A19 Downhill Lane Junction Improvement
Scheme Number: TR010024
7.4(1) Transport Assessment

APFP Regulation 5(2)(q)

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A19 DOWNHILL LANE JUNCTION IMPROVEMENT

The A19 (Downhill Lane Junction Improvement) Development Consent Order 201[ ]

TRANSPORT ASSESSMENT

Regulation Number:	Regulation 5(2)(q)
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1 INTRODUCTION

1.1 Introduction

1.1.1 This document is submitted to the Secretary of State through the Planning Inspectorate in relation to an application made by Highways England ("the Applicant") under section 37 of the Planning Act 2008.

1.1.2 The Application is for an order granting development consent ("the development consent order" / "DCO") for the A19 Downhill Lane junction Improvement scheme ("the Scheme"). The draft DCO is referred to as The A19 Downhill Lane junction Improvement Development Consent Order 2019. The made DCO would grant powers to upgrade the existing grade separated signal controlled junction to a fully signal controlled gyratory style junction. The Scheme description can be found in detail in Chapter 2, Section 2.5 Scheme Description of the Environmental Statement **(Application Document Reference: TR010024/APP/6.1)**. Schedule 1 of the draft A19 Downhill Lane junction Improvement Development Consent Order **(Application Document Reference: TR010024/APP/3.1)** describes the proposed works for which this application for development consent is sought.

1.1.3 This document forms part of a suite of documents accompanying the Application. It is not a statutory document, but has been included in the Application with reference to Regulation 5(2)(q) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009, and in accordance with the Department for Communities and Local Government guidance, 'Planning Act 2008: Application form guidance' (June 2013), which allows for the inclusion of any other documents considered necessary to support the Application. The Applicant has included this document in the Application to provide information relating to the transport analysis that has been undertaken as part of the development of the Scheme.

1.1.4 Arup has been commissioned by the Applicant to provide a Transport Assessment (TA) to provide a transport modelling and network assessment to support the Application.

1.2 Planning and Policy Context

Planning Act 2008

1.2.1 The Scheme is a Nationally Significant Infrastructure Project (NSIP) under Section 14 of the Act (as amended by the Highways and Railways (Nationally Significant Infrastructure Project) Order 2013), as it comprises the alteration of a highway where the speed limit for any class of vehicle is expected to be 50mph or greater, the area of development exceeds 12.5 hectares (ha) and the Secretary of State is the highway authority. This Scheme therefore qualifies as an NSIP project and is subject to the Planning Act 2008. This is explained in greater detail in the Explanatory Memorandum (Application Document Reference: TR010024/APP/3.2).

National, Regional and Local Policy

1.2.2 On 17 December 2014, a National Policy Statement (NPS) for National Networks (NN) was published. The NPS sets out the Government's vision and policy for the

future development of nationally significant infrastructure projects on the national road and rail networks. Annex A of the Planning Statement **(Application Document Reference: TR010024/APP/7.1)** sets out how the Scheme complies with and furthers the aims of the NN NPS.

1.2.3 Chapter 5 of the Planning Statement **(Application Document Reference: TR010024/APP/7.1)** also discusses the conformity with the following national, regional and local plans and policies:

- NNNPS (National Networks National Policy Statement) 2014;
- National Infrastructure Delivery Plan 2016-2021;
- NPPF (National Planning Policy Framework) 2018;
- RIS (Road Investment Strategy): 2015- 2020;
- Action for Roads: A network for the 21st Century (July 2013);
- Department for Transport Single Departmental Plan 2015-2020;
- Highways England Delivery Plan 2015-2020;
- South Tyneside's Local Development Plan Documents;
- Sunderland City Council Development Plan Documents; and
- Local Transport Plan (LTP3) for Tyne and Wear.

1.3 References

1.3.1 Extensive detailed analysis has been undertaken in parallel with the TA. The analysis in the TA has been informed by this analysis included within the following documents:

- Combined Modelling and Appraisal Report September 2018; and
- Social Distributional Impacts (SDI) Analysis Report August 2018.

1.4 Scoping

1.4.1 This TA has been prepared in line with paragraph 32 of the National Planning Policy Framework guidelines through considering:

- if safe and suitable access can be achieved for all people; and
- whether the Scheme results in any severe cumulative impacts.

1.4.2 This TA therefore includes the following:

- a description of the existing situation, to include a presentation of traffic flows, congestion and journey ambience and an overview of facilities for non-motorised users;
- a description of the Scheme;
- a description and presentation of the transport impacts associated with the proposed Scheme. This includes a review of forecast traffic flows, congestion conditions and a discussion with regards to changes in journey ambience;

- a review of the impacts related to non-motorised users; and
- a review of road safety impacts related to the Scheme proposal which references a COBA-LT (Cost and Benefit to Accidents – Light Touch) analysis.

1.5 Existing Situation

1.5.1 The Downhill Lane junction is located on the A19, 1.2km south of the Testo's roundabout. Downhill Lane feeds into the A1290 which supplies the northern access to Nissan. Nissan operates on shift patterns, and as a consequence of the change in shifts, the Downhill Lane junction suffers from severe congestion at these times due to the concentration of arrivals and departures. The proposed International Advanced Manufacturing Park (IAMP) adjacent to the Nissan site will also require access onto the A19 via the A19 Downhill Lane junction. This is anticipated to exacerbate the congestion problem at shift change times.

1.6 Surrounding Land Uses

1.6.1 Existing land uses are discussed in section 2.4 of the Environmental Statement **(Application Document Reference: TR010024/APP/6.1)** but by way of summary, the surrounding area is characterised as follows;

- The area to the south-east of the junction is predominantly residential, including Town End Farm, Downhill, Hylton Red House, Hylton Castle Estate and Castletown;
- The River Don passes beneath the A19 via a culvert approximately 140m north of the Downhill Lane junction. Land adjacent to the River Don, approximately 1 km to the north-east of the Scheme, is designated as public open space;
- The area to the north and west of the site is largely greenfield. There is a farmhouse approximately 100m west of the A19 to the north of the junction;
- To the north-west of the junction there is a national grid pylon in close proximity to the A19. Additionally, Northern Powergrid overhead power lines cross the A19 north of the junction and continue south parallel to the A1290; and
- The area to the south-west of the junction is largely industrial and commercial, including Nissan Motor Manufacturing, the North-East Air Craft Museum, Vantec, Unipres and Gateshead College Skills Academy.

Figure 1: Surrounding Land Uses

1.7 Existing Highway Operations

1.7.1 The A19 provides an alternative south-north route to the A1(T). The A19 merges with the A168(T) just north of where this diverges from the A1(M) at Dishforth, North Yorkshire. Continuing north as a trunk road, the A19 provides links to the Teesside conurbation, East Durham and Sunderland, before re-joining the A1(T) at Seaton Burn, north of Newcastle.

1.7.2 The A19 forms part of an orbital route of the Tyneside conurbation. This consists of the A1(T) Gateshead / Newcastle Western Bypass, the A194(M), A184(T) and the A19.

1.7.3 A footbridge (known as the 'Nissan footbridge') crosses the A19 approximately 800m south of the Downhill Lane junction.

1.7.4 The River Don passes beneath the A19 via a steel arch and masonry culvert of approximately 3.7m diameter. The culvert is located approximately 140m north of the Downhill Lane junction.

1.7.5 The Downhill Lane junction is a signalised grade separated junction located approximately 1.2km south of the Testo's roundabout. The junction primarily serves the Nissan plant, located to the south of the junction adjacent to the A19. The junction carries Downhill Lane across the A19 via a bridge and also provides connectivity to the A1290 and Washington Road to the south.

1.7.6 Downhill Lane, which is a single carriageway road, crosses the A19 in an east-west direction and proceeds onto Washington Road, which is also a single carriageway road. Washington Road lies to the east of the A19 and runs in a north-south direction for 0.8km and then continues in the east-west direction towards Sunderland.

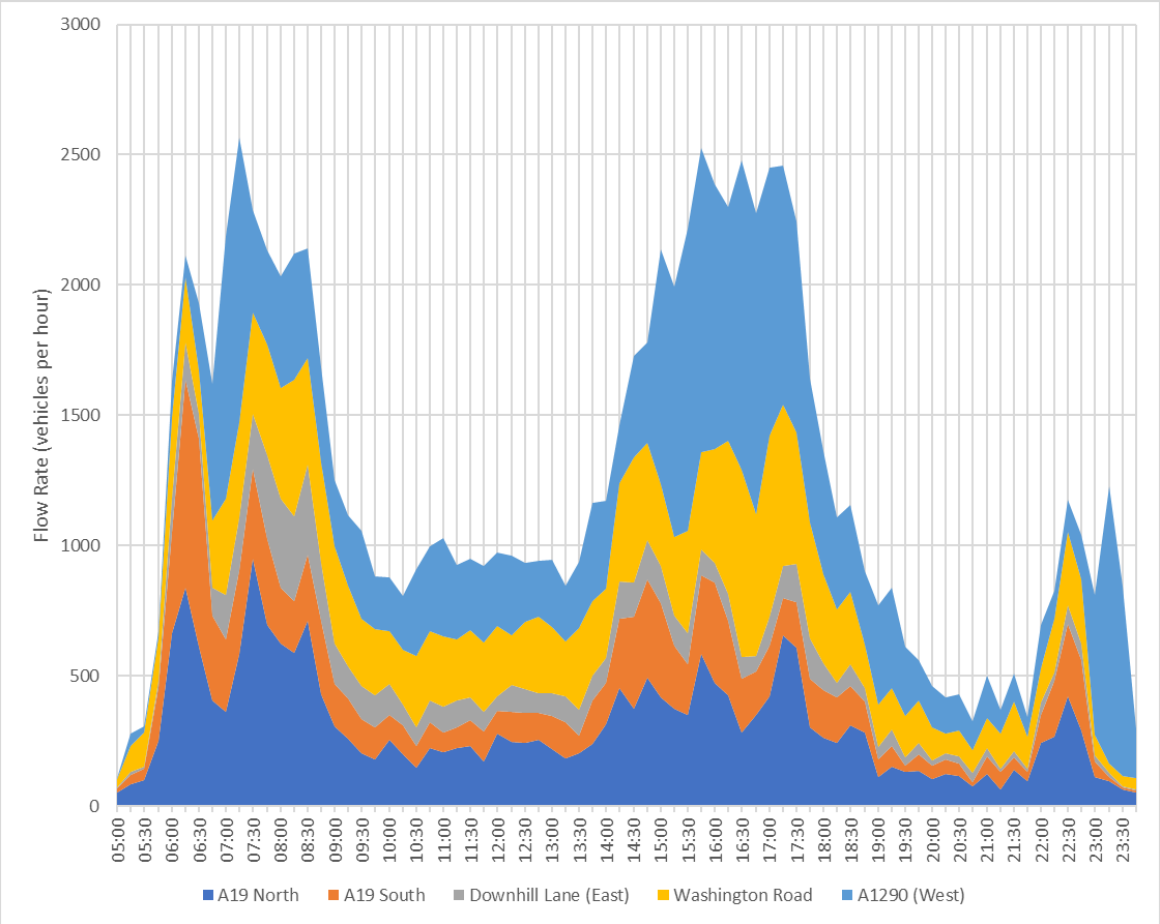
1.7.7 To the west of the A19, Downhill Lane proceeds southwards onto the A1290 which runs in a north-south direction for 1km and continues in an east-west direction

towards Washington.

1.8 Traffic Flows

1.8.1 **Figure 2** summarises flow rate for vehicles arriving at the four approach arms throughout the day of all vehicles travelling through the Downhill Lane junction. The flows come from a single day manual classified traffic count undertaken in October 2017.

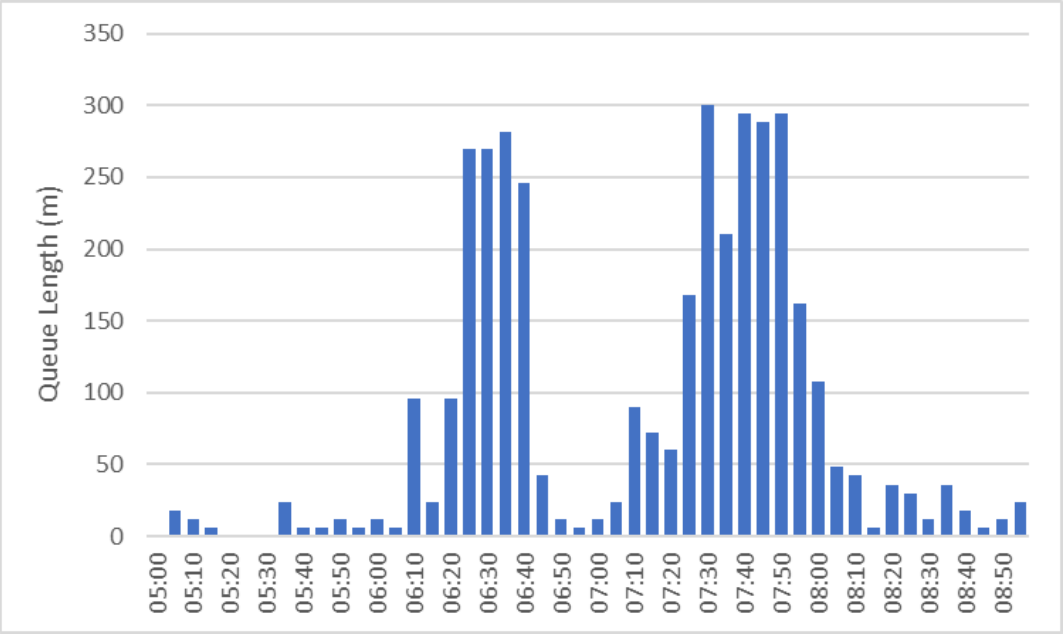
Figure 2: Flow rate for Downhill Lane junction approaches



1.8.2 The outstanding features of the flow profiles at the Downhill Lane junction are the peaks on the approaches caused by Nissan shift changes. The morning shift change occurs at 07:00, whilst there are a number of afternoon shift changes occurring between 15:00 and 17:00. The majority of staff arrive at the site before 07:00. The highest traffic counts on the A19 slip roads occur between 06:15 and 08:00, whilst the flows on the A1290 coincide with workers leaving Nissan at 07:00, 15:30 and 16:30.

1.8.3 Significant queuing at the Downhill Lane junction during the Nissan shift change-over and occurs over short periods of time, of up to 30 minutes each. The queues on the A19 South are shown during the morning period in **Figure 3**.

Figure 3: Queue Length A19 South Slip Road – AM Period 05:00-09:00

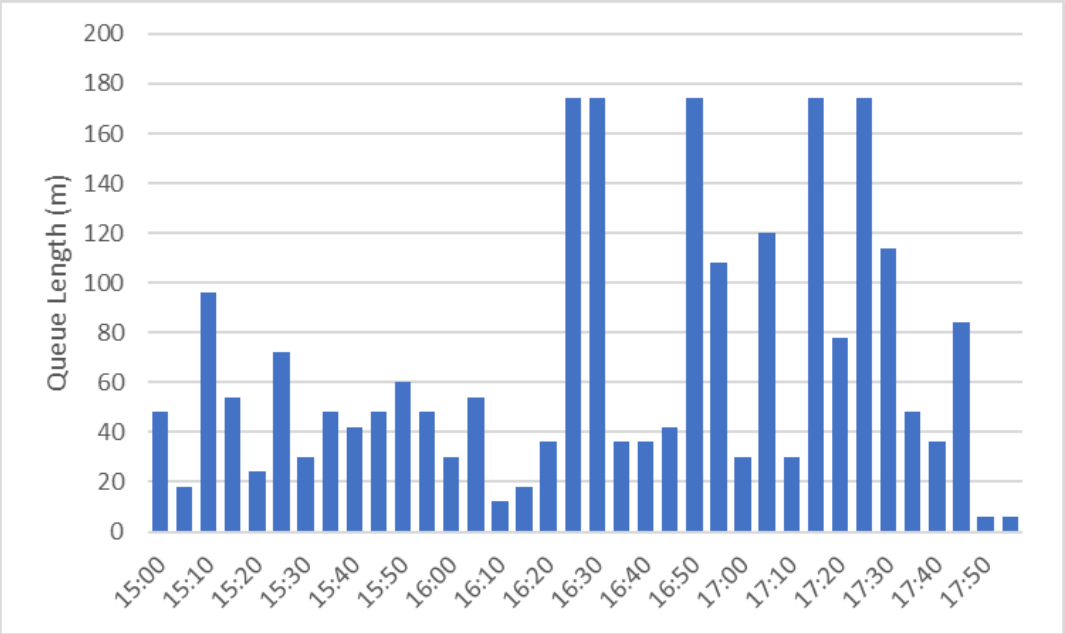


1.8.4 This queueing occurs on the A19 diverges due to incoming traffic before the 07:00 shift changes. This queuing also occurs as workers arrive between 07:00 and 08:00. As the queue extends beyond 250m, it causes traffic to become stationary on the nearside lane of the A19 northbound mainline.

1.8.5 This queueing occurs as the A1290 exit on the western side of the junction contains queuing traffic. These queues occur as traffic is slow moving on the A1290 running southbound to the Nissan car parks. The A1290 has two lanes southbound from the Downhill Lane junction for a distance of approximately 100m, after which, traffic is required to merge in turn to a single lane. Site observations confirm that the slow-moving traffic to the Nissan car park and the merge point on the A1290 act as a bottle-neck. From this merge point on the A1290, traffic queues back through the Downhill Lane junction on all approaches. This influences the saturation flow of vehicles on the junction approaches, most notably, the A19 slip roads.

1.8.6 **Figure 4** illustrates the queuing that occurs in the afternoon on the A1290 approach to the Downhill Lane junction. Significant queuing occurs as traffic exits the Nissan Plant at different times throughout the afternoon and early evening.

Figure 4: Queue Length – A1290 Approach – PM Period 15:00-18:00



1.8.7 The traffic count is presented to illustrate the turning proportions at the Downhill Lane junction throughout the day. **Table 1** shows the turning proportions between 06:00 and 07:00.

Table 1: Downhill Lane junction Weekday Turning Proportions 06:00-07:00, October 2017

From / To	A19 North	A19 South	Downhill Lane (East)	A1290 (West)	Wash. Road	Total
A19 North		0	0	583	35	618
A19 South	0		0	575	5	580
Downhill Lane (East)	10	8		126	8	152
A1290 (West)	93	65	18		57	233
Washington Road	29	27	2	190		248
Total	132	100	20	1,474	105	1,831

1.8.8 Over 1,400 of the 1,831 vehicles during this period are travelling from the A19 slip roads, Downhill Lane East and Washington Road to the A1290 West, and are associated with the Nissan shift change.

1.8.9 **Table 2** shows the turning proportions during the busiest period during the morning at the junction, between 07:00 and 08:00.

Table 2: Downhill Lane junction Weekday Turning Proportions 07:00-08:00, October 2017

From / To	A19 North	A19 South	Downhill Lane (East)	A1290 (West)	Wash. Road	Total
A19 North		0	0	510	121	631
A19 South	0		17	265	35	317
Downhill Lane (East)	37	57		138	10	242

From / To	A19 North	A19 South	Downhill Lane (East)	A1290 (West)	Wash. Road	Total
A1290 (West)	270	228	78		129	705
Washington Road	67	93	29	201		390
Total	374	378	124	1114	295	2,285

1.8.10 A smaller proportion of the total traffic during this period is travelling from the A19 diverges and the A1290, than in the previous period. This is partly due to outbound trips from Nissan travelling to the A19 merges, and partly due to background traffic increases during this busier time of day.

1.8.11 **Table 3** shows the turning proportions during the busiest period during the evening peak period at the junction, between 16:30 and 17:30.

Table 3: Downhill Lane junction Weekday Turning Proportions 16:30-17:30, October 2017

From / To	A19 North	A19 South	Downhill Lane (East)	A1290 (West)	Wash. Road	Total
A19 North		0	0	201	219	420
A19 South	0		48	28	102	178
Downhill Lane (East)	26	20		23	25	94
A1290 (West)	482	239	101		239	1061
Washington Road	186	196	82	168		632
Total	694	455	231	420	585	2,385

1.8.12 During the PM peak period the largest movements are the A1290 (West) to the A19 merges and Washington Road.

1.8.13 **Table 4** summarises the turning proportions across the day between 06:00 and 12:00.

Table 4: Downhill Lane junction 12 Hour Weekday Turning Proportions 06:00-18:00, October 2017

From / To	A19 North	A19 South	Downhill Lane (East)	A1290 (West)	Wash. Road	Total
A19 North		0	3	2,949	1,594	4,546
A19 South	0		309	1,659	760	2,728
Downhill Lane (East)	341	369		788	218	1,716
A1290 (West)	2,523	1,377	627		1,416	5,943
Washington Road	1,014	1,111	469	1,663		4,257
Total	3,878	2,857	1,408	7,059	3,988	19,190

1.8.14 The large movements illustrated within these turning counts tally with the large queues illustrated on the A19 south in the morning peak periods and the A1290 in the evening peak period. These large flows are associated with Nissan traffic.

1.9 Existing Non-Motorised User (NMU) Facilities

1.9.1 Downhill Lane junction is a significant crossing over the A19 for equestrians, recreational walkers and in particular for both commuting and recreational cyclists. There are various footpaths, bridleways and cycle routes in the study area. Of specific note, a bridleway (B46, the 'Don Valley Footpath') runs north-south from the A184 to Downhill Lane immediately to the east of the A19 and southbound off-slip road. Surveys of NMU traffic have been carried out at five locations surrounding the junction during both the winter and summer periods in 2016, and a consultation meeting has been held with the Tyne and Wear Local Access Forum and user groups in December 2016, June 2017, September 2017 and November 2017 to identify their aspirations and concerns relating to the junction. Existing NMU routes are shown in **Table 5** and **Figure 11**

Table 5: Existing NMU Routes

ID	Description/Comments
Footpaths	
B27	East-west footpath linking West Pastures Lane (located to the west of A19). The B27 is severed by the A19 south of Testo's but not formally stopped up, making crossing at grade through the central reservation dangerous due to the high volumes and speeds of traffic on the A19 and the lack of signage. The footpath has relatively low usage; pedestrian use was recorded but not crossing the A19. It is suggested that users are also accessing the route from across the fields.
B29	North-south field path linking the A184 Newcastle Road and West Pastures Lane.
B22	Field path linking Follingsby Lane and West Pastures Lane.
Bridleways	
B46 'The Don Valley Way'	Is located to the east of the A19 and runs north-south from the A184/ B1298 Abingdon Way roundabout to Downhill Lane. The bridleway is in good condition and is a well-used route by a variety of NMU users, particularly cyclists, as a commuter route.
Cycleways	
A1290 northbound to A1290 Washington Road	There is an existing cycleway running along the A1290 across the Downhill Lane junction and down the A1290 Washington Road to the east of the A19.
Roads	
A19	There are no footpaths along the A19. There is evidence of both cyclists and pedestrians using the A19 on-slip road at the Downhill Lane junction as a short cut to and from the B46 by climbing over the safety fence. There has been one recorded collision involving a cyclist on the slip road.
A184	The A184 connects Boldon to Gateshead to the west and Sunderland to the east via the A1018. Downhill Lane connects to the A184 to the east of Testo's junction near West Boldon.

ID	Description/Comments
	The A184 is a popular route for cyclists in both directions. Much of the NMU traffic originates from and/or leaves the A184 at Abingdon Way.
B1298 Abingdon Way	Abingdon Way links Boldon Colliery in the north to the A184 east of Testo's and also links to bridleway B46, which then runs south to Downhill Lane.
West Pastures Lane	To the west of the A19, West Pastures Lane runs north-south linking Downhill Lane with the A184 to the north, west of Testo's junction. It also provides access to the West Pastures Travellers and Gypsy site.
Downhill Lane	Downhill Lane links north-eastwards to Boldon and south-westwards towards the Nissan Manufacturing Plant and Washington. To the west of Downhill Lane it also links to Follingsby Lane and the A1290. Downhill Lane itself is part of a recreational route known as the 'Great Forest Trail'. The B46 exits onto Downhill Lane to the east of the Downhill Lane junction. There were a large number of cyclists recorded turning east from the B46 onto Downhill Lane.
A1290	To the west of the A19, the A1290 runs south-west from the Downhill Lane junction towards Washington. It crosses the A19 at the Downhill Lane junction and then runs north-south, immediately east of the A19, towards Sunderland as Washington Road. This provides access to the residential areas of Town End Farm and Hylton Castle.

1.9.2 NMU survey counts of pedestrians, cyclists and horse riders were undertaken between 31 January and 2 February 2016 and 8 June and 27 August 2016 at a total of 5 locations. The count and direction of pedestrian, cyclists and equestrian journeys at each location was recorded.

1.9.3 The 2016 NMU survey results show strong cyclist use of the Downhill Lane junction, using Downhill Lane, the B46 and also the A1290, particularly in the direction of the Nissan Manufacturing Plant. There is also strong pedestrian and equestrian use of Bridleway B46. This indicates that there is a strong desire line between the residential areas to the north-east such as West Boldon and Boldon Colliery and the Nissan Manufacturing Plant to the south-west.

1.9.4 Surveys undertaken as part of the Testo's junction improvement Scheme during 2014/2015 suggest that, with the exception of Bridleway B46, there was generally low usage of the NMU network by pedestrians and equestrians but higher usage by cyclists, particularly for commuting. This is believed to be as a result of limited connectivity between and along the existing routes and because the existing crossing facilities are perceived as dangerous for NMUs.

1.9.5 With the exception of the B46, and the use of the A1290 as a route for cyclists across Downhill Lane junction towards the Nissan Manufacturing Plant, low usage may be as a result of suppressed demand rather than lack of desire lines.

1.10 Public Transport

1.10.1 A small number of bus services travel through Downhill Lane junction as shown in **Table 6**. The buses that use the junction provide a connection between Newcastle, Gateshead, Durham and Sunderland

Table 6: Bus Services through Downhill Lane junction

Service	Provider	Frequency	Route
56	Go North East	5 Buses per hour weekday daytimes	Sunderland, Hylton Castle, Nissan, Gateshead, Newcastle
50	Go North East	2 Buses per hour weekday daytimes	Durham, Chester-Le-Street, Washington, Nissan, Boldon, South Shields

1.10.2 In total, 7 buses per hour pass through the junction. However, these buses are delayed by the traffic congestion at the junction as there is no bus priority infrastructure provided.

2 PROPOSED SCHEME

2.1.1 All figures accompanying this section can be found in **Appendix A**.

2.2 Traffic Infrastructure

2.2.1 Overall the Scheme involves upgrading the A19 Downhill Lane junction from a signalised priority, grade-separated junction with a single bridge crossing to a two-bridge, grade separated signalised roundabout junction, with a full circulatory carriageway across the mainline A19. Although the Scheme is an online improvement option, there would be no change to the route of the mainline A19. The Scheme layout is included in **Figure 10**.

2.2.2 A new overbridge would be constructed immediately to the south of the existing A19 overbridge creating a full circulatory carriageway over the A19. The existing Downhill Lane bridge would be retained as part of the circulatory carriageway construction. A structural assessment undertaken on this bridge has confirmed that the existing structure has adequate load-bearing capacity to accommodate the proposed improvement works.

2.2.3 The existing Washington Road and Downhill Lane (East) would be re-aligned to link with the circulatory carriageway.

2.2.4 As the A19 / A184 Testo's Junction Improvement Scheme has been granted consent, as outlined in Paragraph 2.4.3, the Scheme would modify the existing northbound merge and southbound diverge slip roads at Downhill Lane junction would be modified to tie in with the Testo's scheme link roads.

2.2.5 The northbound diverge slip road would be modified to provide connectivity to the new Downhill Lane junction grade separated roundabout and the new overbridge for the circulatory carriageway and for the A1290 towards the Nissan Plant. The southbound merge slip road would also require modification to connect the new roundabout with the A19 mainline.

2.2.6 The junction of Downhill Lane (West) and the A1290 would be modified, making this a left-in and left-out junction, requiring the permanent relocation of the northbound bus stop for routes 50 and 56 between Sunderland and Newcastle and Concord, Gateshead and Newcastle which would require agreement with South Tyneside Council and Sunderland City Council[1]. This would also require the realignment of the access road for Make-Me-Rich farmhouse.

2.2.7 A new NMU route would be constructed, to link the existing Bridleway B46 with the A1290. This would be a dedicated NMU route, with full segregation of vehicular and NMU traffic to the point where this links with the existing provision along the A1290. The new NMU route would include a NMU bridge across the A19. Further details are provided in Section 2.3.

2.2.8 The Scheme would also involve the construction of three new attenuation (drainage) ponds: the north attenuation pond, located to the north-east of Downhill Lane junction, the south attenuation pond, located to the south of the junction

[1] The northbound stop is within the border of South Tyneside Council; however, the southbound stop is within the border of Sunderland City Council. It has been assumed that discussion and agreement would take place with both local authorities.

adjacent to the existing A19 mainline; and the A1290 attenuation pond, located to the east of the A1290.

2.3 Non-Motorised User Infrastructure

2.3.1 Existing NMU routes would remain open, with suitable diversions where required, for the duration of the construction period. Specific diversion routes would be identified during the detailed design phase.

2.3.2 The NMU proposals would involve the creation of a dedicated NMU route, connecting Bridleway B46 to the north-east of Downhill Lane junction with the A1290 to the west of the junction via a new NMU bridge to the south of Downhill Lane junction across the A19. The key features of the proposals are:

- B46 – connection of the existing bridleway B46 to a new crossing point at Downhill Lane (East). The B46 is currently un-lit along the course of its length and is a heavily used NMU route for cyclists, in particular those travelling from the north to the Nissan Plant. No lighting is proposed beyond that included for the slip-road and junction. The draft Scheme DCO (Application Document Reference: TR010024/APP/3.1) proposes to make changes to the A19/A184 Testo's Junction Alteration Development Consent Order 2018 (the Testo's Order). In particular, the Scheme is proposing to maintain an existing non-motorised user route north-east of Downhill Lane junction which would otherwise be replaced by a non-motorised user route that has been consented in the Testo's Order, but that is not yet existent. The non-motorised user route proposed in the Testo's scheme does not complement the segregated non-motorised user facilities proposed under the Scheme; whereas the existing B46 bridleway would form part of a more desirable route (see further **Application Document Reference TR010024/APP/7.5**).
- Downhill Lane (East) crossing – a new signalised Pegasus crossing across Downhill Lane is proposed, to connect with the new NMU route.
- NMU route (Washington Road) – creation of a new shared-use NMU route running adjacent to the re-aligned Washington Road. This would be a dedicated NMU facility and segregated from the traffic on Washington Road. It would connect to the new NMU bridge and also to existing NMU provision along Washington Road to the south, creating further connectivity for residents of Town End Farm. For the purposes of environmental assessment, we have proposed that low-level lighting would be provided along the newly constructed route. The provision of low level lighting in this location will be subject to further discussions with South Tyneside Council.
- NMU bridge (A19) – to the south of the junction a new NMU bridge, of a single-span, parallel-truss type, would be provided from the east side of Washington Road crossing Washington Road, the southbound merge slip road, the mainline A19 and the northbound diverge slip road. Ramps would be provided on either side of the bridge to allow access for cyclists and equestrians. These would also provide access for NMUs with reduced or impaired mobility. It is proposed that the bridge would be lit using low-level deck lighting.
- A19 (west) to the A1290 – creation of a new shared-use NMU route, running adjacent to the northbound diverge slip-road towards Downhill Lane junction

and along the eastern side of the A1290. As for the eastern part of the route, it would be lit using low level lighting. It would connect with the existing NMU facility along the east side of the A1290. The provision of low level lighting in this location will be subject to further discussions with South Tyneside Council.

- A1290 crossing – a new signalised Pegasus crossing would be provided to the south at the junction of Follingsby Lane with the A1290, to connect to the NMU route through IAMP One. This would connect with Downhill Lane (West) at Hylton Bridge Farm.

2.3.3 The new NMU route would provide improved connectivity for users travelling from the north and Testo's roundabout (i.e. the residential areas of West and East Boldon, Fellgate and Hedworth) and from Town End Farm to the Nissan Plant, and would provide full segregation for NMU and vehicular traffic along the route. Compared to the existing provision this provides improved safety for NMU users.

2.4 Other developments

2.4.1 The most notable other proposed developments near the Scheme are discussed below. A full list of proposed developments within the area is discussed in Section 3.10.

Testo's Junction Improvement Scheme

2.4.2 Highways England is also intending to improve the junction at the A19 / A184 Testo's roundabout, which is an at grade junction, located approximately 1.2 km north of Downhill Lane. The proposed Testo's improvement scheme involves raising the A19 to an elevation of 7.5 m above ground level over an enlarged roundabout. Traffic on the A19 mainline would flow freely above the roundabout, while traffic using the A184 would still use the roundabout. Traffic would be raised to this height using approach ramps to the north and south of the junction. Further detail on the Testo's scheme and a full scheme description can be found in the ES for Testo's, located at:

https://infrastructure.planninginspectorate.gov.uk/projects/north-east/a19-a184-testos-junction-improvement/

2.4.3 An application by Highways England for an Order Granting Development Consent for the proposed A19 /A184 Testos Junction Improvement was received by the Planning Inspectorate in July 2017. The Secretary of State for Transport has granted development consent for this application.

2.4.4 The close proximity of two proposed grade-separated junctions at Testo's and Downhill Lane junctions means that they would not be able to safely accommodate a full suite of slip roads, as would be conventional with grade-separated junctions. Therefore, the A19 / A184 Testo's Junction Improvement Scheme proposes that the existing northbound on-slip road from Downhill Lane junction to the A19 and southbound off-slip road from the A19 to Downhill Lane junction would be reconfigured. These slip roads would be disconnected from the A19, and extended north to form new link roads running parallel to the A19 on either side, between Downhill Lane and Testo's junctions. This means that traffic travelling north from Downhill Lane junction would first travel to Testo's junction using the link road, and then join the A19 via the northbound slip road from Testo's roundabout. Traffic

travelling from the north to Downhill Lane junction would leave the A19 at Testo's junction and use the southbound link road.

2.4.5 The northbound link road is proposed to have two lanes and the southbound link road would have one lane, increasing to two lanes on the approach to Downhill Lane junction.

2.4.6 There are elements of the Testo's and Downhill Lane junction improvement schemes that would tie in, but these are considered as two separate schemes by Highways England due to the differing need cases and are capable of being constructed independently of each other.

Non-highway schemes

2.4.7 An International Advanced Manufacturing Park (IAMP) is proposed north of the Nissan Plant. The IAMP Limited Liability Partnership was set up by South Tyneside Council and Sunderland City Council to progress and deliver the IAMP. The area of land affected straddles the boundary between the two authorities. The aim is to attract advanced manufacturing businesses, with a particular focus on the automotive supply chain (given the proximity to the Nissan Plant). The main elements of the scheme would be on a 150-hectare site either side of the A1290 to the west of the A19 and Downhill Lane junction. Current proposals for IAMP have two phases.

2.4.8 IAMP One has been granted consent under the Town and Country Planning Act, whilst IAMP Two is subject to a DCO application under development. IAMP One includes nine light general industrial and storage & distribution units with ancillary office and research & development floorspace within the southern area of the IAMP area to the north of the Nissan Plant. The plans include a new link road from the A1290, associated car parking, service yards, access, landscaping and drainage ponds. IAMP Two encompasses the larger IAMP area to support the remaining two-thirds of the total IAMP proposals. The highway upgrades associated with IAMP One and IAMP Two are discussed in detail in Section 3.10

2.4.9 In addition, expansion of the Nissan Plant, which is located 1km south of Downhill Lane junction, has been proposed.

3 APPROACH TO MODELLING

3.1 Introduction

3.1.1 The modelling work for this Scheme has followed a 2-stage approach:

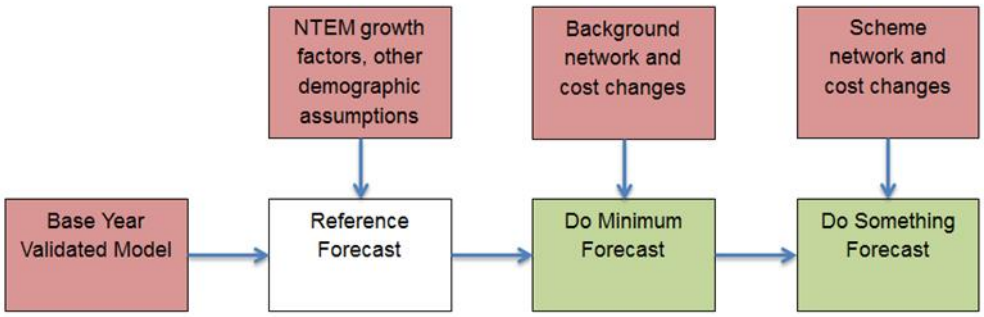
- The impact of the Scheme on traffic flows and journey times is informed by an extensive strategic modelling exercise undertaken in support of the traffic, economic and environmental assessment of the Scheme.
- This strategic model informs an operational model to the Scheme in terms of the detailed junction performance.

3.1.2 The strategic model is used to compare the 'With Scheme' or 'Do Something' case to a 'Without Scheme' or 'Do Minimum' situation. The Operational model only considers the performance of the Scheme itself. Sections 3.2 to 3.10 of this report discuss the development of the strategic model, whilst Section 3.11.12 discusses the development of the operational model and the interaction between the two models.

3.2 Overview of Demand Forecasting Procedure

3.2.1 TAG Unit M4 Forecasting and Uncertainty describes the methodology to be followed to produce a set of forecasts. This process is shown as **Figure 5** below.

Figure 5: Basic approach to forecasting using a transport model



3.2.2 The Reference Case matrices, and the Reference Forecast is the starting point for the VDM (Variable Demand Modelling) process necessary to develop the Do Minimum and Do Something forecasts.

3.3 Base Year Model

3.3.1 The strategic modelling work being undertaken is based upon the A19HAM2.2. The history of the A19HAM is summarised as:

- A19HAM – Developed in 2013 for the assessment of the A19(T)/A1058 Coast Road Scheme.
- A19HAM2 – An update of the A19HAM, developed in 2014 for the assessment of the adjacent Testo's scheme.
- A19HAM2.2 – A further development of the model was completed in 2015 and subsequently updated in 2016 for the assessment of both Testo's and

Downhill Lane.

3.3.2 The A19HAM model was originally developed with volumetric traffic flow data collected in November 2012. Origin - Destination (O-D) data was collected in the form of 9 Road Side Interview Surveys (RSIs) in 2013, around the A19(T)/A1058 Coast Road Scheme. The A19HAM2 model was updated for the A19 / A184 Testos and A19 / A1290 Downhill Lane junction assessment using a total of seven RSI surveys within the study area in March 2014. As part of the RSI process, volumetric surveys were undertaken at the RSI sites. The A19HAM2.2 model was refined and reviewed based on a large number of volumetric counts and an Automatic Number Plate Recognition (ANPR) O-D survey from March 2015 collected around the A19 / A184 Testos and A19 / A1290 Downhill Lane study area, with a particular focus on traffic accessing the Nissan site.

3.3.3 TAG unit M3-1 Highway Assignment Modelling states that trip matrices within models should not be based on O-D data that is more than 6 years old. The O-D data around the A19 / A184 Testos and A19 / A1290 Downhill Lane junctions was undertaken in March 2014, and as such will remain 'in date' until March 2020. Additionally, the latest model has been refined using volumetric data from March 2015, and November 2017. Whilst the A19HAM2.2 is based on 2012 data within the wider area, the data that the model is based upon around the A19 / A1290 Downhill Lane junction is more up to date and is considered to be representative of local conditions.

3.3.4 The primary purpose of the model is to provide a validated 2012 base year SATURN highway assignment model which will allow a robust assessment of the likely impacts of the Scheme upon the operation of the surrounding road network, and to provide a range of additional outputs for use in further environmental assessments, including noise and pollution. The model is capable of testing both local and area-wide schemes and of assessing strategic interventions.

3.3.5 The Reference Case matrices, and the reference forecast is the starting point for the VDM process necessary to develop the Do Minimum (without Scheme) and Do Something (with Scheme) forecasts. AM peak, Interpeak and PM peak forecasts were produced for the following years:

- 2021 – Year of Opening; and
- 2036 – Design Year.

3.4 NTEM and the National Transport Model

3.4.1 The TEMPRO software presents the output of the Department for Transport's (DfT) National Trip End Model (NTEM). The role of this model is to act as a nationally consistent benchmark available for the distribution of growth in planning data and trip ends.

3.4.2 NTEM forecasts extracted from TEMPRO v7.2 for each of the NTEM zones covered by the A19HAM2.2 model are summarised by Local Authority area in **Table 7** below, for car drivers, on an average weekday over 12 hours, in terms of growth in Productions and Attractions. The term 'Production' refers to the end of the trip generated at the home, whilst the term 'Attraction' refers to the activity at the second end of the trip, for instance the employment, business or leisure

opportunity. In this way the model is able reflect proposed land use changes in anticipated trip making.

Table 7: NTEM 7.2 Growth by Local Authority Area (Weekday - 12 hour)

	2012 - 2021		2012 - 2036	
	P	A	P	A
Gateshead	2.69%	2.70%	13.72%	13.74%
Newcastle	3.33%	3.37%	15.82%	15.89%
North Tyneside	2.91%	2.92%	15.01%	15.02%
South Tyneside	2.60%	2.66%	13.76%	13.82%
Sunderland	1.94%	2.06%	11.37%	11.51%
Tyne and Wear	2.71%	2.76%	13.94%	14.00%
Northumberland	2.67%	2.60%	11.63%	11.55%
Durham	1.36%	1.36%	10.88%	10.88%
Cleveland	0.88%	0.82%	10.84%	10.77%
North East	1.98%	1.98%	12.23%	12.23%
GB	3.52%	3.52%	15.16%	15.16%
P = Productions, A = Attractions				

3.4.3 PPM (pence per minute) and PPK (pence per kilometre) have been calculated for the forecast years of 2021 and 2036 in accordance with the guidance in TAG Unit A1.3, updated in November 2017. The generalised cost values used in the A19HAM2 are summarised in **Table 8** in terms of PPM and PPK.

Table 8: Calculation of PPM and PPK

	PPK	PPM		
	(All Periods)	AM Peak	Inter Peak	PM Peak
2021 – Forecast				
Commute	5.68	21.09	21.44	21.17
Employers Business	12.13	31.45	32.23	31.91
Other	5.68	14.55	15.50	15.24
LGV	13.63	22.23	22.23	22.23
OGV	45.79	22.57	22.57	22.57
2036 – Forecast				
Commute	5.39	27.29	27.73	27.38
Employers Business	11.07	40.69	41.70	41.28
Other	5.39	18.83	20.06	19.72
LGV	13.36	28.76	28.76	28.76
OGV	51.38	29.20	29.20	29.20

3.5 Uncertainty in Forecasting

3.5.1 A review of the proposed housing and employment developments within the modelled area was undertaken based upon the proposals set out by the following Local Authorities:

- Sunderland
- South Tyneside;

- North Tyneside;
- Newcastle; and
- Gateshead;

3.5.2 Officers from these Authorities have been consulted to ensure the latest information has been gathered, together with a review of published documents, including Strategic Housing Land Availability Assessments (SHLAA), Local Development Frameworks (LDFs) and Core Strategies / Urban Core Plans.

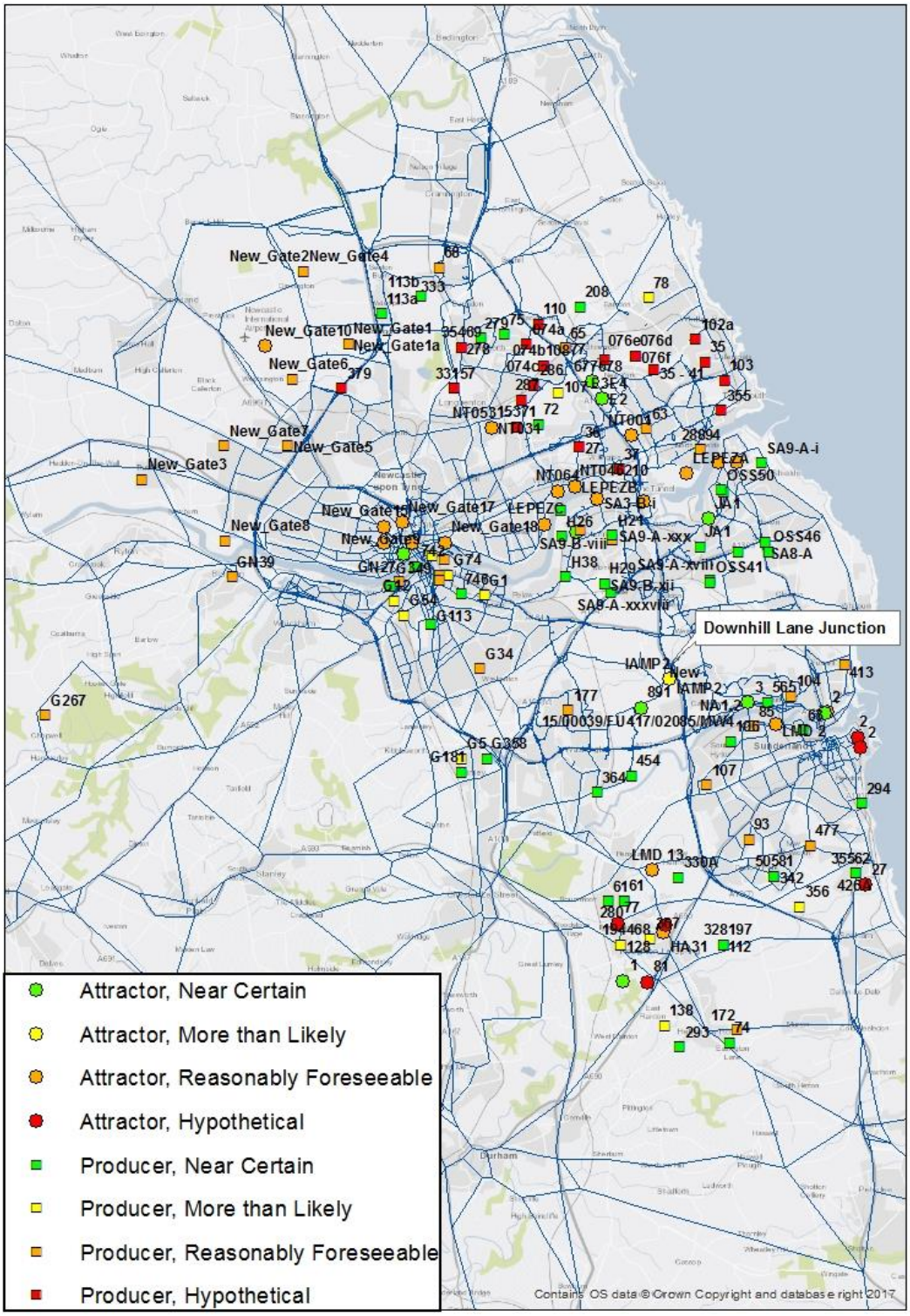
3.5.3 All relevant developments were then collated and are presented in an 'Uncertainty Log' which contains an assessment of the likelihood of each development being constructed and occupied. The review process has identified each development as falling under 1 of 4 categories based upon the guidance contained in TAG Unit M4. These four classifications are described in **Table 9** below.

Table 9: Uncertainty Log Classification

Probability	Description
Near certain: The outcome will happen or there is a high probability that it will happen.	- Intent announced by proponent to regulatory agencies; - Approved development proposals; and - Projects under construction.
More than Likely: The outcome is likely to happen but there is some uncertainty.	- Submission of planning or consent application imminent; and - Development application within the consent process.
Reasonably Foreseeable: The outcome may happen, but there is significant uncertainty.	- Identified within a development plan; - Not directly associated with the transport strategy/ scheme, but may occur if the strategy/scheme is implemented; - Development conditional upon the transport strategy/scheme proceeding; and - Or, a committed policy goal, subject to tests (e.g. of deliverability) whose outcomes are subject to significant uncertainty
Hypothetical: There is considerable uncertainty whether the outcome will ever happen.	- Conjecture based upon currently available information; - Discussed on a conceptual basis; - One of a number of possible inputs in an initial consultation process; and - Or, a policy aspiration.

3.5.4 **Figure 6** shows the developments considered across Tyne and Wear and South-east Northumberland.

Figure 6: Uncertainty Log Developments in Tyne and Wear



3.5.5 A detailed breakdown of all developments, and their planning status is provided in **Appendix B.**

3.6 International Advanced Manufacturing Park

3.6.1 The IAMP is expected to be delivered in two phases.

- IAMP One is assumed to be developed before 2021
- IAMP Two is assumed to be developed after 2022, and to be operational after 2026.

3.6.2 Indicative masterplans for both IAMP One and IAMP Two are shown in **Figure 12** and **Figure 13**. IAMP One was granted planning permission on 25th of May 2018, as such it is classified as 'Near Certain'. Preliminary discussions have been held with the Planning Inspectorate with regard to IAMP Two, and the application is now expected in 2019. This development has therefore been classified as 'More than Likely' as the development is likely to happen but there is some uncertainty.

3.7 Trip Generation

3.7.1 The indicative floor schedule in **Table 10** has been assumed based on discussion with representatives of IAMP LLP and the floor areas assumed within the IAMP One application.

Table 10 IAMP Indicative Floor Area / Job Schedule

Type	Building Area m^2	Jobs
IAMP One 2018-2021		
B2 / B8	156,750	3,200
IAMP Two 2022 Onwards		
B1	20,325	2,096
B2 / B8	199,500	2,547
Total		
Total	391,875	7,842

3.7.2 Nissan operate a continental shift pattern which corresponds to 3 shifts per day;

- Day Shift: 07.00 – 15.35hrs;
- Late Shift: 15.30 – 23.20hrs; and
- Night Shift: 23.15 – 07.05hrs

3.7.3 The submission of the IAMP One application includes trip generation assumptions within the IAMP One Traffic Assessment (IAMP One TA) 2. These assumptions recognise that the operators of IAMP One would require their employees, for the purposes of operational efficiency, to work the same shifts as Nissan staff. It also recognises that that the existing operational issues at the Downhill Lane junction are most apparent when the Nissan shift-change times occur. It therefore commits the operators to operate a shift pattern (for all class B1/B2/B8 uses) that is off-set by one hour from those used at Nissan in the morning and afternoon periods for a temporary period until the improvement works to the A19 at Testo's and Downhill Lane (i.e. the Scheme) are completed and operational by means of a Highways Operational Masterplan (HOMP).

3.7.4 Subsequent correspondence with IAMP and Sunderland City Council has confirmed they anticipate appropriate measures to manage the proposed one-hour

2 IAMP ONE Transport Assessment - Systra – 18/12/2017

shift pattern offset beyond the delivery of the A19 Testo's junction improvement and the Scheme; specifically that the shift offset as part of the HOMP will remain in place at least until the A1290 dualling proposed as part of the IAMP Two development is completed (as well as the Scheme and the A19 Testo's junction improvement).

3.7.5 For the reasons set out in 3.11.12 to **Error! Reference source not found.**, H ighways England anticipate that the HOMP will remain as a control measure in relation to future developments and, as part of working with the Sunderland City Council in its role under the Town and Country Planning Act 1990, will ensure that any such control measures will not be removed until all parties, including Highways England, are satisfied that the local and strategic road networks can operate safely. The proposed offset shift patterns would therefore be;

- Day Shift: 06.00 – 14.35hrs;
- Late Shift: 14.30 – 22.20hrs; and
- Night Shift: 22.15 – 06.05hrs

3.7.6 It is understood that the operators would not want to operate with this hour offset over the longer term, particularly after the opening of the Scheme and other local highway infrastructure improvements. This assessment therefore considers both cases, with the IAMP development operating on the offset shift patterns in the short term, and then the Nissan shift patterns upon completion of the proposed local road infrastructure improvements as discussed in Section 3.10 and 3.11.

3.7.7 To inform the trip generation potential associated with the proposed employment within the IAMP One TA, i.e. to quantify how many new vehicle trips would be on the highway network at any given time during a typical working day, surveys were undertaken in January 2017 at the access of a local Nissan supplier (Unipress). This was used to identify a vehicle trip rate over a 24-hour period. The surveys included, but do not distinguish between, trips associated with the continental shifts and traditional administrative working (9am – 5pm) throughout the day.

3.7.8 The following trip rates (per person) in **Table 11** have were derived, and have been used within this assessment to provide a consistent approach, with the IAMP One TA.

Table 11: IAMP Continental Shift Trip Rate

Time Start	Trips per Employee		Time	Trips per Employee	
	Arrivals	Departures		Arrivals	Departures
15 min period					
06:00	0.086	0.017	15:00	0.027	0.062
06:15	0.123	0.006	15:15	0.004	0.103
06:30	0.062	0.004	15:30	0.012	0.038
06:45	0.007	0.101	15:45	0.013	0.008
07:00	0.016	0.033	16:00	0.022	0.046
07:15	0.018	0.012	16:15	0.002	0.011
07:30	0.036	0.004	16:30	0.001	0.035
07:45	0.006	0.004	16:45	0.000	0.018

Time Start	Trips per Employee		Time	Trips per Employee	
	Arrivals	Departures		Arrivals	Departures
08:00	0.001	0.002	17:00	0.004	0.017
08:15	0.004	0.002	17:15	0.005	0.011
08:30	0.005	0.002	17:30	0.007	0.008
08:45	0.004	0.003	17:45	0.005	0.006
Hour period					
06:00-07:00	0.278	0.127	15:00-16:00	0.057	0.212
07:00-08:00	0.076	0.053	16:00-17:00	0.025	0.110
08:00-09:00	0.014	0.008	17:00-18:00	0.022	0.042

3.7.9 In respect to IAMP Two, there is currently uncertainty as to what proportion of this development would operate a continental shift pattern. Any additional traffic arriving during the Nissan shift change times could potentially result in congestion on the local / HE network.

3.7.10 To understand the potential impact of the development on the road network it is necessary to develop a worst-case assessment. It is therefore assumed that the IAMP Two shift change for all B2 / B8 employees will occur at the same time as NISSAN and IAMP One. In this case the trip generation rates from the IAMP one assessment will be used. The office employees (B1 staff) would arrive for the traditional administrative (9am-5pm) hours. This trip generation represents a worst-case assessment in operational terms for the highway network. Total trip generation assumed for IAMP One and IAMP Two is shown below in Table 12. This includes the trips made by the B2 / B8 employees and the B1 staff.

Table 12: IAMP Trip Generation

	IAMP One		IAMP Two	
	Arrivals	Departures	Arrivals	Departures
AM Peak Period				
06:00-07:00	889	408	1937	888
07:00-08:00	242	171	688	397
08:00-09:00	46	26	491	108
PM Peak Period				
15:00-16:00	182	678	465	1610
16:00-17:00	80	351	235	1047
17:00-18:00	71	134	195	671

3.8 IAMP Trip Distribution

3.8.1 The trip distribution in Table 13 was used within the IAMP One TA. The distribution was based on that used within the IAMP AAP examination in public[3].

3.8.2 The finer distribution of trips within the Local Authority areas to each production zone is based on the existing distribution of home-based work productions within the model.

[3] SD63 JMP Technical Note: IAMP – Vehicle Trip Distribution (November 2015)

Table 13: IAMP One Trip Distribution

Local Authority Areas	Proportion
County Durham	30%
Darlington	1%
Gateshead	9%
Newcastle upon Tyne	3%
North Tyneside	5%
Northumberland	5%
South Tyneside	10%
Washington	14%
Sunderland (N)	9%
Sunderland (W)	5%
Sunderland (E)	3%
Sunderland (S)	3%
External	3%
Total	100%

3.9 Committed Developments

3.9.1 The committed developments from the IAMP One TA, local to the Scheme, have been included within the uncertainty log to ensure alignment between the traffic forecasts.

- Hillthorn Farm – A commercial industrial development to the west of the proposed site. Part of the Hillthorn Farm site is already occupied and in operation. However, when the traffic surveys associated with the IAMP One TA were undertaken, and when the A19HAM2 was developed, the site was not yet occupied. Therefore, all of the predicted traffic from the supporting Transport Assessment was added as committed development.
- Turbine Business Park – A commercial industrial development to the south-west of the proposed site. The original application for this site was submitted in 2007 and since then, a large proportion of the development has been built out and so will be included in the traffic surveys. In order to account for the remaining undeveloped area, the IAMP One TA applied a pro-rata volume of traffic, based on the amount of developed and undeveloped land within the site red line boundary. This traffic has been included within the all scenarios.
- Renewable Energy Centre (REC) Site – A planning application has been submitted to Sunderland Council for a REC on land at Hillthorn Farm. Traffic flows for this development have been directly taken from the supporting transport documents and are included as a committed development within the IAMP One assessments and are included within all scenarios.

3.9.2 Table 14 shows the number of household units and employee numbers generated from the uncertainty log and compares them against the equivalent data derived from NTEM.

Table 14: Scenario Development Content by Local Authority

	2021		2036	
	Uncertainty Log	**NTEM**	**Uncertainty Log**	**NTEM**
Jobs				
Sunderland	4,036	8,470	8,778	14,334
South Tyneside	982	3,667	982	6,022
North Tyneside	3,997	5,517	3,997	9,437
Newcastle/ Gateshead	0	17833	278	30,042
Households				
Sunderland	2,299	5,761	6,478	11,914
South Tyneside	2,904	3,095	3,939	7,490
North Tyneside	4,228	5,830	5,597	14,868
Newcastle/ Gateshead	2,132	10,607	3,643	25,989

3.9.3 The table above shows that the developments identified in the Uncertainty Log differ on a number of occasions from the equivalent values derived by NTEM. This may be explained by the limited availability of detailed planning information from Local Authorities on the phasing of particular developments (i.e. whether the development will be constructed by 2021 or 2036). Where there is a shortfall of developments within the uncertainty log, additional growth from NTEM is assumed such that total growth within the Local Authority area is equal to the NTEM forecasts.

3.10 Local Road Network Upgrades

3.10.1 The highway mitigation works associated with IAMP One contained within the TA consists of widening works on the western side of the A1290, as shown in **Figure 14**. The proposals to widen from DLJ southward to the location of the proposed northern access junction of the IAMP, providing two narrow lanes. The industrial units would be accessed from a spine road running roughly parallel to the A1290 between the A19 and Cherry Blossom Way.

3.10.2 As part of IAMP Two the following works are anticipated:

- The A1290 Dualled between Downhill Lane and Cherry Blossom Way. It is currently programmed to be complete by summer 2022.
- A new bridge over the A19 roughly 400m to the south of the Downhill Lane junction, known as the 'Washington Road Bridge'. This links Washington Road to the Nissan Site and the A1290.
- A new feeder road running parallel to the A1290 allowing access to the IAMP Two industrial units.

3.10.3 The Washington Road Bridge and Feeder Road is anticipated to be complete for the opening of IAMP Two. The layout of the IAMP Two highway infrastructure can be seen in **Figure 15**.

3.10.4 The A1290 widening works associated with IAMP One and the shift offset incorporated as part of the HOMP should remain in place at least until A1290

dualling proposed as part of the IAMP Two development is complete (see Paragraph 3.7.4). The completion of the A1290 dualling between Downhill Lane and Cherry Blossom Way, due in 2022 would remove the existing bottleneck of the southbound two to one merge on the A1290 to the west of Downhill Lane Junction. It is possible that this would provide sufficient capacity to allow the one-hour shift pattern offset to be reviewed and removed.

3.10.5 In addition to future year housing and employment developments, the treatment of uncertainty in model forecasting also needs to include any proposed highway infrastructure schemes. All relevant schemes have been reviewed, collated and presented in **Table 15**, in accordance with the classifications in **Table 9.** These schemes are also included in **Appendix B**.

Table 15: Highway Scheme Uncertainty Log Summary

Local Authority	Scheme Name / Type	Uncertainty
Highways England	Moor Farm (Built)	Near Certain
	Seaton Burn (Built)	
	Coast Road (Under Construction)	
	Testo's Junction Major Improvement (A19(T) / A184)	
	Howdon Interchange (A19(T) / A193) (LNMS)	More than likely
	Killingworth Interchange (A19(T) / A1056) (LNMS)	
	A19 Northbound Widening between A194 Lindisfarne and A185 Southern Portal	
	A1 Birtley to Coalhouse Widening	
Sunderland	A19/A690 (Built)	Near Certain
	A19/A1231 (Built)	
	Cherry Blossom Way Realignment, Nissan Way Dualling, Hilthorne Farm Link/A1290 Realignment	
	St Marys Way Realignment (SSTC Phase 1)	
	New Wear Bridge (SSTC Phase 2)	
	A1290 Widening between Downhill Lane and the IAMP One Access	
	Highway Infrastructure associated with IAMP including Washington Road Bridge	More Than Likely
South Tyneside	Lindisfarne Corridor Improvements (Built)	Near Certain
	A19/A1290 Junction Improvements (Built)	
	The Arches Roundabout (Under Construction)	
	A194/B1306 Signalisation	
Gateshead	A184 / A185 / B1426 Heworth Roundabout. Junction upgrade scheme - Signalised crossroads (Built)	Near Certain
North Tyneside	Whitehouse Farm – Buffer Area (106 / 278)	Near Certain
	High Flatworth Roundabout (106 / 278)	
	Four Lane Ends - Buffer Area (Pinchpoint)	
	Scaffold Hill, West Shiremoor Amendments (106 / 278)	
	A192 West Park Highway Mitigations (Built)	

Local Authority	Scheme Name / Type	Uncertainty
	Holystone Roundabout Capacity Improvement (Built)	
	A191 Dualling and associated Cobalt Road Improvements (Built)	
	A1058 / Norham Road	Reasonably Foreseeable
	Billy Mill Roundabout, LEP Bid	

3.10.6 It is anticipated that all of these schemes will be complete before 2021, apart from those associated with IAMP Two. As such the completed schemes will be included in both assessment years.

3.11 Scenario Development

3.11.1 Scenarios have been developed in line with the principles outlined in WebTAG Unit M4 Forecasting and Uncertainty. The Scenarios are therefore based on:

- NTEM growth in demand, at a suitable spatial area;
- Sources of local uncertainty that are more likely to occur than not;
- Appropriate modelling assumptions;
- The assumptions and caveats listed in 3.11.12 to **Error! Reference source not found.**; and
- The operation of a HOMP.

3.11.2 Forecasts have been produced for 2021, the year of opening of the Scheme and for 2036, a design year of 15 years after Scheme opening, as required for highway design.

3.11.3 Two different scenarios have been considered for the opening year:

- Scenario 'TA1' assumes the traffic demand associated with the IAMP One development, and the widening of the A1290 between the IAMP northern access and Downhill Lane. A right turn lane will be provided for access into the IAMP site. A one-hour shift pattern offset will be applied to the IAMP One shift patterns for all staff, reducing the IAMP One trip generation to negligible levels during the congested Nissan shift change period as agreed within the HOMP. Therefore, IAMP One staff will arrive on site before 06:00.
- Scenario 'TA2' assumes the traffic demand associated with the IAMP One development and assumes that the A1290 is dualled between Downhill Lane and Cherry Blossom Way. This scenario assumes the removal of the one-hour shift pattern offset; therefore, the shift pattern for IAMP One is the same as that for Nissan.

3.11.4 TA1 represents an interim scenario whereby the impact of the IAMP One traffic is mitigated by the one-hour shift pattern offset. The widening of the A1290 between the IAMP northern access and Downhill Lane is assumed to be in place within the Do Minimum. The Scheme adjusts the layout of the A1290 such that the two-lane southbound exit from Downhill Lane Junction merges to a single lane before a ghost island right turn pocket is developed to allow access to IAMP One. The widening is therefore not relevant in the Do Something scenario.

3.11.5 The dualling of the A1290, necessary to provide sufficient capacity between Downhill Lane and Cherry Blossom Way, is provided in TA2 therefore allowing the one-hour shift pattern offset to be reviewed and removed as discussed in 3.10.4.

3.11.6 Given the proximity of the local road improvement year of opening to the Scheme year of opening, both scenarios are based on trip matrices that represent 2021 demand on the wider strategic network. Given the proximity of the proposed completion of the A1290 dualling to the opening year of the Scheme, TA2 has been run assuming the same 2021 strategic model demand (adjusted locally to account for the removal of the one-hour shift pattern offset). Using the same modelled year within the strategic model assessment is acceptable given the scale of the additional demand due to the opening of the IAMP. Road Traffic Forecasts[4] assume traffic growth on roads within the north east is less than 1% per annum. Peak hour traffic growth at Downhill Lane due to the opening of IAMP One is in the order of 40% (comparing total traffic in Paragraphs 1.8.8 and 4.3.4). An additional one, two or three years background traffic growth at this location is insignificant compared to the IAMP traffic included within the assessment.

3.11.7 Scenario TA2 represents a worst-case assessment in terms of traffic demand within the opening year during the daytime. Scenario TA1 has therefore only been considered for the AM peak period, as it is only during this period that the capacity restraint of the two to one merge on the A1290 to the west of Downhill Lane junction causes queueing. It was considered sufficient to assess the scheme using the higher traffic demand in TA2 during the inter peak and PM peak periods, as the two to one merge does not cause capacity issues during this period. The effect of the one-hour shift pattern offset within Scenario TA1 was tested during the off peak (i.e. overnight) for a Noise assessment undertaken as part of the Environmental Statement, given that some of the traffic from the AM peak period would be moved into the hour before 06:00 within this scenario.

3.11.8 Scenario TA3 considers a design year. This assumes all the traffic demand from both IAMP One and IAMP Two. This scenario considers the provision of all of the local road network infrastructure, i.e. the A1290 Dualled between Downhill Lane and Cherry Blossom Way, the Washington Road Bridge and the new feeder road running parallel to the A1290 to allow access to the IAMP Two developments.

3.11.9 Scenario TA3 has been considered as a realistic scenario for the design year as it aligns with the scheme description within the Road Investment Strategy[5] namely: '*significantly enhanced capacity on the junction between the A19 and the A1290 in Sunderland, supporting local plans for an International Advanced Manufacturing Park to the north of the existing Nissan Plant'*. The assumption that B2/B8 uses would operate using the same shift patterns as Nissan constitutes a worst-case situation in terms of traffic loading at Downhill Lane Junction, and therefore has been chosen as a suitable scenario to test the Scheme within the design year.

3.11.10 It should be noted that for the purposes of this assessment the one-hour shift pattern offset is removed in both the Do Minimum and the Do Something of Scenarios TA2 and TA3. The removal of the HOMP in Do Minimum is a

4 https://www.gov.uk/government/publications/road-traffic-forecasts-2018 (rtf18-scenario-1-reference.xlsx Table 1 – Total vehicles, All Road Types, North East Region, years 2020-2025)
5 Department for Transport – Road Investment Strategy: for the 2015/16-2019/20 Road Period. March 2015

hypothetical situation as within the Do Minimum scenario, the one-hour shift pattern offset could not be removed: a key condition of the HOMP is that the shift time restriction should apply at least until the improvement works to the A19 at Testos and Downhill Lane Junction are complete and operational (and, as per the assumptions stated in 3.7.4, the A1290 is dualled). The generation of a hypothetical situation is necessary to create a consistent basis across which the benefit of the Scheme can be derived, and the environmental impact assessed.

3.11.11 The impact of the scheme is tested within each scenario by comparing a 'Do Minimum' test without the scheme to a 'Do Something' test that includes the scheme. The forecast scenarios are summarised in **Table 16**.

Table 16: IAMP Development Assumptions

Scenario	TA1	TA2	TA3
One-hour shift pattern offset in place?	✓	×	×
A1290 Dualled between Downhill Lane and Cherry Blossom Way	×	✓	✓
Widening of the A1290 between the IAMP northern access and Downhill Lane	Only in "do-minimum"	×	×
Washington Road Bridge	×	×	✓
The Scheme (DLJ)	Only in "do something".	Only in "do something".	Only in "do something".
Time Periods Assessed	AM and Off Peak only	AM, Inter, PM and Off Peak	AM, Inter, PM and Off Peak
Relevant Years	2021-2023	2021-2024	2036-2038
IAMP Development traffic	IAMP One	IAMP One	IAMP One and IAMP Two

3.11.12 The following caveats should be noted in relation to Scenarios TA1, TA2 and TA3:

- Assumptions regarding IAMP Trip generation, shift patterns and trip distribution profiles have been informed by the IAMP One TA. These have been developed solely for the employment types and skills mix anticipated by the IAMP. IAMP intend to impose a Framework Travel Plan which will be supplemented by detailed travel plans for each unit occupier. Each travel plan for each particular unit will need to include measures for modal shift to reduce single car occupancy. Measures will incentivise travel by walking, cycling and public transport.
- It is assumed that the shift times, and number of staff on each production line at Nissan do not change from November 2017 (when the Downhill Lane traffic count was undertaken).
- The level of committed development was current at the time that the assessments were undertaken.

3.11.13 Any changes to these assumptions, and separately the specifics of the aforementioned IAMP travel plans, may result in changes to the performance of the local road network. For this reason, in order to ensure the safe operation of the SRN and local road network around Downhill Lane Junction, Highways

England anticipate that a HOMP will be integrated as a planning condition (or requirement) on any forthcoming development (including IAMP Two) to monitor and control traffic movements to and from key traffic generators. Any HOMP could include but would not be limited to; Shift pattern offsets, vehicle access routing strategies, and detailed travel plans. Any HOMP will remain as a control measure and will not be removed until all parties, including Highways England, are satisfied that the local and strategic road networks can operate safely. The HOMP can be reviewed jointly by partners to establish what control measures need to be maintained and what can be amended accordingly.

3.11.14 Given the above assumptions the results of this TA therefore cannot be relied upon by third parties wishing to gain planning approval for development within the area. The assumptions made within this document are relevant only to the assessment of the impact of the Scheme, the realistic worst case scenario informed by the current trip generation, shift patterns and trip distribution profiles in the IAMP One TA, and illustrates the benefits the Scheme provides.

3.12 Operational Model Development

Introduction

3.12.1 Micro-simulation models are computer models where the movements of individual vehicles travelling through road networks are determined by using simple car following, lane changing and gap acceptance rules. These provide a representation of driver behaviour and network performance. For this assessment, a micro-simulation model was constructed using the VISSIM 8 software program developed by the PTV Group, Germany. VISSIM software was used because it can model adaptive signal control (e.g. MOVA) accurately.

3.12.2 The following peak periods were modelled:

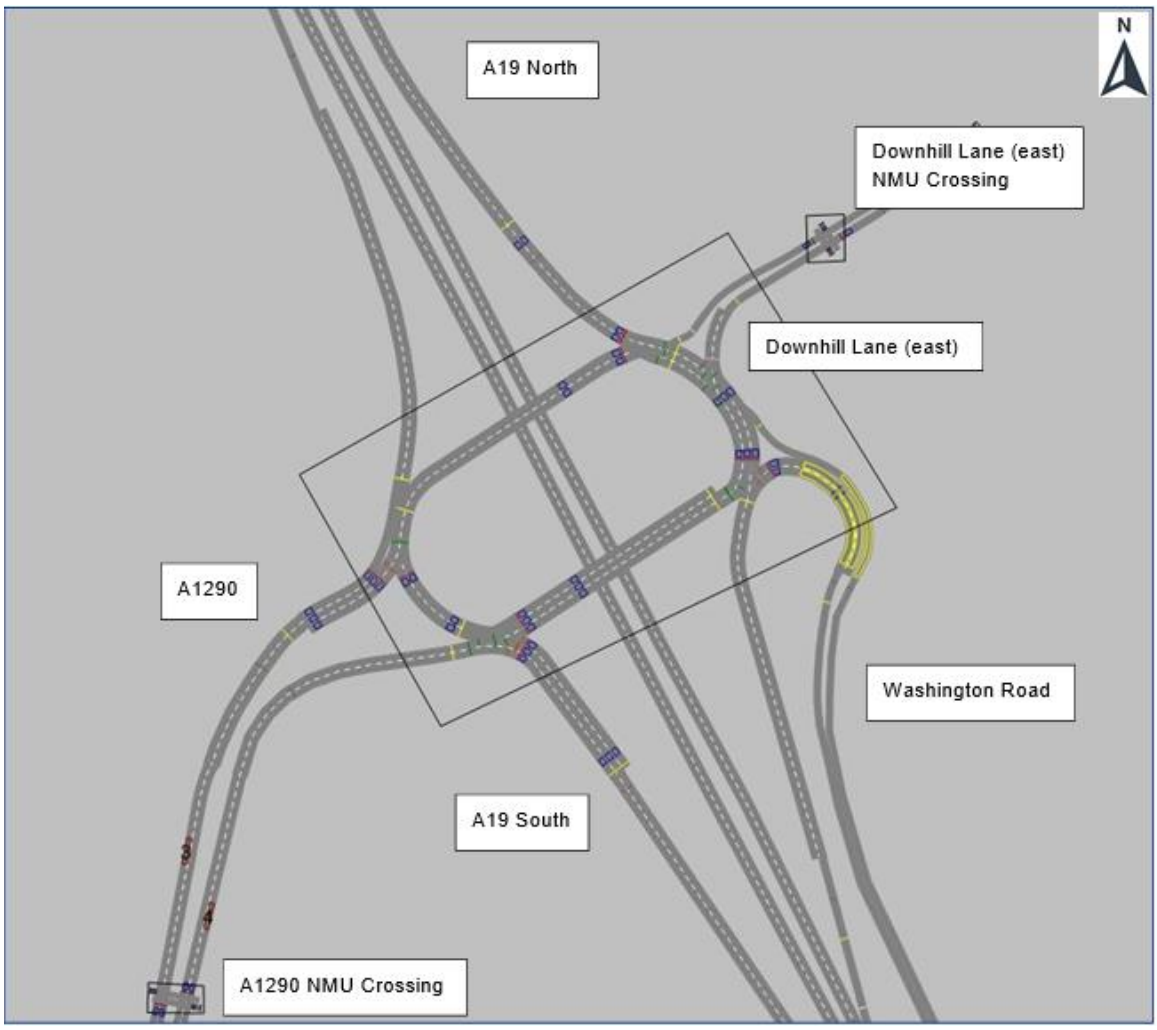
- Scenario TA1 AM Peak between 06:00 and 07:00;
- Scenario TA2 AM Peak 2021 Opening Year between 06:00 and 07:00; and
- Scenario TA3 AM Peak 2036 Design Year between 06:00 and 07:00.

3.12.3 These peak hours were modelled because these are the key periods during which congestion currently occurs and that the trip generation is the greatest. Additionally, previous LinSig modelling showed that the proposed junction would operate over capacity at these times. The remainder of the AM peak period and the PM peaks were not modelled because the LinSig modelling showed that the junction would operate within desirable capacity during these periods.

Network Development

3.12.4 The basic road network, such as the roads and junctions, were constructed on Open Street Map tiles within the VISSIM software. The road network is shown in **Figure 7**.

Figure 7: VISSIM Model Network Construction



3.12.5 Speed limits were assigned to the links based on current locations and assigned a standardised speed distribution derived from Department for Transport figures. No adjustments were made to other base data elements such as link behaviour types.

3.12.6 The driver behaviour for a freeway (free lane selection) link type was updated to allow 'cooperative lane change'. The parameters used are shown in **Table 17**.

Table 17: Parameters Used as Part of Cooperative Lane Change

Parameter	Value
Maximum Speed Difference	6.75 mph
Maximum Collision Time	10 seconds

3.12.7 Priority rules were used on the Downhill Lane (East) approach to ensure that vehicles were giving way to traffic on the circulatory. They were also used on the A19 North and A19 South off-slip approaches to ensure that traffic did not join the circulatory if the queue was exceeding its storage capacity to avoid blocking the exits to Downhill Lane (East) and the A1290.

3.12.8 Public Transport (PT) was coded into the model as a series of PT Stops and

PT Lines, representing bus stops and bus routes respectively. Bus routes and timetables for the *Fab 56* and *Whey Aye 50* services were sourced via the service operators' websites and matched with bus stops in the area using Open Street Map.

3.12.9 Traffic signals were modelled as demand-activated signals using VISSIM's add-on software, VISVAP. This software enabled the model to replicate MOVA method of control by providing the signals with the ability to vary cycle times and the amount of green time allocated to each stage. The phasing and staging plans were the based on those used in the LinSig model for the Opening Year and Design Year AM Peak hours.

3.12.10 The proposed NMU crossings on the A1290 and approaches (see **Figure 10**) were also included in the model and operated with demand-activated signals.

3.12.11 Evaluation features such as data collection points, travel time markers and queue counters were added into the model network to provide data for the analysis in Chapter 4.

Traffic Demand

3.12.12 Input traffic flows to the VISSIM and LinSig models was based on base year observed counts adjusted to reflect the traffic forecast growth from the strategic model. Forecast traffic growth was extracted from the strategic model forecasts and is calculated as the change between the base year model flows and the forecast year model flows. This forecast growth from the strategic model was then added to the observed traffic count discussed in Section 1.8. This process is described as 'Pivoting' and is a common practice within traffic modelling and ensures the use of as much observed data as possible. This methodology was chosen as it ensures the most accurate representation of traffic flows to be input to the operational model. This process also allows the 15-minute periods present within the traffic counts to be maintained.

3.12.13 In the case of the Weekday AM Peak TA1 Scenario assessment the 2017 count was used directly as a proxy for 2021 conditions as no IAMP traffic would be generated at this time due to the one-hour shift offset.

3.12.14 Traffic flows from 06:00 to 06:15 were halved to produce a 'warm up' period, 05:45 – 06:00. This ensured that there was traffic on the VISSIM network prior to 06:00 – 07:00 peak hour traffic being loaded onto the network.

3.12.15 The limitations and key assumptions that informed the VISSIM modelling are listed below:

- No baseline modelling was undertaken or provided for the existing junction layout; therefore, the assessment did not compare the performance of the Scheme against the existing junction layout. No model calibration was undertaken because this model represents a concept junction design. The modelling does not include a do-minimum layout. It only considers the do-something scenario for Scenarios TA1, TA2 and TA3.
- The existing A1290/ Nissan Manufacturing Plant traffic signal junction and the proposed Washington Road/ Link Road junction were not included within the VISSIM model.

- Traffic signal timings in LinSig were used to inform the VISSIM model. These times were not fully replicated because the signal controllers within VISSIM were coded to operate variable cycle times and stage lengths.

4 DEVELOPMENT IMPACT

4.1 Introduction

4.1.1 This section presents a description of the transport impacts associated with the Scheme. Namely the effect on the following, as a result of the Scheme:

- strategic model assessment;
- operational model assessment;
- user experience; and
- facilities for NMUs.

4.1.2 The impact of the Scheme on traffic flows and journey times is informed by the extensive modelling exercise undertaken in support of the traffic and economic assessment of the Scheme.

4.2 Strategic Model Assessment

Traffic Flows

4.2.1 Traffic Flows on the approach to the Downhill Lane junction are shown in **Table 18**. It should be noted that the results of the Scenario TA1 are only shown for the AM period.

4.2.2 The table considers the Signalised A19 Downhill Lane junction only within the Do Minimum, Downhill Lane East meets Washington Road at a 3-arm priority junction 30 meters to the east of the Downhill Lane junction. The flows at this priority junction are not represented within the table below. The flows through Downhill Lane junction from Downhill Lane East are included on the Washington Road approach within the table. Within the Do Something, the Scheme includes Downhill Lane East as a fifth arm on the roundabout. The table therefore includes the approach flows from this arm.

Table 18 Hourly* Traffic Flow on A19 / A1290 Downhill Lane junction Approach Roads

		A19(T) North	Washing-ton Road	Downhill Lane (East)	A19(T) South	A1290 West	Sum
AM Pre Pre Peak: 06:15-06:45 (*Note this is a flow rate during this 30-minute period)							
TA1	Do Min	559	426		193	178	1356
	Do Som	581	260	166	213	182	1403
TA2	Do Min	602	408	-	208	222	1440
	Do Som	926	416	188	475	230	2235
TA3	Do Min	654	417	-	242	193	1506
	Do Som	1424	138	94	729	215	2599
AM Pre Peak: 07:00-08:00							
TA1	Do Min	704	667	-	154	1081	2606
	Do Som	730	740	133	133	1084	2802

		A19(T) North	Washing-ton Road	Downhill Lane (East)	A19(T) South	A1290 West	Sum
TA2	Do Min	640	633	-	102	1081	2455
	Do Som	745	791	279	108	1083	3006
TA3	Do Min	565	481	-	162	1153	2362
	Do Som	846	670	313	103	1194	3127
AM Peak: 08:00-09:00							
TA1	Do Min	373	642	-	46	637	1698
	Do Som	402	701	228	38	707	2077
TA2	Do Min	360	676	-	43	675	1755
	Do Som	399	717	228	34	758	2137
TA3	Do Min	462	527	-	79	937	2005
	Do Som	558	794	298	98	932	2680
Inter Peak Average Hour (10:00-15:00)							
TA2	Do Min	238	222	-	107	137	705
	Do Som	247	208	79	87	154	776
TA3	Do Min	382	235	-	178	206	1000
	Do Som	386	209	116	157	233	1101
PM Pre Pre Peak (15:00-16:00)							
TA2	Do Min	412	511	-	144	1045	2113
	Do Som	423	336	346	105	1063	2273
TA3	Do Min	484	381	-	136	1531	2533
	Do Som	528	229	399	152	1736	3044
PM Peak Pre Peak (16:00-17:00)							
TA2	Do Min	391	621	-	104	819	1936
	Do Som	375	654	370	48	838	2286
TA3	Do Min	336	556	-	68	1100	2060
	Do Som	398	623	467	80	1178	2747
PM Peak (17:00-18:00)							
TA2	Do Min	289	600	-	88	381	1358
	Do Som	264	705	350	29	452	1801
TA3	Do Min	290	529	-	59	578	1456
	Do Som	343	687	431	61	633	2155

4.2.3 The results for the AM Pre-Pre Peak, i.e. between 06:15-06:45 are reported as flow rates, (i.e. vehicles per hour) to allow comparison against other time periods. Within the opening year in Scenario TA1, the flow through the junction within the

Do Minimum and the Do Something is similar as the demand is constrained by the one-hour shift pattern offset.

4.2.4 Within Scenario TA2, with the one-hour shift pattern offset removed during this period, flows increase in both the Do Minimum and the Do Something due to the additional demand and the provision of the Dual A1290. Flows in the Do Something increase (an additional 644 vehicles) significantly more than the Do Minimum (an additional 84 vehicles) due to the additional capacity provide by the Scheme.

4.2.5 It should be noted that the apparent drop in flow in Scenario TA1 during this period on Washington Road between the Do Minimum (426 vehicles) and the Do Something (260 vehicles) is due to the 166 vehicles approaching the Scheme from Downhill Lane (East). Within the Do Minimum these vehicles would have joined Washington Road at the Downhill Lane / Washington Road priority junction.

4.2.6 In the design year 1,093 more vehicles are able to pass through the junction with the Scheme in place during this pre-pre peak time period. The scheme is aided by the opening of the Washington Road Bridge which provides an alternative access from the Downhill Lane junction to the IAMP and Nissan via Washington Road and the Washington Road Bridge. Traffic between the Downhill Lane junction and Nissan / IAMP is therefore split between the A1290 west and this alternative route.

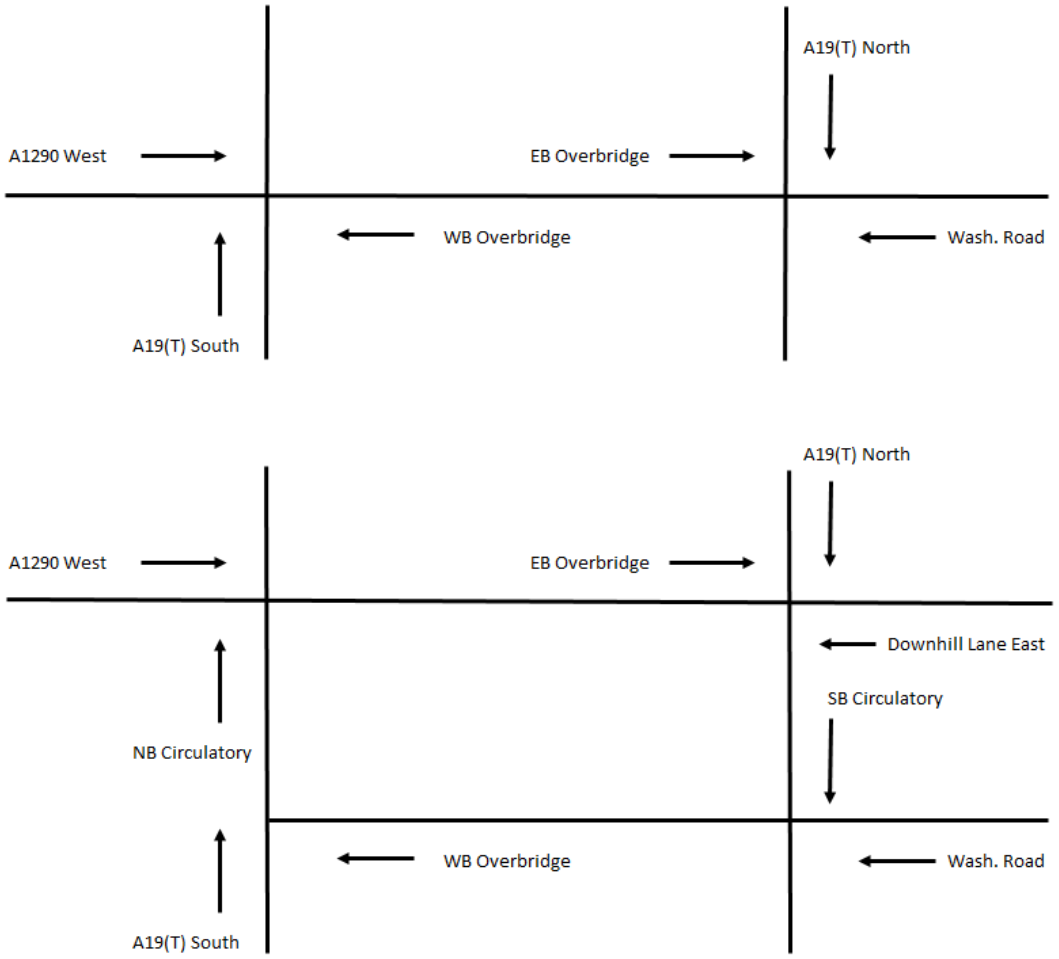
4.2.7 The flows through the Scheme in the AM Pre Peak (07:00-08:00), and the AM Peak (08:00-09:00) are greater with the scheme in place providing capacity for an additional 300-500 vehicles per hour. The impact of the scheme in the interpeak and PM peak is less pronounced in terms of vehicle flow. In the PM peak, the junction provides capacity for an additional 500-700 vehicles.

4.2.8 It can therefore be concluded that in Scenarios TA2 and TA3 the Scheme successfully provides additional capacity. Whilst the performance of the Scheme in Scenario TA1 is limited by the capacity of the single carriageway A1290 West exit, it should be noted that Scenario TA1 represents an interim situation until the A1290 is dualled.

Journey Times

4.2.9 The key links have been examined in order to establish the effects on each of these junctions in terms of delay. **Table 19** shows the delay on each approach to the Downhill Lane junction during the peak periods. **Figure 8** provides a link naming convention.

Figure 8: Downhill Lane junction Link Naming Convention



4.2.10 The table does not include the delays at the Downhill Lane East stopline at the A1290 East/Washington Road 3-arm priority junction within the Do Minimum.

Table 19: Forecast Junction Delays (seconds) at Downhill Lane junction

		A19 North	Wash. Road	DHL East	A19 South	A1290 West	EB O-B	WB O-B	NB Circ.	SB Circ.
AM Pre Pre Peak:06:15-06:45										
TA1	Do Min	85	57		61	7	4	12	-	-
	Do Som	16	14	4	19	5	9	50	16	23
TA2	Do Min	220	111		190	7	4	13	-	-
	Do Som	20	15	18	18	5	9	13	21	25
TA3	Do Min	257	109		257	5	4	15	-	-
	Do Som	25	14	19	19	5	9	15	30	23
AM Pre Peak: 07:00-08:00										
TA1	Do Min	29	46		34	9	43	9	-	-
	Do Som	19	17	6	17	6	10	11	18	16
TA2	Do Min	68	72		82	9	6	9	-	-
	Do Som	19	17	17	17	6	10	11	17	16

		A19 North	Wash . Road	DHL East	A19 South	A1290 West	EB O-B	WB O-B	NB Circ.	SB Circ.
TA3	Do Min	141	35		70	9	86	15	-	-
	Do Som	20	16	17	17	6	10	9	19	13
AM Peak: 08:00-09:00										
TA1	Do Min	19	26	-	29	9	85	7	-	-
	Do Som	17	16	4	17	6	9	8	14	13
TA2	Do Min	19	26	-	29	9	96	7	-	-
	Do Som	17	17	17	17	6	10	8	14	13
TA3	Do Min	40	25	-	29	10	96	9	-	-
	Do Som	18	17	17	17	6	9	7	18	13
Inter Peak Average Hour (10:00-15:00)										
TA2	Do Min	18	23	-	29	6	11	17	-	-
	Do Som	14	14	17	17	5	9	9	20	18
TA3	Do Min	21	22	-	30	6	15	18	-	-
	Do Som	15	14	17	17	5	9	7	30	15
PM Pre Pre Peak (15:00-16:00)										
TA2	Do Min	24	23	-	30	8	12	14	-	-
	Do Som	19	24	17	17	5	7	11	20	9
TA3	Do Min	47	21	-	30	23	22	85	-	-
	Do Som	19	23	17	17	6	7	10	29	8
PM Peak Pre Peak (16:00-17:00)										
TA2	Do Min	23	23	-	29	8	74	10	-	-
	Do Som	18	26	17	17	5	7	13	20	8
TA3	Do Min	24	22	-	29	8	82	21	-	-
	Do Som	19	26	17	17	6	7	12	22	8
PM Peak (17:00-18:00)										
TA2	Do Min	23	22	-	29	7	114	10	-	-
	Do Som	18	27	17	17	5	7	13	20	7
TA3	Do Min	24	22	-	29	7	93	13	-	-
	Do Som	18	27	17	17	5	7	13	22	8

4.2.11 The largest delays occur on the junction approach roads in the Do Minimum tests of Scenarios TA2 and TA3 during the Pre-Pre Peak period, due to the traffic demand being in excess of the capacity of the existing junction. Delays on the A19 sliproads are significant (greater than 3 minutes). These delays are removed by the Scheme within the Do Something.

4.2.12 It should be noted that all the delays reported within these forecasts are likely to be conservative. The model averages flows over an hour period (or 30 minutes in the case of the AM Pre Pre Peak). Whilst this averaging is a reasonable assumption for most strategic forecasts, the traffic arrives at the Downhill Lane junction in intense 15-minute bursts. As such, larger delays would be experienced

for a limited time across the hour, with lower flows experienced across the remainder of the period. The effect of this is considered within the operational VISSIM models which has been used to check the scheme performance.

4.2.13 In the design year the significant increase in demand flow causes delays within the Do Minimum to increase further. The scheme can be seen to be mitigating this impact as delays on these slip roads reduce.

4.2.14 During the remainder of the AM Peak Period delays remain at the Downhill Lane junction within the Do Minimum in the AM Pre Peak, and the AM Peak, particularly on the A19 North Slip, and the eastbound overbridge. Within the AM Pre Peak the inbound traffic for those working traditional administrative hours coincides with the night shift workers leaving Nissan and IAMP. Again, the scheme successfully removes the delays within the Do Something.

4.2.15 The impact of the scheme in the interpeak and PM peak is less pronounced in terms of delays, although those delays that are experienced are successfully removed by the scheme.

4.2.16 It is concluded that the results of the Do Something show that the Scheme is successfully able to accommodate the additional demand generated by the IAMP (see Paragraph 4.2.8) whilst removing the delays that would otherwise be experienced within the Do Minimum.

4.3 Operational Assessment

4.3.1 The operational assessment reports on delays and queue lengths with the Scheme in operation using the VISSIM model described in Section 3.11.12. Delays were analysed in 15-minute periods to demonstrate any variation that may occur. The performance of the junction was measured by assessing the delay that one vehicle experienced while travelling from an origin zone to a destination zone. The journeys that were assessed are listed in **Table 20**.

Table 20: Assessed Journeys

Journey	Journey Description
1	On the A19 northbound, starting at the A19/ A1231 Wessington Way junction and ending at the A1290/ Nissan Manufacturing Plant traffic signal junction.
2	On the A1290 eastbound, starting at the A1290/ Nissan Manufacturing Plant traffic signal junction and ending where the A19 Downhill Lane junction southbound on-slip meets the A19 mainline carriageway.
3	On A1290 eastbound, starting from the A1290/ Nissan Manufacturing Plant traffic signal junction and ending at Downhill Lane (East).
4	On the A19 southbound, starting from the north of Testo's junction and ending at the A1290/ Nissan Manufacturing Plant traffic signal junction.

4.3.2 Queue lengths were analysed in 15-minute periods throughout the peak hour to demonstrate any variation that may occur during the 06:00 – 07:00 peak hour. The queue counters were located at the stop line/ give way line on each approach to the junction, as well as at the circulatory stop lines.

Opening Year Assessment

4.3.3 **Table 21** provides a summary of the traffic flows in the opening year in the AM peak hour (06:00-07:00) in Scenario TA1 and Scenario TA2. The table compares the traffic input into the model, and the modelled throughput.

Table 21: Opening Year Traffic Flows -AM Peak

		Scenario TA1			Scenario TA2		
Time Period	**Approach**	**Input Traffic Flow (veh)**	**Modelled (veh)**	**Difference (veh)**	**Input Traffic Flow (veh)**	**Modelled (veh)**	**Difference (veh)**
06:00 06:15	A19 North	164	167	3	223	216	-7
	A19 South	98	97	-1	177	177	0
	Downhill Lane (East)	31	31	0	52	53	1
	A1290 (West)	33	30	-3	30	29	-1
	Washington Road	77	75	-2	109	104	-5
06:15 06:30	A19 North	209	203	-6	293	282	-11
	A19 South	200	178	-22	312	298	-14
	Downhill Lane (East)	32	33	1	61	63	2
	A1290 (West)	19	24	5	16	21	5
	Washington Road	62	63	1	107	109	2
06:30 06:45	A19 North	152	154	2	218	227	9
	A19 South	199	187	-12	287	291	4
	Downhill Lane (East)	22	21	-1	44	45	1
	A1290 (West)	64	64	0	54	53	-1
	Washington Road	41	42	1	77	79	2
06:45 07:00	A19 North	100	102	2	132	140	8
	A19 South	81	117	36	125	136	11
	Downhill Lane (East)	26	28	2	35	37	2
	A1290 (West)	130	128	-2	111	113	2
	Washington Road	64	67	3	83	84	1

4.3.4 Total modelled traffic through the junction in between 06:00 and 07:00 in Scenario TA1 is 1,811 vehicles, whereas in Scenario TA2 total traffic increases to 2,557 vehicles, due to the lifting of the one-hour shift pattern offset.

4.3.5 Within Scenario TA1 traffic throughput on the A19 South between 06:15 and 06:45 is forecast to be approximately 10% below the total observed traffic travelling over the stop line. This is because the two-to-one lane merge on the A1290 exit is forecast to exceed capacity in some cycles during this time period and generate queues back to the junction. Between 06:45 and 07:00, the exit merge on the A1290 is forecast to operate within capacity as traffic demand reduces towards the end of the peak hour.

4.3.6 Within Scenario TA2 the table demonstrates that the modelled traffic flow was similar to the observed traffic flow that was input into the model, which shows that the proposed junction is forecast to operate efficiently with few delays and queues to traffic.

4.3.7 **Table 22** shows the delays experienced on the routes through the junction.

Table 22: Opening Year AM Peak Journey Times

Time Period	Journey Number	Journey Description	Vehicle Delay (mm:ss)	
			Scenario TA1	Scenario TA2
06:00 –06:15	1	A19 Northbound to Nissan	00:39	00:37
	2	Nissan to A19 Southbound	00:27	00:23
	4	A19 Southbound to Nissan	00:52	00:55
	3	Nissan to DHL East	00:00	00:02
06:15 –06:30	1	A19 Northbound to Nissan	01:54	00:55
	2	Nissan to A19 Southbound	00:35	00:19
	4	A19 Southbound to Nissan	01:42	01:12
	3	Nissan to DHL East	00:41	00:33
06:30 –06:45	1	A19 Northbound to Nissan	05:34	00:41
	2	Nissan to A19 Southbound	00:26	00:33
	4	A19 Southbound to Nissan	02:12	01:14
	3	Nissan to DHL East	00:15	00:20
06:45 –07:00	1	A19 Northbound to Nissan	04:13	00:38
	2	Nissan to A19 Southbound	00:25	00:31
	4	A19 Southbound to Nissan	01:54	00:52
	3	Nissan to DHL East	00:17	00:23

4.3.8 Within Scenario TA1 the delay for northbound and southbound journeys from the A19 would peak between 06:30 and 06:45, which coincides with peak traffic demand. The delays are mostly associated with the two-to-one lane merge on the A1290 exit, which is forecast to operate over capacity for the majority of the peak hour; traffic would also experience small delays due to the NMU crossings on Downhill Lane (East) and the A1290. During the 06:45 – 07:00 period, the delay for drivers on both journeys is forecast to decrease as traffic demand reduces towards the end of the peak hour.

4.3.9 Within Scenario TA2 delay to traffic on all journeys remains between 00:30 and 01:30 minutes for the whole peak hour as a result of the combination of the Scheme and the A1290 operating as a dual carriageway. Traffic travelling on all journey's experience some delay while negotiating the Scheme and when the NMU crossing on the A1290 is demanded. However, the delays are not anticipated to significantly impact on the operation of the junction.

4.3.10 **Table 23** shows the modelled queues in the opening year scenarios.

Table 23: Opening Year AM Peak Queue Lengths

Time Period	Location (Stop Line or Give Way)	Scenario TA1		Scenario TA2	
		Average Queue Length (m)	Maximum Queue Length (m)	Average Queue Length (m)	Maximum Queue Length (m)
06:00 –06:15	A19 North	9	64	21	94
	A19 South	4	32	9	47
	Downhill Lane (East)	0	0	0	6
	A1290 (West)	0	0	0	0
	Washington Road	5	27	10	44
	Westbound Circulatory	8	57	18	125
	Northbound Circulatory	0	6	0	5
	Eastbound Circulatory	1	14	1	15
	Southbound Circulatory	1	25	1	26
06:15 –06:30	A19 North	14	69	43	122
	A19 South	48	155	23	107
	Downhill Lane (East)	0	6	0	4
	A1290 (West)	0	0	0	0
	Washington Road	5	25	11	48
	Westbound Circulatory	23	98	29	149
	Northbound Circulatory	0	0	0	7
	Eastbound Circulatory	2	24	2	22
	Southbound Circulatory	1	14	3	22
06:30 –06:45	A19 North	7	48	42	114
	A19 South	180	258	17	77
	Downhill Lane (East)	0	1	0	3
	A1290 (West)	0	0	0	8
	Washington Road	3	21	9	38
	Westbound Circulatory	17	76	17	93
	Northbound Circulatory	0	10	0	7
	Eastbound Circulatory	2	18	3	30
	Southbound Circulatory	1	13	3	41
06:45 –07:00	A19 North	4	31	12	67
	A19 South	48	191	7	50
	Downhill Lane (East)	0	1	0	6
	A1290 (West)	0	0	0	8
	Washington Road	5	25	6	33
	Westbound Circulatory	8	50	8	67
	Northbound Circulatory	1	12	1	16
	Eastbound Circulatory	3	31	5	38

Time Period	Location (Stop Line or Give Way)	Scenario TA1		Scenario TA2	
		Average Queue Length (m)	Maximum Queue Length (m)	Average Queue Length (m)	Maximum Queue Length (m)
	Southbound Circulatory	2	18	4	30

4.3.11 Within Scenario TA1, the largest queue on the A19 South approach is forecast to occur between 06:30 and 06:45, with average queues forecast to be 180 metres in length; maximum queues would be 258 metres in length. The queues on this approach are generated because the two-to-one lane merge on the A1290 exit would exceed capacity in a few cycles during this period. The forecast maximum queue on the A19 South approach is not forecast to exceed the storage capacity of the proposed off-slip, which is 400 metres in length, however if the merge capacity was lower than modelled, queues could be longer.

4.3.12 Within Scenario TA2, queues are forecast to be short for the majority of the peak hour, with average and maximum queues unlikely to block back other junction approaches / exits and adversely impact on the operation of the junction. Queues are forecast to peak during the 06:15 – 06:30 period, when the highest traffic flow from both A19 approaches are anticipated to negotiate the junction.

4.3.13 It can therefore be concluded that should the dualling work on the A1290 between Downhill Lane Junction and Cherry Blossom be completed in 2022 or soon after then the Scheme will have sufficient capacity to cope with the traffic demand should the one-hour shift pattern offset be lifted.

4.3.14 The delays experienced within the operational model are considerably larger than those experienced within the strategic assessment during this peak period, in more congested scenarios in particularly. In congested conditions strategic models tend to average congestion in a number of ways, namely;

- Firstly, the peak conditions within the strategic model are averaged over the model period. The maximum queue lengths and delays that occur within the operational model are experienced for small portions of the period and are not experienced by each vehicle.
- Secondly, vehicles are able to reassign within the strategic model if a faster route is available. Within the strategic model AM pre-pre peak hour the road network is largely uncongested and free flowing, apart from the junctions on the approach to the Nissan plant. Within the congested scenarios (i.e. Scenario TA1, and within the Do Minimum test of Scenario TA2) traffic would be likely to reassign away from Downhill Lane Junction within the strategic model as delays become excessive. The delays noted in the strategic assessment within these scenarios are therefore underestimated. When the congested Scenario TA1 has been considered within the operational model, the reassignment away from the junction is overcome by using the observed base year traffic flows, thereby leading to large delays.

4.3.15 It should be noted that when assessing the full Scheme within the TA2 Scenario this reassignment effect within the strategic model should not be prominent given that the Scheme is operating without any large delays.

Design Year Assessment

4.3.16 **Table 24** provides a summary of the traffic flows in the design year within the AM peak hour (06:00-07:00). The table demonstrates that the modelled traffic flow is similar to the observed traffic flow that was input into the model, which shows that the proposed junction is forecast to operate efficiently with few delays and queues to traffic.

Table 24: Design Year AM Peak Traffic Flows

Time Period	Approach	Input Traffic Flow (veh)	Modelled Throughput (veh)	Difference to input (veh)
06:00 – 06:15	A19 North Off-Slip	353	348	-5
	A19 South Off-Slip	238	237	-1
	Downhill Lane (East)	32	32	0
	A1290 (West)	28	23	-5
	Washington Road	47	46	-1
06:15 – 06:30	A19 North Off-Slip	410	400	-10
	A19 South Off-Slip	393	371	-22
	Downhill Lane (East)	30	31	1
	A1290 (West)	16	23	7
	Washington Road	20	23	3
06:30 – 06:45	A19 North Off-Slip	342	342	0
	A19 South Off-Slip	354	358	4
	Downhill Lane (East)	21	21	0
	A1290 (West)	51	51	0
	Washington Road	11	12	1
06:45 – 07:00	A19 North Off-Slip	276	282	6
	A19 South Off-Slip	166	185	19
	Downhill Lane (East)	26	27	1
	A1290 (West)	103	104	1
	Washington Road	44	47	3

4.3.17 Total modelled traffic through the junction between 06:00 and 07:00 in Scenario TA3 is 2,963 vehicles, which is 60% greater than the number currently observed (see Paragraph 1.8.8). Traffic flows are higher in the design year than in the opening year due to the operation of IAMP Two. There is more capacity on the local road network due to the Washington Road Bridge being assumed to be open allowing an additional route to Nissan and IAMP.

4.3.18 **Table 25** shows the modelled delays for the operational assessment in the design year.

Table 25: Design Year AM Peak Modelled Delays

Time Period	Journey Number	Description	Vehicle Delay (mm:ss)
06:00 – 06:15	1	A19 Northbound to Nissan	00:30
	2	Nissan to A19 Southbound	00:25
	3	Nissan to DHL East	00:00
	4	A19 Southbound to Nissan	00:42
06:15 – 06:30	1	A19 Northbound to Nissan	00:50
	2	Nissan to A19 Southbound	00:26
	3	Nissan to DHL East	00:35
	4	A19 Southbound to Nissan	00:52
06:30 – 06:45	1	A19 Northbound to Nissan	00:45
	2	Nissan to A19 Southbound	00:31
	3	Nissan to DHL East	00:19
	4	A19 Southbound to Nissan	00:44
06:45 – 07:00	1	A19 Northbound to Nissan	00:32
	2	Nissan to A19 Southbound	00:34
	3	Nissan to DHL East	00:18
	4	A19 Southbound to Nissan	00:43

4.3.19 Vehicles on all four journeys would not experience delays of higher than one minute throughout the peak hour. The junction is forecast to operate well and queues on each approach would clear during each cycle. **Table 26** shows the modelled queues in the design year.

Table 26: Design Year AM Peak Hour Modelled Queues

Time Period	Location (Stop Line or Give Way)	Average Queue Length (m)	Maximum Queue Length (m)
06:00 – 06:15	A19 North Off-Slip	14	86
	A19 South Off-Slip	10	61
	Downhill Lane (East)	0	23
	A1290 (West)	0	0
	Washington Road	4	23
	Westbound Circulatory	9	68
	Northbound Circulatory	0	8
	Eastbound Circulatory	2	22
	Southbound Circulatory	1	13
06:15 – 06:30	A19 North Off-Slip	29	135
	A19 South Off-Slip	21	100
	Downhill Lane (East)	0	11
	A1290 (West)	0	0

Time Period	Location (Stop Line or Give Way)	Average Queue Length (m)	Maximum Queue Length (m)
	Washington Road	3	20
	Westbound Circulatory	12	80
	Northbound Circulatory	0	11
	Eastbound Circulatory	3	27
	Southbound Circulatory	1	17
06:30 – 06:45	A19 North Off-Slip	17	87
	A19 South Off-Slip	19	81
	Downhill Lane (East)	0	9
	A1290 (West)	0	0
	Washington Road	2	18
	Westbound Circulatory	8	65
	Northbound Circulatory	0	6
	Eastbound Circulatory	4	28
	Southbound Circulatory	1	13
06:45 – 07:00	A19 North Off-Slip	16	76
	A19 South Off-Slip	7	44
	Downhill Lane (East)	0	13
	A1290 (West)	0	0
	Washington Road	3	19
	Westbound Circulatory	5	40
	Northbound Circulatory	1	13
	Eastbound Circulatory	6	38
	Southbound Circulatory	3	28

4.3.20 Queues are forecast to be short for the majority of the peak hour, with average and maximum queues unlikely to block back other junction approaches / exits and adversely impact on the operation of the junction.

4.3.21 Queues are forecast to peak during the 06:15 – 06:30 period, when the highest traffic flow from both A19 approaches are anticipated to negotiate the junction. The queues on the Westbound Circulatory and A19 North off-slips are forecast to increase as the signal timings optimise each cycle to maximise the capacity of each approach. These queues are not forecast to block back other junction approaches / exits.

4.4 User Experience

4.4.1 The additional infrastructure allows more through traffic to cross the A19 at the Downhill Lane junction. The main impact of the Scheme is the reduction of vehicle delay in all peak hour time periods, including in the pre-peak when the shift changes from the Nissan plant occur

4.4.2 The Scheme would be visible from the A19 mainline carriageway and Downhill Lane, replacing open views of arable and pastoral land with a view of the Scheme. The change in views for drivers represents a small magnitude of change and an adverse effect of minor significance.

4.4.3 There is a significant demand for travel between North Sunderland and Tyneside which uses the congested A19 / A1231 junction. In the Do Something, some of these trips route away from this congested junction and route via Washington Road and the improved Downhill Lane junction. Therefore, the upgrading of the Downhill Lane junction can also be concluded to provide some relief to the A19 / A1231 junction.

4.4.4 The Scheme would be expected to provide improved access between jobs and the labour market and reduced time and cost in the transport of and access to goods and services across the three local authorities of Sunderland, South Tyneside and Gateshead.

4.5 Non-Motorised User Impacts

4.5.1 The new NMU route continuing south from Downhill Lane alongside Washington road would provide a link to the existing cycleway along Washington Road and a greater degree of separation of vehicles and NMU traffic, which would improve safety.

4.5.2 Improved crossing facilities at the junction would improve access to the wider countryside and to the bus stops on the west side of the junction on the A1290.

4.5.3 The new NMU footbridge will avoid the need for NMUs to physically navigate the Downhill Lane junction, improving safety and reducing severance between communities and employment centres across the A19.

4.5.4 During construction, there would be some disruption to existing NMU routes because of works to divert statutory services, highways works, works to improve the NMU facilities themselves or the construction of new NMU facilities. At this stage, the duration of temporary closures and diversion and the diversion routes has not been determined as this would be done at detailed design stage. Journeys made between community facilities, residential properties and industrial zones are likely to increase in length and duration during temporary, localised diversions. Bridleway B46 is a particularly well used commuter route from residential communities to the north of the Downhill Lane junction to the Nissan Manufacturing Plant and users of this rote currently cross the A19 at Downhill Lane. There would be some disruption to users of this route during construction due to temporary closures or diversions.

4.5.5 The Scheme is considered to result in a net improvement to the NMU facilities within the vicinity of the junction.

4.6 Land Use Impacts

4.6.1 There would be little change or impact to community land and facilities as a result of construction or operation of the scheme. However, temporary road closures and diversions would be required during the construction period, which would result in potential disruption to residents accessing community facilities further afield e.g. at Boldon Colliery.

4.6.2 There would be little in the way of adverse impact on any land allocations as a result of the Scheme. Although land allocated for IAMP is in close proximity to the Scheme, current information on the project suggests that IAMP Two contains the land allocations that would intersect with the Scheme and these land allocations would not have been developed at the time of construction of the Scheme. Land allocated for IAMP One lies to the south of Downhill Lane immediately north of the Nissan Manufacturing Plant and does not intersect with the Scheme area.

4.6.3 The Scheme would not require the demolition of any properties. However, there would be some disruption to properties in close proximity to the Scheme, particularly Make Me Rich Farm House and Town End Farm residential estate. There would be potential disruption to access to the farmhouse, which is currently accessed from Downhill Lane to the west of the junction, as a result of construction activity in the vicinity.

4.6.4 There would be some change in access to the A1290 from Make Me Rich Farm due to the junction with Downhill Lane and the A1290 being moved slightly to the south. The existing access to the Downhill Lane junction with the A1290 would be stopped up as public highway and re-created as private access for Make Me Rich Farm. A new access road would be constructed for Make Me Rich farmhouse connecting to Downhill Lane (West).

4.6.5 During construction, the amenity of community members who live near or use land in proximity to the site would be affected by disruption caused by construction activities due to increased congestion and reduced visual amenity caused by temporary traffic management measures.

4.6.6 It is thought that while there may be some adverse effects and disruption on commercial and industrial properties including the Three Horseshoes Pub, North-East Aircraft Museum and Nissan as a result of construction, the overall operational effects will be beneficial.

4.7 Summary

4.7.1 The forecast assignments from the Scenarios TA2 and TA3 show that there is an increase in demand at the junction, due to the opening of the IAMP, the expansion of Nissan and traffic growth. In the AM peak period between 06:00 and 07:00, total junction traffic grows by 60% in the design year compared to the existing during the peak hours. This increase occurs despite the provision of the proposed Washington Road Bridge 500m to the south of the Downhill Lane junction. Without the scheme the growth in traffic cannot be accommodated with significant extra delay at the Downhill Lane junction.

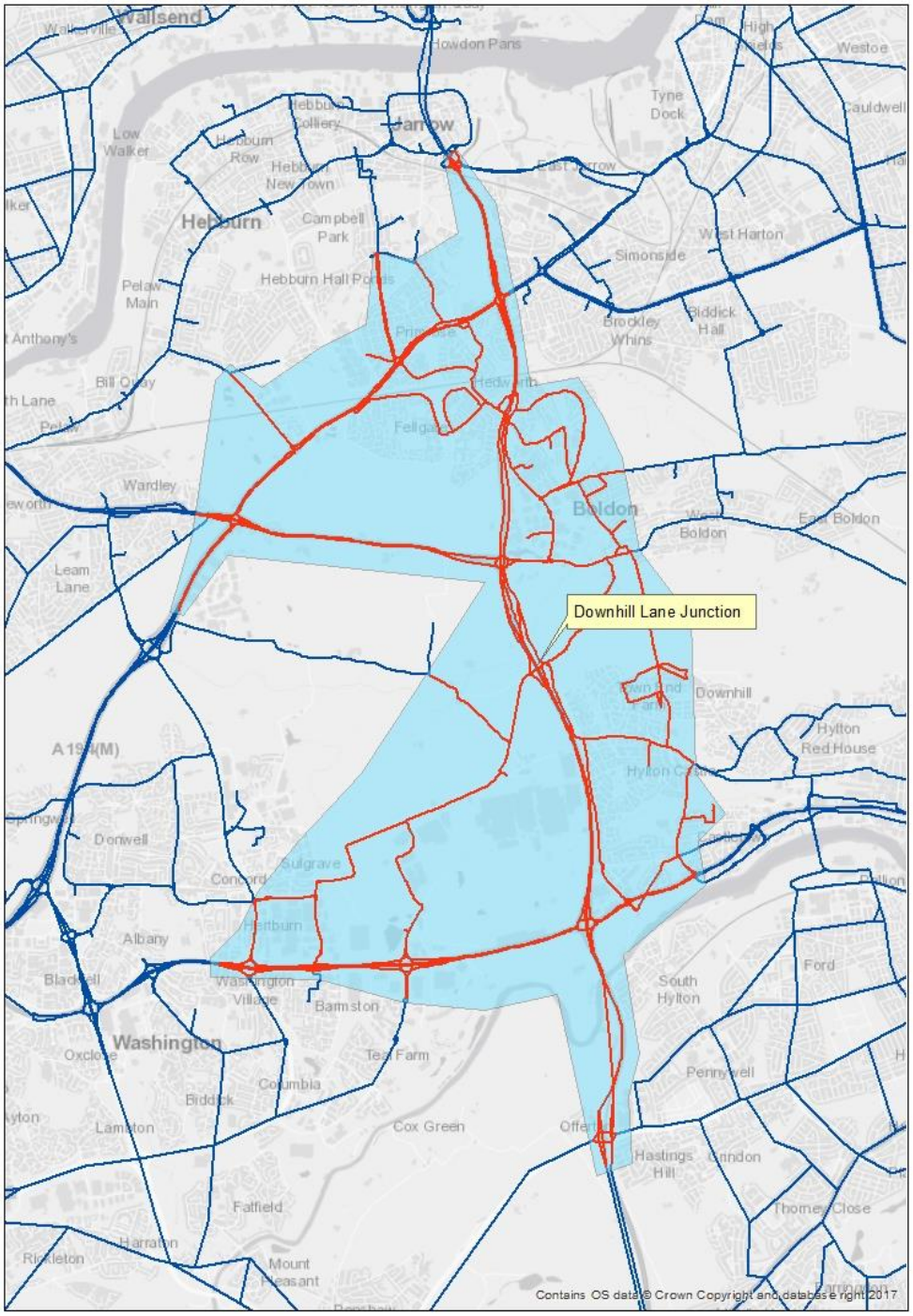
4.7.2 The analysis indicated that whilst traffic flows will increase in future years, the level of congestion and journey experience would improve for users. The improved NMU facilities to the south of the roundabout will improve access to public transport and improve the permeability of the junction for NMUs.

5 ACCIDENT ANALYSIS

5.1 Affected Road Network

5.1.1 The accident analysis was undertaken over a pre-defined area of the A19HAM2 network known as the 'Affected Road Network' (ARN). The ARN was defined as the area of road network likely to be influenced by both the A19 / A184 Testo's Junction Improvement scheme and the A19/A1290 Downhill Lane junction scheme. The extent of the ARN is illustrated in **Figure 9**.

Figure 9: Downhill Lane junction COBA-LT Road Network



5.2 Observed Accident Data

5.2.1 Observed accident data over a 5-year period (2013-2017) was obtained from the Stats19 data, published by DfT. This data included the following:

- police force area;
- date and time of accident;
- vehicle type;
- location (by road name and x-y co-ordinates); and
- casualty severity (slight, serious and fatal).

5.2.2 Each accident was plotted within GIS and a relationship between the observed data and the A19HAM2 network was developed. All accidents were then summed by level of severity, whether they were link or junction based, and the severity proportions calculated. The COBA-LT approach was used to split the accidents in to various link and junction types.

5.3 Accidents by Link and Junction Type

5.3.1 COBA-LT has been used to compare the observed accident data to national average accident rates. This was achieved by calculating the accidents that may have been expected to occur between 2013 and 2017 by applying national average accident rates to the traffic flows from the base year A19HAM2. It was found that there have been a total of observed 811 accidents over the course of the last 5 years on those links and junctions which fall within the ARN. The COBA-LT method forecast 987 accidents. **Table 27** shows the link accidents as categorised by severity. **Table 28** below shows the junction only accidents, defined as those that occur within 20m of a junction, as categorised by junction types.

Table 27: Summary of Accident Proportions by Link Type

Speed Limit (mph)	Road Description	Observed Accident Numbers			COBA-LT Accidents		
		Fatal	**Serious**	**Slight**	**Fatal**	**Serious**	**Slight**
Rural	Motorway	0	1	7	0	0	3
Urban	S2 A Road	0	2	8	0	0	1
Rural		0	4	13	1	2	12
Urban	Other S2 Roads	0	14	70	1	6	44
Rural		0	0	6	0	1	7
Urban	Dual Carriageway	0	0	18	0	3	20
Rural		1	33	132	2	8	62
Total		**1**	**54**	**254**	**4**	**21**	**150**

5.3.2 The general trend shown above suggests that there are a less number of 'slight' observed accidents when compared to the expected values in adopted guidance[6], and the observed 'fatal' accidents are greater than what is indicated in adopted guidance.

[6] https://www.gov.uk/transport-analysis-guidance-webtag

Table 28: Summary of Accident by Junction Type

Junction Type	Observed Accidents			COBA-LT Accidents		
	Fatal	Serious	Slight	Fatal	Serious	Slight
Priority	3	35	160	8	68	377
Signals	0	10	128	1	22	242
Roundabout	0	15	151	0	8	86
Total	**3**	**60**	**439**	**9**	**98**	**705**

5.3.3 There are generally a higher number of 'slight' observed accidents and a greater number of fatal accidents when compared to the expected values in adopted guidance when reviewing junction-based accidents.

5.4 Accident Analysis Result

5.4.1 An accident analysis has been undertaken using COBA-LT, assuming traffic flows from Scenarios TA2 and TA3, to forecast the future number of accidents based on using national average accident rates depending on the type of link and junction that the Scheme provides.

5.4.2 **Table 29** shows the number of Personal Injury Accidents (PIA) occurring on the modelled networks during the modelled years.

Table 29: COBA-LT Accident Forecasts

	Year	Accidents	Casualties		
			Fatal	Serious	Slight
Do Nothing	2021	194.9	2.7	26.4	292.6
	2036	198.2	2.7	26.6	298.2
	Total (60 Years)	11,809	162	1,589	17,772
Do Something	2021	194.3	2.7	26.3	291.7
	2036	198.1	2.7	26.6	298.0
	Total (60 Years)	11,791	161	1,583	17,742
Saving	2021	0.6	0.0	0.1	0.9
	2036	0.1	0.0	0.0	0.2
	Total (60 Years)	17	1	6	30

5.4.3 There is an overall reduction in accidents and casualties in both modelled years.

5.5 Conclusion

5.5.1 Overall it is anticipated that the Scheme would reduce accident rates at the junction. The proposals provide a safer highways configuration when compared to the existing situation.

5.5.2 The analysis above considers the change in accidents on the road network due to the changes in traffic flows. It does not consider any further detail design measures that could be introduced to reduce the likelihood of, and severity of, accidents such as the proposed improvements in pedestrian routes.

5.5.3 In addition, no account has been taken of the reduction in likely accidents due to the reduced likelihood of queues forming on the A19 mainline due to traffic blocking

back from the DLJ slips due to congestion at the existing signalised junction. The likelihood of such accidents occurring is particularly difficult to quantify given the lack of statistical confidence that could be attached to both:

- The likelihood and duration of queues forming that are long enough to block back from DLJ onto the mainline in both Do Minimum and Do Something scenarios in all future years.
- The number of instances that such blocking back would be likely to cause an accident and result in casualties.

5.5.4 As the scheme is expected to provide more capacity at DLJ, which will lead to a reduction in the frequency of queues, and therefore accidents.

6 CONCLUSION

6.1.1 The Downhill Lane junction is located on the A19, 1.2km south of the Testo's roundabout. Downhill Lane feeds into the A1290 which supplies the northern access of Nissan. Nissan operates on shift patterns, and as a consequence of the change in shift, the Downhill Lane junction suffers from severe congestion at these times due to the concentration of arrivals and departures. The proposed International Advanced Manufacturing Park (IAMP) adjacent to the Nissan site will also require access onto the A19 via the A19 Downhill Lane junction. This is anticipated to exacerbate the congestion problem at shift change times.

6.1.2 The IAMP One development is assumed to be open by 2021, however the IAMP Two development is not expected to be operational until after 2026. Given the uncertainty around the timing of the dualling of the A1290 between the A19 Downhill Lane Junction and Cherry Blossom Way the effects of a Highways Operational Masterplan (HOMP) were tested. This assumed a one-hour pattern offset being applied to the IAMP ONE shift patterns for all staff, reducing the IAMP ONE trip generation to negligible levels during the Nissan shift change period. The Scheme was also tested in two further scenarios, with the one-hour shift pattern offset removed:

- An opening year scenario with the traffic demand associated with the IAMP One development and the A1290 dualling between Downhill Lane and Cherry Blossom Way.
- A design year scenario. This assumes all the traffic demand from both IAMP One and IAMP Two, and all associated infrastructure. This scenario aligns with the scheme description within the Road Investment Strategy.

6.1.3 The results of the strategic (SATURN) assessment during the key AM Peak hour, between 06:00 and 07:00 showed the following:

- Within the opening year with the one-hour shift pattern offset in operation the flow through the junction within the Do Minimum and the Do Something is similar as the flows are constrained by the single carriageway exit on the A1290 West.
- With the one-hour shift pattern offset lifted, flows increase in both the Do Minimum and the Do Something due to the additional demand and the provision of the Dual A1290. Flows in the Do Something increase (an additional 644 vehicles) significantly more than the Do Minimum (an additional 84 vehicles) due to the additional capacity provide by the Scheme.
- In the design year 1,093 more vehicles are able to pass through the junction with the Scheme in place during this time period.
- The largest delays occur on the junction approach roads in the Do Minimum tests with the one-hour shift pattern offset removed in both opening and design years due to the traffic demand being in excess of the capacity of the existing junction. Delays on the A19 sliproads are significant (greater than 3 minutes). These delays are removed by the Scheme within the Do Something.

6.1.4 The impact of the scheme during the remainder of the AM Peak Period, and during

the other peak periods is less pronounced in terms of vehicle flow and delays, however the scheme significantly improves capacity (up to 700 vehicles per hour) and reduces delay in all time periods.

6.1.5 The operational (VISSIM) assessment considered the Scheme performance during the key AM Peak hour, between 06:00 and 07:00 in more detail:

- The assessment of the opening year scenario with the one-hour shift pattern offset in operation showed that the queues and delays for journeys from the A19 would peak between 06:30 and 06:45. The delays are mostly associated with the two-to-one lane merge on the A1290 exit, which is forecast to operate over capacity for the majority of the peak hour.
- With the one-hour shift pattern offset lifted and the A1290 Dualling in place the delay to traffic on all journeys remains between 00:30 and 01:30 minutes for the whole peak hour. Queues are forecast to be short for the majority of the peak hour, with average and maximum queues unlikely to block back other junction approaches / exits and adversely impact on the operation of the junction.
- Traffic flows are higher in the design year than in the opening year due to the operation of IAMP Two. There is more capacity on the local road network due to the Washington Road Bridge being assumed to be open allowing an additional route to Nissan and IAMP. The Scheme is forecast to operate well and queues on each approach would clear during each traffic signal cycle.

6.1.6 Based on the assumptions made within this Transport Assessment it is concluded that should the dualling work on the A1290 between the Downhill Lane Junction and Cherry Blossom Way be completed in 2022 or soon after then the Scheme will have sufficient capacity to cope with the traffic demand at Downhill Lane should the one-hour shift pattern offset be lifted.

6.1.7 The accident analysis showed that overall it is anticipated that the Scheme would reduce accident rates at the junction. The proposals provide a safer highways configuration when compared to the existing situation

6.1.8 The analysis presented indicates that the Scheme:

- meets the requirements of central government's transport objectives around economy, environment, social and public accounts;
- aligns with national and local planning policy;
- addresses future traffic demand and creates improved traffic congestion conditions and journey experience for motorists;
- improves facilities for NMUs; and
- creates a safer environment for all users. Accident rates are forecast to reduce as a result of the Scheme.

6.1.9 In conclusion, it is considered that there is no reason in transport terms whereby the DCO should not be granted.

APPENDIX A: SCHEME DRAWINGS

Figure 10: Downhill Lane Junction Improvement Scheme GA

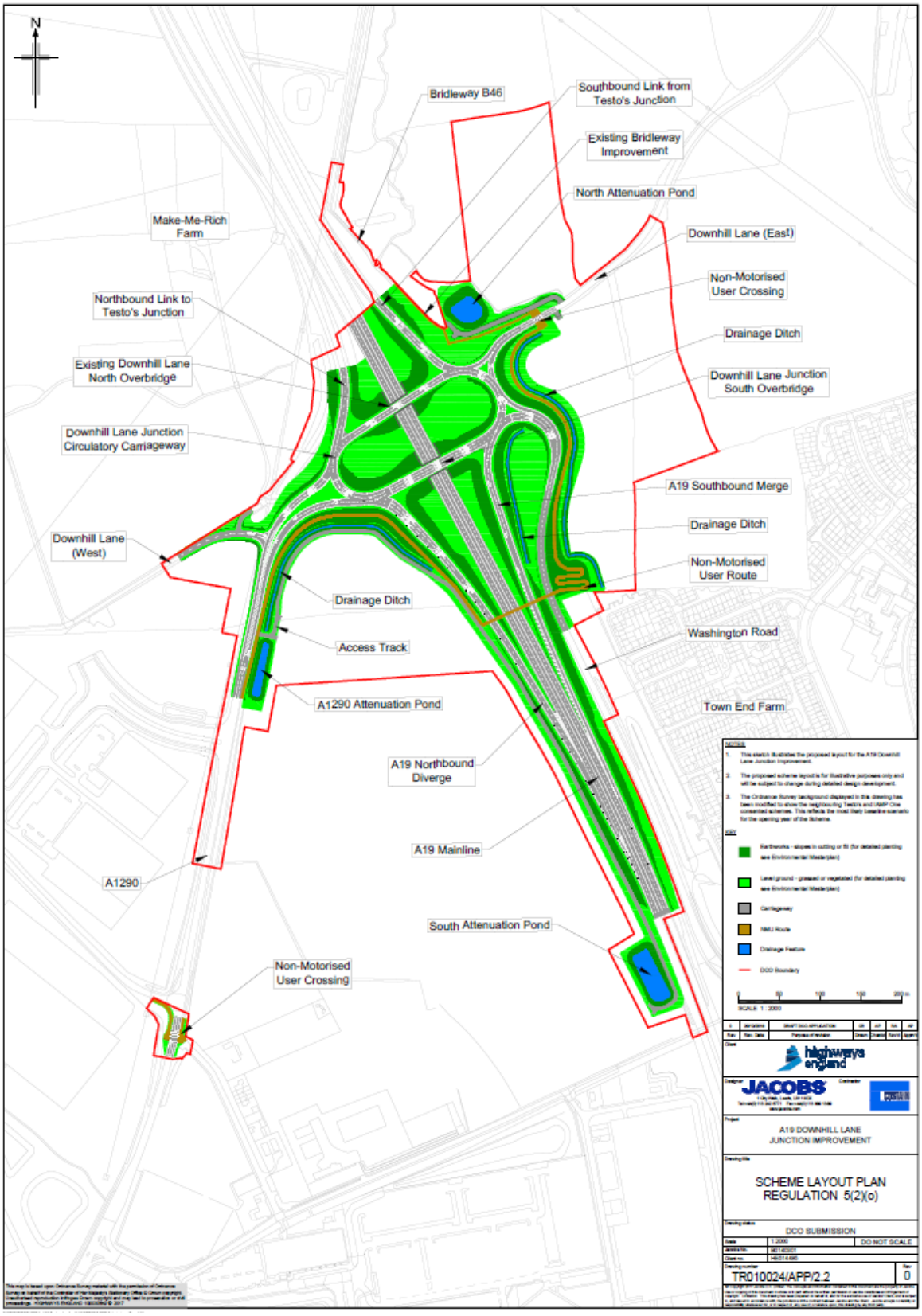


Figure 11: Existing Facilities for Pedestrians and Cyclists

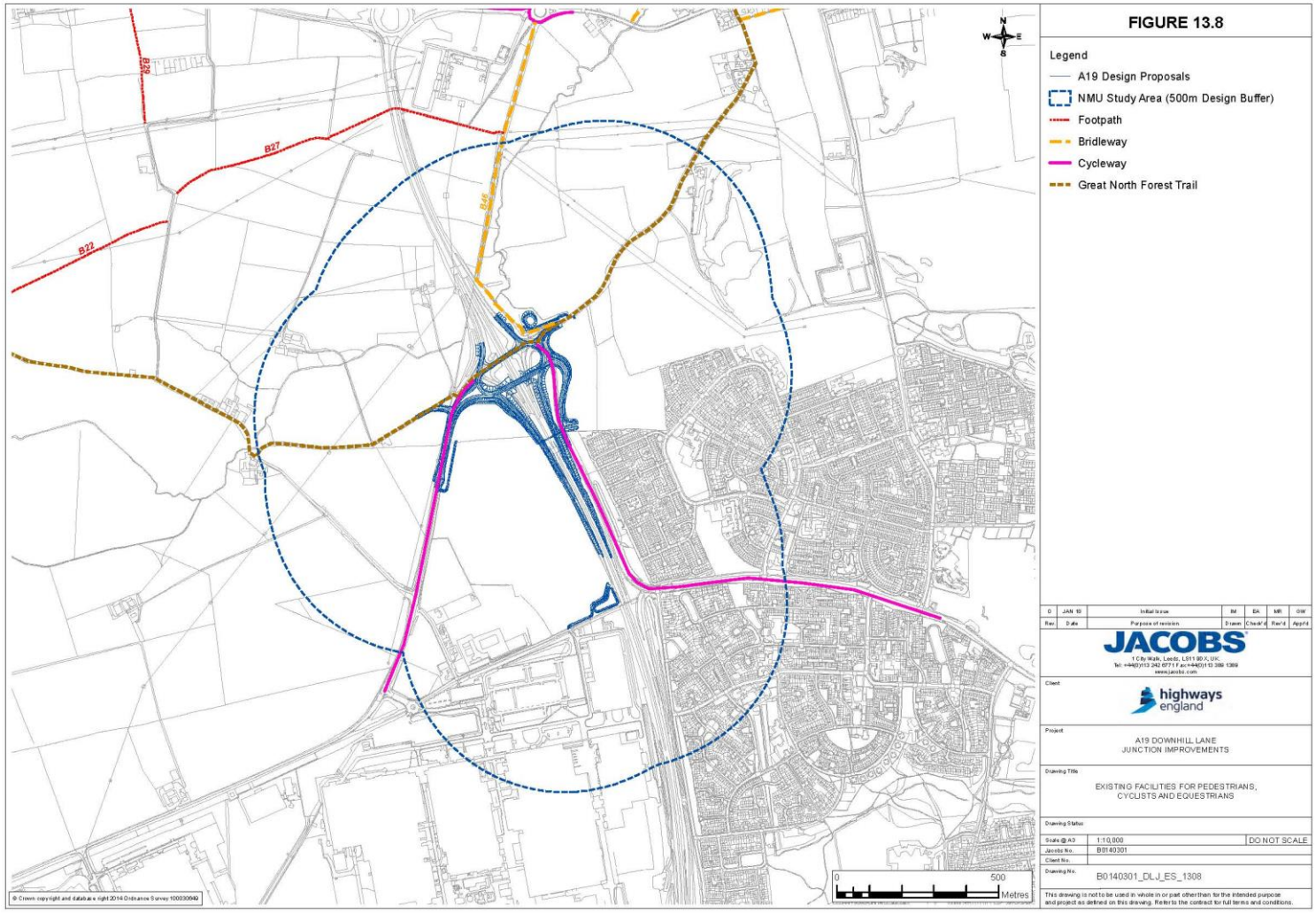


Figure 12: IAMP One Indicative Masterplan

Figure 13: IAMP Masterplan after completion of both IAMP One and IAMP Two

Figure 14: IAMP One Highway Layout

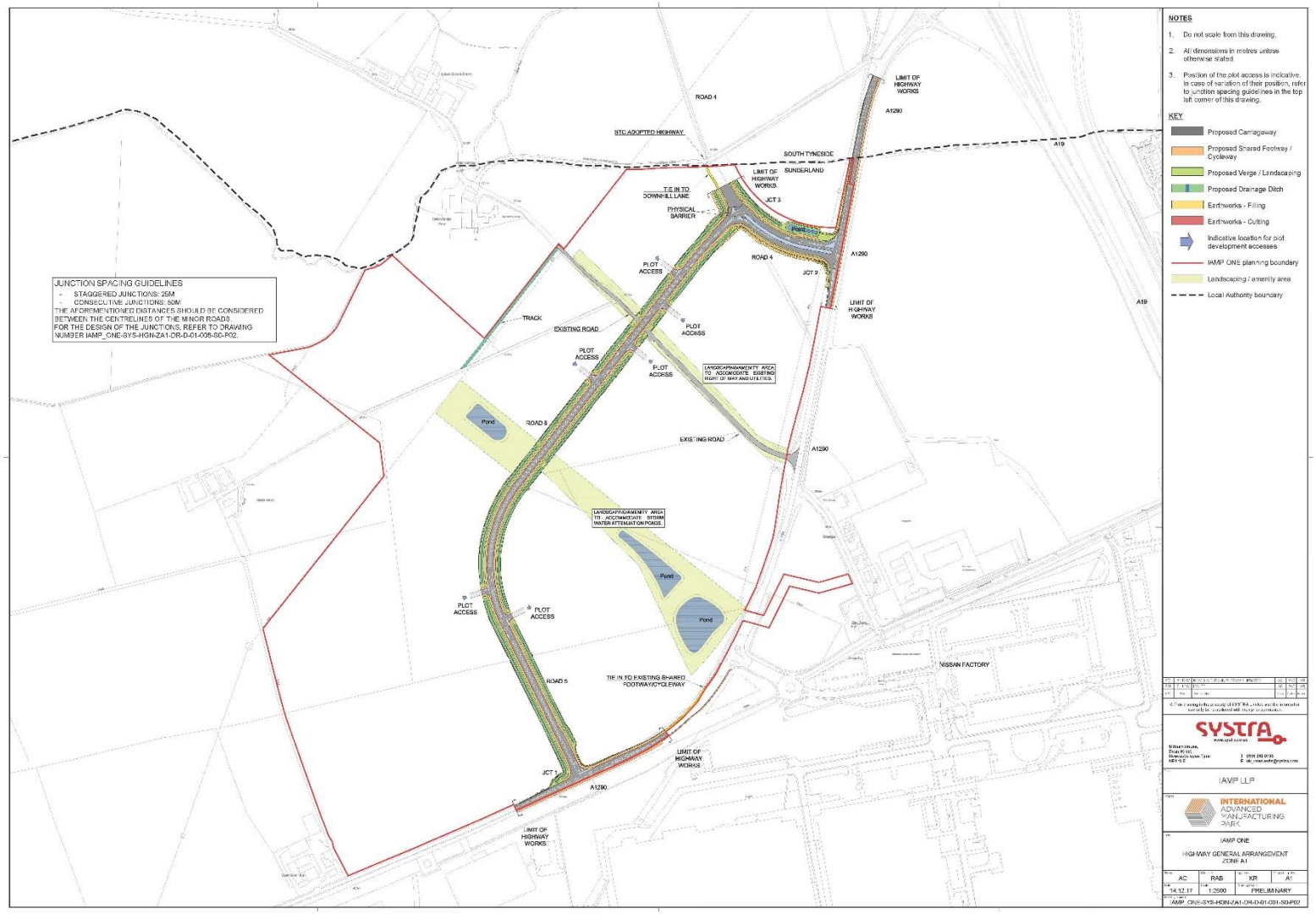


Figure 15: IAMP Two Road Layout

APPENDIX B: UNCERTAINTY LOG

ArupID	Author	AuthRef	SiteNm	X	Y	Dev	Uncertainty	UnitDetail	Jobs	Houses	Zone	Tempro_Zone
2	Sunderland	LMD 2	Former Pallion Ship Yard	437947	557732	Employment	Reasonably Foreseeable	GFA	1690	0	348	Sunderland 005
10	Sunderland	LMD 13	Philadelphia	433548	552558	Employment	Reasonably Foreseeable	HA	525	0	<Null>	
22	Sunderland	61	Former Lambton Cokeworks Site, Boundary Houses, Shiney Row	431983	551468	Housing	Near Certain	Housing	0	304	404	Sunderland 030
23	Sunderland	74	Murton Lane, Easington Lane, (G/H2)	436303	546455	Housing	Near Certain	Housing	0	321	415	Sunderland 030
32	Sunderland	364	Land South of Pattinson Road	431577	555336	Housing	Near Certain	Housing	0	117	429	Sunderland 032
205	Sunderland	NA1.2	Former Jennings car showroom	436954	558510	Retail	Reasonably Foreseeable	GFA	382	0	341	Sunderland 005
206	Sunderland	NA44	Sunderland retail park	439754	558170	Retail	Reasonably Foreseeable	GFA	605	0	351	Sunderland 006
207	Sunderland	HA23.1	Houghton Landfill (COU Ec Dev)	433931	550501	Employment	Reasonably Foreseeable	GFA	273	0	421	Sunderland 032
208	Sunderland	HA31	Former Houghton Colliery site	433954	550331	Retail	Reasonably Foreseeable	GFA	225	0	426	Sunderland 033
209	Sunderland	1	Three-storey office block	432526	548621	Office	Near Certain	GFA	240	0	443	Sunderland 036
210	Sunderland	2	Major retail development (Tesco	439702	558158	Retail	Near Certain	GFA	314	0	351	Sunderland 006
211	Sunderland	3	Retail development (Sainsbury's)*	436962	558533	Retail	Near Certain	GFA	382	0	341	Sunderland 005
217	South Tyneside	SS2-A-iii / SS4-C-iv / S	Land to west of Fowler Street	436545	567061	Mixed	Reasonably Foreseeable	HA	219	40	286	South Tyneside 002
222	South Tyneside	SS2-B-i, SS4-C-iii, SS5	Designated Riverside Regeneration Area (Harton Staithes, Holborn, Windm	435922	567060	Mixed	Reasonably Foreseeable	HA	1703	1050	289	South Tyneside 002
244	South Tyneside	J2-B-i, J4-B-vii *	Land at Mercantile Wharves, Priory Road / Curlew Road (potentially only 0.	433242	565662	Employment	Reasonably Foreseeable	HA	333	0	285	South Tyneside 007
254	South Tyneside	H2-A-i, H2-A-ii, H4, H	Hebburn shopping centre precincts and associated car parking and delivery	430867	564594	Mixed	Near Certain	HA	513	15	287	South Tyneside 010
259	South Tyneside	SA1-A-ii, SA5-B, SA6-	Trinity South, Frederick Street (Riverside Regeneration Area) (phases 1 and	436073	565996	Housing	Near Certain	Housing	0	222	291	South Tyneside 001
310	South Tyneside	SA3-B-i	Jarrow Staithes Green Business Park	431604	565742	Employment	Reasonably Foreseeable	HA	219	0	279	South Tyneside 010
357	South Tyneside	SA8-A	Cleadon Vale, Cleadon Park	437550	564240	Housing	Near Certain	Housing	0	169	333	South Tyneside 022
362	South Tyneside	SA9-A-i	Westoe Crown Village (former Westoe Colliery)	437407	567054	Housing	Near Certain	Housing	0	682	326	South Tyneside 004
370	South Tyneside	SA9-A-xiv	Harton Grange (former Harton & Westoe Collieries Welfare Ground)	436596	563899	Housing	Near Certain	Housing	0	126	320	South Tyneside 016
372	South Tyneside	SA9-A-xviii	Westfield, Orwell Close, Biddick Hall	435601	562887	Housing	Near Certain	Housing	0	103	335	South Tyneside 018
384	South Tyneside	SA9-A-xxx	Bedewell Industrial Estate, Adair Way (phase 1)	432138	564300	Housing	Reasonably Foreseeable	Housing	0	130	633	South Tyneside 009
388	South Tyneside	SA9-A-xxxv	Riverside Village (former VA Tech Reyrolle) (phase 1)	430307	565344	Housing	Reasonably Foreseeable	Housing	0	277	632	South Tyneside 009
389	South Tyneside	SA9-A-xxxvi	Hedgeley Court, Hedgeley Road (former Wailes Dove)	430967	564665	Housing	Reasonably Foreseeable	Housing	0	205	330	South Tyneside 020
390	South Tyneside	SA9-A-xxxviii	Land at Monkton Fell (north)	432090	562430	Housing	Near Certain	Housing	0	145	390	Sunderland 031
397	South Tyneside	SA9-B-viii	Bedewell Industrial Estate, Adair Way (phase 2)	432138	564300	Housing	Reasonably Foreseeable	Housing	0	139	279	South Tyneside 010
398	South Tyneside	SA9-B-xi	Riverside Village (former VA Tech Reyrolle) (phase 2)	430307	565344	Housing	Near Certain	Housing	0	154	306	South Tyneside 015
399	South Tyneside	SA9-B-xii	Land at Monkton Fell (central)	431850	562730	Housing	Near Certain	Housing	0	323	301	South Tyneside 002
420	North Tyneside	208	Earsdon View A	430969	572583	Housing	Near Certain	Housing	0	656	495	North Tyneside 007
421	North Tyneside	75	High Farm	428279	571602	Housing	Near Certain	Housing	0	919	112	North Tyneside 002
423	North Tyneside	113b	East Wideopen (northern)	425316	572952	Housing	Near Certain	Housing	0	107	122	North Tyneside 004
424	North Tyneside	279	Norgas House	427467	571487	Housing	Near Certain	Housing	0	121	113	North Tyneside 008
426	North Tyneside	113a	East Wideopen	423918	572343	Housing	Near Certain	Housing	0	330	508	North Tyneside 004
427	North Tyneside	72	Station Road (East)	429494	568405	Housing	Near Certain	Housing	0	650	103	North Tyneside 025
430	North Tyneside	210	Willington Quay	432360	566817	Housing	Near Certain	Housing	0	288	77	North Tyneside 028
431	North Tyneside	107	Scaffold Hill Farm	430217	569524	Housing	More than likely	Housing	0	450	99	North Tyneside 018
432	North Tyneside	69	Whitehouse Farm	426750	571158	Housing	More than likely	Housing	0	366	114	North Tyneside 008
433	North Tyneside	71	Station Road (West)	428705	568330	Housing	More than likely	Housing	0	450	107	North Tyneside 025
434	North Tyneside	94	Smith's Dock	435262	567517	Housing	More than likely	Housing	0	800	59	North Tyneside 027
435	North Tyneside	77	Shiremoor West (North)	430452	571143	Housing	More than likely	Housing	0	260	9	North Tyneside 011
437	North Tyneside	78	Wellfield	433414	572907	Housing	More than likely	Housing	0	200	497	North Tyneside 001
441	North Tyneside	074c	Killingworth Moor C	429701	570511	Housing	Hypothetical	Housing	0	653	105	North Tyneside 018
442	North Tyneside	65	Shiremoor West (South)	430452	571143	Housing	Reasonably foreseeable	Housing	0	590	9	North Tyneside 011
443	North Tyneside	68	Annitsford Farm	425966	573978	Housing	Reasonably foreseeable	Housing	0	400	123	North Tyneside 002
445	North Tyneside	63	West Chirton South	433356	568272	Housing	Reasonably foreseeable	Housing	0	420	29	North Tyneside 023
456	North Tyneside	288	Dock Road Industrial Estate	435262	567517	Housing	Reasonably foreseeable	Housing	0	128	59	North Tyneside 027
463	North Tyneside	379	Gosforth Business Park	422525	569699	Housing	Hypothetical	Housing	0	250	160	Newcastle upon Tyne 003
464	North Tyneside	153	BMX Track	428705	568330	Housing	Hypothetical	Housing	0	144	107	North Tyneside 025
465	North Tyneside	287	Bellway Industrial Estate	428884	569290	Housing	Hypothetical	Housing	0	200	106	North Tyneside 018
466	North Tyneside	278	Stephenson Industrial Estate West	426750	571158	Housing	Hypothetical	Housing	0	164	114	North Tyneside 008
467	North Tyneside	354	Harvey Comb, Killingworth	426750	571158	Housing	Hypothetical	Housing	0	140	114	North Tyneside 008
468	North Tyneside	074b	Killingworth Moor B	429701	570511	Housing	Hypothetical	Housing	0	830	105	North Tyneside 018
469	North Tyneside	074a	Killingworth Moor A	429061	571264	Housing	Hypothetical	Housing	0	538	110	North Tyneside 012
470	North Tyneside	076aii	Murton Aii	432958	570841	Housing	Hypothetical	Housing	0	572	11	North Tyneside 009
471	North Tyneside	076ai	Murton Ai	431869	570695	Housing	Hypothetical	Housing	0	436	10	North Tyneside 011
472	North Tyneside	37	Howdon Tip	432360	566817	Housing	Hypothetical	Housing	0	208	77	North Tyneside 028
473	North Tyneside	355	Tanners Bank West (N)	436006	568904	Housing	Hypothetical	Housing	0	109	64	North Tyneside 017

ArupID	Author	AuthRef	SiteNm	X	Y	Dev	Uncertainty	UnitDetail	Jobs	Houses	Zone	Tempro_Zone
474	North Tyneside	102a	Ice Rink, Football Ground and surround	435076	571435	Housing	Hypothetical	Housing	0	210	24	North Tyneside 009
475	North Tyneside	57	Balliol East	426525	569699	Housing	Hypothetical	Housing	0	583	135	North Tyneside 019
476	North Tyneside	103	Tynemouth Golf Course	436108	569986	Housing	Hypothetical	Housing	0	806	66	North Tyneside 017
477	North Tyneside	110	A19 Corridor 3	429519	571972	Housing	Hypothetical	Housing	0	348	496	North Tyneside 007
478	North Tyneside	076c	Murton C	432958	570841	Housing	Hypothetical	Housing	0	778	11	North Tyneside 009
479	North Tyneside	076b	Murton B	432958	570841	Housing	Hypothetical	Housing	0	1081	11	North Tyneside 009
480	North Tyneside	076f	Murton F	432958	570841	Housing	Hypothetical	Housing	0	815	11	North Tyneside 009
481	North Tyneside	076e	Murton E	432958	570841	Housing	Hypothetical	Housing	0	1013	11	North Tyneside 009
482	North Tyneside	286	North Tyne Industrial Estate	429348	569804	Housing	Hypothetical	Housing	0	495	104	North Tyneside 018
483	North Tyneside	108	A19 Corridor 1	429701	570511	Housing	Hypothetical	Housing	0	1427	105	North Tyneside 018
485	North Tyneside	076d	Murton D	432958	570841	Housing	Hypothetical	Housing	0	655	11	North Tyneside 009
486	North Tyneside	27	Battle Hill Playing Fields	430964	567604	Housing	Hypothetical	Housing	0	146	76	North Tyneside 029
488	North Tyneside	35	Land East of Preston North Road	435413	570629	Housing	Hypothetical	Housing	0	200	65	North Tyneside 010
489	North Tyneside	36	Land West of St Peter's Road	430964	567604	Housing	Hypothetical	Housing	0	151	76	North Tyneside 029
490	North Tyneside	331	Longbenton Foods	426525	569699	Housing	Hypothetical	Housing	0	128	135	North Tyneside 019
673	North Tyneside	E2	Cobalt Business Park (north)	431777	569318	Employment	Near Certain	GFA	1372	0	3	North Tyneside 015
674	North Tyneside	E3	Cobalt Business Park (south)	431777	569318	Employment	Near Certain	GFA	473	0	3	North Tyneside 015
675	North Tyneside	E4	Amtel Building	431777	569318	Employment	Near Certain	GFA	1017	0	3	North Tyneside 015
677	North Tyneside	0	Cobalt Business Park (north)	431407	569927	Employment	Near Certain	GFA	338	0	6	North Tyneside 011
678	North Tyneside	0	Cobalt Business Park (south)	431407	569927	Employment	Near Certain	GFA	796	0	6	North Tyneside 011
691	North Tyneside	NT031	Balliol Business Park East	427848	568269	Employment	Reasonably Foreseeable	GFA	802	0	125	North Tyneside 018
695	North Tyneside	NT064	East Howdon	430192	566018	Employment	Reasonably Foreseeable	GFA	337	0	85	North Tyneside 030
696	North Tyneside	NT053	Esso	427848	568269	Employment	Reasonably Foreseeable	GFA	386	0	125	North Tyneside 018
702	North Tyneside	NT046	North Bank (Swan Hunters)	430807	566201	Employment	Reasonably Foreseeable	GFA	413	0	82	North Tyneside 029
706	North Tyneside	NT001	Tyne Tunnel Trading Estate Ltd	432836	568010	Employment	Reasonably Foreseeable	GFA	208	0	28	North Tyneside 023
713	North Tyneside	LEPEZA	Royal Quays	434762	566669	Employment	Reasonably Foreseeable	HA	1698	0	58	North Tyneside 027
714	North Tyneside	LEPEZB	Swan Hunter	430807	566201	Employment	Reasonably Foreseeable	HA	753	0	82	North Tyneside 029
715	Newcastle/Gateshaed	New_Gate1	Great Park (housing)	422747	571281	Housing	Near Certain	Housing	0	1200	512	Newcastle upon Tyne 001
716	Newcastle/Gateshaed	New_Gate1a	Great Park (housing)	422747	571281	Housing	Reasonably Foreseeable	Housing	0	1900	512	Newcastle upon Tyne 001
717	Newcastle/Gateshaed	New_Gate2	Dinnington (housing)	421165	573849	Housing	Reasonably Foreseeable	Housing	0	250	526	Newcastle upon Tyne 001
718	Newcastle/Gateshaed	New_Gate3	Throckley (housing)	415409	566447	Housing	Reasonably Foreseeable	Housing	0	550	554	Newcastle upon Tyne 014
719	Newcastle/Gateshaed	New_Gate4	Hazelrigg and Wideopen (housing)	421165	573849	Housing	Reasonably Foreseeable	Housing	0	500	526	Newcastle upon Tyne 001
720	Newcastle/Gateshaed	New_Gate5	Newbiggin Hall (housing)	420595	567651	Housing	Reasonably Foreseeable	Housing	0	300	522	Newcastle upon Tyne 004
721	Newcastle/Gateshaed	New_Gate6	Kingston Park/ Kenton Bankfoot (housing)	420785	570030	Housing	Reasonably Foreseeable	Housing	0	800	521	Newcastle upon Tyne 004
722	Newcastle/Gateshaed	New_Gate7	Lower, Middle and Upper Callerton (housing)	418334	567659	Housing	Reasonably Foreseeable	Housing	0	1000	538	Newcastle upon Tyne 031
723	Newcastle/Gateshaed	New_Gate8	Newburn	418380	564278	Housing	Reasonably Foreseeable	Housing	0	500	543	Newcastle upon Tyne 021
724	Newcastle/Gateshaed	New_Gate9	Central (housing)	424703	563812	Housing	Reasonably Foreseeable	Housing	0	160	203	Newcastle upon Tyne 024
725	Newcastle/Gateshaed	New_Gate10	Newcastle International Airport (airport & general employment)	419794	571175	Employment	Reasonably Foreseeable	Jobs	2188	0	533	Newcastle upon Tyne 004
727	Newcastle/Gateshaed	New_Gate12	Stephenson Quarter (offices)	424703	563812	Office	Near Certain	Jobs	278	0	203	Newcastle upon Tyne 024
728	Newcastle/Gateshaed	New_Gate13	Discovery (offices / leisure / residential)	424044	564193	Mixed	Reasonably Foreseeable	Jobs	200	1150	208	Newcastle upon Tyne 024
729	Newcastle/Gateshaed	New_Gate14	Science Central (research / offices / residential student)	424044	564193	Mixed	Reasonably Foreseeable	Jobs	200	600	208	Newcastle upon Tyne 024
730	Newcastle/Gateshaed	New_Gate15	Civic (education / health / residential student)	424043	564765	Mixed	Reasonably Foreseeable	Jobs	50	1215	206	Newcastle upon Tyne 024
731	Newcastle/Gateshaed	New_Gate16	East Pilgrim Street (retail / offices / residential student)	425024	564168	Mixed	Reasonably Foreseeable	HA	188	500	198	Newcastle upon Tyne 024
732	Newcastle/Gateshaed	New_Gate17	Gallowgate (offices)	424677	564930	Office	Reasonably Foreseeable	Jobs	278	0	197	Newcastle upon Tyne 024
733	Newcastle/Gateshaed	New_Gate18	Quayside and Ouseburn (housing / culture / tourism)	426190	564204	Mixed	Reasonably Foreseeable	Jobs	90	1036	187	Newcastle upon Tyne 023
734	Newcastle/Gateshaed	LEPEZC	Neptune Yard	429730	564855	Employment	Reasonably Foreseeable	Jobs	805	0	128	Newcastle upon Tyne 030
735	Newcastle/Gateshaed	G358	H3.62 Northside, Birtley	427684	556535	Housing	Near Certain	Housing	0	475	393	Gateshead 025
736	Newcastle/Gateshaed	G74	Former Freight Depot site	426276	563068	Housing	More than Likely	Housing	0	357	217	Gateshead 027
737	Newcastle/Gateshaed	G181	BAE Systems	426749	556063	Housing	Near Certain	Housing	0	289	393	Gateshead 025
738	Newcastle/Gateshaed	G267	Chopwell Heartlands Site	411995	558072	Housing	Reasonably Foreseeable	Housing	0	287	451	Gateshead 024
739	Newcastle/Gateshaed	G1	Brandling Village	427580	562356	Housing	More than Likely	Housing	0	240	239	Gateshead 012
740	Newcastle/Gateshaed	G191a	Baltic Business Quarter	426145	563616	Housing	Reasonably Foreseeable	Housing	0	200	219	Gateshead 027
741	Newcastle/Gateshaed	GN39	Bleach Green Clearance Site	418615	562998	Housing	Reasonably Foreseeable	Housing	0	184	406	Gateshead 004
742	Newcastle/Gateshaed	0	Ochre Yards, Rabbit Banks Rd.	425124	563365	Housing	Near Certain	Housing	0	182	226	Gateshead 027
743	Newcastle/Gateshaed	G113	MU14 - Gateshead College, Durham Rd, Shipcote	425682	561307	Housing	Near Certain	Housing	0	175	231	Gateshead 010
744	Newcastle/Gateshaed	G34	Beacon Lough East Joint Venture Site	427421	559736	Housing	Reasonably Foreseeable	Housing	0	174	251	Gateshead 023
745	Newcastle/Gateshaed	GN27	Clasper Village	424562	562817	Housing	Reasonably Foreseeable	Housing	0	173	230	Gateshead 007
746	Newcastle/Gateshaed	0	Land North of Sunderland Road	426769	562395	Housing	Near Certain	Housing	0	160	218	Gateshead 003

ArupID	Author	AuthRef	SiteNm	X	Y	Dev	Uncertainty	UnitDetail	Jobs	Houses	Zone	Tempro_Zone
747	Newcastle/Gateshaed	0	Staiths South Bank	424231	562645	Housing	Near Certain	Housing	0	126	230	Gateshead 007
748	Newcastle/Gateshaed	G350	Site 1 New Chandless	425974	563058	Housing	Reasonably Foreseeable	Housing	0	124	221	Gateshead 027
749	Newcastle/Gateshaed	G362	MU 9 Hawks Rd / South Shore Rd	425727	563753	Housing	More than Likely	Housing	0	120	220	Gateshead 027
750	Newcastle/Gateshaed	G349	Site 2 New Chandless	425965	562870	Housing	Reasonably Foreseeable	Housing	0	109	221	Gateshead 027
751	Newcastle/Gateshaed	G5	Elisabethville, Elisabeth Avenue, Birtley	426786	556548	Housing	More than Likely	Housing	0	109	393	Gateshead 025
752	Newcastle/Gateshaed	G12	Dixon Street	424388	562149	Housing	More than Likely	Housing	0	106	232	Gateshead 007
753	Newcastle/Gateshaed	G54	Saltwell Road West - Clearance Macadam	424738	561638	Housing	More than Likely	Housing	0	104	231	Gateshead 010
762	Sunderland	IAMP1	IAMPONE	434166	559335	Employment	Near Certain	Jobs	3100	0	249	Sunderland 007
763	Sunderland	IAMP2	IAMPTWO	434166	559335	Employment	More than Likely	Jobs	3345	0	249	Sunderland 007
764	Sunderland	IAMP2	IAMPTWO	434166	559335	Office	More than Likely	Jobs	1397	0	249	Sunderland 007
772	North Tyneside	35 - 41	Murton Ai, Murton South West	433612	570354	Housing	Hypothetical	Housing	0	2800		
828	South Tyneside	H21	Bedewell Industrial Estate and disused playing fields, Adair Way / Red Hous	432121	564472	Housing	Near Certain	Housing	0	335	655	South Tyneside 009
829	South Tyneside	JA1	Port of Tyne, Jarrow Road, South Shields	435540	565043	Employment	Near Certain	Jobs	469	0	292	South Tyneside 012
833	Sunderland	294	Paper Mill, Commercial Road	440980	554956	Housing	Near Certain	Housing	0	425	383	Sunderland 024
835	Sunderland	293	Low Moorsley, land at (Ennerdale Street)	434512	546297	Housing	Near Certain	Housing	0	600	443	Sunderland 036
837	Sunderland	77	North of Blackthorn Way (1)	432333	550664	Employment	Hypothetical	Jobs	222	0		
838	Sunderland	81	South of Cygnet Way (5)	433372	548579	Employment	Hypothetical	Jobs	277	0		
839	Sunderland	2	Prospect Road (2)	440849	557286	Employment	Hypothetical	Jobs	217	0		
840	Sunderland	2	Disused Hendon railway sidings, Moor Terrace	440944	556904	Employment	Hypothetical	Jobs	256	0		
841	Sunderland	27	Sea View/Stockton Road, Ryhope	441104	552035	Employment	Hypothetical	Jobs	910	0		
842	Sunderland	0	Biffa landfill site	434038	550594	Employment	Hypothetical	Jobs	258	0		
844	Sunderland	477	Land north of Burdon Lane	0	0	Housing	Reasonably Forseeable	Housing	0	955	385	Sunderland 027
845	Sunderland	62	Ryhope and Cherry Knowles Hospital	0	0	Housing	More than Likely	Housing	0	800	389	Sunderland 028
846	Sunderland	81	Chapelgarth site	0	0	Housing	Near Certain	Housing	0	750	387	Sunderland 031
847	Sunderland	85	Former Groves Site, Woodbine Terrace, Pallion	0	0	Housing	Reasonably Forseeable	Housing	0	700	343	Sunderland 012
848	Sunderland	454	Teal Farm North	0	0	Housing	Near Certain	Housing	0	181	267	Sunderland 017
849	Sunderland	107	Phases 2-6, Chester Road	0	0	Housing	Reasonably Forseeable	Housing	0	500	354	Sunderland 021
850	Sunderland	330A	Philadelphia Complex	0	0	Housing	Near Certain	Housing	0	500	413	Sunderland 032
851	Sunderland	426A	Willow Farm land to south, Ryhope (North)	0	0	Housing	More than Likely	Housing	0	450	389	Sunderland 028
853	Sunderland	61	Former Lambton Cokeworks Site (Elba Park)	0	0	Housing	Near Certain	Housing	0	141	415	Sunderland 030
854	Sunderland	138	North Road, land at	0	0	Housing	More than Likely	Housing	0	300	443	Sunderland 036
855	Sunderland	106	High Ford Estate, Flodden Road	0	0	Housing	Near Certain	Housing	0	233	345	Sunderland 014
856	Sunderland	413	Seaburn Amusements, Whitburn Road	0	0	Housing	More than Likely	Housing	0	279	344	Sunderland 002
857	Sunderland	417	Heritage Green - Rear of Bee Hive Pub, Coaley Lane	0	0	Housing	Near Certain	Housing	0	272	415	Sunderland 030
858	Sunderland	342	Land at Mill Hill, Silksworth Road	0	0	Housing	More than Likely	Housing	0	250	387	Sunderland 031
860	Sunderland	63	Vaux Brewery (site of), Gill Bridge Avenue	0	0	Housing	Near Certain	Housing	0	201	350	Sunderland 013
861	Sunderland	177	Former Usworth Comprehensive School	0	0	Housing	Reasonably Forseeable	Housing	0	200	250	Sunderland 007
863	Sunderland	505	Doxford park Phase 5	0	0	Housing	Near Certain	Housing	0	115	387	Sunderland 031
864	Sunderland	355	Rushford Phase 2, Ryhope	0	0	Housing	Near Certain	Housing	0	112	389	Sunderland 028
865	Sunderland	128	Black Boy Road land at (site A)	0	0	Housing	Reasonably Forseeable	Housing	0	140	428	Sunderland 033
866	Sunderland	154A	Seaburn Camp, Whitburn Road (North)	0	0	Housing	Reasonably Forseeable	Housing	0	140	344	Sunderland 002
867	Sunderland	565	Phoneix Tower Business Park, Castletown Way	0	0	Housing	Near Certain	Housing	0	140	341	Sunderland 005
868	Sunderland	194	Lambton Lane, land at	0	0	Housing	More than Likely	Housing	0	139	428	Sunderland 033
869	Sunderland	93	Recreation Field, North Moor Lane, Farringdon	0	0	Housing	Reasonably Forseeable	Housing	0	138	381	Sunderland 026
870	Sunderland	468	Land north of Blackthorn Way, Sedgeletch Industrial Estate	0	0	Housing	More than Likely	Housing	0	138	428	Sunderland 033
871	Sunderland	112	Site of former Broomhill Estate.	0	0	Housing	Near Certain	Housing	0	128	429	Sunderland 032
872	Sunderland	367	Coaley Lane, Land south of	0	0	Housing	More than Likely	Housing	0	128	426	Sunderland 033
873	Sunderland	280	Former Shiney Row Centre, Success Road	0	0	Housing	Near Certain	Housing	0	113	415	Sunderland 030
874	Sunderland	328	Hetton Downs Phase 2	0	0	Housing	Reasonably Forseeable	Housing	0	125	429	Sunderland 032
876	Sunderland	172	Forest Estate, Land at - High Street	0	0	Housing	Reasonably Forseeable	Housing	0	121	445	Sunderland 036
877	Sunderland	104	Carley Hill School, Emsworth Road	0	0	Housing	Reasonably Forseeable	Housing	0	110	342	Sunderland 005
878	Sunderland	356	Burdon Road/Hall Farm Road, land at	0	0	Housing	More than Likely	Housing	0	109	390	Sunderland 031
879	Sunderland	197	Land to the east of former Broomhill estate	0	0	Housing	Near Certain	Housing	0	102	429	Sunderland 032
882	South Tyneside	H26	St Aloysius View	430314	564440	Housing	Near Certain	Housing	0	134	320	South Tyneside 016
883	South Tyneside	H38	Victoria Road West	430475	563007	Housing	Near Certain	Housing	0	118	328	South Tyneside 013
884	South Tyneside	H29	Monkton Lane/Lukes Lane	431839	562754	Housing	Near Certain	Housing	0	465	315	South Tyneside 011
885	South Tyneside	OSS50	Eldon St	435999	566087	Housing	Near Certain	Housing	0	222	289	South Tyneside 002
886	South Tyneside	OSS46	King George Road/Redwood Avenue	437667	563893	Housing	Near Certain	Housing	0	456	304	South Tyneside 012

ArupID	Author	AuthRef	SiteNm	X	Y	Dev	Uncertainty	UnitDetail	Jobs	Houses	Zone	Tempro_Zone
887	South Tyneside	OSS41	Orwell Close	435584	562809	Housing	Near Certain	Housing	0	148	632	South Tyneside 009
888	South Tyneside	JA1	Ebchester Street	435241	564063	Housing	Near Certain	Housing	0	122	632	South Tyneside 009
889	Sunderland	15/00039/FU4	Land @ Hilthorne Farm - Vantec	0	0	Employment	Near Certain	Jobs	107	0	664	Sunderland 007
890	Sunderland	17/02085/MW4	Land @ Hilthorne Farm - Renewable Energy Centre	0	0	Employment	Near Certain	Jobs	19	0	664	Sunderland 007
891	Sunderland		Turbine Park - Unoccupied Land	0	0	Employment	Near Certain	Jobs	107	0	664	Sunderland 007