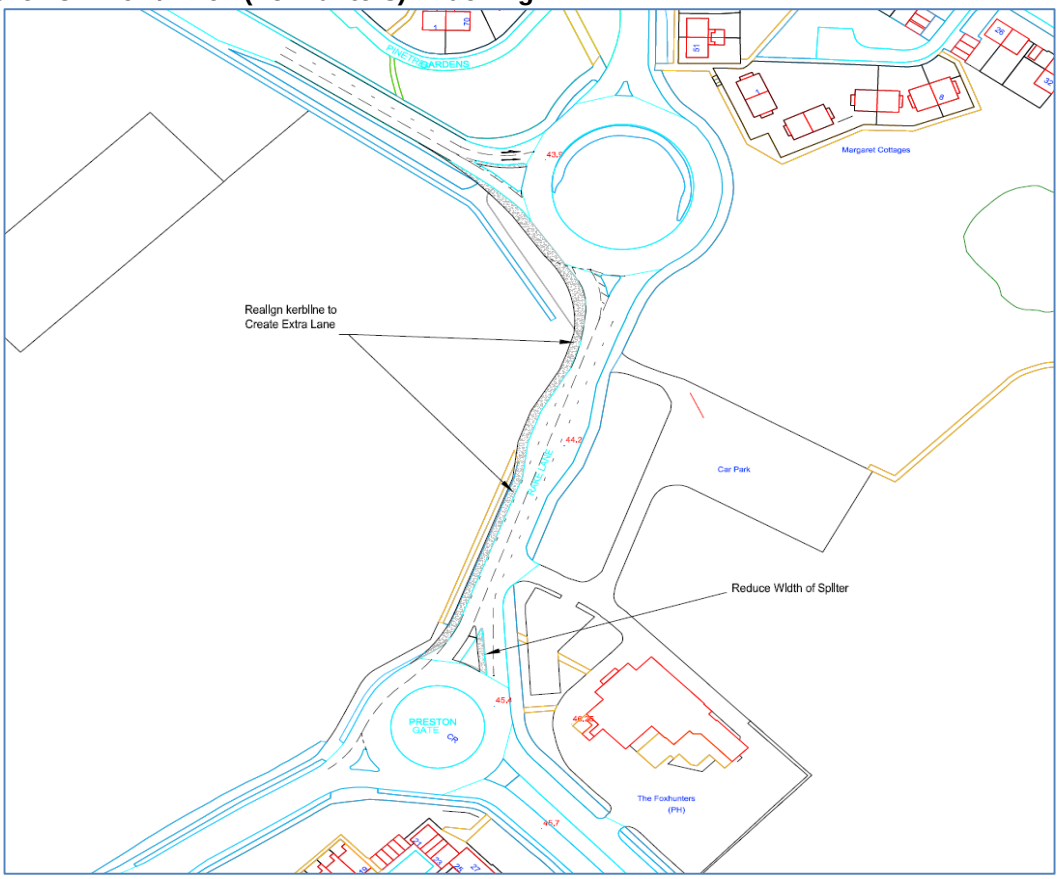
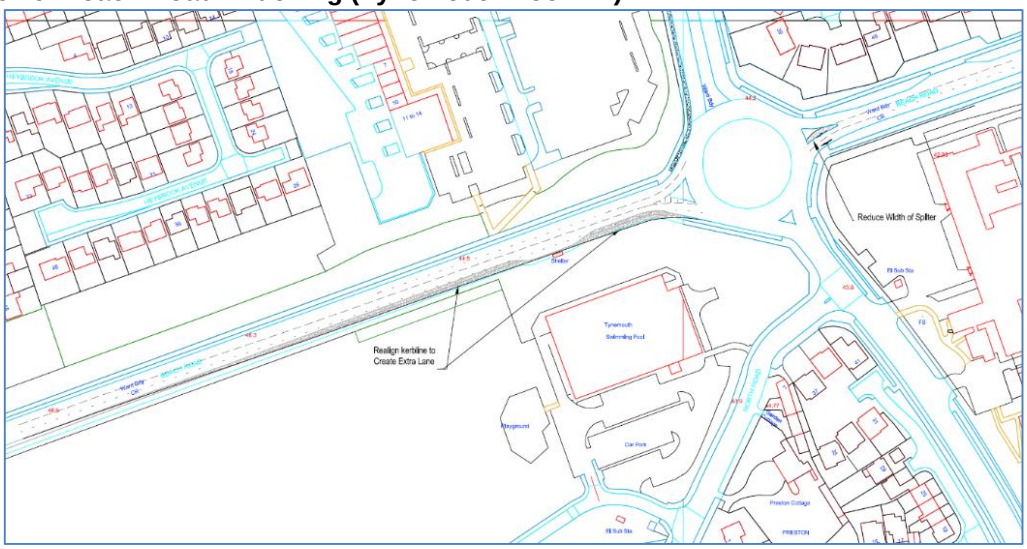


Figure 29 Beach Road Widening (Tynemouth Pool RB)



10. Micro-simulation Model Testing for Murton Gap

10.1 Murton Gap

This section of report summarises the outputs of the phasing testing showing changes in journey times surrounding the Murton Gap site. VISSIM micro-simulation software has been used to analyse the operation of key junctions in greater detail in terms of capacity whilst future committed development and corresponding highway infrastructure is in place.

The area assessed in Vissim is shown in Figure 30 below highlighted by the blue line and includes all junctions from the Norham Road Bridge, North Cobalt, Holystone, Earsdon and Foxhunters roundabout.

Figure 30 Murton Gap Vissim Model Extents

The design year has been taken as 2032 as this is the date proposed for completion of the housing allocations including all network improvements for the Murton Gap strategic site.

10.2 Scenarios

The scenarios that have been assessed in Vissim which were identified during initial discussions with NTC are listed below and summarised in Table 15.

Scenario 1 (S1) – Base Model. This scenario include the base traffic flows obtained through traffic surveys on the highway network. These models constituted the calibrated and validated models of the existing situation during the AM and PM peak periods for the Murton Gap and Killingworth Moor strategic sites. The networks coded in VISSIM reflect the road layouts currently found on the ground.

Scenario 2 (S2) – Do Minimum. This scenario included phase 3 traffic flows from the strategic SATURN model, which incorporates traffic for 100% build out of the strategic Murton Gap and Killingworth Moor sites, as well as all committed development traffic flows generated outside of the Local Plan sites. The networks coded in VISSIM include the existing road layouts and highway improvements being delivered by committed developments outside of the Local Plan proposals and improvements.

Scenario 3 (S3) – Do Something. This scenario included phase 3 traffic flows from the strategic SATURN model, which incorporates traffic for 100% build out of the strategic Murton Gap and Killingworth Moor sites, as well as all committed development traffic flows generated outside of the Local Plan sites. The networks coded in VISSIM include existing road layouts, highway improvements being delivered by other committed developments, and the highway improvements that will be delivered to mitigate the traffic impact of the Murton Gap and Killingworth Moor strategic sites.

Table 15 Vissim Modelling Scenarios for the Murton Gap Strategic Site

Scenario		Description
S1	Base	Base traffic flow surveys on the highway network. Current road layouts
S2	2032 Do minimum	Future 2032 + Committed developments network outside of the Local Plan proposals + Proposed development traffic
S3	2032 Do Something	Future 2032 + Committed developments network + Highway improvement + Proposed development traffic

10.3 Journey Time Routes

Journey travel times has been collected on five crucial routes through the modelled Murton network, including routes along the A192, A186, A191, and Park Lane in both directions. This has generated 10 sets of journey time data for the assessment of the Murton Gap highway improvement scheme on journey time and delay.

The journey time routes are shown in Figure 31 below and include the following:

- **Red Route** – A, K, J, I eastbound and I, J, K, A westbound
  (A186 Shiremoor bypass from A19 Holystone Interchange to A186 / A192 roundabout in Earsdon);
- **Orange Route** – I, H, G, FX southbound and FG, G, H, I northbound
  (A186 / A192 roundabout in Earsdon to A191 Rake Lane / Seatonville Road junction); and
- **Green Route** – FG, E, D westbound and D, E, FE eastbound

(A191 Rake Lane / Seatonville Road junction to A191 New York Road / Norham Road roundabout); and

- **Pink Route** – D, C, J westbound and J, C, D eastbound
  (A191 New York Road / Norham Road roundabout to Lower Crone Street / A186 roundabout).

Figure 31 Murton Gap Journey Time Routes

10.4 Average Journey Time Analysis

A summary of the average journey times for the three modelled scenarios including results for the baseline model for the AM and PM peaks, are shown in Table 16 and Table 17 below. The average journey times are based upon data collected in 10 runs of the modelled network for each peak period.

Table 16 AM Average Journey Times for Murton Gap

AM Peak Summary of Travel Times (sec)				
Route	**Direction**	**Base Scenario 1**	**2032 Do Minimum Scenario 2**	**2032 Do Something Scenario 3**
Red Route: A186	**EB**	217	233	237
	WB	294	257	249
Orange Route: Earsdon Road/Seatonville	**SB**	382	341	292
	NB	278	387	419
Green Route: Rake Lake to Norham Road	**WB**	227	712	275
	EB	177	199	195
Pink Route: Park Lane to A191	**WB & NB**	272	660	220
	SB & EB	273	937	224

Table 17 PM Average Journey Times for Murton Gap

PM Peak Summary of Travel Times (sec)				
Route	**Direction**	**Base**	**2032 Do Minimum**	**2032 Do Something**
Red Route: A186	**EB**	310	231	230
	WB	237	233	232
Orange Route: Earsdon Road/Seatonville	**SB**	305	347	291
	NB	292	280	276
Green Route: Rake Lake to Norham Road	**WB**	180	218	184
	EB	266	203	207
Pink Route: Park Lane to A191	**WB & NB**	334	340	307
	SB & EB	316	255	226

10.5 2032 Do Minimum

The traffic for 2032 has been derived from the strategic SATURN model that includes the committed development traffic.

The results for the AM Vissim model show greater volumes of traffic along the A186 corridor, however, the modelled journey time demonstrates that delay has not been

significantly affected. The journey time for the A186 west bound direction has decreased due to the A186 traffic flow opposing that on Park Lane making it slightly more difficult for traffic exiting Park Lane onto the A186.

The existing A191 New York Road / Park Lane junction operates on MOVA control. The highway improvement scheme associated with proposing a two lane approach on the two A191 approaches to this junction, will require reconfiguration of the MOVA dataset used to control this junction. This junction was seen to cause significant delay within scenario 2. Moreover, introducing the new link road through the Murton Gap site has redistributed some traffic from Park Lane, resulting in shorter journey times along this route (pink route) in scenario 3 for both the AM and PM peaks.

A basic reconfiguration of the MOVA dataset for the A191 New York Road / Park Lane junction was ran in the Murton Vissim model. This demonstrated that with providing an additional lane on the westbound approach, both lanes on the approach should be on green when the left turn out of Park Lane is on green to maximise throughput at the junction for westbound travelling traffic.

10.6 2032 Do Something

In relation to the A186 corridor (red route), the journey times can be expected to increase by 20 seconds eastbound and reduce by 45 seconds westbound in the AM peak when comparing scenario 1 and scenario 3. The increase eastbound in the AM is a result of Murton Gap development traffic joining the A186 via the northern site access and travelling towards the A192 during the peak, a combination of employment and education destined trips. Reduced westbound journey times can be anticipated as a result of development traffic and existing traffic using the link road proposed through the Murton Gap site.

When comparing scenario 1 and scenario 3 for the A186 corridor during the PM peak the results, demonstrate that the redistribution of traffic on the highway network in the future years including the Murton highway improvement scheme, will improve both the eastbound and westbound journey times along the A186 corridor.

In relation to the eastern route covering the A192 Earsdon Road / Seatonville Road (orange route), the northbound and southbound journey times all improve during the AM and PM peaks when comparing scenario 1 to scenario 3, with the exception of the journey time for traffic travelling northbound in the AM peak. This journey time is predicted to increase by 141 seconds as a result of traffic being able to travel through the previous section of the network more efficiently and therefore, arriving along this route sooner than the base situation.

The modelling results show similar longer journey times along the A191 Rake Lane to A191 / Norham Road junction (green route) when comparing scenario 1 and scenario 3 for the AM peak. This is caused by higher traffic demand eastbound on this corridor during the commuting period. Despite the longer journey times, the Vissim model demonstrates that the network will be able to accommodate the strategic site vehicular traffic along this corridor.

The modelling results for the PM when comparing scenario 1 with scenario 3 demonstrates that there are negligible changes in journey times westbound, with an improvement in journey time eastbound of 59 seconds. This reduced delay eastbound is a result of traffic redistribution in the future years and the desirability of the proposed link road providing access to the A192 / A186 from Norham Road and Cobalt Business Park, in favour of the existing A191 Rake Lane route.

In relation to the pink route covering the A191 New York Road / Park Lane in Shiremoor, the northbound and southbound journey times all improve during the AM and PM peaks when comparing scenario 1 to scenario 3. This is a direct result of the removal of existing Cobalt bound and A19 / Holystone Interchange bound traffic that currently uses Park Lane as the connecting link from the coastal areas and from the A192 from Seaton Deleval and Northumberland and relocation to the Murton Gap link road.

10.7 Network Performance

Figures 32 and 33 below provide a summary of the journey times for the AM and PM peak models. Considering scenario 3, all the journey times in the AM model are shorter when compared to the journey times reported for scenario 2, with the exception of the A192 Earsdon Road / Seatonville Road corridor northbound. This demonstrates that traffic is arriving at this corridor quicker than in the base scenario 1, and the Murton Gap highway scheme contributes significant benefit to journey times in the AM peak on 9 out of the 10 crucial routes assessed.

The journey times recorded for the PM peak demonstrate that journey times in the future years with the full Murton development can be anticipated to generate shorter journey times that those currently experienced in the baseline scenario 1.

Figure 32 AM Travel Times for Murton Gap

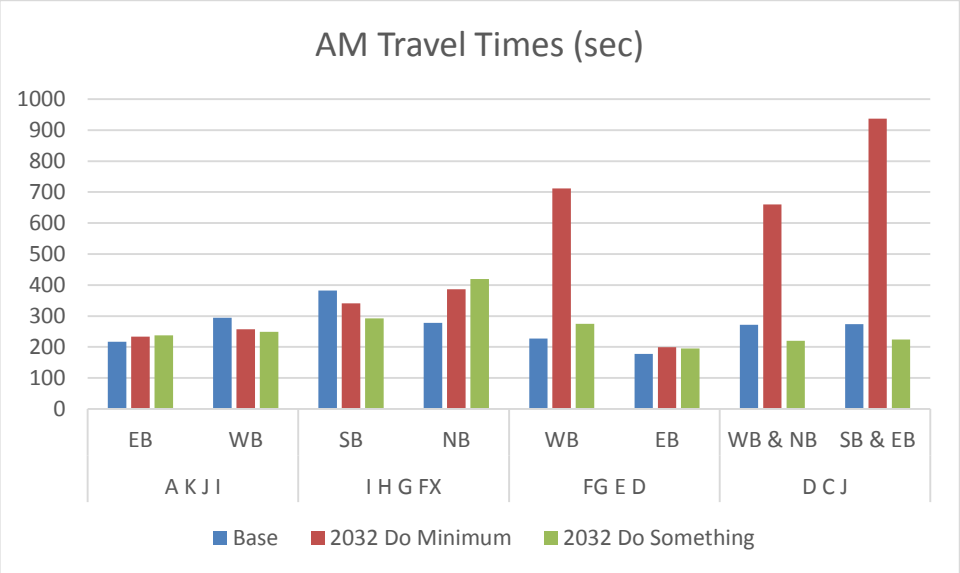
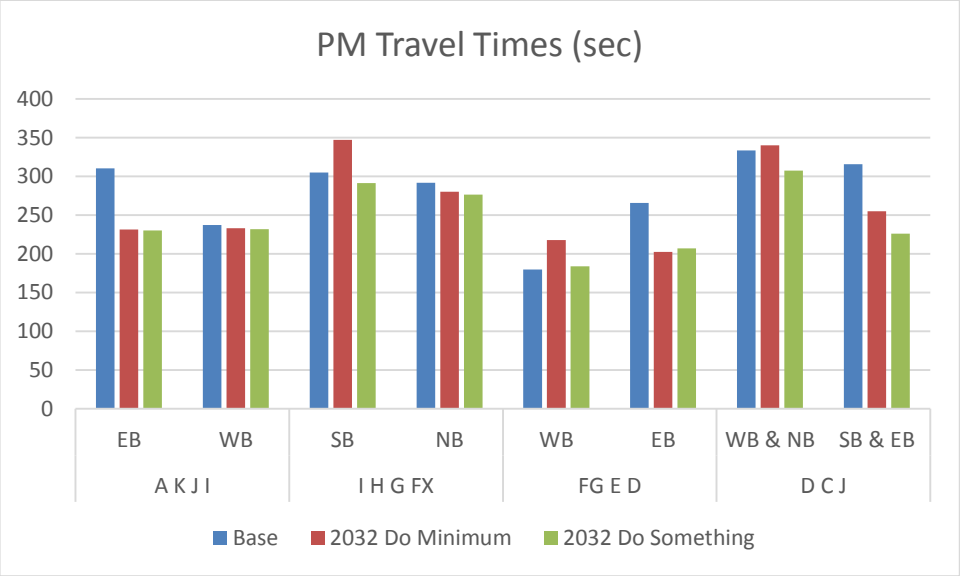


Figure 33 PM Travel Times for Murton Gap



11. Wider Highway Network Impacts

11.1 Strategic Road Network Impacts

The cumulative traffic impacts of North Tyneside's Local Plan proposals on the wider Strategic Road Network (SRN) that is outside of NTCs control, has been assessed using NTC's strategic SATURN model. The SATURN model originated from the HE's own A19HAM model and has been significantly increased in the detail of the network coding to encompass all the SRN in North Tyneside. A substantial amount of local traffic data has also been used to re-calibrate the model with the majority of the North Tyneside network having traffic count data available within the last 3 years.

The cumulative impacts of the Local Plan proposals on the SRN through analysis of the SATURN model is discussed in this section of the report.

11.2 Strategic Road Network Overview

The SRN within North Tyneside has/is undergoing some significant alterations with the recently completed A19 Seaton Burn Interchange and the forthcoming A19 Silverlink Interchange scheme. The A19 Silverlink scheme in particular has the potential to redistribute a significant amount of traffic from some of the adjacent local highway. This is most relevant with regards to the network surrounding Cobalt Business Park, which has seen significant traffic growth over the past 3 years as the park increases in size towards full occupation of 20,000 staff.

NTC has already committed to a major highway improvement scheme at the A19 Holystone Interchange due to commence in spring 2017. This scheme is expected to significantly increase the capacity of this junction and cater for full occupation of the Cobalt Business Park. The A19 Holystone Interchange accommodates almost 50% of all trips into Cobalt with around 30% of these traveling via the A19. The improvement scheme will be funded partly by developer contributions secured against adjacent developments with the majority of funding from the NELEP. The scheme will resolve predicted capacity concerns on the SRN and ensure the mainline A19 continues to operate unhampered by the junction.

The A19 Howdon Interchange has also undergone a recent alteration to improve capacity and reduce the risk of queuing on the slip roads reaching the mainline A19. The southbound off-slip now operates with part-time signal control which will effectively manage future demands for traffic travelling to the Tyne Tunnel Trading Estate and also the North Bank of the Tyne regeneration areas.

The A19 Killingworth Interchange was to be the subject of a HE Local Network Management Scheme (LNMS) due to its poor road safety record. NTC were consulted on the scheme and rejected it on the grounds that the capacity of the local highway approaches to the junction were significantly worsened. Unfortunately, the scheme currently has no funding associated with it from the HE but the need for an improvement to the junction on road safety and capacity grounds is still warranted.

The A19 Moor Farm remains a junction that suffers significantly from peak period congestion and although the junction is located within Northumberland the performance of the junction impacts on the highway in North Tyneside. The PM peak queues at the junction are largely as a consequence of A19 Employment corridor (Cobalt, Tyne Tunnel Trading Est., Port of Tyne, Nissan, and Doxford Park) trips returning home to areas within South East Northumberland.

During very early discussions with the HE, NTC has expressed support for any future scheme at Moor Farm that would see the final at-grade junction on the A19 become grade separated. NTC are hopeful that a grade separation scheme would be well received regionally as this would be a large step towards HE's "Expressway" aspirations for the A19 corridor. The substantial amount of existing and proposed employment land adjacent the A19 corridor within North Tyneside, Northumberland, South Tyneside, Gateshead, and Sunderland equates to a substantial proportion of the NELEP's aspiration to create 1 million jobs in the region by 2020.

The specific junctions considered within this section of the report include the following:

- A19 Seaton Burn;
- A19 Moor Farm;
- A19 Killingworth Interchange;
- A19 Holystone;
- A19 Silverlink; and
- A19 Howdon Interchange.

11.3 A19 Junction Impacts

The impact North Tyneside's Local Plan will have on these junction varies considerably and as mentioned above some of the improvements necessary to facilitate the anticipated growth have already progressed. The operation of each junction will be discussed in turn to establish what the potential impacts could be and how they can be resolved. This includes an assessment of the existing slip road merge/diverge arrangements where appropriate.

11.4 A19 Seaton Burn Interchange

The A19 Seaton Burn Interchange has recently undergone an interim capacity improvement scheme that has largely resolved the peak hour congestion that previously occurred on the A19 westbound approach and A1 northbound off-slips. There has been a long term aspiration to completely grade separate this junction allowing the seamless transition of traffic from the A19 onto the A1 in both directions.

The interim scheme also upgraded the A1 northbound diverge to incorporate two lanes for longer with an extended deceleration lane operating similarly to a lane loss arrangement. Consequently, this report does not assess in detail the future capacity of these merge/diverge arrangements as the interim scheme has factored in future traffic demands in this location.

Following initial comments received back from the HE, NTC will be revisiting the coding of the interim scheme within the strategic SATURN model to ensure it has the appropriate capacity and is not diverting traffic along the A1056 as an alternate route.

11.5 A19 Moor Farm Junction

The A19 Moor Farm junction operates with significant peak hour delays despite recent alterations to the A19 eastbound approach associated with the new Northumbria Specialist Emergency Care Hospital (NSECH). The A19 northbound approach from North Tyneside remains the most congested approach during the PM peak period. The majority of local traffic impacting this junction is originating from Northumberland via the A189 southbound approach during the AM peak and then returning via the A19 northbound approach during the PM peak.

The predicted traffic flow during the AM and PM peak periods is summarised in Table 18 below.

Table 18 A19 Moor Farm Junction Base & Predicted Future Traffic Flows

	AM			PM		
Approach	**Base (2013)**	**Future (2032)**	**Increase (%)**	**Base (2013)**	**Future (2032)**	**Increase (%)**
A19 Eastbound	1564	2141	37%	1551	1745	13%
A189 Southbound	2513	3165	26%	1832	2231	22%
A19 Northbound	1938	2753	42%	1849	2399	30%
A189 Northbound	676	1139	68%	978	1281	31%

The table shows that there is significant growth anticipated on all approaches to the junction. The SATURN model will need to be further interrogated to establish the origin of the traffic growth and apportioning of the impacts to individual residential and employment development within North Tyneside. Whilst the levels of growth appear very high there are examples already on sections of the A19 where growth of around 23% over the past 5 years has been recorded.

11.6 A19 Killingworth Interchange

The A19 Killingworth Interchange has been assessed in detail in the previous sections of this report which concludes that a highway improvement scheme is necessary to mitigate the trips that predominantly arise from the Killingworth Moor strategic site. Table 19 below summarises the predicted operational capacity of each approach as the Local Plan is delivered up to 2032 (Phase 3).

Table 19 A19 Killingworth Interchange Operational Capacity for the Local Plan Phases

Arm	AM				PM			
	Ph 0	Ph 1	Ph 2	Ph 3	Ph 0	Ph 1	Ph 2	Ph 3
A19 NB Off-slip	100%	98%	41%	40%	102%	101%	73%	74%
A19 SB Off-slip	59%	58%	37%	38%	82%	76%	56%	56%
A1056 EB	103%	103%	85%	85%	101%	103%	52%	52%
A1056 WB	39%	46%	46%	47%	40%	46%	31%	31%

The modelling results highlight that the first phase of development at the Killingworth Moor site that can directly access the A19 Killingworth Interchange will not significantly impact the junction beyond its current operational performance. The modelling also shows that the proposed improvement scheme significantly resolves the capacity concerns at the junction which the micro-simulation modelling has further confirmed.

The scheme proposed builds upon the HE LNMS safety scheme but provides some capacity benefits also by reducing the number of conflicting movements at the interchange. The scheme will remove the right turn movement onto the A19 northbound on-slip such that traffic will need to perform a U-turn at a new roundabout west of the interchange and then turn left unopposed onto the slip-road. The same restriction will be imposed on A19 southbound off-slip traffic which will be forced to turn left then perform a U-turn at a new roundabout to travel westbound. The U-turn manoeuvres impact a small percentage of total traffic and the additional distance travelled is negligible. A concept drawing is included in Appendix D.

An additional assessment of the merge/diverge arrangements has been undertaken to ascertain if the existing slip road arrangements remain appropriate. The DMRB manual (V2 S2 P1 - TD 22/06) has been used to assess and identify whether the current highway merge/diverge arrangements are appropriate. The results are summarised in Table 20 below.

Table 20 A19 Killingworth Interchange Merge & Diverge Arrangements

Killingworth	AM				PM			
Description	**Existing**	**Mainline**	**Slip-road**	**Future**	**Existing**	**Mainline**	**Slip-road**	**Future**
A19 NB Merge	D	2276	477	A or D	D	2118	280	A or D
A19 NB Diverge	A	2276	780	A	A	2118	1309	D
A19 SB Merge	D	2702	1157	E	D	1783	846	A or D
A19 SB Diverge	A	2702	240	A	A	1783	388	A

The merge/diverge assessment highlights which slip-road arrangements require upgrading in the future. The requirements are in keeping with the HE's own link capacity assessments which suggest that the A19 between Killingworth and Silverlink should become 3 lanes (2 lanes plus lane drop/gain) based on predicted traffic growth. The assessment results in Table 20 confirm that the southbound merge should be a lane gain and northbound diverge a lane loss. Further analysis will be required to confirm when the alteration is required within the Local Plan period and which developments trigger this requirement.

11.7 A19 Holystone Interchange

The assessment of the A19 Holystone Interchange has been undertaken using the SATURN model which concludes that the junction performs within its increased operational design capacity following the major improvement scheme. There has been subsequent more detailed analysis of the junction carried out as part of NTC's business case submission to the NELEP for the major scheme funding. The scheme achieves a strong BCR of 5.30 largely due to the reduction in queue length and associated journey times of traffic arriving via the A19 during the AM peak.

Further assessment has been carried out on the junction using the Murton Gap Vissim model with MOVA configured signal controlled operational in both peak periods. The detailed journey time and queue length reductions are summarised in detail in the microsimulation section of this report.

The modelling has retained the priority measures afforded to the A19 slip roads by way of queue detectors that deliver phase extensions if queues extend too far up the slip roads towards the mainline. The modelling has shown that this in-directly causes increased queuing on the A186 Shiremoor bypass as this arm loses green time each cycle the phase extension is called.

The widening of both A19 slip roads and alterations to lane designations ensures that the main movements from each slip road are afforded two lanes to do so. The A19 southbound off-slip provides two dedicated lanes towards the A191 (Cobalt) and the A19 northbound off-slip allows two lanes to turn left towards the A191 (Holystone bypass) and the A186 (Shiremoor bypass). The major scheme junction improvement drawing is included in Appendix D.

An additional assessment of the merge/diverge arrangements has been undertaken to ascertain if the existing slip road arrangements remain appropriate. The DMRB manual has been used to assess and identify whether the current highway merge/diverge arrangements are appropriate. The results are summarised in Table 21 below.

Table 21 A19 Holystone Interchange Merge & Diverge Arrangements

Holystone	AM				PM			
Description	**Existing**	**Mainline**	**Slip-road**	**Future**	**Existing**	**Mainline**	**Slip-road**	**Future**
A19 NB Merge	D	2097	958	A or D	D	2292	1136	E
A19 NB Diverge	A	2097	845	A	A	2292	1293	D
A19 SB Merge	D	2636	1611	F	D	1829	1119	B
A19 SB Diverge	A	2636	1223	D	A	1829	800	A

The merge/diverge assessment highlights which slip-road arrangements require upgrading in the future. The requirements appear in keeping with HE's own link capacity assessments which suggest that the A19 between Killingworth and Silverlink should become 3 lanes (2 lanes plus lane drop/gain) based on predicted traffic growth. The assessment confirms this as both off-slips warrant a lain-loss arrangement and both on-slip merges require lain-gain arrangements. Further analysis will be required to confirm when the alteration is required within the Local Plan period and which developments trigger this requirement.

11.8 A19 Silverlink Interchange

The A19 Silverlink Interchange is due to undergo a significant capacity improvement scheme to further grade separate the junction (3 levels). This scheme is due to commence in the autumn 2016 and be completed by autumn 2018 within the first year of the Local Plan.

The scheme proposals will remove the existing A19 northbound/southbound traffic from the junction thus freeing up substantial capacity for the A1058 Coast Road approaches and A19 turning movements onto the A1058 Coast Road. The scheme is anticipated to resolve the existing capacity problems at the junction as well as accommodate future traffic growth associated with North Tyneside's Local Plan.

The new junction arrangement has been coded into the NTC's SATURN model which confirms that all approaches operate within design capacity subject to optimisation of the traffic signals. The strategic model suggests that several parallel routes currently used as "rat-runs" will see reductions in traffic flows as traffic re-assigns back to the A1058 Coast Road via Silverlink rather than via Norham Road and Willington Square junctions.

As such no further detailed assessment of the A19 Silverlink Interchange has been undertaken or the merge/diverge arrangements being proposed as these are assumed to accommodate the predicted growth from North Tyneside.

11.9 A19 Howdon Interchange

The A19 Howdon Interchange is predicted to operate close to its operational capacity subject to the full build-out of the Tyne Tunnel Trading Estate and North Bank of the Tyne regeneration areas. Currently, the junction operates within capacity but requires part-time signals to operate during busy periods during the AM peak. The junction is anticipated to continue to operate within capacity in the future.

The developments within North Tyneside's Local Plan that impact this junction are amongst those which have already progressed through planning (Smith's Dock and West Chirton). An additional assessment of the merge/diverge arrangements has been undertaken to ascertain if the existing slip road arrangements remain appropriate. The DMRB manual has been used to assess and identify whether the current highway merge/diverge arrangements are appropriate. The results are summarised in Table 22 below.

Table 22 A19 Howdon Interchange Merge & Diverge Arrangements

Howdon	AM				PM			
Description	**Existing**	**Mainline**	**Slip-road**	**Future**	**Existing**	**Mainline**	**Slip-road**	**Future**
A19 NB Merge	D	2975	590	E	D	2049	1118	B
A19 NB Diverge	A	2975	359	A	A	2049	601	A
A19 SB Merge	D	2644	1120	E	D	2454	1120	E
A19 SB Diverge	A	2644	1104	A	A	2454	952	A

The merge/diverge assessment highlights which slip-road arrangements require upgrading in the future. The assessment recommends that both on-slip merges require lain-gain arrangements. Further analysis will be required to confirm when the alteration is required within the Local Plan period and which developments trigger this requirement.

11.10 Highways England Comments

As part of North Tyneside ongoing dialogue with Highways England (HE) they have confirmed their support of the robust and detailed assessment undertaken by NTC. They have scrutinised the modelling work and carried out theire own assessment to confirm the scale of the impacts upon the SRN.

Overall they conclude that the proposed mitigation schemes identified on the Strategic Road Network (SRN) are justified and appropriate subject to detailed designs being prepared. Furthermore HE are supportive of the sustainable transport measures being proposed at both strategic sites that contribute to the successful mitigation of wider impacts upon the SRN.

HE have accepted the trip rates applied in the modelling assessments but caveat that the impacts upon the SRN would need to be reassessed should the trip rates increase significantly. This work is proposed to be carried out by NTC as a sensitivity test in the coming weeks.

HE have agreed to work with NTC and developers to secure the delivery of the necessary improvement scheme at the A19 Killingworth Interchange. This includes supporting bids for growth fund money from NECA however HE are unable to allocate any internal budgets to help deliver the scheme. Discussions will continue to agree acceptable timescales for the delivery of the scheme which is currently proposed for delivery within Phase 2 (2023-2027).

HE expressed initial concern with the potential impacts upon the A19 Holystone Interchange, specifically queuing on the slip roads. The provision of the A19 underpass within the Killingworth Moor site combined with the proposed good provision of sustainable travel alternatives has largely addressed these concerns as they reduce the trips impacting the A19 junction. HE have stipulated that any impact that would cause blocking back onto the A19 mainline would require appropriate mitigation.

11.11 Wider Local Plan Junctions Impacted

The Strategic modelling exercise also highlighted several other locations where mitigation may be required. These junction are addressed individually below.

11.11.1 Silverlink Retail Park Access

The Silverlink Retail Park Access roundabout is quite constrained with only a single lane travelling ahead northbound and southbound which is predicted to be insufficient as the Local Plan and more specifically Cobalt develops.

Since the strategic modelling exercise took place there has been a retail development (Silverlink Point) application submitted and subsequently approved on land adjacent this junction. As part of the site access alterations the existing roundabout is being removed and a more comprehensive scheme linked to the Highways England Major Scheme at Silverlink Interchange delivered. This scheme will increase the northbound/southbound

capacity of the junction such that future predicted traffic growth is adequately accommodated. The junction is therefore considered to have been appropriately mitigated.

11.11.2 High Flatworth Roundabout

The High Flatworth roundabout currently suffers from peak hour congestion as a consequence to the ongoing development of employment land at Tyne Tunnel Trading Estate and along the North Bank of the Tyne. As a consequence North Tyneside Council have secured funding from the North East Local Enterprise Partnership (NELEP) to improve the local highway network along the North Bank of the Tyne to ensure that he anticipated job growth comes forward.

High Flatworth falls within the remit of the major scheme extents and as such will be subject to an improvement scheme that will aim to resolve the existing congestion problems and provide sufficient capacity to accommodate the expected growth from the Local Plan.

11.11.3 A1058 Coast Road / A186 Station Road – Station Road East/West

The Station Road junction with the A1058 Coast Road already suffers from congestion during peak periods with significant queues forming on Station Road during the AM peak and on the A1058 Coast Road Eastbound off-slip during the PM peak. The junction is subject to a mitigation scheme associated with the Station Road East development that should achieve a nil detriment position. However the additional trips that are expected to route towards the Coast Road from other proposed development land around the A191 corridor and Station Road West site are likely to require further more comprehensive mitigation.

North Tyneside have developed an indicative highway mitigation scheme at this junction which will be subject to contributions from those developments that cumulatively cause the junction to exceed its predicted design capacity. The proposed developer contribution model is discussed later in this report.

The cost of the mitigation is estimated at £2.9M

11.11.4 A189 Annitsford Roundabout – Minor alterations required

The Saturn modelling identified a capacity concern at the A189 Annitsford roundabout. On further investigation into the cause it was identified that the capacity was constrained due to the existing lane designations on the ground only allowing a single lane to travel ahead on the A189 in both directions. This constraint can be easily mitigated without any physical alterations to the junction by altering the road marking and signage which would be carried out when the predicted local plan growth has manifested on this part of the local highway network.

North Tyneside have developed an indicative highway mitigation scheme at this junction which will be subject to contributions from those developments that cumulatively cause the junction to exceed its predicted design capacity.

The cost of the mitigation is estimated at £32,000

11.11.5 A1056 Killingworth Way / Camperdown

The Strategic modelling exercise identified that the A1056 Killingworth Way approaches to the Camperdown roundabout would require mitigation. On further investigation this was found to be in part associated with traffic choosing to utilise the A1056 as a route between the A19 and A1.

Highways England have recently completed work to the A1/A19 Seaton Burn interchange which is likely to have an impact upon route choice along the A1056. Furthermore should work be carried out to the A19 Moor Farm junction this could potentially remove non-local traffic from the A1056 corridor during AM and PM peaks and hence resolve the capacity concerns raised by the Saturn model.

North Tyneside have developed an indicative highway mitigation scheme at this junction which will be subject to contributions from those developments that cumulatively cause the junction to exceed its predicted design capacity.

The cost of the mitigation is estimated at £2.6M

12. Local Plan Cross Boundary Impacts

12.1 Neighbouring Authorities

Discussions are currently on-going between NTC, Newcastle City Council and Northumberland County Council regarding the cross boundary implications of each authority delivering their adopted / emerging Local Plans.

The main generator of travel in peak periods is the home to work and work to home journeys. In its most simplistic form, the main causation of large increases in local cross boundary traffic movements is generally when at one side of a border there is a disproportionate level of new housing compared to employment opportunities and the other side of the border the profile is reversed. This generalisation is not absolute and a number of other factors can influence travel demand in peak traffic periods. However this rationale has been discussed between the three adjoining authorities and the potential for this event to occur has been identified at a few major locations.

12.2 North Tyneside / Newcastle

North Tyneside has some significant growing areas of employment such as Quorum and Cobalt which draws cross boundary traffic movements for the journey to work. In addition the emerging Local Plan has allocated a large employment site (Indigo Park) on the border of Newcastle. Indigo Park is accessed from A1056 Sandy Lane. Newcastle have significant housing growth within close proximity of the North Tyneside Border at Great Park and Hazzlerigg.

NTC have secured Local Growth Funding (LGF) to deliver a highway improvement scheme to mitigate the traffic impacts of Indigo Park as well as future proofing access to the growing Cobalt Business Park. North Tyneside Council have also recently delivered a local “pinch point” scheme on the Four Lane Ends corridor, which improves access to Quorum Business Park. It is recognised however that on the Newcastle side of the border additional works will be required on the A1056. In addition, Highways England are likely to require mitigation of the A1 Rotary Way junction.

Discussion between the two authorities means an understanding on cross boundary issues has been met and the City Council will be seeking developer contributions to mitigate cross boundary impacts, whether that be within the City Council or North Tyneside Border.

With respects to the Murton and Killingworth Strategic sites competing travel demands on the network are likely minimal, with either mitigation already secured or as with the strategic sites, the access arrangement are such that they remove demand from likely cross border access conflicts, such as the A19 Holystone junction.

The biggest outward draw from North Tyneside to Newcastle City will be employment within the City Centre and outlying business parks. The main access to Newcastle from North Tyneside is via the A1058 Coast Road. As previously discussed the Coast Road

capacity at its major junctions within North Tyneside are being increased by NTC and Highways England.

12.3 Northumberland / North Tyneside

Similar to Newcastle, Northumberland has some significant housing growth proposals within their Local Plan, near the border with North Tyneside. These are predominately located within and around Cramlington. Demand to access employment within the North Tyneside for area will increase proportionately as business relocate / open to areas such as Cobalt Business Park.

As previously discussed much of the mitigation required to enable new employment development is currently being delivered / secured. The key cross boundary issue identified is the A19 Moor Farm junction. This junction is located within Northumberland and managed and maintained by Highways England it is currently subject to significant congestion within the peak traffic period. This is predominately the demand to travel South in the AM and North in the PM. The current congestion occurs despite a recent “interim” scheme being delivered.

The potential increase in demand resulting from increased housing provision in Cramlington and increased employment opportunities in North Tyneside will results in increased congestion.

A number of discussions have occurred between North Tyneside, Northumberland and HE and the three parties agree the junction needs to be significantly improved to cater for future demand. Discussions are continuing as to promoting and securing funding for a jointly promoted scheme.

13. Developer Contribution Model

13.1 Network Impact Contribution Model

NTC are seeking to establish a methodology that sets out an equitable process for securing off-site highway impact contributions to allow mitigation schemes to be delivered promptly and without significant risk to the council. To date NTC has secured highway mitigation schemes via a combination of section 278 and section106 agreements. The decision between section 278 or 106 agreements has largely been driven by the scale of the works required.

The council's preference is toward section 278 agreements as these can reduce the delivery burden upon the council. A section 278 agreement can also provide developers with the opportunity to deliver the works with their own preferred contractors at a preferable cost. The worked example in Table 23 below illustrates how NTC would equitably quantify the network impacts of each development within the Local Plan and re-allocate this to deliver specific junction improvements without increasing the ask of any developer.

Table 23 Quantifying Network Impacts of Local Plan Developments, Worked Example

Example NTC Local Plan Highways Contribution Model (S.106 / S.278)

Step 1 Proportionate Impact - percentage of Local Plan trips impacting junction

	Junction 1	Junction 2	Junction 3	Junction 4	Junction 5	Junction 6	Junction 7	Junction 8	
Mitigation Cost	£ 75,000	£ 1,200,000	£ 450,000	£ 650,000	£ 900,000	£ 350,000	£ 145,000	£ 825,000	
Site									Total Network Obligations
Development A	35%	15%	0%	0%	5%	30%	9%	5%	£ 410,550
Development B	42%	0%	100%	0%	15%	0%	3%	20%	£ 785,850
Development C	10%	0%	0%	25%	10%	5%	70%	40%	£ 709,000
Development D	7%	75%	0%	0%	25%	0%	6%	8%	£ 1,204,950
Development E	4%	10%	0%	75%	10%	40%	12%	13%	£ 965,150
Development F	2%	0%	0%	0%	35%	25%	0%	14%	£ 519,500
	100%	100%	100%	100%	100%	100%	100%	100%	

Step 2 Reallocation of Network Obligations toward specific infrastructure

Funding Type	S.278	S.278	S.278	S.278	S.106	S.278	S.278	S.106	Total
Development A					£ 60,550	£ 350,000			£ 410,550
Development B	£ 75,000		£ 450,000		£ 260,850				£ 785,850
Development C					£ 564,000		£ 145,000		£ 709,000
Development D		£ 1,200,000			£ 4,950				£ 1,204,950
Development E				£ 650,000				£ 315,150	£ 965,150
Development F					£ 9,650			£ 509,850	£ 519,500

Where possible, junction improvements delivered by S.278 agreement will be allocated to the site with the majority/significant impact
e.g. Junction 6 majority impact is from Development E but there are insufficient funds remaining to deliver Junction 6 after the delivery of Junction 4, therefore the next most significant impact has been allocated delivery of Junction 6 i.e. Development A.

The methodology is transparent and would provide developers with cost certainty in advance of any planning applications being submitted. The proposed approach would also reduce the likelihood of the pooling (limited to 5 developments) problem associated with section 106 agreements being breached. In the worked example, there are several junctions identified where the impacts are shared across multiple developments therefore, NTC would seek to allocate delivery to a single development.

Once all highway schemes required to mitigate the cumulative Local Plan impacts have been costed, the above methodology will be applied to establish the off-site network contribution ask from the strategic sites.

14. Conclusion

14.1 Summary of Conclusions

The report provides details of the journey taken to establish the impact of NTC Local Plan preferred option, from the development and use of the Strategic Model to establish the impact of the Plan. The report also details the assumptions made which underpin the traffic modelling and subsequently the mitigation options developed. The main assumptions made are the requirement to adopt a high level of public transport, cycling and walking provision. This approach adopted has defined the trip generation rates adopted and ultimately the level of traffic impact and mitigation required.

Whilst this approach should be advocated where possible, the risk remains that should this level of public transport, walking and cycling service not be provided then the robustness of the trip generation rates would be questioned. Increasing the trip rates used is likely to spread and increase the severity of the traffic impacts on the highway. To date sensitivity testing around the trip rates used has not been undertaken. As such the scale of impact and subsequent increases in highway mitigation required is not known should the proposed public transport, walking and cycling provision be diluted.

On further review of the final SATURN modelling outputs it was revealed that the A192 corridor would be over capacity at key junctions between the A191/A192 (Fox Hunters) and the Beach Road / A192 (Tynemouth Pool) junction and require mitigation. Whilst the A191 / A192 junction falls within the modelled Vissim Network for Murton, the remaining parts of that corridor are not included within the model extents. At this stage of the Plan process this does not represent a major barrier as the corridor is modelled within the strategic model which would provide sufficient evidence.

Apart from the initial SATURN modelling of the central case the modelling and transportation work has concentrated on the two strategic sites of Murton and Killingworth Moor. Whilst these two sites represent the greatest challenges due to their size and traffic generated, there are other sites being promoted within the emerging Local Plan which will warrant a greater level of assessment to understand their impacts and solutions required to mitigate the impacts.

This report outlines the assessment undertaken against NTC preferred strategy and provides recommendations on the infrastructure required to deliver the strategy. It is recognised however that developers on these sites will have their own opinions on what the preferred strategy and mitigation plan should be. We would expect these suggestions to come forward through the plan process.

Some preliminary discussions have occurred between North Tyneside, Newcastle and Northumberland which have had a positive outcome with respect to developing a general consensus on how to jointly address obvious cross boundary issues. To date however there has been no checking / testing within the NTC model of cross boundary trips Newcastle to the west and Northumberland to the North have assumed in their own Local Plan assessments. If there are significant variations in the figures being presented by the three adjoining authorities, then the validity of the assumptions underpinning the

transport evidence base within the plan could be subject to greater challenge at the examination stage.

In addition discussions and information sharing has been on-going between the HE and NT. The report identifies areas on the strategic network which require mitigation as a result of the delivery of both NT and Northumbria CC Local Plan, further work is required by the HE to undertaken detailed modelling and design and cost the required mitigation.

Appendix A - Killingworth Moor Strategic Site Drawings

NOTE:

1. EXTENT OF HIGHWAY ADOPTION TO BE CONFIRMED

2. THIS DRAWING DEPICTS AN ILLUSTRATIVE DESIGN, THE FINAL DETAILED DESIGN WILL BE SUBJECT TO THE APPROVAL OF THE HIGHWAY AUTHORITY AS PART OF THE HIGHWAYS ACT SECTION 278 PROCESS DETAILS NOT SHOWN ON THIS DRAWING THAT IT IS ASSUMED WILL BE DEVELOPED AS PART OF ANY FUTURE SECTION 278 INCLUDE:
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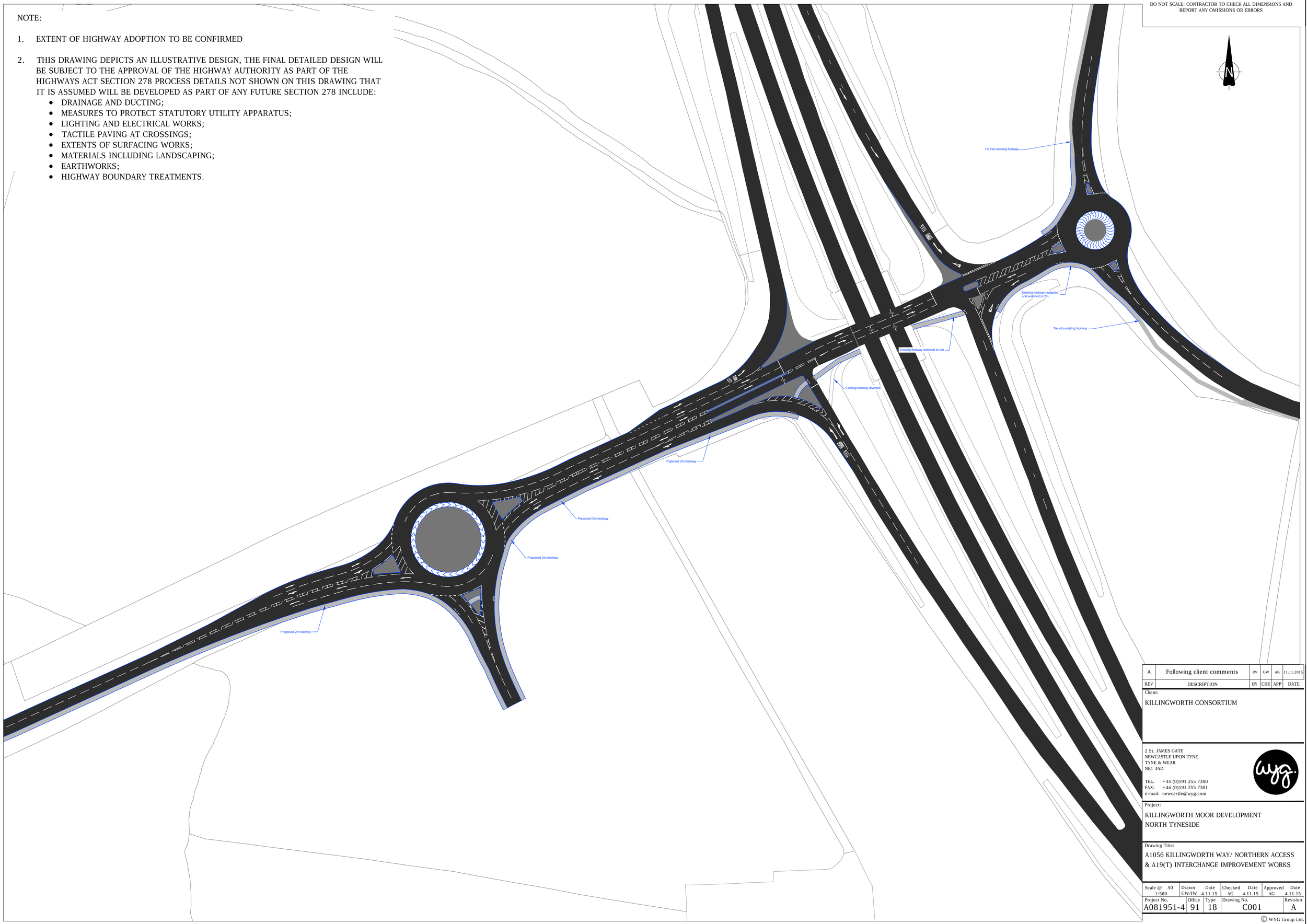
   - LIGHTING AND ELECTRICAL WORKS;
   - TACTILE PAVING AT CROSSINGS;
   - EXTENTS OF SURFACING WORKS;
   - MATERIALS INCLUDING LANDSCAPING;
   - EARTHWORKS;
   - HIGHWAY BOUNDARY TREATMENTS.



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REV	DESCRIPTION	BY	CHK	APP	DATE
A	Following client comments	IW	GW	AG	11.11.2015

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Project:
KILLINGWORTH MOOR DEVELOPMENT
NORTH TYNESIDE

Drawing Title:
A1056 KILLINGWORTH WAY/ NORTHERN ACCESS & A19(T) INTERCHANGE IMPROVEMENT WORKS

Scale @ A0	Drawn Date	Checked Date	Approved Date
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Project No.	Office	Type	Drawing No.	Revision
A081951-4	91	18	C001	A

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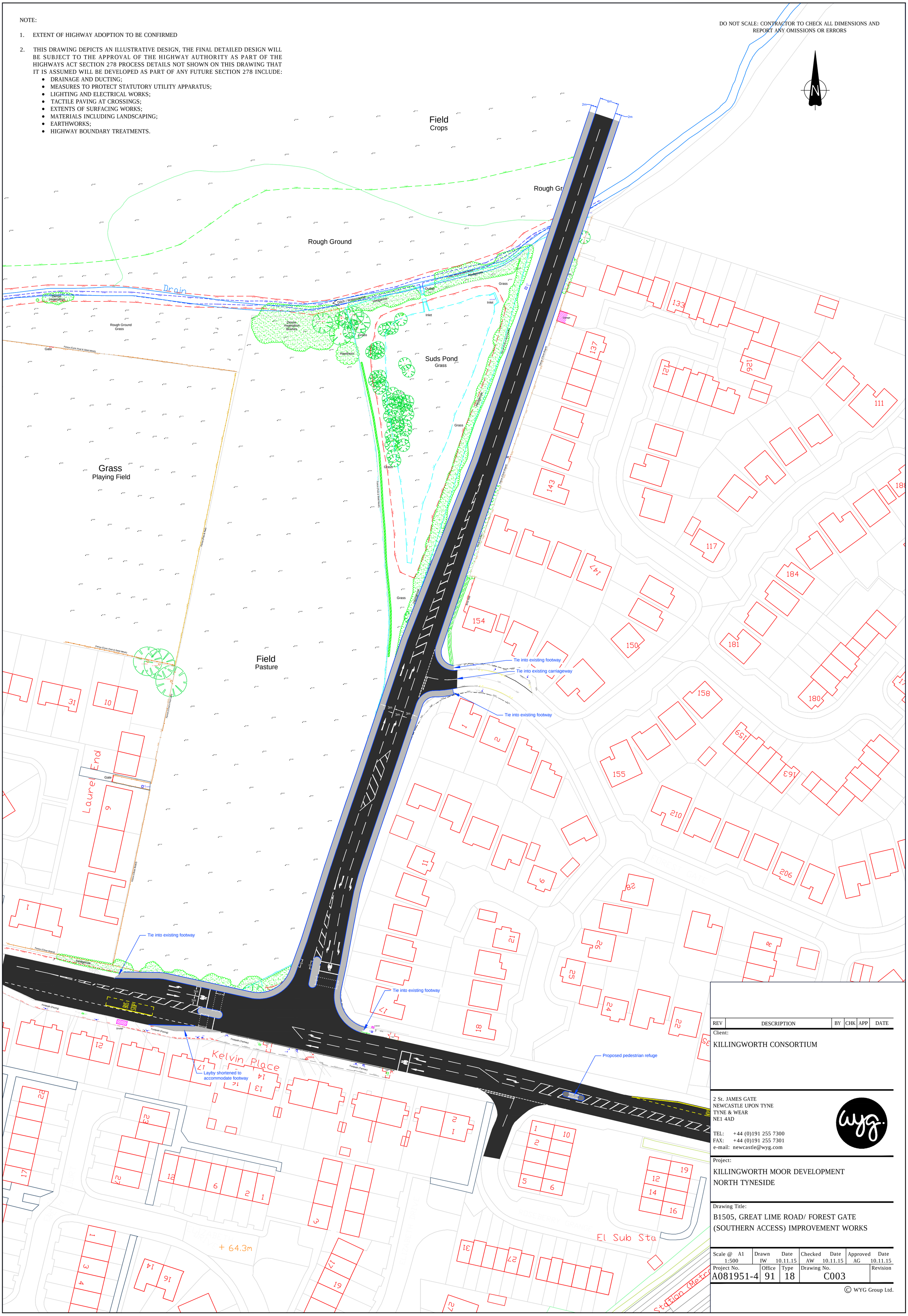

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Project:

KILLINGWORTH MOOR DEVELOPMENT
NORTH TYNESIDE

Drawing Title:

B1505, GREAT LIME ROAD/ FOREST GATE (SOUTHERN ACCESS) IMPROVEMENT WORKS

Scale @ A1	Drawn	Date	Checked	Date	Approved	Date
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Project No.	Office	Type	Drawing No.	Revision
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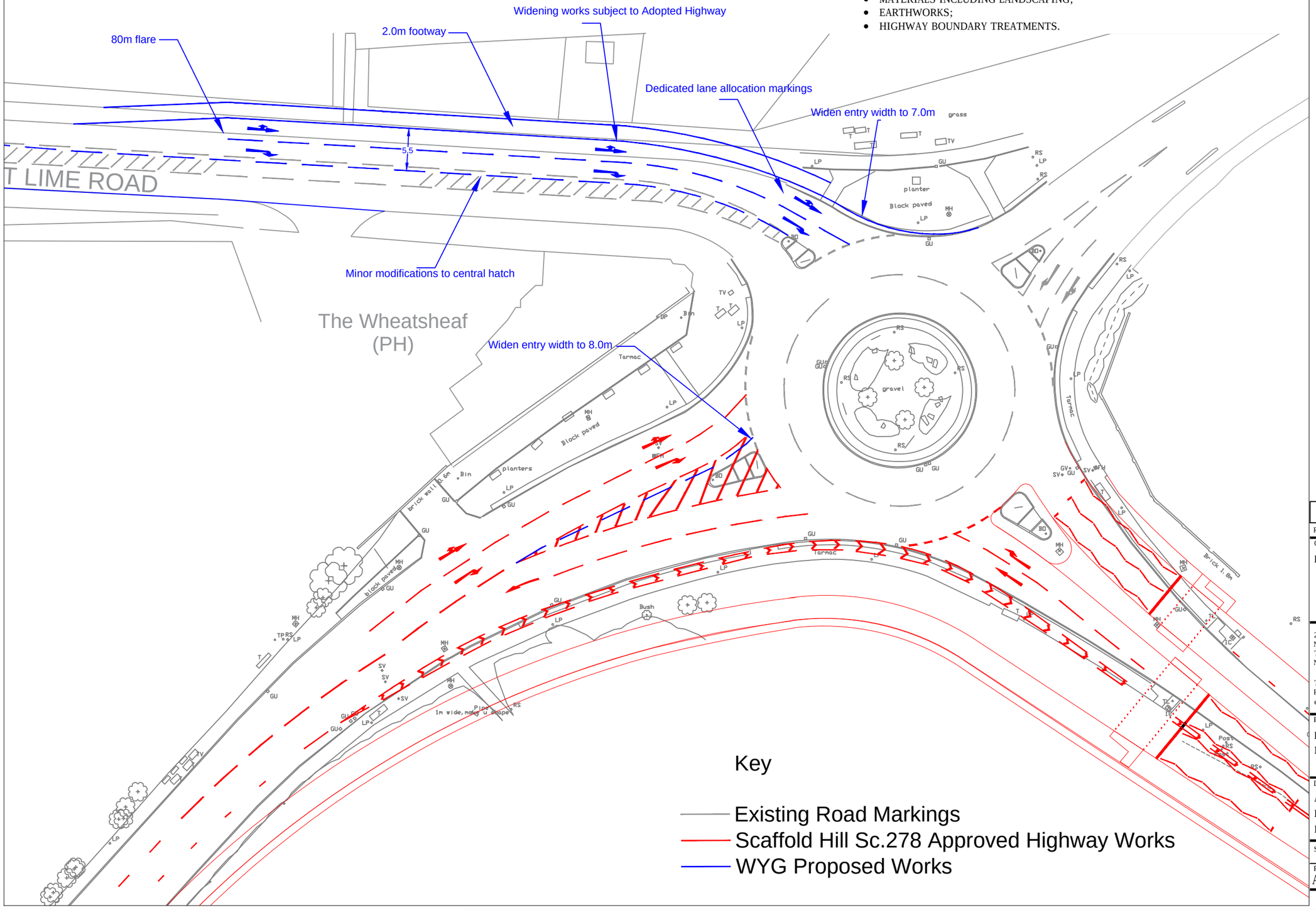
   - EARTHWORKS;
   - HIGHWAY BOUNDARY TREATMENTS.



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NORTH TYNESIDE

Drawing Title:
A191 WHITLEY ROAD/ B1505 GREAT LIME ROAD/ HOLYSTONE WAY ROUNDABOUT
PROPOSED IMPROVEMENTS

Scale @ A3	Drawn	Date	Checked	Date	Approved	Date
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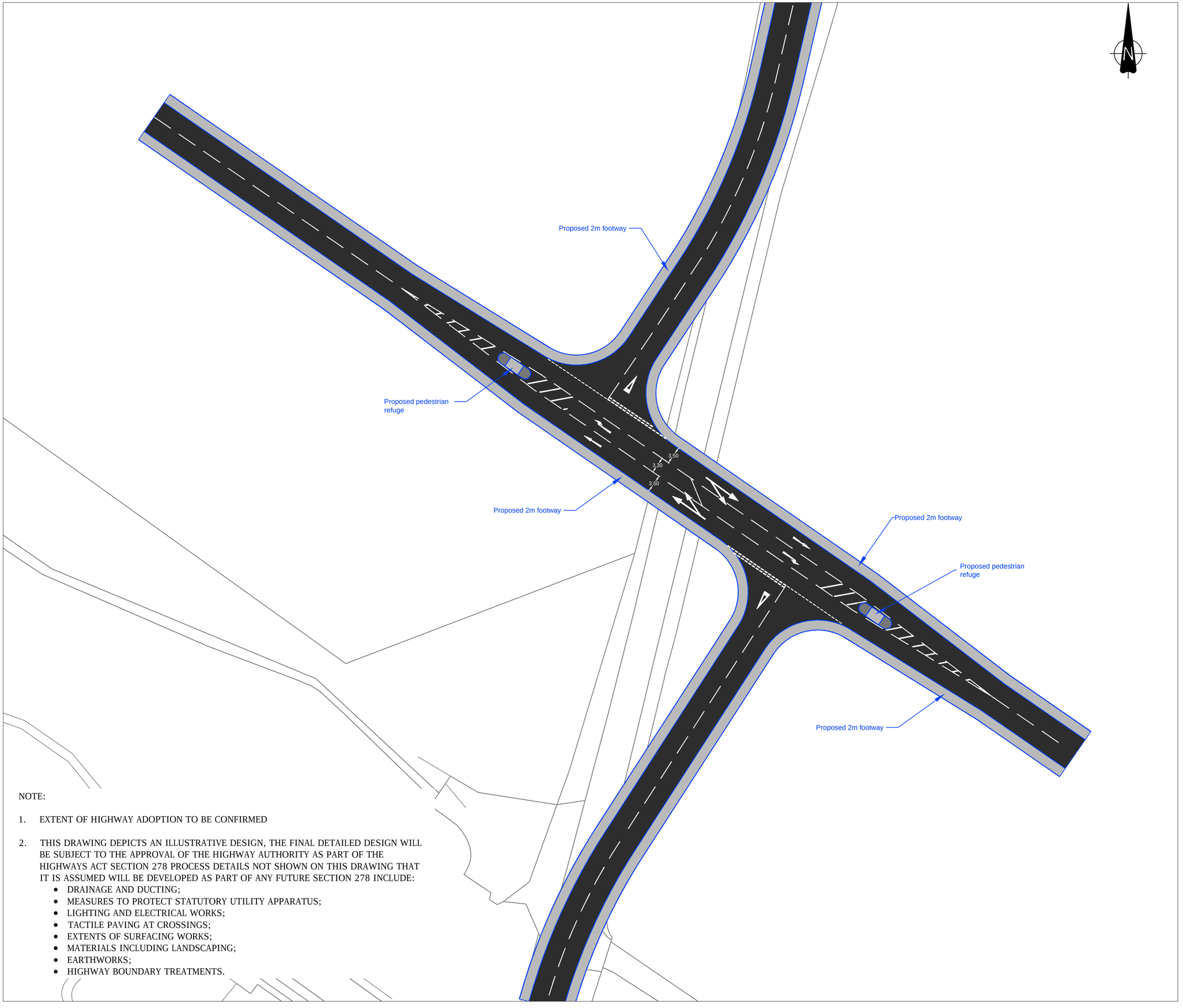

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   - MATERIALS INCLUDING LANDSCAPING;
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   - HIGHWAY BOUNDARY TREATMENTS.

REV	DESCRIPTION	BY	CHK	APP	DATE

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Project:

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NORTH TYNESIDE

Drawing Title:

B1317/ CENTRAL ACCESS
STAGGERED CROSSROAD ARRANGEMENT

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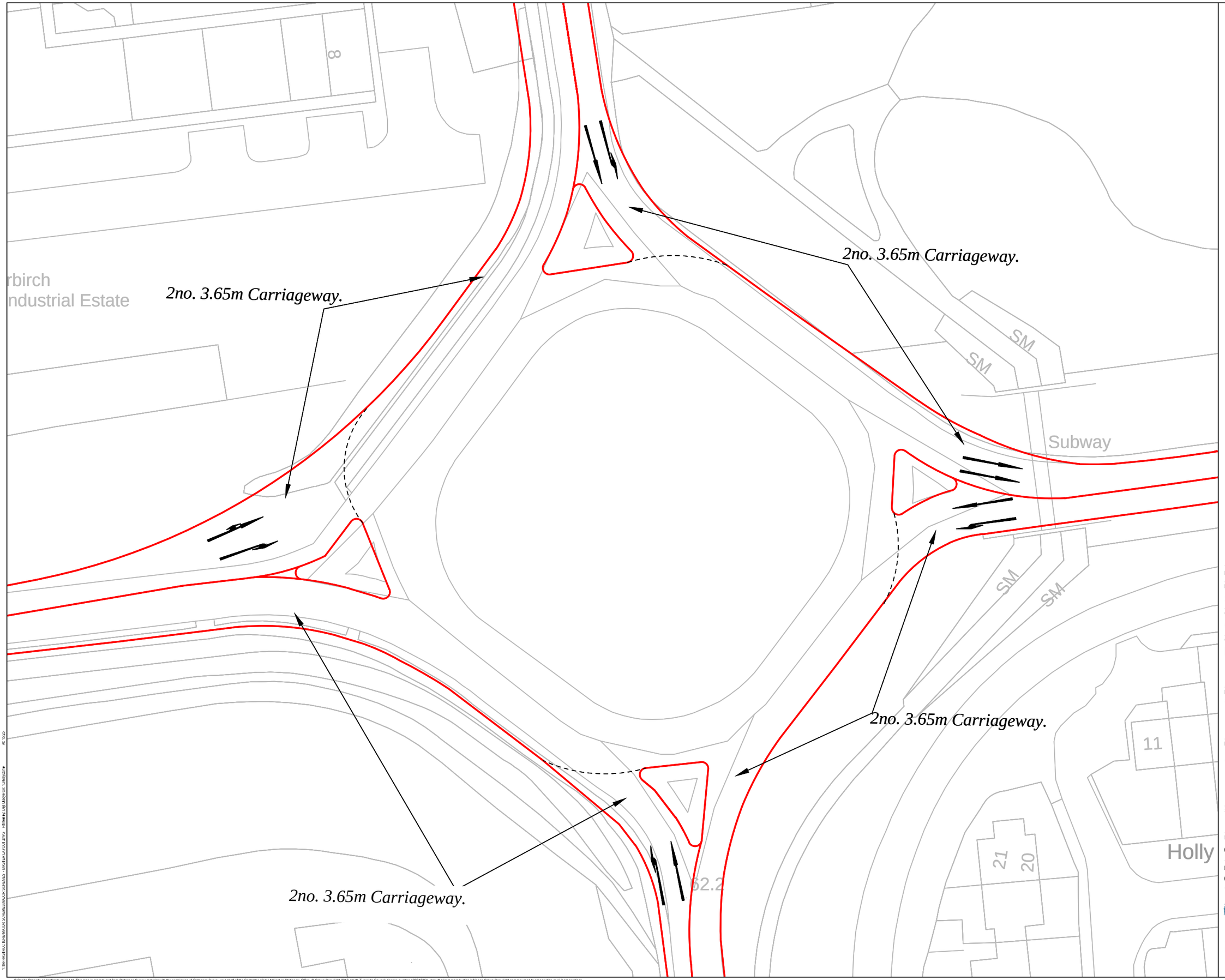

Rev | Drwn | Chk'd | App'd | Description | Date

Purpose of Issue
S2 for information

Classification
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Client
North Tyneside Council

Project
Wider Local Plans

Drawing
A1056 Killingworth Way / Camperdown

Scale at A3	Drawn	Checked	Approved
1 : 500	DO	-	-

Project No.	Date
CS077876	12-May-2016

Drawing Identifier
CS077876/PD/12 P01

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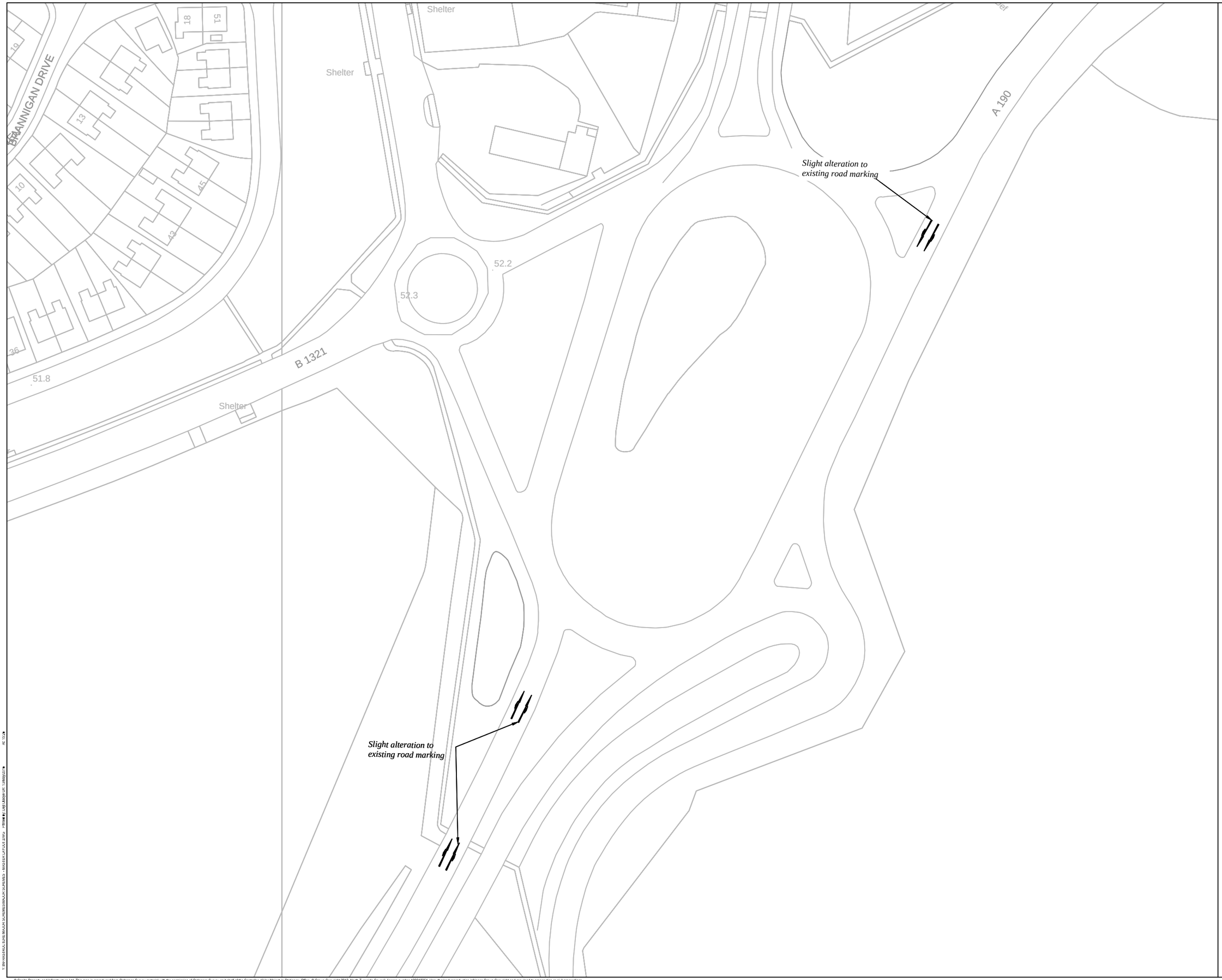

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Purpose of Issue
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Classification
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Client
North Tyneside Council

Project
Wider Local Plans

Drawing
A189 Annitsford Roundabout
Minor Alteration

Scale at A3	Drawn	Checked	Approved
1 : 1000	DO	-	-

Project No.
CS077876

Date
13-May-2016

Drawing Identifier
CS077876/PD/11

P01

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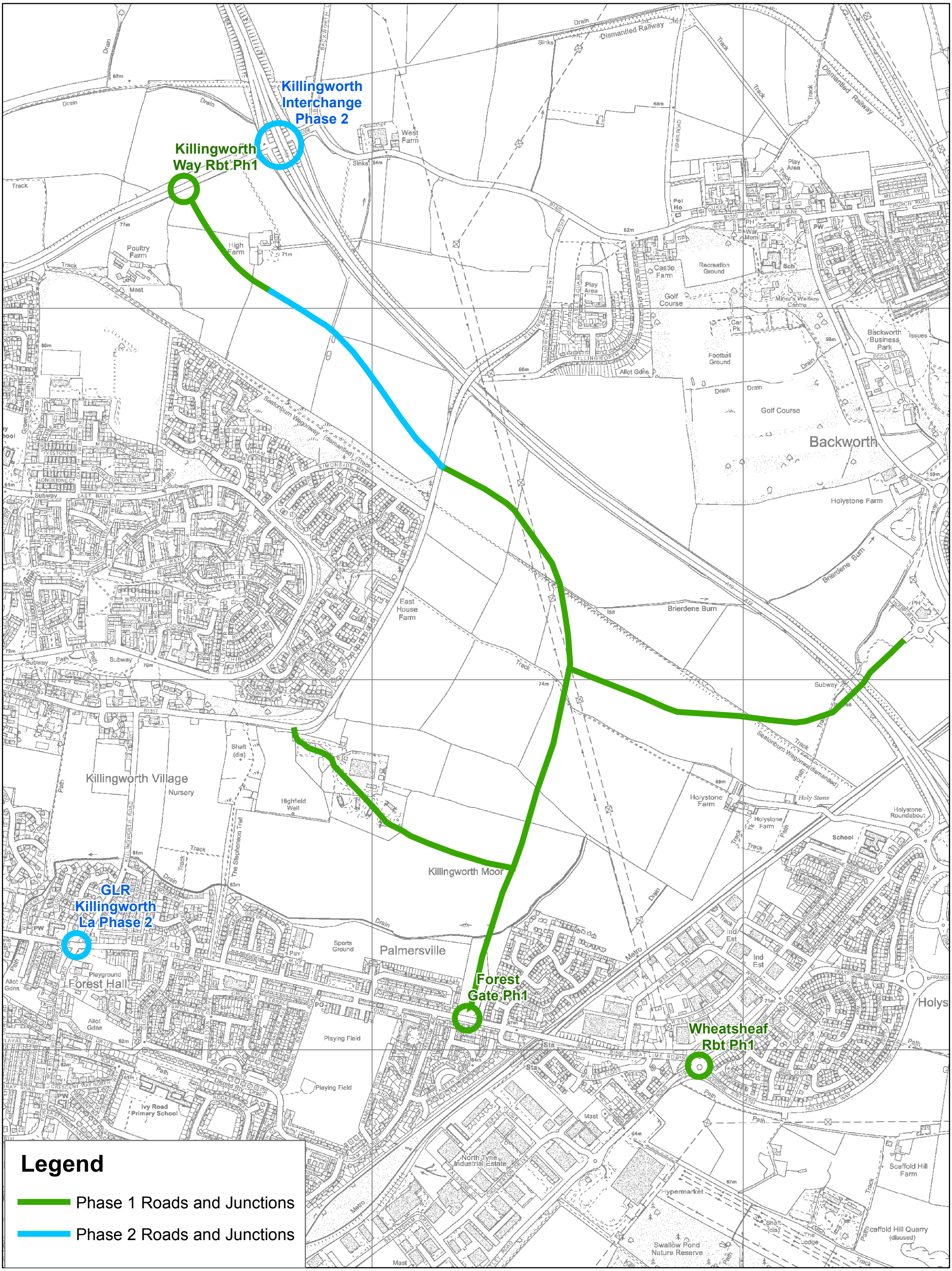

KILLINGWORTH MOOR

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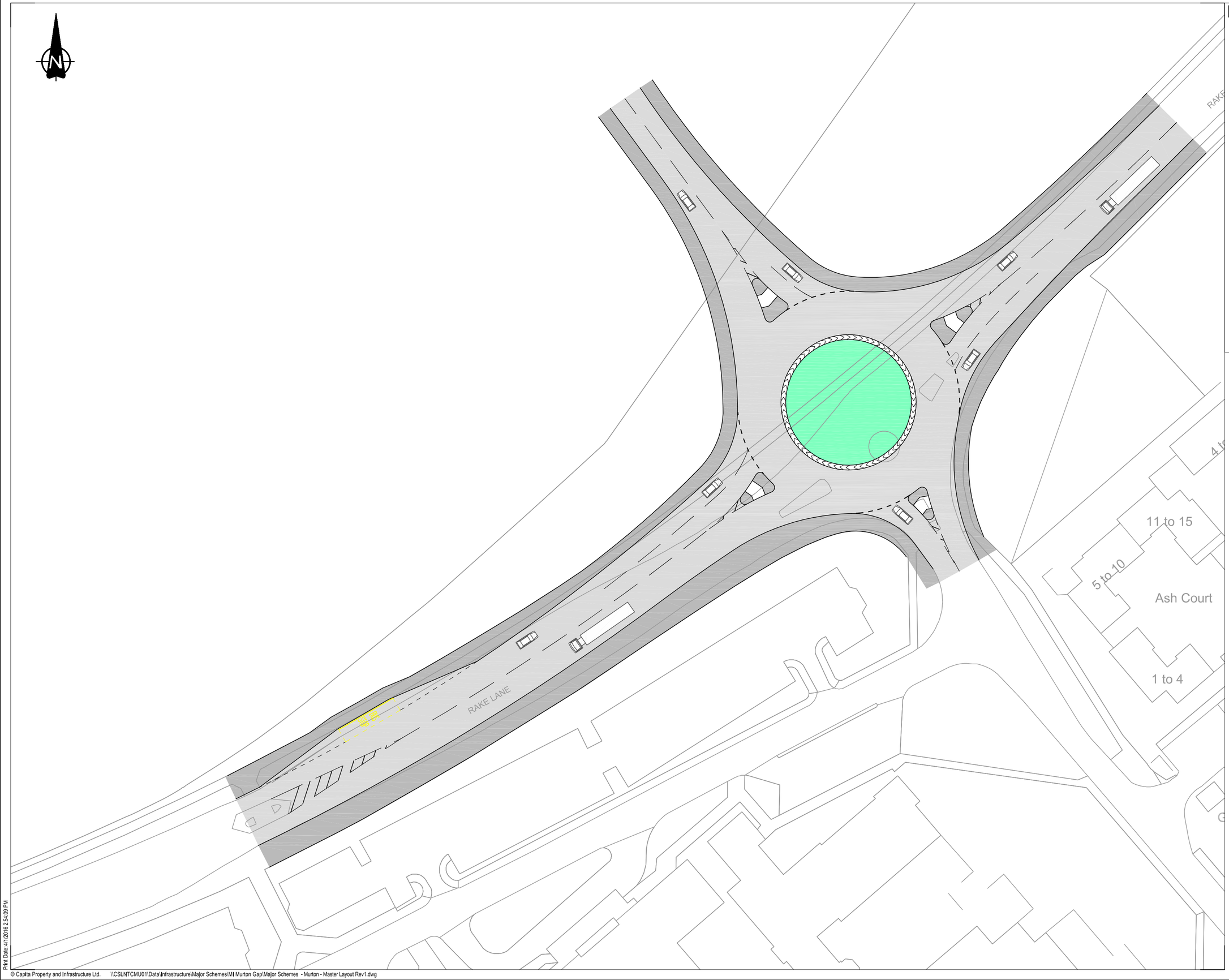
Appendix B - Murton Gap Strategic Site Drawings



NOTES:

1. Extents of highway adoption to be confirmed
2. This drawing depicts a preliminary design. The final detailed design will be subject to the approval of the highway authority.

Rev	Drwn	Chkd	Appd	Description	Date
P01	MI	-	-	For Information	31.03.16

Purpose of Issue
S2 for Information

Classification
Commercial in Confidence

Client
North Tyneside Council

Project
Major Projects
Murton
North Tyneside

Drawing
Phase 1
Rake Lane
Access Arrangement

Scale @ A2	Drawn	Checked	Approved
1:500	MI	-	-

Project No.
CS085562

Date
31-MAR-2016

Drawing Identifier
CS/085562/PD/007

BS1192 Compliant rev
P01

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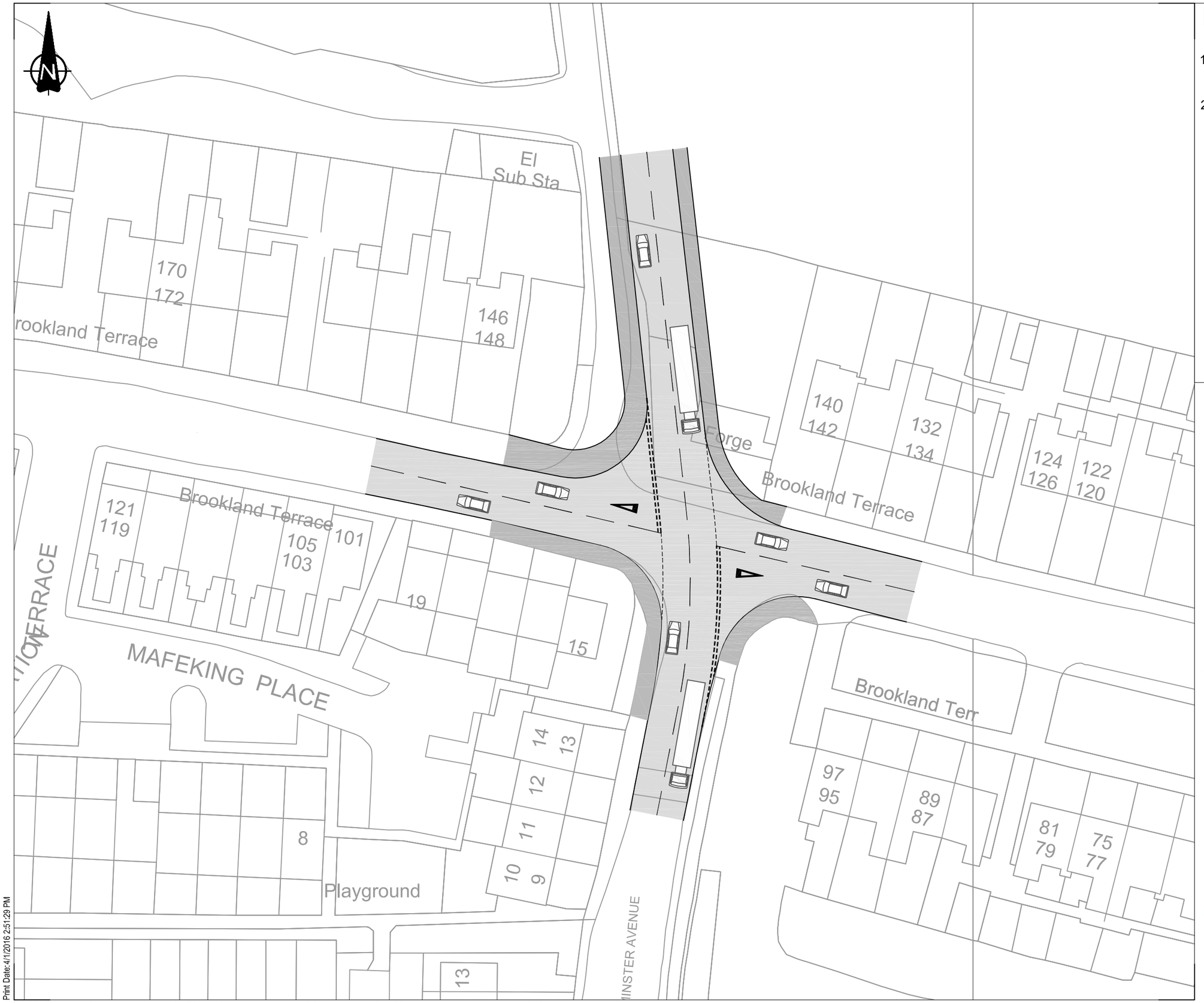

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P01	MI	-	-	For information	31.03.2016

Purpose of Issue
S2 for Information

Classification
Commercial in Confidence

Client
North Tyneside Council

Project
Major Projects
Murton
North Tyneside

Drawing
Murton Lane
New York Road

Scale @ A3	Drawn	Checked	Approved
1:500	MI	-	-

Project No.
CS085562

Date
31-MAR-2016

Drawing Identifier
CS/085562/PD/006

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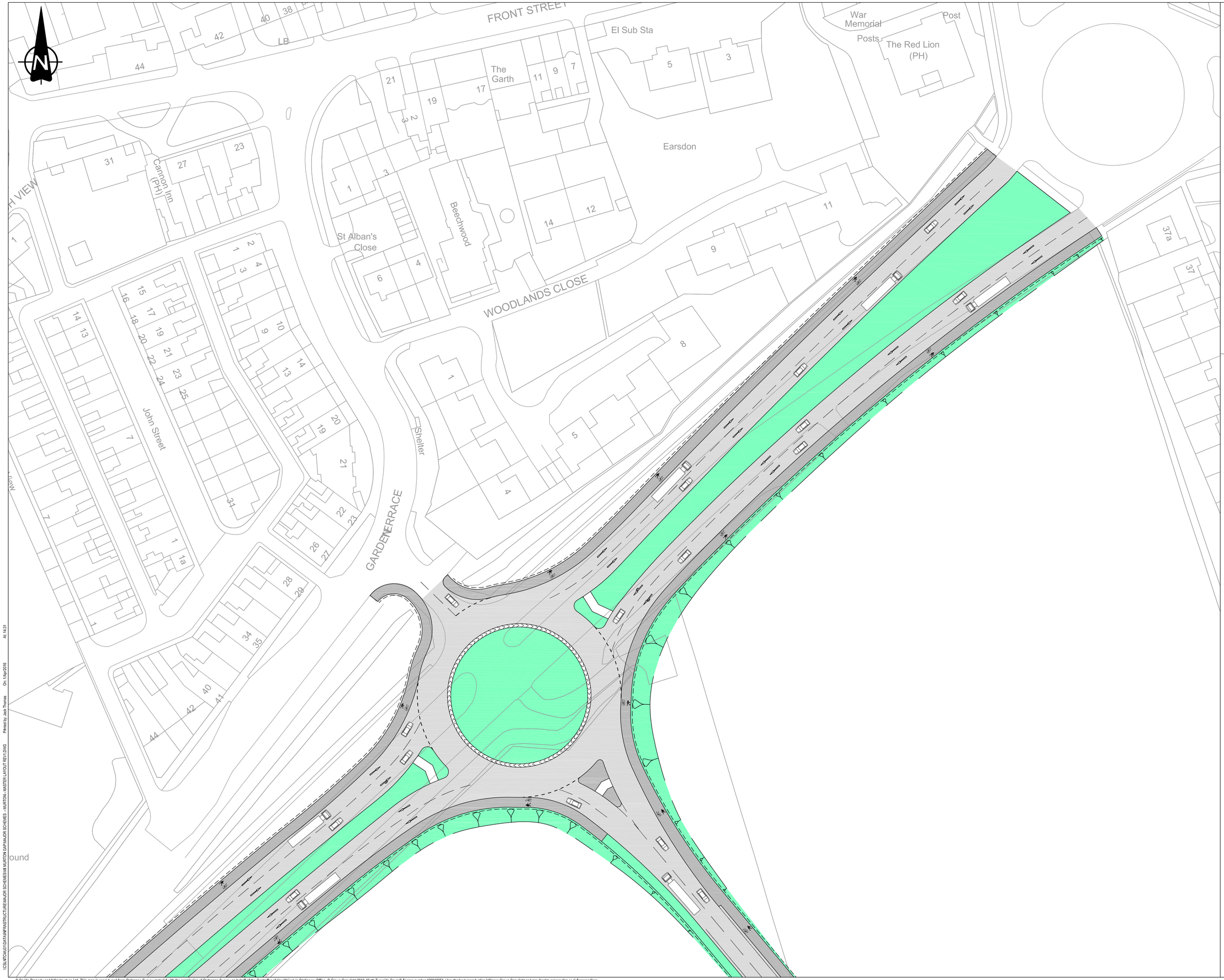

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Client
North Tyneside Council

Project
Major Projects
Murton
North Tyneside

Drawing
Northern Access
Garden Terrace

Scale at A1	Drawn	Checked	Approved
1 : 500	MI	-	-

Project No.
CS/085562

Date
31-MAR-2016

Drawing Identifier
CS077876/PD/001

P01

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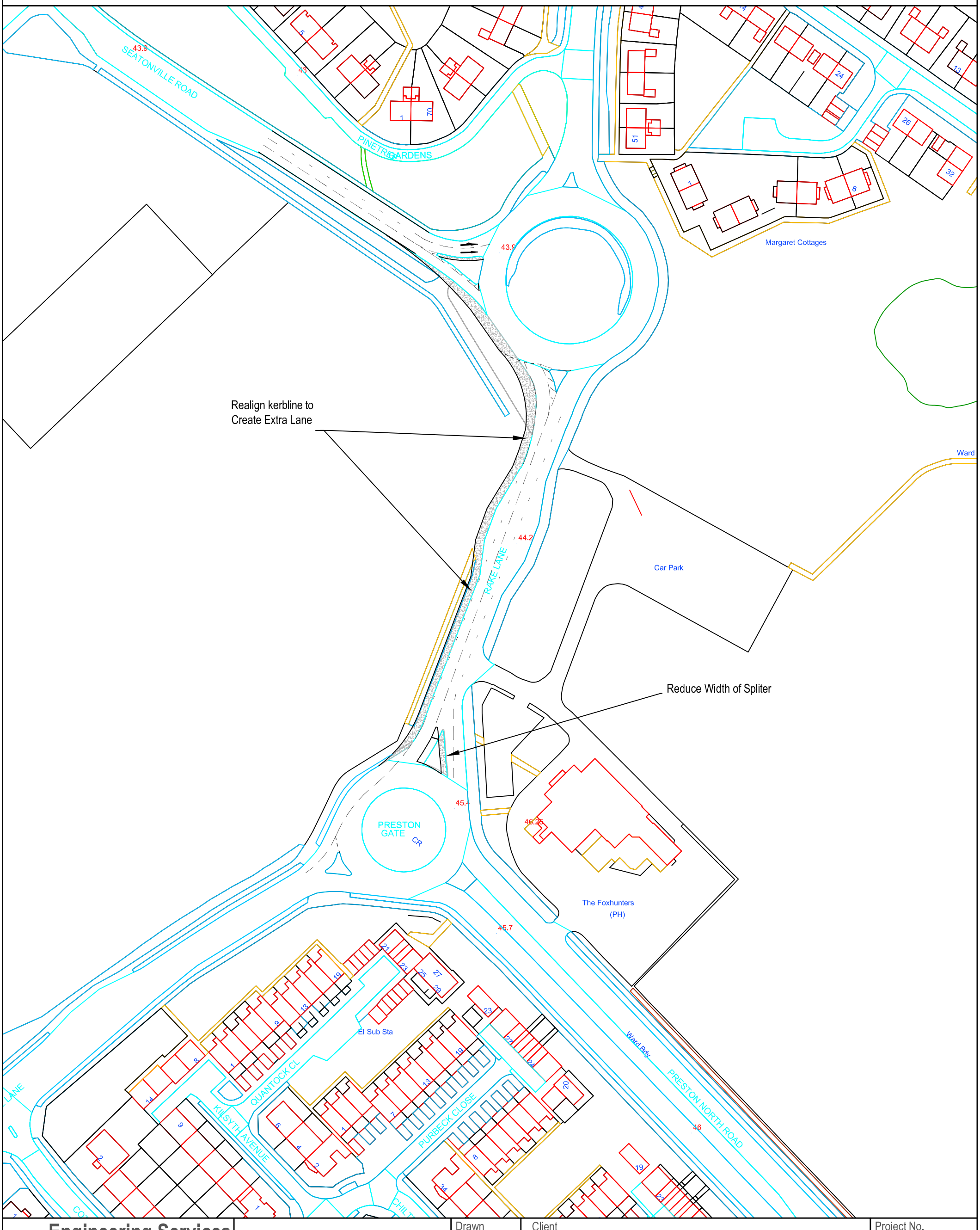

Engineering Services
Regeneration, Development and Regulatory Services
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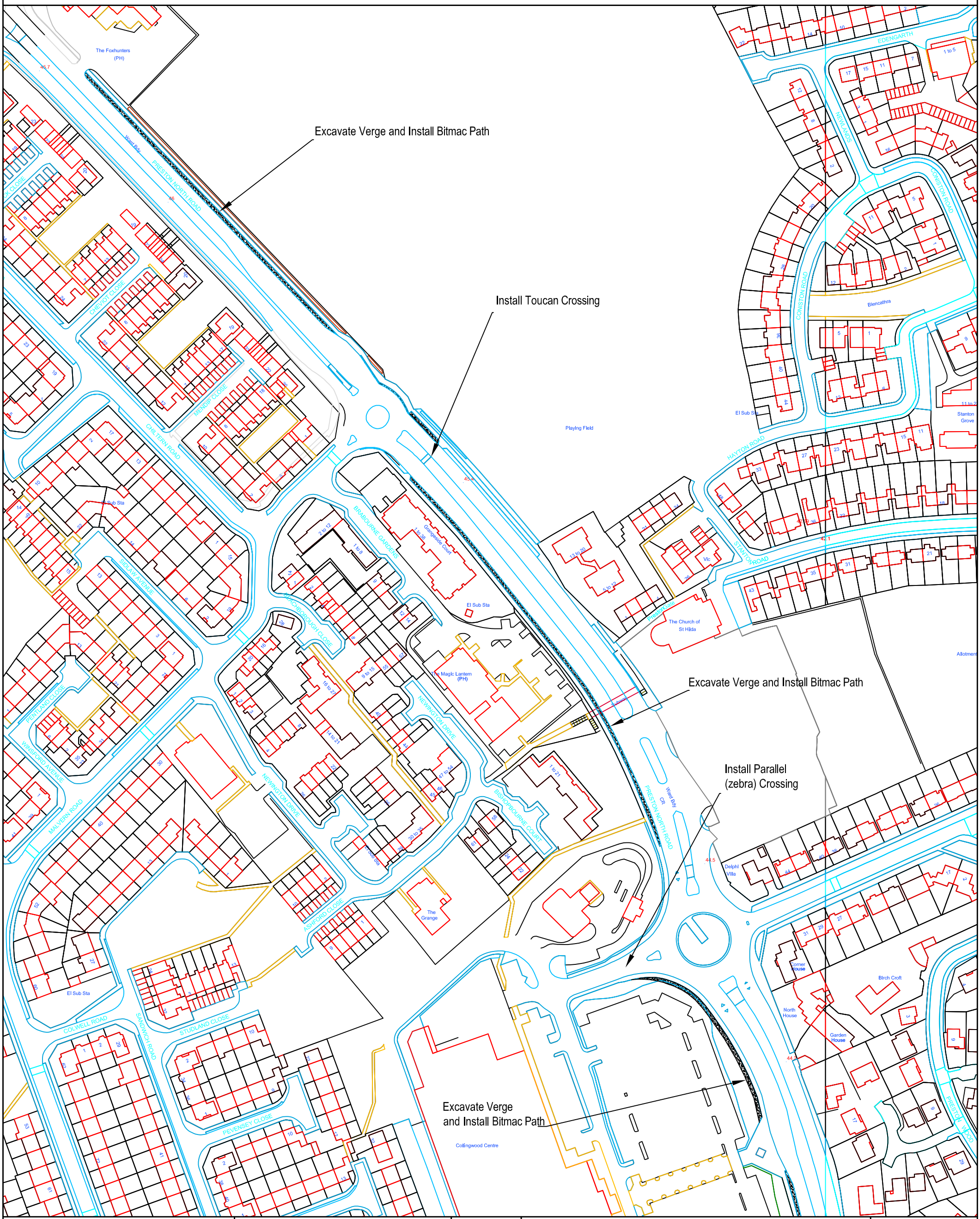
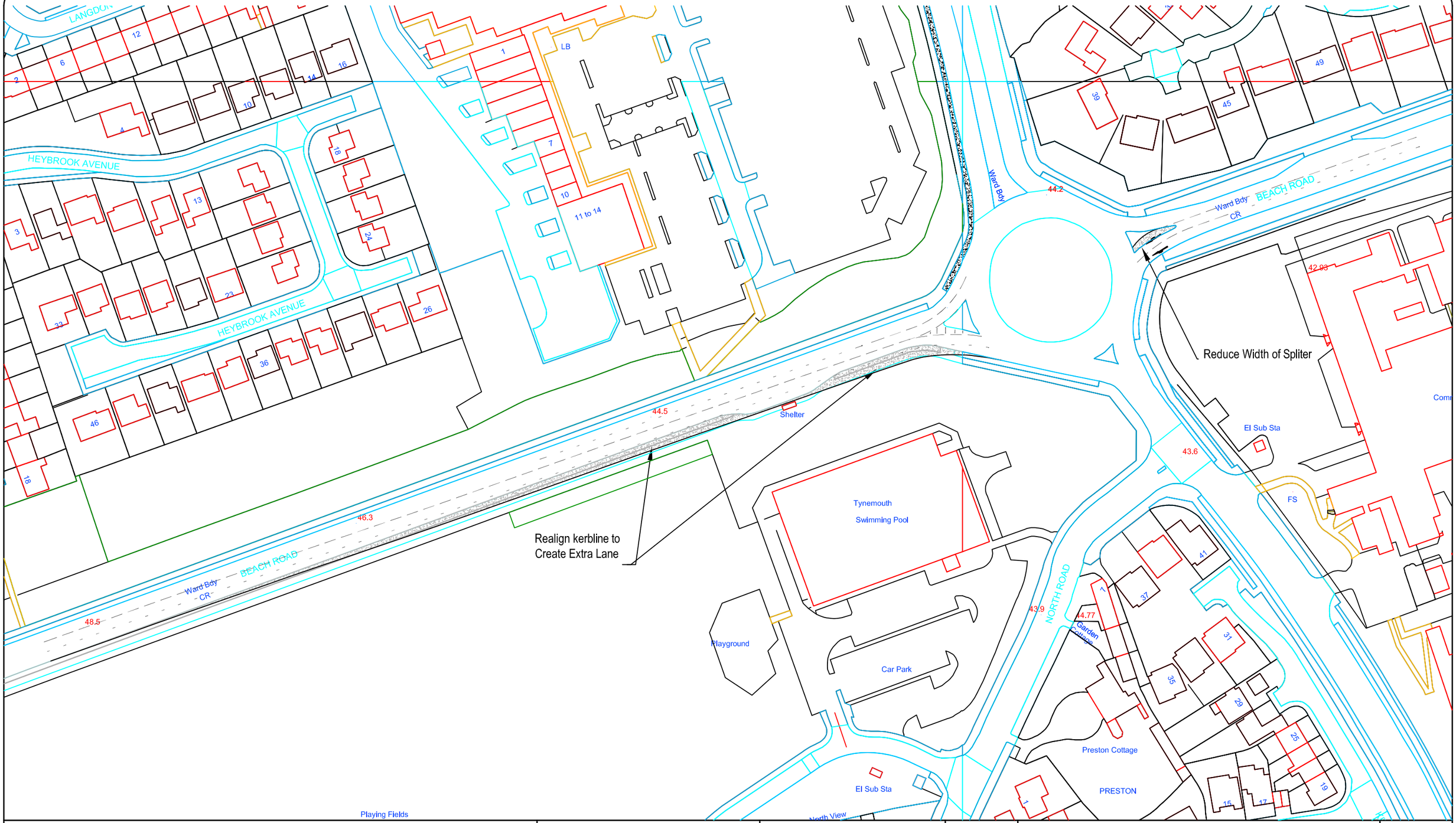
Checked	KDR
Scale\s	1:1250
Date Drawn	Jan 2016
Client	
Project Title	Preston Road / Rake Lane, Foxhunters Roundabout, North Shields
Drawing Title	Proposed Widewning of Rake Lane
Project No.	FOXRBT
Drawing No.	001
Revision	
Sheet Size	A3



Engineering Services Regeneration, Development and Regulatory Services 16 The Silverlink North Quadrant, Cobalt Business Park West Allotment Newcastle Upon Tyne NE27 0BY E-mail: traffic@northtyneside.gov.uk Web: www.northtyneside.gov.uk	North Tyneside Council Working in partnership with CAPITA	Drawn: JK Checked: KDR Scale\s: 1:1250 Date Drawn: Jan 2016	Client Project Title: Preston Road, North Shields Drawing Title: Excavation of Verge and Installation of Cycle Path and Crossing Points	Project No.: PRECTPATH Drawing No.: 001 Revision: Sheet Size: A3



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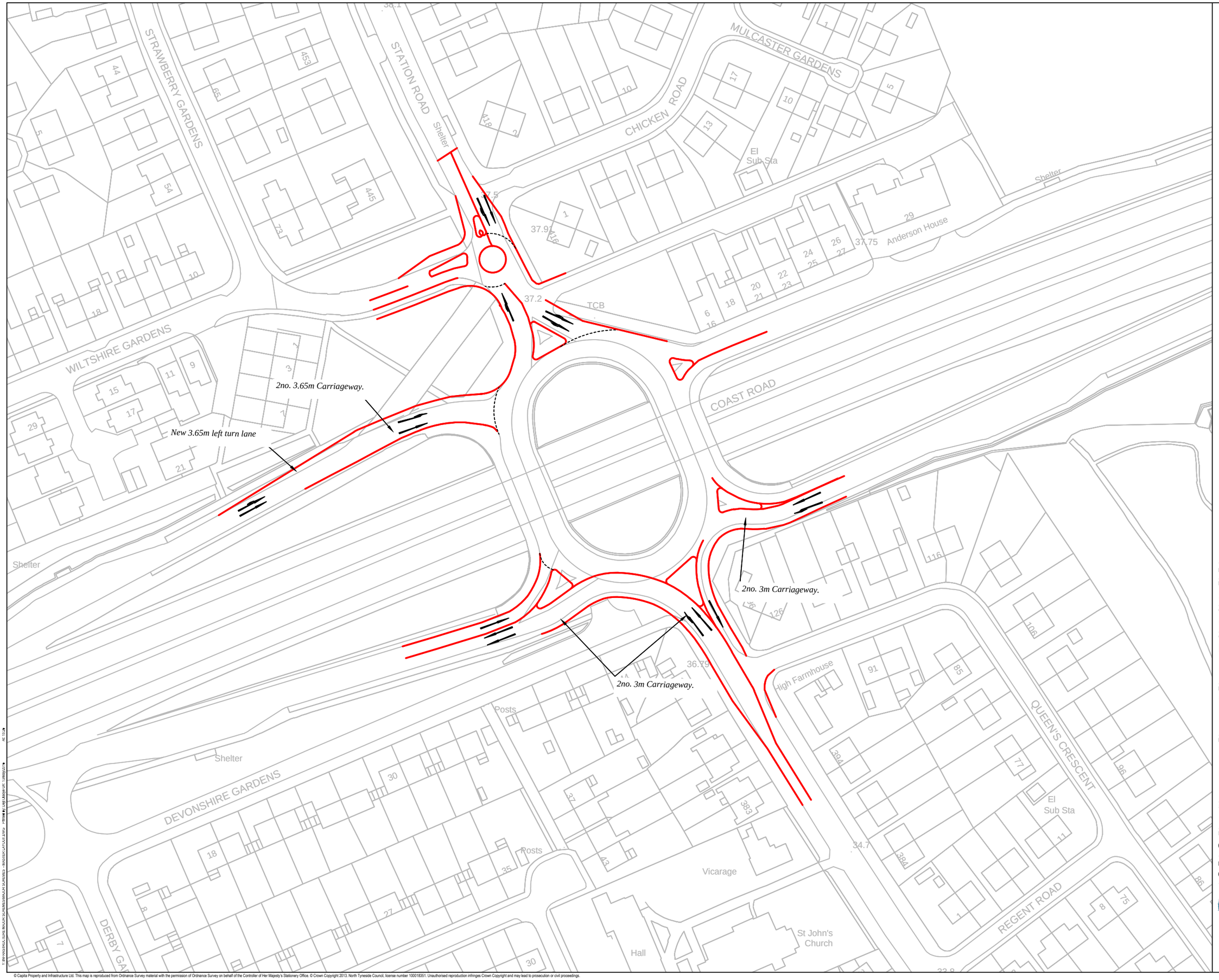
Drawn	JK
Checked	KDR
Scale\s	1:1250
Date Drawn	Jan 2016
Client	
Project Title	A1058 Beach Road, North Shields
Drawing Title	Proposed Widening of Carriageway
Project No.	BEACHWID
Drawing No.	001
Revision	
Sheet Size	A3



Rev	Drwn	Chk'd	App'd	Description	Date

Purpose of Issue

S2 for information

Classification

Commercial in Confidence

Client

North Tyneside Council

Project

Wider Local Plans

Drawing

A1058 Coast Road / A186 Station Road - Station Road East/West

Scale at A3	Drawn	Checked	Approved
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Project No.	Date
CS077876	13-May-2016

Drawing Identifier

CS077876/PD/11 P01

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Link Rd N Rbt Ph1

Link Rd S Rbt Ph1

Norham Rd Rbt Ph1

New York Rd Access Ph1

Rake Lane Access Ph1

Legend

- Phase 1 Roads and Junctions
- Phase 2 Roads and Junctions
- Internal Access Road

MURTON GAP

Scale 1: 10000

0 60 120 180 240 300 360 420 480 Meters

N

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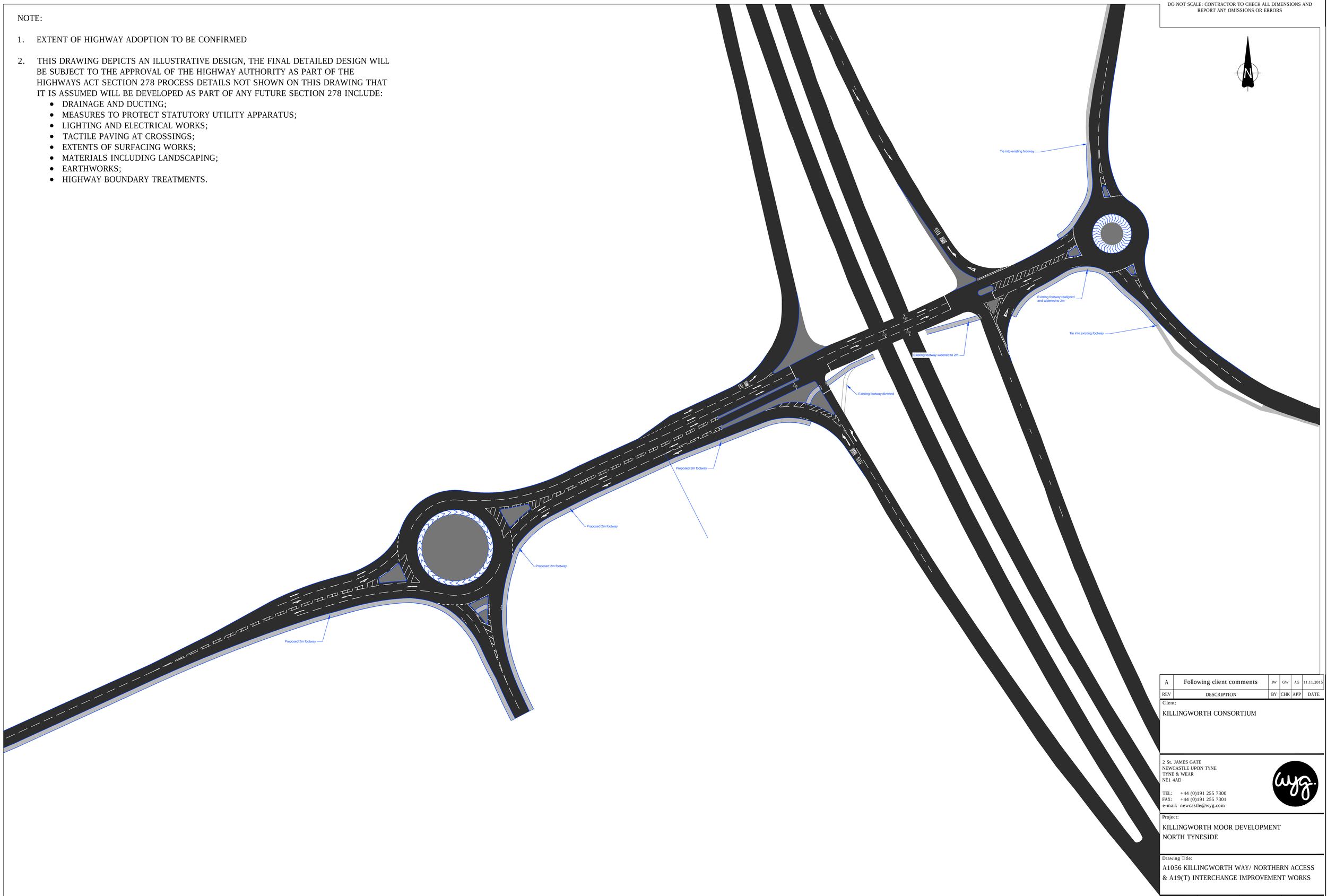
Appendix C - A19 Killingworth Interchange Concept Design

NOTE:

1. EXTENT OF HIGHWAY ADOPTION TO BE CONFIRMED

2. THIS DRAWING DEPICTS AN ILLUSTRATIVE DESIGN, THE FINAL DETAILED DESIGN WILL BE SUBJECT TO THE APPROVAL OF THE HIGHWAY AUTHORITY AS PART OF THE HIGHWAYS ACT SECTION 278 PROCESS DETAILS NOT SHOWN ON THIS DRAWING THAT IT IS ASSUMED WILL BE DEVELOPED AS PART OF ANY FUTURE SECTION 278 INCLUDE:
   - DRAINAGE AND DUCTING;
   - MEASURES TO PROTECT STATUTORY UTILITY APPARATUS;
   - LIGHTING AND ELECTRICAL WORKS;
   - TACTILE PAVING AT CROSSINGS;
   - EXTENTS OF SURFACING WORKS;
   - MATERIALS INCLUDING LANDSCAPING;
   - EARTHWORKS;
   - HIGHWAY BOUNDARY TREATMENTS.

DO NOT SCALE: CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ANY OMISSIONS OR ERRORS



REV	DESCRIPTION	BY	CHK	APP	DATE
A	Following client comments	IW	GW	AG	11.11.2015

Client:

KILLINGWORTH CONSORTIUM

2 St. JAMES GATE
NEWCASTLE UPON TYNE
TYNE & WEAR
NE1 4AD

TEL: +44 (0)191 255 7300
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Project:

KILLINGWORTH MOOR DEVELOPMENT
NORTH TYNESIDE

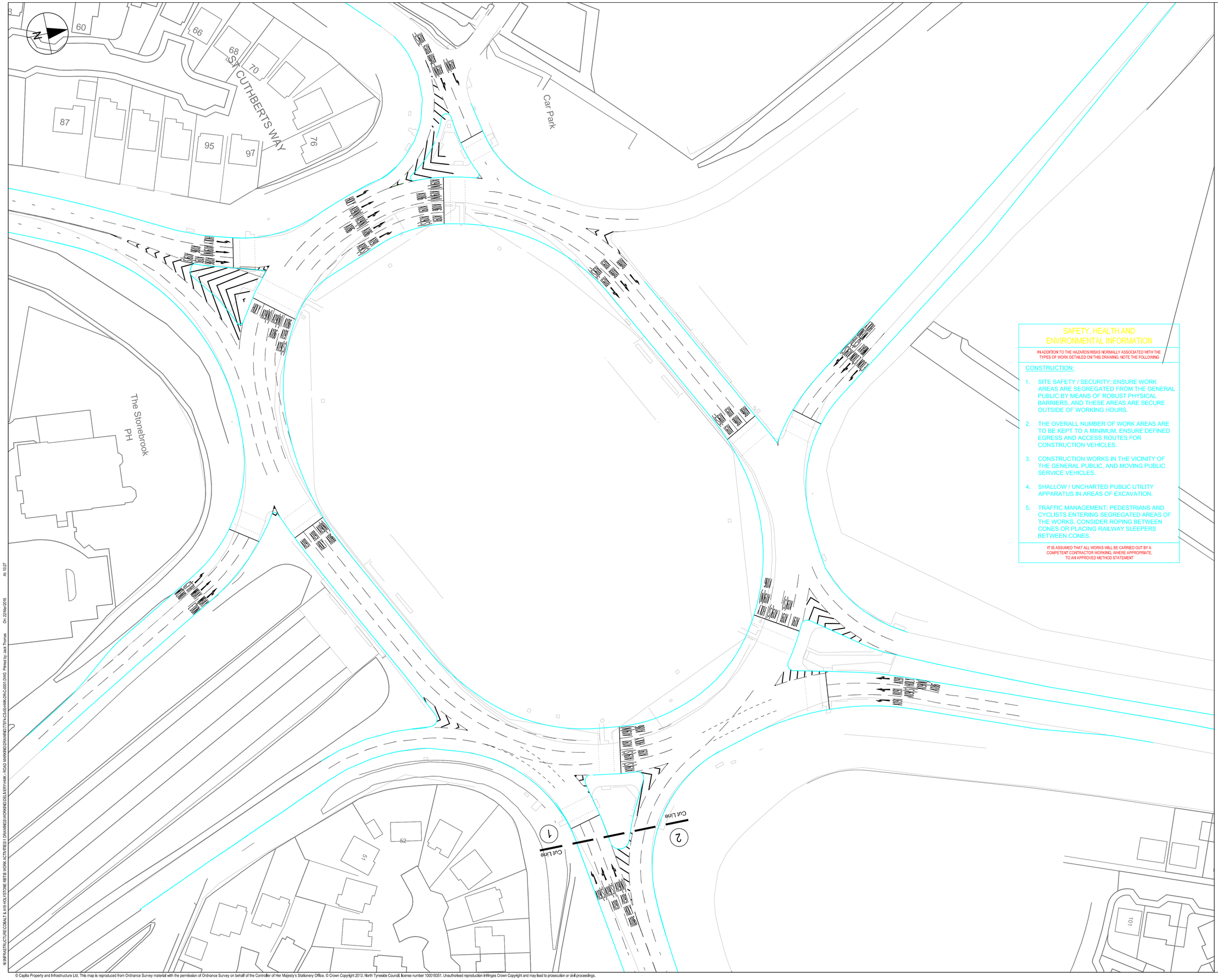
Drawing Title:

A1056 KILLINGWORTH WAY/ NORTHERN ACCESS & A19(T) INTERCHANGE IMPROVEMENT WORKS

Scale @ A0	Drawn Date	Checked Date	Approved Date
1:500	GW/IW 4.11.15	AG 4.11.15	AG 4.11.15

Project No.	Office	Type	Drawing No.	Revision
A081951-4	91	18	C001	A

Appendix D - A19 Holystone Interchange Improvement Scheme



Key

Proposed layout

Proposed road markings

Notes

1. This drawing should not be scaled. All dimensions must be checked on site, and the contractor is to report any omissions or errors to the contract administrator.
2. Refer to Appendix 12/3 for additional details.
3. All diagram numbers refer to The Traffic Signs Regulations and General Directions 2002.
4. New road markings to be in thermoplastic screed with applied solid glass beads.
5. Road markings to be in accordance with clause 1212 of SHW: Retro-reflectivity requirements commence from the date of application or date of trafficking, whichever is later and shall last for the functional life of the marking. Markings to have a requirement of a minimum retro-reflectivity value of 200 MCD/M2/LX. The minimum laid thickness is 2.0mm for screeded markings and 1.5mm for spray applied markings. In no case shall any material be laid more than 6mm thick.
6. The standard colour for yellow markings should be either BS381C No.355 (lemon) or No.309 (canary).
7. Drawing to be read in conjunction with drawing numbers;
   77874-CS-00-HMK-DR-C-1002
   77874-CS-00-HMK-DR-C-1003
   77874-CS-00-HMK-DR-C-1004
   77874-CS-00-HMK-DR-C-1005
   77874-CS-00-HMK-DR-C-1006

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING

CONSTRUCTION:

1. SITE SAFETY / SECURITY: ENSURE WORK AREAS ARE SEGREGATED FROM THE GENERAL PUBLIC BY MEANS OF ROBUST PHYSICAL BARRIERS, AND THESE AREAS ARE SECURE OUTSIDE OF WORKING HOURS.
2. THE OVERALL NUMBER OF WORK AREAS ARE TO BE KEPT TO A MINIMUM. ENSURE DEFINED EGRESS AND ACCESS ROUTES FOR CONSTRUCTION VEHICLES.
3. CONSTRUCTION WORKS IN THE VICINITY OF THE GENERAL PUBLIC, AND MOVING PUBLIC SERVICE VEHICLES.
4. SHALLOW / UNCHARTED PUBLIC UTILITY APPARATUS IN AREAS OF EXCAVATION.
5. TRAFFIC MANAGEMENT: PEDESTRIANS AND CYCLISTS ENTERING SEGREGATED AREAS OF THE WORKS, CONSIDER ROPING BETWEEN CONES OR PLACING RAILWAY SLEEPERS BETWEEN CONES.

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT.

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Rev	Drwn	Chk'd	Appd	Description	Date

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
North Tyneside Council

Project
A19 EMPLOYMENT ACCESS - COBALT SEP

Drawing
Road Markings

Sheet 1 of 6

Scale at A1	Drawn	Checked	Approved
1:500	BA	LJS	-

Project No.
CS077874

Date
12-OCT-15

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
77874-CS-00-HMK-DR-C-1001

Revision
P01.1

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The Quadrant, The Silverlink North, Cobalt Business Park, North Tyneside NE27 0BY - 0191 643 4819
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Capita Property and Infrastructure Ltd.

N:\INFRASTRUCTURE\COBALT & A19 HOLYSTONE ISB\18 WORK ACTIVITIES\1 DRAWINGS\WORKING\CBLMSERY.mkk - ROAD MARKING\DRAWING\77874-CS-00-HMK-DR-C-0001.DWG Plotted by: Jack Thomas On: 23/Mar/2016 At: 10:27

Appendix E - Mitigation Cost Estimates

North Tyneside New Major Schemes 2018/19 Onwards

A189 Annitsford Roundabout

A189 Annitsford Roundabout	Estimated costs £
Highway Works	£16,800
Preliminaries (20%)	£3,360
Contract Works Total	£20,160
Contingencies (10%)	£2,016
Off Peak Working etc. (5%)	-
OH & Profits (12.5%)	£2,520
Risk	-
Design & Supervision Fees (15%)	£3,024
Stats Search C2	£1,000
Communication	£1,000
Surveys *(Provisional)*	£2,000
Grand Total	**£31,720**

North Tyneside New Major Schemes 2018/19 Onwards

A1056 Killingworth Way / Camperdown

Killingworth Way / Camperdown	Estimated costs £
Highway Works	£1,100,000.00
Preliminaries (20%)	£220,000.00
Contract Works Total	£1,320,000.00
Contingencies (10%)	£132,000.00
Off Peak Working etc. (5%)	£66,000.00
OH & Profits (12.5%)	£165,000.00
Risk	£400,000
Design & Supervision Fees (15%)	£198,000.00
Stats Diversions	£300,000.00
Communication	£45,000
Surveys etc.	£35,000
Grand Total	**£2,661,000.00**

North Tyneside New Major Schemes 2018/19 Onwards

A1058 Coast Road / A186 Station Road – Station Road East - West

A1058 Coast Road / A186 Station Road – Station Road East / West	Estimated costs £
Highway Works	£1,200,000
Preliminaries (20%)	£240,000
Contract Works Total	£1,440,000
Contingencies (10%)	£144,000
Off Peak Working etc. (5%)	£72,000
OH & Profits (12.5%)	£180,000
Risk	£500,000
Design & Supervision Fees (15%)	£216,000
Stats	£300,000
Communication	£45,000
Surveys	£35,000
Grand Total	**£2,932,000**

North Tyneside New Major Schemes 2018/19 Onwards

Foxhunters widening scheme

Foxhunters widening scheme	Estimated costs
Contract Works Estimate (Inc Street Lighting)	£1,812,000
Off Peak Working etc (5%)	£90,600
Preliminaries (20%)	£362,400
OH & Profits (12.5%)	£226,500
Risk	£200,000
Design & Supervision Fees (15%)	£271,800
Stats Diversions	£200,000
Communication	£50,000
Surveys etc	£20,000
Grand Total	**£3,233,300**

North Tyneside New Major Schemes 2018/19 Onwards

Killingworth Junction

Killingworth Junction	Estimated costs
Contract Works Estimate (Inc Traffic Signals & Street Lighting)	£3,125,100
Off Peak Working etc (10%)	£312,510
Preliminaries (20%)	£625,020
OH & Profits (12.5%)	£390,638
Risk	£500,000
Design & Supervision Fees (15%)	£468,765
Stats Diversions	£500,000
Communication	£50,000
Surveys etc	£50,000
Grand Total	**£6,022,033**

North Tyneside New Major Schemes 2018/19 Onwards

Murton Lane – New York Road

Murton Lane – New York Road	Estimated costs £
Highway Works *(inc Street Lighting)*	£177,532.62
Preliminaries (20%)	£35,506.52
Contract Works Total	£213,039.15
Contingencies (10%)	£21,303.91
Off Peak Working etc (5%)	£10,651.96
OH & Profits (12.5%)	£26,629.89
Risk	£250,000.00
Design & Supervision Fees (15%)	£31,955.87
Stats Diversions	£321,046.01
Communication	£15,000
Surveys etc	£10,000
Grand Total	**£899,626.79**

North Tyneside New Major Schemes 2018/19 Onwards

New York Road Improvements

New York Road Improvements	Estimated costs
Contract Works Estimate (Inc Street Lighting)	£2,915,900
Off Peak Working etc (10%)	£291,590
Preliminaries (20%)	£583,180
OH & Profits (12.5%)	£364,488
Risk	£500,000
Design & Supervision Fees (15%)	£437,385
Stats Diversions	£500,000
Communication	£50,000
Surveys etc	£50,000
Grand Total	**£5,692,543**

North Tyneside New Major Schemes 2018/19 Onwards

Northern Access – Garden Terrace

Northern Access – Garden Terrace	Estimated costs £
Highway Works *(inc' Street Lighting & Controlled Ped' crossing)*	£1,562,959.91
Preliminaries (20%)	£312,591.98
Contract Works Total	£1,875,551.89
Contingencies (10%)	£187,555.19
Off Peak Working etc. (5%)	£93,777.59
OH & Profits (12.5%)	£234,443.99
Risk	£560,000
Design & Supervision Fees (15%)	£281,332.78
Stats Diversions	£328,197.58
Communication	£45,000
Surveys etc.	£37,000
Grand Total	£3,642,859.02

North Tyneside New Major Schemes 2018/19 Onwards

Rake Lane – Hospital Roundabout

Rake Lane – Hospital Roundabout	Estimated costs £
Highway Works *(inc' Street Lighting & Controlled Ped' crossing)*	£751,470.62
Preliminaries (20%)	£150,294.12
Contract Works Total	£901,764.74
Contingencies (10%)	£90,176.47
Off Peak Working etc. (5%)	£45,088.24
OH & Profits (12.5%)	£112,720.59
Risk	£400,000
Design & Supervision Fees (15%)	£135,264.71
Stats Diversions	£329,197.58
Communication	£40,000
Surveys etc.	£32,000
Grand Total	**£2,086,212.33**

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