



**HIGNETT FAMILY  
SETTLEMENT**

**LAND ADJOINING ODD  
DOWN, BATH**

**PRELIMINARY CAPACITY  
ASSESSMENT OF ACCESS  
JUNCTIONS**

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## 1. INTRODUCTION

- 1.1. This report has been prepared for the Hignett Family by PFA Consulting Ltd, Consulting Engineers and Transport Planners, and presents the results of a preliminary assessment of the indicative vehicular accesses onto the public road network to serve development on land adjacent to Odd Down, Bath.
- 1.2. Bath and North East Somerset Council (B&NES) has issued for public consultation a 'Schedule of Proposed Changes to the Submitted Core Strategy'. New policy B3A 'Land Adjoining Odd Down' proposes that land will be removed from the Green Belt to provide for development of around 300 dwellings together with small scale local employment opportunities. No specific area for the proposed development of 300 dwellings has been identified as it is the Council's intention that this will be carried out as part of the Placemaking Plan.
- 1.3. To test whether vehicular access can be provided to serve the Council's proposed development a desktop study has been completed assessing potential access options at the western and eastern ends of land under the control of the Hignett Family. In addition, a third option has been tested assuming development of around 900 dwellings together with employment opportunities for around 500 employees.
- 1.4. Reference has been made to the following documents:-
- 'Schedule of Proposed Changes to the Submitted Core Strategy', B&NES, March 2013.
  - 'Land Adjoining Odd Down', Development Concept Options Report, Ove Arup & Partners, April 2013.
  - 'Core Strategy Transport Evaluation', Ove Arup & Partners, February 2013.
  - 'Information Trip Rate Computer System' (TRICS v2013a).

## 2. POTENTIAL DEVELOPMENT OPTIONS

- 2.1. The quantum of potential development options is summarised in **Table 1**.
- 2.2. The sketch plans included as **Figures 1 to 3** indicate the approximate potential locations of development areas for each option examined.

**Table 1: Residential Development Quantum**

Option	Areas	Gross Dev Area (Ha)	Density (Units/Ha)	Units (No.)
<b>1</b>	A1	2.7	35	95
	A2	2.8	35	98
	A3	2.8	40	112
<b>Total</b>		<b>8.3</b>		<b>305</b>
<b>2</b>	D	5.8	35	203
	E	2.7	35	95
<b>Total</b>		<b>8.5</b>		<b>298</b>
<b>3</b>	A1	2.7	35	95
	A2	2.8	35	98
	A3	2.8	40	112
	B	7.5	35	263
	D	6.5	35	228
	E	2.7	35	95
	<b>Total</b>		<b>25</b>	

### Option 1

2.3. This option assumes that circa 300 dwellings are all located in the western part of the land under the control of the Hignett Family. The vehicular access to this development would be from Combe Hay Lane and a preliminary highway layout is shown on Drawing No. G220/01 enclosed as **Appendix A**.

2.4. It is assumed that The Lew Hill Memorial football ground and playing field would be relocated to the south west corner of the land under consideration. Vehicular access to the existing employment area to the west of South Stoke village would be accessed as currently exists. Only small scale local employment opportunities are likely to be provided with the scale of development envisaged for Option 1 and at this stage traffic generation from such employment is included within the development traffic generation.

### Option 2

2.5. This option assumes that 300 dwellings would be located in the north eastern part of the land under the control of the Hignett Family. The vehicular access would be taken from a new traffic signal control junction at the Midford Road/Southstoke Road existing junction. Southstoke Lane would be closed at its northern end and would connect to the new access road serving the residential development and the existing employment to the west of South Stoke village.

### Option 3

2.6. This option shows the majority of the land under the control of the Hignett Family developed for around 900 dwellings. It is assumed that a primary school, neighbourhood centre and local small scale employment would be included as part of the development and 500 employees have been assumed to access the development during the highway peak hours.

- 2.7. Vehicular access would be provided for both the western and eastern areas but it is not envisaged that an internal all traffic connection would be provided within the site, however, a bus only/emergency vehicle link could potentially be provided in the northern part of Sulis Manor. No vehicular links would be provided to the existing Sulis Meadow residential area.

### 3. CENSUS (2011) JOURNEY TO WORK MODE SHARE

- 3.1. The Arup Transportation Evaluation report included the 2011 Census Odd Down Ward mode share for journeys to work. The ONS has now published journey to work mode share for sub-areas within wards. **Table 2** shows the journey to work for Odd Down Ward and the sub-area B&NES 019C covering the Sulis Meadow residential area and part of the residential area to the north of the Wansdyke. An abstract from the ONS is included at **Appendix B**.

**Table 2: 2011 Census Journey to Work Mode Share**

Journey to Work Mode	Odd Down Ward	BANES 019C Sub-area
Walk	13%	11%
Cycle	3%	3%
Bus	14%	16%
Train	3%	3%
Car Driver	58%	59%
Car Passenger	7%	6%
Taxi	1%	1%
Motorcycle	1%	1%
Other	0%	0%
Total	100%	100%

- 3.2. From **Table 2** it will be noted that the sub-area generally mirrors the Odd Down Ward apart from 16% of journeys being made by the bus compared with 14% for the Ward. As noted in the Arup Transport Evaluation report the use of the bus in Odd Down Ward is ranked as No. 1 within B&NES where typically only 7% of journeys to work are by bus. This evidence suggests that many local residents use the Odd Down Park and Ride bus service for their journey to work into Bath.
- 3.3. The 59% car driver mode share in the sub-area is similar to that for the Odd Down Ward and is also similar to that for the whole of B&NES which has a car driver mode share journey to work of 60%.

### 4. TRAFFIC GENERATION

- 4.1. To assess the capacity of the existing priority staggered junction at Sulis Manor Road / Combe Hay Lane standard practise would be to survey existing traffic movements for the peak hours. However, due to time and resource constraints at this stage surveys could not be carried out and therefore an estimate of traffic flows at the junction have been based on traffic generation from the existing developments and the proposed development using the TRICS database. For this

location it is considered that this is an acceptable methodology as traffic flows are directly related to development there being no through traffic.

- 4.2. The existing development includes St Gregory’s Catholic College and, including the Sixth Form Centre (currently under construction), it has been assumed that 1,200 students would be at the secondary school. The Sulis Meadow residential development has 320 dwellings. For the proposed development (Option 1 or 3) 300 new residential dwellings have been assumed.
- 4.3. The latest version of TRICS, 2013(a), has been used to calculate vehicle generations and for the secondary school these generations include students who are dropped-off or collected by parents. A summary of the traffic generations are provided in **Tables 3 to 5** for the assumed highway weekday peak hours.

**Table 3: AM Peak Hour Calculations (08:00 – 09:00)**

		School	Residential	Total Trips Generated
Trip Rate	Arrivals	0.174	0.161	
	Departures	0.100	0.406	
	Two-way	0.274	0.567	
<b>Calculation Factor</b>		1 Pupils	1 Household	
Trip Generation	Arrivals	<b>210</b>	<b>51</b>	<b>261</b>
	Departures	<b>120</b>	<b>130</b>	<b>250</b>
	Two-way	<b>329</b>	<b>181</b>	<b>510</b>

**Table 4: PM Peak Calculations (17:00 – 18:00)**

		School	Residential	Total Trips Generated
Trip Rate	Arrivals	0.016	0.403	
	Departures	0.027	0.243	
	Two-way	0.043	0.646	
<b>Calculation Factor</b>		1 Pupils	1 Household	
Trip Generation	Arrivals	<b>19</b>	<b>129</b>	<b>148</b>
	Departures	<b>32</b>	<b>78</b>	<b>110</b>
	Two-way	<b>52</b>	<b>206</b>	<b>258</b>

- 4.4. The vehicle trip generations for the proposed 300 dwellings at Odd Down have been taken from the Arup Transport Evaluation report, February 2013, and are presented in **Table 5**. In addition, it has been assumed that 50 vehicles currently exit from Combe Hay Lane in the AM peak hour and turn left, while 20 vehicles turn right into Combe Hay Lane. These estimated flows were reversed for the PM peak hour.

**Table 5: AM and PM Peak Hour Calculations for Proposed 300 Dwellings**

	AM Peak Hour		PM Peak Hour	
	Arrivals	Departures	Arrivals	Departures
<b>Vehicle Trips</b>	30	99	101	58
<b>Equivalent Trip Rates per Dwelling</b>	0.10	0.33	0.34	0.19

## 5. CAPACITY ASSESSMENT – SULIS MANOR ROAD / COMBE HAY LANE JUNCTION

5.1. The preliminary capacity assessment of the Sulis Manor Road / Combe Hay Lane staggered junction has been assessed using the PICADY module of the standard transportation software program JUNCTIONS 8. The arms of the junction have been given the following notation.

- A. Sulis Manor Road East
- B. Combe Hay Lane
- C. Sulis Manor Road West
- D. School Exit (Combe Hay Lane north)

5.2. The total assumed vehicle turning movements are summarised in **Table 6**.

**Table 6: Estimated Vehicle Turning Movements Sulis Manor Road/Combe Hay Lane Staggered Junction**

	AM Peak Hour (08:00 – 09:00)				PM Peak Hour (17:00 – 18:00)			
	A	B	C	D	A	B	C	D
A	0	0	130	0	0	0	80	0
B	0	0	150	0	0	0	80	0
C	50	50	0	210	130	150	0	20
D	0	0	120	0	0	0	30	0

Note: Flows rounded to nearest 10 vehicles

5.3. The results of the preliminary capacity assessment are presented in **Tables 7** and **8** for the AM and PM peak hours respectively.

**Table 7: PICADY Capacity Results AM Peak Hour (08:00-09:00)**

Movement	Max Queue (veh)		Max RFC		Max Delay (min/veh)	
	No Dev	With Dev	No Dev	With Dev	No Dev	With Dev
B-ACD		0.2		0.16		0.11
A-BCD		0.0		0.00		0.00
D-ABC		0.3		0.26		0.16
C-ABD		0.1		0.05		0.10

Note: RFC is Ratio of Flow to Capacity on an arm

**Table 8: PICADY Capacity Results PM Peak Hour (17:00-18:00)**

Movement	Max Queue (veh)		Max RFC		Max Delay (min/veh)	
	No Dev	With Dev	No Dev	With Dev	No Dev	With Dev
B-ACD		0.1		0.09		0.09
A-BCD		0.0		0.00		0.00
D-ABC		0.1		0.07		0.12
C-ABD		0.2		0.16		0.11

Note: RFC is Ratio of Flow to Capacity on an arm

- 5.4. The results from the preliminary capacity assessment indicates that the Sulis Manor Road / Combe Hay Lane staggered priority junction would operate well within capacity even with the additional traffic from the proposed 300 dwellings located on the western part of the land controlled by the Hignett Family at Odd Down.
- 5.5. To check the robustness of the estimated traffic generations all traffic movements were increased by 10% and 20% and tested in PICADY. The 20% results are presented in **Tables 9** and **10** and the results demonstrate that the staggered junction would continue to operate well within capacity.

**Table 9: PICADY Capacity Results AM Peak Hour (08:00-09:00) + 20%**

Movement	Max Queue (veh)		Max RFC		Max Delay (min/veh)	
	No Dev	With Dev	No Dev	With Dev	No Dev	With Dev
B-ACD		0.25		0.20		0.12
A-BCD		0.00		0.00		0.00
D-ABC		0.45		0.31		0.17
C-ABD		0.07		0.06		0.10

Note: RFC is Ratio of Flow to Capacity on an arm

**Table 10: PICADY Capacity Results AM Peak Hour (08:00-09:00) + 20%**

Movement	Max Queue (veh)		Max RFC		Max Delay (min/veh)	
	No Dev	With Dev	No Dev	With Dev	No Dev	With Dev
B-ACD		0.12		0.11		0.10
A-BCD		0.00		0.00		0.00
D-ABC		0.09		0.08		0.13
C-ABD		0..25		0.20		0.11

Note: RFC is Ratio of Flow to Capacity on an arm

## 6. CAPACITY ASSESSMENT – MILFORD ROAD / SOUTHSTOKE ROAD JUNCTION

- 6.1. Development on the western part of the land adjoining Odd Down could be brought forward as Option 2 (300 dwellings and 250 employment opportunities) or as part of Option 3 (900 dwellings and 500 employment opportunities with c600 dwellings on the western part of the site). The sketch plans **Figures 2** and **3** show the configuration of these options.
- 6.2. A single access junction would serve the western development and from previous studies it is anticipated that a staggered traffic control junction would be the preferred layout as this layout provides greater capacity for right turning vehicles and is a better layout for pedestrians than a simple cross road arrangement. An indicative layout of the new junction is shown on Drg No. G220/02 included as **Appendix C**.

- 6.3. An estimation of the AM and PM peak hour vehicle generations has been based on the trip rates assumed by Arup in its Core Strategy Transport Evaluation report. The residential vehicle generations for the two options are summarised in **Table 11**.

**Table 11: Residential Vehicle Generations (from Arup report)**

Development Option	AM Peak Hour		PM Peak Hour	
	Arrivals	Departures	Arrivals	Departures
<b>Vehicle Trips – 300 dwellings</b>	30	100	100	60
<b>Trip Rates</b>	0.10	0.33	0.34	0.19
<b>Vehicle Trips – 600 dwellings</b>	60	200	200	120

- 6.4. The employment trip generation was based on the modal share of from the 2011 Census for journeys to work and has been assumed as 60% car driver, with  $\frac{2}{3}$  arriving in the AM peak hour and  $\frac{2}{3}$  departing in the PM peak hour. Adding the employee vehicle trips to the residential vehicle trips produces an estimate of vehicle arrivals and departures at the traffic signal junction, **Table 12**.

**Table 12 Vehicle Generations for Options 2 and 3**

Development Option	AM Peak Hour		PM Peak Hour	
	Arrivals	Departures	Arrivals	Departures
<b>Option 2</b>				
300 Dwellings	30	100	100	60
250 Employees	100	25	25	100
<b>Option 2 Total</b>	<b>130</b>	<b>125</b>	<b>125</b>	<b>160</b>
<b>Option 3</b>				
600 Dwellings	60	200	200	120
500 Employees	200	50	50	200
<b>Option 3 Total</b>	<b>260</b>	<b>250</b>	<b>250</b>	<b>320</b>

- 6.5. To test the likely capacity of the preferred access junction traffic movements at the existing junction were recorded for the AM peak hour on 8 August 2008. The existing vehicular turning movements were used as a proxy for the distribution of development traffic at the proposed signalised access junction. At this stage the AM peak period count was reversed to provide PM peak period movements. The 'background traffic' was then increased to a future year of 2021, using TEMPRO v6.2, and development traffic added.
- 6.6. The capacity of the proposed junction was tested using the traffic signal junction software program LINSIG V3. The results are summarised in **Tables 13 and 14**.

**Table 13: 2021 AM Peak Hour (07:30 – 08:30) LINSIG Capacity Results**

Test	Max Queue on any Arm (PCU)	Junction Reserve Capacity (%)	Cycle Time (secs)
2021 no Development	24.7	5.6	112
2021 with Option 2	26.4	2.3	112
2021 with Option 3	29.6	2.3	240 (double cycle)

**Table 14: 2021 PM Peak Hour (17:00 – 18:00) LINSIG Capacity Results**

Test	Max Queue on Any Arm (PCU)	Junction Reserve Capacity (%)	Cycle Time (secs)
2021 no Development	16.6	4.8	105
2021 with Option 2	15.2	2.7	105
2021 with Option 3	15.3	9.6	180 (double cycle)

6.7. The preliminary results indicate that the proposed traffic signal controlled access junction would have capacity to accommodate development traffic in the forecast year 2021, although the degree of 'reserve capacity' is likely to be limited, particularly for the AM peak hour.

## 7. CONCLUSIONS

7.1. Development on land adjoining Odd Down would be transport sustainable and it is likely that a significant proportion of journeys would be made by sustainable modes, in particular by bus.

7.2. An access serving development on the western part of the land adjoining Odd Down and under the control of the Hignett Family could be provided utilising Combe Hay Lane. Preliminary capacity assessment indicates that the existing Sulis Manor Road / Combe Hay Lane staggered cross road junction could accommodate 300 dwellings and operate within capacity.

7.3. A new traffic signal controlled access junction from Midford Road serving development on the eastern part of the land adjoining Odd Down and under the control of the Hignett Family could be provided. This arrangement has been preliminary tested for capacity and would operate satisfactorily for development Options 2 and 3, although reserve capacity may be limited.

7.4. Further detailed transport assessment would be required to support a planning application and it is likely that the highway authority would require the assessment to utilise the GBATH transport model to take into account the effect of cumulative development.



OPTION 1

300 Dwellings



Figure 1  
May 2013

OPTION 2

300 Dwellings  
+ 250 Employees

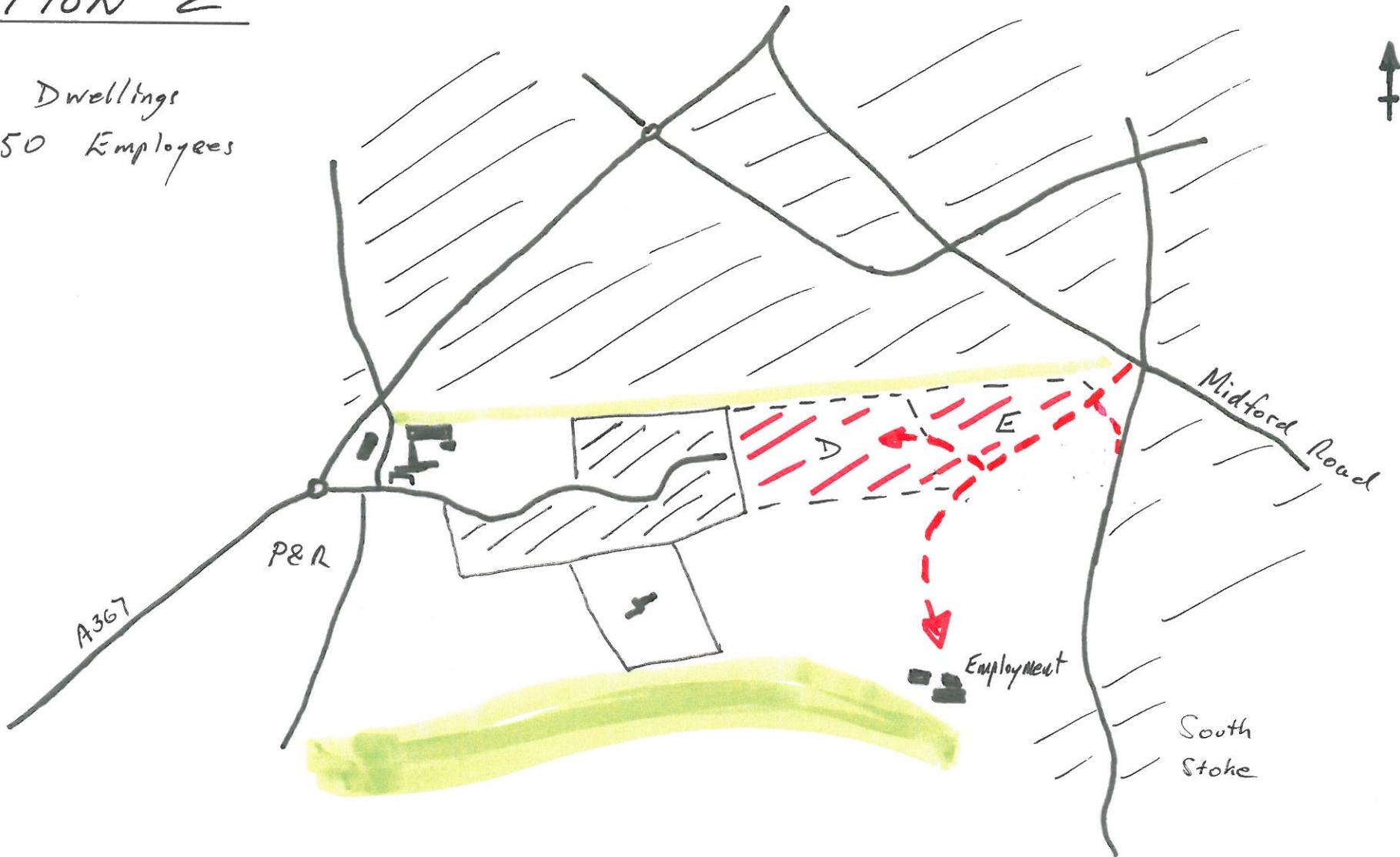


Figure 2  
May 2013

OPTION 3

900 Dwellings  
+ 500 Employees



Figure 3  
May 2013







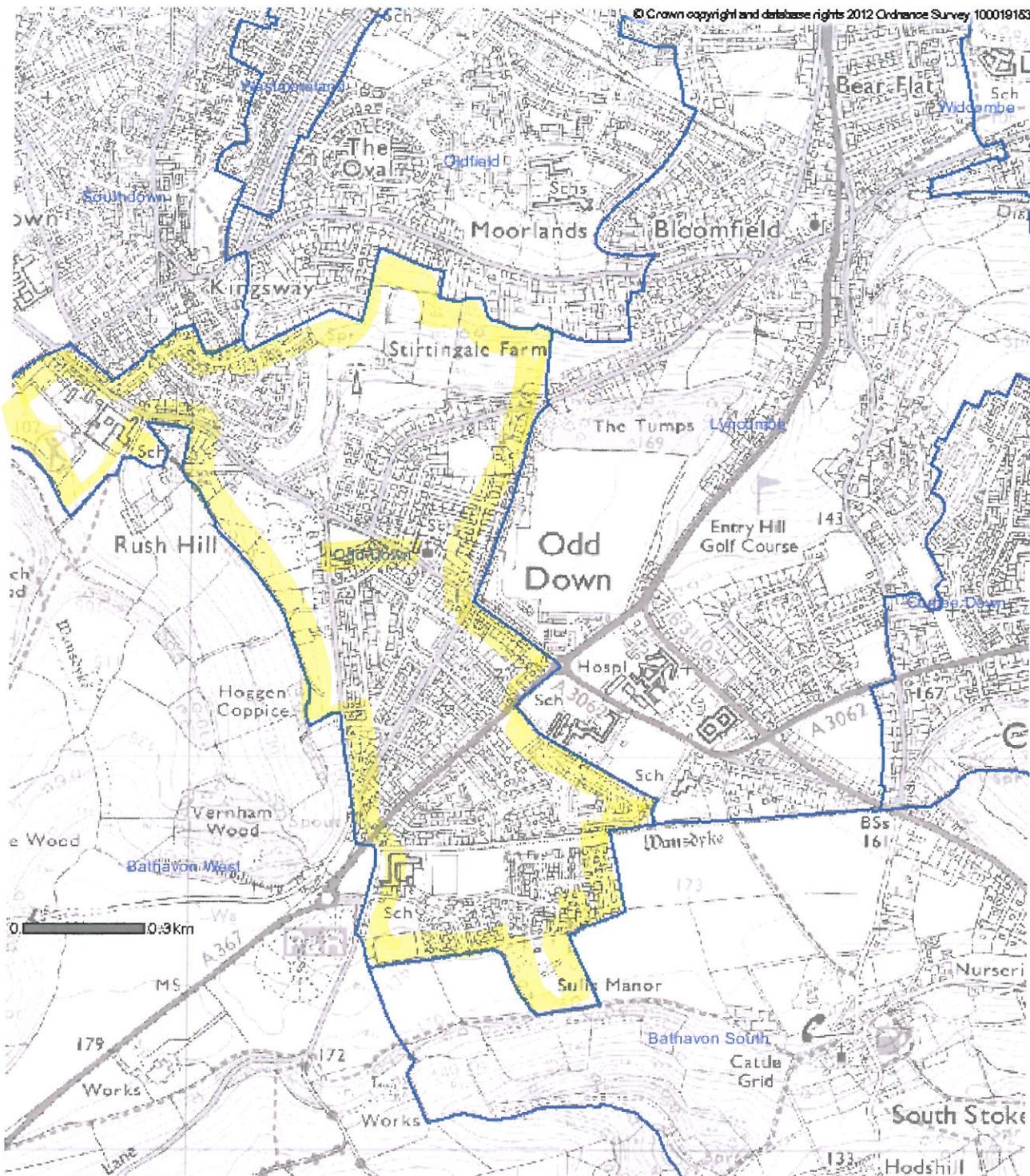


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## Method of Travel to Work, 2011 (QS701EW)

Period: Mar11

Area: Odd Down (Ward)

Variable	Measure	Odd Down	Bath and North East Somerset (Unitary Authority)	South West	England
All Usual Residents Aged 16 to 74 (Persons) <sup>1</sup>	Count	4,217	130,550	3,856,715	38,881,374
Work Mainly at or From Home (Persons) <sup>1</sup>	Count	119	6,512	177,999	1,349,568
Underground, Metro, Light Rail, Tram (Persons) <sup>1</sup>	Count	3	121	3,086	1,027,625
Train (Persons) <sup>1</sup>	Count	81	3,051	38,898	1,343,684
Bus, Minibus or Coach (Persons) <sup>1</sup>	Count	382	5,472	119,878	1,886,539
Taxi (Persons) <sup>1</sup>	Count	27	221	7,493	131,465
Motorcycle, Scooter or Moped (Persons) <sup>1</sup>	Count	41	891	28,461	206,550
Driving a Car or Van (Persons) <sup>1</sup>	Count	1,631	47,051	1,596,171	14,345,882
Passenger in a Car or Van (Persons) <sup>1</sup>	Count	189	3,891	132,014	1,264,553
Bicycle (Persons) <sup>1</sup>	Count	73	2,537	90,285	742,675
On Foot (Persons) <sup>1</sup>	Count	358	14,579	348,463	2,701,453
Other Method of Travel to Work (Persons) <sup>1</sup>	Count	12	532	17,636	162,727
Not in Employment (Persons) <sup>1</sup>	Count	1,301	45,692	1,296,331	13,718,653

Last Updated: 30 January 2013

Source: Office for National Statistics

## Notes

<sup>1</sup> National Statistics

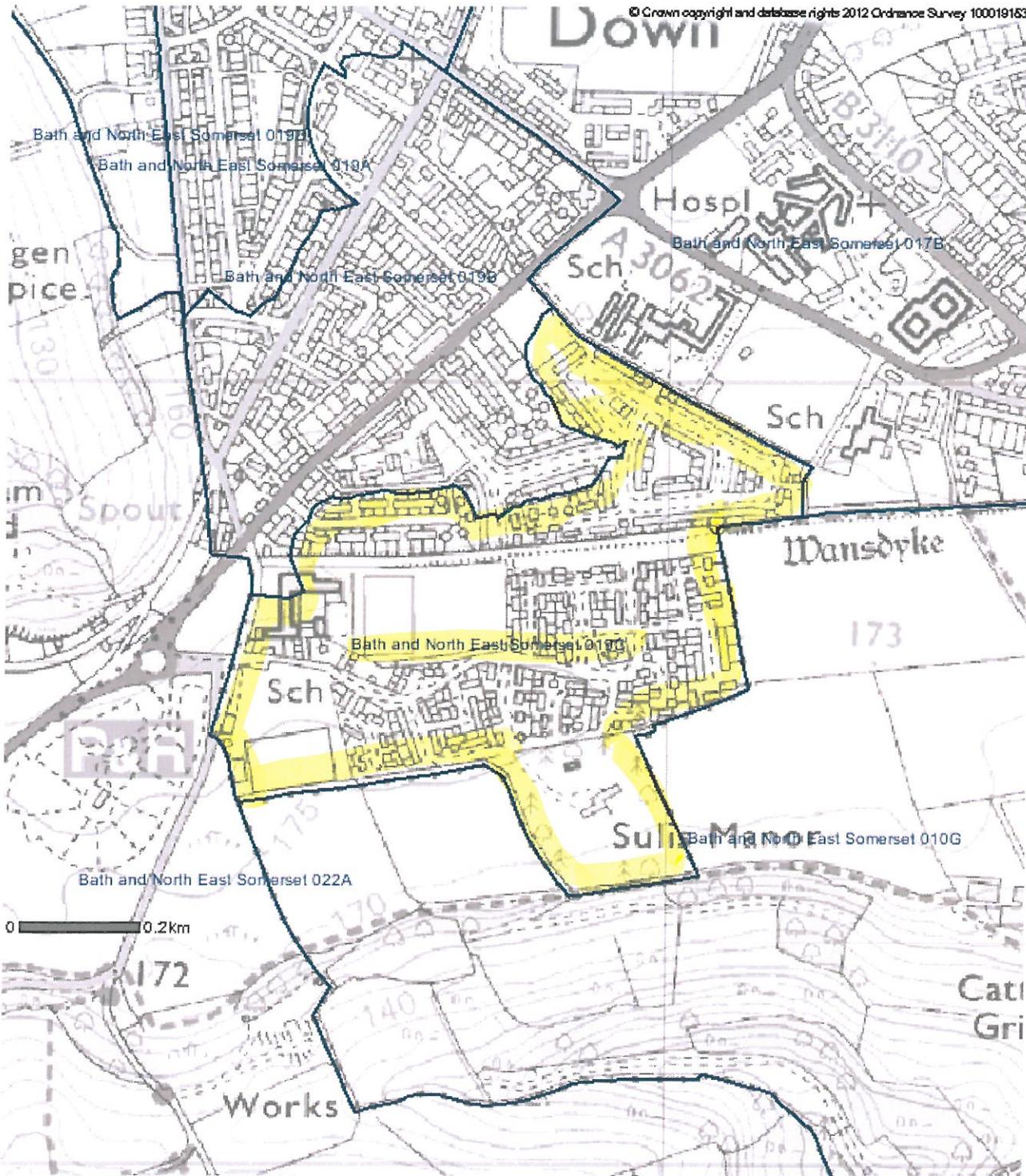
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## Method of Travel to Work, 2011 (QS701EW)

Period: Mar11

## Area: Bath and North East Somerset 019C (Lower Layer Super Output Area)

Variable	Measure	Bath and North East Somerset 019C	Bath and North East Somerset (Unitary Authority)	South West	England
All Usual Residents Aged 16 to 74 (Persons) <sup>1</sup>	Count	952	130,550	3,856,715	38,881,374
Work Mainly at or From Home (Persons) <sup>1</sup>	Count	20	6,512	177,999	1,349,568
Underground, Metro, Light Rail, Tram (Persons) <sup>1</sup>	Count	1	121	3,086	1,027,625
Train (Persons) <sup>1</sup>	Count	23	3,051	38,898	1,343,684
Bus, Minibus or Coach (Persons) <sup>1</sup>	Count	107	5,472	119,878	1,886,539
Taxi (Persons) <sup>1</sup>	Count	5	221	7,493	131,465
Motorcycle, Scooter or Moped (Persons) <sup>1</sup>	Count	8	891	28,461	206,550
Driving a Car or Van (Persons) <sup>1</sup>	Count	388	47,051	1,596,171	14,345,882
Passenger in a Car or Van (Persons) <sup>1</sup>	Count	38	3,891	132,014	1,264,553
Bicycle (Persons) <sup>1</sup>	Count	19	2,537	90,285	742,675
On Foot (Persons) <sup>1</sup>	Count	71	14,579	348,463	2,701,453
Other Method of Travel to Work (Persons) <sup>1</sup>	Count	1	532	17,636	162,727
Not in Employment (Persons) <sup>1</sup>	Count	271	45,692	1,296,331	13,718,653

Last Updated: 30 January 2013

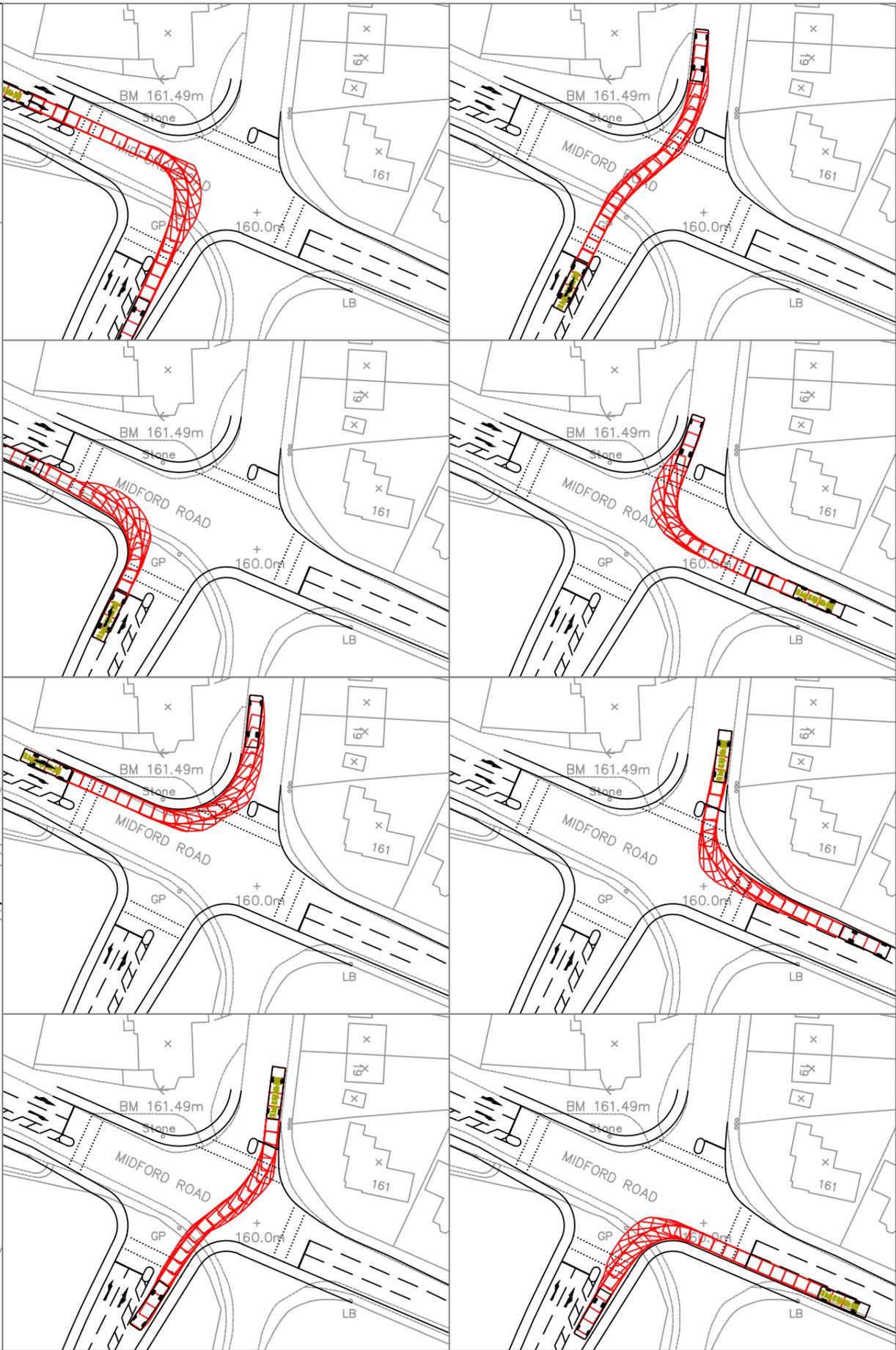
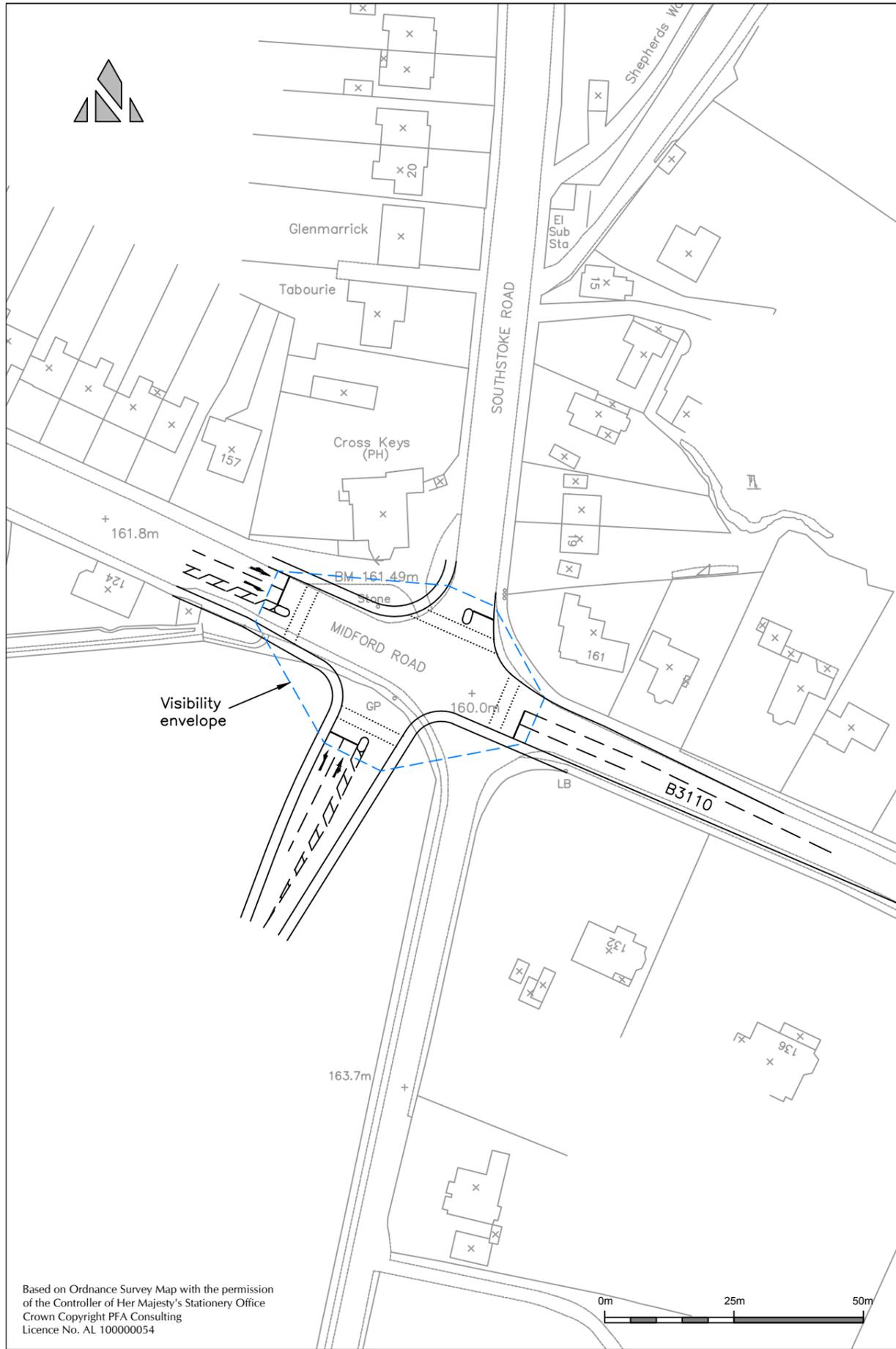
Source: Office for National Statistics

## Notes

<sup>1</sup> National Statistics

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Rev	Date	Description	Initials
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Client

**Hignett Family  
Settlement**

Project

**Odd Down  
Bath**

Drawing Title

**Midford Road Signal  
Controlled Layout**

Drawing No.

**G220/02**

Date

May 2013

Scale

1:1000 @ A3

Drawn By

CS

Checked By

PT

E-Mail

ptregear@pfapl.com

File Ref.

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