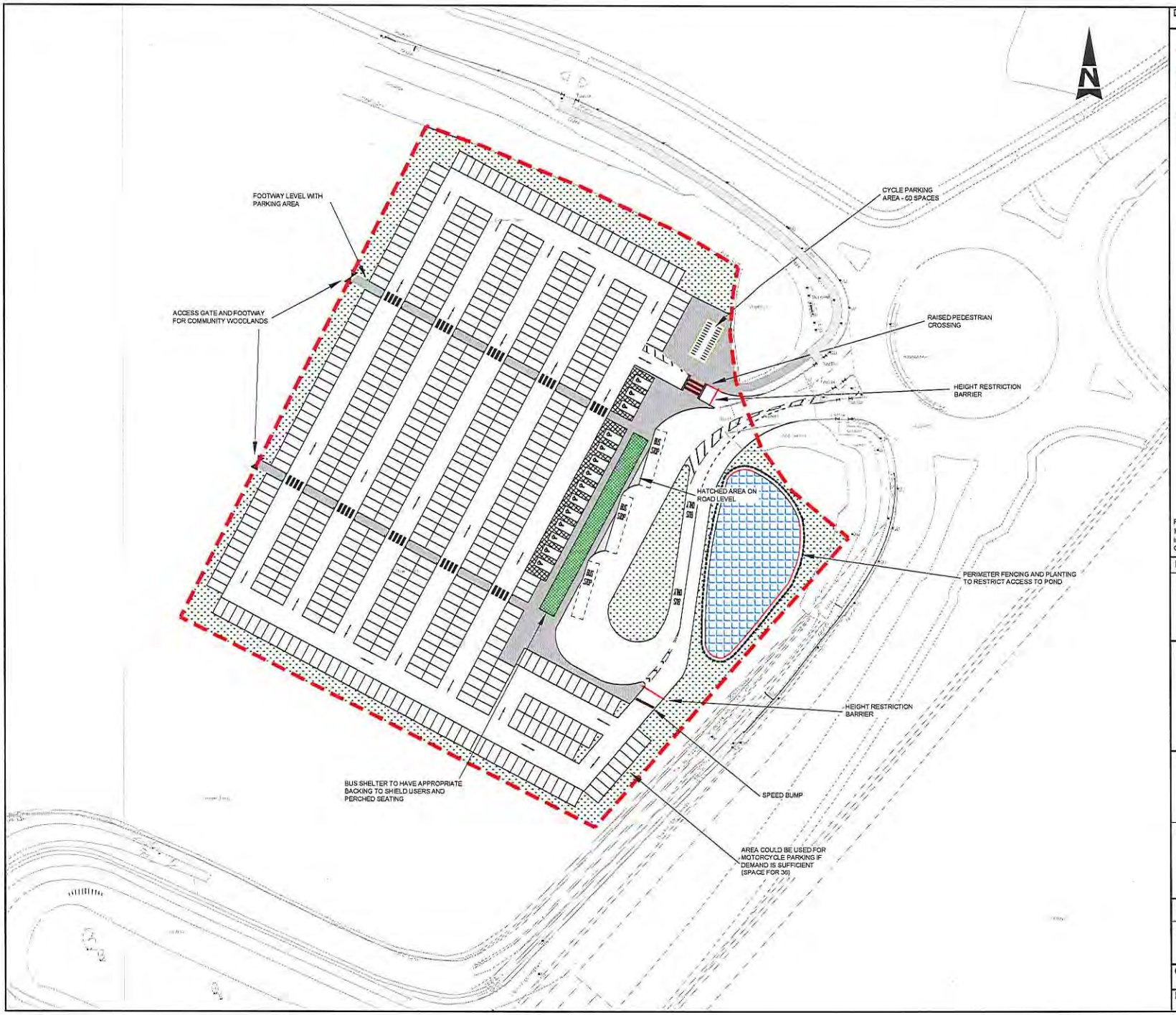
Appendix E. Proposed Site Layout

OXFORDSHIRE COUNTY COUNCIL

APPROVED

DATE: 06/01/14
APPLICATION No: R3.0143/13



Drawing No. 5124607/BIC/FEA/002 | Revision 1

KEY

- AREA IDENTIFIED FOR PARK AND RIDE
- PEDESTRIAN WALKWAY
- SOFT LANDSCAPING
- ATTENUATION POND
- Bollard

Rev.	Date	Purpose of revision	Drawn	Checked	Approved
0	9/10/13	FOR INFORMATION	RP	AL	

OXFORDSHIRE COUNTY COUNCIL
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Project title
BICESTER REMOTE PARK AND RIDE

Drawing title
GENERAL ARRANGEMENT

Drawing Status
FEASIBILITY

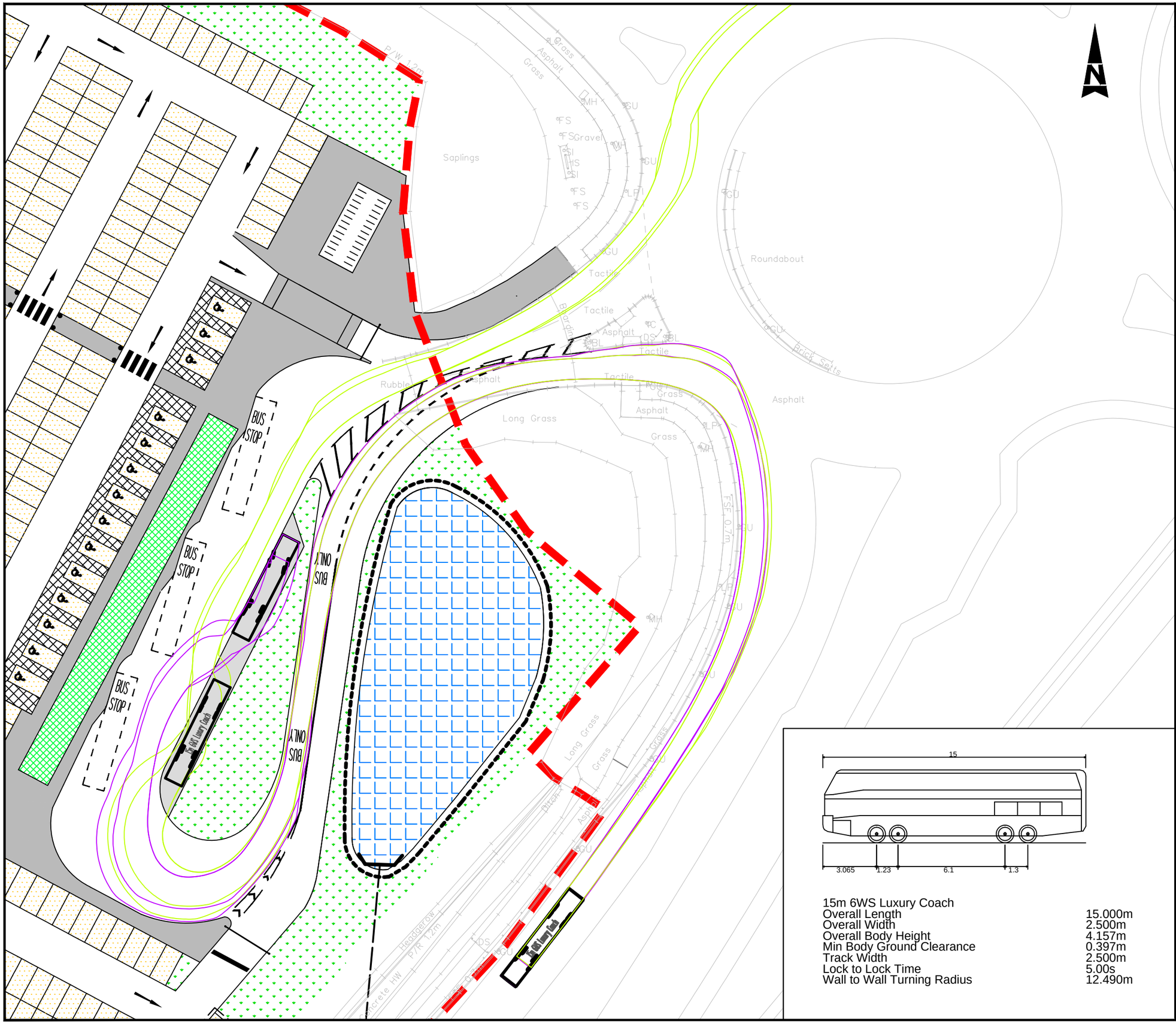
DRAFT

Scale @ A1	Drawn by	Checked by	Approved by
500	RP		
	Date drawn 18/10/13	Date checked	Date approved

Oxfordshire Project No. & File Ref.
5124607

Drawing No. 5124607/BIC/FEA/002 | Revision 1

Appendix F. Swept Path Analysis



15m 6WS Luxury Coach	
Overall Length	15.000m
Overall Width	2.500m
Overall Body Height	4.157m
Min Body Ground Clearance	0.397m
Track Width	2.500m
Lock to Lock Time	5.00s
Wall to Wall Turning Radius	12.490m

Rev.	Date	Purpose of revision	Drawn	Checked	Approved
0	30/10/13	FOR INFORMATION	RP	AL	SRH

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Project title

BICESTER REMOTE

PARK AND RIDE

Drawing title

BUS LAYBY
TRACKING CHECK
15M BUS

Drawing Status			
FEASABILITY			
Scale @ A3	Drawn by	Checked by	Approved by
1:500	RP	AL	SRH
	Date drawn	Date checked	Date approved
	29/10/13	30/10/13	30/10/13

Oxfordshire Project No. & File Ref
5124607

Drawing No. 5124607-BIC-FEA-009 Revision 0

Drawing No. 5124607-BIC-FEA-009 Revision 0

Drawing No.	5124607/BIC/FEA/008	Revision	0

Rev.	Date	Purpose of revision	Drawn	Checked	Approved
0	30/10/13	FOR INFORMATION	RP	AL	SRH

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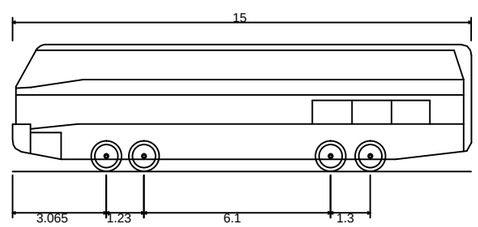
Project title

BICESTER REMOTE
PARK AND PARK AND RIDE

Drawing title

BUS STOP ARRANGEMENT
TRACKING CHECK
15M BUS
BUS STOP 3



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Wall to Wall Turning Radius	12.490m

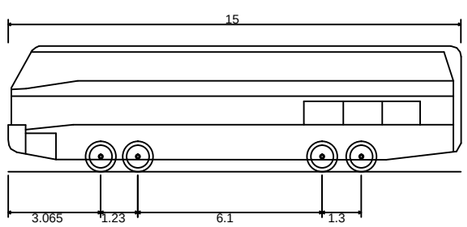
Drawing Status	FEASABILITY		
Scale @ A3	Drawn by	Checked by	Approved by
1:500	RP	AL	SRH
	Date drawn 29/10/13	Date checked 30/10/13	Date approved 30/10/13

Oxfordshire Project No. & File Ref
5124607

Drawing No.	5124607/BIC/FEA/008	Revision	0

Drawing No.	5124607/BIC/FEA/007	Revision	0

Rev.	Date	Purpose of revision	Drawn	Checked	Approved
0	30/10/13	FOR INFORMATION	RP	AL	SRH



15m 6WS Luxury Coach	
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Track Width	2.500m
Lock to Lock Time	5.00s
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Project title

BICESTER REMOTE

PARK AND RIDE

Drawing title

BUS STOP ARRANGEMENT
TRACKING CHECK
15M BUS
BUS STOP 2

Drawing Status

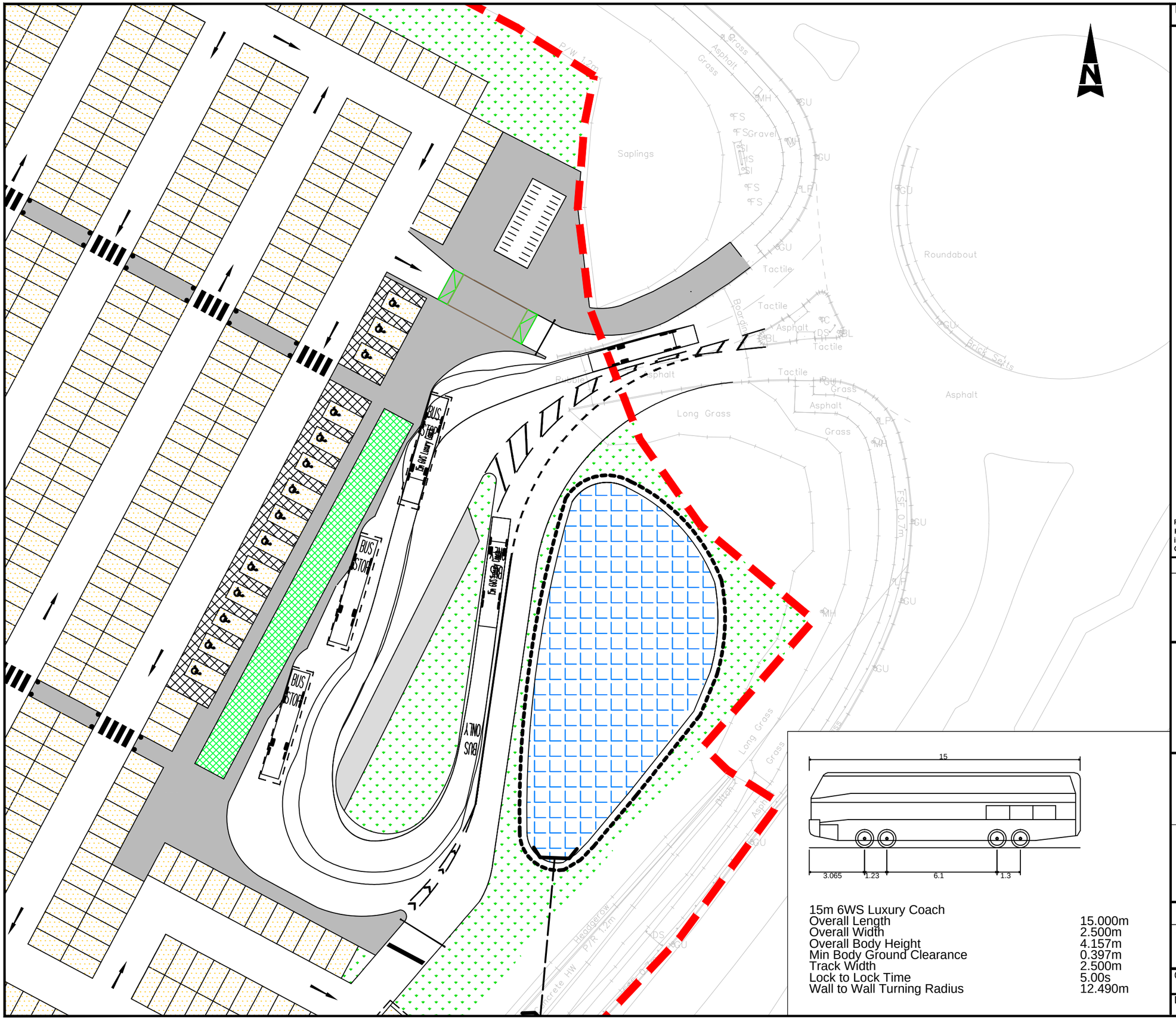
FEASABILITY

Scale @ A3	Drawn by	Checked by	Approved by
1:500	RP	AL	SRH
	Date drawn 29/10/13	Date checked 30/10/13	Date approved 30/10/13

Oxfordshire Project No. & File Ref

5124607

Drawing No.	5124607/BIC/FEA/007	Revision	0



15m 6WS Luxury Coach

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Overall Body Height	4.157m
Min Body Ground Clearance	0.397m
Track Width	2.500m
Lock to Lock Time	5.00s
Wall to Wall Turning Radius	12.490m

Drawing No. 5124607/BIC/FEA/006 | Revision 0

Rev.	Date	Purpose of revision	Drawn	Checked	Approved
0	30/10/13	FOR INFORMATION	RP	AL	SRH

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Project title
BICESTER REMOTE
PARK AND RIDE

Drawing title
BUS STOP ARRANGEMENT
TRACKING CHECK
15M BUS
BUS STOP 1

Drawing Status: FEASABILITY

Scale @ A3	Drawn by	Checked by	Approved by
1:500	RP	AL	SRH
	Date drawn 29/10/13	Date checked 30/10/13	Date approved 30/10/13

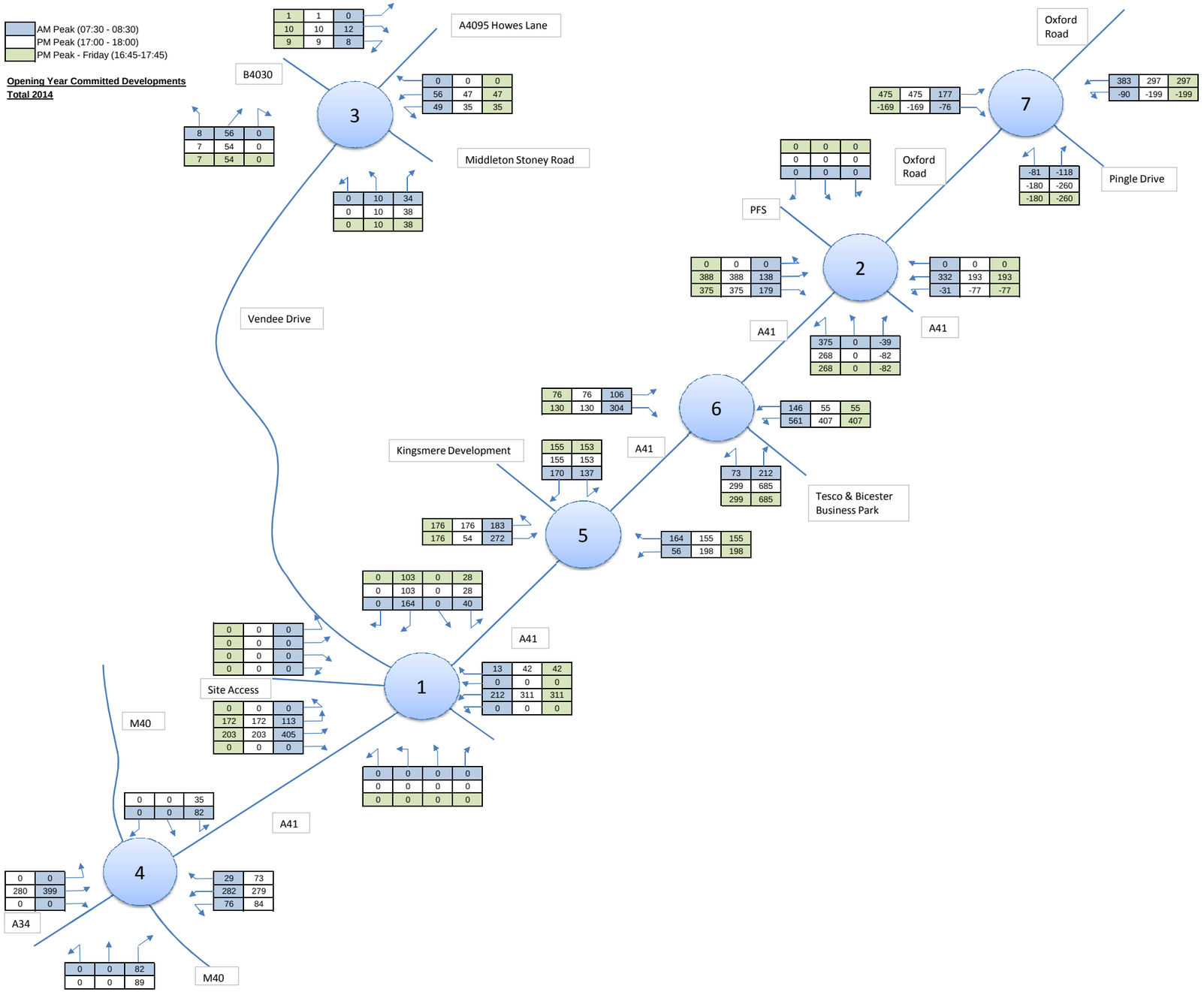
Oxfordshire Project No. & File Ref: 5124607

Drawing No. 5124607/BIC/FEA/006 | Revision 0

Appendix G. Committed Development Flows and Highway Schemes

AM Peak (07:30 - 08:30)
PM Peak (17:00 - 18:00)
PM Peak - Friday (16:45-17:45)

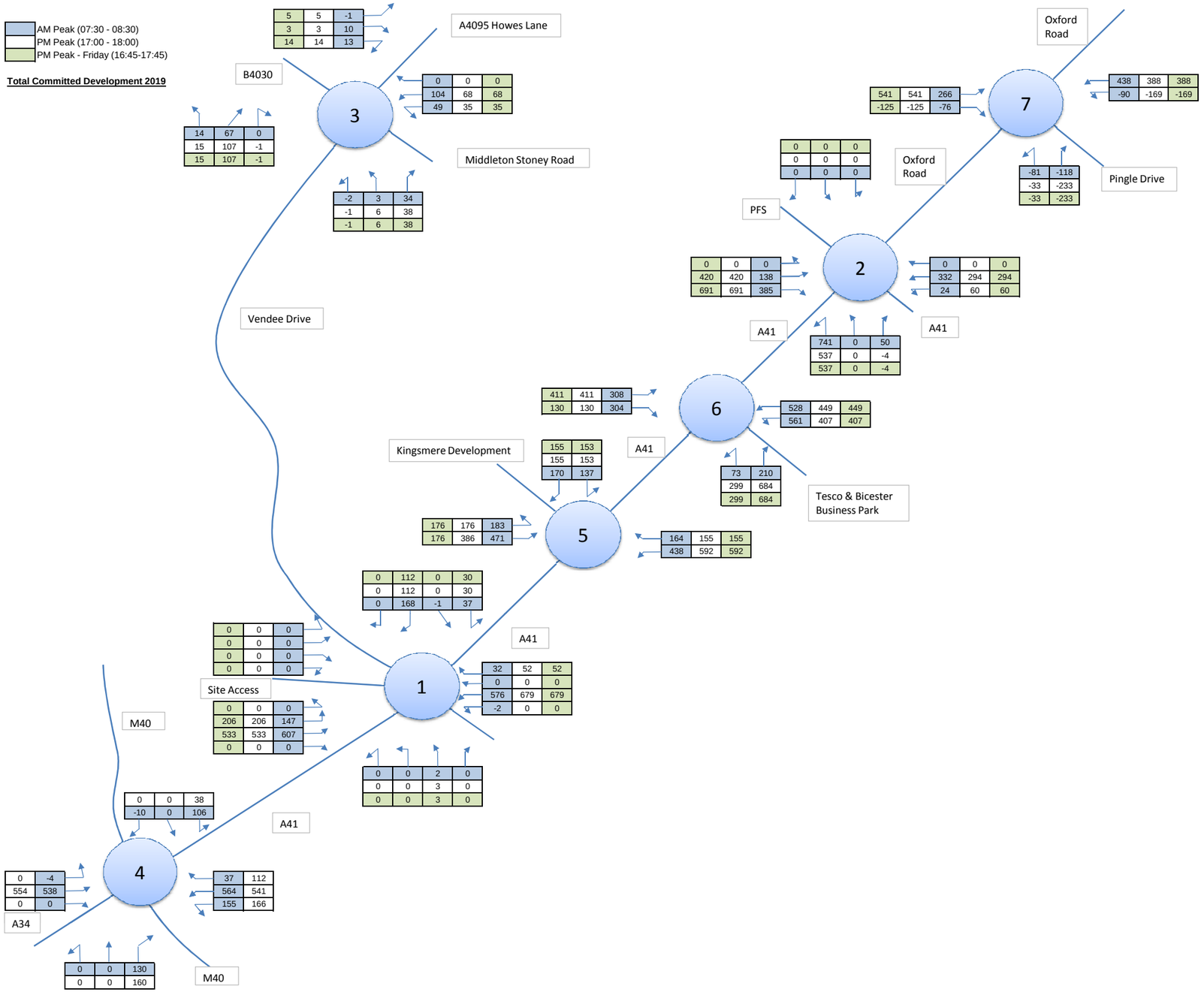
Opening Year Committed Developments
Total 2014



ATKINS

AM Peak (07:30 - 08:30)
PM Peak (17:00 - 18:00)
PM Peak - Friday (16:45-17:45)

Total Committed Development 2019



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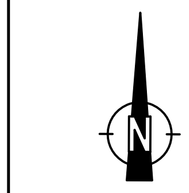

NOTES

This drawing has been based upon survey information provided by Seaman Smith Surveys Ltd., and Haskoning UK Ltd. shall not be liable for any inaccuracy or deficiencies arising from it.

REV	DATE	DESCRIPTION	BY	CHK	APP

REVISIONS

CLIENT

VALUE RETAIL MANAGEMENT LTD

PROJECT

BICESTER VILLAGE

TITLE

PROPOSED HIGHWAY WORKS

A COMPANY OF ROYAL HASKONING

HASKONING UK LTD
DEVELOPMENT AND TRANSPORT

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Telephone +44(0)1932 569566
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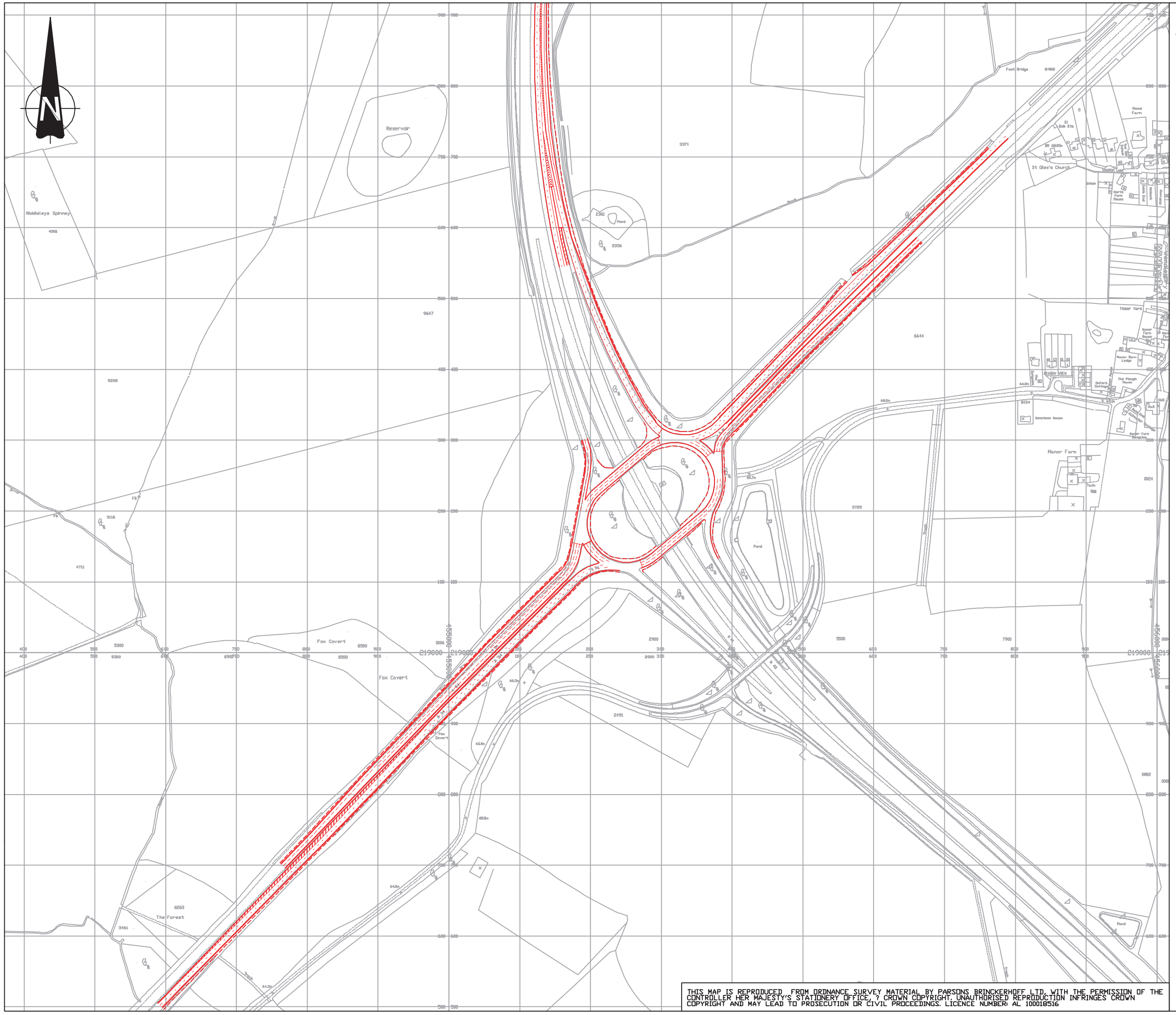
DRAWN	PK	CHECKED	RAM	APPROVED	IRF
DATE	21.02.12	DATE	21.02.12	DATE	21.02.12
SCALE	1:1000 @ A1	STATUS	NOT FOR CONSTRUCTION		

DRAWING No. 3P7640-SK-22

REVISION P0



THIS DRAWING WAS PRODUCED USING AUTOCAD AND SHOULD ON NO ACCOUNT BE AMENDED BY HAND

REV	DATE	BY	CHKD

• *CLIENT*
HIGHWAYS AGENCY

• *PROJECT*
M40 JUNCTION 9 IMPROVEMENTS

• *TITLE*
MOTT MACDONALD SCHEME LAYOUT

• *DATE*	MARCH 2010	*DRAWN BY*	NN
		PRODUCED BY	NN
• *SCALE*	1:5000	*CHECKED*	AW
• *CAD REF.*		*APPROVED*	MC

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Calyx House, South Road, Taunton, Somerset TA1 3DU
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• *DRAWING NUMBER*
FIGURE 3.1.1 | -

Appendix H. Bicester Park and Ride Demand Study

Bicester Park & Ride Demand Study

Document: CTFAVS130/1 Version: 2

Final Report – FINAL DRAFT

Oxfordshire County Council

7th January 2011

Halcrow

Bicester Park & Ride Demand Study

Final Report – FINAL DRAFT

Oxfordshire County Council

7th January 2011

Halcrow Group Limited
Burderop Park, Swindon, Wiltshire, SN4 0QD
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Document history

Bicester Park & Ride Demand Study

Final Report – DRAFT

Oxfordshire County Council

This document has been issued and amended as follows:

Version	Date	Description	Created by	Verified by	Approved by
1.0	19/10/10	Final Report – Draft	GW	LJ	COB
1.1	07/01/11	Final Report – Final Draft	GW	LJ	COB

Contents

Appendices

Appendix A Modelling methodology

1 Introduction

1.1 Introduction

1.1.1 Halcrow has been commissioned to undertake a study of the proposed Bicester Park & Ride site. The site, to be located on the south-east edge of the South West Bicester development, has been made available as a result of the construction of the housing and the South West Bicester perimeter road. The site will be accessed from a new roundabout on the A41 just north of the existing Chesterton slips.

1.1.2 Under consideration in this report are three possible roles that the park & ride facility could fulfil. These would see the site operate as:

- 'Remote' park & ride to Oxford, utilising the existing express bus service between Bicester and Oxford;
- 'Local' park & ride to Bicester, utilising the existing express bus services between Bicester and Oxford; and
- 'Overflow' parking for the Bicester Village retail park, which would probably need to be served by a dedicated shuttle bus service.

1.1.3 The outputs of this study are to:

- Develop demand profiles for a Bicester Park & Ride site;
- Identify the number of spaces for phase 1 (using a modelling base year of 2007) and what land will be required to permit a phase 2 extension (assumed to be 2026); and
- Identify complementary measures to help facilitate the success of the park & ride.

1.2 Background information

1.2.1 The concept of long distance park & ride in Oxfordshire was first noted in the County Council's Transport Networks Review (TNR). The provision of long distance park & ride was seen as part of a wider strategy to give opportunities to travel by modes of transport other than the car, and hence provide traffic relief on key corridors into Oxford. The TNR study proposed the provision of park & ride sites serving Oxford but located on the 'Oxford side' of Abingdon, Bicester and Witney. These sites were intended to capture car trips from these settlements and for the onward trip to be made by bus.

1.2.2 Halcrow was commissioned by Oxfordshire County Council (OCC) to undertake investigations into the concept of 'Remote Park & Ride' in early 2005. The principle being considered was to promote additional capacity for park & ride into Oxford by locating facilities closer to trip origins, thereby enabling the system to expand while removing car trips from parts of the strategic road network.

1.2.3 The work identified that the concept appeared to be viable if it was based on bus services that had a 'hybrid' function, serving the park & ride site as well as other destinations. For example, rather than running a dedicated shuttle service from Oxford to the edge of Bicester, the site would be served by enhanced versions of the existing Oxford-Bicester services. It was also identified that infrastructure measures would be likely to be required on the corridors to Oxford in order to encourage use of the sites.

1.2.4 Following this work, OCC identified a need to investigate the Bicester corridor in more detail, due to the timescale of proposed development in South West Bicester and the opportunity to include a park & ride site within the development. The location of the development had been identified in the early studies as well placed for a park & ride facility.

1.2.5 This led to Halcrow being commissioned to carry out a more detailed assessment for this particular corridor. The results of this Study, March 2006, concluded that the maximum parking requirement on an average weekday would be around 230 vehicles, although an additional allowance needed to be made for day-to-day and seasonal variation and potential use of the site for other purposes. Overall, it was suggested that a 500 space site should be sufficient, although the potential for the site to be used for other purposes, and how these might be managed, needed to be considered in any final decision.

1.3 Structure of this Report

1.3.1 The structure of the remainder of this report is set out as follows:

- Chapter 2 sets out the challenges facing Bicester, both now and in the future;
- Chapter 3 provides an overview of the modelling work undertaken, and details the COTM and logit modelling results;
- Chapter 4 sets out the demand profiles for a park & ride car park to satisfy Oxford and Bicester bound trips;
- Chapter 5 sets out the current situation at Bicester Village and details the demand profiles for a park & ride site which would act as an overflow car park for Bicester Village;
- Chapter 6 considers the number of car parking spaces that could be required for the park & ride site for Phase 1 and Phase 2 and details complimentary measures to maximise the use of the Bicester Park & Ride site; and
- Chapter 7 sets out the conclusions of this work.

2 Challenges facing Bicester

2.1 Vision for Bicester

2.1.1 Transport related work undertaken in Bicester in recent years has sought to deliver a number of land use and transport objectives that have been identified for the town. The proposed park & ride facility supports the objectives, which set out the need to:

- Increase the number of people who live and work in Bicester, hence reducing the current high level of out-commuting;
- Provide the opportunity to travel by sustainable modes for trips to local destinations, as well as for any out and in-commuting that takes place; and
- Ensure that through-traffic uses the most appropriate route around the town and that trips generated by new development do not impact on congestion or use inappropriate routes (rat-running).

2.2 Challenges

2.2.1 To deliver the vision and land use and transport objectives, a number of challenges will need to be addressed. Through work undertaken to prepare the transport evidence base for the Local Development Framework, 2007-2009, congestion has been identified as a key issue facing the town now, with concerns over the ability for the highway network to support the planned housing and employment growth to 2026. The biggest challenges facing the town now and into the future are how to:

- Deliver planned housing growth (including the 5000 dwelling national eco-town development at North-West Bicester) whilst retaining and increasing the attractiveness of the town as a place for businesses to locate;
- Maintain and enhance the economic vitality of the existing town; and
- Identify opportunities to increase sustainable and reliable access to and within the town to address congestion issues on the network.

2.2.2 The proposed Bicester Park & Ride site at South West Bicester has the potential to provide part of the solution to the challenges identified. It could facilitate trips to both Oxford and Bicester, as well as offering an over-flow car park for the Bicester Village retail outlet site.

2.3 Network issues

2.3.1 The existing and predicted future traffic situation in the town is likely to be a contributory factor to the demand for a park & ride facility. Previous analysis of the network has highlighted queuing traffic at key points on both the local and strategic network. At peak times the A34 and M40 junction 9 operate over

capacity, as well as junctions through Bicester town centre. This can have knock-on impacts across the town.

2.3.2 Access issues to Bicester Village have become a major concern. Peak demand to access the site does not coincide with other peak periods on the network, but residents report that traffic queuing to access the site causes 'gridlock' across the town. Indeed, the demand for parking spaces exceeds supply most weekends.

2.3.3 Assessment of the likely future performance of the highway network for journeys within the town and on the strategic network has highlighted increasingly long and unreliable journey times, increased queue lengths and more rat-running on residential streets and through nearby villages. Strategic transport improvements such as East West Rail, Evergreen 3 and improvements to junction 9 of the M40, as well as network improvements associated with development in Bicester, are being planned and implemented. These will improve the connectivity of the settlement and its attractiveness for both residents and employees. The park & ride facility will provide another important component of these improvements to protect and further promote the economic vitality of the town.

2.4 Developments which could influence potential demand for park & ride

2.4.1 The network issues identified above will be exacerbated by the increasing demand for travel associated with planned housing and employment growth. The park & ride site could provide some relief to these issues by offering an alternative mode of travel for trips into Oxford, and indeed to those from outside of the town who need to access central Bicester. That is, the park & ride could reduce the number of trips made by private car to Oxford and Bicester. The developments which could influence potential demand for the park & ride site are outlined below.

Bicester town centre

2.4.2 Proposals in the town centre of Bicester include re-development at Bure Place and public realm enhancements of Bicester Market. These proposals involve changes to traffic management arrangements and particular bus routeing within the town centre, as well as enhancing the retail and leisure offering in central Bicester. Part of the Bure Place redevelopment comprises a new multi-storey car park. Construction of re-developments in Bicester Town centre are anticipated to complete in 2011/12.

2.4.3 These changes are clearly aimed at increasing the attractiveness of the town centre. Indeed, the provision of parking in the town centre has not been highlighted as a constraint. However, as no improvements to highway infrastructure accessing the town centre have been proposed, predictions of future travel demand on Bicester's arterial routes, particularly from the south, show that junctions become congested at peak times. In the context of this study, if a means could be found of routeing buses into the town centre such that they avoid congestion, the alternative offered by the park & ride may be attractive to some visitors.

SW Bicester (Kingsmere)

2.4.4 The SW Bicester (Kingsmere) development is in the early stages of construction, and is expected to complete by 2012/13. The proposal is for 1,585 dwellings with associated infrastructure, and 2 ha employment. The south east corner of the SW Bicester site contains the area allocated for the park & ride site. It is likely to be available to the County Council within the next year.

2.4.5 It is also noted that, on a site on the east side of the A41, there is a significant business park proposal with car parking. It is not likely that the park & ride site will offer an attractive alternative for trips being made to the proposed business park as the sites are in close proximity to one another.

NW Bicester

2.4.6 Under the previous Government's eco-town initiative, NW Bicester was promoted, and subsequently selected, as a site for 5,000 dwellings and associated employment and other infrastructure, to be developed in the period 2010-2034. Developers are currently preparing detailed plans for submission to the local planning authority to commence work on the site. The initial proposal is for an exemplar site of approximately 400 dwellings on the northernmost part of the overall site to commence in 2011. The subsequent site proposals will be for the remaining dwellings.

2.4.7 The NW Bicester and SW Bicester proposals represent a significant growth in the housing stock in Bicester. Whilst the policy background to the development is to encourage local trips, and indeed encourage the sustainability of Bicester by providing employment and service opportunities across the town to avoid out-commuting, it is inevitable that there will be a demand for travel out of Bicester. The park & ride could offer a facility that would encourage some of these trips to be made by sustainable modes.

Former MoD sites south east of Bicester

2.4.8 There are emerging proposals to release areas currently designated as MoD operational land for housing and employment development. Main access from these sites to Bicester town centre would not pass the proposed park & ride site. However, trips from these sites, travelling towards the M40 and Oxford, would pass the park & ride facility and therefore benefit from the service offered.

Development outside Bicester – former RAF Upper Heyford

2.4.9 The location of the former RAF Upper Heyford site is some way out of Bicester, to the west of the M40. Direct routes to Bicester and Oxford do not pass by the site. It is not envisaged that a significant patronage for the Bicester Park & Ride site will come from this development.

East-West Rail, Evergreen 3, M40 J9 improvements

2.4.10 Three key infrastructure improvements are proposed that will provide additional capacity for strategic transport movements to, from and around Bicester, including two strategically significant rail infrastructure improvements.

2.4.11 The East-West Rail and Evergreen 3 proposals will result in greatly enhanced rail links to Oxford, Milton Keynes and London. The London-Oxford via Bicester service included in 'Evergreen 3' is due to commence by May 2013, with wider East-West rail services likely to be operational after 2017 (though no specific completion date has been published).

2.4.12 These proposals fundamentally changes the accessibility of the town to key employment locations. The enhancement to the direct rail service to Oxford is in direct competition to the proposed park & ride service. That said, the rail service is restricted to offering access to Oxford Station and the proposed Water Eaton Parkway station, whilst the park & ride bus service could access more local locations and will offer greater penetration of the city centre.

2.4.13 In investigating the potential future demand for the park & ride, Chiltern Rail Evergreen 3 proposals will be included as a sensitivity test to understand the impact the provision of this new rail service will have on the demand for the site.

2.4.14 Improvements to M40 junction 9 are ongoing and due for completion in December 2010.

2.5 Potential operation of Bicester Park & Ride

2.5.1 The County Council has advised that, at least in the short-term, it is not proposed that the Bicester Park & Ride site will have a dedicated bus service, and the site would be available for any passing bus routes to serve the site. As a key link between Oxford and Bicester, it is likely that the site will primarily be served by the existing Stagecoach S5 service. The S5 service would not be altered (other than calling at the site) and no additional stops to the existing timetable would provide interchange with other services; this is principally available at Summertown shops. Similarly, it is not assumed that any additional bus priority will be provided on the route between the park & ride site and Oxford and the site and Bicester.

2.5.2 It is proposed that, in conjunction with the new development planned by 2026, there will be four S5 bus services an hour throughout the day. This could include two services from NW Bicester and two services from Langford to Oxford, all of which could serve Bicester Park & Ride. The County Council is currently seeking to understand other aspirations Stagecoach may have related to bus services in Bicester.

3 Modelling overview

3.1 Background

3.1.1 In order to assess the potential demand at Bicester Park & Ride, two modelling tools have been used.

3.1.2 Since the Bicester Remote Park & Ride Study in 2005, a more sophisticated model has been developed. The Central Oxfordshire Transport Model (COTM) is a WebTAG compliant variable demand model. The initial purpose of COTM was to assess major infrastructure projects in central Oxfordshire, to secure funding for schemes. It has subsequently been used for more localised option testing for strategies and schemes, such as the assessment of Local Development Framework (LDF) proposals and the transport impact of major developments. A park & ride sub-model was included in COTM, and this was used as part of the assessment of capacity issues at the Thornhill Park & Ride site.

3.1.3 COTM has been used to estimate future demand at the Bicester Park & Ride site, as well as providing trip demand and distribution data. Generalised trip cost information has been provided for input into the second modelling tool, a bespoke logit spreadsheet model.

3.1.4 COTM is calibrated to the existing situation, which implicitly takes into account the amount of suppressed demand. However, it does not actively model specific capacity of individual park & ride car parks, and as such the future-year demand is 'unconstrained' by any capacity limitations. The logit model has been developed to work with the results of COTM assessments to better understand the demand in the car park. Model forecasts are AM peak hour (08:00-09:00) so a conversion model to the hour-by-hour profile of a car park has been developed, which uses the COTM and logit model results to provide demand profiles for the car park throughout the day.

3.1.5 The detail on the methodology and assumptions that have been applied in both COTM and the logit models are set out in Appendix 1.

3.2 Results of COTM and logit modelling

3.2.1 The remainder of this chapter discusses the modelling demand results for the Bicester Park & Ride site using COTM and the logit model. These results are taken forward in the following chapter to produce daily and weekly usage profiles for the proposed park & ride site.

2007 Base Year

3.2.2 An initial forecast was prepared for the AM peak in the 2007 base year to indicate the likely change in park & ride demand to Oxford (as well as potential for trips to Bicester) if a site was implemented at Bicester with current developments and transport assumptions, based on COTM outputs (providing car trips and generalised cost components) and 2007 park & ride survey results for existing sites around Oxford. The survey results are particularly important,

providing details of full trips (initial origin, site used and final destination). Although the survey results were a key informant in the development of COTM, as a result of the way that the park & ride sub-model works, the full park & ride trip is treated separately in COTM, being split into component car and public transport trips during analysis.

3.2.3 Table 3.1 shows the results of the AM peak 2007 base year forecast with the numbers likely to transfer from the existing park & ride facilities north of Oxford.

Site	Forecast Usage		Transfer to Bicester site
	Vehicles	Trips	Vehicles
Peartree	247	296	9
Water Eaton	234	281	14
Bicester	70	84	-

Table 3.1: Bicester Park & Ride 2007 Base Year forecast

3.2.4 The table indicates that the Bicester Park & Ride site would generate some 84 trips in the AM peak, resulting in 70 vehicles entering the car park. Unsurprisingly some trips are from the Peartree and Water Eaton sites. A very small number of trips also transfer from the other Oxford park & ride sites. These are trips destined for locations in Oxford that are served by bus services from the other sites, which the new site at Bicester would allow slightly better access to, albeit assuming interchange with other bus services in the city.

3.2.5 Destinations for users of the Bicester Park & Ride site are split between trips to Oxford and Bicester centre (61% and 39% respectively). Within Oxford, the great majority of trips are to the city centre. It should be noted that caution should be exercised with regards the forecast number of trips demanded from Oxford to Bicester. As set out in Chapter 2, parking in the town centre is not considered a restraint and there are plans for a new multi-storey car park. Hence there is a risk that the model has over estimated the number of people transferring to the park & ride site. It is also worth noting that depending on the amount of parking made available related to future employment growth in the town, this could also impact on the decisions that Bicester bound commuters make with regards where they park.

2026 AM Peak

3.2.6 Results of the 2026 AM peak forecast are shown in Table 3.2.

Site	Forecast Usage		Transfer to Bicester site
	Vehicles	Trips	Vehicles
Peartree	291	349	9
Water Eaton	267	321	17
Bicester	94	112	-

Table 3.2: Bicester Park & Ride 2026 AM peak forecast

3.2.7 The overall market for park & ride in the AM peak is forecast to rise by around 20% from 2007 to 2026. This results in more trips using all of the sites around Oxford, although the amount of change forecast for each site varies; for instance, at the existing sites, usage increases by around 15% at Seacourt, but up to 28% at Peartree. However, the Bicester Park & Ride site is only forecast to see a 9% rise to 2026, to around 94 vehicles in the AM peak. Again, there is a de facto transfer of trips from other sites, although only around one third of trips at Bicester would otherwise have used other sites in the 2026 AM peak. A greater proportion of trips are destined for Bicester town centre in the 2026 AM peak compared to 2007, reflecting more trips as a result of the greater attractiveness of Bicester as a destination through future development, as well as more congestion on the network on route to the destination.

2026 PM Peak

3.2.8 Results of the 2026 PM peak forecast are shown in Table 3.3.

Site	Forecast Usage		Transfer to Bicester site
	Vehicles	Trips	Vehicles
Peartree	285	342	16
Water Eaton	263	316	21
Bicester	87	105	-

Table 3.3: Bicester Park & Ride 2026 PM peak forecast

3.2.9 PM peak demand for park & ride in 2026 is broadly similar to AM peak demand, albeit that the pattern of travel is essentially reversed in direction; Bicester Park & Ride demand is some 87 vehicles (105 trips). Slightly more trips are modelled to transfer from other sites to Bicester Park & Ride in the PM peak, at almost 50% of all movements at Bicester. There is also a slightly higher proportion of trips from the centre of Bicester in this period than in the AM peak, albeit that this mirrors the AM peak in that a proportion of trips are modelled to be returning in the PM peak, having travelled out in the AM peak.

3.3 Park & Ride users – origins

3.3.1 Closer analysis of the results of the modelling identifies the origins of potential park & ride users. It is important to note, however, that care should be taken in considering these results because of the location of Bicester at the northern edge of the most detailed sections modelled within COTM. For instance, the pattern of zones in this area means that, while values are appropriate at an aggregated level, smaller area analysis can reveal apparent inconsistencies.

3.3.2 Origins of potential park & ride site users are shown in Table 3.4 for the 2026 AM peak (the pattern exhibited in this time period is broadly similar to that in the other modelled periods).

Origin	Destination		
	Oxford	Bicester centre	
Proportion of total demand >>	56%	44%	100%
Bicester *	36%	66%	
Northamptonshire	16%	1%	
North Cherwell	11%	2%	
South Cherwell (north of Bicester)	10%	8%	
Banbury (and surrounds)	8%	1%	
South Cherwell (around Bicester)	6%	9%	
North Buckinghamshire	5%	4%	
Milton Keynes	5%	1%	
Warwickshire	3%	-	
other (mostly Oxfordshire)	-	5%	
Oxford	-	3%	
	100%	100%	

Table 3.4: Origins of trips using Bicester Park & ride

Note:

* The figures for the 'Bicester' area aggregates results for all sectors used in the logit model to represent Bicester (north-east, north-west, east, west, south-west and centre). This is because strict analysis of the results for Oxford as a destination indicates that trips using the park & ride site only originate from the north-west sector of Bicester. Trips originating from only one sector would not be expected; hence the results have been aggregated to overcome this.

4 Demand profiles for Oxford and Bicester

4.1 Background data

4.1.1 In order to assess the potential daily profile of use of the proposed Bicester Park & Ride site and resulting maximum car park accumulations, use has been made of the data derived from counts of vehicle movements at the existing park & ride sites at Water Eaton and Peartree. These are dedicated park & ride sites serving trips from the same overall catchment area as the proposed Bicester site.

4.1.2 Count data is available for 2007-2009 inclusive. Figures from 2007 and 2008 have been used, as some of the information for 2009 provided very different patterns across the day to the very similar patterns observed in 2007 and 2008, suggesting the 2009 information may contain some inconsistencies.

4.1.3 Tables 4.1 and 4.2 show average movements recorded for cars into and out of the Water Eaton Park & Ride site in 2007 and 2008 respectively, with Tables 4.3 and 4.4 having the same information for Peartree Park & Ride. Note that car park accumulations at the end of the average days are greater than zero, peaking on a Thursday at both Peartree and Water Eaton, implying that there can be an element of overnight parking at both sites. As this is not on the scale of that observed at Thornhill Park & Ride, and it is not specifically envisaged that long-distance coach services would stop at the Bicester site, it has not been specifically considered in this study.

4.1.4 This count information has been interrogated and normalised to provide two profiles based on using the AM and PM peak hours to build up a picture of movements on an average weekday, Saturday and Sunday. The resulting profiles are shown in Table 4.5. A profile based on the AM peak only is used to generate daily figures for 2007, while a profile based on both the AM and PM peaks is used to generate daily figures for 2026. As noted above, the profiles have been normalised to forecast no overnight parking.

4.1.5 Note also that there are currently no buses serving Water Eaton Park & Ride on a Sunday, with a commensurately insignificant number of vehicles entering and leaving the site compared to Pear Tree Park & Ride. As such, the profile for Sunday is based on an average of 2007 and 2008 values at Peartree only. This essentially assumes that the proposed Bicester Park & Ride site would be served by buses on a Sunday.

	Monday			Tuesday			Wednesday			Thursday			Friday			Weekdays			Saturday			Sunday		
	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum
MAXIMUM	180	187	536	186	198	567	192	203	596	178	189	588	154	155	485	178	186	550	77	78	271	16	15	16
Hr begin																								
00:00														3	-3		1	-1	1	2	-1	2	2	
01:00															-3			-1			-1			
02:00															-3			-1			-1			
03:00															-3			-1			-1			
04:00															-3			-1			-1			
05:00	2		2	1		1	2		2	2		2	2		-1	2		1			-1			
06:00	50	6	46	50	6	45	51	4	49	50	5	47	43	5	37	49	5	45	7		6			
07:00	171	13	204	171	11	205	178	13	214	169	10	206	152	10	179	168	11	202	18	2	22	2		2
08:00	180	14	370	186	10	381	192	11	395	178	9	375	154	10	323	178	11	369	38	4	56	5	3	4
09:00	101	9	462	112	9	484	108	8	495	109	8	476	91	7	407	104	8	465	61	5	112	6	5	5
10:00	61	13	510	68	17	535	74	13	556	72	15	533	61	12	456	67	14	518	73	12	173	15	11	9
11:00	48	23	535	52	23	564	58	24	590	54		587	52	23	485	53	23	548	77	24	226	16	15	10
12:00	40	39	536	41	38	567	44	38	596	41	40	588	39	39	485	41	39	550	67	35	258	13	12	11
13:00	32	48	520	33	53	547	37	54	579	35	51	572	33	54	464	34	52	532	56	43	271	10	9	12
14:00	21	55	486	22	59	510	24	63	540	23	65	530	23	62	425	23	61	494	36	50	257	7	7	12
15:00	13	76	423	15	76	449	17	82	475	18	77	471	15	76	364	16	77	433	18	63	212	5	5	12
16:00	16	127	312	16	134	331	17	141	351	17	139	349	15	138	241	16	136	313	10	77	145	7	8	11
17:00	17	187	142	18	198	151	21	203	169	18	189	178	17	155	103	18	186	145	8	78	75	4	6	9
18:00	11	108	45	11	118	44	10	121	58	11	111	78	11	75	39	11	107	49	7	42	40	4	5	8
19:00	9	25	29	9	29	24	9	32	35	10	30	58	7	22	24	9	28	30	5	15	30	8	7	9
20:00	11	10	30	11	13	22	9	12	32	18	15	61	8	9	23	11	12	29	7	8	29	8	4	13
21:00	10	10	30	11	11	22	11	11	32	14	16	59	8	8	23	11	11	29	6	7	28	8	5	16
22:00	5	6	29	6	9	19	7	8	31	7	10	56	8	8	23	7	8	28	4	5	27	5	5	16
23:00	2	2	29	2	2	19	3	4	30	2	4	54	4	5	22	3	3	28	4	4	27			16

Table 4.1: Counts of movements in/out of Water Eaton Park & Ride (including site accumulations) – averages across 2007

	Monday			Tuesday			Wednesday			Thursday			Friday			Weekdays			Saturday			Sunday		
	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum
MAXIMUM	191	204	594	201	210	623	205	213	641	201	208	648	177	162	545	195	199	605	75	77	261	15	14	8
Hr begin																								
00:00					1	-1		2	-2		1	-1					1	-1	1	2	-1	1	2	-1
01:00						-1			-2			-1						-1			-1			-1
02:00						-1			-2			-1						-1			-1			-1
03:00						-1			-2			-1						-1			-1			-1
04:00						-1			-2			-1						-1			-1			-1
05:00	4		4	4		3	4		2	4		3	4		4	4		3	2		1			-1
06:00	61	6	59	62	6	59	62	5	59	63	6	60	57	7	54	61	6	58	5		6			-1
07:00	191	13	237	201	11	249	205	14	250	201	12	249	177	11	220	195	12	241	12		18			-1
08:00	184	10	411	192	13	428	196	13	433	191	11	429	169	11	378	186	12	415	35	4	49	3	1	1
09:00	107	8	510	120	9	539	118	9	542	111	8	532	92	7	463	110	8	517	58	6	101	5	3	3
10:00	68	12	566	71	14	596	78	14	606	73	12	593	65	12	516	71	13	575	72	10	163	13	10	6
11:00	49	22	593	50	23	623	56	26	636	55		648	51	22	545	52	23	604	75	21	217	15	13	8
12:00	38	37	594	39	39	623	44	39	641	38	38	648	41	41	545	40	39	605	65	35	247	14	14	8
13:00	31	45	580	31	52	602	36	52	625	34	49	633	33	55	523	33	51	587	56	42	261	10	10	8
14:00	22	59	543	23	64	561	23	69	579	24	65	592	24	68	479	23	65	545	35	48	248	7	8	7
15:00	17	86	474	16	86	491	15	93	501	18	91	519	19	93	405	17	90	472	18	62	204	8	7	8
16:00	21	148	347	18	155	354	20	156	365	20	153	386	19	149	275	20	152	340	11	77	138	6	7	7
17:00	20	204	163	20	210	164	21	213	173	21	208	199	18	162	131	20	199	161	8	73	73	6	8	5
18:00	12	123	52	11	118	57	13	131	55	12	122	89	10	85	56	12	116	57	8	46	35	4	5	4
19:00	6	32	26	7	30	34	7	34	28	7	39	57	6	27	35	7	32	32	4	17	22	4	4	4
20:00	6	10	22	5	10	29	5	12	21	6	13	50	4	9	30	5	11	26	4	6	20	5	4	5
21:00	6	8	20	4	8	25	5	8	18	6	10	46	6	8	28	5	8	23	4	5	19	4	4	5
22:00	4	5	19	4	6	23	4	7	15	4	8	42	4	6	26	4	6	21	4	7	16	3	4	4
23:00	1	2	18	1	4	20	2	4	13	3	4	41	3	4	25	2	4	19	3	3	16			4

Table 4.2: Counts of movements in/out of Water Eaton Park & Ride (including site accumulations) – averages across 2008

	Monday			Tuesday			Wednesday			Thursday			Friday			Weekdays			Saturday			Sunday		
	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum
MAXIMUM	207	198	647	226	217	694	217	218	709	219	210	734	192	174	627	212	203	681	156	168	592	87	77	246
Hr begin																								
00:00														1	-1					1	-1		1	-1
01:00															-1						-1			-1
02:00															-1						-1			-1
03:00															-1						-1			-1
04:00															-1						-1			-1
05:00	4		4	7		7	6		6	7		7	4		3	6		6	1					-1
06:00	38	1	41	44	2	49	47	1	52	42	1	48	37	1	39	42	1	47	11		11			-1
07:00	142	8	175	153	6	196	154	8	198	150	7	191	139	3	175	148	6	189	28	1	38	3		2
08:00	207	8	374	226	8	414	217	8	407	219	8	402	192	7	360	212	8	393	82	4	116	15	1	16
09:00	130	6	498	135	8	541	146	9	544	143	8	537	122	6	476	135	7	521	114	8	222	36	5	47
10:00	87	9	576	94	9	626	99	10	633	103	11	629	97	12	561	96	10	607	150	16	356	81	8	120
11:00	72	18	630	76	22	680	81	22	692	82		711	77	23	615	78	21	664	156	30	482	87	10	197
12:00	53	36	647	52	38	694	56	39	709	58	35	734	54	42	627	55	38	681	129	51	560	67	22	242
13:00	36	52	631	37	54	677	39	60	688	43	61	716	39	66	600	39	59	661	104	72	592	42	38	246
14:00	21	69	583	24	75	626	26	76	638	27	81	662	27	77	550	25	76	610	64	92	564	22	53	215
15:00	13	81	515	15	86	555	17	94	561	21	92	591	19	98	471	17	90	537	30	120	474	9	69	155
16:00	12	128	399	10	135	430	14	136	439	16	139	468	16	133	354	14	134	417	16	155	335	6	77	84
17:00	10	198	211	13	217	226	14	218	235	16	210	274	14	174	194	13	203	227	13	168	180	5	67	22
18:00	9	154	66	11	152	85	10	154	91	14	146	142	12	121	85	11	145	93	13	96	97	4	24	2
19:00	4	32	38	5	38	52	6	38	59	6	52	96	8	36	57	6	39	60	6	36	67	4	7	-1
20:00	1	13	26	4	18	38	4	20	43	4	29	71	4	17	44	3	19	44	4	22	49		4	-5
21:00		9	17	3	12	29	4	13	34	4	17	58	4	12	36	3	13	34		13	36		3	-8
22:00	1	9	9	2	13	18	4	17	21	3	17	44	3	17	22	3	15	22	2	21	17		1	-9
23:00		6	3		6	12	1	7	15		8	36		10	12		7	15		10	7			-9

Table 4.3: Counts of movements in/out of Peartree Park & Ride (including site accumulations) – averages across 2007

	Monday			Tuesday			Wednesday			Thursday			Friday			Weekdays			Saturday			Sunday		
	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum
MAXIMUM	198	184	646	207	201	678	204	201	667	201	203	687	177	159	601	197	190	652	154	160	577	89	72	246
Hr begin																								
00:00																				1	-1		1	-1
01:00																					-1			-1
02:00					1	-1															-1			-1
03:00						-1															-1			-1
04:00						-1															-1			-1
05:00	3		3	3		2	3		3	3		3	3		3	3		3	1					-1
06:00	39		42	36	2	36	36		39	37	1	39	35	1	37	37	1	39	10		10			-1
07:00	137	6	173	139	7	168	142	7	174	140	7	172	133	6	164	138	7	170	22	1	31	2		1
08:00	198	7	364	207	8	367	204	9	369	201	7	366	177	5	336	197	7	360	69	3	97	12		13
09:00	131	6	489	146	8	505	133	8	494	134	8	492	118	6	448	132	7	485	112	8	201	36	4	45
10:00	89	8	570	100	9	596	98	9	583	101	9	584	91	11	528	96	9	572	145	14	332	78	8	115
11:00	70	17	623	78	17	657	80	19	644	81		665	77	20	585	77	18	631	154	27	459	89	10	194
12:00	53	30	646	54	33	678	57	34	667	58	36	687	54	38	601	55	34	652	131	47	543	65	21	238
13:00	33	44	635	35	49	664	40	53	654	42	51	678	39	62	578	38	52	638	104	70	577	43	35	246
14:00	19	62	592	22	67	619	25	71	608	26	73	631	28	76	530	24	70	592	66	88	555	20	48	218
15:00	17	85	524	16	93	542	18	101	525	19	98	552	21	98	453	18	95	515	34	120	469	10	66	162
16:00	12	123	413	12	126	428	13	131	407	14	127	439	16	126	343	13	127	401	15	153	331	8	72	98
17:00	11	184	240	13	201	240	12	201	218	16	203	252	15	159	199	13	190	224	13	160	184	8	67	39
18:00	9	141	108	10	137	113	11	139	90	13	133	132	13	114	98	11	133	102	12	91	105	4	26	17
19:00	5	36	77	6	39	80	6	40	56	6	49	89	8	39	67	6	41	67	5	34	76	4	8	13
20:00	2	14	65	3	17	66	4	18	42	4	25	68	4	18	53	3	18	52	3	20	59		5	8
21:00		9	56	1	12	55	4	13	33	3	17	54	4	12	45	2	13	41	2	16	45		2	6
22:00	1	8	49	3	12	46	3	17	19	4	17	41	4	16	33	3	14	30	3	24	24		4	2
23:00		4	45		5	41		9	10	1	9	33	1	9	25		7	23		10	14			2

Table 4.4: Counts of movements in/out of Peartree Park & Ride (including site accumulations) – averages across 2008

AM Peak only – used in 2007

Time	5 Day IN	5 Day OUT	Saturday IN	Saturday OUT	Sunday IN	Sunday OUT
	all movements prop AM peak		all movements prop AM peak		all movements prop AM peak	
00:00	0%	0%	0%	1%	0%	0%
01:00	0%	0%	0%	0%	0%	0%
02:00	0%	0%	0%	0%	0%	0%
03:00	0%	0%	0%	0%	0%	0%
04:00	0%	0%	0%	0%	0%	0%
05:00	2%	0%	1%	0%	0%	0%
06:00	25%	2%	4%	0%	0%	0%
07:00	85%	5%	10%	1%	1%	0%
08:00	100%	5%	28%	2%	7%	0%
09:00	62%	4%	44%	4%	18%	2%
10:00	42%	6%	56%	7%	40%	4%
11:00	33%	11%	59%	14%	44%	5%
12:00	25%	20%	50%	22%	33%	11%
13:00	19%	28%	41%	30%	21%	18%
14:00	12%	36%	26%	36%	10%	25%
15:00	9%	47%	13%	48%	5%	33%
16:00	8%	73%	7%	60%	3%	37%
17:00	8%	104%	5%	62%	3%	33%
18:00	6%	66%	5%	36%	2%	12%
19:00	4%	18%	3%	13%	2%	4%
20:00	3%	8%	2%	7%	0%	2%
21:00	3%	6%	2%	5%	0%	1%
22:00	2%	6%	2%	7%	0%	1%
23:00	1%	3%	1%	3%	0%	0%

AM and PM Peaks – used in 2026

Time	5 Day IN	5 Day OUT	Saturday IN	Saturday OUT	Sunday IN	Sunday OUT
	IN - prop AM peak OUT - prop PM peak		IN - prop AM peak OUT - prop PM peak		IN - prop AM peak OUT - prop PM peak	
00:00	0%	0%	0%	1%	0%	1%
01:00	0%	0%	0%	0%	0%	0%
02:00	0%	0%	0%	0%	0%	0%
03:00	0%	0%	0%	0%	0%	0%
04:00	0%	0%	0%	0%	0%	0%
05:00	2%	0%	1%	0%	0%	0%
06:00	25%	2%	4%	0%	0%	0%
07:00	85%	5%	10%	1%	1%	0%
08:00	100%	5%	28%	2%	7%	0%
09:00	62%	4%	44%	3%	18%	2%
10:00	42%	6%	56%	7%	40%	4%
11:00	33%	11%	59%	13%	44%	5%
12:00	25%	19%	50%	22%	33%	11%
13:00	19%	28%	41%	29%	21%	18%
14:00	12%	35%	26%	36%	10%	25%
15:00	9%	45%	13%	47%	5%	34%
16:00	8%	71%	7%	59%	3%	37%
17:00	8%	100%	5%	61%	3%	34%
18:00	6%	64%	5%	35%	2%	13%
19:00	4%	18%	3%	13%	2%	4%
20:00	3%	8%	2%	7%	0%	2%
21:00	3%	6%	2%	5%	0%	1%
22:00	2%	6%	2%	7%	0%	1%
23:00	1%	3%	1%	3%	0%	0%

Table 4.5: Proportions of AM and PM peak models used to derive daily profiles

4.2 Car park accumulations

4.2.1 The resulting daily usage of the proposed Bicester Park & Ride site is shown in Table 4.6, illustrating the total number of vehicles using the site daily in 2007 and 2026, as well as the maximum car park accumulation achieved, for an average weekday, Saturday and Sunday. Figures 4.1 and 4.2 show the full profiles of use across the days (weekday, Saturday and Sunday).

Day	2007		2026	
	Daily vehicles	Maximum accumulation	Daily vehicles	Maximum accumulation
Weekdays	314	224	400	286
Saturday	251	150	322	193
Sunday	132	86	173	112

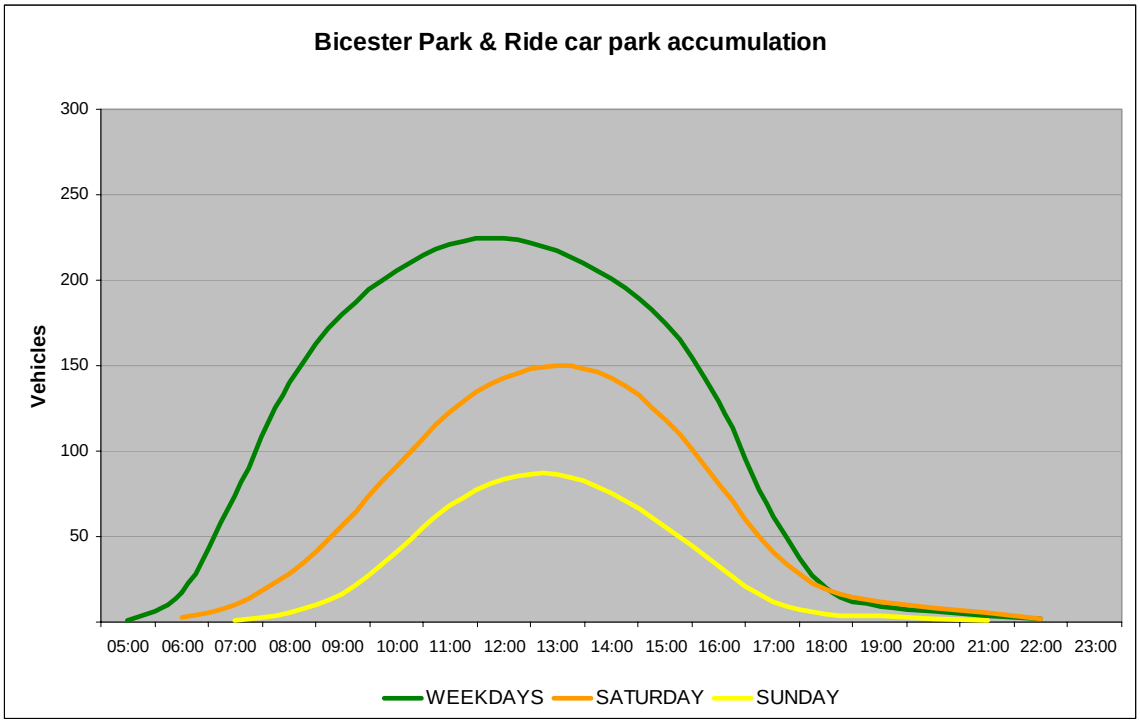
Table 4.6: Bicester Park & Ride 2026 PM peak forecast

4.2.2 Car park accumulation at the Bicester Park & Ride site is forecast to be a maximum on a weekday of 286 in 2026 (224 in 2007). Although the weekday maximum accumulation is reached at around midday, it is principally made up of park & ride users arriving before 10:00am, and hence predominantly likely to be commuters. This is illustrated by the arrival and departure patterns of users.

4.2.3 At the weekend, car park accumulations are significantly lower, being around two thirds of the weekday value on a Saturday and just over a third on a Sunday. The overall profile of users is also different, with a more even distribution of users arriving during the morning and leaving across the afternoon, though the maximum accumulation occurs at a similar time (1:00pm). This would be consistent with predominantly leisure retail users using the site.

4.2.4 Around a third of users of Bicester Park & Ride are forecast to re-locate from Water Eaton or Peartree in 2026 (reducing from around 40% in 2007 forecasts). As such, almost 100 of the vehicles parked at Bicester Park & Ride on a weekday would previously have parked at either Water Eaton or Peartree, thus reducing accumulations by approximately 60 and 40 at each of the other park & ride sites respectively.

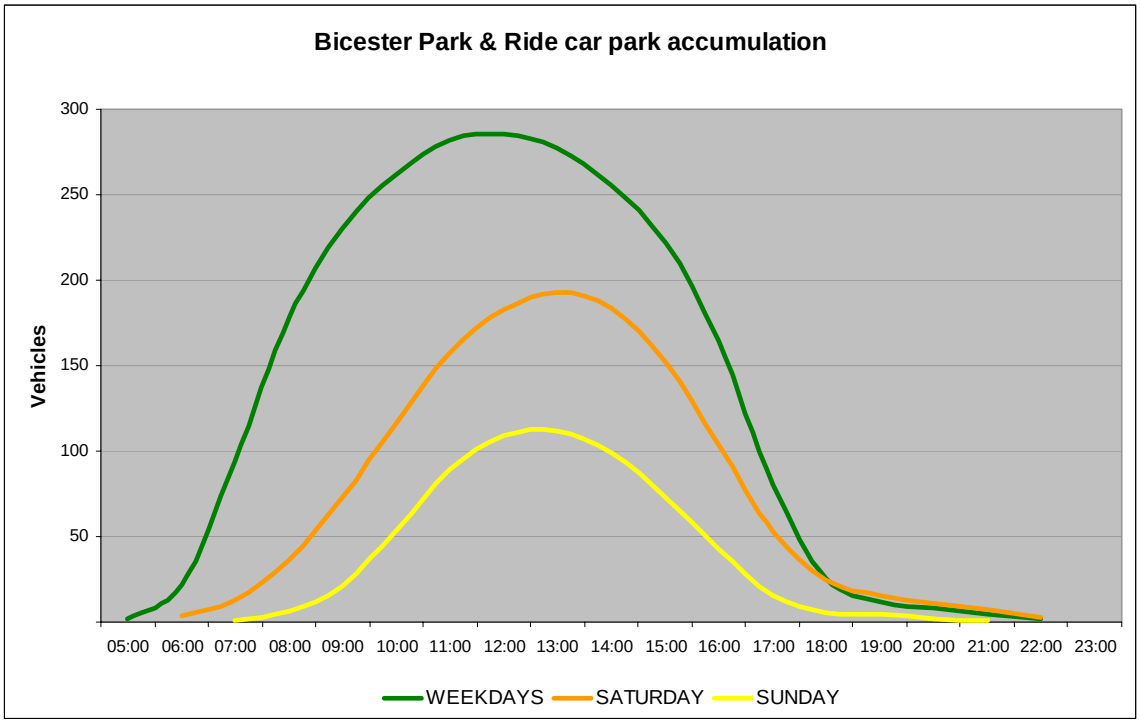
2007



	WEEKDAYS			SATURDAY			SUNDAY		
	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum
MAX	**314**	**314**	**224**	**251**	**251**	**150**	**132**	**132**	**86**
05:00	1		1						
06:00	17	1	17	3		3			
07:00	59	3	73	7	0	10	1		1
08:00	70	4	140	20	1	28	5	0	5
09:00	44	3	180	31	2	57	13	2	16
10:00	30	4	206	39	5	91	28	3	41
11:00	23	8	221	41	9	123	31	3	68
12:00	17	14	224	35	16	142	23	7	84
13:00	13	20	218	29	21	150	15	13	86
14:00	9	25	201	18	25	143	7	17	76
15:00	6	33	174	9	33	118	3	23	56
16:00	6	51	129	5	42	81	2	26	33
17:00	6	73	62	4	44	41	2	23	12
18:00	4	46	20	4	25	19	1	9	5
19:00	3	13	9	2	9	12	1	3	3
20:00	2	6	6	2	5	8		2	2
21:00	2	4	4	1	4	6		1	1
22:00	2	4	1	1	5	2		1	
23:00		2		1	2				

Figure 4.1: Bicester Park & Ride movements and accumulations – 2007

2026



	WEEKDAYS			SATURDAY			SUNDAY		
	IN	OUT	Accum	IN	OUT	Accum	IN	OUT	Accum
MAX	**400**	**400**	**286**	**322**	**322**	**193**	**173**	**173**	**112**
05:00	2		1						
06:00	22	2	22	4		4			
07:00	76	4	93	9	0	12	1		1
08:00	89	5	178	26	2	36	6	0	7
09:00	55	4	230	40	3	73	16	2	21
10:00	38	5	262	50	6	117	36	4	53
11:00	30	10	282	53	12	158	40	5	89
12:00	22	18	286	45	20	183	30	10	109
13:00	17	25	277	37	27	193	19	16	112
14:00	11	32	256	23	33	183	10	23	99
15:00	8	42	222	11	43	152	4	30	73
16:00	7	65	164	6	54	104	3	33	43
17:00	7	92	80	5	56	52	3	30	15
18:00	5	59	26	5	32	25	2	11	6
19:00	3	17	12	2	12	15	2	3	4
20:00	3	7	8	2	7	11		2	2
21:00	3	5	5	1	5	7		1	1
22:00	2	5	2	2	7	2		1	
23:00	1	2		1	3				

Figure 4.2: Bicester Park & Ride movements and accumulations – 2026

4.3 Sensitivity tests

4.3.1 Four sensitivity tests have been carried out to consider the effect on potential demand for Bicester Park & Ride of elements of the park & ride service or associated changes. These have included:

- Evergreen 3 rail service developments;
- Bus fares for park & ride users;
- Frequencies for bus services at the park & ride site; and
- Bus priority on the A41.

Evergreen 3

4.3.2 A sensitivity test has been undertaken to consider the effect that potentially significant improvement to the rail connectivity of Bicester proposed through Chiltern Railways' Evergreen 3 scheme could have on the Bicester Park & Ride site. Evergreen 3 will provide a new train service between London (Marylebone) and Oxford via High Wycombe and Bicester.

4.3.3 This would include significant enhancement to services at the existing Bicester Town station, as well as construction of a new station at Water Eaton Parkway. The improvements will result in journey times of 14 minutes for trains between Bicester (Town) and Oxford. It should also be noted that the proposed East-West Rail services between Oxford, Bicester and Bletchley/Milton Keynes (and beyond) should enhance frequencies further, though would not materially affect journey times further than Evergreen 3 enhancements.

4.3.4 Using COTM to assess the impact of Evergreen 3 with Bicester Park & Ride in operation at the same time suggests that Evergreen 3 itself will not result in a significant change in demand for Bicester Park & Ride. However, this is because a new service such as Evergreen 3 makes significant changes to the overall opportunity costs and times of using public transport in COTM. As a result of this, COTM re-distributes trips across the overall network, predicting that people will adjust their behaviour (in particular in choosing destinations) according to the available options, as represented in the opportunity costs of public transport and competing car journeys.

4.3.5 The model also does not necessarily fully take into account 'parking and riding' at railway stations for local journeys making use of the improved rail services for movements between Bicester and Oxford, effectively in 'competition' with Bicester Park & Ride. It is acknowledged though that the primary focus of Evergreen 3 is on providing links towards London.

4.3.6 Alongside a relatively congested highway network, significant new rail services will make some movements far more attractive than they might have otherwise been. As such though, COTM does not predict significant alterations in the amount of car trips on the road network in total, moreover that the pattern of movement is altered to reflect some significant improvements in longer-distance public transport journeys, which are subsequently attracted to the new rail

services. Evergreen 3 rail services therefore generate many users from trip redistribution, in particular between the Oxford/Bicester area and comparatively distant places to the south and east of Oxford (such as Berkshire and Buckinghamshire).

4.3.7 A decision was taken to further investigate the impact of Evergreen 3 on the use of the Bicester Park & Ride site, as a direct competitor to 'parking and riding' at Bicester Town and Water Eaton rail stations (i.e. parking at either Water Eaton or Bicester Town rail station and accessing Oxford by train). An assessment has been completed using a variation of the logit model to estimate the proportion of Bicester Park & Ride trips that could be attracted to use rail services.

4.3.8 The results of this analysis indicate that around half of the trips to/from Oxford that were forecast to use Bicester Park & Ride in the 2026 AM peak in the absence of Evergreen 3 could transfer to either Water Eaton or Bicester Town rail stations (with approaching 60% of these using Bicester Town station). This would result in a decline in use of Bicester Park & Ride of about 100 vehicles a day, with maximum accumulation on weekdays dropping to around 220 (from almost 300). However, it should be noted that this is a broad estimate, making basic assumptions about access times to the railway stations and park & ride sites and differential fares.

Bus fares

4.3.9 As buses serving the potential park & ride are existing services, it has been assumed that park & ride users' bus fares would be based on existing fares and only increase broadly in line with inflation in forecast years. In order to assess the potential effect of fare changes on park & ride demand, two tests have been carried out using the logit model, increasing park & ride bus fares by 10%, as well as decreasing by a similar amount.

4.3.10 Increasing or decreasing bus fares by 10% has a similar relative effect on demand. With fares some 10% lower, park & ride demand increases by 4% in the 2026 AM peak and just over 3% in the 2026 PM peak, leading to an overall increase of 14 vehicles entering the car park (around 3.6%) and maximum accumulation increasing by 10 (to 296). If fares are increased by 10%, demand for the park & ride site reduces, by just under 4% in the AM peak and 3% in the PM peak, leading to a reduction in vehicles entering the site of 14 (3.4% reduction), and accumulation of 276.

Bus service frequencies

4.3.11 The main assumption for buses serving the park & ride site used in modelling is a service interval of 15 minutes to both Oxford and Bicester Town Centre. While it is acknowledged that other buses could serve the site, this is based on the key Bicester-Oxford bus service (primarily the Stagecoach S5). The sensitivity test has considered increasing service levels to one departure every 10 minutes and decreasing to one every 20 minutes. In modelling, increasing or decreasing the interval between services affects the amount of waiting time that is included in the calculation of generalised costs.

4.3.12 Changing bus service intervals to 10 minutes increases park & ride demand by 17% in the 2026 AM peak and just over 16% in the 2026 PM peak, leading to an overall increase of 67 vehicles entering the car park (around 17%) and maximum accumulation increasing by 48 (to 334). Reducing the level of bus service to one every 20 minutes has a slightly lesser effect on demand proportionally, with park & ride demand reducing by just over 11% in both the AM and PM peaks, leading to an overall decrease of 46 vehicles entering the car park (also around 11%) and maximum accumulation decreasing to 253.

Bus priority

4.3.13 There are currently no specific bus priority measures on the A41 between Bicester and M40 junction 9. However, journey times can be variable as a result of congested conditions, particularly at peak times. This is reflected in bus timetables, which have allowances of as much as 15 minutes for journeys between Bicester and Oxford in the morning peak when compared to journey times during off peak periods in the day (although this obviously includes delays elsewhere on the road network, such as routes into Oxford city centre). In the PM peak, delays on this section are much less.

4.3.14 Analysis of journey times for vehicles travelling south on the A41 between Bicester (near the potential site of a park & ride site) and M40 junction 9, based on ITIS sensor information, indicates that journey times on this section of road in the morning peak (averaged across the hours beginning 07:00 or 08:00) are around 2 minutes slower than free-flow conditions, though this is an aggregate time that would conceal spikes of journey time both quicker and slower. At other times of the day there is much less aggregate delay on average.

4.3.15 As such, a sensitivity test has been carried out assuming that bus priority measures could cut the bus journey times by 2 minutes on this section in the AM peak and 1 minute in the PM peak. No specific measures are suggested by this approach, moreover that priority measures would achieve the savings. Improved bus journey times would also apply to other bus services using the route, and commensurately could affect opportunities for through journeys by bus. Hence, this sensitivity test was done using COTM.

4.3.16 In summary, bus priority affording a 2 minute saving is forecast to increase park & ride demand by around 7% in the 2026 AM peak, although by less than 1% in the PM peak with a 1 minute saving. Overall demand for the site increases by around 15 vehicles, leading to accumulations of 297 (an increase of 11). This COTM test also indicates small rises in bus use at the expense of car use, which effectively reduces the total potential pool of park & ride users (i.e. car users).

5 Demand profiles for Bicester Village

5.1 Current situation

5.1.1 The Bicester Village retail park is located on the southern edge of Bicester between the A41 and Pingle Drive. Road access to the site is from Pingle Drive, off a roundabout on the B4030 Oxford Road, some 200m north of the junction of the B4030 and the A41. Pedestrian access is possible from Bicester Town railway station. The site of Bicester Village is located immediately adjacent to a Tesco superstore which uses the same Pingle Drive access from the B4030.

5.1.2 The operators of Bicester Village estimate that most visitors to the site arrive by car, although a significant minority arrive by other means, principal among these being coaches (including a daily service from London), shuttle buses from Bicester North station and by walking from Bicester Town railway station.[1]

5.1.3 As discussed in this chapter, demand for car parking at Bicester Village can exceed capacity. This typically occurs at weekends or holiday periods, though recent expansion of the car park has assisted capacity issues. Traffic management measures are required on the site as traffic can queue to enter the car parks and have a resultant negative impact on the surrounding highway network.

5.2 Discussions with the Bicester Village operators

5.2.1 The County Council has held discussions with the Bicester Village operators to gain a background understanding about the operations of the site. Information has been provided on when the busiest periods occur, mode of travel to the site, staff travel behaviours and future expansion plans.

5.2.2 Bicester Village has 'red weekends' which are its busiest periods. Red weekends are 'pay day' weekends (the last weekend of each month) and Bank Holidays, and these often coincide. Footfall estimates for a red weekend, based on the counts from 2009, are:

- Saturday 20,000
- Sunday 15,000
- Monday 18,000

5.2.3 A new 380 space car park on the former coal depot opened on Saturday 17th July 2010. This car park is shared with Bicester Town Station and is segregated

[1] A survey of Bicester Village customers has been conducted during summer 2010. This is expected to be available in late October 2010, and includes questions about the home origin of customers and whether travelling from home or staying elsewhere, as well as the mode of transport used to get to Bicester Village.

on weekdays (by a barrier) to protect spaces for rail users, but at weekends and Bank Holidays the barrier is open so the whole area can be used by Bicester Village customers.

5.2.4 On weekdays Bicester Village staff park in the overflow car park to the north of the site. At weekends the Service Yard is opened for staff as there are no deliveries, so no staff park on site in spaces which could be used by visitors.

5.2.5 In considering the mode of travel to Bicester Village, it is clear that the majority of trips are made by car. Low numbers of people walk to the site, however many use the Bicester North Station & associated shuttle bus. There is a new Shopping Express Coach service from London which was launched on 28th January 2010. It is a 49-seater coach which does 1 return trip per day. This is targeted at a niche London tourist market via hotel concierges. There is currently space for 10 coaches on site. At weekends, if these spaces are full, coaches can wait at Bicester Community College.

5.2.6 There are plans to promote a seamless train-coach service by Bicester Village. This would include an upgrade of the Bicester North station shuttle bus service to a luxury coach and the provision of a desk at the station which would direct visitors to the coach.

5.2.7 The Chiltern Railways Evergreen 3 proposals linking Marylebone to Bicester Town station and on to Oxford will provide more choice for visitors from London to access Bicester Village. This could shift some Bicester Village visitors who use Bicester North station to Bicester Town. However many London services to/from Banbury and beyond will continue to stop at Bicester North, as an important station for visitors from the Midlands and further north.

5.2.8 It is estimated that 60-90% of Bicester Village staff live locally. As each retail outlet is a lease holder and is responsible for its own staff, it is not possible to understand, without a detailed survey, where staff travel to work from and how they travel. In addition to those who work in the retail outlets, the site is the head office of Value Retail who own the Bicester Village site, and other similar outlets across Europe. Around 70 staff work in the head office.

5.2.9 It is likely that, in the future, Bicester Village will seek further expansion. If Tesco chose to sell their adjacent site, this would be the most logical direction for any expansion.

5.3 Use of Bicester Village car park

5.3.1 Counts of traffic movements on Pingle Drive have been provided by the Bicester Village operators. These counts have been undertaken at a location to the east of the Tesco access roundabout on Pingle Drive, and as such only cover traffic accessing Bicester Village. While there is an amount of traffic included in the counts that does not actually park, such as buses and coaches dropping off or picking up passengers, this is considered to be limited overall. Comparison of ‘in’ and ‘out’ movements therefore provides a reasonable assessment of car park accumulation.

5.3.2 Figure 5.1 shows the profiles of vehicles counted entering and leaving the Bicester Village on Pingle Drive.

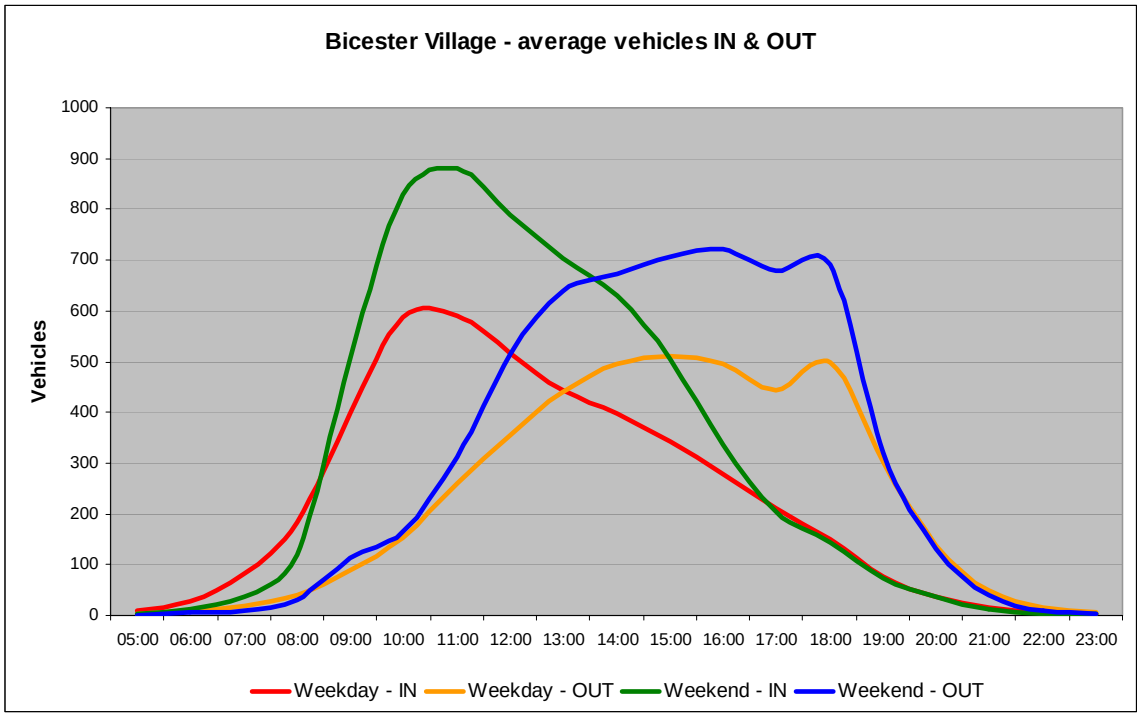


Figure 5.1: Bicester Village parking – 2010 average profile of vehicles in and out

5.3.3 This illustrates that weekend demand is higher than weekday, although the pattern of movement with time of day is very similar in profile. For instance, while there is a distinct peak in traffic entering the site between 10am and 11am every day, there is a steady, albeit decreasing, stream of entries throughout the day, with a similar number of vehicles entering the car park at 5pm as at 9am on both weekdays and weekends. Reflecting that the length of stay in a retail destination is shorter than would be expected for commuters, departures from the car park are noted throughout the day, with similar numbers leaving every hour from 2pm to 6pm, though there are small peaks at 4pm and 6pm.

5.3.4 Prior to the opening of the additional car parking spaces on 17th July 2010, counts indicate that vehicle accumulations in the car parks at Bicester Village exceeded capacity at weekends. Indeed, apart from one weekend in January, during a period when the weather was particularly severe, this happened for some time on every weekend in 2010 prior to 17th July. Weekdays rarely saw overcapacity in the car parks, with the key exception of school holidays, when demand was high every day.

5.3.5 Since 17th July 2010, demand has still exceeded capacity at weekends, as well as on August Bank Holiday Monday, though it appears that the amount of excess demand has reduced. However, the period for which data is currently available predominantly covers the school summer holidays which is a generally busy period. It is apposite to note that the counts indicate demand would have exceeded the previous car park capacity (1,600 spaces) virtually every weekday in the school holidays after 17th July and during August 2010.

5.3.6 Table 5.1 summarises the average car park accumulation and associated spare capacity or excess demand by day of the week before 17th July 2010 (1,600 spaces available); Table 5.2 shows similar information for the period from 17th July to 5th September 2010 (with 1,986 spaces available).

Day	Accumulation	Capacity	Spare/Excess	
Monday	1,457	1,600	143	Spare
Tuesday	1,372	1,600	228	Spare
Wednesday	1,339	1,600	262	Spare
Thursday	1,410	1,600	190	Spare
Friday	1,565	1,600	35	Spare
Saturday	2,054	1,600	**454**	**Excess**
Sunday	1,963	1,600	**363**	**Excess**

Table 5.1: Bicester Village car park accumulation – 2010 (1-Jan to 16-Jul)

Day	Accumulation	Capacity	Spare/Excess	
Monday	1,828	1,986	158	Spare
Tuesday	1,665	1,986	321	Spare
Wednesday	1,652	1,986	334	Spare
Thursday	1,677	1,986	309	Spare
Friday	1,720	1,986	266	Spare
Saturday	2,285	1,986	**299**	**Excess**
Sunday	2,273	1,986	**287**	**Excess**

Table 5.2: Bicester Village car park accumulation – 2010 (17-Jul to 5-Sep)

5.3.7 The tables show that even with increased car park capacity, there is still some excess parking demand at Bicester Village during peak shopping times. While weekends in school holidays remain especially busy, traffic counts indicate that there may also be problems on weekends outside school holidays. However, currently available data only covers the initial post school holiday period to 5th September (and indeed some school terms had not started at that point).

6 Bicester Park & Ride Phase 1 and 2

6.1 Introduction

6.1.1 The previous two chapters have set out the demand profiles for a Bicester Park & Ride site for trips into Oxford and Bicester, as well as for Bicester Village. Based on these assessments, this chapter sets out the number of spaces that would be required at the park & ride site to satisfy both existing (Phase 1) and future demand (Phase 2).

6.2 Trips to Oxford and Bicester

6.2.1 Chapter 4 sets out that car park accumulation, based on the use of the park & ride site for trips into Oxford and Bicester only, is forecast to be a maximum on a weekday of 224 (Phase 1) and 286 (Phase 2). This is in line with the conclusions of the 2005 study which assessed the need for 230 spaces. At the weekend, car park accumulations are significantly lower, being around two thirds of the weekday value on a Saturday and just over a third on a Sunday. That is forecasts for Bicester Park & Ride estimate that weekend car park accumulations (without Bicester Village use) would be around 150 on Saturday and 86 on Sunday if the site was implemented now, rising to 193 and 112 respectively by 2026.

6.2.2 These forecasts suggest that to satisfy the demand of a park & ride for trips to Oxford and Bicester there should be a minimum car park size of 300 (Phase 1). However, as this is based on average day forecasts, it is likely to be exceeded and would leave little or no day-to-day flexibility or room for expansion.

6.3 Overflow for Bicester Village

6.3.1 As traffic counts and resulting car park accumulations have shown, there is likely to be an on-going excess of demand for parking at Bicester Village at peak times, in the region of about 300 spaces at weekends. In lieu of further expansion of parking capacity, use could be made of the Bicester Park & Ride site, given appropriate linkages between Bicester Village and the park & ride site. The potential park & ride site is located approximately 1km south-east of Bicester Village along the A41.

6.3.2 While bus services passing through the park & ride site could be used to access Bicester Village via bus stops on the B4030 Oxford Road, this would still require customers to cross the B4030 and walk approximately 400m to Bicester Village. This is unlikely to be practical, so a dedicated link between Bicester Village and the park & ride site would probably be required, notionally in the form of a bus or taxi-bus shuttle service provided by Bicester Village.

6.3.3 There is potentially a good fit between the likely periods of excess parking requirement at Bicester Village and the forecasts of demand at Bicester Park & Ride. Excess demand at Bicester Village is primarily at weekends, when park & ride demand is lowest and, conversely, parking at Bicester Village is far less

likely to be over capacity when park & ride demand is highest on weekdays. However, the amount of parking available for Bicester Village overflow usage will depend on the ultimate capacity of the park & ride site.

6.3.4 As identified above, a minimum park & ride site capacity of 300 would satisfy demand for Oxford and Bicester trips on weekdays. As demand for Oxford and Bicester trips is less at the weekend, this would potentially leave between 100 and 200 spare spaces on Saturdays and Sundays (if solely used for Oxford and Bicester trips). To accommodate the excess demand from Bicester Village at weekends (300), as well as the demand for Oxford and Bicester weekend trips, a park & ride site of 500 is more likely to be appropriate.

6.3.5 Operationally, it is likely that a degree of restriction will be required to ensure that sufficient parking spaces are available for park & ride users at times when the site is being used for Bicester Village overflow parking. Conceptually, this would be similar to the way that the recently opened parking spaces are shared with Bicester Town railway station and prioritised for stations users on weekdays.

6.3.6 In the first instance, as the park & ride site is remote from Bicester Village and requires a dedicated transport link provided by Bicester Village, though the link would not operate at times when there is no overflow parking requirement. As part of traffic management operations facilitated by Bicester Village, variable message signing could then be used to direct Bicester Village customers either to the main Bicester Village site or park & ride site as appropriate.

6.4 Park & ride car park capacity

6.4.1 Based on the existing and future demand profiles, it is considered that a 500 space car park would be appropriate to meet existing demand (Phase 1). However, this is dependant on the use of the site by Bicester Village and Bicester Village running a dedicated shuttle service.

6.4.2 The need for a Phase 2 extension of the site will be dependant on any future expansion of the Bicester Village site and their continued demand for overflow parking.

7 Summary & Conclusions

7.1 Bicester Park & Ride

7.1.1 The proposed Bicester Park & Ride site, located on the south eastern edge of the South West Bicester development could potentially have three roles in the transport network of Bicester. These are: 'remote' park & ride for journeys to Oxford; 'local' park & ride to Bicester; and 'overflow' parking for the Bicester Village retail park.

7.1.2 The park & ride site would not have dedicated bus services, but would make use of existing (passing) bus services to provide links into both Bicester town centre and Oxford, primarily express services between Bicester and Oxford. While the existing express buses past the proposed site is reasonable, there is scope for these services to be enhanced in response developments in Bicester. Links to Bicester Village would require dedicated 'shuttle' services or equivalent, provided by Bicester Village.

7.2 Demand for the site

7.2.1 Two modelling tools have been used to assess potential demand for a park & ride site at Bicester. The Central Oxfordshire Transport Model (COTM) has provided the main data regarding overall trips made and trips times and costs, particularly in future years. A bespoke logit model has also been used to better understand the detailed use of the car park; this is linked to profiles of daily usage on weekdays and weekends, in turn based on counts of usage at other park & ride sites around Oxford.

7.2.2 Initial 'base' forecasts (utilising a 2007 model year) indicate that Bicester Park & ride could attract some 70 vehicles to park in the AM peak. Trips are to Oxford city centre (61%) or Bicester (39%). Applying modelled results to anticipated demand profiles indicates that the maximum car park accumulation in the base year is forecast to be 224, occurring on an average weekday, with a commensurate daily usage by over 300 vehicles. Weekend usage is lower, with maximum accumulation of 150 on a Saturday (86 on Sunday).

7.2.3 In the 2026 forecast year, demand at the site rises to 94 vehicles in the AM peak, with 87 in the PM peak. Overall usage of park & ride around Oxford is forecast to rise by around 20% from base year to 2026. Hence, Bicester sees a disproportionally lower increase (around 10%). Bicester town centre is more important as a destination for Bicester Park & Ride site users in 2026, as a result of its assumed greater attractiveness and future traffic conditions. Daily usage in 2026 is higher than the base year, with again the largest accumulations of vehicles in the car park being on weekdays, with a maximum of 286 parked at the same time out of 400 users of the site. At weekends, accumulations are lower, with 193 on a Saturday and 112 on Sunday.

7.2.4 Around one third of forecast users of the Bicester Park & ride site would previously have used other park & ride sites (principally to get to Oxford city

centre). These uses principally 're-locate' from the park & ride sites at Peartree and Water Eaton, reducing maximum accumulations at these sites by around 60 and 40 (respectively); there are greater capacity pressures at Peartree.

7.2.5 A significant number of users of the Bicester Park & Ride site are forecast to be from the Bicester area itself, with around 35% of trips to Oxford and 65% of trips to Bicester town centre originating from Bicester. The remaining trips are from surrounding areas. However, care should be taken in considering these results because of the location of Bicester at the northern edge of the most detailed sections modelled within COTM.

Complementary measures & sensitivity tests

7.2.6 Four key elements that could affect demand at Bicester Park & Ride have been considered in the modelling, including development of the Evergreen 3 rail service proposals between London Marylebone and Oxford, bus fares, bus frequencies and bus priority.

7.2.7 Evergreen 3 train services could reduce demand at Bicester Park & Ride by around 100 vehicles per day, and car park accumulations dropping by around 80. Changing bus fares or frequencies would encourage demand if fares are reduced or frequencies increased, and reduce demand in the reverse situations. Park & ride demand is more sensitive to frequencies than fares.

7.2.8 Bus priority measures on the A41 are forecast to have a limited effect on park & ride demand (around a 5% increase in daily usage). However, there would also be wider gains for bus use, as trips are encouraged to use bus services that experience slightly more reliable journey times in a more congested future.

Bicester Village

7.2.9 The Bicester Village retail park is a popular attraction, particularly at weekends and during school holidays. Most visitors to Bicester Village travel by car, although other means are used, including coaches and trains from London. Demand for Bicester Village is such that, even with increased car park capacity that opened midway through 2010, there is still excess parking demand at during peak shopping times. This is estimated to be approximately 300.

7.2.10 On days when excess demand for car parking is anticipated, traffic management measures are enacted on the approaches to the retail park, and some use is already made of overflow parking elsewhere in Bicester (with shuttle bus linkages). There is scope for overflow demand at Bicester Village to use spare capacity at the park & ride site, subject to appropriate linkages being provided between the two locations.

7.3 Car park capacity

7.3.1 Forecasts suggest that to satisfy the demand of a park & ride for trips to Oxford and Bicester there should be a minimum car park size of 300 (Phase 1). This would leave 100-200 spare spaces at weekends, which could be used for Bicester Village overflow (subject to appropriate linkages being provided).

7.3.2 However, as this is based on average day forecasts in 2026, a capacity of 300 is likely to be exceeded and would leave little or no day-to-day flexibility or room for expansion, and would not have sufficient space to cater for overflow from Bicester Village. Hence, a 500 space car park would be suggested as a Phase 1 capacity. Note that this is still dependant on use of the park & ride site for Bicester Village overflow, and a dedicated shuttle linkage being provided by the Vilage accordingly.

7.3.3 Further expansion of the car park in Phase 2 would be dependant on future expansion of Bicester Village and continued demand for overflow parking.

Appendix A

Appendix A Modelling Methodology

Appendix A Modelling methodology

A.1 Data provision

A.1.1 Traffic data was obtained from the County Council to ensure that the most up-to-date traffic flows were used.

- Bicester bus boarding and alighting surveys on Bure Place and Kings End;
- Entry and exit data for the Oxford park & ride sites;
- Queue length surveys on Oxford Road and the A41; and
- Traffic counts at locations across Bicester.

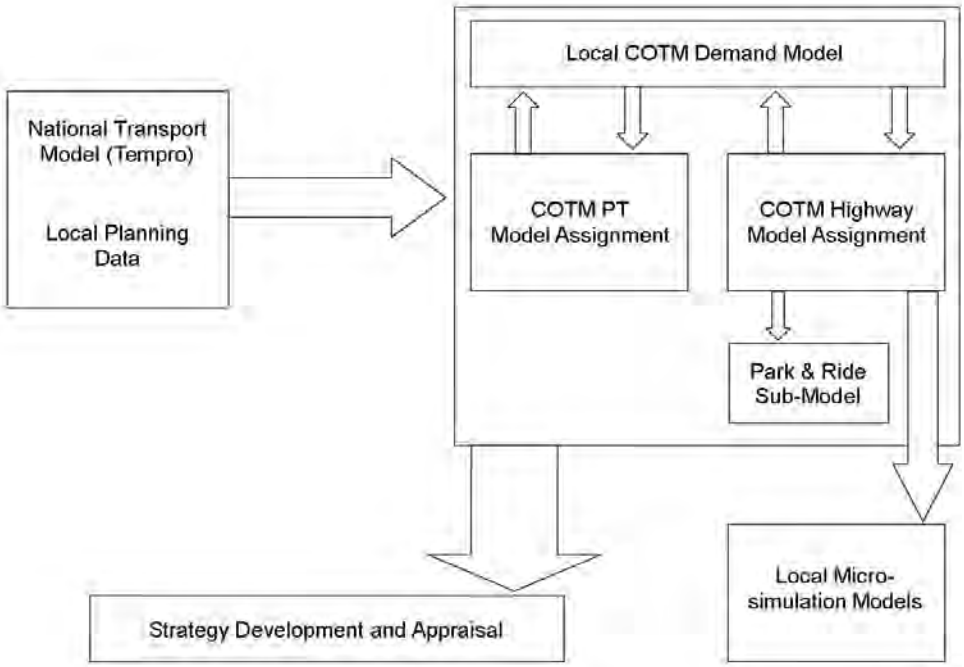
A.1.2 In addition, it was necessary to gain information from Bicester Village to enable the development of demand profiles for the Village car park. The following data was obtained:

- The capacity of the Bicester Village car park;
- Entry and exit traffic count data;
- Information on car park demand (time and day); and
- The surplus demand for car parking spaces.

A.2 The Central Oxfordshire Transport Model (COTM)

A.2.1 The initial purpose of the Central Oxfordshire Transport Model (COTM) was to assess major infrastructure projects in central Oxfordshire, with the aim of securing funding for schemes. It has subsequently been used for more localised option testing for strategies and schemes, such as the assessment of local development framework (LDF) proposals and the transport impact of major developments. A park & ride sub-model was included in COTM, and this was used as part of the assessment of capacity issues at the Thornhill Park & Ride site.

A.2.2 COTM is a WebTAG compliant variable demand model. The modelling framework is shown below:



A.2.3 In essence, COTM includes a local demand model which provides forecasts of demand for the scenario under test. This provides information that enables the assignment of movements to the highway and public transport networks. Being a 'variable demand model', the results of assignment are used to 'loop-back' into the demand process, and the demand adjusted to better match travel information. Several loops are performed whereby the assignment models feed travel information back to the local demand model, until the differences between loops are small. In this process COTM is able to compare the cost of travel by car and public transport, in order to decide on mode and route choice. In addition, based on the results of the cost comparisons, COTM is able to make changes to the destinations of trips or even conclude that the cost required to make this trip is prohibitive and thus stop the trip being made.

A.2.4 COTM assumes that all users have perfect knowledge of the public transport and highway networks. That is, each user understands how long it will take and the fuel cost to undertake the trip by car, and how long it will take and how much it will cost for the trip by public transport. COTM assumes that all highways operate smoothly i.e. there are no delays due to accidents or road works (either planned or emergency) and that all public transport operates to timetable.

A.2.5 A 2026 reference case was developed for COTM in 2008. The reference case is to enable testing to take place on a network which reflects agreed future year (2026) development assumptions across the Central Oxfordshire area. The reference case includes committed housing and employment development and infrastructure, as well as development and infrastructure assumptions based on knowledge of future plans. Reference case assumptions within Oxford City were updated in March 2009 to take account of the revised housing figures provided by Oxford City Council. Further analysis of these committed and proposed development numbers have been undertaken as part of on-going re-assessment of likely planning scenarios.

A.2.6 To provide good calibration of COTM in considering Bicester Park & Ride, in particular feeding into future-year assessments, information relating to the park & ride facilities north of Oxford was reviewed and where necessary enhanced through the use of specific data. These new data inputs provided the basis of a more robust assessment of the change in 'generalised costs', which forms the basis of mode-split calculations for a trip by car or other means, including driving to the park & ride site and catching the bus to the final destination[2].

A.2.7 Additional origin-destination interviews were analysed, cleaned and then processed to the COTM zone system. This was expanded using up-to-date observed counts. Using this as a base, it was possible to calibrate the COTM model with the current situation; the logit model makes use of this information as well. Future year assumptions were used in COTM to forecast park & ride demand in 2026. COTM has been used to simulate demand for the Bicester Park & Ride bus service during the morning peak (08:00-09:00) and evening peak (17:00-18:00).

A.2.8 However, while the total demand for park & ride can readily be calculated, assessing the number of users at individual park & ride sites can be problematic in the situation where there are over-lapping catchment areas for park & ride sites. This is a particular issue in the area north of Oxford, where the existing sites of Peartree and Water Eaton already have overlapping catchment areas, and introducing a site at Bicester effectively provides another site operating in the same catchment area. This is exacerbated by Bicester being located on the outer edge of COTM's most detailed coverage.

A.2.9 Outputs from COTM have been used to develop a logit model which provides an opportunity to assess trips across the catchment area in more detail, and provide greater control over the functions that determine the amount of usage at each site north of Oxford. Results have also been used to develop forecast daily use profiles for the site to assess capacity utilisation and site saturation times.

A.3 Logit model

A.3.1 Outputs from COTM have been used as the basis of a bespoke logit model to assess suppressed demand at Thornhill. The logit model makes use of detailed base year and future forecast park & ride demand from COTM, as well as time and cost information. Both AM and PM peak logit models have been prepared. While acknowledging there will be users of park & ride throughout the day, this reflects that park & ride demand is typically dominated by the commuter market. Demand across the remainder of the day is modelled using these peak periods and reference to counts of users at existing sites.

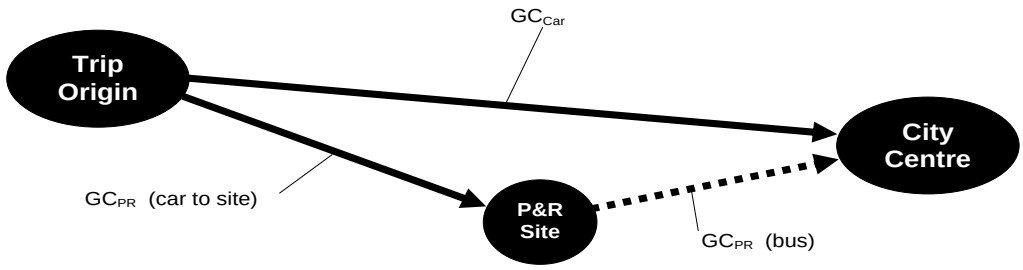
A.3.2 The model uses logit-based probability calculations to assess the mode-share of trips using the park & ride facility. This is a widely-used approach that forms the basis of most multi-modal transport models. Logit models have, in the form used

[2] Generalised costs are discussed further in the next section of this chapter, as they are an inherent part of the logit model described therein

in this study, been applied many times for park & ride sites, both in considering the demand for new and existing sites. Indeed, mode split elements of COTM, including the park & ride sub-model, use forms of logit functions.

Basic logit function

A.3.3 The principle behind the logit function is that it uses the 'generalised costs' of journeys by particular modes of transport to express the share of the transport market of each mode. The most basic form of logit function operates in a binary situation with pairs of modes, as shown below.



$$Park\ \&\ Ride\ Share = \frac{\exp(GC_{P\&R})}{\exp(GC_{P\&R}) + \exp(GC_{CAR})} \quad [3]$$

Where: GC_{mode} is the generalised cost of the journey by the mode. GC_{PR} and GC_{Car} are the generalised costs of park & ride and car modes respectively (further description of generalised costs can be found later in this chapter).

A.3.4 The basic logit function can be amended to specific situations. For instance, there may be more than two mode choices, including for example local bus or rail services as well as park & ride. The relationship with local bus and rail services has not been considered in the logit model, as this is enshrined in the COTM methodology.

Incremental and adjusted absolute models

A.3.5 In this study, a combination of 'incremental' and 'adjusted' absolute logits have been used to produce base year (2007) and future year (2026) models for Oxford's park & ride. The 'incremental' approach is an amended version of the basic logit equation, and the form of this function is shown below:

$$Park\ \&\ Ride\ Share = \frac{PR\ Trips \times \exp(\delta GC_{PR})}{PR\ Trips \times \exp(\delta GC_{PR}) + Car\ Trips \times \exp(\delta GC_{Car})} \quad [4]$$

A.3.6 The incremental approach is particularly well-suited to the case where there is a known existing situation. The incremental logit utilises this defined initial situation

[3] In all the logit functions, exp(x) is the exponential function of 'x', where *e* (2.71828….) is raised to the power x

[4] δGCMode is the change in generalised costs by that mode, compared to the base situation

and 'pivots' around the initial mode split. In essence, this means that if nothing changes to alter generalised costs, the forecast mode shares are the same as the initial situation. This very effectively takes into account the inherent biases that exist between modes within the calculation. This approach has been used where there are existing park & ride movements.

A.3.7 However, the incremental approach does not identify park & ride trips where there are none in the initial situation, and can therefore underestimate the effects of improving the availability of park & ride, such as by the implementation of a new site. As such, an adjusted absolute logit approach has been taken for potential movements that do not have park & ride demand in the initial situation. The adjusted absolute approach uses existing situations from a relevant proxy area (in this case elsewhere in the same study area) to calculate the modal bias against (or towards) park & ride that have to be added to generalised costs to produce appropriate park & ride mode shares. The form of this logit function is as follows:

$$Park\ \&\ Ride\ Share\ = \frac{\exp\left(GC_{P\&R} + X_{P\&R}\right)}{\exp\left(GC_{P\&R} + X_{P\&R}\right) + \exp\left(GC_{CAR}\right)}$$

Where $X_{P\&R}$ is the calculated modal bias for park &ride against car.

Trip Data

A.3.8 Car and park & ride trips have been taken from COTM for the base year 2007 and forecast year 2026. Trip matrices extracted from COTM have been aggregated to a system of 80 sectors representing the model zones. In addition, 'representative' zones were identified within each sector. These representative zones were used to interrogate journey time and distance skim matrices to provide appropriate car journey times and speeds from sector-to-sector.

A.3.9 The logit models compare overall park & ride trips from sector to sector with car trips. As such, generalised costs for park & ride use via each available site are also averaged (sector to sector movement), to give a weighted overall value including values from every movement recorded in the trip matrix.

Site split

A.3.10 A key element of the analysis of Bicester Park & Ride is the interaction between a potential new site and the existing sites that operate in the same catchment area. Effectively, the catchment area of Bicester Park & Ride is a sub-area of the wider catchment area for the Peartree and Water Eaton sites.

A.3.11 In the first instance, this means that the generalised cost of park & ride used in the incremental and adjusted absolute logit models (that calculate the mode share) is a combined generalised cost, based on the number of sites available for each movement. The availability of sites is governed by realistic catchments of each of the sites, and is calculated as follows:

$$GC_{PR} = \ln\left(\frac{1}{No.Sites} \cdot \left[\exp\left(GC_{Site\,1}\right) + \exp\left(GC_{Site\,2}\right) + \exp\left(GC_{Site\,3}\right) + ...\right]\right) \quad [5]$$

A.3.12 In turn, the park & ride mode share is split into the number of trips that use each site using an adjusted absolute logit function

$$Site\,Share = \frac{\exp\left(GC_{Site\,1} + X_{Site\,1}\right)}{\exp\left(GC_{Site\,1} + X_{Site\,1}\right) + \exp\left(GC_{Site\,2}\right) + \exp\left(GC_{Site\,3}\right) + ...}$$

Where $X_{Site\,1}$ is a calculated site bias against, based on the observed catchments of existing sites, extrapolated to an anticipated catchment for a Bicester site.

Generalised Costs

A.3.13 The 'generalised cost' of a journey is built-up of all the component times and costs that are incurred in order to make the journey. So, for example, a bus-based park & ride journey is the summation of:

- Driving time to the park & ride site
- Walk time from the car park to the bus
- Bus journey time to destination stop
- Walk time from/to a final destination
- Car operating costs
- Waiting time for bus to depart
- Bus fare
- Appropriate parameters & biases

A.3.14 These elements are expressed in units of 'generalised minutes', using the value-of-time to convert monetary inputs to minutes. The resulting generalised cost equation for park & ride trips is as follows:

$$GC_{PR} = \lambda \cdot \left[IVT_{Car} + IVT_{Bus} + 2 \cdot \left(Walk_{Site} + Wait + Walk_{Dest}\right)\right]$$

A.3.15 Key associated assumptions include:

- Walk times – based on notional times at park & ride site and car parks in the city centre; a factor of 2 is used to represent users' dislike of walking;
- Car in-vehicle journey times – derived from COTM. This included car journey times/speeds between sectors and the City centre, as well as the park & ride site, identified from a 2007 base journey time/distance skim matrices and 2026 forecast car journey time/distance skim matrices;
- Bus in-vehicle times – based on existing timetables for park & ride services;

[5] 'ln' denotes natural logarithm; logarithm to the base 'e' (2.71828….)

- Wait times (public transport only) – assumed to be half of the service interval, unless this is greater than 30 minutes; a factor of 2 is used to represent users' dislike of waiting;
- Costs (park & ride bus fares) – based on existing fares, with weighting allowances made for season-ticket use. Fares for users of the Bicester park & ride site are assumed to be consistent with existing bus fares between Bicester and Oxford and local services within Bicester (for trips to the town centre);
- Costs (city centre car parking) – assumed at basic rate of £5.00 per day, but weighted (from zero in some areas) to allow for cheaper or free parking; and
- Costs (car operating costs) – fuel and non-fuel costs are based on DfT recommended values (WebTAG, December 2008).

A.3.16 As noted above, generalised costs usually include 'biases' to reflect people's tendency to favour particular modes or aspects of service. Parameters and biases are typically associated with the local situation, and be factors applied to times or costs and/or constant terms. This is partly dependant on whether the system being modelled is existing or proposed. Where a service already has a track-record of operation and use (such as Water Eaton Park & Ride), the existing mode split can be used to calibrate the generalised costs to actual mode shares. The logit model in this study uses a combination of generic park & ride parameters derived from previous studies and biases from the current situation in Oxford and COTM.

A.3.17 All elements are expressed as generalised time (in minutes), using values of time to convert monetary inputs to time and weighting factors. The value of time is taken from DfT recommended values (WebTAG). In addition, values are expressed in one-way terms and per person-trip, using vehicle occupancy of 1.2 (consistent with COTM). A generic 'spread' factor of -0.035 (λ in the equation above) is used to scale the generalised minutes calculated to appropriate levels for use by the logit formulation. This is derived from previously used figures.

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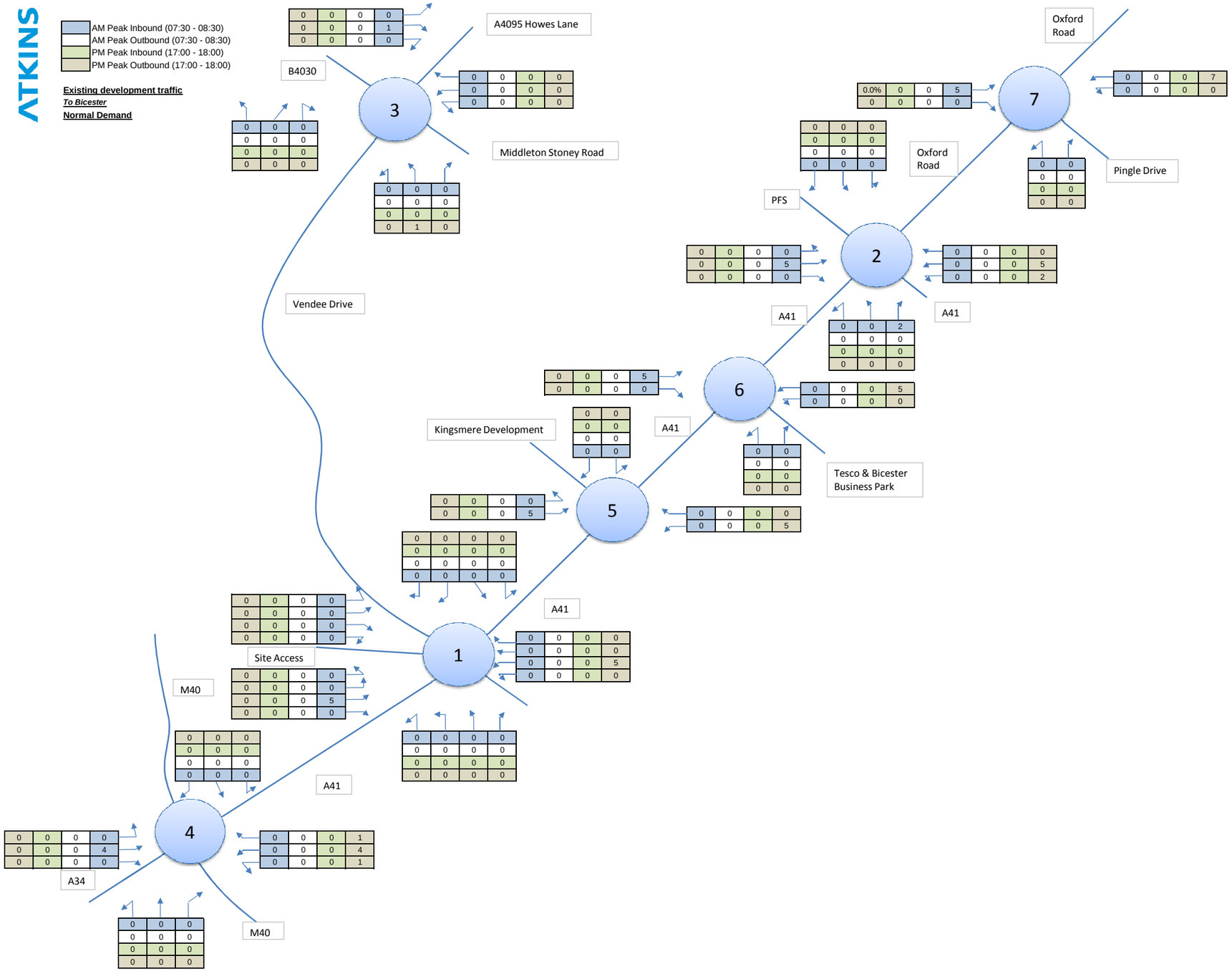
Appendix I. Development Distribution

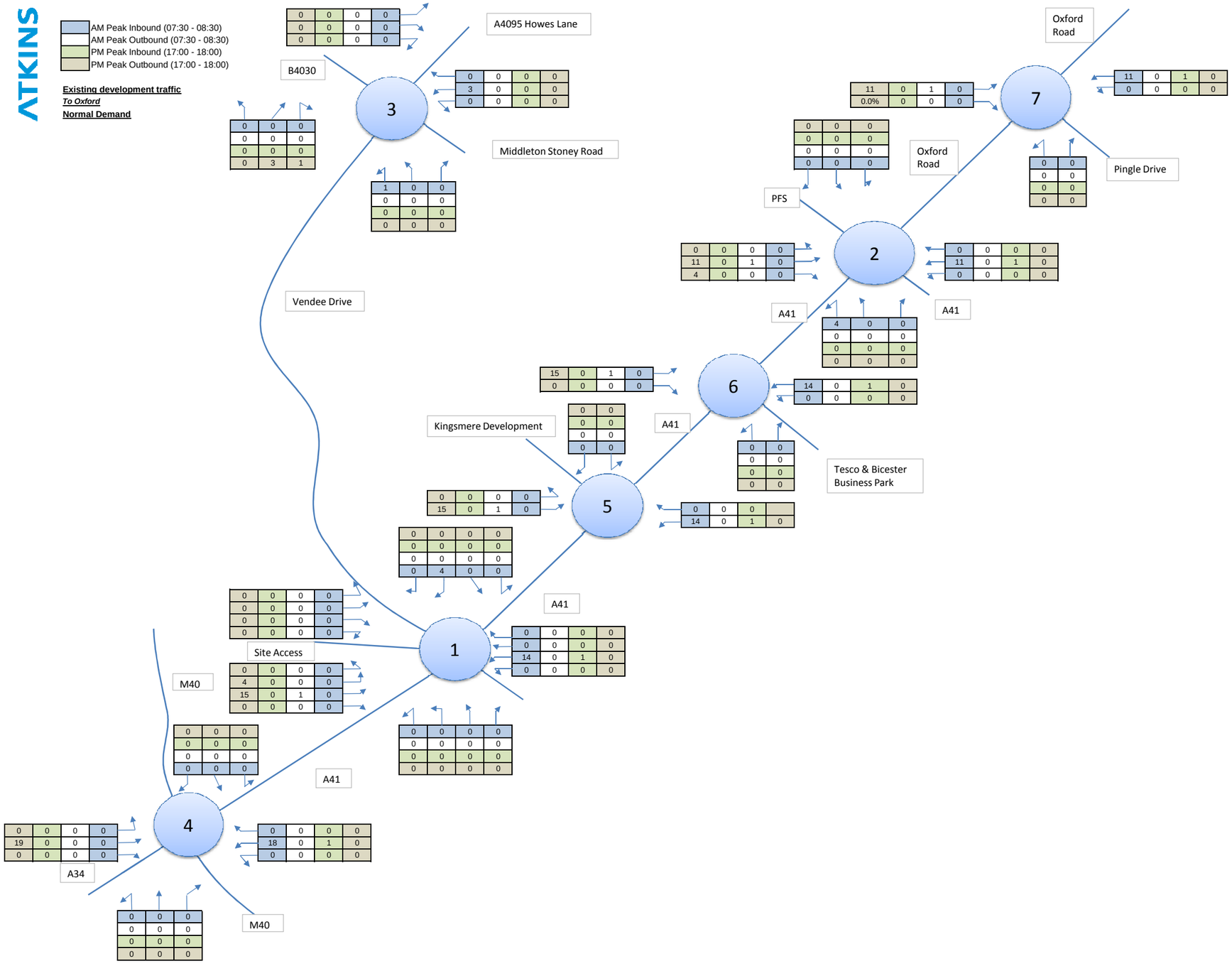
AM Peak Inbound (07:30 - 08:30)
AM Peak Outbound (07:30 - 08:30)
PM Peak Inbound (17:00 - 18:00)
PM Peak Outbound (17:00 - 18:00)

Existing development traffic
To Bicester
Normal Demand



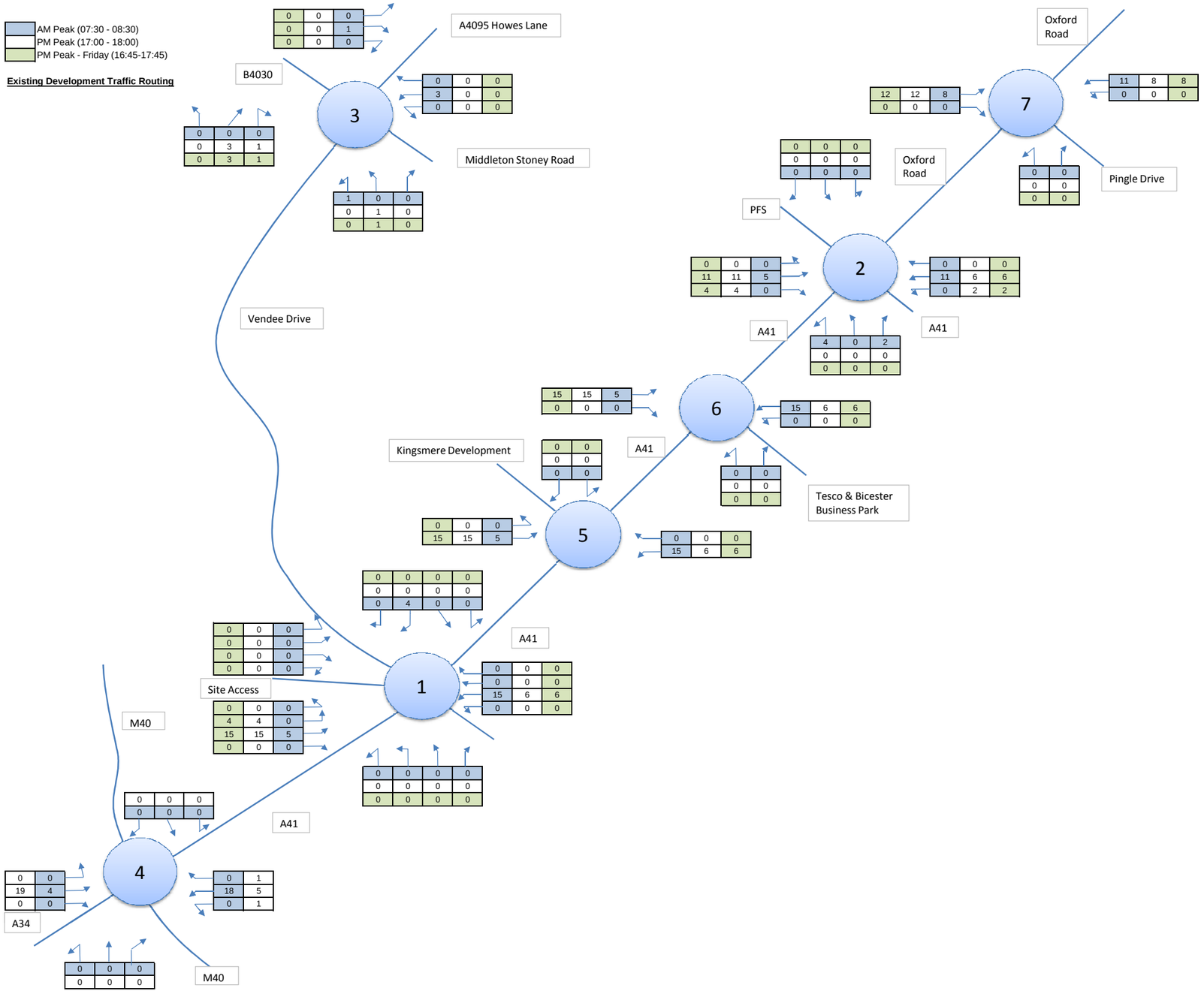
AM Peak Inbound (07:30 - 08:30)
AM Peak Outbound (07:30 - 08:30)
PM Peak Inbound (17:00 - 18:00)
PM Peak Outbound (17:00 - 18:00)

Existing development traffic
To Oxford
Normal Demand



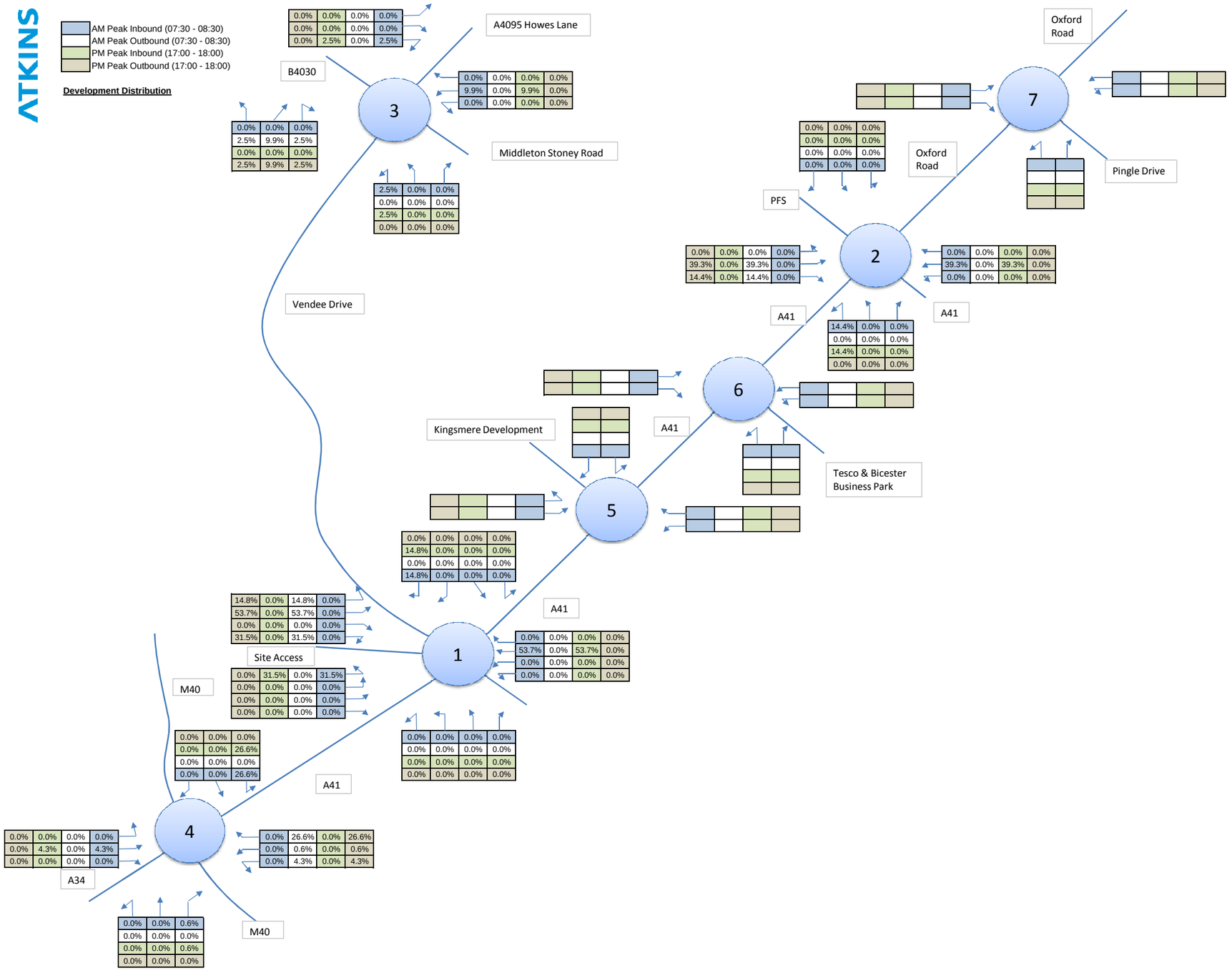
AM Peak (07:30 - 08:30)
PM Peak (17:00 - 18:00)
PM Peak - Friday (16:45-17:45)

Existing Development Traffic Routing



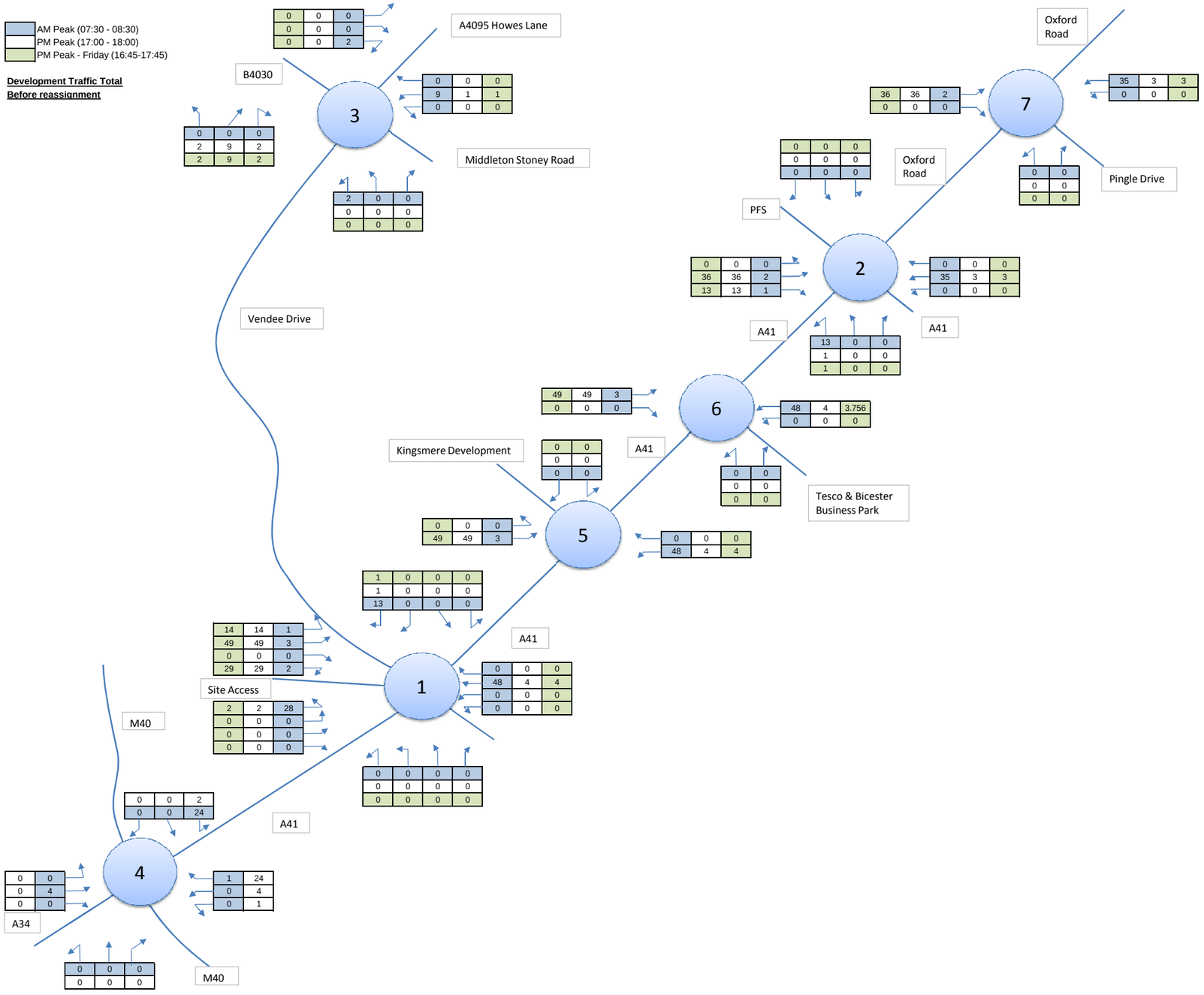
AM Peak Inbound (07:30 - 08:30)
AM Peak Outbound (07:30 - 08:30)
PM Peak Inbound (17:00 - 18:00)
PM Peak Outbound (17:00 - 18:00)

Development Distribution



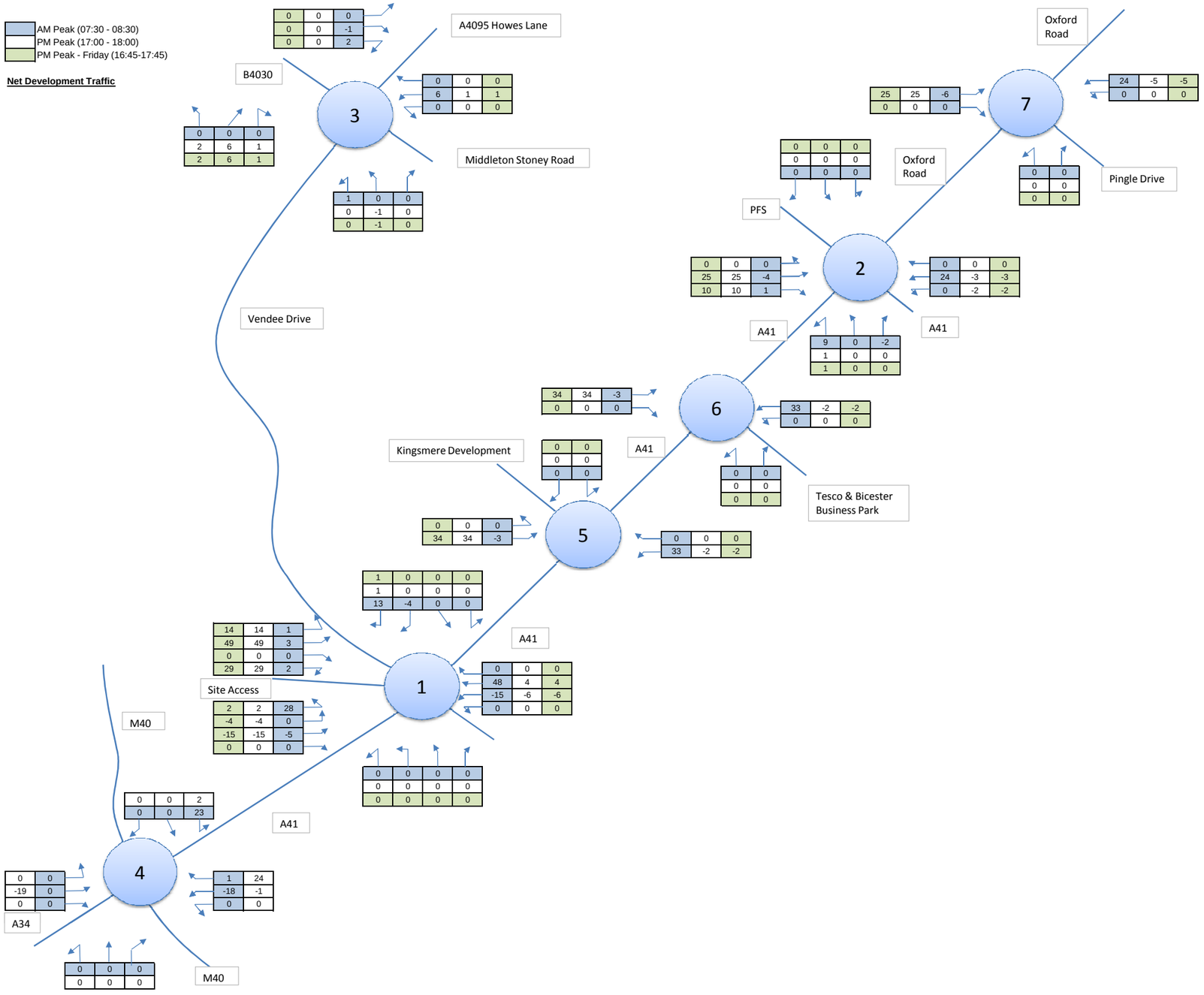
AM Peak (07:30 - 08:30)
PM Peak (17:00 - 18:00)
PM Peak - Friday (16:45-17:45)

Development Traffic Total
Before reassignment



AM Peak (07:30 - 08:30)
PM Peak (17:00 - 18:00)
PM Peak - Friday (16:45-17:45)

Net Development Traffic

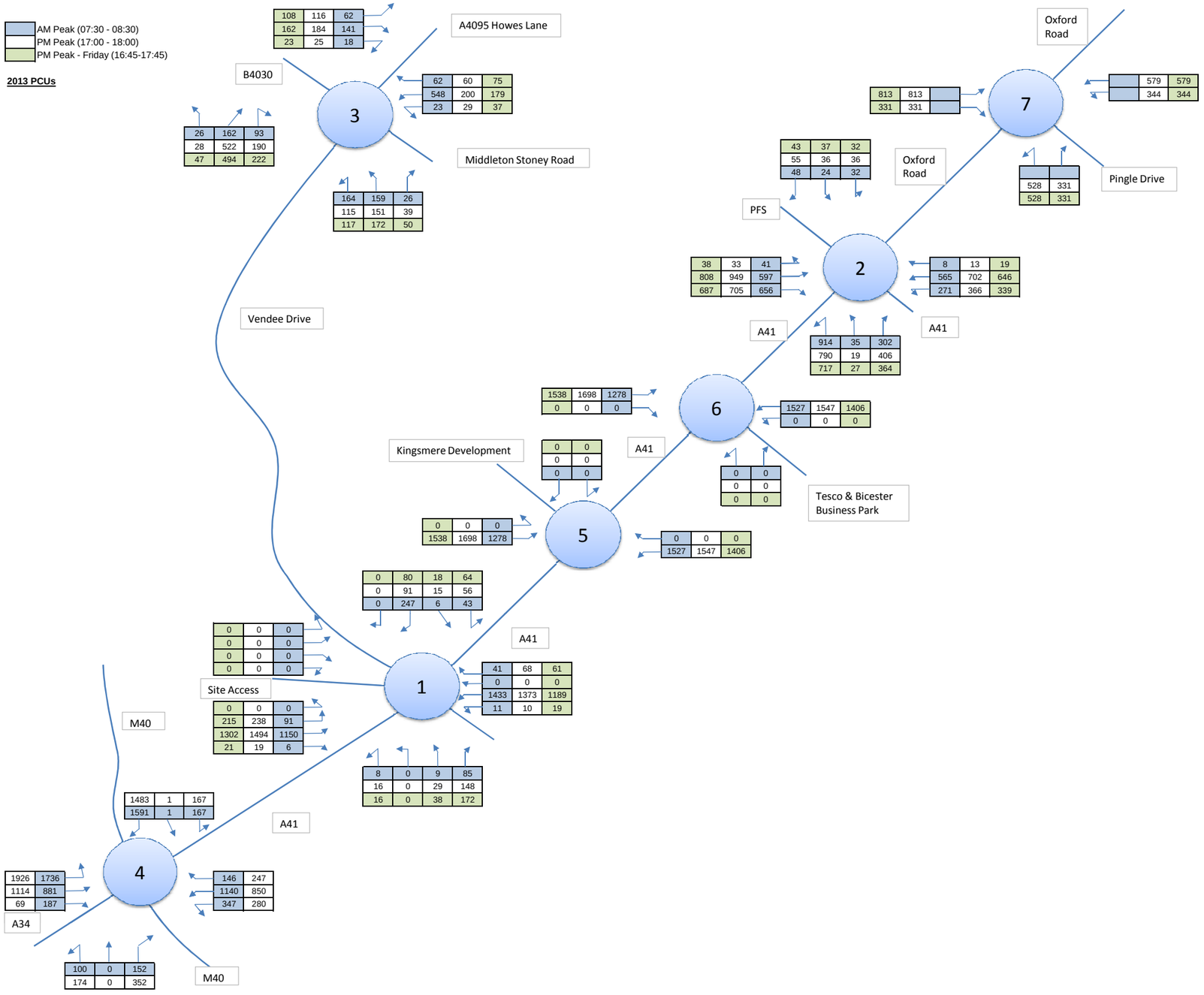


Appendix J. Capacity Assessment Flow Diagrams

ATKINS

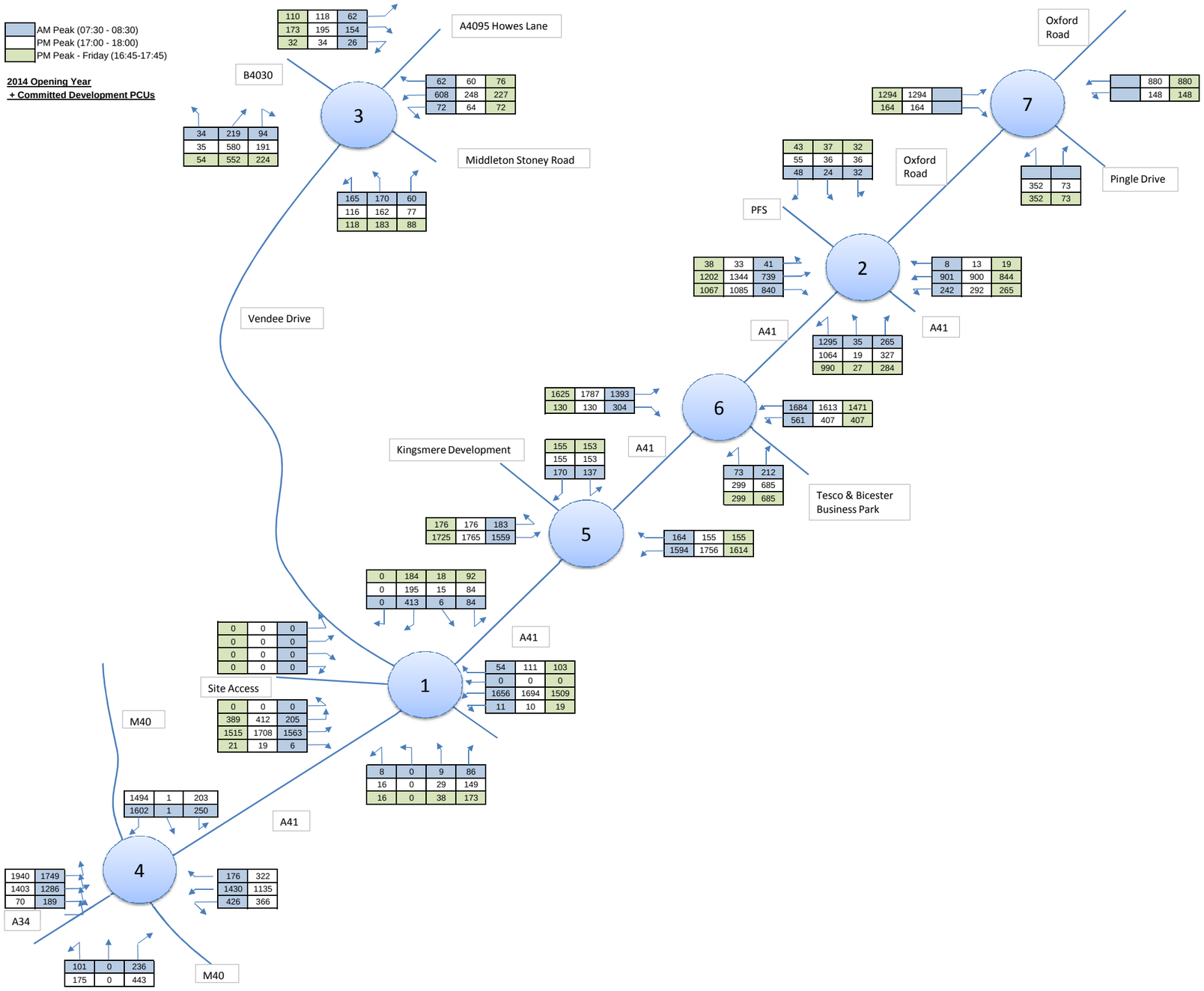
AM Peak (07:30 - 08:30)
PM Peak (17:00 - 18:00)
PM Peak - Friday (16:45-17:45)

2013 PCUs



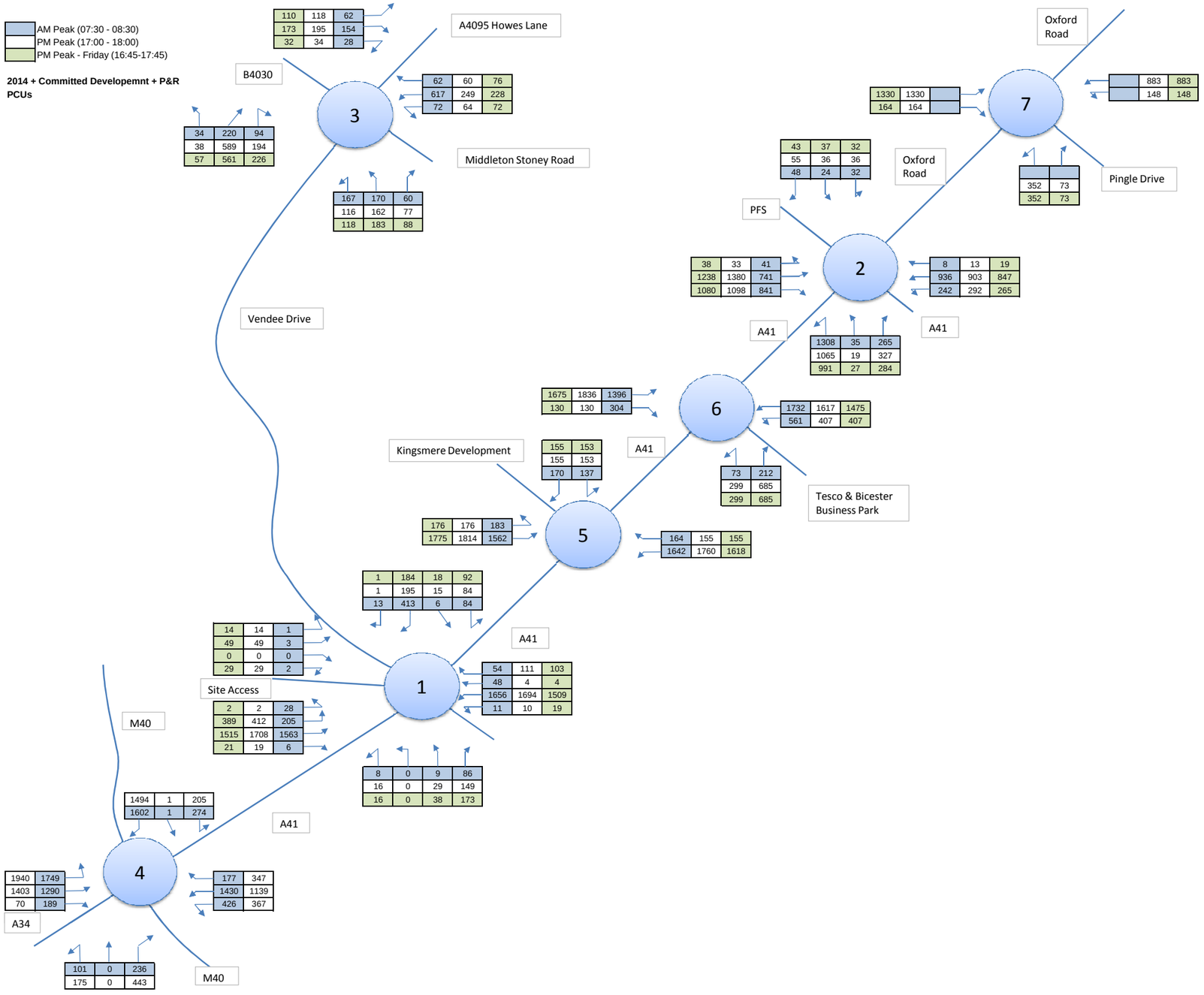
AM Peak (07:30 - 08:30)
PM Peak (17:00 - 18:00)
PM Peak - Friday (16:45-17:45)

2014 Opening Year
+ Committed Development PCUs



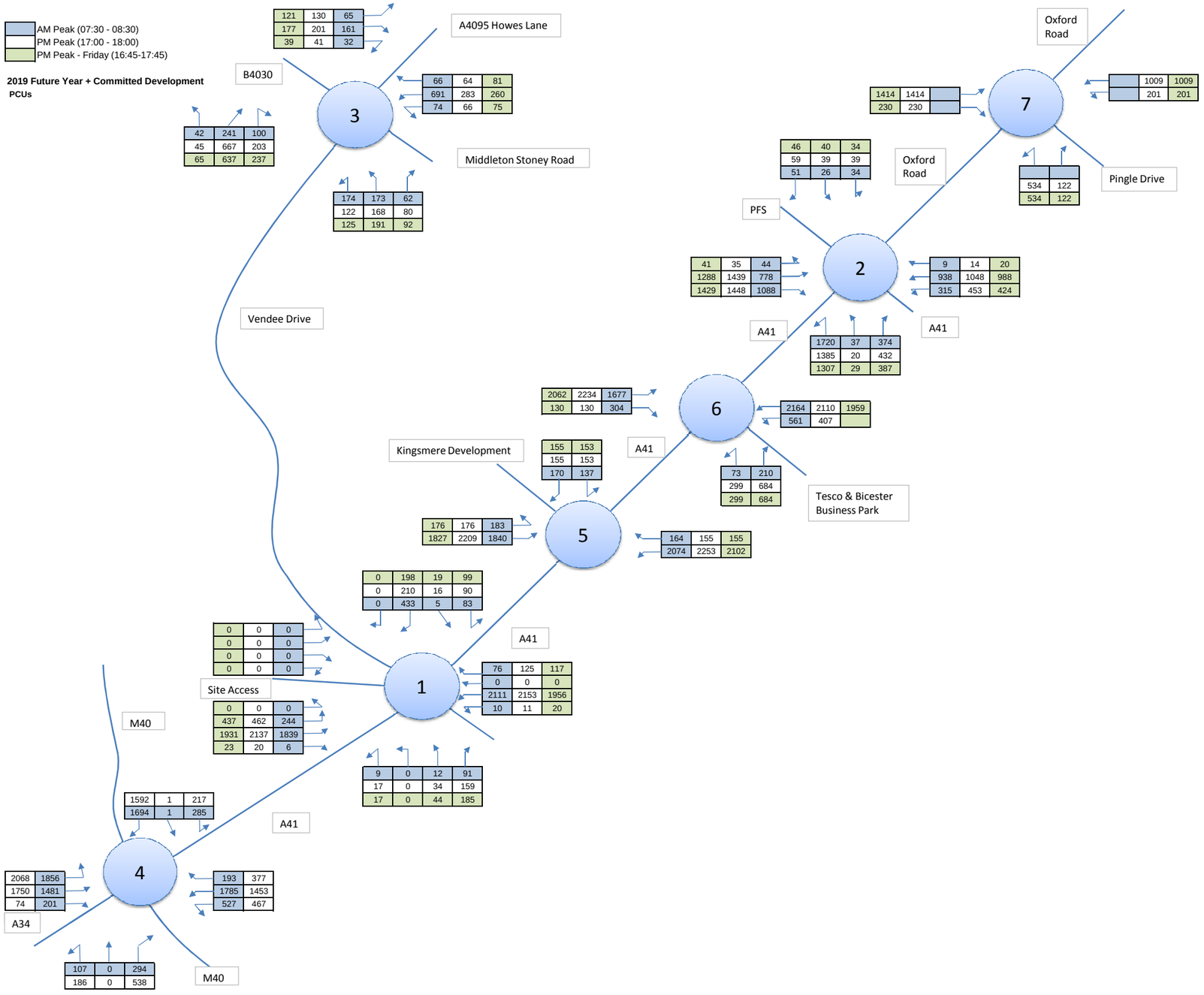
AM Peak (07:30 - 08:30)
PM Peak (17:00 - 18:00)
PM Peak - Friday (16:45-17:45)

2014 + Committed Developemnt + P&R PCUs



AM Peak (07:30 - 08:30)
PM Peak (17:00 - 18:00)
PM Peak - Friday (16:45-17:45)

2019 Future Year + Committed Development
PCUs

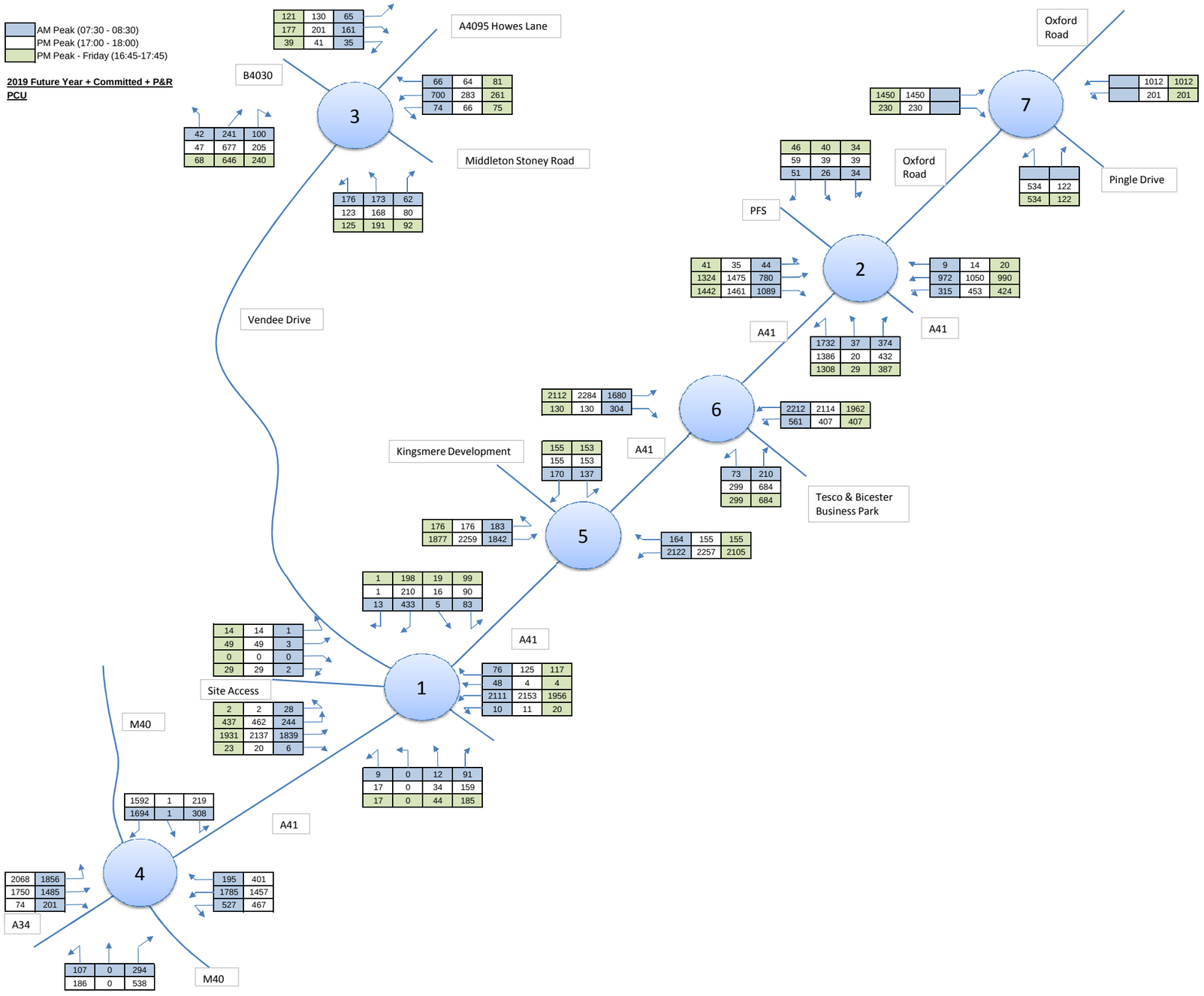


1732

ATKINS

AM Peak (07:30 - 08:30)
PM Peak (17:00 - 18:00)
PM Peak - Friday (16:45-17:45)

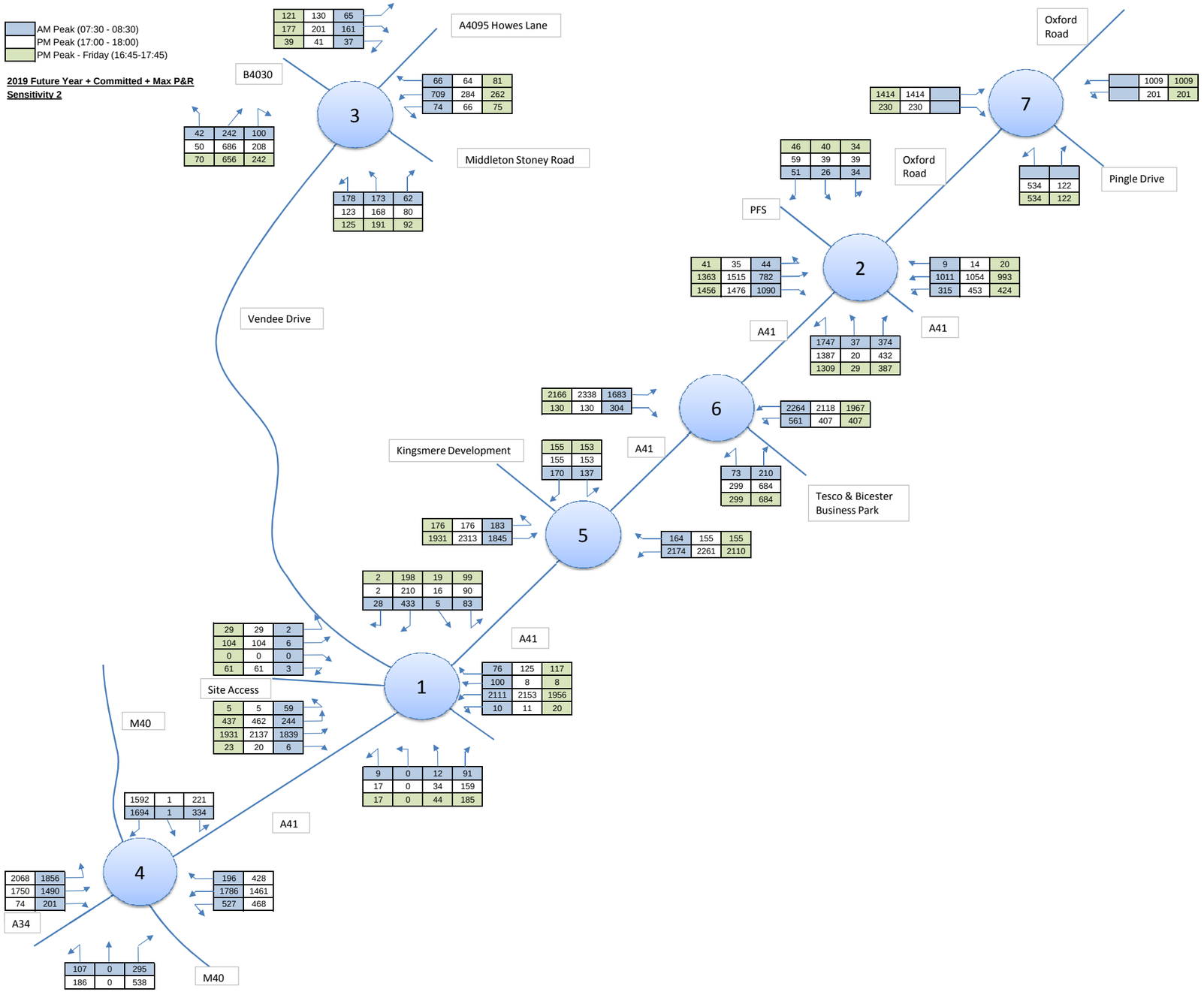
2019 Future Year + Committed + P&R PCU



ATKINS

AM Peak (07:30 - 08:30)
PM Peak (17:00 - 18:00)
PM Peak - Friday (16:45-17:45)

2019 Future Year + Committed + Max P&R Sensitivity 2



Appendix K. Vendee Drive / A41 / Site Access Arcady Summary

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.2.316 [14 Feb 2013]

For sales and distribution information, program advice and maintenance, contact TRL:
Tel: +44 (0)1344 770758 E-mail: software@trl.co.uk Web: http://www.trlsoftware.co.uk

Filename: A41 Vendee Drive - App K.arc8
Path: P:\GBBMA\HandT\CS\Projects\5124607.610 - Bicester P&R - CORB6289\030 - Technical\ARCADY\Result Models
Report generation date: 25/10/2013 11:34:45

Summary of junction performance

	AM			
	Queue (PCU)	Delay (s)	RFC	LOS
	A1 - Base			
Arm 1	0.32	3.90	0.24	A
Arm 2	1.09	2.64	0.50	A
Arm 3	0.11	3.81	0.09	A
Arm 4	0.75	2.15	0.41	A
Arm 5	0.00	0.00	0.00	A

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle.

"D1 - Base, AM " model duration: 07:30 - 08:30
"D2 - Base, PM" model duration: 17:00 - 18:00
"D9 - 2014 OY +CD, AM" model duration: 07:30 - 08:30
"D10 - 2014 OY +CD, PM" model duration: 17:00 - 18:00
"D12 - 2014 OY +CD +P&R, AM" model duration: 07:30 - 08:30
"D13 - 2014 OY +CD +P&R, PM" model duration: 17:00 - 18:00
"D21 - 2019 FY +CD, AM" model duration: 07:30 - 08:30
"D22 - 2019 FY +CD, PM" model duration: 17:00 - 18:00
"D24 - 2019 FY +CD +P&R, AM" model duration: 07:30 - 08:30
"D25 - 2019 FY +CD +P&R, PM" model duration: 17:00 - 18:00

Run using Junctions 8.0.2.316 at 25/10/2013 11:34:43

File summary

File Description

Title	(untitled)
Location	
Site Number	
Date	20/09/2013
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (s)	Queue Threshold (PCU)
5.75			N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCU	PCU	perHour	s	-Min	perMin

(Default Analysis Set) - Base, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 2 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Analysis Set Details

Name	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
Base, AM	Base	AM		FLAT	07:30	08:30	60	60		

Junction Network

Junctions

Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Junction Delay (s)	Junction LOS
(untitled)	Roundabout	1,2,3,4,5			2.60	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	Vendee Drive	
2	A41 North	
3	Wendlebury Road	
4	A41 South	
5	P&R Site	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	3.70	7.30	25.00	18.00	70.00	20.00	
2	7.00	11.00	32.00	32.00	70.00	20.00	
3	3.50	10.00	21.00	25.00	70.00	25.00	
4	7.00	12.00	25.00	35.00	70.00	25.00	
5	4.00	8.50	15.00	18.00	70.00	20.00	

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Pedestrian Crossings

Arm	Crossing Type
1	None
2	None
3	None
4	None
5	None

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.548	1922.479
2		(calculated)	(calculated)	0.745	3145.122
3		(calculated)	(calculated)	0.576	2105.577
4		(calculated)	(calculated)	0.745	3161.417
5		(calculated)	(calculated)	0.554	1963.494

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	FLAT	✓	296.00	100.000
2	FLAT	✓	1485.00	100.000
3	FLAT	✓	102.00	100.000
4	FLAT	✓	1247.00	100.000
5	FLAT	✓	0.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (PCU/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (PCU/hr)	Direct Demand Pedestrian Flow (Ped/hr)
07:30-08:30	1	296.00	296.00		
07:30-08:30	2	1485.00	1485.00		
07:30-08:30	3	102.00	102.00		
07:30-08:30	4	1247.00	1247.00		
07:30-08:30	5	0.00	0.00		

Turning Proportions

Turning Counts or Proportions (PCU/hr) - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.000	43.000	6.000	247.000	0.000
	2	41.000	0.000	11.000	1433.000	0.000
	3	9.000	85.000	0.000	8.000	0.000
	4	91.000	1150.000	6.000	0.000	0.000
	5	0.000	0.000	0.000	0.000	0.000

Turning Proportions (PCU) - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.00	0.15	0.02	0.83	0.00
	2	0.03	0.00	0.01	0.96	0.00
	3	0.09	0.83	0.00	0.08	0.00
	4	0.07	0.92	0.00	0.00	0.00
	5	0.20	0.20	0.20	0.20	0.20

Vehicle Mix

Average PCU Per Vehicle - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	1.000	1.132	1.200	1.008	1.000
	2	1.079	1.000	1.100	1.077	1.000
	3	1.000	1.049	1.000	1.600	1.000
	4	1.083	1.085	1.500	1.000	1.000
	5	1.000	1.000	1.000	1.000	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.000	13.200	20.000	0.800	0.000
	2	7.900	0.000	10.000	7.700	0.000
	3	0.000	4.900	0.000	60.000	0.000
	4	8.300	8.500	50.000	0.000	0.000
	5	0.000	0.000	0.000	0.000	0.000

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.24	3.90	0.32	A
2	0.50	2.64	1.09	A
3	0.09	3.81	0.11	A
4	0.41	2.15	0.75	A
5	0.00	0.00	0.00	A

Main Results for each time segment

Main results: (07:30-08:30)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	296.00	295.68	1240.22	0.00	1243.42	0.238	0.32	3.903	A
2	1485.00	1483.91	258.72	0.00	2952.25	0.503	1.09	2.640	A
3	102.00	101.89	1719.65	0.00	1115.38	0.091	0.11	3.812	A
4	1247.00	1246.25	134.87	0.00	3061.00	0.407	0.75	2.153	A
5	0.00	0.00	1381.12	0.00	1198.38	0.000	0.00	0.000	A

(Default Analysis Set) - Base, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 2 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Analysis Set Details

Name	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
Base, PM	Base	PM		FLAT	17:00	18:00	60	60		

Junction Network

Junctions

Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Junction Delay (s)	Junction LOS
(untitled)	Roundabout	1,2,3,4,5			2.81	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	Vendee Drive	
2	A41 North	
3	Wendlebury Road	
4	A41 South	
5	P&R Site	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	3.70	7.30	25.00	18.00	70.00	20.00	
2	7.00	11.00	32.00	32.00	70.00	20.00	
3	3.50	10.00	21.00	25.00	70.00	25.00	
4	7.00	12.00	25.00	35.00	70.00	25.00	
5	4.00	8.50	15.00	18.00	70.00	20.00	

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Pedestrian Crossings

Arm	Crossing Type
1	None
2	None
3	None
4	None
5	None

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.548	1922.479
2		(calculated)	(calculated)	0.745	3145.122
3		(calculated)	(calculated)	0.576	2105.577
4		(calculated)	(calculated)	0.745	3161.417
5		(calculated)	(calculated)	0.554	1963.494

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	FLAT	✓	162.00	100.000
2	FLAT	✓	1451.00	100.000
3	FLAT	✓	193.00	100.000
4	FLAT	✓	1751.00	100.000
5	FLAT	✓	0.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (PCU/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (PCU/hr)	Direct Demand Pedestrian Flow (Ped/hr)
17:00-18:00	1	162.00	162.00		
17:00-18:00	2	1451.00	1451.00		
17:00-18:00	3	193.00	193.00		
17:00-18:00	4	1751.00	1751.00		
17:00-18:00	5	0.00	0.00		

Turning Proportions

Turning Counts or Proportions (PCU/hr) - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.000	56.000	15.000	91.000	0.000
	2	68.000	0.000	10.000	1373.000	0.000
	3	29.000	148.000	0.000	16.000	0.000
	4	238.000	1494.000	19.000	0.000	0.000
	5	0.000	0.000	0.000	0.000	0.000

Turning Proportions (PCU) - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.00	0.35	0.09	0.56	0.00
	2	0.05	0.00	0.01	0.95	0.00
	3	0.15	0.77	0.00	0.08	0.00
	4	0.14	0.85	0.01	0.00	0.00
	5	0.20	0.20	0.20	0.20	0.20

Vehicle Mix

Average PCU Per Vehicle - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	1.018	1.000	1.022	1.000	1.000
	2	1.000	1.000	1.049	1.000	1.000
	3	1.000	1.000	1.067	1.000	1.000
	4	1.038	1.056	1.000	1.000	1.013
	5	1.000	1.000	1.000	1.000	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	1.800	0.000	2.200	0.000	0.000
	2	0.000	0.000	4.900	0.000	0.000
	3	0.000	0.000	6.700	0.000	0.000
	4	3.800	5.600	0.000	0.000	1.300
	5	0.000	0.000	0.000	0.000	0.000

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.16	4.23	0.19	A
2	0.48	2.25	0.91	A
3	0.16	3.49	0.19	A
4	0.59	3.08	1.50	A
5	0.00	0.00	0.00	A

Main Results for each time segment

Main results: (17:00-18:00)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	162.00	161.81	1659.56	0.00	1013.82	0.160	0.19	4.232	A
2	1451.00	1450.09	124.86	0.00	3052.04	0.475	0.91	2.247	A
3	193.00	192.81	1530.99	0.00	1224.02	0.158	0.19	3.490	A
4	1751.00	1749.50	244.79	0.00	2979.17	0.588	1.50	3.078	A
5	0.00	0.00	1994.29	0.00	858.70	0.000	0.00	0.000	A

(Default Analysis Set) - 2014 OY +CD, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 2 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Analysis Set Details

Name	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2014 OY +CD, AM	2014 OY +CD	AM		FLAT	07:30	08:30	60	60		

Junction Network

Junctions

Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Junction Delay (s)	Junction LOS
(untitled)	Roundabout	1,2,3,4,5			3.79	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	Vendee Drive	
2	A41 North	
3	Wendlebury Road	
4	A41 South	
5	P&R Site	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	3.70	7.30	25.00	18.00	70.00	20.00	
2	7.00	11.00	32.00	32.00	70.00	20.00	
3	3.50	10.00	21.00	25.00	70.00	25.00	
4	7.00	12.00	25.00	35.00	70.00	25.00	
5	4.00	8.50	15.00	18.00	70.00	20.00	

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Pedestrian Crossings

Arm	Crossing Type
1	None
2	None
3	None
4	None
5	None

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.548	1922.479
2		(calculated)	(calculated)	0.745	3145.122
3		(calculated)	(calculated)	0.576	2105.577
4		(calculated)	(calculated)	0.745	3161.417
5		(calculated)	(calculated)	0.554	1963.494

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	FLAT	✓	503.00	100.000
2	FLAT	✓	1721.00	100.000
3	FLAT	✓	103.00	100.000
4	FLAT	✓	1774.00	100.000
5	FLAT	✓	0.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (PCU/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (PCU/hr)	Direct Demand Pedestrian Flow (Ped/hr)
07:30-08:30	1	503.00	503.00		
07:30-08:30	2	1721.00	1721.00		
07:30-08:30	3	103.00	103.00		
07:30-08:30	4	1774.00	1774.00		
07:30-08:30	5	0.00	0.00		

Turning Proportions

Turning Counts or Proportions (PCU/hr) - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.000	84.000	6.000	413.000	0.000
	2	54.000	0.000	11.000	1656.000	0.000
	3	9.000	86.000	0.000	8.000	0.000
	4	205.000	1563.000	6.000	0.000	0.000
	5	0.000	0.000	0.000	0.000	0.000

Turning Proportions (PCU) - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.00	0.17	0.01	0.82	0.00
	2	0.03	0.00	0.01	0.96	0.00
	3	0.09	0.83	0.00	0.08	0.00
	4	0.12	0.88	0.00	0.00	0.00
	5	0.20	0.20	0.20	0.20	0.20

Vehicle Mix

Average PCU Per Vehicle - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	1.000	1.132	1.200	1.008	1.000
	2	1.079	1.000	1.100	1.077	1.000
	3	1.000	1.049	1.000	1.600	1.000
	4	1.083	1.085	1.500	1.000	1.000
	5	1.000	1.000	1.000	1.000	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.000	13.200	20.000	0.800	0.000
	2	7.900	0.000	10.000	7.700	0.000
	3	0.000	4.900	0.000	60.000	0.000
	4	8.300	8.500	50.000	0.000	0.000
	5	0.000	0.000	0.000	0.000	0.000

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.49	7.18	1.00	A
2	0.61	3.49	1.67	A
3	0.12	4.94	0.14	A
4	0.58	3.05	1.51	A
5	0.00	0.00	0.00	A

Main Results for each time segment

Main results: (07:30-08:30)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	503.00	502.00	1653.55	0.00	1017.11	0.495	1.00	7.177	A
2	1721.00	1719.33	424.16	0.00	2828.93	0.608	1.67	3.491	A
3	103.00	102.86	2120.52	0.00	884.56	0.116	0.14	4.942	A
4	1774.00	1772.49	148.82	0.00	3050.62	0.582	1.51	3.053	A
5	0.00	0.00	1921.31	0.00	899.13	0.000	0.00	0.000	A

(Default Analysis Set) - 2014 OY +CD, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 2 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Analysis Set Details

Name	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2014 OY +CD, PM	2014 OY +CD	PM		FLAT	17:00	18:00	60	60		

Junction Network

Junctions

Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Junction Delay (s)	Junction LOS
(untitled)	Roundabout	1,2,3,4,5			4.11	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	Vendee Drive	
2	A41 North	
3	Wendlebury Road	
4	A41 South	
5	P&R Site	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	3.70	7.30	25.00	18.00	70.00	20.00	
2	7.00	11.00	32.00	32.00	70.00	20.00	
3	3.50	10.00	21.00	25.00	70.00	25.00	
4	7.00	12.00	25.00	35.00	70.00	25.00	
5	4.00	8.50	15.00	18.00	70.00	20.00	

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Pedestrian Crossings

Arm	Crossing Type
1	None
2	None
3	None
4	None
5	None

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.548	1922.479
2		(calculated)	(calculated)	0.745	3145.122
3		(calculated)	(calculated)	0.576	2105.577
4		(calculated)	(calculated)	0.745	3161.417
5		(calculated)	(calculated)	0.554	1963.494

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	FLAT	✓	294.00	100.000
2	FLAT	✓	1815.00	100.000
3	FLAT	✓	194.00	100.000
4	FLAT	✓	2139.00	100.000
5	FLAT	✓	0.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (PCU/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (PCU/hr)	Direct Demand Pedestrian Flow (Ped/hr)
17:00-18:00	1	294.00	294.00		
17:00-18:00	2	1815.00	1815.00		
17:00-18:00	3	194.00	194.00		
17:00-18:00	4	2139.00	2139.00		
17:00-18:00	5	0.00	0.00		

Turning Proportions

Turning Counts or Proportions (PCU/hr) - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.000	84.000	15.000	195.000	0.000
	2	111.000	0.000	10.000	1694.000	0.000
	3	29.000	149.000	0.000	16.000	0.000
	4	412.000	1708.000	19.000	0.000	0.000
	5	0.000	0.000	0.000	0.000	0.000

Turning Proportions (PCU) - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.00	0.29	0.05	0.66	0.00
	2	0.06	0.00	0.01	0.93	0.00
	3	0.15	0.77	0.00	0.08	0.00
	4	0.19	0.80	0.01	0.00	0.00
	5	0.20	0.20	0.20	0.20	0.20

Vehicle Mix

Average PCU Per Vehicle - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	1.018	1.000	1.022	1.000	1.000
	2	1.000	1.000	1.049	1.000	1.000
	3	1.000	1.000	1.067	1.000	1.000
	4	1.038	1.056	1.000	1.000	1.013
	5	1.000	1.000	1.000	1.000	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	1.800	0.000	2.200	0.000	0.000
	2	0.000	0.000	4.900	0.000	0.000
	3	0.000	0.000	6.700	0.000	0.000
	4	3.800	5.600	0.000	0.000	1.300
	5	0.000	0.000	0.000	0.000	0.000

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.33	5.97	0.49	A
2	0.61	3.10	1.56	A
3	0.20	4.73	0.25	A
4	0.73	4.66	2.77	A
5	0.00	0.00	0.00	A

Main Results for each time segment

Main results: (17:00-18:00)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	294.00	293.51	1873.57	0.00	896.65	0.328	0.49	5.970	A
2	1815.00	1813.44	228.63	0.00	2974.69	0.610	1.56	3.097	A
3	194.00	193.75	1998.12	0.00	955.04	0.203	0.25	4.728	A
4	2139.00	2136.23	288.67	0.00	2946.50	0.726	2.77	4.658	A
5	0.00	0.00	2424.90	0.00	620.15	0.000	0.00	0.000	A

(Default Analysis Set) - 2014 OY +CD +P&R, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 2 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Analysis Set Details

Name	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2014 OY +CD +P&R, AM	2014 OY +CD +P	AM		FLAT	07:30	08:30	60	60		

Junction Network

Junctions

Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Junction Delay (s)	Junction LOS
(untitled)	Roundabout	1,2,3,4,5			3.98	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	Vendee Drive	
2	A41 North	
3	Wendlebury Road	
4	A41 South	
5	P&R Site	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	3.70	7.30	25.00	18.00	70.00	20.00	
2	7.00	11.00	32.00	32.00	70.00	20.00	
3	3.50	10.00	21.00	25.00	70.00	25.00	
4	7.00	12.00	25.00	35.00	70.00	25.00	
5	4.00	8.50	15.00	18.00	70.00	20.00	

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Pedestrian Crossings

Arm	Crossing Type
1	None
2	None
3	None
4	None
5	None

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.548	1922.479
2		(calculated)	(calculated)	0.745	3145.122
3		(calculated)	(calculated)	0.576	2105.577
4		(calculated)	(calculated)	0.745	3161.417
5		(calculated)	(calculated)	0.554	1963.494

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	FLAT	✓	516.00	100.000
2	FLAT	✓	1769.00	100.000
3	FLAT	✓	103.00	100.000
4	FLAT	✓	1802.00	100.000
5	FLAT	✓	6.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (PCU/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (PCU/hr)	Direct Demand Pedestrian Flow (Ped/hr)
07:30-08:30	1	516.00	516.00		
07:30-08:30	2	1769.00	1769.00		
07:30-08:30	3	103.00	103.00		
07:30-08:30	4	1802.00	1802.00		
07:30-08:30	5	6.00	6.00		

Turning Proportions

Turning Counts or Proportions (PCU/hr) - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.000	84.000	6.000	413.000	13.000
	2	54.000	0.000	11.000	1656.000	48.000
	3	9.000	86.000	0.000	8.000	0.000
	4	205.000	1563.000	6.000	0.000	28.000
	5	1.000	3.000	0.000	2.000	0.000

Turning Proportions (PCU) - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.00	0.16	0.01	0.80	0.03
	2	0.03	0.00	0.01	0.94	0.03
	3	0.09	0.83	0.00	0.08	0.00
	4	0.11	0.87	0.00	0.00	0.02
	5	0.17	0.50	0.00	0.33	0.00

Vehicle Mix

Average PCU Per Vehicle - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	1.000	1.132	1.200	1.008	1.000
	2	1.079	1.000	1.100	1.077	1.000
	3	1.000	1.049	1.000	1.600	1.000
	4	1.083	1.085	1.500	1.000	1.000
	5	1.000	1.000	1.000	1.000	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.000	13.200	20.000	0.800	0.000
	2	7.900	0.000	10.000	7.700	0.000
	3	0.000	4.900	0.000	60.000	0.000
	4	8.300	8.500	50.000	0.000	0.000
	5	0.000	0.000	0.000	0.000	0.000

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.51	7.39	1.06	A
2	0.63	3.68	1.81	A
3	0.12	5.18	0.15	A
4	0.60	3.24	1.62	A
5	0.01	4.03	0.01	A

Main Results for each time segment

Main results: (07:30-08:30)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	516.00	514.94	1658.46	0.00	1014.42	0.509	1.06	7.395	A
2	1769.00	1767.19	439.11	0.00	2817.79	0.628	1.81	3.677	A
3	103.00	102.85	2183.33	0.00	848.40	0.121	0.15	5.180	A
4	1802.00	1800.38	209.73	0.00	3005.27	0.600	1.62	3.235	A
5	6.00	5.99	1921.21	0.00	899.18	0.007	0.01	4.030	A

(Default Analysis Set) - 2014 OY +CD +P&R, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 2 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Analysis Set Details

Name	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2014 OY +CD +P&R, PM	2014 OY +CD +P	PM		FLAT	17:00	18:00	60	60		

Junction Network

Junctions

Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Junction Delay (s)	Junction LOS
(untitled)	Roundabout	1,2,3,4,5			4.30	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	Vendee Drive	
2	A41 North	
3	Wendlebury Road	
4	A41 South	
5	P&R Site	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	3.70	7.30	25.00	18.00	70.00	20.00	
2	7.00	11.00	32.00	32.00	70.00	20.00	
3	3.50	10.00	21.00	25.00	70.00	25.00	
4	7.00	12.00	25.00	35.00	70.00	25.00	
5	4.00	8.50	15.00	18.00	70.00	20.00	

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Pedestrian Crossings

Arm	Crossing Type
1	None
2	None
3	None
4	None
5	None

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.548	1922.479
2		(calculated)	(calculated)	0.745	3145.122
3		(calculated)	(calculated)	0.576	2105.577
4		(calculated)	(calculated)	0.745	3161.417
5		(calculated)	(calculated)	0.554	1963.494

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	FLAT	✓	295.00	100.000
2	FLAT	✓	1835.00	100.000
3	FLAT	✓	194.00	100.000
4	FLAT	✓	2141.00	100.000
5	FLAT	✓	92.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (PCU/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (PCU/hr)	Direct Demand Pedestrian Flow (Ped/hr)
17:00-18:00	1	295.00	295.00		
17:00-18:00	2	1835.00	1835.00		
17:00-18:00	3	194.00	194.00		
17:00-18:00	4	2141.00	2141.00		
17:00-18:00	5	92.00	92.00		

Turning Proportions

Turning Counts or Proportions (PCU/hr) - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.000	84.000	15.000	195.000	1.000
	2	111.000	10.000	10.000	1694.000	10.000
	3	29.000	149.000	0.000	16.000	0.000
	4	412.000	1708.000	19.000	0.000	2.000
	5	14.000	49.000	0.000	29.000	0.000

Turning Proportions (PCU) - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.00	0.28	0.05	0.66	0.00
	2	0.06	0.01	0.01	0.92	0.01
	3	0.15	0.77	0.00	0.08	0.00
	4	0.19	0.80	0.01	0.00	0.00
	5	0.15	0.53	0.00	0.32	0.00

Vehicle Mix

Average PCU Per Vehicle - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	1.018	1.000	1.022	1.000	1.000
	2	1.000	1.000	1.049	1.000	1.000
	3	1.000	1.000	1.067	1.000	1.000
	4	1.038	1.056	1.000	1.000	1.013
	5	1.000	1.000	1.000	1.000	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	1.800	0.000	2.200	0.000	0.000
	2	0.000	0.000	4.900	0.000	0.000
	3	0.000	0.000	6.700	0.000	0.000
	4	3.800	5.600	0.000	0.000	1.300
	5	0.000	0.000	0.000	0.000	0.000

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.35	6.50	0.53	A
2	0.62	3.21	1.64	A
3	0.21	4.91	0.26	A
4	0.73	4.76	2.84	A
5	0.15	6.88	0.18	A

Main Results for each time segment

Main results: (17:00-18:00)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	295.00	294.47	1961.35	0.00	848.58	0.348	0.53	6.499	A
2	1835.00	1833.36	258.54	0.00	2952.39	0.622	1.64	3.214	A
3	194.00	193.74	2047.96	0.00	926.34	0.209	0.26	4.913	A
4	2141.00	2138.16	309.64	0.00	2930.89	0.731	2.84	4.760	A
5	92.00	91.82	2434.81	0.00	614.66	0.150	0.18	6.884	A

(Default Analysis Set) - 2019 FY +CD, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 2 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Analysis Set Details

Name	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2019 FY +CD, AM	2019 FY +CD	AM		FLAT	07:30	08:30	60	60		

Junction Network

Junctions

Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Junction Delay (s)	Junction LOS
(untitled)	Roundabout	1,2,3,4,5			5.84	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	Vendee Drive	
2	A41 North	
3	Wendlebury Road	
4	A41 South	
5	P&R Site	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	3.70	7.30	25.00	18.00	70.00	20.00	
2	7.00	11.00	32.00	32.00	70.00	20.00	
3	3.50	10.00	21.00	25.00	70.00	25.00	
4	7.00	12.00	25.00	35.00	70.00	25.00	
5	4.00	8.50	15.00	18.00	70.00	20.00	

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Pedestrian Crossings

Arm	Crossing Type
1	None
2	None
3	None
4	None
5	None

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.548	1922.479
2		(calculated)	(calculated)	0.745	3145.122
3		(calculated)	(calculated)	0.576	2105.577
4		(calculated)	(calculated)	0.745	3161.417
5		(calculated)	(calculated)	0.554	1963.494

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	FLAT	✓	521.00	100.000
2	FLAT	✓	2197.00	100.000
3	FLAT	✓	112.00	100.000
4	FLAT	✓	2089.00	100.000
5	FLAT	✓	0.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (PCU/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (PCU/hr)	Direct Demand Pedestrian Flow (Ped/hr)
07:30-08:30	1	521.00	521.00		
07:30-08:30	2	2197.00	2197.00		
07:30-08:30	3	112.00	112.00		
07:30-08:30	4	2089.00	2089.00		
07:30-08:30	5	0.00	0.00		

Turning Proportions

Turning Counts or Proportions (PCU/hr) - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.000	83.000	5.000	433.000	0.000
	2	76.000	0.000	10.000	2111.000	0.000
	3	12.000	91.000	0.000	9.000	0.000
	4	244.000	1839.000	6.000	0.000	0.000
	5	0.000	0.000	0.000	0.000	0.000

Turning Proportions (PCU) - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.00	0.16	0.01	0.83	0.00
	2	0.03	0.00	0.00	0.96	0.00
	3	0.11	0.81	0.00	0.08	0.00
	4	0.12	0.88	0.00	0.00	0.00
	5	0.20	0.20	0.20	0.20	0.20

Vehicle Mix

Average PCU Per Vehicle - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	1.000	1.132	1.200	1.008	1.000
	2	1.079	1.000	1.100	1.077	1.000
	3	1.000	1.049	1.000	1.600	1.000
	4	1.083	1.085	1.500	1.000	1.000
	5	1.000	1.000	1.000	1.000	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.000	13.200	20.000	0.800	0.000
	2	7.900	0.000	10.000	7.700	0.000
	3	0.000	4.900	0.000	60.000	0.000
	4	8.300	8.500	50.000	0.000	0.000
	5	0.000	0.000	0.000	0.000	0.000

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.60	10.70	1.55	B
2	0.78	6.20	3.80	A
3	0.19	7.91	0.25	A
4	0.69	4.14	2.41	A
5	0.00	0.00	0.00	A

Main Results for each time segment

Main results: (07:30-08:30)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	521.00	519.45	1933.68	0.00	863.73	0.603	1.55	10.697	B
2	2197.00	2193.20	442.69	0.00	2815.11	0.780	3.80	6.199	A
3	112.00	111.75	2614.93	0.00	599.87	0.187	0.25	7.910	A
4	2089.00	2086.59	178.64	0.00	3028.42	0.690	2.41	4.140	A
5	0.00	0.00	2265.24	0.00	708.60	0.000	0.00	0.000	A

(Default Analysis Set) - 2019 FY +CD, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 2 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Analysis Set Details

Name	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2019 FY +CD, PM	2019 FY +CD	PM		FLAT	17:00	18:00	60	60		

Junction Network

Junctions

Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Junction Delay (s)	Junction LOS
(untitled)	Roundabout	1,2,3,4,5			8.79	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	Vendee Drive	
2	A41 North	
3	Wendlebury Road	
4	A41 South	
5	P&R Site	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	3.70	7.30	25.00	18.00	70.00	20.00	
2	7.00	11.00	32.00	32.00	70.00	20.00	
3	3.50	10.00	21.00	25.00	70.00	25.00	
4	7.00	12.00	25.00	35.00	70.00	25.00	
5	4.00	8.50	15.00	18.00	70.00	20.00	

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Pedestrian Crossings

Arm	Crossing Type
1	None
2	None
3	None
4	None
5	None

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.548	1922.479
2		(calculated)	(calculated)	0.745	3145.122
3		(calculated)	(calculated)	0.576	2105.577
4		(calculated)	(calculated)	0.745	3161.417
5		(calculated)	(calculated)	0.554	1963.494

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	FLAT	✓	316.00	100.000
2	FLAT	✓	2289.00	100.000
3	FLAT	✓	210.00	100.000
4	FLAT	✓	2619.00	100.000
5	FLAT	✓	0.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (PCU/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (PCU/hr)	Direct Demand Pedestrian Flow (Ped/hr)
17:00-18:00	1	316.00	316.00		
17:00-18:00	2	2289.00	2289.00		
17:00-18:00	3	210.00	210.00		
17:00-18:00	4	2619.00	2619.00		
17:00-18:00	5	0.00	0.00		

Turning Proportions

Turning Counts or Proportions (PCU/hr) - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.000	90.000	16.000	210.000	0.000
	2	125.000	0.000	11.000	2153.000	0.000
	3	34.000	159.000	0.000	17.000	0.000
	4	462.000	2137.000	20.000	0.000	0.000
	5	0.000	0.000	0.000	0.000	0.000

Turning Proportions (PCU) - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.00	0.28	0.05	0.66	0.00
	2	0.05	0.00	0.00	0.94	0.00
	3	0.16	0.76	0.00	0.08	0.00
	4	0.18	0.82	0.01	0.00	0.00
	5	0.20	0.20	0.20	0.20	0.20

Vehicle Mix

Average PCU Per Vehicle - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	1.018	1.000	1.022	1.000	1.000
	2	1.000	1.000	1.049	1.000	1.000
	3	1.000	1.000	1.067	1.000	1.000
	4	1.038	1.056	1.000	1.000	1.013
	5	1.000	1.000	1.000	1.000	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	1.800	0.000	2.200	0.000	0.000
	2	0.000	0.000	4.900	0.000	0.000
	3	0.000	0.000	6.700	0.000	0.000
	4	3.800	5.600	0.000	0.000	1.300
	5	0.000	0.000	0.000	0.000	0.000

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.48	10.47	0.92	B
2	0.77	5.29	3.38	A
3	0.31	7.72	0.45	A
4	0.90	11.73	8.72	B
5	0.00	0.00	0.00	A

Main Results for each time segment

Main results: (17:00-18:00)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	316.00	315.08	2308.47	0.00	658.52	0.480	0.92	10.465	B
2	2289.00	2285.62	245.28	0.00	2962.28	0.773	3.38	5.295	A
3	210.00	209.55	2484.03	0.00	675.25	0.311	0.45	7.723	A
4	2619.00	2610.28	317.40	0.00	2925.11	0.895	8.72	11.727	B
5	0.00	0.00	2927.68	0.00	341.62	0.000	0.00	0.000	A

(Default Analysis Set) - 2019 FY +CD +P&R, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 2 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Analysis Set Details

Name	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2019 FY +CD +P&R, AM	2019 FY +CD +P	AM		FLAT	07:30	08:30	60	60		

Junction Network

Junctions

Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Junction Delay (s)	Junction LOS
(untitled)	Roundabout	1,2,3,4,5			6.33	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	Vendee Drive	
2	A41 North	
3	Wendlebury Road	
4	A41 South	
5	P&R Site	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	3.70	7.30	25.00	18.00	70.00	20.00	
2	7.00	11.00	32.00	32.00	70.00	20.00	
3	3.50	10.00	21.00	25.00	70.00	25.00	
4	7.00	12.00	25.00	35.00	70.00	25.00	
5	4.00	8.50	15.00	18.00	70.00	20.00	

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Pedestrian Crossings

Arm	Crossing Type
1	None
2	None
3	None
4	None
5	None

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.548	1922.479
2		(calculated)	(calculated)	0.745	3145.122
3		(calculated)	(calculated)	0.576	2105.577
4		(calculated)	(calculated)	0.745	3161.417
5		(calculated)	(calculated)	0.554	1963.494

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	FLAT	✓	534.00	100.000
2	FLAT	✓	2245.00	100.000
3	FLAT	✓	112.00	100.000
4	FLAT	✓	2117.00	100.000
5	FLAT	✓	6.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (PCU/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (PCU/hr)	Direct Demand Pedestrian Flow (Ped/hr)
07:30-08:30	1	534.00	534.00		
07:30-08:30	2	2245.00	2245.00		
07:30-08:30	3	112.00	112.00		
07:30-08:30	4	2117.00	2117.00		
07:30-08:30	5	6.00	6.00		

Turning Proportions

Turning Counts or Proportions (PCU/hr) - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.000	83.000	5.000	433.000	13.000
	2	76.000	0.000	10.000	2111.000	48.000
	3	12.000	91.000	0.000	9.000	0.000
	4	244.000	1839.000	6.000	0.000	28.000
	5	1.000	3.000	0.000	2.000	0.000

Turning Proportions (PCU) - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.00	0.16	0.01	0.81	0.02
	2	0.03	0.00	0.00	0.94	0.02
	3	0.11	0.81	0.00	0.08	0.00
	4	0.12	0.87	0.00	0.00	0.01
	5	0.17	0.50	0.00	0.33	0.00

Vehicle Mix

Average PCU Per Vehicle - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	1.000	1.132	1.200	1.008	1.000
	2	1.079	1.000	1.100	1.077	1.000
	3	1.000	1.049	1.000	1.600	1.000
	4	1.083	1.085	1.500	1.000	1.000
	5	1.000	1.000	1.000	1.000	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.000	13.200	20.000	0.800	0.000
	2	7.900	0.000	10.000	7.700	0.000
	3	0.000	4.900	0.000	60.000	0.000
	4	8.300	8.500	50.000	0.000	0.000
	5	0.000	0.000	0.000	0.000	0.000

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.62	11.19	1.66	B
2	0.80	6.82	4.28	A
3	0.20	8.54	0.27	A
4	0.71	4.48	2.64	A
5	0.01	5.12	0.01	A

Main Results for each time segment

Main results: (07:30-08:30)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	534.00	532.34	1938.48	0.00	861.10	0.620	1.66	11.187	B
2	2245.00	2240.72	457.59	0.00	2804.01	0.801	4.28	6.821	A
3	112.00	111.73	2677.35	0.00	563.93	0.199	0.27	8.539	A
4	2117.00	2114.36	239.48	0.00	2983.12	0.710	2.64	4.480	A
5	6.00	5.99	2265.01	0.00	708.73	0.008	0.01	5.122	A

(Default Analysis Set) - 2019 FY +CD +P&R, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 2 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Analysis Set Details

Name	Description	Locked	Network Flow Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)			100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Single Time Segment Only	Locked
2019 FY +CD +P&R, PM	2019 FY +CD +P	PM		FLAT	17:00	18:00	60	60		

Junction Network

Junctions

Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Junction Delay (s)	Junction LOS
(untitled)	Roundabout	1,2,3,4,5			9.16	A

Junction Network Options

Driving Side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	Vendee Drive	
2	A41 North	
3	Wendlebury Road	
4	A41 South	
5	P&R Site	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1	3.70	7.30	25.00	18.00	70.00	20.00	
2	7.00	11.00	32.00	32.00	70.00	20.00	
3	3.50	10.00	21.00	25.00	70.00	25.00	
4	7.00	12.00	25.00	35.00	70.00	25.00	
5	4.00	8.50	15.00	18.00	70.00	20.00	

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Pedestrian Crossings

Arm	Crossing Type
1	None
2	None
3	None
4	None
5	None

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Enter slope and intercept directly	Entered slope	Entered intercept (PCU/hr)	Final Slope	Final Intercept (PCU/hr)
1		(calculated)	(calculated)	0.548	1922.479
2		(calculated)	(calculated)	0.745	3145.122
3		(calculated)	(calculated)	0.576	2105.577
4		(calculated)	(calculated)	0.745	3161.417
5		(calculated)	(calculated)	0.554	1963.494

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCU Factor for a HV (PCU)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	HV Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Arm	Profile Type	Use Turning Counts	Average Demand Flow (PCU/hr)	Flow Scaling Factor (%)
1	FLAT	✓	317.00	100.000
2	FLAT	✓	2293.00	100.000
3	FLAT	✓	210.00	100.000
4	FLAT	✓	2621.00	100.000
5	FLAT	✓	92.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (PCU/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (PCU/hr)	Direct Demand Pedestrian Flow (Ped/hr)
17:00-18:00	1	317.00	317.00		
17:00-18:00	2	2293.00	2293.00		
17:00-18:00	3	210.00	210.00		
17:00-18:00	4	2621.00	2621.00		
17:00-18:00	5	92.00	92.00		

Turning Proportions

Turning Counts or Proportions (PCU/hr) - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.000	90.000	16.000	210.000	1.000
	2	125.000	0.000	11.000	2153.000	4.000
	3	34.000	159.000	0.000	17.000	0.000
	4	462.000	2137.000	20.000	0.000	2.000
	5	14.000	49.000	0.000	29.000	0.000

Turning Proportions (PCU) - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	0.00	0.28	0.05	0.66	0.00
	2	0.05	0.00	0.00	0.94	0.00
	3	0.16	0.76	0.00	0.08	0.00
	4	0.18	0.82	0.01	0.00	0.00
	5	0.15	0.53	0.00	0.32	0.00

Vehicle Mix

Average PCU Per Vehicle - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	1.018	1.000	1.022	1.000	1.000
	2	1.000	1.000	1.049	1.000	1.000
	3	1.000	1.000	1.067	1.000	1.000
	4	1.038	1.056	1.000	1.000	1.013
	5	1.000	1.000	1.000	1.000	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To				
		1	2	3	4	5
From	1	1.800	0.000	2.200	0.000	0.000
	2	0.000	0.000	4.900	0.000	0.000
	3	0.000	0.000	6.700	0.000	0.000
	4	3.800	5.600	0.000	0.000	1.300
	5	0.000	0.000	0.000	0.000	0.000

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1	0.51	11.97	1.05	B
2	0.78	5.50	3.52	A
3	0.32	8.06	0.47	A
4	0.90	11.92	8.89	B
5	0.27	14.38	0.37	B

Main Results for each time segment

Main results: (17:00-18:00)

Arm	Total Demand (PCU/hr)	Entry Flow (PCU/hr)	Circulating Flow (PCU/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCU/hr)	RFC	End Queue (PCU)	Delay (s)	LOS
1	317.00	315.95	2386.02	0.00	616.06	0.515	1.05	11.967	B
2	2293.00	2289.48	275.06	0.00	2940.07	0.780	3.52	5.505	A
3	210.00	209.53	2517.68	0.00	655.87	0.320	0.47	8.058	A
4	2621.00	2612.11	322.37	0.00	2921.41	0.897	8.89	11.924	B
5	92.00	91.63	2927.50	0.00	341.72	0.269	0.37	14.375	B