

**Government Office for the South West**

London to South West and South Wales

Multi-Modal Study

Swindon Area Plan

Final Report

May 2002



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**Contents Amendment Record**

This report has been issued and amended as follows:

Issue	Revision	Description	Date	Signed
25	0	Final Draft Report	Apr'02	DJL
25	1	Final Report	May'02	MBr

*The Preferred Strategy will go to the Regional Assemblies for the South West and South East of England, and the Welsh Assembly Government, to consider their recommendations and as an input to the revision of the Regional Transport Strategies in Regional Planning Guidance for the South West and the South East.*

*These bodies will consider whether they wish to support the strategy. They will then, in turn, make recommendations to Ministers. Only then will any decisions be taken on the addition of schemes to investment programmes.*

*The study has been taken forward in an open and consultative manner and the possible options discussed publicly. Many of the proposals are at an early stage in the planning process and if the recommendations were accepted, further work would be required to prepare and consult on detailed designs and route alignments. This will allow specific impacts to be identified.*

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# Executive Summary

- E.1* This Plan report has considered the likely operating conditions within Swindon and along the M4 to the south of town by 2011, and outlined the range and extent of transport measures necessary to maintain a satisfactory level of service in the motorway corridor. This has included a broad assessment of public transport measures aimed at reducing the level of demand on the highway network.
- E.2* In order to assess 'base' level highway conditions in 2011, the SATURN traffic model of Swindon has been used. The network used incorporates all committed highway schemes included in the Local Transport Plan for the town and, in addition, includes the improvements to the A419(T) recommended by the Highways Agency's Blunsdon Study. Traffic assignments undertaken 'elastically' for the morning peak hour 'base' situation demonstrate that, not unexpectedly, suppressed demand would exist in 2011, irrespective of the highway infrastructure improvements assumed to be in place.
- E.3* The analyses undertaken in developing the Plan clearly demonstrate that, notwithstanding any highway or public transport improvements assumed in the 2011 scenario, the level of residual road traffic using the road network in the Swindon area would still lead to a significant level of congestion in the peak periods. Indeed, operating conditions at the two motorway junctions to the south of the town will deteriorate when compared with the current situation.
- E.4* The analyses indicate that a 'step-change' in local public transport provision and associated priority measures will be needed to achieve a significant reduction in car use. The development of 'high capacity' public transport linkages, with an appropriate level of priority, will thus be a key element in maintaining an adequate level of service within an increasingly congested road network. This level of provision will require largely segregated operation, through the construction of 'with-flow' bus lanes, bus-ways or guide-ways and/or the use of bus gates and local access restrictions. It is not the purpose of SWARMMS to investigate the feasibility of specific route corridor treatment, or area wide priority measures, suffice to say that a 'high capacity' core public transport system would be required to cater for projected passenger demand whilst maintaining reliability. An extended bus fleet operating largely on the existing highway, with localised priority provision, will not fulfil this objective.

- E.5* Notwithstanding this, investment in new highway infrastructure to mitigate problems at M4 Junctions 15 and 16 will still be required. This is because 'step change' improvements in local public transport provision, whilst helping to ease road conditions in Swindon, are likely to have a more marginal impact on the longer distance car trips using the motorway corridor.
- E.6* Examination of the predicted road traffic conditions at M4 Junction 15 suggests that congestion problems could be largely addressed by a combination of at-grade improvements to the motorway junction and the southern section of the A419(T), together with grade-separation of the movement from the A419(T) to the westbound M4.
- E.7* In-situ measures at M4 Junction 16 are either not feasible, or would not be effective in significantly reducing the likely traffic problems in 2011. In consequence the solution necessary here would require the removal of traffic currently forced to route via the roundabout, namely the heavy 'through' traffic movements along the A3102 corridor between Swindon Road and Great Western Way. Two distributor road options have been described, the first linking Swindon Road with the highway infrastructure proposed for the 'Front Garden' development, and the second linking Swindon Road with Tewkesbury Way to the west of M4 Junction 16. The latter would be the less attractive option for trips between the A3102 and the central area of Swindon, although less complex in engineering terms. It would thus need to be developed in conjunction with the implementation of a public transport priority corridor along Tewkesbury Way, which would require the provision of a Park and Ride site in the Lydiard Tregoze area. This would be needed to cater for abstracted demand from the A3102, but would also provide enhanced public transport access to many residents in West Swindon. In the absence of any motorway connection to the western link road, a Park and Ride site in the Lydiard Tregoze area would not provide a viable alternative for eastbound M4 traffic accessing Swindon via Junction 16. However, the subsequent provision of a new motorway junction with west-facing slip-roads joining this new road could be considered in the longer term.
- E.8* Looking further at the internal Swindon highway network it is possible to identify additional public transport schemes. Although its potential for reducing traffic pressure on the M4 is limited, the proposed construction of the Purton-Iffley link road between Bruce Street Bridges and Purton Road should consider the provision of public transport priority measures in both directions. This could be tied in with the provision of a possible Park and Ride site near Moredon Bridge, which could

serve both the Northern Sector development and areas of West Swindon. Establishing a possible Park and Ride site in this location would provide an opportunity to consider the provision of a new station on the Swindon-Gloucester railway line. This could fulfil a dual purpose in providing a realistic alternative to the car for longer distance trips to and from West Swindon and the Northern Sector by improving accessibility to rail services, whilst providing a possible rail-based Park and Ride facility for local movements. The concept of a public transport interchange in the vicinity of Moredon Bridge should be actively considered. Whilst the effect of improved rail accessibility in this area is unlikely to have a great impact on longer distance car trips using the M4 corridor to the west, it would provide a viable alternative for longer distance movements between West/North Swindon and the east. It would also remove the need to drive into the Town Centre to access the main station, reducing pressure on the central area road network.

#### *E.9*

Looking ahead to 2016 and beyond, the transport systems in and around Swindon will continue to be under increasing pressure. As such, future development must be undertaken with a strong focus towards self-containment of the area. This self-containment must be developed not only for the Swindon area as a whole, but also for the development areas themselves. Without this focus, the strategic transport links, and particularly the M4 between Junctions 15 and 16, will be increasingly used for 'local' journeys around the central urban area. Indeed, it may be that some limitations to motorway access need to be developed and/or new access points off the network. Whatever the precise form of the future transport networks, significant levels of future development should only proceed with a strong focus towards self-containment and the provision of high quality sustainable transport networks.

# 1 Introduction

## 1.1

### *The SWARMMS Study*

#### 1.1.1

Halcrow was appointed by the Government Office for the South West (GOSW) in March 2000 to undertake the London to South West and South Wales Multi-Modal Study ('SWARMMS' – South West Area Multi-Modal Study). The overall aim of the study is to make recommendations for a long-term strategy to address passenger and freight transport needs within the key transport corridors between London and the South West of England and South Wales (M3, M4, M5, A303, A30, A38 and the parallel rail routes). The SWARMMS study area is shown in Figure 1.1.

**Figure 1.1: Map of the SWARMMS Study Area**



#### 1.1.2

This will include, as and where appropriate, plans of specific interventions to address existing and predicted strategic transport problems in the study area, looking in particular at opportunities for reducing congestion by better management and modal shift, as well as options for taking forward focused improvements.

### 1.1.3

This Plan is one of ten being produced for SWARMMS. The ten plans comprise:

#### *Four Multi-Modal Transport Corridor Plans*

- (London) Reading-Bristol/Severn Estuary (including the Great Western rail line and the M4)
- (London) Reading/Basingstoke-Exeter (including the Berks & Hants and Waterloo-Exeter rail lines and the M3/A303/A30)
- Bristol-Exeter (including the Bristol-Exeter railway and the M5)
- Exeter-Penzance (including the Exeter-Penzance railway, the A30 and the A38)

#### *Two Principal Urban Area (PUA) Plans*

- Greater Bristol
- Swindon

#### *Four Study-Wide Theme Plans*

- Reducing the growth in travel demand
- Tourism
- Inter-modal freight
- Rural access to the transport system

## 1.2

### ***Content of the Report***

### 1.2.1

This Plan specifically addresses the Principal Urban Area of Swindon, focusing particularly on future predicted operating conditions on the transport networks in 2011, notably along the section of the M4 to the south of the town. Strategic rail issues in the Swindon area are dealt with in the London to Bristol/Severn Estuary Plan.

### 1.2.2

Following this introduction, Chapter 2 describes the study methodology, particularly the use of the Swindon SATURN model developed previously by Halcrow for Swindon Borough Council. Chapter 3 then describes the existing operating conditions along the M4 corridor, relating these to conditions elsewhere within the town. Following this, Chapter 4 describes the 'base' operating conditions expected along the motorway corridor and elsewhere in the Swindon urban area by 2011. The latter takes into account the anticipated development in the Swindon area over the period 2002-2011, and the completion of various highway schemes and public transport improvements identified in the Local Transport Plan.

1.2.3

Chapter 5 then discusses the scale of public transport infrastructure investment needed to realise the anticipated expansion of the town whilst maintaining a satisfactory level of service on the transport networks, including the motorway junctions. Chapter 6 then considers the scale of improvements needed to mitigate any future deterioration in operating conditions along this section of the M4. Chapter 7 concludes with a summary outlining the key requirements of the Swindon Area Plan.

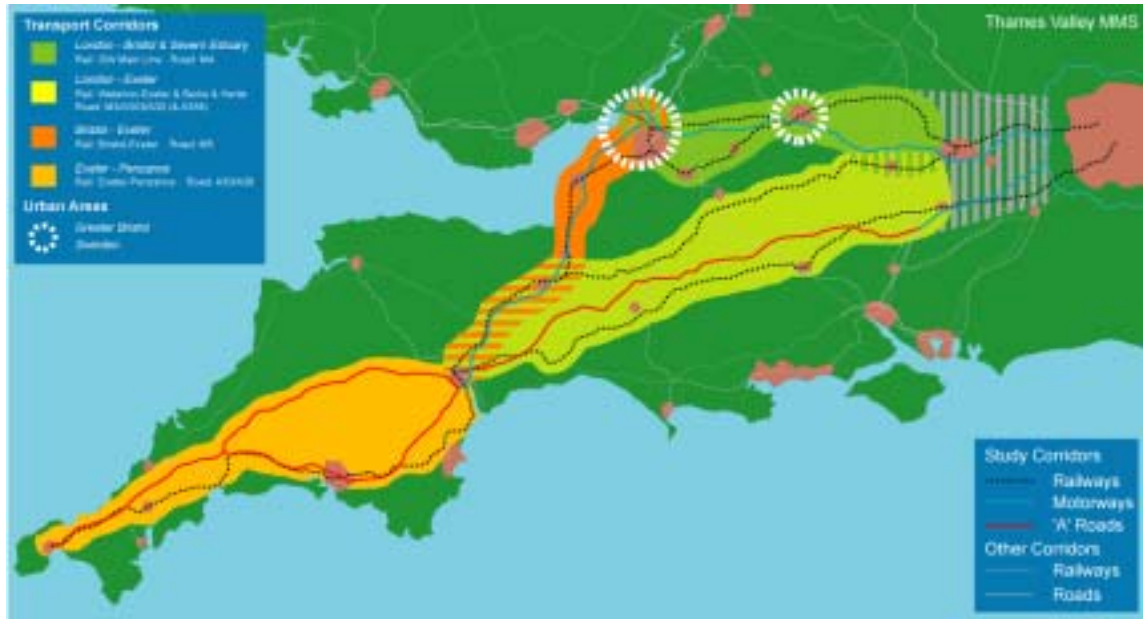
1.3

***Interaction with Other Plans***

1.3.1

There is a degree of interaction between all ten Plans being produced by SWARMMS. By definition, the four corridor plans interact by reason of geography as shown in Figure 1.2, and specific links are referenced throughout each Plan.

**Figure 1.2: Coverage of Geographic Plans**



1.3.2

This Plan for the Swindon PUA has an obvious interaction with the London to Bristol/Severn Estuary Corridor Plan. Indeed, the London to Bristol/Severn Estuary Plan contains details of all schemes and measures proposed on the rail, coach and road networks, which extend along the GWML/M4 corridor beyond the immediate Swindon area.

### *1.3.3*

The four study-wide theme Plans also interact, both with each other and the geographic-based Plans. This Swindon Plan is particularly influenced by the Plan to reduce the growth in travel demand, as indeed are all the Plans.

## 2 Methodology

### 2.1 *Introduction*

2.1.1 Future development in the Swindon area, wherever its location, will undoubtedly result in a large increase in the demand for travel. Whilst the development of parallel investment in public transport infrastructure will assist in providing realistic mode choice for a proportion of the trips associated with areas of new development area, substantial demand for car-based travel is likely to remain.

2.1.2 In view of this the methodology adopted first looked at future 'predicted' highway operating conditions in and around Swindon, notably at M4 Junctions 15 and 16. The second phase of the study then considered the broad level of public transport improvements necessary to reduce car dependency, thus encouraging a mode shift from the private car and helping to ease pressure on the highway network. The third phase of the study examined possible local highway improvements to mitigate operational problems in the vicinity of the motorway corridor and sought to bring these issues together to develop an appropriate future transport system for the Swindon area.

### 2.2 *The Swindon SATURN Model*

2.2.1 In order to examine 'base' highway operating conditions along the M4 corridor in 2011, and likely changes in traffic demand with the different land use scenarios, the SATURN traffic model developed by Halcrow for the Borough Council was used. This model provides full junction 'simulation' across the whole of the urban area under consideration, including the M4 and A419 corridors, Wootton Bassett and Wroughton, with a coarser link-based 'buffer' network used for key approach routes from the surrounding highway network. A Local Model Validation Report (LMVR) demonstrating compliance with the acceptability criteria set out in the Highways Agency's Design Manual for Roads and Bridges, Section 2, Part 1 - Traffic Appraisal in Urban Areas is available for a 'base' 1999 situation.

### 2.3 *Transport Network*

2.3.1 The 'base' network scenario used included all committed highway schemes in the Borough Council's Local Transport Plan, notably:

- The Northern Sector Distributor Road between the A4311 Cricklade Road and the B4534 to the west of Haydon Wick. This provides the

primary highway access to the Northern Sector Development, and will be constructed to dual standard throughout its length;

- The Purton-Iffley Link Road; and
- Highway infrastructure associated with the proposed 'Front Garden' development between Okus and the M4, notably the construction of a new distributor road between the A3102 Great Western Way and the junction of the A4361/B4006 south of Old Town. Improvements to Mill Lane and the construction of an improved traffic signal controlled junction with Wharf Road are also included in the model network, in order to provide enhanced road capacity across the M4.

2.3.2 The locations of these road schemes are shown in Figure 2.1. The eastern end of the Northern Sector Distributor Road is currently being upgraded to dual standard, with the remaining length now built and open to traffic.

2.3.3 The model network described above was previously used to examine a number of strategies in developing the Local Transport Plan for Swindon. However, it did not include any improvements to the A419(T) corridor, the extent and feasibility of which were being separately examined at the time by the Highways Agency as part of the Blunsdon Study. The recommendations regarding improvements to the A419(T) have since been reported and, for the purposes of developing this Swindon Plan for SWARMMS, have been additionally included in the 'base' network. These comprise:

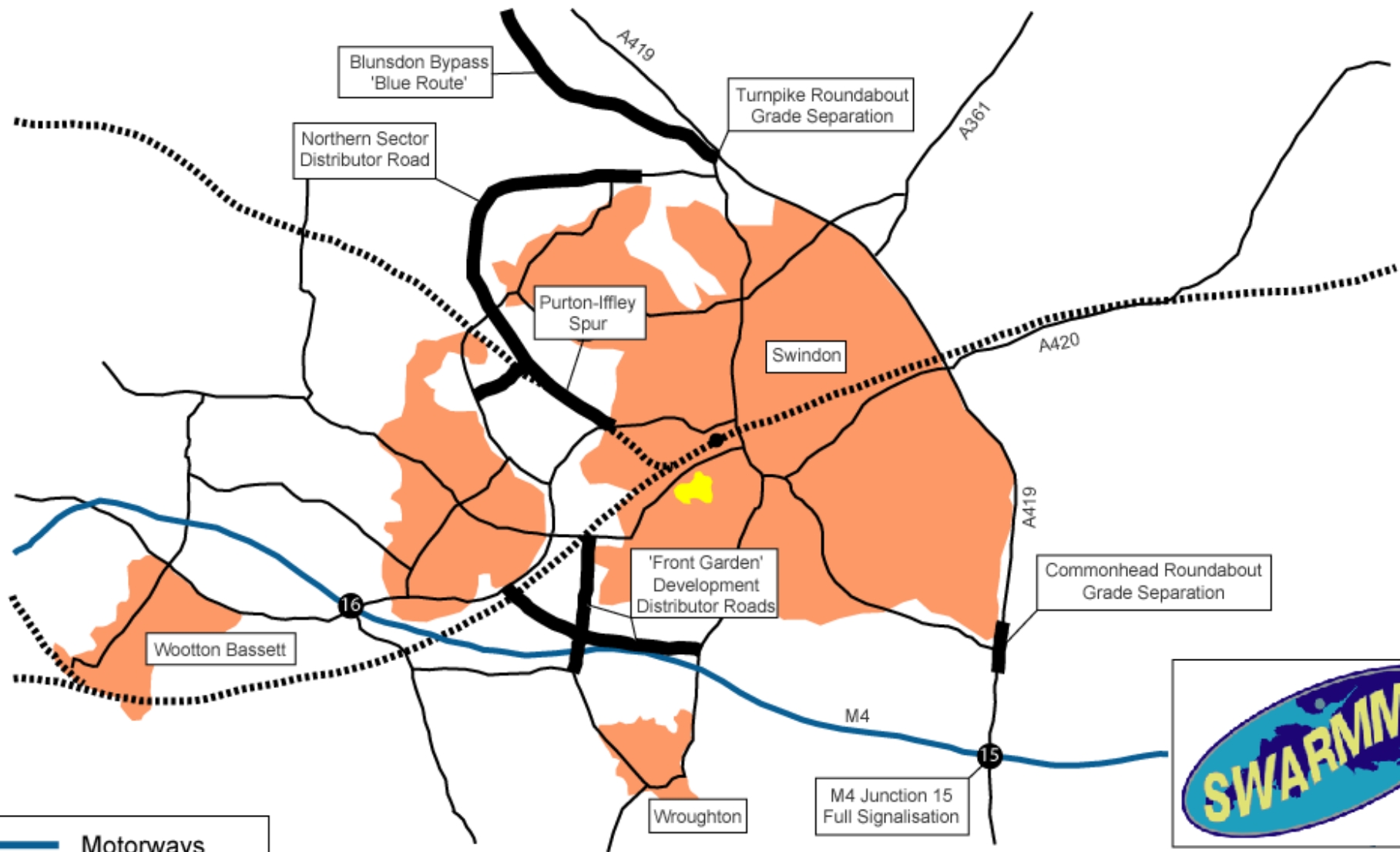
- Construction of a bypass to the west of the existing A419(T) at Blunsdon, together with grade-separation of Turnpike Roundabout. An alignment based on the 'Blue Route' has been used;
- Grade-separation of Commonhead Roundabout; and
- Full signalisation of M4 Junction 15, but no major physical improvements. The circulatory carriageway on the south side of the roundabout would, however, need to be widened to provide three lanes on safety grounds if the A346 approach were signalled. This minor physical improvement is assumed in the 'base' network.

2.3.4 The locations of these improvements are also indicated on Figure 2.1.

## 2.4 *Trip Matrices*

2.4.1 The trip matrix used for assessing 2011 'base' conditions utilises the 'actual' trip matrix output from undertaking an elastic assignment with the network described.

This is more realistic than one based purely on demand, in that it takes into account the effect of congestion in influencing whether trips are re-timed, not made, or a different mode used. The results of this assignment demonstrate that there would be a level of congestion sufficient to 'suppress' a proportion of the 'base' travel demand by 2011, notwithstanding the assumed changes to the transport networks. The assessments undertaken consider operating conditions in the morning peak period only. This is considered sufficiently robust to identify the potential level of infrastructure improvement needed within the Swindon area by 2011, albeit focussed along the motorway corridor.



- Motorways
- Other Roads
- ⋯ Railways
- Railway Station

- Committed Highway Improvements
- Town Centre



**Swindon Area:  
Location of Committed  
Highway Improvements**

Figure 2.1

## 3 Existing Conditions: 2000

### 3.1

#### ***General***

#### 3.1.1

This Chapter considers the current operating conditions on the highway network in and around Swindon during the peak periods, focussing in particular on the two motorway junctions and their associated mainline links. Figure 3.1 is a location plan showing principal roads and 'key' junctions in the town.

### 3.2

#### ***Swindon Urban Area***

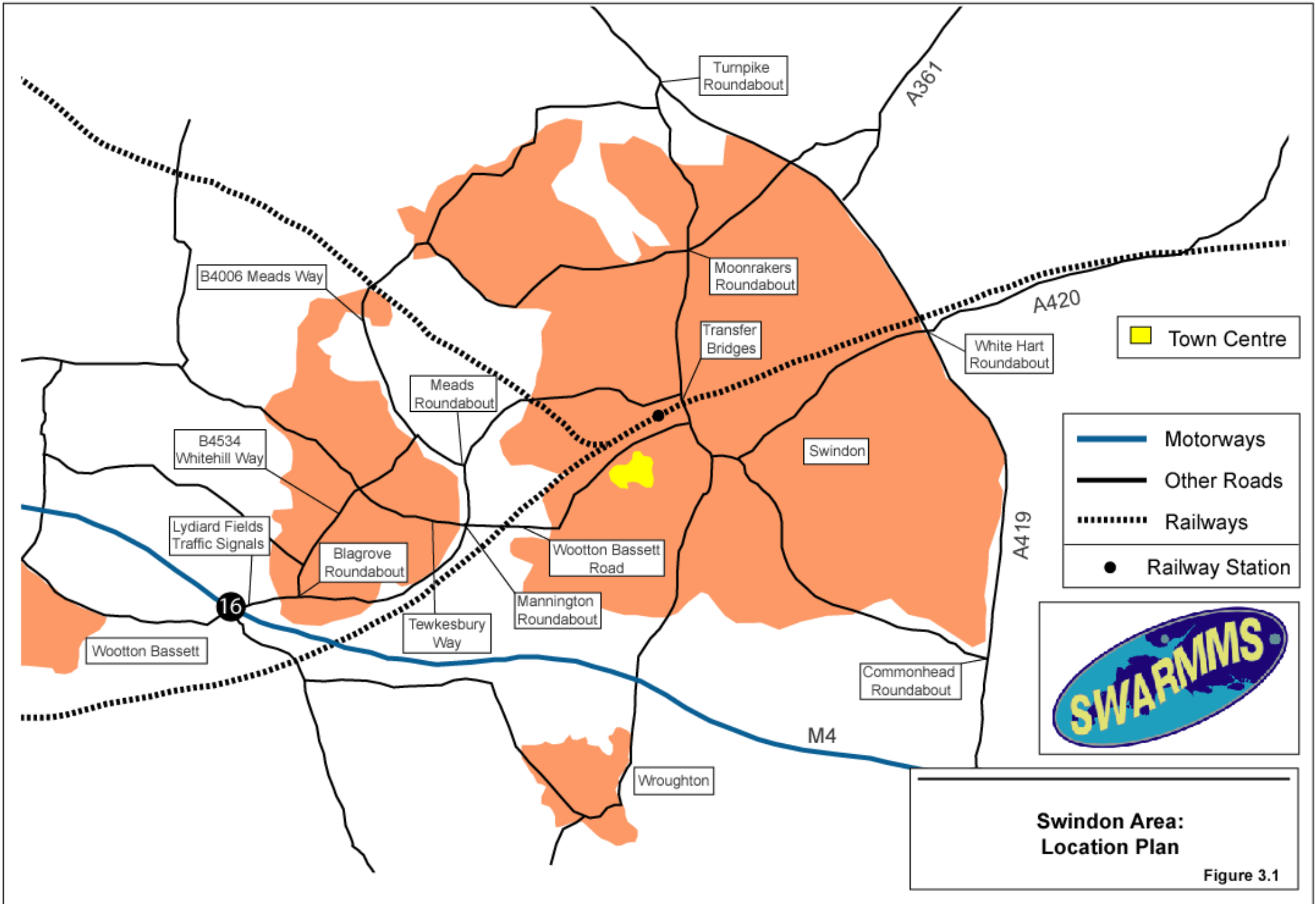
#### 3.2.1

Like many towns and cities in the United Kingdom, Swindon presently suffers from regular peak hour congestion both within the town centre and on the main radial routes. Particularly congested operating conditions occur in the following locations:

- The A3102 corridor between Mannington Roundabout and the town centre, notably Wootton Bassett Road, where traffic is often slow moving or stationary in both peak periods;
- Blagrove Roundabout, notably the B4534 Whitehill Way approach in the morning peak hour;
- The Meads Roundabout, notably the B4006 Meads Way approach in the morning peak hour;
- Transfer Bridges;
- Moonrakers Roundabout; and
- A419(T)/A4311 Turnpike Roundabout, notably the southbound A419(T) approach in the morning peak hour.

#### 3.2.2

It should be noted that this list is not exhaustive, and that peak period operational problems do occur at many other junctions within Swindon, although with a lesser degree of severity. It is thus clear that the level of residual capacity on the main highway network within Swindon is relatively limited in the peak hours. Any significant growth in road traffic demand over and above current levels will therefore tend to be taken up by 'peak spreading'.



- 3.3 ***M4 Junction 14(A338) to Junction 15(A419/A346)***
- 3.3.1 Traffic volumes on this section of the M4 are 82,000 vehicles AADT (2000) and traffic generally flows smoothly throughout the day. There are no particular link-based accident problems and the accident rate is below the national average for D3M.
- 3.4 ***M4 Junction 15(A419/A346)***
- 3.4.1 This junction is partially signalised, with traffic signals controlling the two exit slip-roads from the M4. There is congestion and queuing on the A419(T) approach in the evening peak hour, and on the westbound exit slip-road in the morning peak hour. This results in accident problems, predominately the shunt (nose to tail) type. There is also some queuing on the A345 approach in both peak periods, due to difficulties encountered by drivers in finding suitable 'gaps' in the high volume of circulating traffic on the south side of the roundabout.
- 3.4.2 The recommendations from the Highways Agency's Blunsdon Study include proposals for full signalling of the roundabout. However, this will need to be carefully developed as there is potential for exacerbating the accident problems on the westbound exit slip-road due to reduced queuing capacity within the roundabout. This should have the effect of reducing accidents on the A419(T) approach.
- 3.5 ***M4 Junction 15(A419/A346) to Junction 16(A3102)***
- 3.5.1 Traffic volumes on this section are about 76,000 vehicles AADT (2000) and, again, operating conditions are generally acceptable. There are no particular link-based accident problems and the accident rate is below the national average for D3M.
- 3.6 ***M4 Junction 16(A3102)***
- 3.6.1 This junction is fully signalised and is heavily congested in the peak periods. There is a significant queue of slow moving or stationary traffic on the A3102 Swindon Road approach from Wootton Bassett in the morning peak hour, which regularly extends back into the town.
- 3.6.2 During the evening peak period queuing occurs on the A3102 Great Western Way approach from Swindon. Queuing on the B4005 approach occurs in both peak periods, whilst congestion on both motorway exit slip-roads can lead to queues which extend onto the main carriageway of the motorway. The proximity of the junction to Lydiards Fields/Windmill Hill Business Park on the A3102 to the

north serves to exacerbate the problem. Available accident statistics show a high proportion of shunt-type accidents, consistent with the queuing noted above.

3.7

***M4 Junction 16(A3102) to Junction 17(A429/A350)***

3.7.1

Flows on this section are about 78,000 vehicles AADT (2000), and again there are no significant operating problems. There are no particular link-based accident problems and the accident rate is below the national average for D3M.

## 4 'Base' Highway Conditions in 2011

### 4.1

#### ***Introduction***

#### 4.1.1

As previously stated, an 'elastically restrained' SATURN assignment undertaken for the morning peak hour scenario in 2011 showed that the level of congestion on the road network would be sufficient to 'suppress' a proportion of the 'base' travel demand. The number of predicted vehicular trips in the 'capped' morning peak hour 'base' matrix in 2011 is around 58500 vehicle trips. This compares with some 46000 vehicles currently using the road network in the Swindon area during the morning peak period. This 27% increase in morning peak hour traffic from current levels by 2011 reflects major proposed expansion in the Northern Sector and 'Front Garden' development areas, and the highway capacity improvements afforded by the roads schemes described in Chapter 2.

#### 4.1.2

Examination of the highway model shows that this increase in road traffic would be associated with widespread congestion at many junctions in the urban area, lasting for virtually the whole of the peak hour. This is not surprising, given the extent of present congestion problems in the urban area, which were outlined in Chapter 3. However, whilst existing congestion problems prevalent at many junctions within Swindon do not last for the entire peak hour, it is clear that the effect of this growth, whilst accommodated, will extend congestion problems over a much longer time period.

#### 4.1.3

Sector-to-sector analysis has been used to examine the pattern of traffic movement associated with this period, particularly movements likely to use the M4. In respect of the M4 corridor a number of points are worthy of mention from the sector analysis. These are as follows:

- An eastbound flow of up to 4900vph is predicted to enter the Swindon area via the M4 corridor to the west, most of it along the motorway. Of these, some 1500 trips have destinations in Swindon and around 1800 trips are associated with 'through' traffic along the motorway. The remaining 1600 trips are associated with 'external' destinations accessed via other primary routes, such as the A419(T) and A420;
- A westbound flow of around 4550vph is predicted to enter the Swindon area via the M4 corridor to the east of the town, again much of it via the motorway. Around 1350 trips have destinations in Swindon, with some

1900 trips making 'through' journeys along the M4. The remaining 1300 trips are again associated with 'external' destinations accessed via other primary routes, such as the A419(T) and A3102; and

- There is a significant volume of traffic between areas south of the M4 and Swindon. This accounts for up to 4000 northbound vehicle movements in the morning peak hour, a high proportion of which must be accommodated by M4 Junctions 15 and 16.

#### 4.2

##### ***M4 Junction 15***

##### 4.2.1

Examination of the SATURN model results for M4 Junction 15 show that operational problems would be prevalent in this location during the morning peak hour in 2011, notwithstanding the proposals to fully signalise the roundabout. The junction with the eastbound exit slip-road would form the critical point on the roundabout, with both entry and circulatory approaches 'at capacity'. The latter would lead to 'excess' queuing on the roundabout and resultant 'blocking back' into the upstream junction with the A346. Both the A346 and the A419(T) approaches to M4 Junction 15 are also predicted to be over-saturated, with permanent queuing during this period.

#### 4.3

##### ***M4 Junction 16***

##### 4.3.1

The SATURN results predict that M4 Junction 16 would be seriously congested by 2011, with four of the five approaches to the roundabout either at or over-capacity. This is perhaps not unexpected, since present queuing on the A3102 Swindon Road regularly extends back to Wootton Bassett in the morning peak hour, whilst queuing on the westbound exit slip-road can extend back onto the M4. Only the A3102 Great Western Way approach from Swindon would have any residual capacity available during the morning peak period.

##### 4.3.2

These existing problems are mirrored by the SATURN results obtained for 2011 with, in addition, significant queuing predicted on the eastbound exit slip-road. Problems are compounded, as at present, by capacity restraint associated with the section of the A3102 immediately north of M4 Junction 16. Thus, even if it were possible to significantly improve the capacity of the motorway junction, adjacent junctions such as Blagrove Roundabout and the traffic signals at Lydiard Fields would be unable to absorb the additional inbound traffic 'released' by any improvement.

#### 4.4 ***M4 Motorway: Mainline Links***

4.4.1 Predicted traffic flows on the section of the M4 between Junctions 15 and 16 are around 3450vph and 3300vph in the westbound and eastbound directions respectively. To the east of M4 Junction 15 the predicted westbound and eastbound flows on the M4 are 4100vph and 3700vph respectively. These flows would remain within the link capacity of the M4.

4.4.2 To the west of M4 Junction 16 the predicted westbound and eastbound traffic volumes using the M4 in the morning peak hour are around 3100vph and 4250vph respectively. These are again within the link capacity of the M4. However, the flow of traffic on the eastbound carriageway during this period is likely to be affected by queuing on the approach to M4 Junction 16, as a result of congestion problems at the signalled roundabout.

#### 4.5 ***Overview***

4.5.1 The SATURN traffic model results for the morning peak hour scenario in 2011 show that there would be widespread congestion at many junctions within the urban area of Swindon, with operational problems extending throughout the whole of the peak hour. The effect of this congestion would be sufficient to 'suppress' a proportion of the 'base' travel demand. However, the number of predicted vehicular trips in the 'capped' morning peak hour 'base' matrix in 2011 is still expected to rise to around 58500 vehicle trips. This represents a 27% increase from the 46000 vehicles currently using the road network in the Swindon area during the morning peak period. This growth is to some extent facilitated by a number of proposed highway schemes which are expected to be completed by 2011, but also by 'peak' spreading, the latter giving rise to congested operating conditions over a longer time period. Although congestion occurs at a number of junctions within Swindon at present, this does not normally result in 'saturated' operating conditions throughout the whole of the peak hour.

4.5.2 The assessment of operating conditions along the M4 to the south of Swindon indicates that the predicted traffic volumes in 2011 would remain within the link capacity thresholds for the motorway. However, significant operational problems are likely to exist at both M4 Junctions 15 and 16, particularly the latter. Indeed, significant congestion already occurs at M4 Junction 16 in the morning peak hour.

4.5.3 It is clear that a combination of alternative public transport measures to reduce the future volume of car traffic and/or significant improvements to one or both junctions will need to form an essential component of the SWARMMS Plan for

the Swindon area. Improving future transport conditions in Swindon cannot just be highway related, which could simply encourage further traffic growth, but will need to take into account the potential role which can be played by other modes, and the additional investment needed to make these modes a viable alternative to the car.

## 5 The Role of Public Transport

### 5.1 *The Current Strategy*

5.1.1 The current Local Transport Plan (LTP) for Swindon envisages an essentially bus-based strategy for improving public transport facilities in the town. This includes the identification of a number of possible locations for Park and Ride sites on the edge of the town to complement the existing site at The Copse on the A4311 Cricklade Road. A new Park and Ride site is currently under construction to the south of the town at the junction of the A4361 Croft Road and Pipers Way, just north of the M4. The Local Transport Plan also identifies a number of bus priority schemes, the effects of which have already been considered in testing work previously undertaken by Halcrow with the multi-modal model on behalf of the Borough Council.

5.1.2 The morning peak hour highway matrix used for assessment can therefore be considered as the residual level of road traffic using the road network in 2011, after taking account of likely modal shift and other travel decisions in response to increasing congestion. It is clear from the highway model results that, not unexpectedly, the road network in and around Swindon will remain very congested in the morning peak hour in 2011, with continued operational problems prevalent at the motorway junctions and many other locations within the urban area. Congestion is also likely to be prevalent over a longer time period as a result of 'peak spreading'.

5.1.3 This Chapter considers additional changes to the public transport system which are likely to be required to achieve a 'step change' in modal shift, thus easing pressure on the local road network and the motorway corridor.

### 5.2 *New Bus Infrastructure*

5.2.1 The development of 'high quality' local public transport linkages, with an appropriate level of priority, will be a key element in making a bus or guided bus strategy 'work' in transport terms. This system would need to provide:

- A high level of capacity to prevent overcrowding, which would otherwise reduce the 'quality of journey';
- A high level of priority over other vehicular traffic; and

- A network of services with convenient interchange, catering for journeys between all parts of the town, not just journeys into and out of the town centre.

5.2.2 This level of provision will require largely segregated operation, through the construction of bus-ways or guide-ways and/or the use of bus gates and local access restrictions. It is not the purpose of SWARMMS to investigate the feasibility of specific route corridor treatment, or area wide priority measures in the Swindon urban area, suffice to say that a 'high capacity' core public transport system would be required. This would assist in maintaining an adequate standard of service within an increasingly congested road network, thus encouraging the necessary 'step change' needed in public transport usage.

5.2.3 An extended bus fleet operating largely on the existing highway, with localised priority provision, will not fulfil this objective. Notwithstanding this, investment in new highway infrastructure to either relieve or improve the existing motorway junctions would still be required. This is because 'step change' improvements in local public transport provision, whilst helping to ease road conditions in Swindon, are likely to have a more marginal impact on the longer distance car trips using the motorway corridor. Possible public transport schemes to link into new highway infrastructure at the motorway junctions are discussed in Chapter 6.

5.2.4 In addition, although its potential for reducing traffic pressure on the M4 is limited, the proposed construction of the Purton-Iffley link road between Bruce Street Bridges and Purton Road should consider the provision of public transport priority measures in both directions. This could be tied in with the provision of a possible Park and Ride site near Moredon Bridge, which could serve both the Northern Sector development and areas of West Swindon.

### 5.3 ***New Rail Infrastructure***

5.3.1 Establishing a possible Park and Ride site in the vicinity of Moredon Bridge would provide an opportunity to consider the provision of a new station on the Swindon-Gloucester railway line in this location. This could fulfil a dual purpose in providing a realistic alternative to the car for longer distance trips to and from West Swindon and the Northern Sector by improving accessibility to rail services, whilst providing a possible rail-based Park and Ride facility for local movements. The concept of a public transport interchange in the vicinity of Moredon Bridge should be actively considered.

### 5.3.2

Whilst the effect of improved rail accessibility in this area is unlikely to have a great impact on longer distance car trips using the M4 corridor to the west, it would provide a viable alternative for longer distance movements between West/North Swindon and the east. It would also remove the need to drive into the Town Centre to access the main station, reducing pressure on the central area road network.

## 6 Highway Improvement Measures

### 6.1

#### 6.1.1

#### **General**

The SATURN model tests undertaken for 2011 already take into account the construction of a number of highway schemes within Swindon, in addition to the recommended proposals along the A419(T) on the eastern side of the town. Whilst there may be opportunities for considering additional enhancements to particular 'key' junctions in the town, it should be recognised that opportunities for constructing new urban roads through the existing 'built-up' area will be much more limited. Any particular scheme, which may require property demolition, would clearly have to be considered on its own merits, as regards its ability to solve localised transport or traffic problems. It is not the purpose of the SWARMMS plan to identify particular highway schemes in the urban area, other than those that could be implemented in the vicinity of the existing motorway junctions to complement improvements to the latter.

### 6.2

#### 6.2.1

#### **M4 Junction 15**

Analyses indicate that, despite the proposed transport improvements in the Local Transport Plan and additional public transport measures of the type described in Chapter 5, road traffic conditions in this location will continue to deteriorate over the period 2002-2011. Possible at-grade improvements to this junction which could be considered are as follows:

- Widening the northbound A419(T) between the motorway and Commonhead Roundabout to three lanes. This would allow a segregated left turn filter lane with a downstream lane gain to be provided from the eastbound exit slip-road. Since the left turn from the slip-road to the A419(T) is by far the dominant movement, much of the present conflict at this roundabout entry would be removed. Achieving a satisfactory weaving length between the end of the filter lane and the northbound diverge nosing at Commonhead Roundabout would be the critical road safety issue;
- Widening the southbound A419(T) between Commonhead Roundabout and M4 Junction 15 to three lanes. The third lane created on the A419(T) approach to the motorway could be used to provide a left turn filter lane from the trunk road onto the eastbound entry slip-road to the M4. The proposed measures would significantly enhance the capacity of the

A419(T) entry, although the upstream weaving length achievable between the southbound slip-road entry from Commonhead Roundabout and the start of the filter lane will again be a critical highway safety consideration; and

- Improvements to the existing 'simple' merges with the M4 to increase capacity, say, by constructing auxiliary lanes to increase the merging length.

6.2.2 Improving the A419(T) entry will inevitably encourage additional traffic to use the trunk road to access the westbound M4, thereby increasing circulatory traffic pressure across both the westbound exit slip-road and A345 entries, which would already be at or close to capacity without any improvement. Consideration will therefore need to be given to investigating the feasibility of grade-separating the movement from the A419(T) to the westbound M4, which would be the only practical way of increasing the achievable entry capacities of the westbound exit slip-road and A345 approaches to the roundabout.

6.3

#### ***M4 Junction 16***

6.3.1

Easing or mitigating congestion problems at M4 Junction 16 will be far more difficult. Grade-separation of the A3102 is not considered practical because of the proximity of accesses on the northern side of the junction. Furthermore, Blagrove Roundabout would remain a 'bottleneck' unless improved, so increased inbound traffic pressure on this junction would simply lead to traffic queues tailing back into M4 Junction 16. Localised widening of one or more of the roundabout approaches is unlikely to have much impact on congestion, particularly as the present number of entry lanes on each approach is already 'balanced' with respect to provision on circulatory sections. With the exception of the movement from the eastbound exit slip-road to Great Western Way, left turning volumes are also relatively low, so the provision of one or more segregated left filter lanes is unlikely to provide a solution to future operational problems. The proximity of the traffic signal controlled junction with Lydiard Fields to M4 Junction 16 would in any case make the provision of a filter lane for the eastbound exit slip-road impractical on safety grounds.

6.3.2

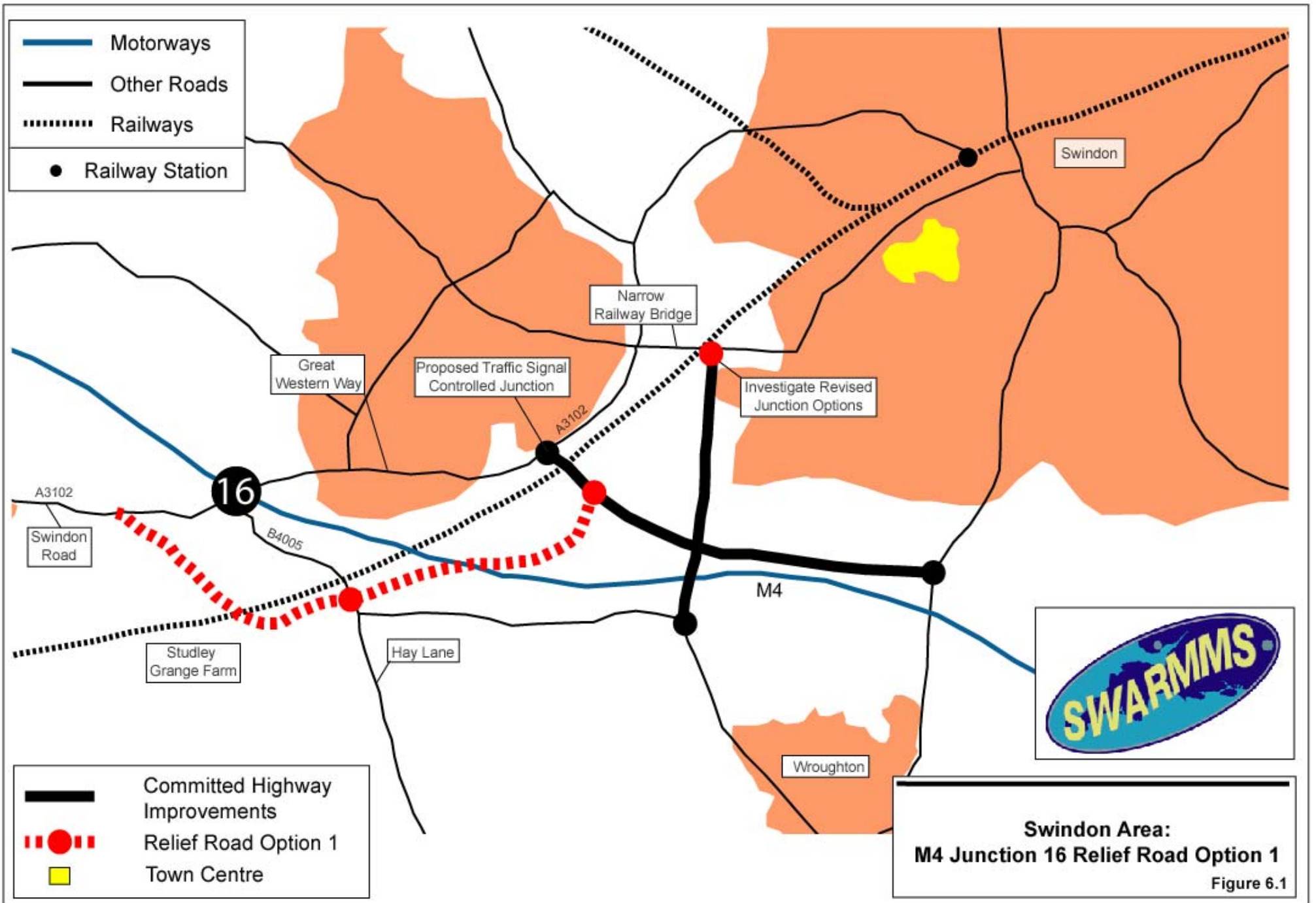
The only real solution to improving future traffic conditions at M4 Junction 16 would be to remove or reduce the volume of traffic required to pass through the roundabout. In this respect the obvious movements to target would be the heavy traffic movements between Swindon Road and Great Western Way along the A3102 corridor.

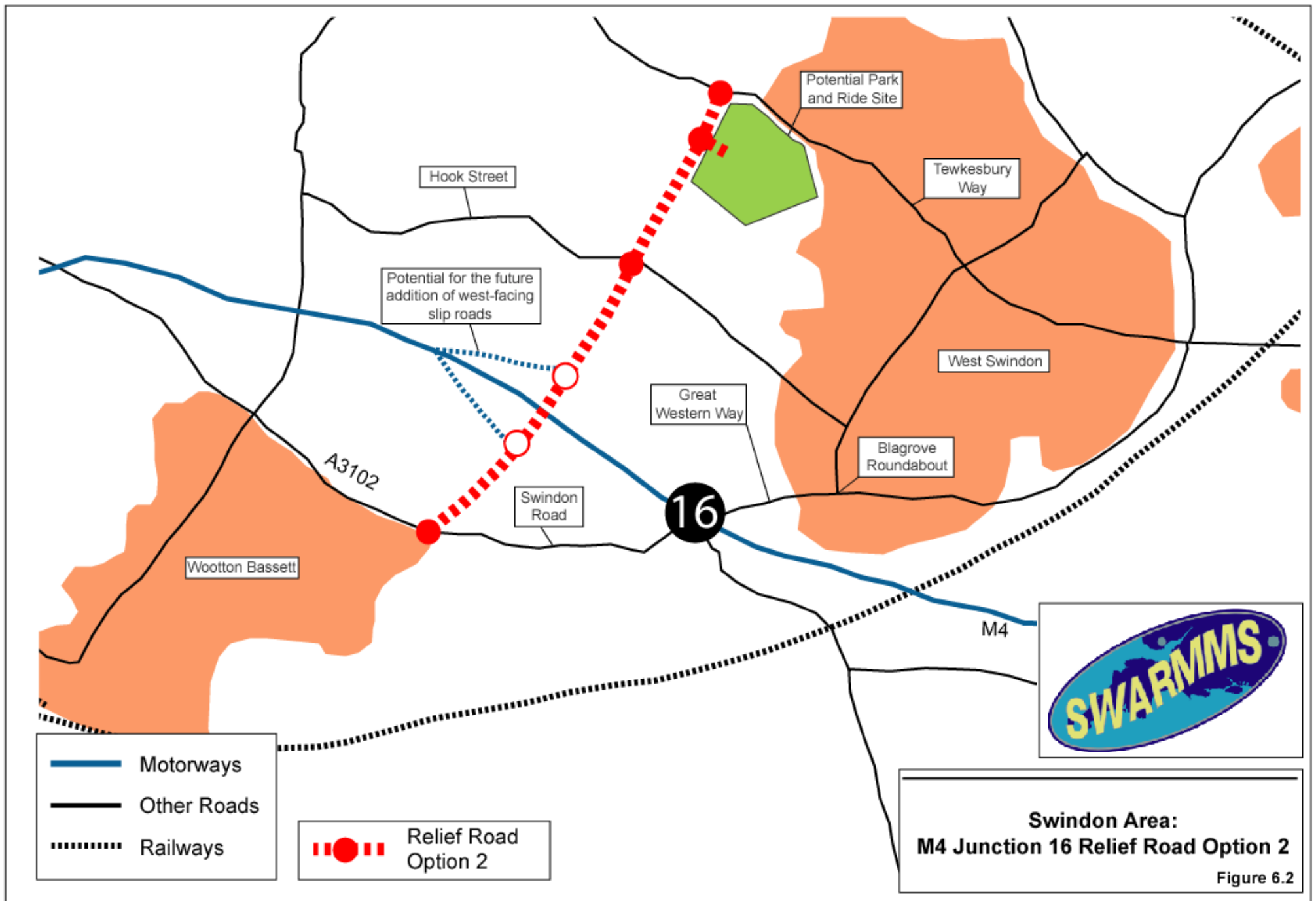
- 6.3.3 One possible solution would be the construction of a new primary route linking the A3102 Swindon Road with the proposed distributor road network serving the 'Front Garden' development. A possible alignment for this new road is indicated in Figure 6.1. This would be required to pass under or over the railway line to the west of Hay Lane, and then continue eastwards to a new junction with the latter, most probably along the existing alignment of the access road to Studley Grange Farm. The junction with Hay Lane would require the construction of a new roundabout or the installation of traffic signals. From Hay Lane the new road would follow a north east alignment, passing under or over the M4 to a junction with the distributor road network proposed for the 'Front Garden' development.
- 6.3.4 The layout of the distributor road network proposed for the 'Front Garden' development would clearly need to take into account this linkage to Swindon Road which, whilst introducing additional traffic into the area, would also provide improved access between the development area and areas to the south of the M4. This would require an additional access onto Wootton Bassett Road near Rushy Platt Farm, in addition to proposed accesses onto Great Western Way and Croft Road. Present model tests assume that the link to Wootton Bassett Road would be restricted to buses, cyclists, pedestrians and emergency access, on the basis of information provided by Swindon Borough Council. However, to accommodate both development related and external traffic movements on the new road network planned for this area, general traffic access and egress capacity would need to be enhanced. The layout of the junction required on Wootton Bassett Road would require much more detailed study, the narrow railway bridge in this location being a particular constraint on feasible design options. However, bus priority facilities would need to be provided as part of any design solution.
- 6.3.5 An alternative solution which might be considered would be the construction of a new road link between Swindon Road and Tewkesbury Road, passing under or over the M4 to the west of Junction 16, with an intermediate junction provided at Hook Street. A possible alignment for this road is indicated in Figure 6.2. The most feasible connection with Swindon Road would be at the existing roundabout junction with Bincknoll Lane. Whilst potentially less difficult in engineering terms than a new road link into the 'Front Garden' site, this is likely to be a less attractive route for trips with an ultimate destination in the central area of Swindon. This is because drivers would still be required to access Great Western Way via already congested routes through West Swindon in the morning peak hour. The key to making it attractive would be a high quality public transport linkage along the Tewkesbury Road axis, building on good existing bus priority measures between

the town centre and Mannington Roundabout. Thus, the provision of a Park and Ride site in the Lydiard Tregoze area would need to be considered as an integral package of transport measures to encourage the use of this new link road, together with associated priority measures along Tewkesbury Way.

### *6.3.6*

Such a site would be required to cater for abstracted demand from the A3102, but would also provide enhanced public transport access to many residents in West Swindon. However, in the absence of any motorway connection to the western link road, a Park and Ride in the Lydiard Tregoze area would not provide a viable alternative for eastbound M4 traffic accessing Swindon via Junction 16. However, the subsequent provision of a new motorway junction with west-facing slip-roads joining this new road could be considered in the longer term.







**FIG 6.2 – new links 2**

## 7 Summary of Findings

### 7.1 *Conclusions*

7.1.1 The analyses undertaken in developing this Plan clearly demonstrate that, notwithstanding any highway or public transport improvements assumed in the 2011 'base' situation, the level of residual road traffic using the road network in the Swindon area would still lead to a significant level of congestion in the peak periods. This congestion would be sufficient to 'suppress' a proportion of the 'base' travel demand by 2011.

7.1.2 The number of vehicular trips in the morning peak hour is forecast to grow by 27% by 2011. This increase in road traffic would be associated with widespread congestion at many junctions in the urban area, lasting for virtually the whole of the peak hour. This is not surprising, given the extent of present congestion problems in the urban area. However, whilst existing congestion problems prevalent at many junctions within Swindon do not last for the entire peak hour, it is clear that the effect of this growth, whilst accommodated, will extend congestion problems over a much longer time period through 'peak spreading'. Operating conditions at the two motorway junctions to the south of the town will deteriorate when compared with the current situation.

7.1.3 The analyses indicate that a 'step-change' in local public transport provision and associated priority measures will be needed to achieve a significant reduction in car use within Swindon. The development of 'high capacity' public transport linkages, with an appropriate level of priority, will thus be a key element in maintaining an adequate level of service within an increasingly congested road network. This level of provision will require largely segregated operation, through the construction of 'with-flow' bus lanes, bus-ways or guide-ways and/or the use of bus gates and local access restrictions.

7.1.4 It is not the purpose of SWARMMS to investigate the feasibility of specific route corridor treatment, or area wide priority measures, suffice to say that a 'high capacity' core public transport system would be required to cater for projected passenger demand whilst maintaining reliability. An extended bus fleet operating largely on the existing highway, with localised priority provision, will not fulfil this objective.

- 7.1.5 Notwithstanding this, investment in new highway infrastructure to mitigate problems at M4 Junctions 15 and 16 will still be required. This is because 'step change' improvements in local public transport provision, whilst helping to ease road conditions in Swindon, are likely to have a more marginal impact on the longer distance car trips using the motorway corridor.
- 7.1.6 Examination of the predicted road traffic conditions at M4 Junction 15 suggests that congestion problems could be largely addressed by a combination of at-grade improvements to the motorway junction and the southern section of the A419(T), together with grade-separation of the movement from the A419(T) to the westbound M4.
- 7.1.7 In-situ measures at M4 Junction 16 are either not feasible, or would not be effective in significantly reducing the likely traffic problems in 2011. In consequence the solution necessary here would require the removal of traffic currently forced to route via the roundabout, namely the heavy 'through' traffic movements along the A3102 corridor between Swindon Road and Great Western Way. Two distributor road options have been described, the first linking Swindon Road with the highway infrastructure proposed for the 'Front Garden' development, and the second linking Swindon Road with Tewkesbury Way to the west of M4 Junction 16.
- 7.1.8 The latter would be the less attractive option for trips between the A3102 and the central area of Swindon, although less complex in engineering terms. It would thus need to be developed in conjunction with the implementation of a public transport priority corridor along Tewkesbury Way, which would require the provision of a Park and Ride site in the Lydiard Tregoze area. This would be needed to cater for abstracted demand from the A3102, but would also provide enhanced public transport access to many residents in West Swindon. In the absence of any motorway connection to the western link road, a Park and Ride site in the Lydiard Tregoze area would not provide a viable alternative for eastbound M4 traffic accessing Swindon via Junction 16. However, the subsequent provision of a new motorway junction with west-facing slip-roads joining this new road could be considered in the longer term.
- 7.2 ***Beyond 2011***
- 7.2.1 Looking ahead to 2016 and beyond, the transport systems in and around Swindon will continue to be under increasing pressure. As such, future development must be undertaken with a strong focus towards self-containment of the area. This self-

containment must be developed not only for the Swindon area as a whole, but also for the development areas themselves.

#### 7.2.2

Without this focus, the strategic transport links, and particularly the M4 between Junctions 15 and 16, will be increasingly used for 'local' journeys around the central urban area. Indeed, it may be that some limitations to motorway access need to be developed and/or new access points off the network. Whatever the precise form of the future transport networks, significant levels of future development should only proceed with a strong focus towards self-containment and the provision of high quality sustainable transport networks.