Mid Devon Local Plan Review

Assessment of Highway Options to Accommodate Potential Developments

V10

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Executive Summary

This report presents the result of assessments undertaken by Devon County Council to understand the potential traffic impacts of various development options in Mid Devon.

Specifically, the options assessed were presented in the Local Plan Review consultation, which was published by Mid Devon District Council in January 2014. This seeks to identify land for further development opportunities in the district, extending the Local Plan timescale from 2026 up to 2033.

In particular, the Mid Devon consultation document considered three different development options:

- Option 1: Expansion of existing towns
- Option 2a: new community at Willand / J27
- Option 2b: new community at East of Cullompton

These options have been refined in accordance with discussions with Mid Devon District Council and as more information has become available from the promoters of various sites. The final detailed development scenarios that have been assessed are set out in the table below:

Option 1: Expansion of existing towns	**Dwellings**	**Gross commercial floorspace (m²)**
Scenario 1 - expansion at Tiverton	3,600	49,000
Scenario 2 - expansion at Cullompton	2,400	46,700
Option 2a: Willand / J27 new community	**Dwellings**	**Gross commercial floorspace (m²)**
Scenario 3	0	139,896*
Scenario 4	0	54,000
Scenario 5	3,000	139,896*
Scenario 6	3,000	54,000
Option 2b: East of Cullompton new community	**Dwellings**	**Gross commercial floorspace (m²)**
Scenario 7	0	32,400
Scenario 8	0	54,000
Scenario 9	2600	32,400
Scenario 10	3000	54,000

*This is equivalent the level of development proposed for the Westwood commercial site in the developers 'trip generation technical note'.

Scenarios 1, 3, 5, 9 and 10 have been focussed upon as these represent the worst case scenarios in each of the locations being considered for development.

The assessment takes account of existing allocations, which are already allocated in the current Mid Devon Local Plan, specifically the allocations and infrastructure document which was adopted in 20102.

Taking a sequential approach, the amount of traffic generated by the different development scenarios has been calculated based on trip rates from the TRICS database, based on a land use mix which has been provided either by promoters of sites or by Mid Devon District Council.

This traffic produced as a result of these developments is then applied or 'assigned' to the transport network so that its impacts on existing roads and junctions can be modelled using a traffic model. The process being that the new development is added into the traffic model and the impacts of this in terms of creating queues and affecting capacity at key points on the network can be understood. Including new junctions or roads into the model provides a basis for testing the suitability of these and how they might improve the transport network, to accommodate the impacts of new development.

The County Council has used various traffic models to assess the impacts of the development options on the transport network and whether these are acceptable generally in terms of transport capacity - and if not, what interventions may be appropriate.

Following this, consideration of the deliverability of the options has also been undertaken, to ensure that any schemes promoted are achievable. This takes into account the physical engineering and associated cost of constructing the transport interventions, and the potential human and environmental impacts of doing so. The results of the assessments are summarised below:

Option 1: Expansion of new towns

Tiverton

Under this option, the expansion of Tiverton is proposed by Mid Devon District Council to take place largely through an extension of the Eastern Urban Extension, in an area known as Hartnoll Farm. In order to deliver this allocation with acceptable highways impacts, it is anticipated that a new route, linking Blundell's road to Heathcoat Way through land owned by Blundell's School will be necessary. There are various options for this and if pursued, further engagement with landowners and the public will be necessary.

Cullompton

The development sites proposed in Cullompton under this option have not specifically been assessed in this report, due to the fact that the development proposed for Cullompton under option 2b would have worse implications for traffic and this has therefore been the focus of the assessment.

Option 2a: new community at Willand / J27

[2] http://www.middevon.gov.uk/CHttpHandler.ashx?id=15292&p=0

The assessment has focussed on the proposal to develop a significant commercial area at junction 27 / Willand known as Westwood. The strategic importance of junction 27 in terms of providing access to northern Devon means that congestion here is far less acceptable than at other parts of the network.

The assessments undertaken by Devon County Council for the summer peak period show that improvements will be required before junction 27 could accommodate the traffic from the proposed commercial development. The improvements likely to be required include full signalisation, with the northern bridge widened to 4 lanes and improvements to all 4 slip roads. It may also be the case that a new segregated left turn lane from the A361 to the M5 northbound is required as well as widening of the railway bridge but this would be difficult and requires the input of Network Rail.

The County Council has also assessed the impacts of housing development at this location. The improvements set out above would not accommodate additional traffic from residential development built alongside the commercial. To accommodate this, it is likely that a new junction onto the M5 will be required, along with the improvements to J27 set out above.

Option 2b: new community East of Cullompton

Several schemes have been considered in order to assess how a new community to the east of the M5 at Cullompton could be accommodated on the strategic road network. These include improvement of the existing junction 28, provision of a new segregated bridge over the M5 (without connecting to the motorway) and the provision of a new motorway junction with south-facing slip roads just north of the existing Duke Street Bridge which travels over the railway and motorway.

Of these, the new M5 junction north of Duke Street Bridge provides the greatest capacity. However, the impacts on this scheme on the town centre are yet to be considered and there remain significant question marks around the deliverability of the scheme.

In addition, pursuing a new junction would also bring about a change in strategy and would reduce the case for an Eastern Relief Road, which was a transport solution previously favoured to accommodate development up to 2026.

Contents

List of Tables

List of Figures

Glossary

DCC	Devon County Council
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
ERR	Eastern Relief Road
EUE	Eastern Urban Extension
FRA	Flood Risk Assessment
HA	Highways Agency
HGV	Heavy Goods Vehicle
J27	M5 Junction 27
J27A	M5 Junction 27A
J28	M5 Junction 28
J28A	M5 Junction 28A
MDDC	Mid Devon District Council
NDLR	A361 North Devon Link Road
SLTL	Segregated Left Turn Lane
SSSI	Site of Special Scientific Interest

1. Introduction

1.1. Aim of Report

1.1.1. This technical report summarises the findings of a joint study carried out between Devon County Council and the Highways Agency. The study identifies and evaluates the transportation impacts of different development options in Mid Devon. It takes account of the cumulative impact of previously identified strategic development proposals in the Mid Devon Local Development Framework: Allocations and Infrastructure Development Plan Document up to the end of 2026, and extends this assessment to consider growth up to 2033. The study then considers the highway improvement scheme concepts that are suitable to mitigate the additional travel demand at strategic access points onto / from the M5 Motorway.

1.1.2. Mid Devon District Council produced a Local Plan Review Options Consultation document in January 2014. This considers growth beyond the timescale of adopted plans from 2026 to 2033. The review considers both the amount and location of growth. Within the review consultation, three options concerning where to locate future development within the district were proposed. These were:

1. Expand the existing market towns
2a. New Community between Willand and J27
2b. New Community east of M5 at Cullompton

1.1.3. These options are discussed in more detail below.

1.2. Option 1: Expand Existing Towns

1.2.1. Under this option, development would be concentrated at Tiverton, Cullompton and Crediton, to a scale and mix appropriate to their individual infrastructures, characters and constraints. Other settlements would have more limited development which meets local needs and promotes vibrant rural communities.

1.2.2. The development levels for this option are shown in Table 1 below. Maps showing the potential development sites in the towns and villages are included in the MDDC options consultation for the Local Plan Review.

1.2.3. The numbers in brackets represent the level of development allocated in the current Local Plan (up to 2026) without planning permission. It may be noted that the currently adopted commercial requirement exceeds that which is proposed in the new plan. This is because these previously adopted totals were considered to be over-ambitious and undeliverable within the areas allocated - largely due to capacity constraints which were realised post-adoption.

Location	Residential (Dwellings)	Commercial (m²)
Tiverton	3,600 (2,223)	49,000 (130,500)
Cullompton	2,400 (1,527)	46,700 (55,000)
Crediton	800 (298)	5,300 (6,500)
Rural Areas	1,600 (192)	53,000 (8,300)
Total	**8,400 (4,240)**	**154,000 (200,300)**

Table 1: Option 1 Development Levels

1.3. Option 2: New Community

1.3.1. The second option is for a new community east of the M5, either at Willand/J27 or to the east of Cullompton. It was proposed in the January 2014 Local Plan Review consultation that this will only come forward after the expansion of the current towns up to 5,460 dwellings or 1st April 2026, whichever is sooner.

1.3.2. Table 2 below details the location of development under this option, with maps showing the exact locations in **Error! Reference source not found.** to 3.

Location	Residential (Dwellings)	Gross commercial floorspace (m^2)
Tiverton	2,340 (2,223)	31,800 (130,500)
Cullompton	1,560 (1,527)	30,400 (55,000)
Crediton	520 (298)	3,400 (6,500)
Rural Areas	1,040 (192)	34,400 (8,300)
New Community at either Willand/J27 or East of Cullompton	2,940	54,000
Total	**8,400**	**154,000**

Table 2: Option 2 Development Levels

1.3.1. Since the Local Plan options consultation, further assessment has indicated that the area of developable land in both locations (Willand/J27 and East of Cullompton) has changed and therefore the development amounts set out above are not the most up-to-date. In particular, it is anticipated that the number of dwellings that can be accommodated east of Cullompton is only 2,600 rather than 2,940. The levels of commercial development considered achievable at either of the new community options have also changed.

1.3.2. Based upon a transport trip generation technical note produced on behalf of the developers of the J27 option, this scheme would include a large commercial development known as the Westwood development. This would include approximately 139,896m^2 of commercial development, the mixes of which are set out below in Table 4.

1.3.3. At the East of Cullompton new community option, the amount of commercial development has been reduced from the 54,000m^2 in the options consultation to account for the available land in this area, to 32,400m^2 gross commercial floorspace.

1.3.4. In order to ensure that the study assesses the possible strategic development options, it was agreed with MDDC that the options, as shown in Table 3 below, could be modelled. This report focuses on scenario 1 for the expansion of existing towns option, scenarios 3 and 5 for J27/Willand option and scenarios 9 and 10 for East of Cullompton option. These scenarios include the greatest amount of development and therefore represent the 'worst case' for transport modelling.

Expansion of existing towns	Dwellings	Gross commercial floorspace (m²)
Scenario 1 - expansion at Tiverton	3,600	49,000
Scenario 2 - expansion at Cullompton	2,400	46,700
Willand / J27 new community	**Dwellings**	**Gross commercial floorspace (m²)**
Scenario 3	0	139,896*
Scenario 4	0	54,000
Scenario 5	3,000	139,896*
Scenario 6	3,000	54,000
East of Cullompton new community	**Dwellings**	**Gross commercial floorspace (m²)**
Scenario 7	0	32,400
Scenario 8	0	54,000
Scenario 9	2600	32,400
Scenario 10	3000	54,000

Table 3: Development Scenarios

1.3.5. In order to properly assess impacts, the commercial development has been broken down into different land uses. For the Westwood development (at Junction 27) this has been taken from the trip generation technical note produced by the developers transport consultants dated 30th May 2014 and is outlined in Table 4 below[4].

*This is equivalent the level of development proposed for the Westwood commercial site in the developers 'trip generation technical note'.

[4] This is the level of development proposed at the time the modelling was carried out. Since then, the developers have submitted an updated breakdown with minor changes to the levels stated here, but these updates have not been included in the modelling process.

Land Use	Floorspace	Units
Intermodal traveller services	21,000	sq ft
Regional Showcase Visitor Centre	21,000	sq ft
Taste of Devon	125,000	Sq ft
Devon outdoor leisure destination	13	ha
Hotel	150	rooms
Conference Centre	60,000	sq ft
Outdoor Activity Sport / Retail Experience	90,000	sq ft
Cinema IMAX	50,000	sq ft
Plant / Horticultural Centre	50,000	sq ft
Designer Retail Outlet	200,000	sq ft
Commercial Zone	900,000	sq ft

Table 4: Westwood Development Commercial Area

1.3.6. The specific land use for the commercial site at East of Cullompton is not known at the time of writing this report, nor is the specific land use mix known for the commercial development at Junction 27 if this only goes to 54,000m^2. For this reason, an indicative breakdown of potential land use mix has been provided by MDDC, based on site coverage and floorspace assumptions as set out in the MDDC Viability Assessment. This is shown in Table 5 below. Whilst this table shows the commercial land use mix of 32,400m^2 at East of Cullompton the assessment for 54,000m² at Junction 27 utilises the same proportions of development featured in Table 5 below.

Uses	Use	Gross commercial floorspace (m²)
A1	Convenience stores	600
A3	Cafes/restaurants	500
A4	Pub	400
B1	Offices	16,800
C1	Hotel	5,600
C2	Care home	3,000
D2	Cinema	5,000
D1	Pre-school	500
Total		32,400

Table 5: Other Commercial Sites Area

1.4. Report Layout

1.4.1. This report has been structured to reflect the process undertaken to evaluate the transportation impacts of the development options outlined above. It is structured as follows:

- **Section 2: Strategic Objectives and Priorities** – this section sets the objectives of the study which accord with the strategic priorities.
- **Section 3: Trip Generation** – this section details the level of each type of development assumed and the associated trip rates.
- **Section 4: Trip Distribution** – this section explains the assumptions used to distribute the traffic generated by the proposed developments.
- **Section 5: Trip Assignment** – this section identifies how the trips were assigned to different routes on the network and predict where congestion is likely to occur.
- **Section 6: Improvement Options** – this section outlines the options tested to accommodate the proposed development sites and why some options are not appropriate for mitigating the impacts of the development.
- **Section 7: Conclusion** – this section suggests the preferred option(s) for each of the development options.

2. Strategic Objectives and Priorities

2.1. Historical Transport Strategy

2.1.1. Devon County Council has previously worked closely with Mid Devon District Council to establish the highway infrastructure required to accommodate the development proposed in the current Local Plan, up until 2026. This includes:

Tiverton:

- **A361 Junction** – a new junction onto the A361 to access the Tiverton Eastern Urban Extension (EUE) development. Planning permission for this is currently being sought.
- **Improvements to M5 Junction 27** – widening of the circulatory and southbound off-slip to three lanes and signalising the M5 off-slip approaches to the roundabout. Work on this will commence in autumn 2014.

Cullompton:

- **Eastern Relief Road** – A new road linking Station Road to Meadow Lane to bypass the congestion in the town centre. A Flood Risk Assessment for this scheme is currently in progress.
- **Improvements to M5 Junction 28** – Widening of the northbound M5 off-slip to two lanes has already been completed. Widening of the Honiton Road approach and signalisation of the eastern junction are to commence in autumn 2014.

Crediton

- **Crediton Link Road** – A new road linking the A377 to Lords Meadow Industrial Estate to bypass congestion issues for HGVs on the existing A377 and Exeter Hill.

2.1.2. While prioritising the development of sustainable travel modes, it is recognised that the current strategy (to 2026) requires the provision of new highway infrastructure. In future, all development in the district will have to demonstrate that sustainable travel modes have been promoted. However, it is anticipated that despite this promotion, the traffic growth from the new development would create an unacceptable level of detrimental impact, and thus highway infrastructure improvements will be needed.

2.1.3. The following chapters in this report will assess the trip generation, distribution and impact on the network for each of the development options and determine the possible infrastructure improvements that can mitigate the additional traffic demands.

2.2. Assessment Methodology

2.2.1. The infrastructure assessment will be undertaken in two parts. Firstly, the forecast travel demand will be calculated based on the development levels outlined in the Local Plan Review Options Consultation (published January 2014) and subsequently updated by MDDC (see Table 3 above). The second stage will identify possible schemes that could provide additional capacity to accommodate the traffic demand.

2.2.2. This assessment will consider the following aspects:

- **Traffic Forecast** – Trip rates, generation, background growth, distribution and assignment
- **Scheme Concepts**
- **Engineering** – Buildability and deliverability
- **Integration**
- **Strategic Context**
- **Environmental Impacts**
- **Junction Capacity Assessments**
- **Slip Road Capacity Assessments**

2.2.3. Traffic forecasts are estimated for a future year of 2033 (end of the Local Plan Review plan period) for a typical AM (08:00 – 09:00) and PM (17:00 – 18:00).

2.2.4. J27 connects the M5 to the A361 North Devon Link Road (NDLR) and is a junction with high strategic importance. For this reason, a summer assessment of this junction will be carried out because this junction needs to work at the busiest times of year as well as the traditional peak periods.

2.2.5. DCC have recently commissioned updated traffic counts to be undertaken at J27 in order to ascertain the most up-to-date traffic demand patterns at this junction. A count was carried out on Friday 8th August to give an indication of the summer peak demand and another neutral weekday count will follow in September.

3. Trip Generation

3.1. Trip Rates

3.1.1. The trip rates for the housing and commercial land uses considered in this report are shown in Table 6 below and are taken from the TRICS[5] database.

Land Use	TRICS Category	Trip Rate value per	AM (08:00 - 09:00)		PM (17:00 - 18:00)	
			Arr	Dep	Arr	Dep
Intermodal traveller services	Motorway Services	100 sqm	5.542	5.197	5.592	5.896
Regional Showcase Visitor Centre	Exhibition Centre	100 sqm	0.807	0.122	0.203	0.777
Taste of Devon	Supermarket	100 sqm	2.541	1.843	4.805	5.024
	Retail Park inc Food	100 sqm	1.124	0.614	3.274	3.328
Devon outdoor leisure destination	Country Park	hectare	0.092	0.055	0.088	0.197
Hotel	Hotel	bedroom	0.112	0.158	0.147	0.114
		100 sqm	0.366	0.494	0.387	0.274
Conference Centre	Exhibition Centre	100 sqm	0.807	0.122	0.203	0.777
Outdoor Activity Sport / Retail Experience	Retail Park exc Food	100 sqm	0.555	0.257	1.208	1.340
Cinema IMAX	Multiplex Cinema	100 sqm	0.000	0.000	0.991	0.783
Plant / Horticultural Centre	Garden Centre	100 sqm	0.484	0.130	0.389	0.862
Designer Retail Outlet	Factory Outlet Centres	100 sqm	0.509	0.112	0.608	1.584
Commercial Zone	Warehousing Commercial	100 sqm	0.060	0.046	0.032	0.075
Retirement Village	Retirement Flats	dwelling	0.063	0.053	0.047	0.060
Residential	Private Housing	dwelling	0.163	0.434	0.410	0.247
Employment	Business Park	100 sqm	1.399	0.280	0.194	1.147
Convenience stores	Convenience Store	100 sqm	7.982	8.060	9.758	9.326
Cafes/restaurants	Restaurant	100 sqm	0.000	0.000	4.867	5.605
Pub	Pub/restaurant	100 sqm	0.000	0.000	2.869	5.145
Care home	Care Home	unit	0.092	0.081	0.054	0.070
Pre-school	Nursery	100 sqm	4.939	4.149	3.589	3.836

Table 6: Trip Rates

[5] TRICS is an online database giving information on the number of trips predicted to be generated by a development site based on collected data.

3.2. Option 1: Expansion of Existing Towns

Cullompton

3.2.1. There are several development options proposed for Cullompton under option 1 including the retention of the north-west Cullompton urban extension, as well as the allocation of two new major sites, these being 400 dwellings at Growen Farm (essentially an extension of the NW Cullompton urban extension) and 300 dwellings at Colebrook. These would have been assessed in scenario 2 (see Table 3).

3.2.2. The impact of these sites on the M5 has not been modelled as part of the analysis behind this report; this approach was agreed between DCC and MDDC. This is due to the fact that modelling of junction 28 (even with improvements proposed under the HA pinch point scheme) has shown that it can accommodate very little more than the development allocated in current plans up to 2026. It is generally felt that something major needs to be done to relieve junction 28 and the cost implications and business case approval of this are felt to be more difficult to achieve with a smaller amount of development.

3.2.3. Having said this, should MDDC choose to take these smaller sites forward, further work shall be undertaken to understand the implications of these potential development sites.

Tiverton

3.2.4. The major development proposed for Tiverton under option 1 is the 1100 dwellings at Hartnoll Farm. This would extend the town further to the east, beyond the currently allocated EUE. Only this development site has been modelled to inform this option for Tiverton. This is justified as this single site forms the majority of development proposed for Tiverton under this option, beyond the current 2026 plan.

3.2.5. A level of 10% internalisation has been assumed to take into account the number of people who will live in Hartnoll Farm and travel to other locations in the development or to the EUE. These people will have a minimal impact on the rest of the network so have not been included in this assessment.

3.2.6. Applying the trip rates from Table 6 above to the proposed 1100 dwellings (minus the 10% internalisation) generates 591 trips in the morning peak and 651 in the PM, as shown in Table 7 below.

	AM		PM	
	Arrivals	Departures	Arrivals	Departures
Development Trips	161	430	406	245

Table 7: Trips Generated by Tiverton Development

3.3. Option 2A: Willand/J27

3.3.1. The Local Plan Review considers a new community of 3,000 dwellings to the east of the M5, just north of Willand, as well as the commercial Westwood development described above which represents one option for the commercial development at this location.

Scenario	Type	AM		PM	
		Arrivals	Departures	Arrivals	Departures
Scenario 3	Housing	0	0	0	0
	Commercial	616	367	924	1227
	Total	**616**	**367**	**924**	**1227**
Scenario 4	Housing	0	0	0	0
	Commercial	554	246	365	624
	Total	**554**	**246**	**365**	**624**
Scenario 5	Housing	440	1172	1107	667
	Commercial	573	344	847	1123
	Total	**1013**	**1516**	**1954**	**1790**
Scenario 6	Housing	440	1172	1107	667
	Commercial	499	221	329	562
	Total	**889**	**1393**	**1436**	**1229**

Table 8: Trips Generated by J27/Willand Development

3.3.2. Following guidance from MDDC, this report will focus on the impacts of scenarios 3 and 5 when assessing the impact the development will have on J27.

3.4. Option 2B: East of Cullompton

3.4.1. Section 1.3.1 detailed the development scenarios to be tested for the new community development to the east of Cullompton. Applying the same trip rates (from Table 6) gives the following trips generated by this site. Scenarios 9 and 10 include housing and commercial development so some people are likely to work and live in this site. To take this into account, 10% of trips are assumed to be interval within the site and do not travel onto the wider network.

Scenario	Type	AM		PM	
		Arrivals	Departures	Arrivals	Departures
Scenario 7	Housing	0	0	0	0
	Commercial	333	148	219	374
	Total	**333**	**148**	**219**	**374**
Scenario 8	Housing	0	0	0	0
	Commercial	554	246	365	624
	Total	**554**	**246**	**365**	**624**
Scenario 9	Housing	382	1015	959	578
	Commercial	299	133	197	337
	Total	**681**	**1148**	**1156**	**915**
Scenario 10	Housing	431	1148	1085	654
	Commercial	499	222	328	561
	Total	**930**	**1370**	**1413**	**1215**

Table 9: Trips Generated by Cullompton Development

3.5. Background Growth

3.5.1. To take into account background traffic growth generated by demographic changes in the population and additional development across the rest of the country, TEMPRO[6] growth factors were derived and used for this assessment. Given that the proposed plan goes up to the end of 2033, this will be the assessment year for all the options.

3.5.2. It is acknowledged that the background growth factor may be an overestimate due to the double counting effect of Mid Devon district growth which will be point loaded into the models. However, at this stage of strategic planning it is not possible to clearly identify the exact land use types, mix and location of emerging allocations.

Tiverton

3.5.3. Devon County Council already has a detailed SATURN[7] model of the Tiverton area for 2026 which was built to assess the impact of the Tiverton Eastern Urban Extension (EUE). Each zone in this model was assigned to a TEMPRO growth area and these same areas were used for the Hartnoll Farm modelling.

3.5.4. The factors applied to the 2026 flows to take account of the background growth up to 2033 are shown in Table 10 below, separated by userclass.

[6] TEMPRO provides an indication to the changes in trip numbers in the future, taking into account planned development, population and demographic changes and changes in car ownership levels per household.
[7] SATURN is a modelling software package designed to assess route choice of vehicles based on the cost of each available route.

2026 - 2033	UC1 (Light Commute)		UC2 (Light Employers Business)		UC3 (Light Other)		UC4 (HGV)	
Area	O	D	O	D	O	D	O	D
AM								
Mid Devon	1.064	1.070	1.051	1.061	1.100	1.105	1.051	1.061
Rest of Devon	1.068	1.066	1.060	1.057	1.096	1.095	1.060	1.057
Rest of SW	1.061	1.061	1.051	1.051	1.092	1.093	1.051	1.051
GB	1.068	1.068	1.063	1.063	1.087	1.087	1.063	1.063
PM								
Mid Devon	1.076	1.060	1.062	1.052	1.095	1.093	1.062	1.052
Rest of Devon	1.066	1.069	1.059	1.061	1.087	1.088	1.059	1.061
Rest of SW	1.062	1.062	1.052	1.052	1.085	1.084	1.052	1.052
GB	1.084	1.068	1.068	1.064	1.076	1.081	1.068	1.064

Table 10: TEMPRO Growth Factors for Tiverton

J27 / Willand

3.5.5. There is not an appropriate existing traffic model covering this area so a bespoke spreadsheet model has been developed for this area. More details of this are shown later in this report.

3.5.6. Given that the development of the east of the M5 is the only growth likely to occur on the A38, no background growth has been added to this arm of J27. The M5 through movements were factored by the TEMPRO factor for the South West, the A361 by North Devon and movements between the A361 and M5 were factored by an average of these two. Table 11 below shows the TEMPRO factors used.

AM	M5 North	A38	M5 South	A361
M5 North	1.000	1.000	1.135	1.125
A38	1.000	1.000	1.000	1.000
M5 South	1.135	1.000	1.000	1.125
A361	1.125	1.000	1.125	1.116

PM	M5 North	A38	M5 South	A361
M5 North	1.000	1.000	1.150	1.141
A38	1.000	1.000	1.000	1.000
M5 South	1.150	1.000	1.000	1.141
A361	1.141	1.000	1.141	1.133

Table 11: TEMPRO Growth Factors for J27/Willand

Cullompton

3.5.7. Devon County Council also has a SATURN model of Cullompton, so each zone is assigned a TEMPRO growth area. No background growth has been applied to Cullompton itself because it is assumed that the development proposed in the Local Plan Review includes all the development that is likely to happen in the town. These TEMPRO factors from 2026 to 2033 are shown in Table 12 below.

2011-2033	AM		PM	
	Origin	Destination	Origin	Destination
SW	1.146	1.146	1.162	1.162
East Devon	1.253	1.207	1.239	1.267
Rural	1.139	1.194	1.204	1.171
Tiverton	1.167	1.202	1.216	1.198

Table 12: TEMPRO Growth Factors for Cullompton

4. Trip Distribution

4.1. Introduction

4.1.1. Once the number of trips generated by each proposed development option has been calculated, the trips have to be distributed across the network to assess the impacts this additional traffic will have. This section of the report details how this distribution process has been carried out for each of the three major development sites.

4.2. Option 1: Expansion of Existing Towns

Cullompton

4.2.1. As discussed above in section 3.2, the modelling work to inform this report does not consider the Cullompton sites proposed under option 1.

Tiverton

4.2.2. The distribution of trips to and from the housing site proposed at Hartnoll Farm is assumed to be the same as that of the EUE housing trips. This distribution was assessed in great detail as part of the Tiverton EUE model in relation to the location of the new access off the A361 into the development site. More details of this distribution can be found in the Tiverton Traffic Model: Forecasting and Economics Report and for brevity is not duplicated here.

4.3. Option 2A: J27 / Willand

4.3.1. Traffic generated by this proposed development will have a major impact on J27 of the M5. However, given that the housing development encroaches on Willand, a proportion of these trips are likely to travel south and impact on J28 as well. Therefore, a simple distribution of these has been assumed as shown below in Table 13.

Location	Commercial	Housing
M5 North	25%	20%
A38 Wellington	10%	5%
A373 Honiton	5%	5%
M5 South	35%	30%
Cullompton	10%	15%
A361	15%	25%

Table 13: Trip Distribution for J27 / Willand

4.4. Option 2B: Cullompton

4.4.1. The distribution of traffic from the new community to the east of Cullompton was assumed to follow the 2001 Census Travel to Work Data for the Cullompton area. Despite this data being dated, it is still the most accurate tool available. This distribution is summarised in Table 14 below. The distributions were reversed for the PM peak.

Location	From Home	From Work
B3440 (Hemyock)	1%	2%
East Devon	2%	6%
M5 North	10%	9%
M5 South	28%	13%
Halberton/Willand	9%	10%
B3181 South	3%	1%
Bradninch	2%	3%
Bickleigh	1%	1%
Tiverton	8%	9%
Cullompton	36%	46%

Table 14: Distribution of Cullompton Development

4.4.2. The table above states the proportion of traffic travelling to and from Cullompton. However, to assess what impact this traffic is likely to have on the network under different options, a more detailed location is required.

4.4.3. To do this, the traffic to/from Cullompton was distributed to the zones in the traffic model based on the existing number of trips to and from each of these zones.

5. Trip Assignment

5.1. Introduction

5.1.1. Once the distribution of the trips was derived, they need to be assigned to roads and routes on the network. This chapter outlines this process for each of the proposed development options.

5.2. Option 1: Expansion of Existing Towns

Cullompton

5.2.1. As discussed above in section 3.2, the modelling work to inform this report does not consider the Cullompton sites proposed under option 1.

Tiverton

5.2.2. As mentioned earlier in this report, Devon County Council has an existing up-to-date SATURN traffic model covering Tiverton and the area to the east to assess the impacts of the Tiverton Eastern Urban Extension. The Hartnoll Farm development was added onto this model, with SATURN assigning the traffic flows to the network based on the costs of driving each route.

5.2.3. An essential element of the Tiverton EUE Development is a new junction onto the A361 close to Uplowman Road. This enables a good distribution of traffic from the development onto the adjoining road network. It also provides a high quality access for the employment allocation which will be a catalyst for further economic growth in the area.

5.2.4. Adding the Hartnoll Farm development traffic to the base network (which includes the new junction onto the A361) adds an additional 200 vehicles to Blundell's Road in the AM peak and 300 in the evening. This is considered unacceptable because of the impact it will have on the road safety and amenity of Blundell's Road, particularly as this corridor is proposed to be a Conservation Area. Therefore, if the development at Hartnoll Farm is to be progressed, mitigation works will be required. Options for this are discussed later in this report.

5.3. Option 2A: J27 / Willand

5.3.1. A spreadsheet model has been set up to assess the impacts of emerging development at M5 Junction 27. The model considers typical weekday morning and evening peaks (AM: 08:00 – 09:00 and PM: 17:00 – 18:00). This spreadsheet is designed to be flexible to cope with subsequent changes.

5.3.2. The base year (2012) turning movements of the typical peak periods are extracted from a Manual Classified Traffic Count carried out in March 2012. Once the most recent traffic count data is available, the modelling process will be updated.

5.3.3. Background growth has been applied for the future year and the development traffic is added to produce the various sets of forecast turning movements at M5 J27. The traffic matrices for each of the modelled scenarios can be found in Appendix 1.

5.3.4. Once the traffic movements through J27 were established, they were modelled in detail using a LinSig[8] model of the junction to assess the impacts of the development and any possible improvements required.

5.3.5. M5 Junction 27 operates reasonably well for most of the year, but is noticeably busier on Fridays, Bank Holidays, and throughout the summer. Traffic queues have been observed on the off-slip roads and occasionally back onto the M5 mainline carriageway, which is a major safety concern. Through the HA Pinch Point funding stream, the Highways Agency is delivering a scheme this autumn in order to address the safety concerns. This will widen the southbound off-slip to three lanes and introduce traffic signals at the roundabout with the motorway off-slip roads; thus allows the level of queuing to be managed.

5.3.6. In order to evaluate the junction performance under summer peak conditions, it is necessary to formulate a simple method to reflect the level of background traffic in the summer. Traffic flows on the slip roads have been analysed to determine factors to convert the typical peaks to summer peaks. These factors are shown in Table 15 below. However, additional counts have recently been commissioned to give a better idea of the current traffic flows, especially in the summer peak periods. These observations will be used to refine the forecasting process.

	M5 North	A38	M5 South	A361
M5 North	1.00	1.39	1.61	1.39
A38	2.30	1.00	1.33	1.00
M5 South	1.93	1.00	1.00	1.00
A361	2.30	1.00	1.33	1.00

Table 15: Summer Peak Factors

5.3.7. Running each of these scenarios through the J27 LinSig model shows that the Pinch Point Scheme cannot accommodate the commercial development in the AM and PM peaks, or during the busy summer holidays. Therefore, improvements at this junction are required to accommodate the development proposed to the east of J27.

5.4. Option 2B: Cullompton

5.4.1. DCC currently has an up-to-date SATURN traffic model of Cullompton which was built to assess the impact of the north-west Cullompton development on J28 of the M5.

5.4.2. The proposed new community to the east of the M5 was added to this model and the flows at J28 were exported for junction capacity analysis. These traffic matrices are shown in Appendix 2.

5.4.3. Modelling the impact of scenarios 9 and 10 (housing and commercial development) with the Pinch Point scheme at J28 reveals that the junction would be over capacity in 2033, so mitigation measures are required and are detailed later in this report.

[8] LinSig is a software package specifically designed to assess signalised junctions.

6. Improvement Options

6.1. Overview

6.1.1. A range of conceptual capacity improvement schemes have been identified. These form the first iteration of highway infrastructure measures that can be incorporated into the emerging Plan to facilitate the delivery of the development. There are numerous combinations of development levels and highway improvements that can be tested. The aim of this report is to carry out a preliminary assessment in order to pave the way for identifying the optimum solution taking into account the costs, benefits and deliverability of each of the options.

6.1.2. At the time of writing this report, there has been no consultation with Network Rail or the Environment Agency (except for Tiverton options as discussed below). The Highways Agency have been involved in the initial options generating stage but require more detailed designs and appraisal before they can fully comment on the acceptability of the options. Any one of these three major organisations could prevent any of the options being developed or require some level of mitigation works which is likely to increase both the cost of the scheme and delivery time. In addition there will be a range of other environment issues that need to be investigated including landscape, ecology, historic environment and consultation with the local community.

6.2. Option 1: Expansion of Existing Towns

Cullompton

6.2.1. As discussed above in section 4.2, the modelling work to inform this report does not consider the Cullompton sites proposed under option 1.

Tiverton

6.2.2. The previous MDDC Allocations and Infrastructure Development Plan Document (AIDPD) stated that the EUE Development required one access onto the A361 and a second onto Heathcoat Way. During the Masterplanning process for this site, the level of development in the site was reduced, so only the access onto the A361 was required.

6.2.3. This Masterplan and associated traffic modelling went on to demonstrate that the Blundell's Road to Heathcoat Way link road would be required if the level of development to the east of the town grew above 2,000 dwellings. The EUE site is expected to deliver 1550 dwellings, so an additional 1100 at Hartnoll Farm would result in this threshold being met. It is therefore proposed that the Hartnoll Farm development requires the Blundell's Road to Heathcoat Way link road. This new link would act as a bypass of Blundell's Road, allowing it to be closed to general through traffic and become a walking, cycling and bus priority corridor (with access for residents and businesses where necessary).

6.2.4. The A361 junction is currently being designed and funds are being sought from the government and the developers of the EUE. This report therefore does not refer to this scheme any further, but assumes it has been delivered before Hartnoll Farm comes forward. The following section discusses the Blundell's Road to Heathcoat Way link road in greater detail.

Blundell's Road to Heathcoat Way Link

6.2.5. Previous design work of this link road identified two locations where it could connect into Heathcoat Way, one either side of the junction with Queensway, as shown in Figures 4 - 6. The north option has an estimated construction cost of £11m as it requires a structure over the floodplain but is all within land owned by Blundell's School.

6.2.6. The south option is likely to be cheaper at £7m but involves a number of different landowners, which may impact on the deliverability of this option and increase scheme costs. The type of junction connecting these two roads has not yet been considered but is envisaged to be either a roundabout or signalised junction.

6.2.7. The initial options stage identified three locations where this road could connect onto Blundell's Road either side of Gornhay Orchard and all require land from Blundell's School. Blundell's School have been made aware of the options and support the concept of a route bypassing Blundell's Road but have yet to comment on their preferred option. Pedestrian facilities would need to be accommodated into the detailed design to allow pupils from the school to safely access their playing fields to the north-east of the road.

6.2.8. The yellow option shown in Figure 1 and connects onto Blundell's Road between the artificial sports ground of Blundell's School and the existing houses at Gornhay Orchard. This gap is tight but with some cutting back of the tree canopy, it is thought that a road of sufficient width could be accommodated here. This option would avoid bisecting the small communities of Gornhay Orchard and Coleman Close and would require a mini roundabout onto Blundell's Road. This would act as a Gateway to the Blundell's Road conservation area and allow limited access only into to area.

6.2.9. The red option shown in Figure 2 makes use of the existing lane that runs parallel to Gornhay Orchard. This lane is not currently wide enough to accommodate a distributor road so the removal of the trees down one side of the lane would be required. There was evidence of dormice at the time of constructing Gornhay Orchard so this and the impact upon the character of the adjacent hedgebanks will need to be investigated further as proposals develop. This option would bisect the two communities but would allow Blundell's Road to be 'stopped off' to discourage traffic from using this route and divert them onto the new link.

6.2.10. The final black option is shown in Figure 3 and again bisects Gornhay Orchard and Coleman Close but avoids disturbing the existing lane. It instead continues through into one of the school playing fields before curving down to connect onto Blundell's Road. This would require the athletics track which is currently marked out in this field to be relocated but does allow Blundell's Road to be 'stopped up' and encourages drivers to use the new road to access the town centre.

Environmental Impacts

6.2.11. An initial environmental appraisal of this link has been undertaken which is included in Appendix 3. This highlights that the scheme is located in floodzones 2 and 3. Despite this, initial discussions with the EA suggest that the scheme '*could deliver an overall reduction in flood risk if a strategic approach is adopted'* with potential development in the area.

6.2.12. Other potential environmental risks include impacts from nitrogen deposition on the Tidcombe Fen Site of Special Scientific Interest (SSSI), although the scheme may actually reduce this by diverting traffic from Blundell's Road (which is closer to the SSSI). There are also possible impacts on areas where protected species have been recorded, although no potential 'show stoppers' have been identified at present and this will be further assessed and mitigation proposed as the scheme progresses.

6.2.13. In terms of historic environment impacts, the setting of the listed building to the north of Gornhay Orchard and the proposed Blundell's Conservation Area will also need to be considered when progressing the design of the scheme. Although the overall impact of the scheme on the conservation area may be positive if through traffic were removed from Blundell's Road.

6.2.14. Given the environmental issues associated with the red route and the black route resulting in the loss of playing fields, DCC's current preferred option is the north yellow route using the land between Gornhay Orchard and the Astroturf. However, discussions with Blundell's School and the public are required before any designs are progressed.

6.3. Option 2A: Willand / J27

6.3.1. As discussed above, the Highways Agency is anticipated to deliver improvements to this junction before Summer 2015, funded through the 'HA Pinch Point' budget. The preliminarily junction analyses of the latest design of the HA Pinch Point Scheme has revealed that it is likely to operate at or overcapacity in 2033 without any new development. Any emerging development in this location will further worsen the level of service of M5 Junction 27 so improvements to this junction have been considered. It is also considered that the emerging development proposals for option 2a, in particular the southern extent of a residential-led area, are likely to generate a demand to travel south and join the motorway at Junction 28 rather than backtrack to J27. Therefore, a new junction concept to the south of J27 (J27A) is also investigated and that results in three options of J27A, as shown in Figure 4, are considered. These include:

- J27A Option 1: North of Willand
- J27A Option 2: South of Willand
- J27A Option 3: Constructing slip roads on to the existing B3181 overbridge

6.3.2. The improvements to Junction 27 and the three potential locations for a new junction onto the M5 are discussed below.

Junction 27 Improvement

Full Signalisation

6.3.3. A number of improvement schemes to J27 can be delivered in addition to the HA Pinch Point Scheme. The simple option is to widen the approach arms with additional flares as shown in Figure 5 and reconfigure the junction to full signalisation. It is also necessary to improve the south facing slip roads to accommodate a high volume of traffic accessing the motorway. The improvement is fairly straight forward as the works does not involve structural alterations and would be carried out under traffic management.

6.3.4. When optimising the signal timings for a signalised roundabout it is important to manage the queuing and delay on the circulatory carriageway in order to prevent vehicles from queuing back around the roundabout and blocking off traffic. The Pinch Point Scheme has been designed to reduce queuing extending along the off-slips and back onto the mainline because of the safety issues this causes. For these reasons, the traffic has been held on the A38 and A361 approaches under the full signalisation option.

6.3.5. Initial junction capacity analysis suggests that this full signalisation scheme will be operating just within capacity in 2033 during the week with the Westwood commercial development, (Scenario 1). However, the scheme will not be able to accommodate the increased traffic flows in the summer periods so it is necessary to consider a larger scheme.

Northern Motorway Bridge Widening

6.3.6. The constraint of the full signalisation scheme is the northern bridge over the M5 on the circulatory given the large increase of traffic on this section in the future. To overcome this, widening this bridge to three lanes was considered, along with some circulatory carriageway widening as shown in Figure 6. This scheme would also require the full signalisation scheme as mentioned above.

6.3.7. The junction capacity analysis suggests that this scheme would create an improvement of the full signalisation option above but it will still be over capacity in the summer peaks with the commercial development under scenario 3.

6.3.8. Following on from this, it is possible to widen the eastbound circulatory bridge to 4 lanes as shown in Figure 7.

6.3.9. This improvement, along with the full signalisation is expected to be able to accommodate the scenario 3 commercial development in both the traditional weekday peaks and the summer peaks. However, DCC are currently carrying out some updated traffic counts at this junction and once this data is available, DCC will be able to update the model.

Segregated Left Turn Lane

6.3.10. In parallel with the bridge widening and full signalisation options, another scheme considered was to add a segregated left turn lane from the A361 approach to the M5 northbound on-slip which bypasses the signals, increasing capacity for this movement. However, given the proximity of the A361 bridge over the mainline railway, only a minor increase in capacity can be achieved and a departure from standards would be required. This is because the left turn lane would flare off from the straight ahead signal controlled lanes, so would be blocked off by traffic stopped by the signals. A plan of this option is in Figure 8.

6.3.11. The modelling results currently show that this will still be close to capacity in the summer peak periods under scenario 1 with the full signalisation, but this could change with the updated count data.

Railway Bridge

6.3.12. The capacity of the A361 approach has been limited through the amount of green time allocated to it in order to manage the circulatory carriageway and the motorway slip roads from excessive queues. However, only a limited scale of widening can be provided without affecting the railway bridge. An aspiration to maximise the A361 potential is to widen this approach to 4 lanes; but that requires structural works on the railway bridge. It is acknowledged that widening the railway bridge is a major undertaking and requires collaboration with Network Rail, but there is a strategic benefit. This option will only be pursued further if additional capacity at the junction is required. This scheme is shown in Figure 9.

M5 J27 Slip Roads

6.3.13. All the slip roads are currently simple merge and diverge layouts but with the proposed development to the east of the junction, the slips require upgrading to create the extra capacity required. Improvements to all four slip roads are likely to be required to accommodate scenario 3 development for all of the junction improvements discussed above.

6.3.14. The guidance for grade separated junctions in DMRB suggests that the most appropriate layout to accommodate future traffic levels is a lane drop / lane gain approach, with a lane departing the mainline and carrying up the slip road. This would require either the loss of a lane through the junction on the mainline or widen the M5 to 4 lanes between J26 and J28 in both directions. The HA would be reluctant to lose a running lane due to the strategic importance of the M5, particularly in summer holidays. The cost of widening the mainline for up to 15 miles in both directions would make this option economically unviable.

6.3.15. In order to maintain the M5 as a 3-lane motorway and avoid widening the mainline carriageways, a departure from standards would be required. The alternative solution is to consider either a parallel merge and diverge layout, or a ghost island approach. This arrangement would maximise the opportunity for traffic to join/leave the M5 while maintaining the mainline and allow the additional lanes on the approach and exits of the roundabout. Figure 10 shows the south facing slip roads with a parallel merge / diverge, with Figure 11 showing the south facing slip roads with a ghost island arrangement. The type of slip road required will depend on the future traffic flows and liaison with the HA.

6.3.16. One alternative for improving the north-facing slip roads is for a parallel diverge as shown in Figure 12. However, if the segregated left turn lane is required at J27, then a parallel merge is not an option because the latest guidance does not allow the merging of traffic on a slip road. The alternative is for a ghost island diverge layout, which may be required for the merge as well as shown Figure 13.

Environmental Appraisal

6.3.17. An initial environmental appraisal of this option is included in Appendix 3. This essentially found that subject to further investigations to assess the impacts on protected species, this scheme is likely to have minor consequences for the natural and historic environment, and minor consequences on surrounding properties.

New Junction 27A

6.3.18. Given that a large proportion of the traffic from the new development is predicted to travel south on the M5, an alternative mitigation measure investigated was for a new junction onto the M5 between J27 and J28 known as J27A. This would be used by traffic travelling to/from the south and relieve the congestion at J27 and J28 in Cullompton. Depending on the location of this junction, Willand traffic could utilise the new facility instead of using J27 or J28.

6.3.19. It is vital to note that any option considering new slip roads onto the motorway will be subject to agreement from the HA. In order to gain this agreement, the development that the infrastructure supports must be of very high level strategic importance - with support from the Heart of the Southwest Local Economic Partnership (LEP), communities and businesses in the area.

6.3.20. The option of a new junction onto the M5 between J27 and J28 is only considered for scenarios where the housing development is included at J27/Willand. The ‘Westwood’ commercial development is adjacent to J27 and is less likely to make use of J27A.

6.3.21. The provision of J27A option alone is not sufficient to accommodate both commercial and residential proposals at J27/Willand, given that the majority of the northern section of development will wish to travel through the existing junction. Therefore, the improvements outlined above for J27 are required as well as a new J27A.

Junction 27A Option 1 – North of Willand

6.3.22. The first option considers a junction to the north of Willand as shown in Figure 14. Design Standards require junctions on motorways to be at least 2km apart, (TD 22/06) to allow the vehicles to merge and diverge safely with the mainline traffic. A full movement junction in this location is too close to J27 to accommodate the north facing slip roads but south facing slip roads can be provided as the distance to J28 exceeds the Design Manual for Roads and Bridges (DMRB) standard of 2km.

6.3.23. The northbound off-slip needs to be constructed in a small gap between the railway and the M5. This makes accessing the site challenging and is the reason for the skewed overbridge. In order to reduce this skew, the radius of the slip road has been tightened and will require a departure from standards. The vertical alignment is only achieved with the slip road being constructed with retaining walls, which increases the cost. A roundabout is provided at the top of the slip roads in order to delineate the strategic road network from the county network and also acts as a speed reduction feature. Network Rail will need to be consulted about this option given the close proximity of the mainline railway from the off-slip.

Environmental Appraisal

6.3.24. The initial environmental appraisal for this option (see Appendix 3) shows that this option does not lie within the floodplain. However, there may be potential impacts from air and water pollution upon the nearby unconfirmed county wildlife site which is also priority habitat. The impacts on this habitat and on other protected species would need to be assessed further and mitigation would be proposed as plans progress.

6.3.25. This access strategy would provide a primary connection into the centre of the proposed new community north of Willand. The junction could also attract vehicular trips from Willand wishing to travel south on the M5, which may result in impacts on local residents and the setting of listed buildings.

6.3.26. Lastly but importantly, some local businesses may be affected by the scheme design, which is close to existing property. These issues will need to be considered if further design of this scheme were to proceed.

Junction 27A Option 2 – South of Willand

6.3.27. The second option is a junction to the south of Willand as shown in Figure 15. As with the previous option, this is located too close to J27 to accommodate north-facing slips, so only south-facing slip roads will be considered.

6.3.28. The railway line is further away from the M5 at this location so a traditional layout can be adopted with an overbridge perpendicular to the motorway. This option is likely to attract traffic from Willand travelling to/from the south but is further away from the new community and the development traffic would have to travel through Willand to access the junction.

Environmental Appraisal

6.3.29. The additional traffic travelling through Willand as a result of this scheme is likely to have an impact on listed buildings and the Willand Conservation Area. Furthermore, it is anticipated that protected species may be present in the area and this will require further investigation. Impacts on a woodland trust reserve which is also an unconfirmed county wildlife site will also need to be investigated further.

6.3.30. Furthermore, there may be impacts upon local residents and businesses from increased traffic flows and land take. These elements would require further investigation if design of this option were to proceed.

Junction 27A Option 3 – Utilise Existing B3181 Bridge

6.3.31. The third option considers utilising the existing B3181 overbridge and provides the south facing slip roads. The main challenge is the height of the B3181 bridge, which is 13m above the motorway, and would result in the slip roads being about 1000m long. In addition, there will be a departure from standard as the new south facing slip roads would become too close (less than 2km) to the next set of slip roads at J28. This option has been discarded for the time being and a design of this has not been drawn up.

Junction 27 Summary

6.3.32. The current junction analysis shows that widening the north bridge to 4 lanes is likely to be able to accommodate the summer peak traffic with the commercial development but not the residential element of the proposals. Assessment also shows that widening of the A361 railway bridge may also be required.

6.3.33. If the proposed housing development was to go ahead at this location alongside the commercial aspect, J27 would be at capacity with the increased traffic demand, even with a new junction onto the M5.

6.3.34. The junction assessments for the J27 options are summarised in the table below, with green representing J27 being within capacity, yellow at capacity and red over capacity. Anything in white has not been assessed. This table will be updated once the new count data is available.

Traffic Demand	Pinch Point Scheme	Full Signal	Full Signal + North Bridge 3Lns	Full Signal + North Bridge 4Lns	Full Signal + North Bridge 4Lns + SLTL[9]	Full Signal + North Bridge 4Lns Railway 4Lns
2012 AM Bkgd						
2012 PM Bkgd						
2033 AM Bkgd						
2033 PM Bkgd						
2033 Summer Bkgd						
2033 AM Scenario 3						
2033 PM Scenario 3						
2033 Summer Scenario 3						
2033 AM Scenario 5 with J27A						
2033 PM Scenario 5 with J27A						
2033 Summer Scenario 5 with J27A						

Table 16: Summary of J27 Options

[9] SLTL Segregated Left Turn Lane

6.3.35. This shows that to accommodate Scenario 3 (commercial development of 139,896m^2 only) in both the weekday and summer peaks, the junction requires full signalisation, with the northern bridge widened to 4 lanes and improvements to all 4 slip roads. More detailed analysis will be required to determine if the segregated left turn lane is needed, or widening of the railway bridge.

6.4. Option 2B: Cullompton

6.4.1. The new community to the east of the motorway at Cullompton will generate a large amount of traffic and the majority of this will travel through J28 of the M5. This junction currently experiences congestion during busy periods, with the priority junction to the east and the roundabout to the west both operating close to capacity. In addition, there is blocking back traffic caused by capacity constraints along Station Road through the two small roundabouts and the signalised junction with the High Street.

6.4.2. The existing motorway junction is a simple one-bridge layout providing all movements and is constructed in the floodplain. J28 contains two smaller junctions - where the slip roads for the northbound and southbound motorway traffic join the overbridge. The western junction is a 6-arm roundabout set on an embankment and surrounded by retaining walls, with the mainline railway just to the west and provides access to the Cullompton Services and a few isolated industrial units. The eastern junction is currently a priority junction, (a junction with a give-way line).

HA Pinch Point Scheme

6.4.3. The eastern junction is to be signalised through a Pinch Point Scheme later this financial year. This improvement is to unlock all the proposed development in the current plan up to the end of 2026 but preliminarily junction capacity analysis of the Pinch Point Scheme suggests that the junction will operate over capacity by 2033 with the new community.

6.4.4. To accommodate the increased traffic generated by the new community, improvements are required to J28 of the M5. The options discussed below can be considered as individual components as part of a major scheme. Given the large number of permutations this generates, only particular combinations of these packages have been considered in the modelling analysis.

6.4.5. The following options in the vicinity of M5 Junction 28 have been considered:

- Improve Junction 28
- New Longbridge Overbridge over M5 joining the Cullompton Eastern Relief Road
- A new motorway junction - J28A Option 1 – North of Duke Street Bridge
- A new motorway junction - J28A Option 2 – South of Duke Street Bridge

Improve Junction 28

6.4.6. The first option considered was to improve the existing junction and in particular the western 6-arm roundabout by converting it to a 4-arm signalised junction. An alternative access to the small industrial estate to the south would need to be found and the northbound on-slip would be relocated to start at the northern end of the services. This would see the two-way road into the services retained, before it connected onto the slip road. The northbound off-slip would also require realignment in order to create a crossroads layout. A plan of this option is located in Figure 16.

6.4.7. The bridge over the M5 would require widening to accommodate 2-lanes in both directions along with a pedestrian footway. However, an alternative option might be to widen the carriageway to the edge of the bridge and construct a separate pedestrian / cycle bridge alongside but more detailed work would be required before this was confirmed to be a viable option.

6.4.8. There is also the option of realigning the A373 Honiton Road through the proposed development site and reconnect to the existing road further east to avoid the S-bend east of junction 28 to help improve capacity.

6.4.9. Junction capacity assessments of this option show that the afore-mentioned improvements alone will not be sufficient to accommodate the traffic demand generated by the new community to the east of Cullompton. There is a high east-west travel demand and that is compounded by the congestion along Station Road blocking back into J28.

Eastern Relief Road (ERR)

6.4.10. The adopted Mid Devon Local Plan proposes the option of an Eastern Relief Road running through the Community Fields between Cullompton and the M5 and is required to accommodate the development proposed in the current plan. This is currently undergoing a Flood Risk Assessment (FRA) as the majority of it is located within the floodplain. A plan of this is shown in Figure 17.

6.4.11. The ERR helps remove north-south traffic from the town centre but does little to relieve J28 of traffic and so is not sufficient to mitigate the impacts of the new community to the east of the town on its own.

Longbridge Overbridge (with ERR)

6.4.12. Given that a large proportion of traffic from the new development is predicted to travel into Cullompton town centre, a second bridge is required to relieve traffic from J28. The first proposed location of this bridge is to the south of J28, at the south end of Longbridge Trading Estate as shown in Figure 18. This option would connect the Eastern Relief Road in the west to the A379 in the east but the exact location where it connects into the new development is likely to change once the layout of the new community is known. The concept of this is to separate out traffic accessing the motorway from the local traffic. This option will require several structures to span over the railway line, M5 and River Culm, or one large one.

6.4.13. In order to allow a sufficiently shallow gradient on the western side of the bridge, the Eastern Relief Road would need to be realigned and constructed high enough out of the floodplain. This will have implications on the floodzone compensation and loss of community fields which would need to be addressed. The higher the Eastern Relief Road is built, the further east it can be located, however this has implications for visual, landscape and noise mitigation. Raising the ERR higher also adds to the cost.

6.4.14. Initial junction capacity assessments suggest that with the lower level of development (2,600 dwellings and 32,400m² commercial) and the Pinch Point Scheme (signalising the eastern junction), J28 will be at capacity in the AM peak, but the western roundabout will be over capacity in the evening.

6.4.15. Slip roads cannot be added to this bridge because of the close proximity to J28; however, it would be possible to close the existing south facing slip roads at J28 and relocate them off this bridge. This option would re-introduce the motorway traffic back onto the local road network, effectively creating a large two-way gyratory. This option is predicted to have a minimal impact on the capacity of J28 and would require traffic to travel further, reducing the benefits of the scheme. It is considered that the Longbridge Overbridge without the relocation of slip roads could provide better integration of the community with Cullompton town.

Environmental Appraisal

6.4.16. The initial environmental appraisal set out in Appendix 3 identifies that construction of the bridge and eastern relief road would result in the loss of priority grazing marsh habitat. However, it is worth noting that this area is not designated for its ecological importance and therefore the loss may be tolerable. There may be impacts on the Cullompton Conservation area and on a listed bridge, such as increased noise and vibrations from passing vehicles.

6.4.17. Furthermore, as already mentioned, the area is within floodzone 2 and 3. Flood risk modelling is already in progress for the ERR and the results of this will be fundamental in assessing the deliverability of this option in future.

6.4.18. It has also previously been identified that the ERR would (as would Longbridge) impact upon the community fields west of the railway, and compensation for any impact would need to be discussed with local stakeholders.

Construction and deliverability

6.4.19. Construction of this scheme could be problematic.

6.4.20. In terms of wider deliverability, this option would require consultation with the Highways Agency, Network Rail and the Environment Agency (EA). It is possible that any or several of these agencies would require mitigation that would increase the cost of this scheme to unaffordable levels. In particular, the interaction with the surrounding floodplain is something that has not been investigated in detail at this stage and may pose very serious delivery constraints. In addition, the scheme would impact upon the community fields west of the motorway and discussions and consultation will be required before this option could progress further.

Junction 28A – North of Duke Street Bridge

6.4.21. In addition to the aforementioned schemes, the principle of a new junction on the M5 was also considered. In order to capture the majority of trips from Cullompton onto the M5, this would have to be located to the south of the existing junction 28 to be attractive to drivers going from / to the East of Cullompton proposal.

6.4.22. An option to use the existing bridge at Duke Street was considered as a crossing point in this location is of sufficient distance from J28 to allow south-facing slips to be added. However preliminary investigations identified that there is insufficient room between the railway line and the motorway to construct the northbound off-slip. Also, there is a 3 tonne weight restriction on the railway overbridge which prohibits the junction to be used by heavy vehicles. Any improvements to this bridge would be very costly and require agreement from Network Rail. For these reasons, the option of using the existing Duke Street Bridge has been discarded.

6.4.23. An alternative is to provide a new overbridge crossing the railway, the M5 and River Culm to the north of Duke Street and take advantage of the increased gap between the motorway and railway as shown in Figure 19. The location of this bridge is further north than originally anticipated to accommodate the south facing slip roads while avoiding the structural works with the existing River Culm Bridge to the south.

6.4.24. It is important to note that this option would only provide south-facing slip roads, as north-facing slip roads would be too close to the existing J28 to comply with standards.

6.4.25. This option would not require the ERR as a replacement distributor road would be constructed through the new community to the east of the M5 instead. The western end would most likely connect with Duke Street / Meadow Lane junction, through the cricket pitch. The impact on the town centre (including air quality management area) of this has not been assessed - the impacts of the loss of the ERR on this should be considered further.

6.4.26. Junction capacity analysis shows that, like the additional bridge, J28 will be close to capacity in the PM peak. This is because the new community is located around J28 so there will always be a high demand for this junction, even with additional motorway junction. J28 can be kept at capacity by limiting the traffic entering the junction from the east and west by reducing the green time to avoid queuing on the slip roads occurring. This will cause some queuing on the local network, diverting drivers to J28A to avoid this.

Environmental Appraisal

6.4.27. Environmental appraisal indicates that there may be impacts on the Cullompton Conservation Area, grazing marsh priority habitat (which is not designated) and potentially protected species – the usual surveys will reveal more about this.

Construction and deliverability

6.4.28. In terms of overall deliverability, there are significant constraints to this option. The first of these includes the Highways Agency requirements, which are that any new motorway junction not only meets design briefs but is of major strategic importance. New motorway junctions are generally only permitted where they are shown to deliver significant employment and housing benefits and in this case will require support from the Local Economic Partnership, from businesses and communities and a robust business case. The Highways Agency have not yet accepted the principle of constructing a new junction on the M5.

6.4.29. In addition, the majority of this scheme is within the floodplain and mitigation measures need to be discussed and agreed with the Environment Agency. It is possible that the mitigation measures in terms of road height and flood displacement compensation will result in other impacts (such as visual and noise) and lead to additional cost above that which is set out below.

6.4.30. In addition to floodplain, the delivery of this scheme also requires liaison and agreement with network rail, as a new structure will be required over the railway. No work has, as yet, been undertaken to progress this.

6.4.31. Notwithstanding the above, the cost estimate for this scheme, which currently stands at £40m, may prove difficult to fund and a robust business case will need to be produced to set out the benefits of the scheme.

6.4.32. In addition to the various agencies that are involved in this scheme, the local community will of course need to be involved in further discussions. Further discussions and consultation will be required before this option could progress further.

6.4.33. On a more technical note, providing construction traffic access for this option will also be challenging because of the weight restriction on the railway bridge. It may be possible to construct a haul road from the western roundabout of J28. Another option is to consider a cable-stayed structure spanning both the railway and the motorway. A third option is providing a level crossing; which allows construction vehicles to access but this option needs to be discussed with Network Rail.

Junction 28a - south of Duke Street Bridge

6.4.34. The final option assessed was locating J28A to the south of Duke Street. The main physical constraint here is the small gap between the railway line and the M5 which would make provision of the northbound off-slip extremely difficult and would involve expensive structures.

6.4.35. There are also a number of delivery constraints which would affect this proposal - these are generally the same as stated above for J28a north of Duke Street Bridge.

Environmental Appraisal

6.4.36. The initial environmental appraisal in Appendix 3 identified potential impacts on local residences and protected species, although this would require further investigation.

6.4.37. Importantly, the potential alignment for this option would result in the loss of ancient woodland. This is given strong protection in the national planning policy framework and any loss must be strongly justified.

6.4.38. In terms of historic environment, Cullompton Conservation area and several listed buildings may also be affected.

6.4.39. For these reasons, this option is not considered further and a design of it has not been drawn up.

Junction Capacity Analysis Summary

6.4.40. The table below summarises the junction capacity analyses of the Pinch Point Scheme and the Full Signalisation scheme at J28. Red cells indicate the junction is over capacity, yellow at capacity and green within capacity. Only the worst case scenarios (see Table 3) have been assessed to best utilise available resources. Further investigation of other options could be considered if this was deemed appropriate.

Traffic Demand	2033 AM Scenario 9	2033 PM Scenario 9	2033 AM Scenario 10	2033 PM Scenario 10
Pinch Point Scheme				
Pinch + ERR				
Pinch + ERR + Longbridge				
Pinch + J28A				
J28 Improvements				
J28 + ERR				
J28 + ERR + Longbridge				
J28 + J28A				

Table 17: Summary of J28 Options

6.4.41. This shows that in capacity terms there is very little gained by the full signalisation of J28 over the Pinch Point Scheme and that the new J28A is a better option in terms of capacity than the Longbridge. The Longbridge delivers the Eastern Relief Road and has no connection onto the M5 so the HA are less likely to object to this but this does mean that all traffic accessing the M5 will still use J28. The Eastern Relief Road will divert traffic out of the town centre but it will still arrive on Station Road so does nothing to mitigate the blocking back along this corridor. This option is also thought to offer less capacity improvement given that there is no relief of the existing J28 slip roads.

6.4.42. The new J28A option is likely to provide for the highest level of growth because of the improved access to the south and because it spreads traffic over a larger area and gives traffic to and from the south an alternative to J28. This scheme is going to be more difficult to construct because of the close proximity of the railway line and probably will not divert as much traffic out of the town centre given that the town centre relief road will be to the east of the M5, through the new community.

6.4.43. Given the close proximity of the development to J28, the existing junction will always be at or close to capacity because of the high traffic demands. Delays can be reduced at the junction by managing the traffic from the east and west to keep the slip roads within capacity. This is likely to cause delays on the local network so people will divert to the new M5 crossing point.

6.4.44. The delays at J28 can also be kept at a minimum during the masterplanning process by consideration of the internal road layout and locating the major traffic generators towards the south of the site to encourage local traffic to make use of the alternative M5 crossing point.

6.5. Cost Estimates

6.5.1. Preliminarily cost estimates have been prepared with Q2 2014 prices. At this stage of scheme identification, designs are conceptual and detailed designs need to be drawn up before an accurate cost can be estimated. No topographical information is available at this stage and no statutory undertaker's equipment has been identified. In addition, it is not clear whether there are specific cost requirements from other stakeholders. In view of these, a 45% risk contingency is included in the estimates.

6.5.2. The cost estimates in this section do not include VAT or inflation costs or design and supervision costs and land compensation. The quantities required to construct the different options are a current best estimate.

6.5.3. The costs of the individual scheme options required for J27/Willand development are summarised in Table 18 below. DCC's preferred package of schemes to unlock the commercial development is therefore estimated to cost around £32m, (£5, for signalisation, £6m for north bridge, £1m for SLTL, and £20m for all 4 slip roads).

6.5.4. If the residential development was to come forward at J27/Willand as well as the commercial, a new junction onto the M5 would be required along with the £32m scheme for J27. This infrastructure improvement is likely to cost over £50m.

	Description	Cost
J27	Full Signalisation	£5m
J27	North Bridge widen to 3 lanes	£4m
J27	North Bridge widen to 4 lanes	£6m
J27	North Bridge & Railway Bridge both widen to 4 lanes	£10m
J27	Segregated Left Turn Lane	£1m
J27	M5 South Facing Slip Roads upgrade to Auxiliary (Parallel) Lane	£5m
J27	M5 South Facing Slip Roads upgrade to Ghost Island (Tiger Tail)	£5m
J27	M5 North Facing Slip Roads upgrade to Auxiliary (Parallel) Lane	£5m
J27	M5 North Facing Slip Roads upgrade to Ghost Island (Tiger Tail)	£5m
J27A	North of Willand - South facing slip roads (skew bridge)	£22m
J27A	South of Willand - South facing slip roads (square bridge)	£20m
J27A	South of Willand - South Facing Slip Roads using existing B3181	£60m

Table 18: Estimated Costs of J27/Willand Options

6.5.5. The cost estimates for the individual scheme options required to accommodate the Cullompton developments are shown in Table 19 below. The option that provides the greatest capacity benefits is the new J28A to the North of Duke Street with an estimated cost of £40m. However, the constraints to delivery of this scheme must be noted and this cost may therefore increase.

	Description	Cost
J28	Full Signalisation and Relocate N/B On-slip	£10m
ERR	Eastern Relief Road	£15m
J28	Longbridge Overbridge	£25m
J28	Relocate S/B On-slip to Longbridge Overbridge	£5m
J28A	North of Duke Street Overbridge & South facing slip roads	£40m[10]

Table 19: Estimated Costs of Cullompton Options

[10] This does not include the cost of the distributor road through the development site as the route of this is currently unknown. This route will require bridges to cross the rivers.

7. Conclusion

7.1. Overview

7.1.1. This report has considered the highway traffic impacts of the large-scale developments proposed by Mid Devon District Council in their Local Plan Review Consultation Document (published January 2014). It has identified a number of potential improvement options to mitigate the increase in traffic forecasted for 2033.

7.2. Option 1: Expansion of Existing Towns

Cullompton

7.2.1. As discussed above in section 4.2, the modelling work to inform this report does not consider the Cullompton sites proposed under option 1.

Tiverton

7.2.2. The housing development proposed at Hartnoll Farm requires a new link road from Blundell's Road to Heathcoat Way to bypass Blundell's School. DCC's current preferred option for this route is to exploit the gap between Gornhay Orchard and the artificial playing field at the eastern end and connect onto Heathcoat Way north of Queensway. This requires negotiations with only one land owner (Blundell's School) but communications with the EA are also necessary because the majority of the link would be constructed in floodplain. The estimated cost of this is about £11m.

7.3. Option 2A: J27 / Willand

7.3.1. M5 Junction 27 requires further improvements to accommodate the commercial development proposed at J27 / Willand. The importance of M5 and the North Devon Link Road pose additional pressure to the highway authorities to maintain a reasonable level of services in the summer periods. This requires a larger improvement scheme to accommodate the summer peak traffic on top of the traditional weekday peaks.

7.3.2. The improvement options at J27 are full signalisation, approach widening, segregating left turn lane, bridge widening and slip road improvements. Initial junction performances of the combination and permutation of these elements show that the improved J27 can accommodate the commercial development for scenario 3 in 2033 with widening the northern bridge to 4 lanes as well as widening of the slip roads, full signalisation and possibly a segregated left turn lane. Widening the A361 approach over the railway bridge may also be required but given the difficulty of delivering it, it will only be considered as a last resort.

7.3.3. Various locations for J27A were considered if the residential development were to come forward at this location. However, there would still be a large demand for traffic through J27 and this junction would still be at capacity, even with new south facing slip roads onto the M5. However, the results may change when the new count data is included in the modelling process.

7.4. Option 2B: Cullompton

7.4.1. The new community to the east of Cullompton will add significant pressure to J28 of the M5, particularly in the evening peak. The only improvement possible at this junction is to signalise the western roundabout and relocate the northbound on-slip but even this is not sufficient to accommodate the additional traffic, so a new bridge crossing the M5 would be required.

7.4.2. A suitable mitigation measure would need to strategically manage the travel demand through a second east-west route across the M5 and railway. The best location for this additional bridge is just to the north of the current Duke Street Bridge, where south-facing slips can be accommodated. Construction of this scheme will be difficult given the small gap between the M5 and railway line and the floodplain covering most of the area. It will require negotiations with the Highways Agency, Environment Agency and Network Rail before a design can be agreed. This option will however not require the Eastern Relief Road as an alternative route would be provided to the east of the M5 through the new community. The estimated cost of this is £40m.

7.4.3. Modelling results of this show that J28 could be kept at capacity by limiting the amount of traffic entering the junction form the east and west. This will encourage traffic to divert to use the bridge at J28A. Traffic can also be encouraged to use the new crossing point by considering the internal road layout and location of each landuse within the development site.

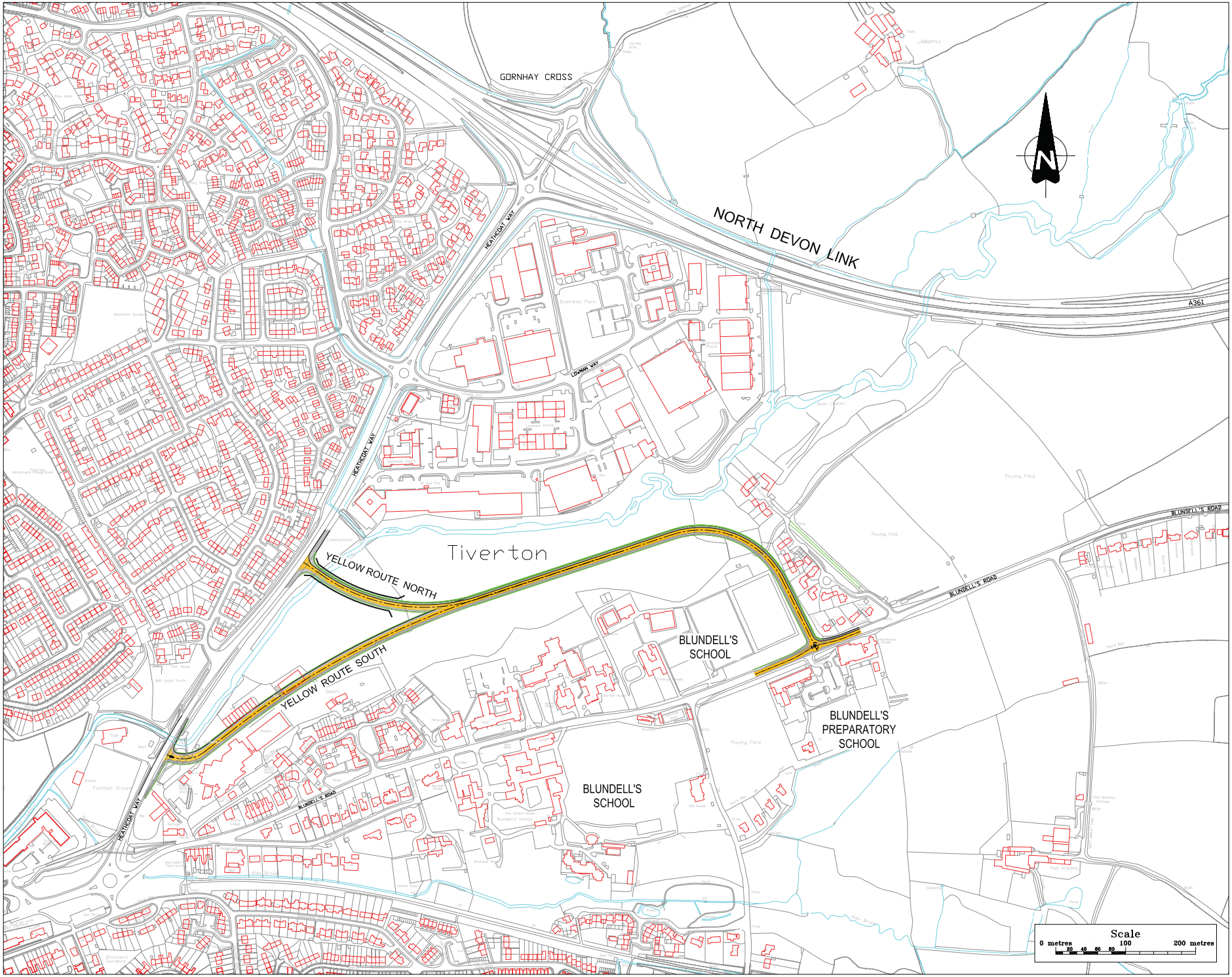
8. Further Work

8.1.1. This report identifies a number of areas where further work could be undertaken. Not least of these is the update of the J27 modelling once new traffic data counts have been undertaken. Once this count data is available, it will be compared to the inputs to the existing model. Adjustments will be made if there are significant discrepancies between the new and previous data.

8.1.2. The commercial use mixes assessed for scenarios 4, 9 and 10 are based on an assumed mix. Should further information about development proposals come forward, these will need to be re-tested as and when development proposals come forward.

8.1.3. MDDC and the local community have expressed their desire to see Cullompton railway station re-open. The County Council is currently looking into the potential demand that such a station would generate, to identify whether the business case could stack up. At present, the highway assessment does not assume that a railway station is delivered by 2033, but should this become a feasible project then a new analysis - likely to be timed according to development proposals coming forward - could be undertaken.

Figure 1: Plan of Yellow Link to Blundell's Road



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NOTES

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M Barratt	M Barratt	

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JOB

Tiverton Eastern Urban Extension.

Heathcoat Way Link Options.

DRAFT

DRAWING TITLE

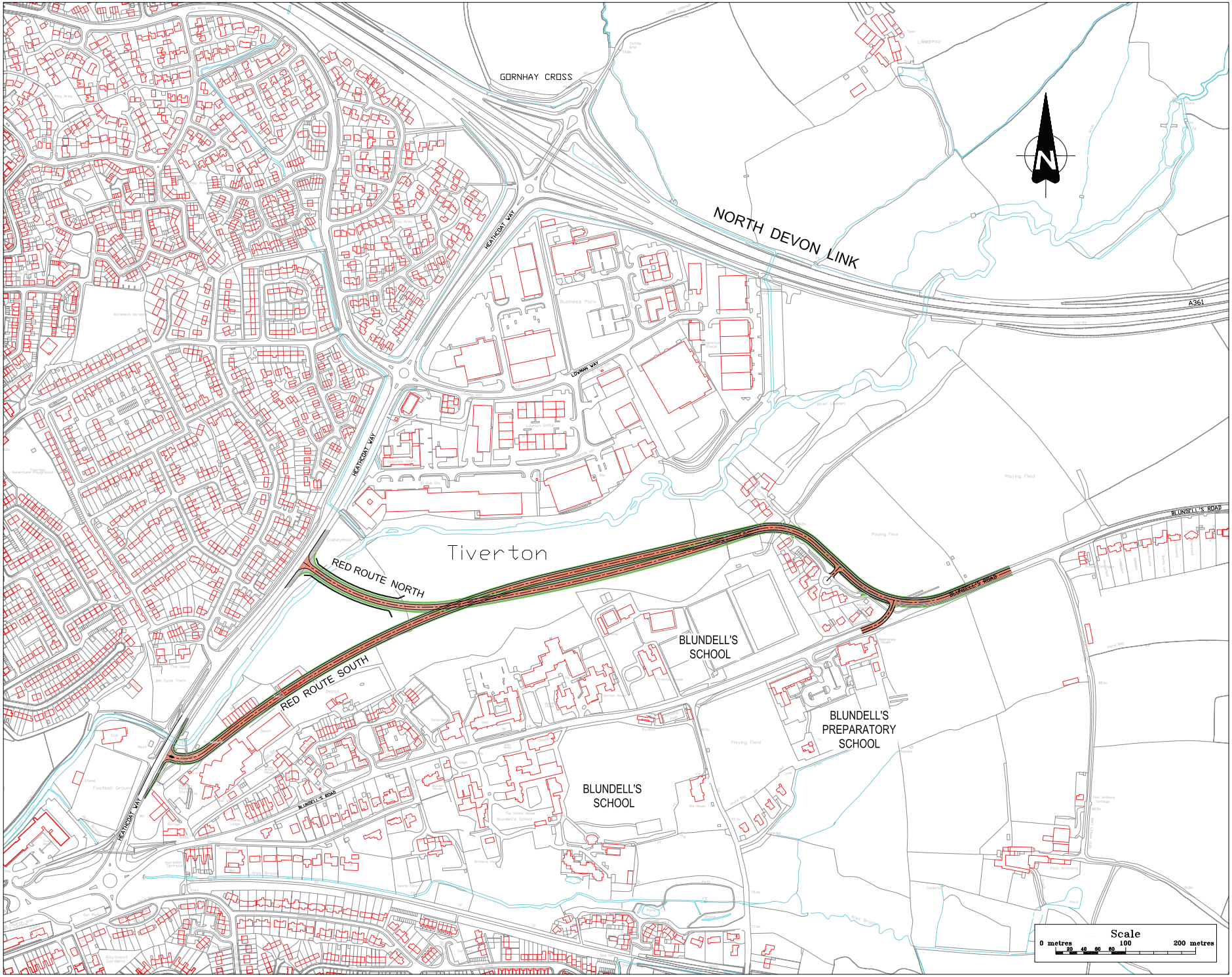
Preliminary Layout.

Yellow Route Options, North & South.

DATE 10/04/2014

drawing number C11017/15

Figure 2: Plan of Red Link to Blundell's Road



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Preliminary Layout.

Red Route Options, North & South.

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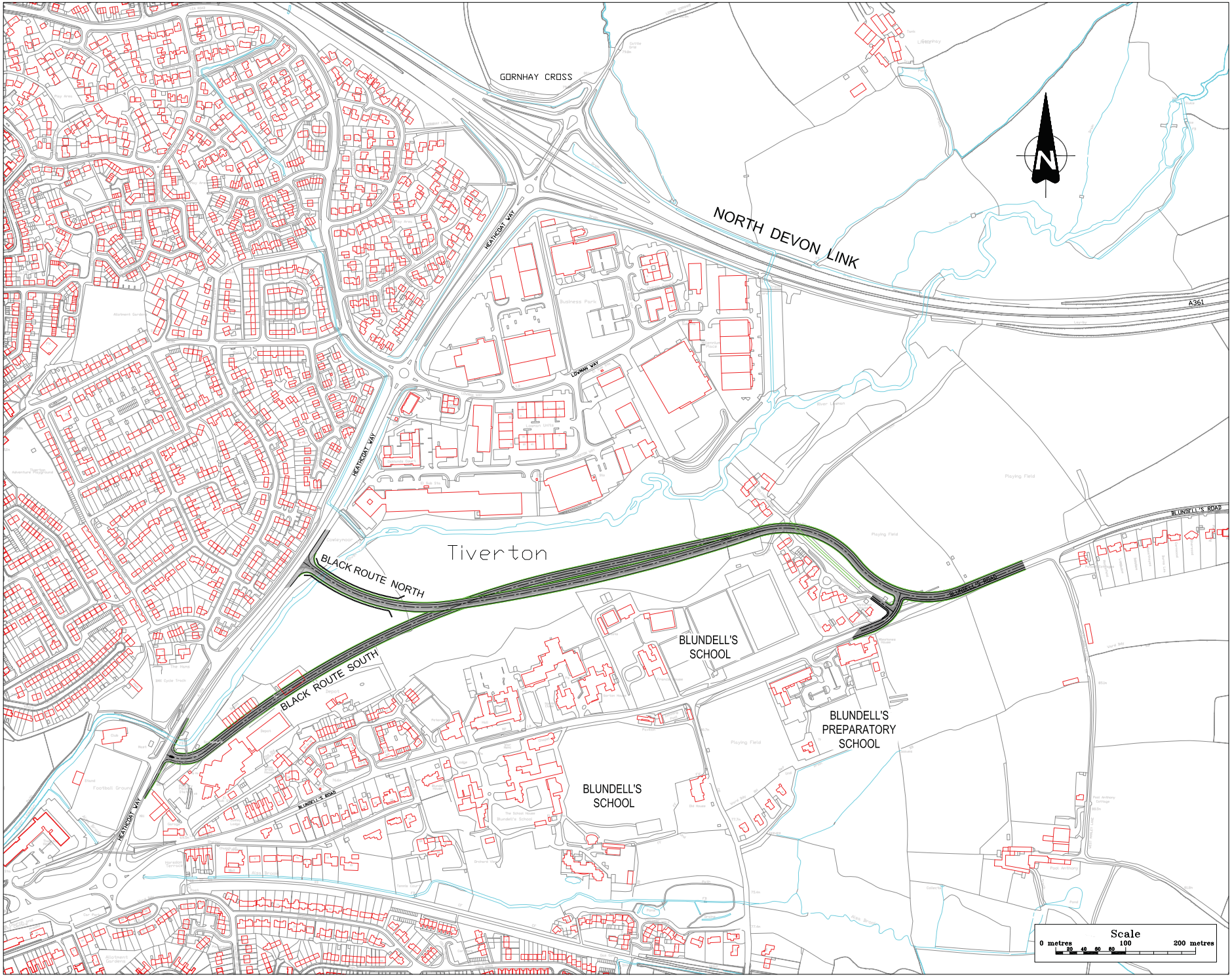
Figure 3: Plan of Black Link to Blundell's Road



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designer	drawn	reviewed
M Barratt	M Barratt	

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drawing number C11017/13

Figure 4: Location Map of J27/Willand Junctions

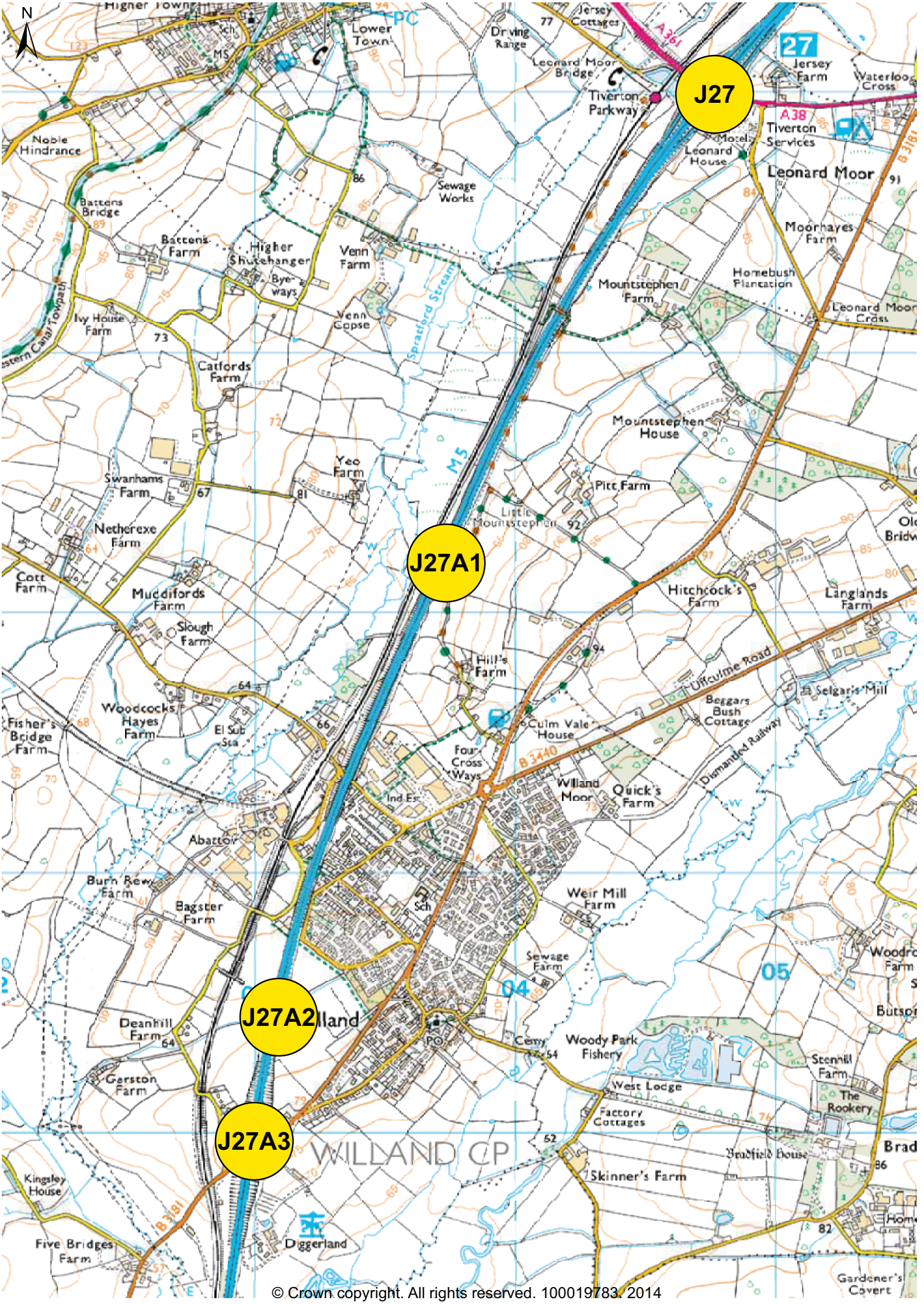
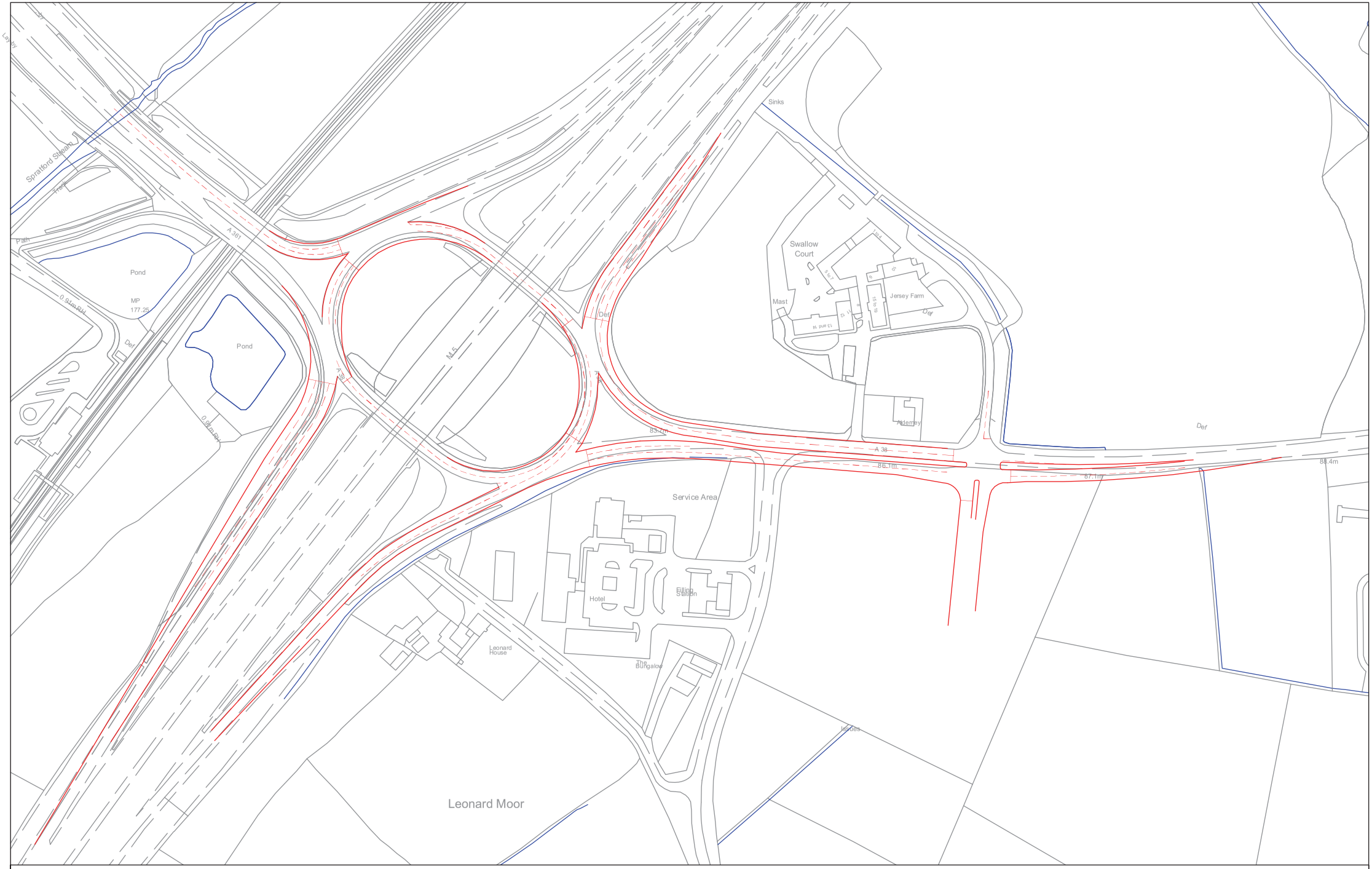


Figure 5: J27– Full Signalisation



M5 Junction 27 Full Signalisation
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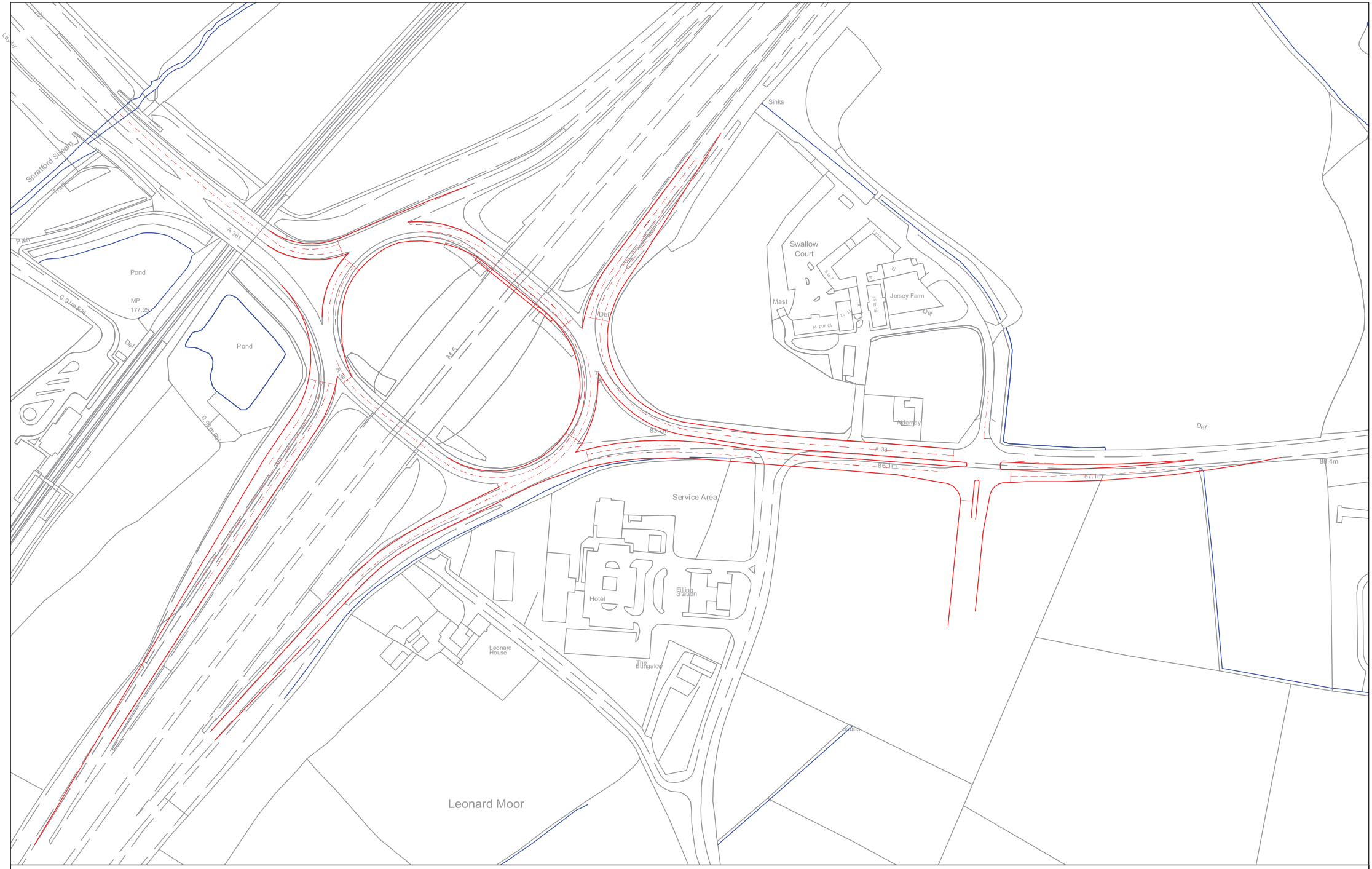
Figure 6: J27 – Widen Northern Bridge to 3 Lanes



M5 Junction 27 3 Lane North Bridge
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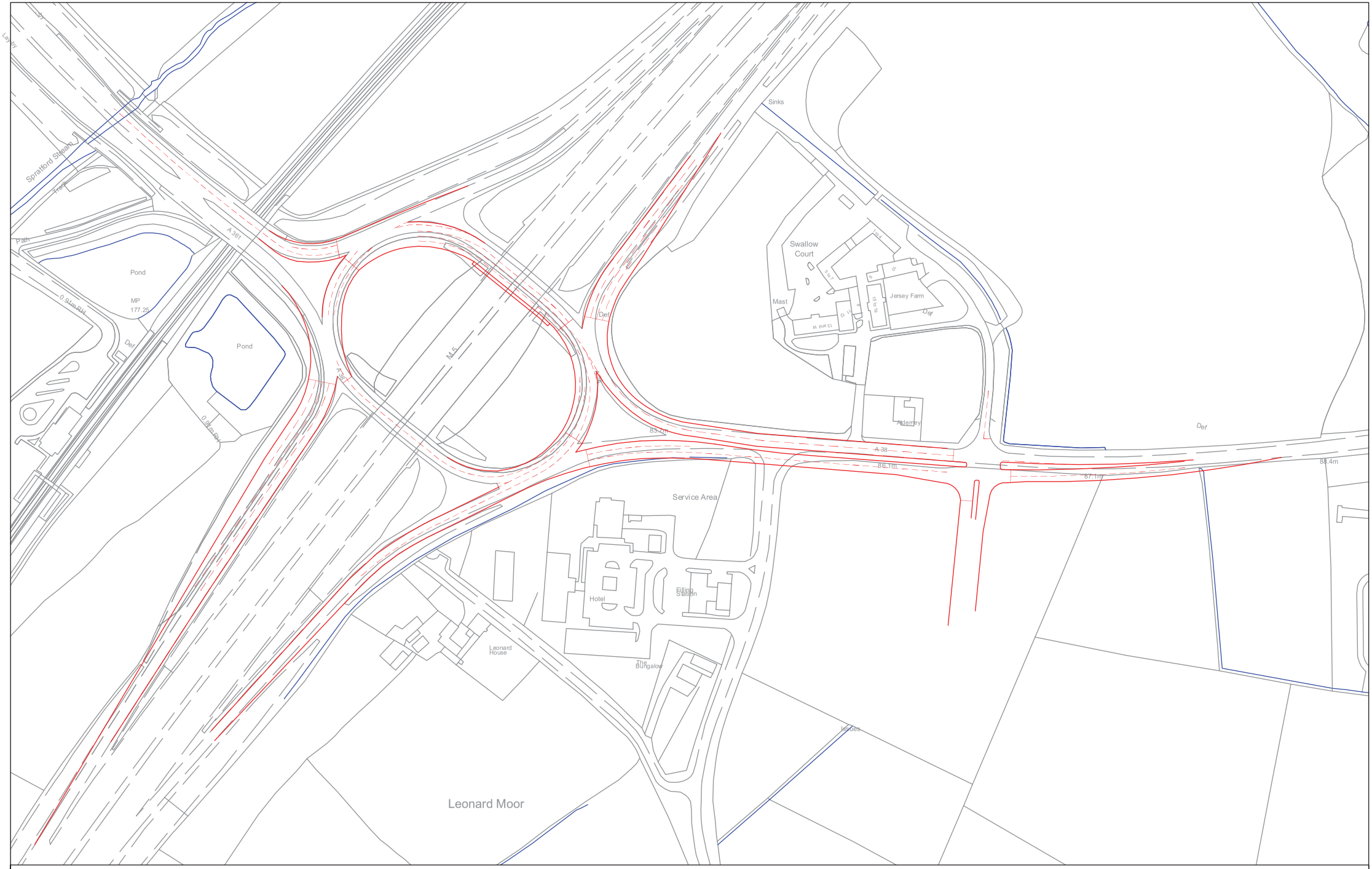
Figure 7: J27 – Widen Northern Bridge to 4 Lanes



M5 Junction 27 4-Lane North Bridge
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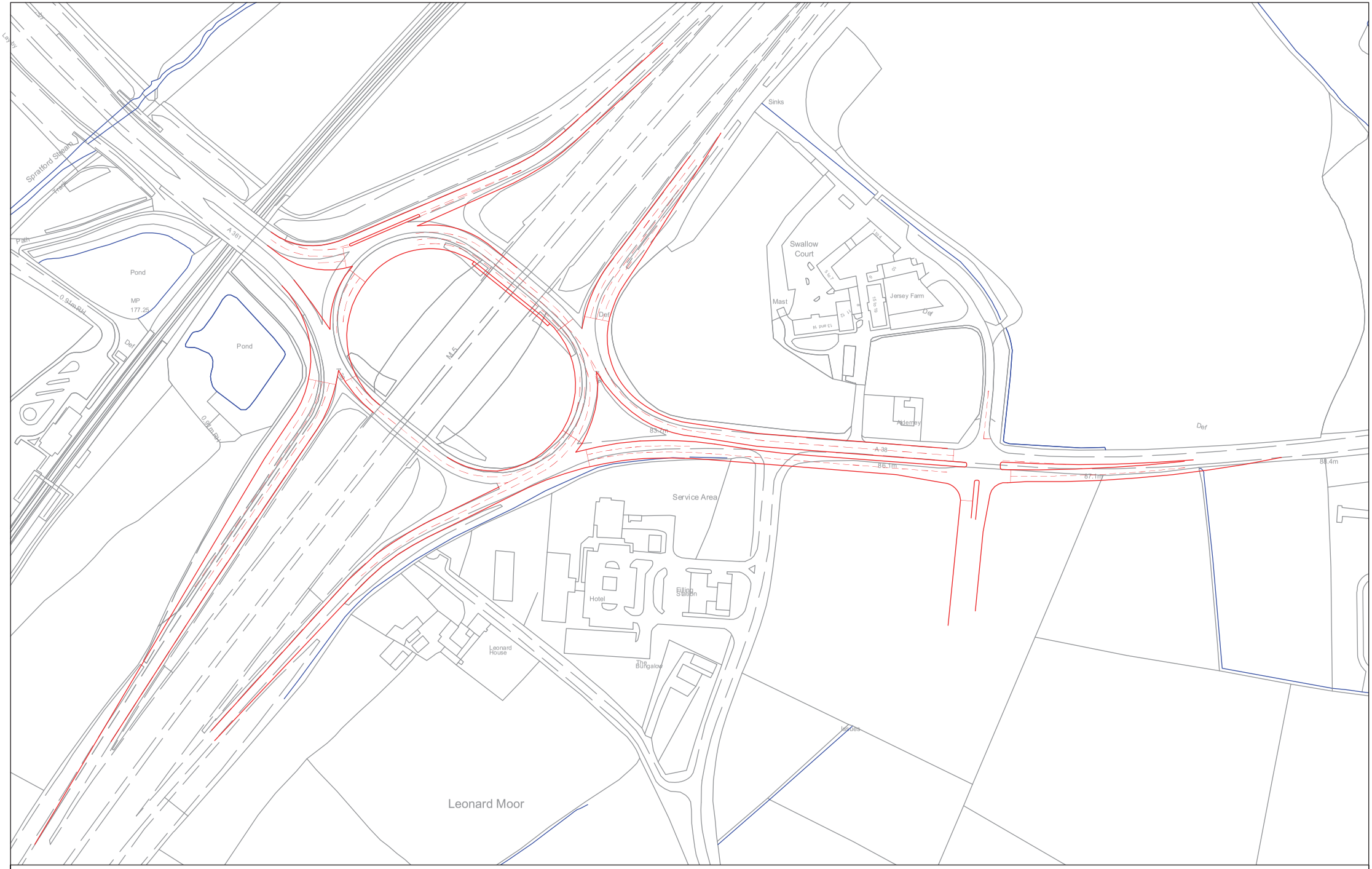
Figure 8: J27 with Segregated Left Turn Lane



M5 Junction 27 Segregated Left Turn Lane
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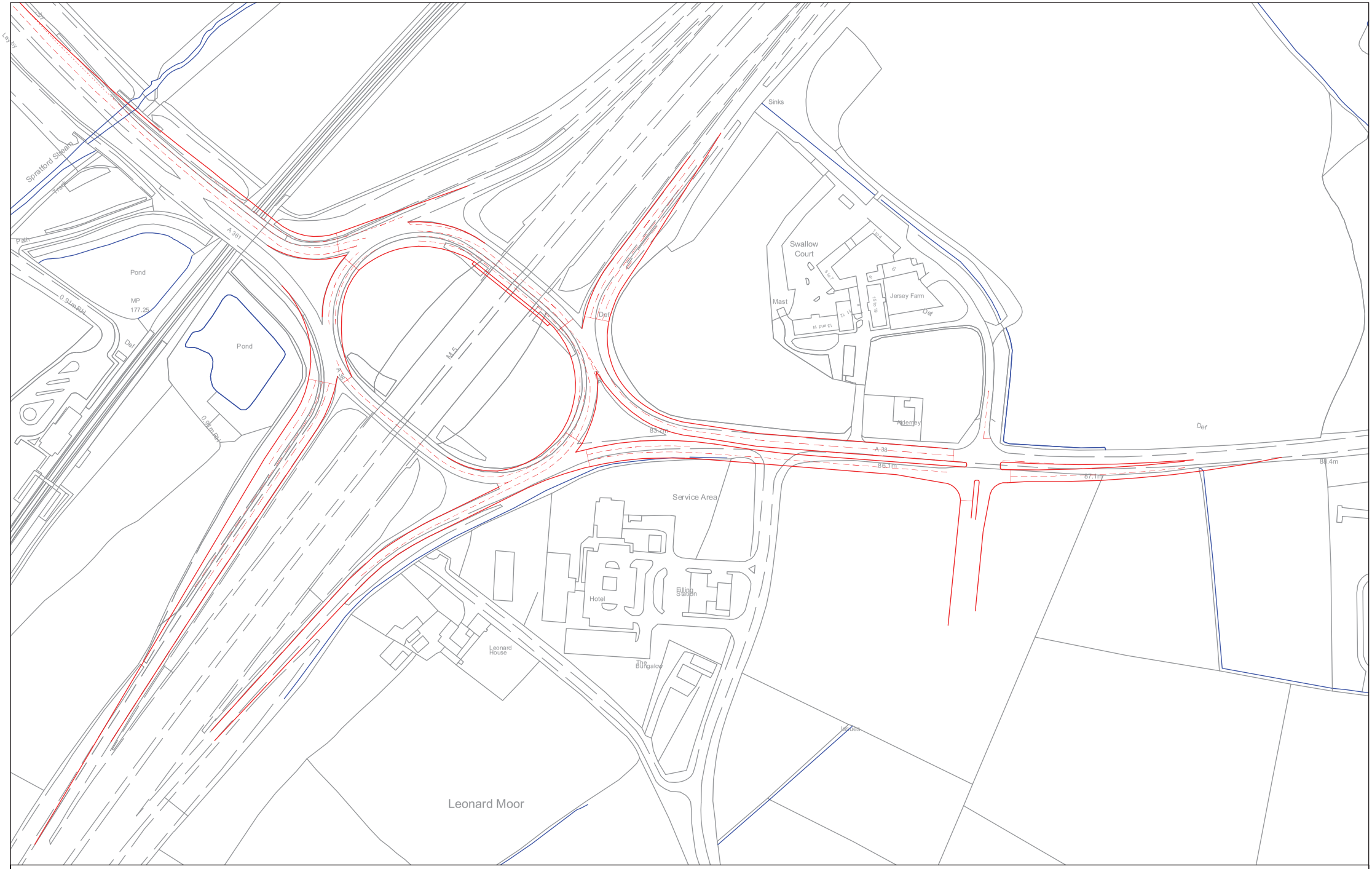
Figure 9: Widening of Railway Bridge with Segregated Left Turn Lane



M5 Junction 27 Widen Railway Bridge
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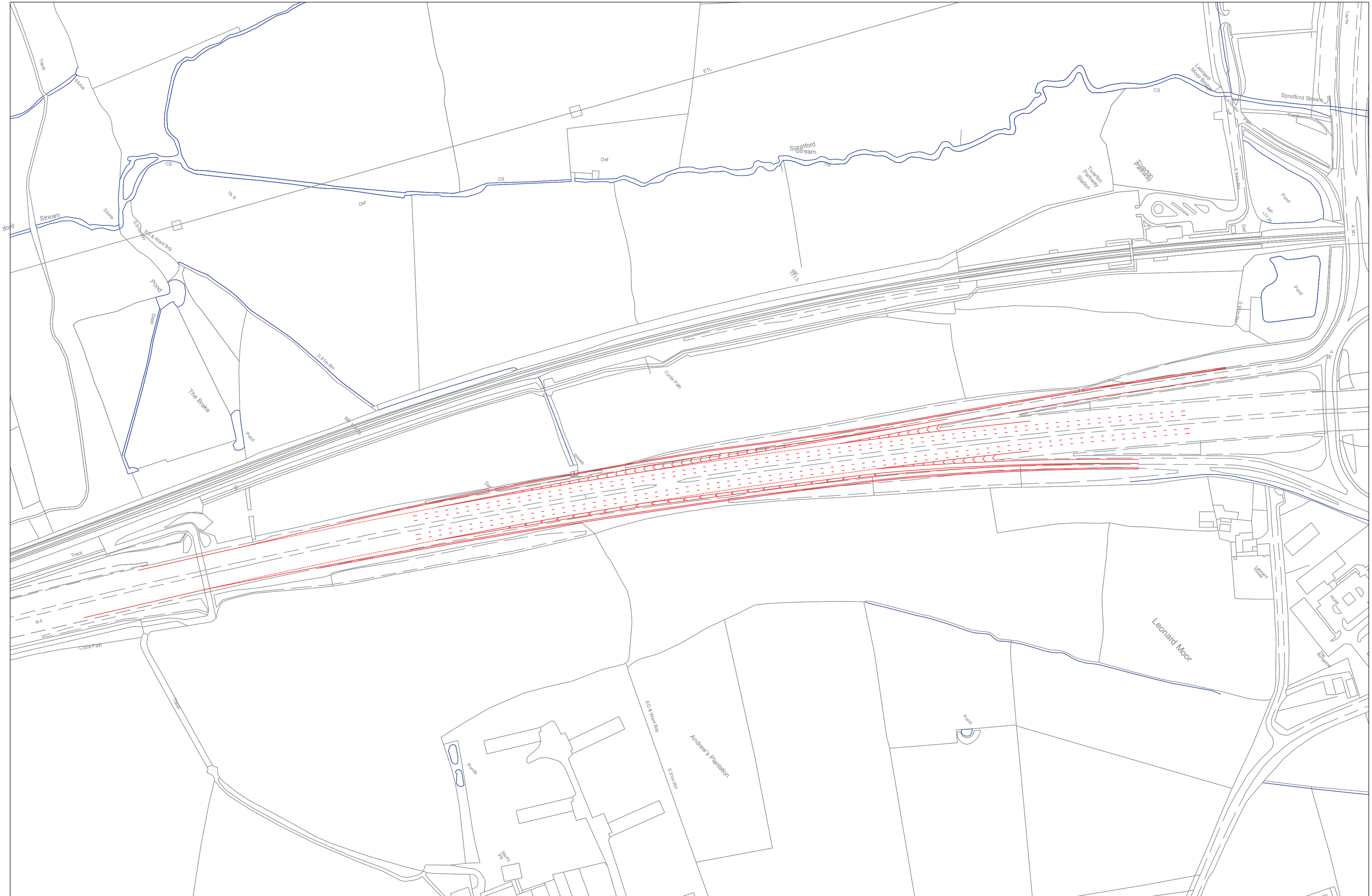
Figure 10: J27 Parallel Merge/Diverge South Facing Slips

M5 Junction 27 Parallel Merge/Diverge South Facing Slips
Scale - 1:2,000

Figure 11: J27 Ghost Island South Facing Slips



M5 Junction 27 Ghost Island South Facing Slips
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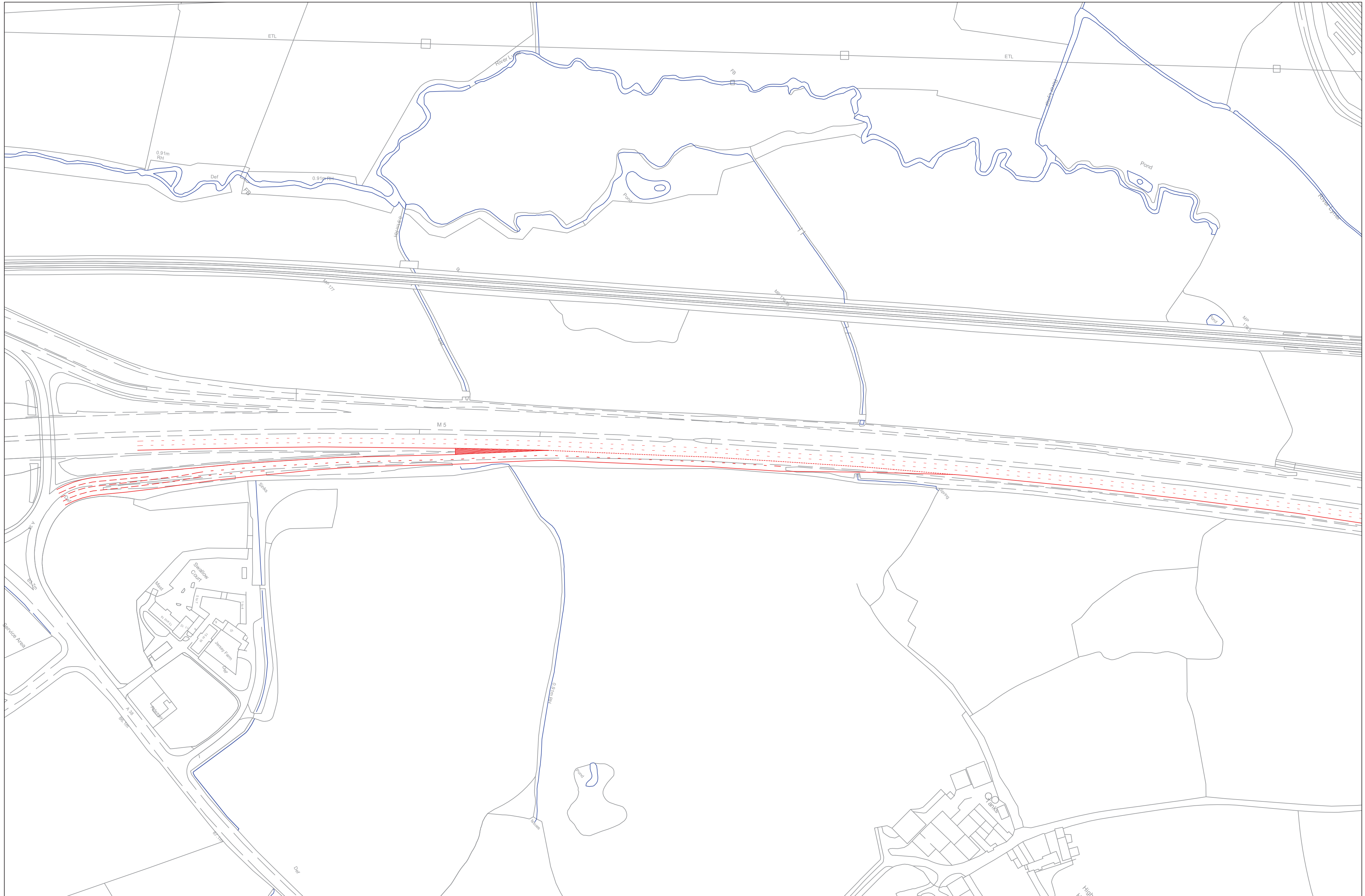
Figure 12: Parallel Lane North Facing Off-Slip Road



M5 Junction 27 Parallel Diverge North Facing Slip
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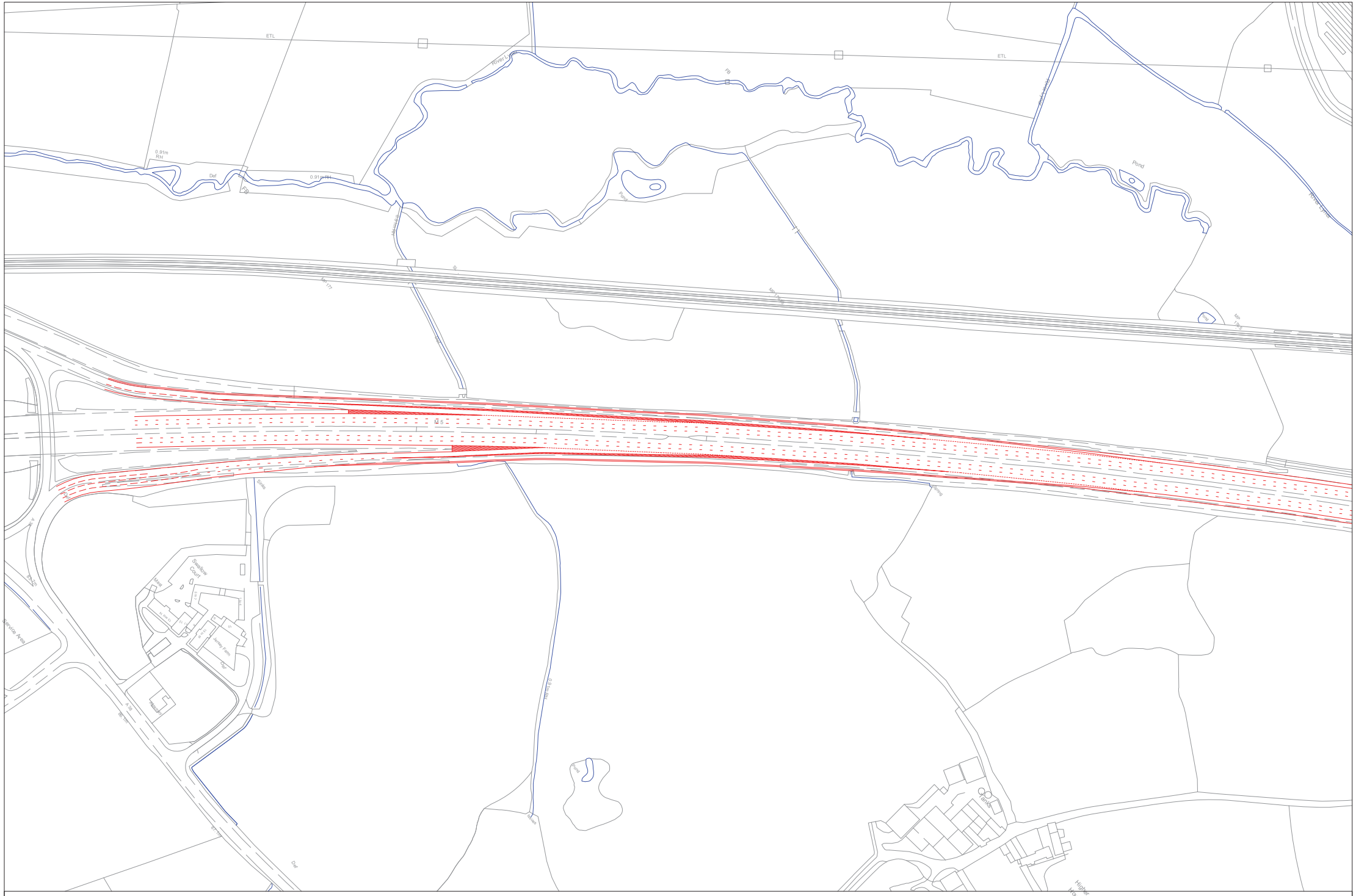
Figure 13: Ghost Island North Facing Slip Roads



M5 Junction 27 Ghost Island North Facing Slips
Scale - 1:2,000

Figure 14: J27A Option 1 – North of Willand

M5 Junction 27A North of Willand
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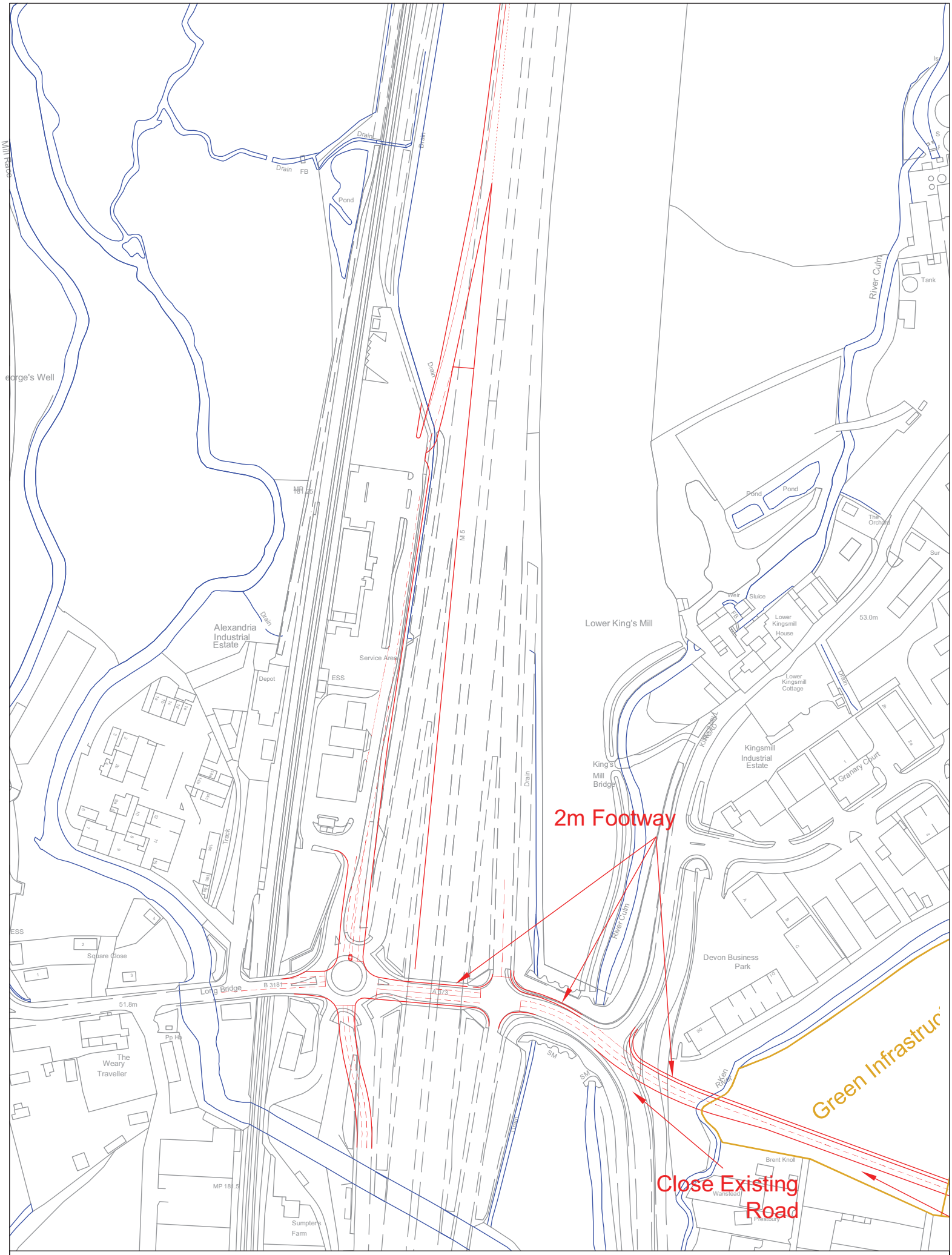
Figure 15: J27A Option 2 – South of Willand

M5 Junction 27A South of Willand
Scale - 1:2,000

Figure 16: Improve J28



M5 Junction 28 Improvement
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Figure 17: Eastern Relief Road Options

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KEY

- General Options Extent Boundary
- Option A
- Option B
- Option C
- Option D

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Cullompton Eastern Distributor

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General Options

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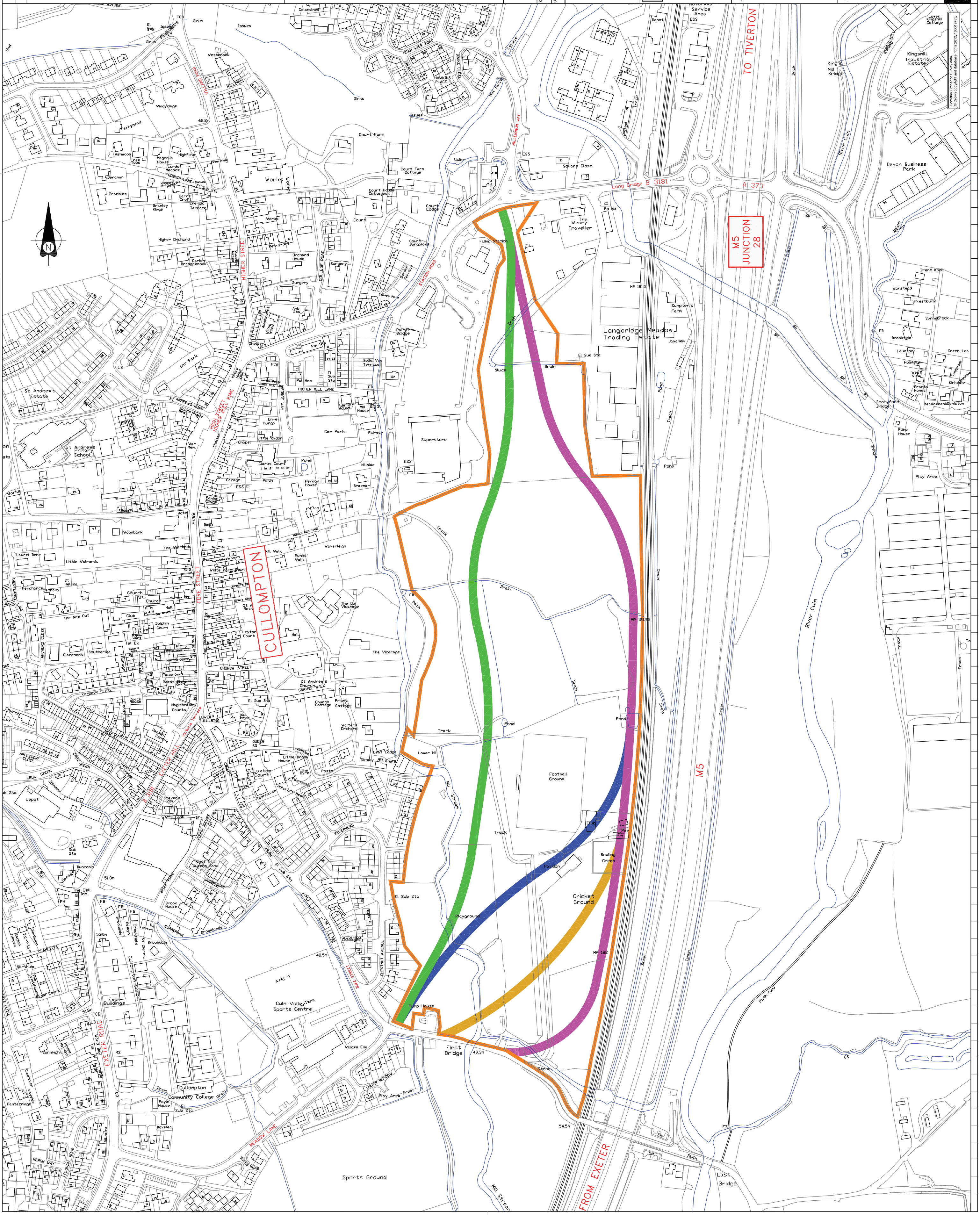
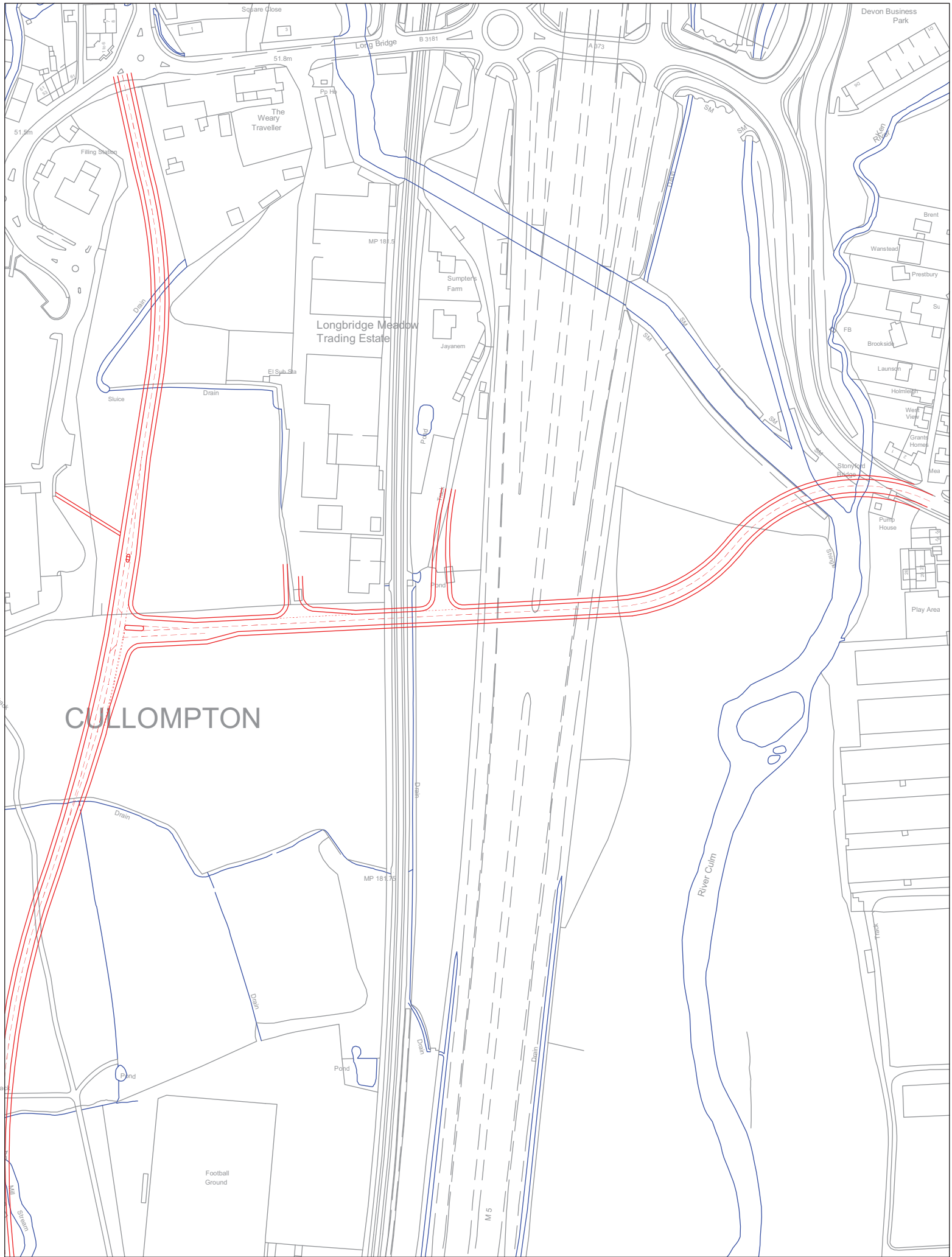
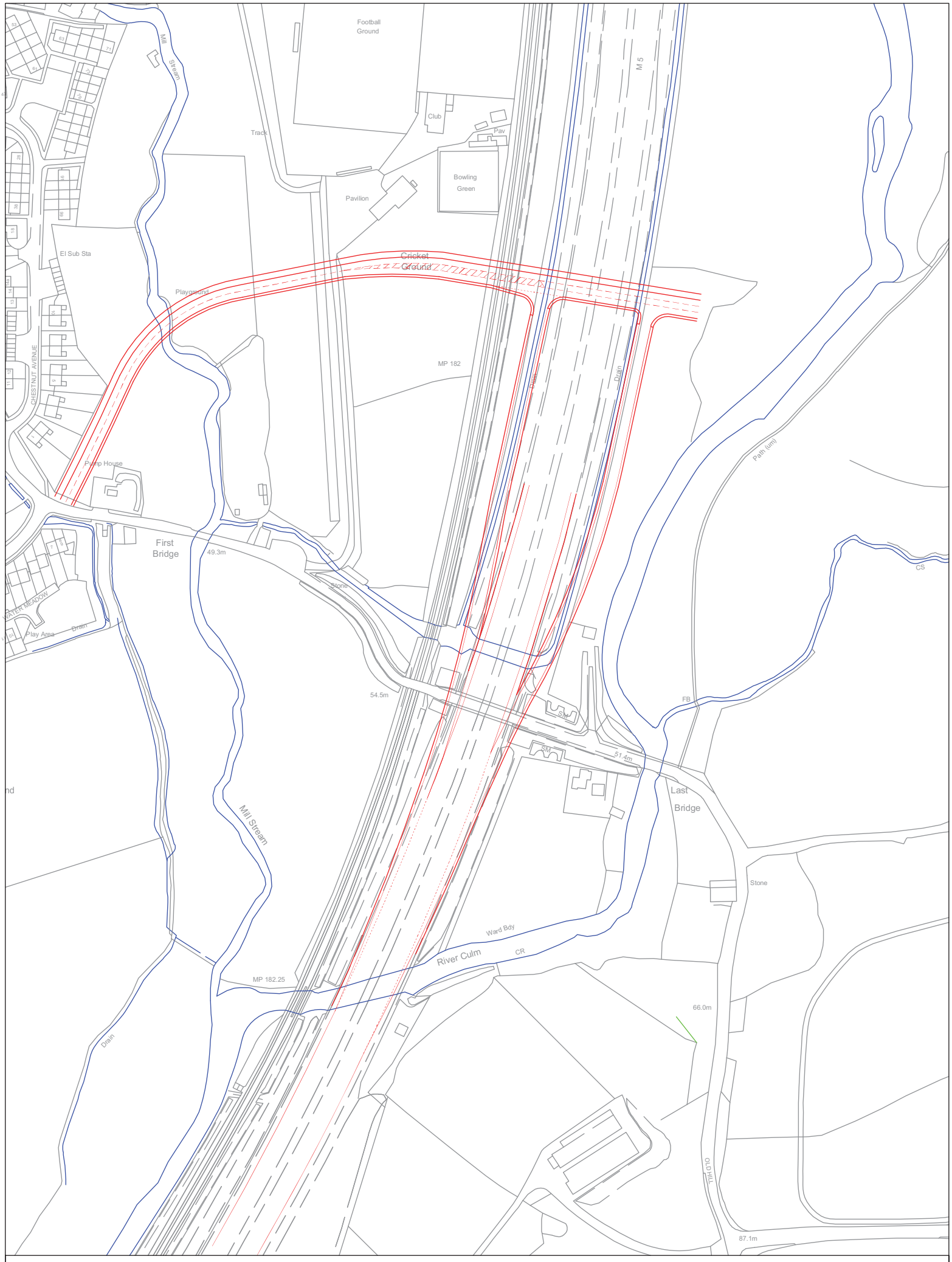


Figure 18: J28 Longbridge Overbridge



M5 Junction 28 Longbridge Overbridge
Scale - 1:2,000

Figure 19: J28A Option 1 – North of Duke Street Bridge



M5 Junction 28A North of Duke Street
Scale - 1:2,000

Appendix 1 : J27 Future Matrices

J27	M5 North	A38	M5 South	A361	Total
M5 North	0	375	1785	279	**2439**
A38	249	0	435	380	**1064**
M5 South	1666	421	0	698	**2784**
A361	474	391	887	97	**1849**
Total	**2388**	**1187**	**3107**	**1454**	**8136**

Scenario 3 AM J27

J27	M5 North	A38	M5 South	A361	Total
M5 North	0	561	2031	377	**2969**
A38	465	0	865	391	**1720**
M5 South	1927	536	0	849	**3312**
A361	488	463	636	14	**1600**
Total	**2880**	**1560**	**3532**	**1630**	**9602**

Scenario 3 PM J27

J27	M5 North	A38	M5 South	A361	Total
M5 North	0	690	3270	523	**4484**
A38	670	0	960	391	**2021**
M5 South	3719	536	0	849	**5104**
A361	1123	463	845	14	**2445**
Total	**5512**	**1689**	**5075**	**1777**	**14054**

Scenario 3 Summer J27

J27	M5 North	A38	M5 South	A361	Total
M5 North	0	452	1785	279	**2516**
A38	477	0	852	669	**1999**
M5 South	1666	561	0	698	**2924**
A361	474	495	887	97	**1953**
Total	**2617**	**1508**	**3524**	**1743**	**9392**

Scenario 5 AM J27

J27	M5 North	A38	M5 South	A361	Total
M5 North	0	763	2031	377	**3171**
A38	572	0	1059	542	**2174**
M5 South	1927	904	0	849	**3680**
A361	488	728	636	14	**1865**
Total	**2987**	**2395**	**3726**	**1781**	**10890**

Scenario 5 PM J27

J27	M5 North	A38	M5 South	A361	Total
M5 North	0	892	3270	523	**4686**
A38	778	0	1154	542	**2474**
M5 South	3719	904	0	849	**5472**
A361	1123	728	845	14	**2710**
Total	**5620**	**2524**	**5270**	**1928**	**15341**

Scenario 5 Summer J27

J27	M5 North	A38	M5 South	A361	Total
M5 North	0	375	1785	279	**2439**
A38	249	0	349	380	**978**
M5 South	1666	276	0	698	**2639**
A361	474	391	887	97	**1849**
Total	**2388**	**1042**	**3021**	**1454**	**7905**

Scenario 3 AM J27 + J27A North

J27	M5 North	A38	M5 South	A361	Total
M5 North	0	561	2031	377	**2969**
A38	465	0	576	391	**1432**
M5 South	1927	319	0	849	**3095**
A361	488	463	636	14	**1600**
Total	**2880**	**1343**	**3243**	**1630**	**9096**

Scenario 3 PM J27 + J27 North

J27	M5 North	A38	M5 South	A361	Total
M5 North	0	690	3270	523	**4484**
A38	670	0	671	391	**1733**
M5 South	3719	319	0	849	**4887**
A361	1123	463	845	14	**2445**
Total	**5512**	**1472**	**4787**	**1777**	**13548**

Scenario 3 Summer J27 + J27 North

J27	M5 North	A38	M5 South	A361	Total
M5 North	0	452	1785	279	**2516**
A38	477	0	610	669	**1757**
M5 South	1666	366	0	698	**2729**
A361	474	495	887	97	**1953**
Total	**2617**	**1313**	**3282**	**1743**	**8955**

Scenario 5 AM J27 + J27A North

J27	M5 North	A38	M5 South	A361	Total
M5 North	0	763	2031	377	**3171**
A38	572	0	704	542	**1818**
M5 South	1927	553	0	849	**3329**
A361	488	728	636	14	**1865**
Total	**2987**	**2044**	**3371**	**1781**	**10183**

Scenario 5 PM J27 + J27 North

J27	M5 North	A38	M5 South	A361	Total
M5 North	0	892	3270	523	**4686**
A38	778	0	799	542	**2119**
M5 South	3719	553	0	849	**5120**
A361	1123	728	845	14	**2710**
Total	**5620**	**2172**	**4915**	**1928**	**14635**

Scenario 5 Summer J27 + J27 North

J27	M5 North	A38	M5 South	A361	Total
M5 North	0	375	1785	279	**2439**
A38	249	0	384	380	**1012**
M5 South	1666	334	0	698	**2697**
A361	474	391	887	97	**1849**
Total	2388	1100	3055	1454	**7998**

Scenario 3 AM J27 + J27A South

J27	M5 North	A38	M5 South	A361	Total
M5 North	0	561	2031	377	**2969**
A38	465	0	692	391	**1547**
M5 South	1927	406	0	849	**3182**
A361	488	463	636	14	**1600**
Total	**2880**	**1430**	**3359**	**1630**	**9299**

Scenario 3 PM J27 + J27 South

J27	M5 North	A38	M5 South	A361	Total
M5 North	0	690	3270	523	**4484**
A38	670	0	787	391	**1848**
M5 South	3719	406	0	849	**4974**
A361	1123	463	845	14	**2445**
Total	**5512**	**1559**	**4903**	**1777**	**13750**

Scenario 3 Summer J27 + J27 South

J27	M5 North	A38	M5 South	A361	Total
M5 North	0	452	1785	279	2516
A38	477	0	749	669	1896
M5 South	1666	460	0	698	2823
A361	474	495	887	97	1953
Total	2617	1407	3421	1743	9188

Scenario 5 AM J27 + J27A South

J27	M5 North	A38	M5 South	A361	Total
M5 North	0	763	2031	377	3171
A38	572	0	870	542	1984
M5 South	1927	733	0	849	3509
A361	488	728	636	14	1865
Total	2987	2224	3537	1781	10530

Scenario 5 PM J27 + J27 South

J27	M5 North	A38	M5 South	A361	Total
M5 North	0	892	3270	523	4686
A38	778	0	965	542	2285
M5 South	3719	733	0	849	5301
A361	1123	728	845	14	2710
Total	5620	2353	5081	1928	14981

Scenario 5 Summer J27 + J27 South

Appendix 2 : J28 Future Matrices

J28	M5 North	A373	M5 South	Ind Est	Town	MSA	**Total**
M5 North	0	227	0	0	198	48	**473**
A373	401	0	823	0	33	46	**1303**
M5 South	0	230	0	0	223	77	**530**
Ind Est	0	0	0	0	1	0	**1**
Town	269	159	55	0	0	7	**490**
MSA	103	43	27	0	31	0	**204**
Total	**773**	**659**	**905**	**0**	**486**	**178**	**3001**

Scenario 9 AM ERR + Longbridge

J28	M5 North	A373	M5 South	Ind Est	Town	MSA	**Total**
M5 North	0	267	0	0	350	61	**678**
A373	379	0	430	0	81	38	**928**
M5 South	0	399	0	0	509	86	**994**
Ind Est	0	0	0	0	1	0	**1**
Town	205	263	97	0	0	6	**571**
MSA	109	29	36	0	29	0	**203**
Total	**693**	**958**	**563**	**0**	**970**	**191**	**3375**

Scenario 9 PM ERR + Longbridge

J28	M5 North	A373	M5 South	Ind Est	Town	MSA	**Total**
M5 North	0	260	0	0	193	48	**501**
A373	433	0	862	0	45	50	**1390**
M5 South	0	275	0	0	210	74	**559**
Ind Est	0	0	0	0	1	0	**1**
Town	263	163	39	0	0	7	**472**
MSA	102	48	26	0	29	0	**205**
Total	**798**	**746**	**927**	**0**	**478**	**179**	**3128**

Scenario 10 AM ERR + Longbridge

J28	M5 North	A373	M5 South	Ind Est	Town	MSA	**Total**
M5 North	0	323	0	0	336	61	**720**
A373	357	0	558	0	64	35	**1014**
M5 South	0	460	0	0	481	83	**1024**
Ind Est	0	0	0	0	1	0	**1**
Town	267	258	21	0	0	14	**560**
MSA	108	34	34	0	27	0	**203**
Total	**732**	**1075**	**613**	**0**	**909**	**193**	**3522**

Scenario 10 PM ERR + Longbridge

J28	M5 North	A373	M5 South	Ind Est	Town	MSA	**Total**
M5 North	0	197	0	0	228	48	**473**
A373	362	0	184	0	312	46	**904**
M5 South	0	120	0	0	68	77	**265**
Ind Est	0	0	0	0	1	0	**1**
Town	307	307	0	0	0	7	**621**
MSA	103	43	27	0	31	0	**204**
Total	**772**	**667**	**211**	**0**	**640**	**178**	**2468**

Scenario 9 AM J28A

J28	M5 North	A373	M5 South	Ind Est	Town	MSA	**Total**
M5 North	0	197	0	0	228	48	**473**
A373	362	0	184	0	312	46	**904**
M5 South	0	120	0	0	68	77	**265**
Ind Est	0	0	0	0	1	0	**1**
Town	307	307	0	0	0	7	**621**
MSA	103	43	27	0	31	0	**204**
Total	**772**	**667**	**211**	**0**	**640**	**178**	**2468**

Scenario 9 PM J28A

J28	M5 North	A373	M5 South	Ind Est	Town	MSA	**Total**
M5 North	0	230	0	0	223	48	**501**
A373	359	0	226	0	325	50	**960**
M5 South	0	139	0	0	64	74	**277**
Ind Est	0	0	0	0	1	0	**1**
Town	337	302	0	0	0	7	**646**
MSA	102	48	26	0	29	0	**205**
Total	**798**	**719**	**252**	**0**	**642**	**179**	**2590**

Scenario 10 AM J28A

J28	M5 North	A373	M5 South	Ind Est	Town	MSA	**Total**
M5 North	0	286	0	0	374	61	**721**
A373	366	0	49	0	322	42	**779**
M5 South	0	78	0	0	164	83	**325**
Ind Est	0	0	0	0	1	0	**1**
Town	258	408	0	0	0	6	**672**
MSA	108	34	34	0	27	0	**203**
Total	**732**	**806**	**83**	**0**	**888**	**192**	**2701**

Scenario 10 PM J28A

J28	M5 North	A373	M5 South	Town	MSA	Total
M5 North	0	197	0	228	48	**473**
A373	0	0	564	90	366	**1020**
M5 South	0	230	0	223	77	**530**
Town	0	249	315	0	357	**921**
MSA	0	43	27	31	0	**101**
Total	**0**	**719**	**906**	**572**	**848**	**3045**

Scenario 9 AM J28 + ERR + Longbridge

J28	M5 North	A373	M5 South	Town	MSA	Total
M5 North	0	407	0	210	61	**678**
A373	0	0	484	5	335	**824**
M5 South	0	402	0	506	86	**994**
Town	0	231	43	0	293	**567**
MSA	0	29	36	29	0	**94**
Total	**0**	**1069**	**563**	**750**	**775**	**3157**

Scenario 9 PM J28 + ERR + Longbridge

J28	M5 North	A373	M5 South	Town	MSA	Total
M5 North	0	230	0	223	48	**501**
A373	0	0	691	73	402	**1166**
M5 South	0	275	0	211	74	**560**
Town	0	304	210	0	351	**865**
MSA	0	48	26	29	0	**103**
Total	**0**	**857**	**927**	**536**	**875**	**3195**

Scenario 10 AM J28 + ERR + Longbridge

J28	M5 North	A373	M5 South	Town	MSA	Total
M5 North	0	286	0	373	61	**720**
A373	0	0	524	67	452	**1043**
M5 South	0	528	0	413	83	**1024**
Town	0	140	55	0	220	**415**
MSA	0	34	34	27	0	**95**
Total	**0**	**988**	**613**	**880**	**816**	**3297**

Scenario 10 PM J28 + ERR + Longbridge

J28	M5 North	A373	M5 South	Town	MSA	Total
M5 North	0	197	0	228	48	**473**
A373	0	0	150	371	372	**893**
M5 South	0	76	0	68	77	**221**
Town	0	498	113	0	351	**962**
MSA	0	43	27	31	0	**101**
Total	**0**	**814**	**290**	**698**	**848**	**2650**

Scenario 9 AM J28 + J28A

J28	M5 North	A373	M5 South	Town	MSA	Total
M5 North	0	241	0	376	61	**678**
A373	0	0	154	322	308	**784**
M5 South	0	98	0	240	86	**424**
Town	0	525	48	0	320	**893**
MSA	0	29	36	29	0	**94**
Total	**0**	**893**	**238**	**967**	**775**	**2873**

Scenario 9 PM J28 + J28A

J28	M5 North	A373	M5 South	Town	MSA	Total
M5 North	0	230	0	223	48	**501**
A373	0	0	225	373	385	**983**
M5 South	0	73	0	58	74	**205**
Town	0	511	116	0	368	**995**
MSA	0	48	26	29	0	**103**
Total	**0**	**862**	**367**	**683**	**875**	**2787**

Scenario 10 AM J28 + J28A

J28	M5 North	A373	M5 South	Town	MSA	Total
M5 North	0	285	0	374	61	**720**
A373	0	0	152	351	371	**874**
M5 South	0	204	0	249	83	**536**
Town	0	520	16	0	301	**837**
MSA	0	34	34	27	0	**95**
Total	**0**	**1043**	**202**	**1001**	**816**	**3062**

Scenario 10 PM J28 + J28A

Appendix 3: Assessment of Highway Options to Accommodate Potential Developments

Environmental Review of Options

INTRODUCTION

This section includes an environmental review of the potential scheme options. This has been undertaken using existing data sets about environmental features. It is essentially a desktop review, with further environmental work to be undertaken at a later stage. The review is intended to identify any serious environmental risks at this early stage of option development.

SCORING METHODOLOGY

The following scoring methodology has been applied to various environmental criteria for each junction option. Where impacts may be either negative or positive (where further investigation is required), the scoring reflects the potential for negative impacts, thus taking a precautionary approach. Scoring results may change as designs progress and more information becomes available about detailed alignments or as further investigation is undertaken.

Score	Reason
High risk of negative impact	There may be irreversible or permanent adverse impact upon valued environmental assets or functions which could not be mitigated to acceptable levels. There is a specific focus on environmental assets within approximately 250m of the site, but other assets that are further away are also considered.
Medium risk of negative impact	There is potential risk of significant adverse impacts on valued environmental assets but mitigation measures could feasibly reduce risk to acceptable levels. There is a specific focus on environmental assets within approximately 250m of the site, but other assets that are further away are also considered.
Potential positive impact	There are potential opportunities to positively impact on environmental assets. There is a specific focus on environmental assets within approximately 250m of the site, but other assets that are further away are also considered.
No anticipated risk	There is no anticipated risk of harm, or minor risks could be avoided or mitigated effectively with standard design / mitigation practices. There is a specific focus on environmental assets within approximately 250m of the site, but other assets that are further away are also considered.

ENVIRONMENTAL REVIEW OF OPTIONS

Blundell's Road to Heathcoat Way Link

No.	Impact criteria	Score	Comments
1	Localised population and land take	Medium risk of negative impact	As a new link road, this scheme would require significant landtake. There are some existing properties at Gornhay Orchard which may be affected by this scheme, and some of the alignments investigated will impact on Blundell's School playing fields. Potential alignments should be considered further to reduce this. Further communication with landowners including Blundell's school will be necessary.
2	Impact on adopted Devon Minerals Local Plan Consultation Area	No anticipated risk	The junction is not within 1km of a Minerals Local Plan Consultation Area and therefore there is considered to be minimal risk to the sterilisation, or working of, mineral deposits.
3	Impact on Special Areas for Conservation (SAC), Special Protection Areas (SPA) or Ramsar sites	No anticipated risk	There are no SACs, SPAs or Ramsar sites within 1km of this scheme. Culm Grassland SAC is over 12.9km to the north west. The distance from the internationally protected sites is considered sufficient to result in, at most, negligible harm.
4	Impact on biological Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNRs) or Local Nature Reserves (LNRs).	Medium risk of negative impact	The Tidcombe Lane Fen SSSI extends within 200m of this scheme to the south. This is an area of unimproved marshy grassland providing a purple moor grass and rush pasture habitat. The Grand Western Canal Country Park Local Nature Reserve extends within 1km of the routing of the road. Utilising standard design and mitigation practices to avoid contamination and pollution of ground and surface water should reduce risks from impacts via waterways to negligible. The Highways Agency Design Manual for Roads and Bridges sets out that impacts from air pollution associated with road schemes within 200m should be considered (http://www.dft.gov.uk/ha/standards/dmrb/vol11/section3/ha20707.pdf para 3.13). Further assessment may therefore be required. Impacts may be positive or negative, but have been scored as potentially negative risk - taking a cautious approach.
5	Impact on County Wildlife Sites or non-designated nature reserves	No anticipated risk	The Grand Western Canal County Wildlife Site is within 1km of the route. No physical harm is anticipated to this asset.
6	Impact on Strategic Nature Areas (SNAs)	No anticipated risk	There are no Strategic Nature Areas within 1km of the route.
7	Impact on protected species that have been sighted within approx. 250m of the junction location.	Medium risk of negative impact	Within 250m of the route there have been sightings of otters and a Red Kite. Within 1km of the site there has been sightings of a numerous bats, as well as, otters, badgers, a slow worm, a Common Frog and moths. This and other surveys relating to the recent development of Gornhay Orchard suggest that protected species may be present and the scheme as proposed may result in de-vegetation. As such, it is considered that there may be medium risk of harm to protected species. Several scheme alignments have already been considered to reduce this impact but further detailed work will be required.

No.	Impact criteria	Score	Comments
8	Potential to lead to loss or damage of ancient woodland	No anticipated risk	There are no areas of ancient woodland within 1km of this route.
9	Impact upon priority habitats	Medium risk of negative impact	There are three priority habitats to the south of this route, two of which extends within 250m of this route. These are Purple moor grass and rush pasture and Fens. Within 1km are areas of Traditional Orchard. Fens are sensitive to nitrogen deposition. Given the distance, air quality impacts may need to be assessed and mitigation may be required. Utilising standard design and mitigation practices to avoid contamination and pollution of ground and surface water should reduce risks from impacts via waterways to negligible
10	Impact on the Jurassic Coast World Heritage Site (WHS)	No anticipated risk	The Jurassic Coast World Heritage Site is over 29km away from this option. This option is a considerable distance from this designation; development of this junction presents no risk of harm to the WHS.
11	Impact on Regionally Important Geological Sites (RIGS)	No anticipated risk	There are no RIGS within 1km of this junction option meaning that there would be no physical impact.
12	Impact on a geological Site of Special Scientific Interest (SSSI)	No anticipated risk	There are no geological SSSIs within 1km of this junction option meaning that there would be no physical impact.
13	Impact on Areas of Outstanding Natural Beauty (AONB) and/or National Park	No anticipated risk	Exmoor National Park is over 12km to the north of the route. The Blackdown Hills AONB is over 11km from the route. The built up surrounding area suggests visual impacts will be minimal. Any residual impacts are likely to be overcome by screening and design.
14	Impact upon Registered Historic Parks and Gardens including setting	No anticipated risk	There are no Registered Historic Parks and Gardens within 1km of this route.
15	Impact on Scheduled Monuments (SM) and archaeology of equivalent status (including setting)	No anticipated risk	There are no Scheduled Monuments within 1km of this route.
16	Impact on Grade I / II* and II listed buildings including setting	Medium risk of negative impact	Within 250m there is one Grade II listed building to the north east of the route. The setting of this building will need to be considered. Within 1km, there are a number of listed buildings. The setting of these buildings may also need to be considered.

No.	Impact criteria	Score	Comments
17	Potential loss of or damage to non-designated heritage assets (including locally listed buildings, locally listed parks and gardens and archaeology)	No anticipated risk	There are two non-designated assets to the east of the route within 1km. The potential alignments will not result in the loss or damage to these assets.
18	Impact on Conservation Areas (CA)	Medium risk of negative impact	Currently, there are two designated Conservation Areas; Tiverton CA and Grand Western Canal CA. The setting of these CAs may need to be considered; however, the route and the CAs are separated by a significant amount of built development. The route is adjacent to, and goes through, the proposed Blundell's Conservation Area. The impact on the character of this area will need to be assessed. Mitigation may be required through design.
19	Proximity to and impact upon Flood Zones 2 and 3	Potential positive impact	New infrastructure in this location would be located on Flood Zone 3. However, initial discussions with the Environment Agency suggest that this scheme 'could deliver an overall reduction in flood risk if a strategic approach is adopted'.
20	Impact on Air Quality Management Areas (AQMAs) (including proposed)	No anticipated risk	There is no AQMA in the surrounding area.

Improved Junction 27

No.	Impact criteria	Score	Comments
1	Localised population and land take	No anticipated risk	Due to the nature of the scheme (enlarging the existing junction), it is not anticipated that significant land take or impact on properties will occur.
2	Impact on adopted Devon Minerals Local Plan Consultation Area	No anticipated risk	There are no Minerals Local Plan Consultation Areas within 250m of this option. Hillhead Quarry Consultation Area is within 1km of the option, however because the option does not lie within the Consultation Area, there is considered to be minimal risk to the sterilisation, or working of, mineral deposits.
3	Impact on Special Areas for Conservation (SAC), Special Protection Areas (SPA) or Ramsar sites	No anticipated risk	There are no SACs, SPAs or Ramsar sites within 250m or 1km of this option. Exmoor Heaths SAC is the closest at approximately 16km to the north west. The distance from the internationally protected sites is considered sufficient to result in, at most, negligible harm.

No.	Impact criteria	Score	Comments
4	Impact on biological Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNRs) or Local Nature Reserves (LNRs).	No anticipated risk	There are no SSSIs, NNRs or LNRs within 250m of this junction option. Within 1km to the north west is the Grand Western Canal Country Park Local Nature Reserve. Also, Maiden Down SSSI, a lowland dry and wet heath supporting a rich invertebrate fauna, is approximately 3.9km to the north east. It is therefore anticipated that there will be no physical impact on these sites. Utilising standard design and mitigation practices to avoid contamination and pollution of ground and surface water should reduce risks from impacts via waterways to negligible. Heathland is sensitive to nitrogen deposition. The Highways Agency Design Manual for Roads and Bridges sets out that impacts from air pollution associated with road schemes beyond 200m need not be considered (http://www.dft.gov.uk/ha/standards/dmrb/vol11/section3/ha20707.pdf para 3.13). As the distance between this scheme and the afore-mentioned designated areas is greater than this, minimal impact is anticipated.
5	Impact on County Wildlife Sites or non-designated nature reserves	No anticipated risk	There are no County Wildlife Sites or non-designated nature reserves within 250m of this junction option. Within 1km to the north west is the Grand Western Canal County Wildlife Site, associated with wetland flora and marshy grassland. The Mountstephen Farm Unconfirmed Wildlife Site, which contains broadleaved woodland, also lies within 1km south east the option. It is therefore anticipated that there will be no physical impact on these sites. Utilising standard design and mitigation practices to avoid contamination and pollution of ground and surface water should reduce risks from impacts via waterways to negligible. Regarding air pollution, the Highways Agency Design Manual for Roads and Bridges sets out that impacts from air pollution associated with road schemes beyond 200m need not be considered (http://www.dft.gov.uk/ha/standards/dmrb/vol11/section3/ha20707.pdf para 3.13). As the distance between this scheme and the afore-mentioned designated areas is greater than this, minimal impact is anticipated.
6	Impact on Strategic Nature Areas (SNAs)	No anticipated risk	There are no SNAs within either 250m or 1km of the site, and therefore minimal impact or change is anticipated.
7	Impact on protected species that have been sighted within approx. 250m of the junction location.	Medium risk of negative impact	Within 1km, a number of protected species have been sighted, including otters, badgers and Common Pipistrelle bats. Due to the nature of the schemes being considered at this location, it is not anticipated that there will be significant de-vegetation and therefore not anticipated that there will be significant impacts on bat species. However, further assessment is required to rule this out and as such a 'medium risk' score has been given against this criteria.
8	Potential to lead to loss or damage of ancient woodland	No anticipated risk	There is no ancient woodland within 1km of the option and therefore impacts will be minimal.
9	Impact upon priority habitats	No anticipated risk	There are no priority habitats within 250m of the site. Within 1km south east of this junction option, there is an area of Lowland Mixed Deciduous Woodland. The nature of the scheme in combination with standard design / mitigation practices will reduce potential impacts to minimal.
10	Impact on the Jurassic Coast World Heritage Site (WHS)	No anticipated risk	The Jurassic Coast World Heritage Site is over 27.8km away from this junction option. This junction is a considerable distance from this designation; development of this junction presents no risk of harm to the WHS.

No.	Impact criteria	Score	Comments
11	Impact on Regionally Important Geological Sites (RIGS)	No anticipated risk	There are no RIGS within 1km of this junction option meaning that there would be no physical impact.
12	Impact on a geological Site of Special Scientific Interest (SSSI)	No anticipated risk	There are no geological SSSIs within 1km of this junction option meaning that there would be no physical impact.
13	Impact on Areas of Outstanding Natural Beauty (AONB) and/or National Park	No anticipated risk	The option is approximately 5.5km west of the Blackdown Hills AONB. The nature of the scheme will result in minimal change from any visible points from the AONB. Any visual impacts are likely to be overcome by screening and design.
14	Impact upon Registered Historic Parks and Gardens including setting	No anticipated risk	There are no Registered Historic Parks and Gardens within 1km of the junction.
15	Impact on Scheduled Monuments (SM) and archaeology of equivalent status (including setting)	No anticipated risk	There are no recorded Scheduled Monuments or archaeological features within 1km of the junction.
16	Impact on Grade I / II* and II listed buildings including setting	No anticipated risk	There are no listed buildings within 250m of the junction. Within 1km, there are two Grade II listed buildings. Due to the distance and location of these buildings in relation to the junction, and the nature of the scheme, it is considered there will be no impact on the character or setting of these buildings.
17	Potential loss of or damage to non-designated heritage assets (including locally listed buildings, locally listed parks and gardens and archaeology)	No anticipated risk	There are no non-designated heritage assets within 1km of the junction.
18	Impact on Conservation Areas (CA)	No anticipated risk	There are no Conservation Areas within 250m of this option. The Grand Western Canal Conservation Area extends within 1km of the option. The distance of this Conservation Area in relation to the existing junction, and the nature of the scheme, will result in no impact on the setting of the area.
19	Proximity to and impact upon Flood Zones 2 and 3	No anticipated risk	Flood Zone 2 runs adjacent to the north and west of the junction and Flood Zone 3 is within 250m in this direction. Junction design will need to take account of flooding issues, however minimal impact is anticipated due to the nature of scheme - relatively minor expansion of an existing junction.

No.	Impact criteria	Score	Comments
20	Impact on Air Quality Management Areas (AQMAs) (including proposed)	No anticipated risk	The junction and surrounding area is not covered by an AQMA.

Junction 27a - Option 1 (north of Willand)

No.	Impact criteria	Score	Comments
1	Localised population and land take	Medium risk of negative impact	Being a brand-new junction with access roads, it is anticipated that this junction option would result in significant land-take. There are also local residences and businesses that may be affected.
2	Impact on adopted Devon Minerals Local Plan Consultation Area	No anticipated risk	The junction is not within 1km of a Minerals Local Plan Consultation Area and therefore there is considered to be minimal risk to the sterilisation, or working of, mineral deposits.
3	Impact on Special Areas for Conservation (SAC), Special Protection Areas (SPA) or Ramsar sites	No anticipated risk	There are no SACs, SPAs or Ramsar sites within 1km of this option. Exmoor Heaths SAC is the closest at approximately 17km to the north west. The distance from the internationally protected sites is considered sufficient to result in, at most, negligible harm.
4	Impact on biological Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNRs) or Local Nature Reserves (LNRs).	No anticipated risk	There are no SSSIs, NNRs or Local Nature Reserves within 1km of this option. It is therefore anticipated that there will be no physical impact on these sites. Maiden Down SSSI, a lowland dry and wet heath supporting a rich invertebrate fauna, is the closest at approximately 5.9km to the north east. Utilising standard design and mitigation practices to avoid contamination and pollution of ground and surface water should reduce risks from impacts via waterways to negligible. The Highways Agency Design Manual for Roads and Bridges sets out that impacts from air pollution associated with road schemes beyond 200m need not be considered (http://www.dft.gov.uk/ha/standards/dmrb/vol11/section3/ha20707.pdf para 3.13). As the distance between this scheme and the afore-mentioned designated area is greater than this, minimal impact is anticipated.
5	Impact on County Wildlife Sites or non-designated nature reserves	Medium risk of negative impact	There are no County Wildlife Sites within 1km of this option. To the west of this option, within 250m, is the Yeo Farm – Burn Rew Farm Marsh Unconfirmed Wildlife Site (UWS), adjacent to the west of the railway. This is a possible flood plain grazing marsh. The concept for this option indicates there will not be a direct loss of this UWS. However, the increase in traffic may lead to a reduction in air quality. Drainage and water contamination issues would also need to be investigated further. Impacts will need to be assessed and appropriate mitigation measures may be required.
6	Impact on Strategic Nature Areas	No anticipated	There are no Strategic Nature Areas within 1km of this option, and therefore minimal impact or change is anticipated.

No.	Impact criteria	Score	Comments
	(SNAs)	risk	
7	Impact on protected species that have been sighted within approx. 250m of the junction location.	Medium risk of negative impact	There have been no sightings of protected species within 250m of the potential junction location. Although within 1km there have been sightings of a badger, a slow-worm and a bat. This suggests that protected species may be present and the scheme as proposed may result in de-vegetation. As such, it is considered that there may be medium risk of harm to protected species.
8	Potential to lead to loss or damage of ancient woodland	No anticipated risk	There is no ancient woodland within 1km of the option and therefore impacts will be minimal.
9	Impact upon priority habitats	Medium risk of negative impact	There is a priority habitat of coastal and floodplain grazing marsh within 250m of the option, adjacent to the west of the railway. Within 1km of the potential junction location, there are two areas of Traditional Orchard to the south east and south west. However, these are both noted to be in poor condition. This option has the potential to impact on these priority habitats in terms of air quality. Drainage and water contamination issues would also need to be investigated further. Impacts will need to be assessed and appropriate mitigation may need to be applied.
10	Impact on the Jurassic Coast World Heritage Site (WHS)	No anticipated risk	The Jurassic Coast World Heritage Site is over 26km away from this site. This junction option is a considerable distance from this designation; development of this junction presents no risk of harm to the WHS.
11	Impact on Regionally Important Geological Sites (RIGS)	No anticipated risk	There are no RIGS within 1km of this junction option meaning that there would be no physical impact.
12	Impact on a geological Site of Special Scientific Interest (SSSI)	No anticipated risk	There are no geological SSSIs within 1km of this junction option meaning that there would be no physical impact.
13	Impact on Areas of Outstanding Natural Beauty (AONB) and/or National Park	No anticipated risk	The option is approximately 5.1km west of the Blackdown Hills AONB. Any visual impacts are likely to be overcome by screening and design.
14	Impact upon Registered Historic Parks and Gardens including setting	No anticipated risk	There are no Registered Historic Parks and Gardens within 1km of the site.
15	Impact on Scheduled Monuments (SM) and archaeology of equivalent status (including setting)	No anticipated risk	There are no recorded Scheduled Monuments or archaeological features within 1km of this option.

No.	Impact criteria	Score	Comments
16	Impact on Grade I / II* and II listed buildings including setting	Medium risk of negative impact	There are no listed buildings within 250m of the potential junction site. There are three Grade II listed buildings within 1km. There is potential to impact on the setting of these buildings, through an increase in visual impact, noise and vibration. Further investigation may be necessary.
17	Potential loss of or damage to non-designated heritage assets (including locally listed buildings, locally listed parks and gardens and archaeology)	No anticipated risk	There are no recorded non-designated heritage assets within 250m of this option. To the east of the possible junction, within 1km, there is a prehistoric rectangular enclosure north east of Braddons Farmhouse. The junction will not result in the loss or damage of this asset.
18	Impact on Conservation Areas (CA)	No anticipated risk	There are no Conservation Areas within 1km of this location and minimal impacts are therefore anticipated.
19	Proximity to and impact upon Flood Zones 2 and 3	No anticipated risk	Flood Zones 2 and 3 will be adjacent to the west of the potential junction. However, the conceptual layout shows development would not take place within the Flood Zones.
20	Impact on Air Quality Management Areas (AQMAs) (including proposed)	No anticipated risk	The junction and surrounding area is not covered by an AQMA.

Junction 27a - Option 2 (south of Willand)

No.	Impact criteria	Score	Comments
1	Localised population and land take	Medium risk of negative impact	Being a brand-new junction with access roads, it is anticipated that this junction option would result in significant land-take. There are also local residences and businesses that may be affected from increase in traffic using local routes to access the junction.
2	Impact on adopted Devon Minerals Local Plan Consultation Area	No anticipated risk	The junction is not within 1km of a Minerals Local Plan Consultation Area and therefore there is considered to be minimal risk to the sterilisation, or working of, mineral deposits.
3	Impact on Special Areas for Conservation (SAC), Special Protection Areas (SPA) or Ramsar sites	No anticipated risk	There are no SACs, SPAs or Ramsar sites within 1km of this option. East Devon Pebblebed Heaths SPA is approximately 17.8km to the south east. The distance from the internationally protected sites is considered sufficient to result in, at most, negligible harm.

No.	Impact criteria	Score	Comments
4	Impact on biological Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNRs) or Local Nature Reserves (LNRs).	No anticipated risk	There are no SSSIs, NNRs or Local Nature Reserves within 1km of this option. Tidcombe Fen SSSI is approximately 5.6km to the northeast. Utilising standard design and mitigation practices to avoid contamination and pollution of ground and surface water should reduce risks from impacts via waterways to negligible. The Highways Agency Design Manual for Roads and Bridges sets out that impacts from air pollution associated with road schemes beyond 200m need not be considered (http://www.dft.gov.uk/ha/standards/dmrb/vol11/section3/ha20707.pdf para 3.13). As the distance between this scheme and the afore-mentioned designated area is greater than this, minimal impact is anticipated.
5	Impact on County Wildlife Sites or non-designated nature reserves	Medium risk of negative impact	Within 250m of the conceptual scheme are the Meadow Park Woodland Trust Reserve and the Willand Unconfirmed Wildlife Site, a Broadleaved woodland. The locations of these designations may affect the alignment of the roads accessing this this option. There are also two further Unconfirmed Wildlife Sites within 1km of the possible junction, Willand - Cullompton Marsh and Yeo Farm – Burn Rew Farm Marsh, both possible floodplain grazing marshes. Air quality and water contamination impacts may need to be considered and appropriate mitigation applied.
6	Impact on Strategic Nature Areas (SNAs)	No anticipated risk	There are no Strategic Nature Areas within 1km of this option.
7	Impact on protected species that have been sighted within approx. 250m of the junction location.	Medium risk of negative impact	Within 250m of this option an otter and a Hazel Dormouse have been recorded. Surveys to further identify populations and potential impacts may be necessary. Within 1km, badgers, a Wall butterfly and a Common Frog have been sighted. However, it is anticipated these species will not be affected.
8	Potential to lead to loss or damage of ancient woodland	No anticipated risk	There are no areas of ancient woodland within 1km of the site.
9	Impact upon priority habitats	No anticipated risk	There are no priority habitats within 250m of this possible junction. Within 1km of the potential junction location, to the south east, south west and north west, the priority habitat coastal and floodplain grazing marsh is present. Utilising standard design and mitigation practices to avoid contamination and pollution of ground and surface water should reduce risks from impacts via waterways to negligible. The Highways Agency Design Manual for Roads and Bridges sets out that impacts from air pollution associated with road schemes beyond 200m need not be considered (http://www.dft.gov.uk/ha/standards/dmrb/vol11/section3/ha20707.pdf para 3.13). As the distance between this scheme and the afore-mentioned designated area is greater than this, minimal impact is anticipated.
10	Impact on the Jurassic Coast World Heritage Site (WHS)	No anticipated risk	The Jurassic Coast World Heritage Site is over 25km away from this option. This junction option is a considerable distance from this designation; development of this junction presents no risk of harm to the WHS.
11	Impact on Regionally Important Geological Sites (RIGS)	No anticipated risk	There are no RIGS within 1km of this junction option meaning that there would be no physical impact.

No.	Impact criteria	Score	Comments
12	Impact on a geological Site of Special Scientific Interest (SSSI)	No anticipated risk	There are no geological SSSIs within 1km of this junction option meaning that there would be no physical impact.
13	Impact on Areas of Outstanding Natural Beauty (AONB) and/or National Park	No anticipated risk	The Blackdown Hills AONB is 5.1km to the east of this option. Any visual impacts are likely to be overcome by screening and design.
14	Impact upon Registered Historic Parks and Gardens including setting	No anticipated risk	There are no Registered Parks and Gardens within 1km of the site.
15	Impact on Scheduled Monuments (SM) and archaeology of equivalent status (including setting)	No anticipated risk	There are no Scheduled Monuments within 1km of the site.
16	Impact on Grade I / II* and II listed buildings including setting	Medium risk of negative impact	There are no Listed Buildings with 250m of the site. However, there is one Grade I listed building and nine listed buildings or structures within 1km of the site. Significant infrastructure may impact on the setting of these assets. Additionally, the proposed routing may increase traffic on Silver Street, which may impact on the setting of the listed building located on this route.
17	Potential loss of or damage to non-designated heritage assets (including locally listed buildings, locally listed parks and gardens and archaeology)	No anticipated risk	Within 1km to the south west of the site, there are three undated curvilinear enclosures south west of Gerston Farm. To the south east there is a Prehistoric or Romano-British enclosure south of Willand. This scheme would not result in the loss or damage of these assets.
18	Impact on Conservation Areas (CA)	Medium risk of negative impact	The Willand Conservation Area would extend within approximately 250m of this option. Locating a new junction here would result in greater traffic using Silver Street, which is adjacent to the Willand Conservation Area; impacts upon the setting may need to be assessed.
19	Proximity to and impact upon Flood Zones 2 and 3	No anticipated risk	Flood Zones 2 and 3 are within 1km proximity of the possible scheme. The scheme would not see development in these areas.
20	Impact on Air Quality Management Areas (AQMAs) (including proposed)	No anticipated risk	The junction and surrounding area is not covered by an AQMA.

Constructing slip roads on to the existing B3181 over-bridge

No.	Impact criteria	Score	Comments
1	Localised population and land take	Medium risk of negative impact	There are a number of local residences and businesses that may be affected by this scheme. Furthermore, although there is an existing bridge, the gradient of slip roads required to access would result in significant land-take.
2	Impact on adopted Devon Minerals Local Plan Consultation Area	No anticipated risk	The junction is not within 1km of a Minerals Local Plan Consultation Area and therefore there is considered to be minimal risk to the sterilisation, or working of, mineral deposits.
3	Impact on Special Areas for Conservation (SAC), Special Protection Areas (SPA) or Ramsar sites	No anticipated risk	There are no SACs, SPAs or Ramsar sites within 1km of this option. East Devon Pebblebed Heaths SPA is over 17km to the south east. The distance from the internationally protected sites is considered sufficient to result in, at most, negligible harm.
4	Impact on biological Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNRs) or Local Nature Reserves (LNRs).	No anticipated risk	There are no SSSIs, NNRs or Local Nature Reserves within 1km of this option. Utilising standard design and mitigation practices to avoid contamination and pollution of ground and surface water should reduce risks from impacts via waterways to negligible. The Highways Agency Design Manual for Roads and Bridges sets out that impacts from air pollution associated with road schemes beyond 200m need not be considered (http://www.dft.gov.uk/ha/standards/dmrb/vol11/section3/ha20707.pdf para 3.13). As the distance between this scheme and the afore-mentioned designated area is greater than this, minimal impact is anticipated.
5	Impact on County Wildlife Sites or non-designated nature reserves	Medium risk of negative impact	Within 250m of the bridge, there are no County Wildlife Sites or non-designated nature reserves. There are two Unconfirmed Wildlife Sites within 1km of the bridge to the south east and south west; Willand – Cullompton Marsh, a possible floodplain grazing marsh, and the Willand Unconfirmed Wildlife Site, a Broadleaved woodland. There is also the Meadow Park Woodland Trust Reserve. Utilising standard design and mitigation practices to avoid contamination and pollution of ground and surface water should reduce risks from impacts via waterways to negligible. Air quality impacts may need to be assessed as this junction would result in a potential increase in traffic on the B3181, which, falls within 200m of these designations.
6	Impact on Strategic Nature Areas (SNAs)	No anticipated risk	There are no Strategic Nature Areas within 1km of this option.
7	Impact on protected species that have been sighted within approx. 250m of the junction location.	Medium risk of negative impact	Within 250m of this location, badgers have been sighted. Within 1km a Wall butterfly, an otter, a Hazel Dormouse and a Little Egret have been sighted. This suggests that protected species may be present and the scheme as proposed may result in de-vegetation. As such, it is considered that there may be medium risk of harm to protected species.
8	Potential to lead to loss or damage of ancient woodland	No anticipated risk	There is no ancient woodland within 1km of the option and therefore impacts will be minimal.

No.	Impact criteria	Score	Comments
9	Impact upon priority habitats	Medium risk of negative impact	There are no priority habitats within 250m of this possible junction. Within 1km, the potential junction location is surrounded to the south, east and west by the priority habitat coastal and floodplain grazing marsh. Utilising standard design and mitigation practices to avoid contamination and pollution of ground and surface water should reduce risks from impacts via waterways to negligible. Air quality impacts may need to be assessed as this junction would result in a potential increase in traffic on the B3181, which, falls within 200m of these designations.
10	Impact on the Jurassic Coast World Heritage Site (WHS)	No anticipated risk	The Jurassic Coast World Heritage Site is over 24km away from this option. The possible junction is a considerable distance from this designation; development of this junction presents no risk of harm to the WHS.
11	Impact on Regionally Important Geological Sites (RIGS)	No anticipated risk	There are no RIGS within 1km of this junction option meaning that there would be no physical impact.
12	Impact on a geological Site of Special Scientific Interest (SSSI)	No anticipated risk	There are no geological SSSIs within 1km of this junction option meaning that there would be no physical impact.
13	Impact on Areas of Outstanding Natural Beauty (AONB) and/or National Park	No anticipated risk	The Blackdown Hills AONB is 5.1km to the east of this option. Any visual impacts are likely to be overcome by screening and design.
14	Impact upon Registered Historic Parks and Gardens including setting	No anticipated risk	There are no Registered Parks and Gardens within 1km of the site.
15	Impact on Scheduled Monuments (SM) and archaeology of equivalent status (including setting)	No anticipated risk	There are no Scheduled Monuments within 1km of the site.
16	Impact on Grade I / II* and II listed buildings including setting	Medium risk of negative impact	There are no listed buildings with 250m of the site. However, there is one Grade I listed building and nine listed buildings or structures within 1km of the site. Significant infrastructure may impact on the setting of these assets. Additionally, the proposed routing for traffic to access this junction option may increase traffic on Silver Street, which may impact on the setting of the listed building located on this route.
17	Potential loss of or damage to non-designated heritage assets (including locally listed buildings, locally listed parks and gardens and archaeology)	No anticipated risk	Within 1km to the west of the bridge, there are three undated curvilinear enclosures south west of Gerston Farm. To the east there is a Prehistoric or Romano-British enclosure south of Willand. This scheme would not result in the loss or damage of these assets.

No.	Impact criteria	Score	Comments
18	Impact on Conservation Areas (CA)	Medium risk of negative impact	The Willand Conservation Area is within 1km of this option. Locating a new junction here would result in greater traffic using Silver Street, which is adjacent to the Willand Conservation Area; impacts upon the setting may need to be assessed.
19	Proximity to and impact upon Flood Zones 2 and 3	No anticipated risk	Flood Zones 2 and 3 are within 1km proximity of the possible scheme. The scheme would not see development in these areas.
20	Impact on Air Quality Management Areas (AQMAs) (including proposed)	No anticipated risk	The junction and surrounding area is not covered by an AQMA.

Improved Junction 28

No.	Impact criteria	Score	Comments
1	Localised population and land take	Medium risk of negative impact	There may be local businesses that are affected, specifically in terms of access. The suitability of any compensation measures needs to be investigated further.
2	Impact on adopted Devon Minerals Local Plan Consultation Area	No anticipated risk	The junction is not within 1km of a Minerals Local Plan Consultation Area and therefore there is considered to be minimal risk to the sterilisation, or working of, mineral deposits.
3	Impact on Special Areas for Conservation (SAC), Special Protection Areas (SPA) or Ramsar sites	No anticipated risk	There are no SACs, SPAs or Ramsar sites within 1km of this option. East Devon Pebblebed Heaths SPA is over 15km to the south. The distance from the internationally protected sites is considered sufficient to result in, at most, negligible harm.
4	Impact on biological Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNRs) or Local Nature Reserves (LNRs).	No anticipated risk	There are no SSSIs, NNRs or Local Nature Reserves within 1km of this option. Utilising standard design and mitigation practices to avoid contamination and pollution of ground and surface water should reduce risks from impacts via waterways to negligible. The Highways Agency Design Manual for Roads and Bridges sets out that impacts from air pollution associated with road schemes beyond 200m need not be considered (http://www.dft.gov.uk/ha/standards/dmrb/vol11/section3/ha20707.pdf para 3.13). As the distance between this scheme and the afore-mentioned designated area is greater than this, minimal impact is anticipated.

No.	Impact criteria	Score	Comments
5	Impact on County Wildlife Sites or non-designated nature reserves	Medium risk of negative impact	The Willand – Cullompton Marsh Unconfirmed Wildlife Site (UWS) is within 250m of this junction. Within 1km, are the East Culm House UWS and the Cullompton – Hele Marsh UWS. There is also an Other Site of Wildlife Interest, St. Andrew's Hill. Air quality impacts may need to be assessed as this junction would result in a potential increase in traffic on routes within approx. 200m of these designations.
6	Impact on Strategic Nature Areas (SNAs)	No anticipated risk	There are no SNAs within 1km of the junction.
7	Impact on protected species that have been sighted within approx. 250m of the junction location.	No anticipated risk	There have been sightings of a number of protected species within 250m of the junction, including otters and a badger. However, the nature of the scheme (which involves little if any expansion of the existing junction) will result in minimal impact on protected species.
8	Potential to lead to loss or damage of ancient woodland	No anticipated risk	There are no areas of ancient woodland within 1km of the junction.
9	Impact upon priority habitats	No anticipated risk	There are no priority habitats within 250m of the junction. Within 1km, to the north and south of the junction, there are two areas of coastal and floodplain grazing marsh. The nature of the scheme will result in minimal impact on these priority habitats.
10	Impact on the Jurassic Coast World Heritage Site (WHS)	No anticipated risk	The Jurassic Coast World Heritage Site is over 22km away from this option. The possible junction is a considerable distance from this designation; development of this junction presents no risk of harm to the WHS.
11	Impact on Regionally Important Geological Sites (RIGS)	No anticipated risk	There are no RIGS within 1km of this junction option meaning that there would be no physical impact.
12	Impact on a geological Site of Special Scientific Interest (SSSI)	No anticipated risk	There are no geological SSSIs within 1km of this junction option meaning that there would be no physical impact.
13	Impact on Areas of Outstanding Natural Beauty (AONB) and/or National Park	No anticipated risk	The Blackdown Hills AONB is 5.4km to the east of this option. The nature of the scheme will result in minor change and, therefore, negligible visual impact.
14	Impact upon Registered Historic Parks and Gardens including setting	No anticipated risk	There are no Registered Parks and Gardens within 1km of the site.

No.	Impact criteria	Score	Comments
15	Impact on Scheduled Monuments (SM) and archaeology of equivalent status (including setting)	No anticipated risk	There are Scheduled Monuments within 1km to the west of the site including two Roman forts and two Roman camps at St Andrew's Hill. However, due to the nature of the scheme, there will be little change to the existing junction and will, therefore, have little or no impact on this heritage asset.
16	Impact on Grade I / II* and II listed buildings including setting	Potential positive impact	There is one Grade II Listed Building within 250m of the junction, and numerous List Buildings within 1km. The scheme will result in little change to the existing junction, however it will reduce congestion on surrounding routes, and the impact of this on the setting of these listed buildings is anticipated to be positive.
17	Potential loss of or damage to non-designated heritage assets (including locally listed buildings, locally listed parks and gardens and archaeology)	No anticipated risk	There are two non-designated heritage assets to the west of the junction. The scheme will not result in the loss or damage of these assets.
18	Impact on Conservation Areas (CA)	Potential positive impact	Cullompton Conservation Area extends within 1km of the existing junction. The scheme will result in little change to the existing junction but will, however lead to a reduction in congestion on the surrounding road network. It is anticipated that this will result in a positive impact.
19	Proximity to and impact upon Flood Zones 2 and 3	No anticipated risk	Flood Zones 2 and 3 surround the existing junctions. The scheme would not result in development on these floodplains.
20	Impact on Air Quality Management Areas (AQMAs) (including proposed)	Potential positive impact	The junction and surrounding area is covered by the Cullompton AQMA. The scheme would result in the more efficient management of traffic, improving air quality.

New bridge over M5

No.	Impact criteria	Score	Comments
1	Localised population and land take	Medium risk of negative impact	This junction option would result in the loss of community assets. Such loss would need to be compensated however the suitability of any compensation needs to be investigated further.
2	Impact on adopted Devon Minerals Local Plan Consultation Area	No anticipated risk	The junction is not within 1km of a Minerals Local Plan Consultation Area and therefore there is considered to be minimal risk to the sterilisation, or working of, mineral deposits.

No.	Impact criteria	Score	Comments
3	Impact on Special Areas for Conservation (SAC), Special Protection Areas (SPA) or Ramsar sites	No anticipated risk	There are no SACs, SPAs or Ramsar sites within 1km of this option. East Devon Pebblebed Heaths SPA is over 15km to the south. The distance from the internationally protected sites is considered sufficient to result in, at most, negligible harm.
4	Impact on biological Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNRs) or Local Nature Reserves (LNRs).	No anticipated risk	There are no SSSIs, NNRs or Local Nature Reserves within 1km of the site, or within 200m of the affected routes. Utilising standard design and mitigation practices to avoid contamination and pollution of ground and surface water should reduce risks from impacts via waterways to negligible. The Highways Agency Design Manual for Roads and Bridges sets out that impacts from air pollution associated with road schemes beyond 200m need not be considered (http://www.dft.gov.uk/ha/standards/dmrb/vol11/section3/ha20707.pdf para 3.13). As the distance between this scheme and the afore-mentioned designated area is greater than this, minimal impact is anticipated.
5	Impact on County Wildlife Sites or non-designated nature reserves	Medium risk of negative impact	There are no County Wildlife Sites within 1km of the site. The Cullompton – Hele Marsh Unconfirmed Wildlife Site (UWS) extends within 200m to the south east of the conceptual layout. This site is possible floodplain grazing marsh, which is sensitive to nitrogen deposition. Prevailing winds may carry deposits away from this area. Utilising standard design and mitigation practices to avoid contamination and pollution of ground and surface water should reduce risks from impacts via waterways to negligible. Within 1km, there are a further two UWSs, East Culm House and Willand Cullompton Marsh. St Andrew's Hill, an Other Site of Wildlife Interest, is also within 1km, this is semi-improved neutral and marshy grassland. Air quality impacts may need to be assessed and mitigation may be required.
6	Impact on Strategic Nature Areas (SNAs)	No anticipated risk	There are no SNAs within 1km of the site.
7	Impact on protected species that have been sighted within approx. 250m of the junction location.	Medium risk of negative impact	Within 250m of the possible new bridge location and an otter. A number of protected species have been sighted within 1km, this includes a bat, a Hazel Dormouse, a badger and kingfisher. This suggests that protected species may be present and the scheme as proposed may result in de-vegetation. As such, it is considered that there may be medium risk of harm to protected species, although further investigation and mitigation may reduce impacts to minimal.
8	Potential to lead to loss or damage of ancient woodland	No anticipated risk	There are no areas of ancient woodland within 1km of this location.
9	Impact upon priority habitats	Medium risk of negative impact	The proposal would cross an area of priority habitat, listed as coastal and floodplain grazing marsh, which is located on the west side on the M5. The loss of the habitat and other impacts resulting from water and air pollution, needs to be further investigated.
10	Impact on the Jurassic Coast World Heritage Site	No anticipated risk	The Jurassic Coast World Heritage Site is over 22km away from this option. This option is a considerable distance from this designation; development of this junction presents no risk of harm to the WHS.

No.	Impact criteria	Score	Comments
	(WHS)		
11	Impact on Regionally Important Geological Sites (RIGS)	No anticipated risk	There are no RIGS within 1km of this junction option meaning that there would be no physical impact.
12	Impact on a geological Site of Special Scientific Interest (SSSI)	No anticipated risk	There are no geological SSSIs within 1km of this junction option meaning that there would be no physical impact.
13	Impact on Areas of Outstanding Natural Beauty (AONB) and/or National Park	No anticipated risk	The Blackdown Hills AONB is over 5.4km to the east of this location. Any visual impacts are likely to be overcome by screening and design.
14	Impact upon Registered Historic Parks and Gardens including setting	No anticipated risk	There are no Registered Historic Parks and Gardens within 1km of this option.
15	Impact on Scheduled Monuments (SM) and archaeology of equivalent status (including setting)	No anticipated risk	There is a Scheduled Monument within 1km to the west of the site. This is two Roman forts and two Roman camps at St Andrew's Hill. Due to the distance and intervening development between this scheme and the Scheduled Monument, any impacts are anticipated to be negligible.
16	Impact on Grade I / II* and II listed buildings including setting	Potential positive impact	There are no listed buildings within 250m of this location, however, within 1km there are a number of listed buildings contained within, and outside of, the Cullompton Conservation Area. This scheme will reduce congestion on surrounding routes, and the impact of this on the setting of these listed buildings is anticipated to be positive.
17	Potential loss of or damage to non-designated heritage assets (including locally listed buildings, locally listed parks and gardens and archaeology)	No anticipated risk	Roman forts and camps on St Andrew's Hill are to the west of this possible option. Due to the distance and intervening development between this scheme and the monument, any impacts are anticipated to be negligible.
18	Impact on Conservation Areas (CA)	Medium risk of negative impact	The Cullompton Conservation Area is within 1km of this option. Although in close proximity to an existing junction, the impacts of an additional junction on the setting of the Conservation Area will need to be considered. Impacts may however be positive.
19	Proximity to and impact upon Flood Zones 2 and 3	Medium risk of negative impact	New infrastructure in this location would be located on Flood Zone 3. Transport infrastructure is considered as essential infrastructure by the National Planning Practice Guidance. Essential transport infrastructure in Flood Zone 3 should be designed and constructed to remain operational and safe in times of flood; not result in a loss of flood plain storage; and not impede water flows and not

No.	Impact criteria	Score	Comments
			increase flood risk elsewhere.
20	Impact on Air Quality Management Areas (AQMAs) (including proposed)	Potential positive impact	This location is covered by the Cullompton AQMA. The scheme would result in the more efficient management of traffic, improving air quality.

Cullompton Eastern Relief Road

No.	Impact criteria	Score	Comments
1	Localised population and land take	Medium risk of negative impact	The eastern relief road scheme will require land-take through the Cullompton Community Fields and as such will require compensation for any community facilities lost or affected. There may also be local businesses that are affected. The suitability of any compensation measures needs to be investigated further.
2	Impact on adopted Devon Minerals Local Plan Consultation Area	No anticipated risk	The junction is not within 1km of a Minerals Local Plan Consultation Area and therefore there is considered to be minimal risk to the sterilisation, or working of, mineral deposits.
3	Impact on Special Areas for Conservation (SAC), Special Protection Areas (SPA) or Ramsar sites	No anticipated risk	There are no SACs, SPAs or Ramsar sites within 1km of this scheme. East Devon Pebblebed Heaths SPA is over 14.2km to the south. The distance from the internationally protected sites is considered sufficient to result in, at most, negligible harm.
4	Impact on biological Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNRs) or Local Nature Reserves (LNRs).	No anticipated risk	There are no SSSIs, NNRs or Local Nature Reserves within 1km of this scheme. Utilising standard design and mitigation practices to avoid contamination and pollution of ground and surface water should reduce risks from impacts via waterways to negligible. The Highways Agency Design Manual for Roads and Bridges sets out that impacts from air pollution associated with road schemes beyond 200m need not be considered (http://www.dft.gov.uk/ha/standards/dmrb/vol11/section3/ha20707.pdf para 3.13). As the distance between this scheme and the afore-mentioned designated area is greater than this, minimal impact is anticipated.

No.	Impact criteria	Score	Comments
5	Impact on County Wildlife Sites or non-designated nature reserves	Medium risk of negative impact	There are no County Wildlife Sites within 1km of the scheme. The route would cross the Cullompton – Hele Marsh Unconfirmed Wildlife Site (UWS). Within 1km of site is the Willand – Cullompton Marsh UWS, the East Culm House UWS and St Andrew's Hill, an Other Site of Wildlife Interest. The potential loss of the Unconfirmed Wildlife Site requires further investigation before this site should proceed. The benefits of the scheme will need to be weighed against the potential harm that may occur.
6	Impact on Strategic Nature Areas (SNAs)	Potential positive impact	There is a SNA adjacent to the south of this route within 1km. The opportunity to restore and enhance this habitat could be taken.
7	Impact on protected species that have been sighted within approx. 250m of the junction location.	Medium risk of negative impact	Within 250m of the route there have been sightings of otters. There have been further sightings of otters within 1km of the route, as well as badgers, bats, Common Frogs, a Hazel Dormouse and a Jersey Tiger Moth. This suggests that protected species may be present and the scheme as proposed may result in de-vegetation. As such, it is considered that there may be medium risk of harm to protected species.
8	Potential to lead to loss or damage of ancient woodland	No anticipated risk	There are no areas of ancient woodland within 1km of the scheme.
9	Impact upon priority habitats	Medium risk of negative impact	This scheme would result in the loss of part of the coastal and floodplain grazing marsh priority habitat The potential loss of the Unconfirmed Wildlife Site requires further investigation before this site should proceed. The benefits of the scheme will need to be weighed against the potential harm that may occur.
10	Impact on the Jurassic Coast World Heritage Site (WHS)	No anticipated risk	The Jurassic Coast World Heritage Site is over 21km away from this route. This route is a considerable distance from this designation; development of this junction presents no risk of harm to the WHS.
11	Impact on Regionally Important Geological Sites (RIGS)	No anticipated risk	There are no RIGS within 1km of this junction option meaning that there would be no physical impact.
12	Impact on a geological Site of Special Scientific Interest (SSSI)	No anticipated risk	There are no geological SSSIs within 1km of this junction option meaning that there would be no physical impact.
13	Impact on Areas of Outstanding Natural Beauty (AONB) and/or National Park	No anticipated risk	The Blackdown Hills AONB is over 5.6km to the east of this location. Any visual impacts are likely to be overcome by screening and design.

No.	Impact criteria	Score	Comments
14	Impact upon Registered Historic Parks and Gardens including setting	No anticipated risk	There are no Registered Historic Parks and Gardens within 1km of this route.
15	Impact on Scheduled Monuments (SM) and archaeology of equivalent status (including setting)	No anticipated risk	There is a scheduled monument to the east of the route within 1km, this is the Two Roman forts and two Roman camps at St Andrew's Hill, about 500m away. Due to the distance and intervening development between this scheme and the Scheduled Monument, any impacts are anticipated to be negligible.
16	Impact on Grade I / II* and II listed buildings including setting	Medium risk of negative impact	Within 250m of this route is the Grade II listed First Bridge. The setting of this structure will need to be considered. Within 1km of this location, there are a number of listed buildings within, and outside of, the Cullompton Conservation Area. The setting of the buildings in this area may need consideration. There is the potential to positively impact the setting of these buildings by removing traffic from the High Street and Fore Street, on which a high concentration of these listed buildings are found.
17	Potential loss of or damage to non-designated heritage assets (including locally listed buildings, locally listed parks and gardens and archaeology)	No anticipated risk	There are three non-designated assets within 1km of the route to the north east - approximately 500m away in a similar location to the Scheduled Monument. Due to the distance and intervening development between this scheme and the assets, any impacts are anticipated to be negligible.
18	Impact on Conservation Areas (CA)	Medium risk of negative impact	The Cullompton Conservation Area extends within 250m of this route, with the northern junction shown to be within 50m of this area. The setting of the Conservation Area will need to be considered. There is the potential to positively impact the setting of the CA by removing traffic from the High Street and Fore Street, which run through the centre of the designation.
19	Proximity to and impact upon Flood Zones 2 and 3	Medium risk of negative impact	New infrastructure in this location would be located on Flood Zone 3. Transport infrastructure is considered as essential infrastructure by the National Planning Practice Guidance. Essential transport infrastructure in Flood Zone 3 should be designed and constructed to remain operational and safe in times of flood; not result in a loss of flood plain storage; and not impede water flows and not increase flood risk elsewhere.
20	Impact on Air Quality Management Areas (AQMAs) (including proposed)	Potential positive impact	The route is covered to the north by the Cullompton AQMA, with the remainder of the route within 250m of the AQMA. This scheme would provide relief to the congestion, and therefore, emissions in the AQMA, resulting in the improvement of air quality.

Junction 28a - north of Duke Street bridge

No.	Impact criteria	Score	Comments
1	Localised population and land take	Medium risk of negative impact	This junction option would potentially result in the loss of community assets. These would have to be compensated for - however the suitability of any compensation measures needs to be investigated further.
2	Impact on adopted Devon Minerals Local Plan Consultation Area	No anticipated risk	The junction is not within 1km of a Minerals Local Plan Consultation Area and therefore there is considered to be minimal risk to the sterilisation, or working of, mineral deposits.
3	Impact on Special Areas for Conservation (SAC), Special Protection Areas (SPA) or Ramsar sites	No anticipated risk	There are no SACs, SPAs or Ramsar sites within 1km of this option. East Devon Pebblebed Heaths SPA is over 14km to the south. The distance from the internationally protected sites is considered sufficient to result in, at most, negligible harm.
4	Impact on biological Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNRs) or Local Nature Reserves (LNRs).	No anticipated risk	There are no SSSIs, NNRs or Local Nature Reserves within 1km of this option. Utilising standard design and mitigation practices to avoid contamination and pollution of ground and surface water should reduce risks from impacts via waterways to negligible. The Highways Agency Design Manual for Roads and Bridges sets out that impacts from air pollution associated with road schemes beyond 200m need not be considered (http://www.dft.gov.uk/ha/standards/dmrb/vol11/section3/ha20707.pdf para 3.13). As the distance between this scheme and the afore-mentioned designated area is greater than this, minimal impact is anticipated.
5	Impact on County Wildlife Sites or non-designated nature reserves	Medium risk of negative impact	The County Wildlife Site, Knight's Wood, extends within 1km to the south of this option, however is likely to be more than 200m away. This is an area of Ancient semi-natural woodland partly replanted with conifers. The Cullompton – Hele Marsh Unconfirmed Wildlife Site (UWS) is located adjacent to the west of this option. The conceptual layout for accessing this junction crosses this possible floodplain grazing marsh. The potential loss this habitat should be investigated further. Air quality and drainage / water contamination impacts may also need to be assessed. The benefits of the scheme will need to be weighed against the potential harm that may occur.
6	Impact on Strategic Nature Areas (SNAs)	Potential positive impact	There is a SNA to the south west of this option within 1km. The opportunity to restore and enhance this habitat could be taken.
7	Impact on protected species that have been sighted within approx. 250m of the junction location.	Medium risk of negative impact	An otter has been sighted within 250m of this possible junction. Within 1km, there have been a number of bats, otters, a Hazel Dormouse and common frogs. This suggests that protected species may be present and the scheme as proposed may result in de-vegetation. As such, it is considered that there may be medium risk of harm to protected species.

No.	Impact criteria	Score	Comments
8	Potential to lead to loss or damage of ancient woodland	No anticipated risk	There is an area of ancient woodland, Knight's Wood, within 1km of the possible junction location. There will be no physical harm to this habitat. Utilising standard design and mitigation practices to avoid contamination and pollution of ground and surface water should reduce risks from impacts via waterways to negligible. The Highways Agency Design Manual for Roads and Bridges sets out that impacts from air pollution associated with road schemes beyond 200m need not be considered (http://www.dft.gov.uk/ha/standards/dmrb/vol11/section3/ha20707.pdf para 3.13). As the distance between this scheme and the afore-mentioned designated area is greater than this, minimal impact is anticipated.
9	Impact upon priority habitats	Medium risk of negative impact	An area of potential coastal and floodplain grazing marsh priority habitat is adjacent to the west of the railway line. The access routes to this junction option would see the loss of some this habitat. Mitigation would need to be further investigated. The benefits of the scheme will need to be weighed against the potential loss that may occur.
10	Impact on the Jurassic Coast World Heritage Site (WHS)	No anticipated risk	The Jurassic Coast World Heritage Site is over 21km away from this option. This option is a considerable distance from this designation; development of this junction presents no risk of harm to the WHS.
11	Impact on Regionally Important Geological Sites (RIGS)	No anticipated risk	There are no RIGS within 1km of this junction option meaning that there would be no physical impact.
12	Impact on a geological Site of Special Scientific Interest (SSSI)	No anticipated risk	There are no geological SSSIs within 1km of this junction option meaning that there would be no physical impact.
13	Impact on Areas of Outstanding Natural Beauty (AONB) and/or National Park	No anticipated risk	The Blackdown Hills AONB is over 5.6km to the east of this location. Any visual impacts are likely to be overcome by screening and design.
14	Impact upon Registered Historic Parks and Gardens including setting	No anticipated risk	There are no Registered Historic Parks and Gardens within 1km of this option.
15	Impact on Scheduled Monuments (SM) and archaeology of equivalent status (including setting)	No anticipated risk	There is no recorded Scheduled Monuments or archaeology of equivalent status within 1km of this option.
16	Impact on Grade I / II* and II listed buildings including setting	Medium risk of negative impact	Within 250m of the scheme is the Grade II listed First Bridge. The setting of this structure will need to be considered. Within 1km of this location, there are a number of listed buildings within, and outside of, the Cullompton Conservation Area. This option proposes the use of Duke Street as the connecting route. The impact of this on the setting of the buildings along this route may need to be assessed.

No.	Impact criteria	Score	Comments
17	Potential loss of or damage to non-designated heritage assets (including locally listed buildings, locally listed parks and gardens and archaeology)	No anticipated risk	To the south west of this location is a Prehistoric ring ditch south west of Padbrookhill Cottage. The scheme would not result in the loss of or damage to this non-designated heritage asset.
18	Impact on Conservation Areas (CA)	Medium risk of negative impact	This scheme is within 1km of the Cullompton Conservation Area. There is potential to impact on the setting of this Conservation Area with routing on Duke Street which connects to Fore Street. Impacts on the setting will need to be considered.
19	Proximity to and impact upon Flood Zones 2 and 3	Medium risk of negative impact	New infrastructure in this location would be located on Flood Zone 3. Transport infrastructure is considered as essential infrastructure by the National Planning Practice Guidance. Essential transport infrastructure in Flood Zone 3 should be designed and constructed to remain operational and safe in times of flood; not result in a loss of flood plain storage; and not impede water flows and not increase flood risk elsewhere.
20	Impact on Air Quality Management Areas (AQMAs) (including proposed)	Potential positive impact	This location is within 250m of the Cullompton AQMA. The scheme would result in the more efficient management of traffic, improving air quality.

Junction 28a - south of Duke Street bridge

No.	Impact criteria	Score	Comments
1	Localised population and land take	Medium risk of negative impact	Being a brand-new junction with access roads, it is anticipated that this junction option would result in significant land-take. Local residences may be affected and this should be investigated further.
2	Impact on adopted Devon Minerals Local Plan Consultation Area	No anticipated risk	The junction is not within 1km of a Minerals Local Plan Consultation Area and therefore there is considered to be minimal risk to the sterilisation, or working of, mineral deposits.
3	Impact on Special Areas for Conservation (SAC), Special Protection Areas (SPA) or Ramsar sites	No anticipated risk	There are no SACs, SPAs or Ramsar sites within 1km of this option. East Devon Pebblebed Heaths SPA is over 13.5km to the south. The distance from the internationally protected sites is considered sufficient to result in, at most, negligible harm.

No.	Impact criteria	Score	Comments
4	Impact on biological Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNRs) or Local Nature Reserves (LNRs).	No anticipated risk	There are no SSSIs, NNRs or Local Nature Reserves within 1km of the site, or within 200m of the affected routes. Utilising standard design and mitigation practices to avoid contamination and pollution of ground and surface water should reduce risks from impacts via waterways to negligible. The Highways Agency Design Manual for Roads and Bridges sets out that impacts from air pollution associated with road schemes beyond 200m need not be considered (http://www.dft.gov.uk/ha/standards/dmrb/vol11/section3/ha20707.pdf para 3.13). As the distance between this scheme and the afore-mentioned designated area is greater than this, minimal impact is anticipated.
5	Impact on County Wildlife Sites or non-designated nature reserves	High risk of negative impact	There are locally designated and non-designated sites in close proximity to this option. The south east of the current conceptual scheme borders and crosses the Knight's Wood County Wildlife Site, which is ancient semi-natural woodland partly replaced with conifers. There is also the Cullompton – Hele Marsh Unconfirmed Wildlife Site adjacent to the west side of this option, which is possible floodplain grazing marsh. Within 250m, there is Peverstone Embankment, an Other Site of Wildlife Interest which is unimproved neutral grassland with scrub and areas of conifers. Within 1km to the south east, there is Weekes Farm Orchard County Wildlife Site. The potential loss of the County Wildlife Site and Unconfirmed Wildlife Site requires further investigation before this site should proceed. The benefits of the scheme will need to be weighed against the potential harm that may occur.
6	Impact on Strategic Nature Areas (SNAs)	Potential positive impact	There is a SNA adjacent to the west of this option. The opportunity to restore and enhance this habitat could be taken.
7	Impact on protected species that have been sighted within approx. 250m of the junction location.	Medium risk of negative impact	Within 250m of this option, there have been sightings of an otter, and a badger. Within 1km, further otters and badgers have been sighted, as well as bats and Common Frogs. This suggests that protected species may be present and the scheme as proposed may result in de-vegetation. As such, it is considered that there may be medium risk of harm to protected species.
8	Potential to lead to loss or damage of ancient woodland	High risk of negative impact	The south east of the current conceptual scheme borders and crosses Knight's Wood, and area of ancient woodland. Great protection is afforded to this irreplaceable habitat in the National Planning Policy Framework, which states permission should be refused for development resulting in the loss or deterioration of irreplaceable habitats, unless the need for, and benefits of, the development in that location clearly outweigh the loss. Further investigation is required before this site should proceed. The benefits of the scheme will need to be weighed against the potential harm that may occur.
9	Impact upon priority habitats	Medium risk of negative impact	An area of potential priority habitat is adjacent to the west of the railway line. The conceptual option for this junction would see the loss of some this habitat. The loss of the habitat in the context of the wider provision in Devon will require further investigation. This is scored as a medium risk as loss of priority habitats is not as significant as loss of designated areas or ancient woodland.
10	Impact on the Jurassic Coast World Heritage Site	No anticipated risk	The Jurassic Coast World Heritage Site is over 21km away from this option. This option is a considerable distance from this designation; development of this

No.	Impact criteria	Score	Comments
	(WHS)		junction presents no risk of harm to the WHS.
11	Impact on Regionally Important Geological Sites (RIGS)	No anticipated risk	There are no RIGS within 1km of this junction option meaning that there would be no physical impact.
12	Impact on a geological Site of Special Scientific Interest (SSSI)	No anticipated risk	There are no geological SSSIs within 1km of this junction option meaning that there would be no physical impact.
13	Impact on Areas of Outstanding Natural Beauty (AONB) and/or National Park	No anticipated risk	The Blackdown Hills AONB is over 6km to the east of this location. Any visual impacts are likely to be overcome by screening and design.
14	Impact upon Registered Historic Parks and Gardens including setting	No anticipated risk	There are no Registered Historic Parks and Gardens within 1km of this option.
15	Impact on Scheduled Monuments (SM) and archaeology of equivalent status (including setting)	No anticipated risk	There are no Scheduled Monuments within 1km of the site.
16	Impact on Grade I / II* and II listed buildings including setting	Medium risk of negative impact	There are no listed buildings within 250m of the potential junction site. There are six Grade II listed buildings / structures within 1km; two of these, to the south of this location, may be particularly sensitive receptors. There is potential to impact on the setting of these buildings, through an increase in visual impact, noise and vibration, which should be investigated further.
17	Potential loss of or damage to non-designated heritage assets (including locally listed buildings, locally listed parks and gardens and archaeology)	No anticipated risk	There are three non-designated heritage assets within 1km of this location. These are two the south and east. Due to the distance, the scheme would not result in any loss of damage to these assets.
18	Impact on Conservation Areas (CA)	Medium risk of negative impact	The Cullompton Conservation Area extends within 1km of this option. There is a potential to impact on the setting of this Conservation Area due to the routing of roads to access the new M5 junction. Impacts on the setting will need to be considered.
19	Proximity to and impact upon Flood Zones 2 and 3	Medium risk of negative impact	New infrastructure in this location would be located on Flood Zone 3. Transport infrastructure is considered as essential infrastructure by the National Planning Practice Guidance. Essential transport infrastructure in Flood Zone 3 should be designed and constructed to remain operational and safe in times of flood; not result in a loss of flood plain storage; and not impede water flows and not

No.	Impact criteria	Score	Comments
			increase flood risk elsewhere.
20	Impact on Air Quality Management Areas (AQMAs) (including proposed)	Potential positive impact	This location is within 250m of the Cullompton AQMA. The scheme would result in the more efficient management of traffic, improving air quality.