MEPC

Project Hillington
Hillington Park

Transport Assessment

Volume 2

May 2014

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APPENDIX A

Review of Relevant Transport Policy

Hillington Park- Policy Review

National Policy

National Planning Framework 3: A Plan for Scotland

1. The National Planning Framework (NPF) sets the context for development planning in Scotland and provides a framework for the spatial development of Scotland as a whole. The document sets out the Government's Development Priorities over the next 20-30 years and identifies national developments which support the development strategy.

2. It is stated within the NPF3 Main Issues Report that the transport-related aims set out within NPF2 remain relevant. The document goes on to state a number of objectives including:

   - Decarbonising transport and reducing the need to travel;
   - Links within and between cities and their regions;
   - Links to support economic investment, recognising the role of good connectivity in supporting balanced and sustainable growth;
   - Rural links;
   - International connections.

3. In regards to the improvement of links within and between cities, it is stated that NPF3 should focus on the need to invest in transport infrastructure and to support more sustainable development, including at higher densities and mixed uses in central areas, and those well-served by public transport. It is also noted that areas of expansion around cities should be linked with public transport and planned as sustainable places.

4. The Main Issues Report (MIR) for NPF3 was published for consultation on April 30th 2013, together with its supporting documents, and the consultation period ended on July 23rd 2013.

5. A summary paper presenting an analysis of the responses to the consultation was published on October 28th 2013. In relation to the Government's transport-related aims, the majority of those commenting expressed broad agreement with the overall focus of the Main Issues Report.

6. In particular, it was suggested that large scale road developments are not consistent with decarbonisation of transport, a significant focus of the report. Instead, the key role of NPF3 in the promotion of active travel was raised, with cycling and walking being seen by some as key to decarbonisation of transport. The role of active travel in reducing the volume of road traffic and encouraging a shift to public transport was also raised frequently by respondents, particularly in relation to its promotion for commuter journeys.

7. Other areas in which NPF3 was suggested as having a role to play included:

- Encouraging the integration of active travel routes within other transport networks;
- Extending the National Cycle Network;
- Ensuring cycle routes are separate from the road network, in terms of improving accessibility and safety;
- Promoting the importance of Core Paths Planning

Scotland's National Transport Strategy

8. The vision set out within the Scotland's National Transport Strategy (NTS) is of *"an accessible Scotland with safe, integrated and reliable transport that supports economic growth, provides opportunities for all and is easy to use… and where transport provider and planners respond to the changing needs of business, communities and users."*

9. The three key strategic outcomes identified to achieve the vision are to:

- Improve journey times and connections;
- Reduce emissions; and
- Improve quality, accessibility and affordability.

10. A key principle identified within the NTS and is sustainable development, and is noted that that which brings together the economy, the environment and social inclusion will be supported.

11. The NTS also identifies the importance of integrated transport and land use planning, in order to minimise the environmental impacts of transport networks. It states that priority should be given to access on foot, by bicycle, by public transport and lastly by car when assessing planning applications.

12. In addition, SMART measures such as travel plans and high quality travel information should be actively promoted in order to encourage more sustainable travel.

Scottish Planning Policy (SPP)

13. SPP is a statement of the Scottish Government's policy on land use planning matters. It was adopted in February 2010 and supersedes SPP17, which provided guidance on Transport and Planning matters.

14. SPP provides guidance on the development of integrated land use and transport planning. It aims to provide sufficient guidance to enable sustainable development in terms of improving transport to support economic growth while protecting the environment and improving the quality of life.

15. Paragraph 165 notes that "Reducing emissions from transport sources as a contribution to achieving Scottish Government greenhouses gas emission targets requires a shift to more

sustainable modes of transport". This means a shift from car based travel to walking, cycling or public transport.

16. It is indicated in Paragraph 165 that the "planning system should support a pattern of development which reduces the need to travel, facilitates travel by public transport and freight movement by rail or water, and provides safe and convenient opportunities for walking or cycling". The planning system should also support the installation of infrastructure and new technology.

17. SPP identifies how the planning system and relationship between transportation issues and land use has a strong influence on sustainable economic growth. It is noted that tackling congestion will also support sustainable economic growth and reduce emissions.

18. SPP paragraph 167 notes that "significant travel generating uses should be in locations which are well served by public transport and the amount of associated car parking permitted should be controlled to encourage more sustainable travel choices". SPP indicates that Travel Plans should also be encouraged for these types of developments.

19. Parking policies are emphasised in SPP. Paragraph 171 notes that "the available of parking can have an important influence in reducing the reliance on the car". It suggests that planning authorities should apply maximum parking standards to on-site parking at new development to encourage modal shift, but also notes that such parking restraint policies should be accompanied by measures to support high quality public transport services.

Draft Scottish Planning Policy (DSPP)

20. A review of the SPP was announced in Scottish Parliament on September 18th 2012 by the Minister for Local Government and Planning. The aim of the review is to update policy, focus it on sustainable growth and emphasise place-making.

21. A consultation period on the Draft SPP was undertaken between April 30th and July 23rd 2013 and on Sustainability and Planning between October 28 and December 16th 2013, with the aim to publish the final SPP in June 2014, alongside the finalised NPF3.

22. Having reflected on the responses to the consultation and taking into account the views of a range of stakeholders, it has now been considered to replace the Draft SPP policies on 'sustainable economic growth' and 'sustainable development' with a principal policy on 'Sustainability and Planning' and introducing a presumption in favour of sustainable development into the updated SPP. This is discussed in further detail in the 'Draft Scottish Planning Policy: Sustainability and Planning Consultation' document.

23. This document defines the presumption as follows: "the planning system should contribute to economically, environmentally and socially sustainable places by enabling development that balances the costs and benefits of a proposal over the longer term."

24. The aim of the policy presumption will be to achieve the right development in the right place, rather than allowing development regardless of the costs.

25. The document goes on to state that in order to achieve this aim, planning decisions should be guided by the following policy principles, including but not limited to:

- Giving due weight to net economic benefit;
- Respond to economic and financial conditions;
- Make efficient use of existing capacities of land, buildings and infrastructure;
- Supporting delivery of infrastructure, for example transport.

26. In regards to development management, the document states that *"proposals that accord with the development plan should be considered acceptable in principle and the process should focus on the detailed matters arising."*

Planning Advice Note (PAN) 75

27. PAN 75 accompanies the SPP on transport matters and provides advice on good practice. Paragraph 6 notes that 'one focus of SPP 17 (now superseded by SPP on Transport) is to achieve better and earlier integration between transport and land use planning at national, regional and local level.' It continues that *"integration can reduce the need to travel and offer more sustainable travel choices. To achieve sustainable development the objectives of SPP17 must be considered in the context of other planning policy and guidance."*

28. The early involvement of interested parties will positively inform transport planning by building consensus and minimising potential future areas of objection. Consultation and feedback to those who have contributed is crucial.

29. Development plan policy should encourage development of significant travel generating proposals at locations which are key nodes on the public transport network, that have a potential for higher density development and a potential for mixed use development, with an emphasis on high quality design and innovation.

30. Planning authorities, through development plan policy, should give greater recognition to the potential sites where accessibility can be improved by developer or public funding.

31. Targets which promote modal shift are valuable in encouraging developer and operators to look innovatively at possibilities for increasing accessibility. The Transport Assessment process should then establish ways to accommodate or mitigate the impacts of less sustainable transport modes in order to meet mode share targets.

32. It should be noted that mode share targets are applicable to new development, change of use proposals and extensions to existing developments.

33. 'No-net-detriment' is a useful aim in setting mode share targets. No-net detriment means for example, no net increase in travel time or risk of accident as a result of the development. More restrictive targets are however desirable, for example an increase in public transport mode share over a given period.

34. All new and re-development proposals should be designed for safety and the convenience of all users. Good design and layout of a development can significantly improve the ease of access by non-car modes, for example:

- Entrances to be as close as possible to pedestrian routes and bus stops;

- Links to cycle networks, with secure parking near the main entrance

35. Decisions made in respect of specific planning proposals should aim to put into practice the policies of SPP. The following section provides good practice advice on some practical mechanisms to achieve successful outcomes.

Transport Assessments

36. SPP requires a transport assessment to be produced for significant travel generating developments to provide information which covers the associated transport implications.

37. Transport Assessment should initially provide information on the proposal's compliance with key site policy. It should set out proposed measures of mitigation designed to reduce adverse transport impacts. Assessments should therefore include the following three main elements:

- An assessment of travel characteristics;
- A description of the measures which are being adopted to influence travel impacts of the proposal;
- A description of the transport impacts of the development in a broader context and how these will be addressed.

38. The process also incorporates travel planning and monitoring.

Travel Plans

39. Travel Plans are required where a development reaches or exceeds the threshold for requirement of a Transport Assessment. The Travel Plan should encourage travel behaviour change in a manageable way for those it is targeting. It should be practical and realistic in its aims.

40. Those aspects of travel on which individuals place the highest significance, should be incorporated into the measures chosen to influence mode, for example time and convenience. An initial survey will identify the current behaviour of staff and their opinions for possible change. The plan should consist of a package of complementary 'carrot' and 'stick' measures that can act as incentives and disincentives.

41. Where the occupier is speculative or unknown, the planning conditions which would be associated with the travel plan should include physical/ infrastructure facilities to encourage walking and cycling, and where possible, public transport use.

42. The plan at that stage should concentrate on output measure e.g. the number of trips by different modes that can be accommodated on the network. Any outline permission given should pass on the commitment to develop a full travel plan to the end user and enable future development and modification of the travel plan.

43. The monitoring of the operation and implementation of a travel plan are key elements. Monitoring should not be an afterthought but incorporated into the design of the travel plan from the outset to ensure efficient and consistent review of the process.

44. It is not always the case that the most resource intensive travel plans have the most effect on mode share. Research has demonstrated that travel plans:

- Containing only marketing and promotion are unlikely to achieve any modal shift.
- With car-sharing and cycle measures may achieve 3-6% reduction in drive alone commuting.
- Works buses may achieve around an 8-13% reduction in drive alone commuting.
- The combination of all the above measures plus disincentives to car use may achieve a larger (15-20%+) reduction in drive alone commuting.

45. It should be noted that planning agreements can be used to overcome obstacles to the grant of planning permission. By securing developer contributions, proposals can be made acceptable in land use and transport terms, for example through the provision of public transport infrastructure.

46. Local authorities are encouraged to develop weighting for different trip reduction measures relevant to their local circumstances that they and developers can utilise when designing a proposal. The trip reduction measures and scores are presented in **Table 1**, overleaf.

47. The score indicates a likely level of car trip reduction that can be achieved with those measures at sites in the local area. The scores and resultant levels in single occupant trip reduction are then calculated as follows:

- 8 or less: 3 - 5%
- 8 – 16: 5 - 10%
- 16+, which must include parking restrictions: 10 – 15%

Table 1- Trip Reduction Measures and Weighted Scores

Measure		Score
Major new public transport infrastructure		**3**
Minor new public transport infrastructure i.e. bus stops, cycle racks		**1**
1-2 new or enhanced public transport services		**2**
More than 2 new or enhanced public transport services		**2**
Reductions in prices of public transport services by 30% or more		**3**
Restrictions on effective parking availability		**5**
Annual budget for measures per employee or (retail/leisure) 50m GFA	Not stated	**0**
	< £10	**1**
	£20 - £50	**2**
	£50 - £100	**3**
	> £100	**4**
Promotional activities i.e. green transport week		**1**
Consultation with staff		**2**
Public transport information		**1**

Car sharing scheme	Paper based (notice boards)	**1**
	Computer access and self-registration	**2**

Regional Policy

The Regional Transport Strategy for the West of Scotland

48. The Regional Transport Strategy (RTS) for the West of Scotland was approved by the Minister for Transport, Infrastructure and Climate Change on 15th June 2008, and it sets out Strathclyde Partnership for Transport's (SPT) vision for transport from 2008 to 2021.

49. The RTS identifies the complementary regional transport outcomes and strategic priorities that set the scope for SPT's role in working towards four key transport outcomes. These are:

- Improved connectivity
- Access for all
- Reduced emissions
- Attractive, seamless, reliable travel

50. The shared goals of the RTS include developing the economy through *"improving connectivity for business and freight, making transport more effective and efficient, and providing access to employment, education, shopping and leisure, by improving transport integration."*

51. A series of strategic objectives are listed to help achieve the goals of the RTS, including:

- Modal Shift: to increase the proportion of trips undertaken by walking, cycling and public transport;
- Effectiveness and Efficiency: to ensure the provision of effective and efficient transport infrastructure to improve connectivity for people and freight;
- Economy, Transport and Land-Use Planning: to support land-use planning strategies, regeneration and development by integrating transport provision.

Glasgow and Clyde Valley Strategic Development Plan

52. The Glasgow and Clyde Valley Strategic Development Plan was approved by Scottish Ministers on 29th May 2012 and published on 13th July 2012. The Strategic Development Plan sets out a development strategy of where new development should be located over the next 20 years. The Plan focuses on growing the economy of the city region in a low carbon and sustainable manner and setting out a planning framework which positively encourages investment within Glasgow and Clyde Valley.

53. SDP explains that certain urban centres in the plan area have been identified as having key strategic roles and have been included in the 'Network of Strategic Centres' because their roles are regarded as central to delivering the SDP's aims. Hillington is identified as a 'Strategic Economic Investment Location.'

54. In addition, the central focus of the Spatial Development Strategy contained within the SDP is a development corridor along the M8 corridor to Edinburgh, paralleling the River Clyde. This corridor is identified as a way to achieve the objectives of the SDP whilst reducing the carbon footprint of the region by:

- Generating large-scale economic development within easy reach of communities;
- Maximising the opportunity for sustainable travel between home and work;
- Developing increased development densities; and
- Recycling and reusing brownfield land.

Local Policy

Renfrewshire Council Proposed Local Development Plan

55. The proposed LDP, approved by the Planning and Property Policy Board on 18th June 2013, has been submitted to the Scottish Government for examination.

56. The proposed LDP makes reference to the opportunity presented to Hillington through investment in order to improve its facilities and environment and identifies Hillington as a key location which will support economic growth.

57. The LDP states the importance of connecting people and places to delivering regeneration outcomes and sustainable communities. The plan aims to concentrate and consolidate development in Renfrewshire's more urban areas, and in doing so promote areas which are located beside or close to existing active travel, public transport and road networks.

58. It also states that the Council will support investment in locations where there is good access to sustainable travel modes and where existing infrastructure has the capacity to accommodate additional demand.

Glasgow City Council Proposed Local Development Plan

59. Glasgow City Council is currently preparing a Local Development Plan (LDP). The production of a Main Issues Report (MIR) is the first stage in producing an LDP for Glasgow, which when adopted, will replace the current City Plan 2 in guiding future development and the sue of the land.

60. Section 1 of the MIR sets out the 'broad future regeneration context' for Glasgow City, which is based on five key principles, including 'Sustainable Connections.' The regeneration context in regard to sustainable connections is based on *"planning for a reduction in the need to travel and a more significant role in active travel and public transport, whilst helping realise opportunities for regeneration and economic development."*

61. The MIR goes on to note the importance of using brownfield land for redevelopment as this make the most effective use of resources already invested in the urban area such as utilities and public transport. It states that "the LDP will promote a range of effective location which are attractive to existing and potential business, and are easily accessible by public transport or active travel.

Renfrewshire Local Transport Strategy

62. Renfrewshire Council's Local Transport Strategy (LTS) document was published in 2007 and is intended to set out the Council's objectives, strategies and implementation plans for the development of an integrated transport system in Renfrewshire.

63. The vision of the LTS is that *"people can improve their health and travel to where they want to get to within a set timescale, using all modes, including walking, cycling, public transport or their car for essential trips; business can operate effectively and efficiently, creating prosperity and job opportunities…; and all this is accommodated without compromising our future."*

64. Aims and objectives set out within the LTS that are relevant to overall travel patterns in the wider area are as follows:

- Ensure that all Renfrewshire residents have the means to get to jobs, social, health and leisure facilities at all times of the day and that goods can be moved to where they are required when they are needed;
- Resolve traffic congestion on the M8 and A737, and rail capacity at peak periods, such that economic growth is supported without constraints imposed by transport;
- Continue and develop strategies for travel planning and parking which reduce the growth of trips by private car and achieve a shift to walking, cycling, public transport and car sharing, thus having a positive impact upon air quality and climate change; and
- Improve the health and well-being of its residents and visitors through promoting healthier travel choices for both leisure and commuting.

Glasgow City Local Transport Strategy

65. The Local Transport Strategy (LTS) sets out Glasgow City Council's aspirations for taking forward transport policy within Glasgow between 2007 and 2009. No updated LTS is currently available.

66. Five high level objectives have been set in the LTS, including:

- LTS1 – Support the continuing physical, social, economic, cultural and environmental regeneration of the City by maintaining and promoting efficient and effective transportation services and infrastructure within Glasgow

- LTS3 – Promote healthy and environmentally sustainable methods of transport that minimise harmful emissions and energy consumption including those that involve physical activity.

67. Section 6c of the LTS describes how the planning process allows local authorities to influence future transport demand by encouraging local developments to minimise the need for travel and ensuring that any travel which is required is by sustainable modes.

68. A number of approaches to influencing transport demand are discussed, including:

- the refusal of development in locations not readily accessible by means other than the private car;
- Restricting the amount of parking provided for a new development through the development management process; and
- Requiring the preparation of a Travel Plan.

69. A number of actions are listed to support the approaches noted above. These include:

- DMA1 – Ensure that all developments include appropriate provision for public transport access, cycling, walking and freight;
- DMA2 – Ensure that where a Transport Assessment is required it is undertaken in line with SPP17, PAN 75 and the Scottish Executive Transport Assessment and Implementation Guide;
- DMA10 – Progressively encourage employers to reduce their travel impacts by adopting Travel Plans

70. The LTS also sets out maximum permitted parking standards and minimum permitted cycle parking standards for non-residential developments, which accord with the City Plan. These are set out below in **Table 2** and **Table 3**.

Table 2 – Glasgow City Maximum Permitted Car Parking Provision

Land Use	Location	Maximum Permissible Parking Provision (spaces)
Offices	Glasgow City Centre	0.4 / 100 sqm
	Inner Urban Area	1.5 / 100 sqm
	Elsewhere	3.0 / 100 sqm
General Industry	-	1.0 / 100 sqm
Storage and Distribution	Glasgow City Centre	0.1 / 100 sqm
	Inner Urban Area	0.25 / 100 sqm
	Elsewhere	0.5 / 100 sqm
Retail	Glasgow City Centre	2.0 / 100 sqm
	Elsewhere	6.0 / 100 sqm (food)
		4.5 / 100 sqm (non-food)
Leisure and Recreation	-	4.0 / 100 sqm
Health Facilities	-	3 spaces per consulting room and 1 space / 2 staff

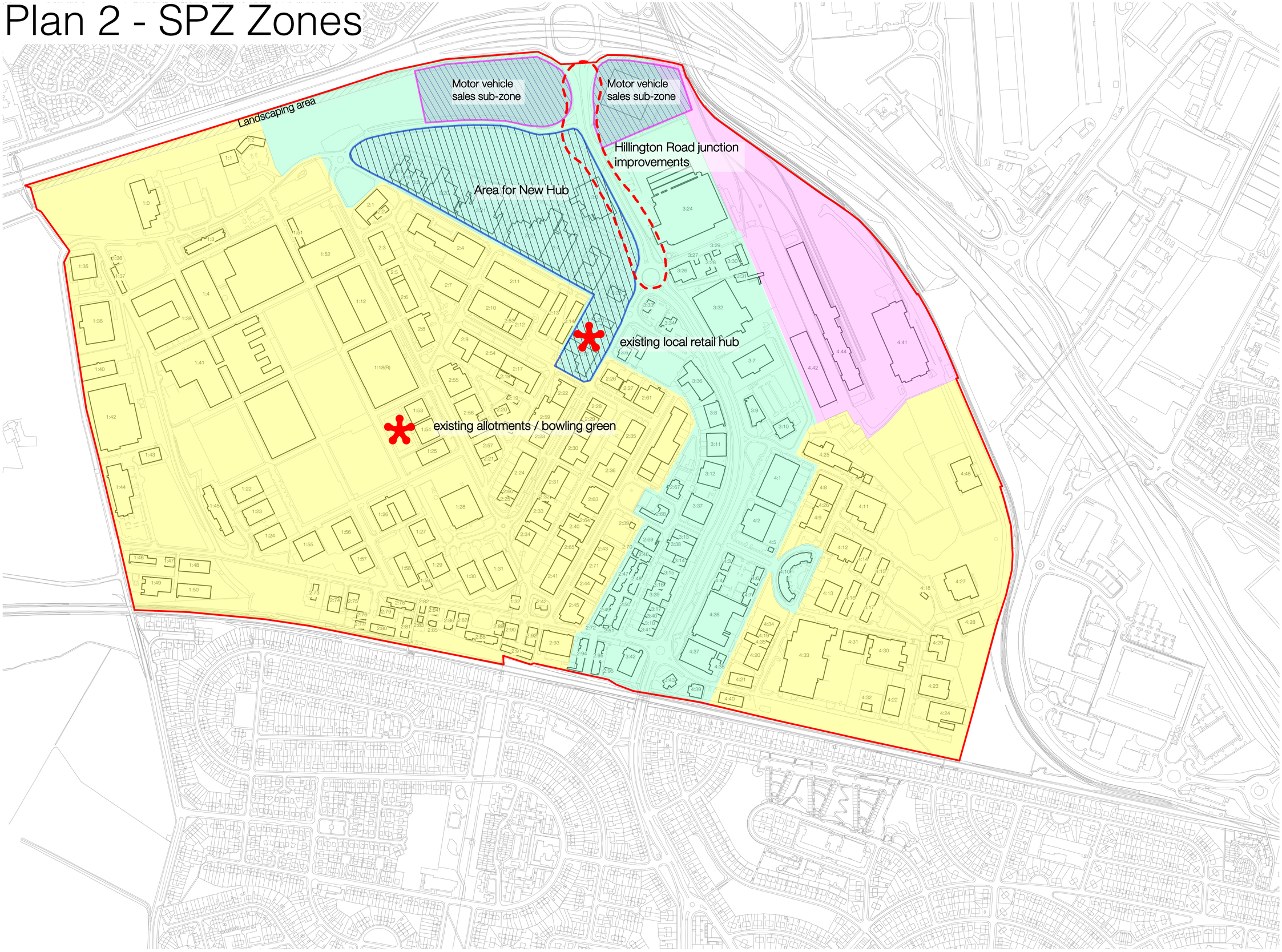
Table 2 – Glasgow City Maximum Permitted Car Parking Provision

Land Use	Minimum Cycle Parking Provision	
	Staff	Customers
Offices	1 + 1 / 1000 sqm	1 / 400 sqm
General Industry	1 + 1 / 2000 sqm	1 / 700 sqm
Retail- Food	1 + 1 per 20 staff	2 + 1 / 350 sqm
Retail- Non-Food	1 + 1 per 20 staff	2 + 1 / 500 sqm
Leisure and Recreation	1 + 1 per 20 staff	1 / 100 sqm public area
Health Facilities	1 + 1 per 20 staff	1 per 20 beds

APPENDIX B

Development Opportunity Areas

Plan 2 - SPZ Zones



Key

- A — core business / employment areas
- B — mixed use gateway zone
- C — Deanside freight safeguarded zone

Hillington Park Glasgow
MEPC

First Issue 19 March 2014
Rev A_10 April 2014
Rev B_28 April 2014

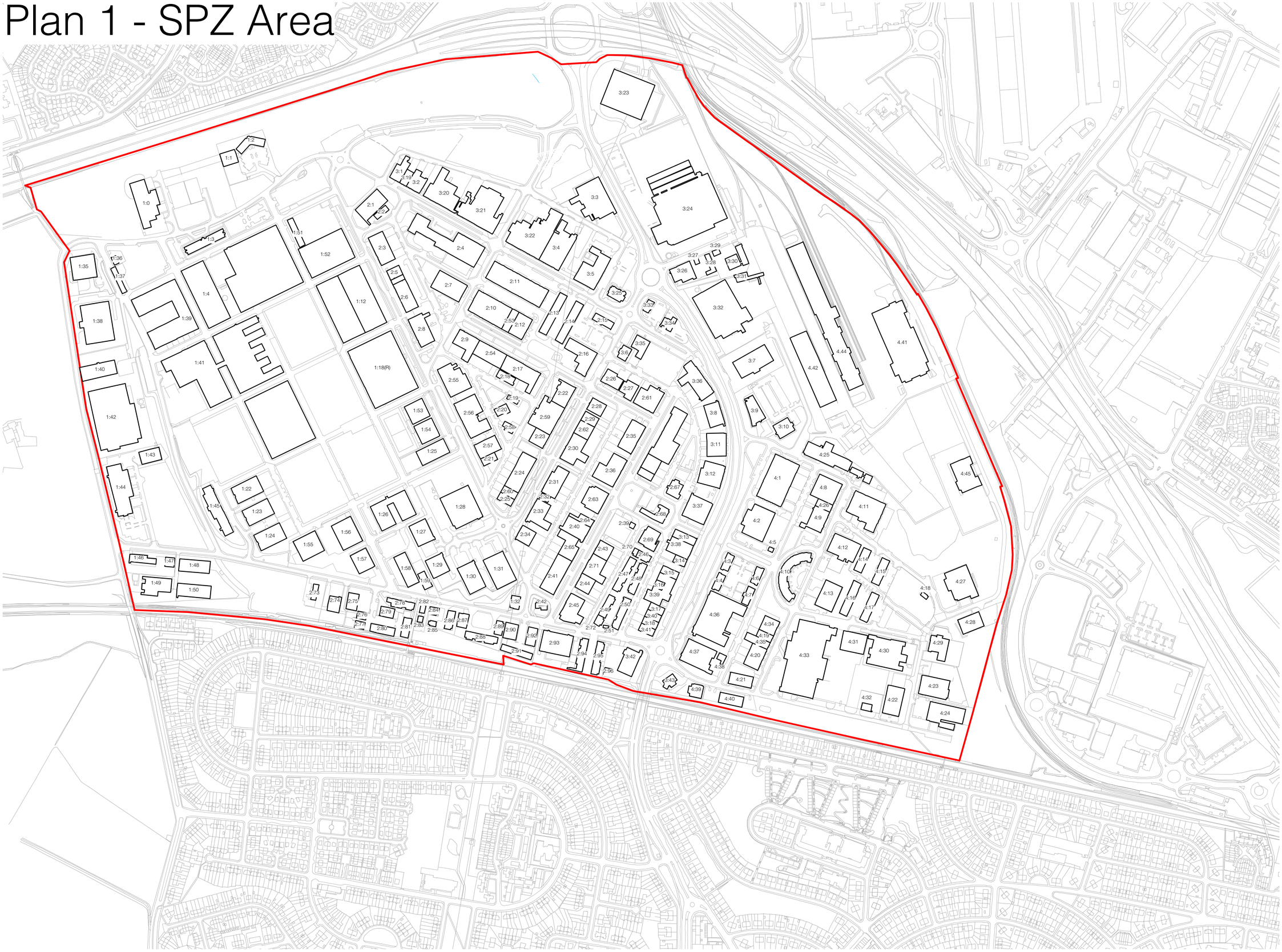
Hillington Park
SPZ Zones
199304-SK 1001
1:5000@A2
March 2014

Terence O'Rourke
Planning | Design | Environment

APPENDIX C

SPZ Red Line Boundary

Plan 1 - SPZ Area



Key

- SPZ Boundary
- Existing Buildings

Hillington Park Glasgow
MEPC

Hillington Park
SPZ Area
199304-SK 1000
1:5000@A2
March 2014

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Planning | Design | Environment

APPENDIX D

New Access Junction Proposals

M8 Junction 26

Hillington Road

Mossland Drive

Hillington Road

Notes:

1. This is not a construction drawing and is intended for illustrative purposes only.
2. White lining is indicative only.

REV.	DETAILS	DRAWN	CHECKED	DATE
.	.	.	.	.

CLIENT:

MEPC

PROJECT:

HILLINGTON PARK
GLASGOW

DRAWING TITLE:

Hillington Road / Mossland Drive
Possible Signalised Junction Layout

SCALES:

1:500 at A1

DRAWN:	CHECKED:	DATE:
DSN	.	30.1.2014

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DRAWING NUMBER: 120825/A/5

REVISION: .

APPENDIX E

Stage 1 Road Safety Audit and Risk Assessment

go-surveys

Road Safety Audits

Vectos (South) Ltd

PROPOSED SIGNALISED JUNCTION, HILLINTON ROAD / MOSSLAND DRIVE, GLASGOW

STAGE 1 - ROAD SAFETY AUDIT AND RISK ASSESSMENT FEBRUARY 2014

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Contents

Appendices

1 INTRODUCTION

1.1 This report presents the findings from a Stage 1 Road Safety Audit and Risk Assessment carried out on the proposed junction reconfiguration at the Hillington Road/Mossland Drive junction, Glasgow.

1.2 The audit was carried out by the following:

Tristan Brooks BSc (Hons), MBA, CMILT, MCIHT, MSoRSA	-	Road Safety Audit Team Leader
Naresh Madhaven MCIHT, MSoRSA, HA RSA Cert.Comp	-	Road Safety Audit Team Member

1.3 The site visit took place on Sunday 9th February 2014 and comprised a walk and drive through of the site. During the site visit, there were intermittent showers and the road surface was damp. Traffic was relatively light and free flowing.

1.4 The drawings and documents supplied for audit are listed in Appendix A. An annotated drawing showing the locations of the problems identified is provided in Appendix B.

1.5 The terms of reference of the audit are as described in DMRB HD19/03 and the Institution of Highways and Transportation (IHT) Guidelines on Road Safety Audits. The team has examined and reported only on the road safety implications of the scheme as presented and has not examined or verified the compliance of the designs to any other criteria.

1.6 From the plans provided for audit it is proposed that the Hillington Road/Mossland Drive junction is reconfigured to form an 'onion' shaped signalised gyratory. To accommodate the proposals Mossland Drive will be realigned to the south of its existing tie in with Hillington Road, and Hillington Road widened from 2 to 3 lanes to the south of the M8 Junction 26.

1.7 The proposals would also result in Huntly Road being stopped up, although no specific details of this have been provided for review as part of the Audit Brief.

1.8 A review of the Personal Injury Accident (PIA) data between April 2008 and September 2013 indicates that that there have been 3 PIA's recorded at or on the approach to the Hillington Road/Mossland Drive junction, all of which resulted in damage only accidents.

A review of the PIA descriptions and causation factors of the historical PIA data have been undertaken and if considered relevant, addressed as part of this Audit.

1.9 No departures from standard have been provided by the design team as part of the Audit Brief.

2 ROAD SAFETY AUDIT FINDINGS FROM RSA 1

PROBLEM 1

LOCATION: Hillington Road southbound approach to Mossland Drive junction.

SUMMARY: Risk of side swipe conflict and rear end shunts due to insufficient weaving length.

2.1 Vehicles existing the M8 westbound intending to travel to Mossland Drive will be required to cross two lanes of traffic over a relatively short length. This could result in an increased propensity for weaving type collisions involving side swipe or rear end shunts. This problem is likely to be exacerbated by the location of the pedestrian crossing to the south of the proposed merge. It is however noted (based on site observations) that this crossing is likely to be used infrequently reducing the element of risk associated with this problem.

RECOMMENDATION

2.2 Ensure that adequate weaving distance is provided between the M8 westbound exit slip and the proposed right turn lanes onto Mossland Drive. If necessary, relocate the pedestrian crossing on the southbound approach to the gyratory further south to increase the weaving length.

PROBLEM 2

LOCATION: Throughout the scheme.

SUMMARY: Risk of side swipe collisions due to insufficient lane width.

2.3 No lane width dimensions have been provided for review. Should the lane widths be insufficient it could lead to side swipe collisions particularly involving large vehicles such as HGVs around the turning areas of the junction.

RECOMMENDATION

Carry out swept path analysis throughout the scheme to ensure that adequate lane widths are provided so that HGVs may circulate the gyratory without risk of collision with other vehicles.

3 OBSERVATIONS/NOTES

3.1 The recommendations included within this report should not be regarded as being prescriptive design solutions to the problems raised. They are intended only to indicate a proportionate and viable means of eliminating or mitigating the identified problem, in accordance with HD19/03. There may be alternative methods of addressing a problem which would be equally acceptable in achieving the desired elimination or mitigation and these should be considered when responding to this report.

3.2 It should also be noted that although not necessarily expected at a Stage 1 RSA, there was limited information provided to indicate details of lighting provision, signage, drainage, street furniture, landscaping and cross-sectional details. As a result, it is not been possible to ascertain the potential Road Safety issues arising from these elements of the scheme.

3.3 However, like many RSA's it is envisaged that this information would be provided and addressed accordingly as part of the Stage 2 RSA that would be undertaken at completion of the detailed design stage.

4 AUDIT STATEMENT

4.1 We certify that this Road Safety Audit has been carried out in accordance with HD 19/03 and the Institution of Highways and Transportation (IHT) Guidelines on Road Safety Audits.

Signed:

Date: 10 February 2014

T Brooks – BSc (Hons) MBA CMILT MIHT MSoRSA
Audit Team Leader
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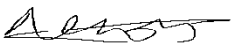
72 Plasturton Avenue
Cardiff
CF11 9HJ

Signed:



Date: 10 February 2014

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5 RISK ASSESSMENT

5.1 The following section provides a risk assessment of the issues raised in the Road Safety Audit. The main function of a risk assessment is to categorise/evaluate the level of potential risk associated with the problems identified within the RSA, by undertaking this assessment it allows the design team and local highway authority to place the problems identified into perspective, with regard to severity of outcome, and the potential frequency of occurrence as a result of the development proposals.

5.2 The following risk assessment methodology has been derived from that shown within the IHT Road Safety Audit Guidelines.

Table 1 – Risk Assessment Matrix

		Frequency of Collisions			
		More than one per year	**One every 1-3 years**	**One every 4-7 years**	**Less than 1 per 7 years**
Severity	**Fatal**	Very High	High	High	Medium
	Serious	High	High	Medium	Medium
	Slight	Medium	Low	Low	Very Low
	Damage Only	Low	Very Low	Very Low	Very Low

5.3 In applying the Risk Assessment to the problems identified in the RSA, the vulnerability of the collision victim and likely speed and type of impacting vehicles have been considered on reaching a conclusion on exposure to potential risk.

5.4 The risks associated with the problems identified have been based upon the audit teams experience and control data in the form of PIA data provided as part of the assessment.

5.5 The potential risks associated with the problems identified in the RSA are shown in **Table 2**.

Table 2 – Risk Assessment of existing problems identified in RSA

RSA Problem Ref	Original Scheme Risk Assessment	Risk Assessment after introducing Recommendation
1	**Low** Frequency: One every 1-3 years Severity: Slight	**Very Low** Frequency: One every 4-7 years Severity: Slight
2	**Low** Frequency: One every 1-3 years Severity: Slight	**Risk Mitigated**

5.6 In summary, if the recommendations identified in the RSA are addressed, the relative potential risks associated with the problems identified in the RSA are likely to be removed or mitigated against. This is not to say that PIC's would not occur for other reasons e.g. driver error.

5.7 It should be noted that the use of the risk assessment process is intended to evaluate the impact of the problems raised in the RSA and place them into perspective regarding the potential scale and/or severity of the problem, in order to make an informed judgement on the scheme proposals. It is not intended to abdicate the responsibility of the Local Highway Authority in determining what level of risk is considered acceptable, and with all forms of risk assessment is subjective.

APPENDIX A

List of Drawings and Documents Provided

120825/A/05
Hillington Road/Mossland Drive –
Possible signalised Junction Layout

PIA Data

ARCADY Outputs

APPENDIX B

Location of Identified Problems

M8 Junction 26

Hillington Road

Mossland Drive

1

2 - Throughout the Scheme

Notes:

1. This is not a construction drawing and is intended for illustrative purposes only.
2. White lining is indicative only.

REV.	DETAILS	DRAWN	CHECKED	DATE
.	.	.	.	.

CLIENT:

MEPC

PROJECT:

HILLINGTON PARK
GLASGOW

DRAWING TITLE:

Hillington Road / Mossland Drive
Possible Signalised Junction Layout

SCALES:

1:500 at A1

DRAWN:	CHECKED:	DATE:
DSN	.	30.1.2014

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DRAWING NUMBER: 120825/A/5

REVISION: .

APPENDIX F

Designers Response to Road Safety Audit

Hillington Park

Road Safety Audit – Designer's Response

Introduction

This Designers Response has been prepared following an initial Stage 1 Road Safety Audit (RSA) received from Go-Surveys in February 2014, with regard to the proposed highways works for a new access as part of the SPZ at Hillington Park as shown on **Drawing 120825/A/05** which is included at **Appendix A**. The numbering system follows the format within the initial Stage 1 Road Safety Audit report.

Comments and Response

1. Location: Hillington Road southbound approach to Mossland Drive Junction

Summary: Risk of side swipe conflict and rear end shunts due to insufficient weaving length.

Vehicles existing the M8 westbound intending to travel to Mossland Drive will be required to cross two lanes of traffic over a relatively short length. This could result in an increased propensity for weaving type collisions involving side swipe or rear end shunts. This problem is likely to be exacerbated by the location of the pedestrian crossing to the south of the proposed merge. It is however noted (based on site observations) that this crossing is likely to be used infrequently reducing the element of risk associated with this problem.

Recommendation

Ensure that adequate weaving distance is provided between the M8 westbound exit slip and the proposed right turn lanes onto Mossland Drive. If necessary, relocate the pedestrian crossing on the southbound approach to the gyratory further south to increase the weaving length.

Risk Assessment

The risk assessment has identified that this issue is Low Risk.

Designer's Response 1

The assessment considers this 'low risk'. When considering whether to move the pedestrian crossing, which is achievable, it is pertinent to weight in the balance pedestrian convenience against the benefits associated with the move. Our position is that the balance lies with retaining the crossing where it is given the ethos of the site.

2. Location: Throughout the scheme.

Summary: Risk of side swipe collisions due to insufficient lane width.

No lane width dimensions have been provided for review. Should the lane widths be insufficient it could lead to side swipe collisions particularly involving large vehicles such as HGVs around the turning areas of the junction.

Recommendation

Undertake vehicle swept path analysis to determine the nature of any lane over-running. Provide details of the hatched area adjacent to the central island and widen the circulatory carriageway if deemed necessary.

Risk Assessment

The risk assessment has identified that this issue is Low Risk.

Designer's Response 2

Swept path analysis of the roundabout has been undertaken with a 16.5m articulated Heavy Goods Vehicle (HGV) as shown in **Appendix B**. The swept path analysis identifies that all vehicles can travel around the roundabout simultaneously and this demonstrates that the risk has been mitigated.

APPENDIX A

M8 Junction 26

Hillington Road

Mossland Drive

Hillington Road

Notes:

1. This is not a construction drawing and is intended for illustrative purposes only.
2. White lining is indicative only.

REV.	DETAILS	DRAWN	CHECKED	DATE
.	.	.	.	.

CLIENT:

MEPC

PROJECT:

HILLINGTON PARK
GLASGOW

DRAWING TITLE:

Hillington Road / Mossland Drive
Possible Signalised Junction Layout

SCALES:

1:500 at A1

DRAWN:	CHECKED:	DATE:
DSN	.	30.1.2014

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DRAWING NUMBER: 120825/A/5

REVISION: .

APPENDIX B

Hillington Road

HILLINGTON ROAD

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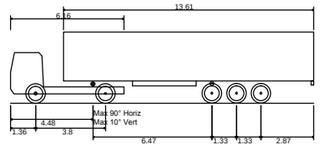
Notes:

1. This is not a construction drawing and is intended for illustrative purposes only.
2. White lining is indicative only.
3. Design from 120825/A/05.



FTA Design Articulated Vehicle (1998)

Overall Length	16.480m
Overall Width	2.550m
Overall Body Height	3.870m
Min Body Ground Clearance	0.515m
Max Track Width	2.470m
Lock to Lock Time	3.00s
Kerb to Kerb Turning Radius	6.550m

REV.	DETAILS	DRAWN	CHECKED	DATE
.	.	.	.	.

CLIENT:

MEPC

PROJECT:

Hillington Park
Glasgow

DRAWING TITLE:

Swept Path Analysis
Proposed Mossland Junction
16.5m Articulated Vehicle

SCALES:

1:1000 at A3

DRAWN:	CHECKED:	DATE:
JM	MdC	17/02/2014

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DRAWING NUMBER:	REVISION:
120825/AT/A01	.

APPENDIX G

Sustainable Transport Strategy

MEPC

Project Hillington, Hillington Park

Sustainable Transport Strategy

May 2014

Network Building, 97 Tottenham Court Road, London W1T 4TP www.vectos.co.uk
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Contents

1 INTRODUCTION AND SUMMARY

1.1 Vectos is retained by MEPC to provide Transport advice in support of a Simplified Planning Zones (SPZ) for Hillington Park.

1.2 The site lies between Glasgow and Renfrewshire, to the south of M8 and north of the train line. The site comprises the largest mixed business and industrial park in Scotland.

1.3 An SPZ has been proposed at Hillington Park. It will create an employment led redevelopment, providing choice and quick delivery for businesses considering locating in this part of Scotland.

1.4 The aim is to encourage employment growth as well as providing bespoke space quickly, there is much potential for Hillington Park to provide an environment and accessibility that is increasingly attractive.

1.5 There is significant potential to enhance the existing characteristics of the Park so that transport choice improves.

1.6 We have been advised, although this is not yet demonstrated by the Hillington Park team, that the M8 and Junction 26 will be at capacity once committed development is taken into account. This should not stifle economic development, including growth at Hillington Park.

1.7 Nevertheless, Hillington Park will be more attractive if the Park can introduce initiatives to achieve mode shift away from the car at peak periods. Achieving this is also consistent with sustainability aims. The opportunity is substantial at Hillington Park given its excellent transport links and current travel patterns.

1.8 This document touches on some of the initiatives that may be introduced. It considers traditional and also new technology. In some cases there are 'wow' factor, or 'new', initiatives. These are not all a panacea for mode shift, but complementary measures that will also raise awareness of the aims and effort being applied by Hillington Park.

1.9 This document also considers the fact that MEPC have been engaging with Scottish Enterprise on the Mobility Integrator Challenge Programme. This may provide an opportunity to engage with a range of companies to promote Hillington Park as a living laboratory for smart, integrated mobility initiatives. These initiatives will combine under a single vision for development at the site, to provide a more sustainable, inclusive mobility for

the area; creating jobs and acting as a hub for Scottish investment in smart mobility solutions. The intention is to create a THISTLE centre of excellence and innovation for like-minded companies to locate and/or invest in the site.l

Future Cities: Glasgow

1.10 Glasgow City is already pursuing a new technology and management approach to life in the City. It beat 29 other cities to win funding (£24m) for the Future City programme in a competition run by the Technology Strategy Board, the UK's innovation agency.

1.11 The aim of the programme is to demonstrate how technology can make life in the city smarter, safer and more sustainable.

1.12 The projects address health, safety and sustainability through the use of open data, apps, and portals.

1.13 Amongst other programmes is the Active Travel Demonstrator. The aim is to increase journeys made on foot or bicycle and so cut emissions, improve air quality, aid health and deal with obesity. This is consistent with the aims at Hillington Park.

1.14 This is an app based programme to assist people with finding the most appropriate and easiest routes. It also explores the opportunity for linking this with intuitive street lights (i.e., street lights that get brighter as one approaches).

1.15 The Social Transport Project explores how technology assists with a demand responsive transport service. This is also consistent with the potential delivery of measures at Hillington Park. This involves route optimisation, real time information to avoid unnecessary travel, and cuts in congestion and pollution.

1.16 The investment in time and money that Glasgow and Central Government is making to explore these measures demonstrates confidence, and a firm belief, in the practical value of these measures and this type of approach to transport.

1.17 In this context it is reasonable for Hillington Park to expect that a similar approach will have a demonstrable effect on travel demand by mode.

Transport Connections

1.18 Hillington Park is already very well connected to a plethora of travel networks, as shown below in the Public Transport Facilities Plan and the Connectivity of Hillington Park.

Public Transport Facilities Plan

1.19 Furthermore, there are onward connections from easy to reach destinations such as Braehead and the City Centre. In particular, the Bus Rapid Transit route will be in place in Glasgow in 2015 and is predicted to be extended to Braehead. There is already a bus service from Hillington Park to Braehead which takes 7 minutes, and which runs at a frequency of one bus every 30 minutes during the daytime.

Connectivity of Hillington Park

Glasgow 'Fastlink' – Bus Rapid Transit System

1.20 Having said this, there is room for improvement at Hillington so that better use is made of this excellent location. This is particularly in terms of the attractiveness of moving around this large site, and also in terms of the day to day social facilities on offer.

1.21 Achieving this improvement will have a direct effect on the propensity for employees to choose sustainable and socially inclusive travel methods. The holy grail will be to find that the 'sustainable travel measures' cause a sufficient shift in demands that there is no additional pressure on the Transport Scotland highway network as a result of the SPZ.

1.22 This report considers the potential for that through these potential measures and management.

Summary

1.23 Implementing all or part of the measures touched on in this document or by achieving success with the THISTLE proposal will have an effect on travel demand. These measures are encouraged by Scottish policy, and Renfrewshire Council and Glasgow City Council are investing in a similar approach with the same expectation.

1.24 Some of the initiatives are new to Scotland and the UK. Others are already in play and well documented.

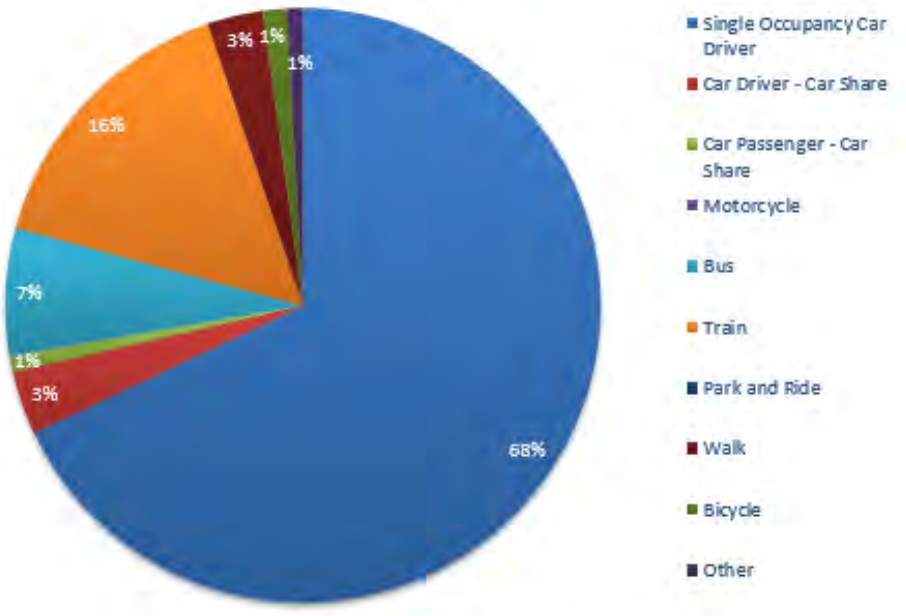
1.25 Application of just those measures that now have some observed effect to draw upon, will result in material changes. These changes alone are potentially so significant as to more than neutralise the extra demand for single car occupancy that may derive from the expansion proposal. It is reasonable to expect these initiatives together to do better, and to provide an exemplar employment site for Scotland and the UK.

2 CURRENT TRAVEL PATTERNS

2.1 The headline results from the 250 respondents to the June 2013 Staff Travel survey for Hillington Park (6500 employees) are:

- 68% by single occupancy car;
- 4% by car share;
- 7% by bus;
- 16% by rail;
- 3% by foot; and
- 1% by cycle.

Hillington Park – Employee Travel to Work Mode Share



2.2 In comparison, Milton Park in Oxfordshire, a similar sized MEPC Park, with about 6,500 employees, but less well connected to a large conurbation, or by rail, achieves as a result of its travel plan:

- 63% by single occupancy car;
- 10% by car share;
- 11% by bus;
- 8% by rail;
- 2% by foot; and
- 5% by cycle (or 9% on an occasional basis).

Milton Park Site Location Plan

2.3 The point is that in an arguably less advantageous location, MEPC, through its Travel Plan, achieves 6% more by car share, and 4% more by cycle. The Milton Park Travel Plan is in **Appendix A**.

Example of Milton Park Travel Plan

2.4 The Milton Park Travel Plan works well. Given the location of Hillington Park and the services at the park we can achieve greater success.

2.5 In the recent Hillington Park survey, stated preference questions were asked. The results were:

- 53% of all those travelling by single car occupancy said that they would consider car share;
- 59% of drivers said they would consider walking;
- 28% of drivers said they would consider cycling;
- 72% of drivers said that they would consider using rail or bus (with some caveats)
- Poor quality of services or environment was cited for non-use of rail or buses

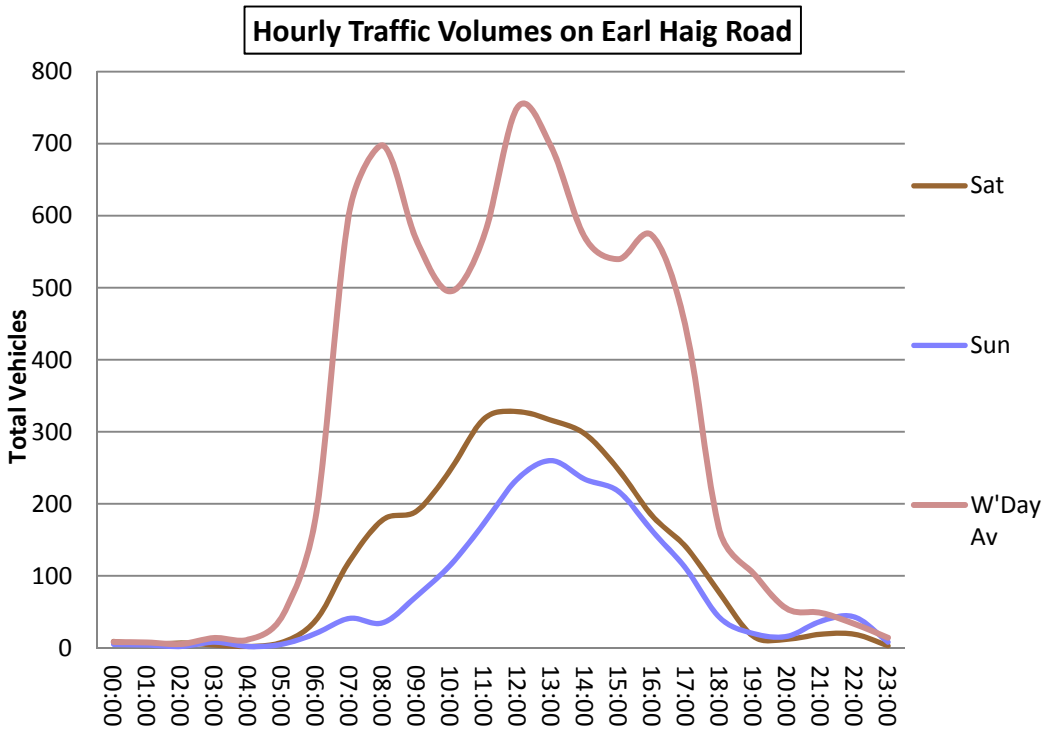
2.6 A quick analysis of employees' home location shows that the substantial majority are capable of travelling to the site by non-single car occupancy means, including bus, rail, walk, cycle and car share.

Plot of Employee Postcodes

2.7 That so many currently do travel on their own in the car is probably to a large extent due to the convenience of the motorway (despite comments about congestion), the current site wide deficiencies (including the poor environment around the rail stations), insufficient encouragement, insufficient education and the sheer distances involved within the site.

2.8 Notably, at the moment, there are sharp car borne travel peaks in the morning, evening and at lunchtime. The reasonable conclusion is that people do not socialise, or undertake other activities at the Park. They arrive, work, go elsewhere for lunch, and leave the Park

immediately the working day ends. The sharp nature of the peaks suggests that congestion is not yet having much of an effect on time of travel, as one might expect in a more inconvenient travel network.



2.9 There is therefore the opportunity to spread peaks by the carrot of attractive facility rather than the stick of unbearable congestion. For instance, health facilities (gym, team games such as football), media facilities at lunchtime, ancillary shops, cafes and others.

2.10 All of these deficiencies or opportunities are currently being addressed, or will be addressed as part of the MEPC site wide improvements, many of which will come forward with the SPZ.

2.11 This report looks at the headline opportunities for each of these improvements under the following sections:

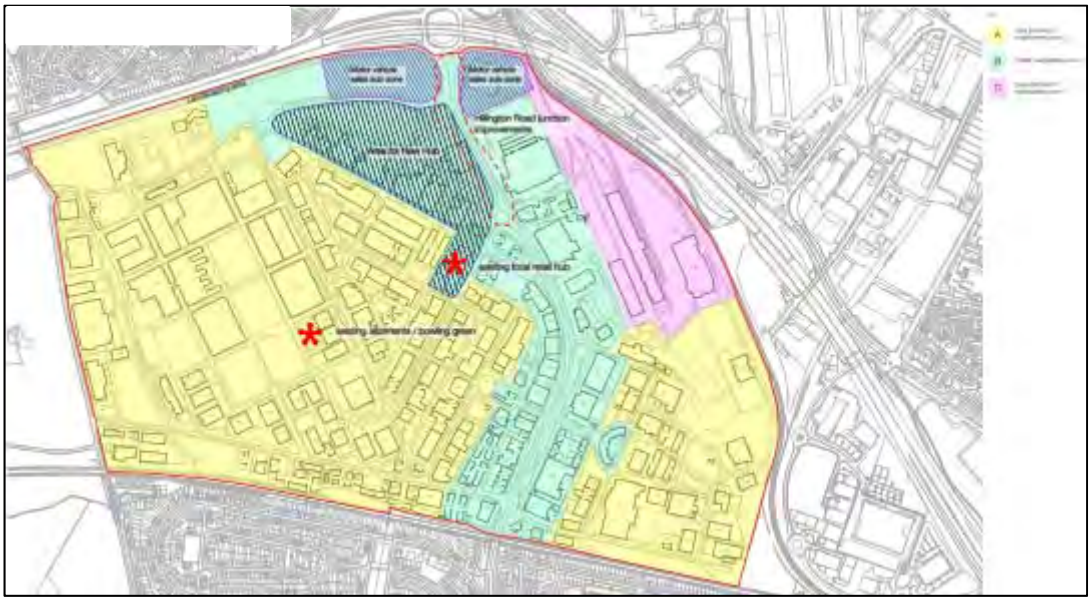
- Land-use Planning
- Walking and Cycling
- Public transport and Demand Responsive Travel
- Car Sharing
- Travel Planning

3 LAND USE PLANNING

3.1 Land Use planning on a site wide basis will allow for strategic coordination of development that creates a walkable and cycleable neighbourhood. To have such a neighbourhood implies facilities that people want to get to.

3.2 Therefore, one of the key aspects of the site wide development plan will be to create a Hub within the site to provide a range of attractive facilities for employees and visitors. The plan below is indicative only and will evolve over time.

Project Hillington Development Zones including The Hub



3.3 The Hub will be a social centre, a transport node, a place to meet, to exercise, to wait and to conduct business. The facilities that will be provided in the Hub are not yet specified but options include:

- Retail units ancillary to the operation of the Park (including sandwich shops, newsagents, cycle accessories and maintenance;
- Leisure facilities, including gyms, football pitches, and others;
- Changing and showering Areas;
- Restaurants, café and/or Public House facilities ancillary to the Park and local area;
- Professional services, including hairdressers, accountant, lawyers, banks etc.
- Transport services, including a stepping off point for bus services to Braehead and Glasgow City Centre
- Bespoke travel planning facilities

- Internet cafe

3.4 The integration of various land uses within one area has been recognised by Designing Streets (**The Scottish Government, March 2010**) and Sustrans as fundamental in relation to improving the use of sustainable transport. Concentrating a range of ancillary facilities within the Hub will increase the presence of this area for employees within the park therefore encouraging the area to become more vibrant and welcoming.

3.5 The aim is to establish the Hub as one of the Gateway features of the site. Access to and from the Hub will be fundamental to its value as a means of encouraging less car reliant travel into and out of the site. This remains a challenge given the distances involved within the site, although for the same reason of size, there is the rare opportunity of critical mass which enables management techniques to have far greater effect.

3.6 This is the subject of the walking, cycling, and demand responsive initiatives set out below.

4 WALKING AND CYCLING

4.1 The more formal walking and cycling links within the site are shown below.

Walking Facilities Plan

Cycling Facilities Plan

Internal to the Site

4.2 The Masterplan aim is to create a walkable and cycleable neighbourhood. It is to provide day to day facilities, to encourage healthy lifestyles and to provide convenience and useful services for the employees and visitors to the Park. **Table 4.1** below highlights the internal distance from the Hub to the Key Nodes in the park.

Table 4.1 Distances to Key Nodes from Hub

Key Nodes	Distance (metres)	Walk Time (minutes)	Cycle Time (minutes)
Bus Stop on Hillington Road at the Hub	0m	0	0
Hillington West Train Station	1,250m	15	5
Hillington East Train Station	1.900m	24	8
Braehead Shopping Centre	1,200m	14	5

4.3 The internal layout will be well connected via a network of legible streets and spaces that provide a good environment for walking and cycling. The infrastructure has to be carefully planned to provide convenient and direct links between existing nodes (Train Stations, Bus Stops and main employment areas), and it also means that new facilities on site are located where these links converge to create new nodes. Footpaths will be constructed along desire lines between land uses to ensure that walking is considered as a realistic choice. The routes will be lit with appropriate security levels. Pedestrians will be given priority wherever possible over all other forms of traffic with crossing facilities taking the form of signalised Pelican crossings, Zebra crossings or shared surfaces depending on the location and pedestrian/traffic volumes.

4.4 Cycle lanes will be created alongside all major roads, either on-street or dedicated off-street as appropriate, and along key desire lines either as shared or dedicated facilities, with cyclists given priority over motorised traffic. Crossing facilities will be provided either as part of signalised junctions or signalised Toucan crossings, with details submitted with reserved matters planning applications.

4.5 For some people, cycling will be the most convenient way of getting around the Park. Secure and weather protected cycle parking will be provided throughout the site in appropriate quantities. Cycle parking will be provided within public areas for general use and within individual plots as these are developed out. Cycle parking will be provided at key bus stops.

4.6 Developers of individual plots will submit details identifying the numbers and locations of cycle parking along with links to walking and cycling facilities.

Walking and Cycling Innovations

4.7 Cycling is most attractive for the last mile or so of the journey to work, and is particularly attractive for relatively short distances. It is also an attractive method of travel for many people for distances in the order of 8km given the right environments and encouragements.

Cycle Hire Scheme

4.8 Hillington Park is eminently suited, or will be, for use of the cycle. It is flat, the Masterplan will ensure attractive and safe routes, more activity within the Park will mean more social interaction when travelling by cycle or foot, and the Hub will be accessible in a matter of minutes from any location within the site.

4.9 Therefore, we propose investigating a localised cycle hire scheme.

4.10 With docking stations at the railway stations, the key bus stops, the Hub and various locations around the site, this will encourage movement around the site, use of the Hub and also multi modal travel to and from work. The proposal is that this is administered by the Travel Plan team.

4.11 This will be helped by the publicity currently being focussed on Glasgow for the Commonwealth Games and cycling in particular. As part of the Commonwealth Games proposals, Glasgow City Council is proposing to invest £1.3m on a city wide cycle hire scheme and this will be linked to a significant marketing scheme. While the Hillington Park (MEPC) scheme would not be linked with that scheme in particular it may be possible to achieve some benefits as a result of the rise of importance and profile of cycling as a means of sustainable travel.

Chispa Electric Car

4.12 The Chispa Electric Car is an electric vehicle that can be stacked and towed in the same way that supermarket trollies are. It is a vehicle developed akin to 'cycle hire' schemes but where there is no need for docking stations.

4.13 Administered by a Travel Plan team, it enables the operator to know where, at any one time, each vehicle is for easy pick up.

4.14 This has been tested in the Canaries by a British inventor, and it is now looking for a practical application.

Shared Electric Cycle/Rickshaw Scheme

4.15 One of the most innovative areas of transport at the moment is the idea of shared electric cycle's or rickshaws, either self drive, or demand responsive from the Travel Plan team. This is an innovative idea based on the passenger transport used throughout Asia and becoming more popular in the UK in recent years.

4.16 This has the potential to be a 'wow' factor initiative, raising profiles whilst also providing convenient covered transport within the site.

4.17 It is possible to operate a system of electric rickshaws on a demand responsive basis. Demand Responsive Travel is in a separate section of this report.

Walking and Cycling Organised Schemes

4.18 A range of 'soft' travel initiatives have been implemented at other business parks throughout the UK and MEPC sites with a varying range of success. Each of these would be run by the Travel Plan Manager (TMP) and may be included within the Travel Plan:

- Lunchtime walking groups
- Bike User Group (BUG)
- Loan cycles
- Cycle Purchase and Maintenance Scheme
- Cycle trains (individuals meet to cycle together to and from work)

5 PUBLIC TRANSPORT AND DEMAND RESPONSIVE TRANSPORT

5.1 Public transport at the site is excellent. However, we hypothesise that awareness and encouragement of its use is not.

Public Transport

5.2 At present, Hillington Park has excellent public transport linkages with two train stations and a bus corridor (as shown on **Public Transport Plan**) with frequent services (as summarised in **Table 5.2**.

Public Transport Facilities Plan

Table 5.2 - Summary of the Most Frequent Bus Services to Hillington Park

Service	Destination	AM Peak (Services/hr)	PM Peak (Services/hr)	Average Frequency (minutes)	First Bus	Last Bus
9A	Buchanan Bus Station	1	3	20-30	08:21	21:39
	Braehead Centre	3	3	20-30	07:17	20:41
22	Nitshill	2	2	30	07:00	18:08
	Braehead Centre	3	2	30	06:50	17:51

5.3 In order to supplement the existing excellent public transport provision surrounding the site we propose a number of improvements.

Table 5.3 – Summary of Services at Hillington East and West Train Station

Destination	AM Peak (Services/hr)	PM Peak (Services/hr)	Average Frequency (minutes)	Journey Time
Glasgow Central via Paisley Gilmore Street to Gourock	2	3	20-30	10-12 mins to Glasgow
Gourcock to Glasgow Central via Paisley Gilmore Street	2	2	20-30	5-8 mins to Paisley Gilmore St

Upgrading Public Transport Infrastructure

5.4 A key area in terms of improving the use of public transport is to upgrade the local bus stops and train stations. Upgrading means creating better environments, better weather protection and foot access, and in some case providing cycle parking. These facilities are in the control of SPT and Network Rail/First Scotland and any improvements would need to be agreed with both all of these bodies.

5.5 Linking the key bus stops on Hillington Road with the Hub will be of great value in terms of encouraging bus use as Part of either a journey to or from work, or a lunchtime journey, say to Braehead.

Real Time Information Provision and Marketing

5.6 Another key aspect in relation to improving the use of Public Transport will be to implement Real Time Information (RTI) systems at the public bus stops, and within key buildings within the park (such as the Hub, Innovation Centre and private employers). RTI provides up to date and accurate information regarding bus and train services, reduces waiting times, increase the profile and encourages more people to choose public transport as their preferred mode of transport.

5.7 From the responses to the stated preference questions in the Travel Questionnaire it seems that employees at the site are unaware of the public transport opportunities around the site. The provision of RTI will enable these employees at the park to be fully aware of the opportunities available and encourage them to use public transport.

5.8 A new technology feature of real time information is an app based system for use on mobile phones. This will be consistent with the Future Cities programme within Glasgow.

Demand Responsive Transport (DRT)

5.9 Demand Responsive Transport (DRT) is an innovative and user oriented form of public transport routing for small and medium sized vehicles.

5.10 A number of case studies of DRT have been undertaken recently and can be categorised into a number of vehicle types – all of which would be suitable for Hillington Park and MEPC.

5.11 The first example is the DRT Electric Bus, examples of which can be seen in terms of the Personal Bus in Tuscany, Italy and the Technobus in Italy, Spain and Portugal. These are electric buses that are smaller and more energy efficient than standard buses. They can be run on a fixed timetable (i.e. pick-ups from a train station) or can be demand responsive (say at off peak times).

5.12 Demand responsive technology now exists, and this will form part of Glasgow City's Future City programme. On site, an electric bus, complemented by other measures such as rickshaws, can be operated by the Travel Plan team.

Demand Responsive Bus - Technobus

Demand Responsive Technology - Electric Rickshaw

5.13 The CHISPA electric public car system, as well as a potential 'cycle hire' scheme will also function through app based technology as a demand responsive unit.

The Point

5.14 The point behind all of these technologies is that they maximise convenience and create easy to make choices that are alternative to single occupancy car use. They make the site more 'pedestrian scale' and encourage sustainable interaction.

5.15 The tendency will for a drop in single occupancy car based demand.

6 CAR SHARING AND CAR CLUB

6.1 At Hillington Park only a small percentage of the population (4%) car share. Given the success of the Milton Park Travel Plan, in an arguably more difficult location, there is good opportunity for a step change away from single occupancy car, and material benefit, as a result of such a scheme.

6.2 This could result in as a much as a 5-10% or more reduction in site wide car demand.

6.3 Based on the results of the stated preference survey the main improvements that could be implemented to improve car sharing are as follows:

- Car Sharing Database and website run by MEPC at Hillington Park;
- Pool Vehicles or a Car Club on site for use during the day for business trips;
- Better parking facilities for people that car share;
- Financial incentives for car sharing.

6.4 Based on our research a high quality and easy to use car sharing database and website will have the greatest impact on increasing the number of trips to the site by cars with multiple passengers. A number of example website exist such as Liftshare.com but a specific website for employees at Hillington Park may be more beneficial over time as it could be managed by the Travel Plan Manager at the park.

6.5 A Car Club scheme already exists in Glasgow and is run by City Car Club. Given the volume of employees at Hillington Park it should be possible to agree a deal with City Car Club to locate a certain number of car club vehicles at Hillington Park for the use of employees and visitors to the park (yet to be discussed). These will help with employees at the Park who need to use a car for business trips.

6.6 At each of the new development sites it will be possible to allocate dedicated car share car parking spaces close to the front of the building, in the most convenient locations. This will contribute to the encouragement of employees to car share. Car sharing reduces the proportion of single occupancy car trips and can reduce the overall demand for car travel.

7 TRAVEL PLANNING

Introduction

7.1 The critical feature of Project Hillington will be the new Travel Plan (TP). It will encompass all of the sustainable and social initiatives. It will be well funded, with transparent monitoring, reporting and comparison of achievements against targets.

7.2 It will be a living document and it will enable adjustments to be made to best achieve the stated aims and targets.

7.3 It will have a 'fighting fund' for unforeseen actions.

7.4 The TP's overriding objective will be to:

Put in place the management tools deemed necessary so that employees of the proposed site are able to make informed choices about their travel, while at the same time minimising the adverse impacts of their travel on the environment, surrounding highway network and local residents.

7.5 The sub-objectives are:

- To reduce the need to travel to and from the site, particularly during peak hours;
- To increase the awareness of choice of travel modes and promote social inclusion;
- To promote the health, wealth and environment benefits of walking, cycling and public transport use; and
- To provide clear information to all employees and visitors on the alternative modes of transport available at the site.

Travel Plan Management

7.6 MEPC will appoint a Travel Plan Manager (TPM) and team to manage the Travel Plan.

7.7 The TPM will be responsible for overseeing the management, development, implementation, monitoring and review of the Site-wide Travel Plan.

Travel Plan Targets

7.8 The Framework Travel Plan targets are based on achieving a reduction in single occupancy vehicle trips at peak times. Specific targets will be incorporated into the TP.

7.9 Specific Travel Plans will be required for each of the specific land uses, Workplace and Leisure will accord with the overall TP targets and measures, however will also set out specific targets for travel based on initial baseline survey results.

Measures and Initiatives

7.10 The initiatives and measures that form part of the Framework Travel Plan are a mix of 'hard' and 'soft' measures. The 'hard' measures include the provision of facilities set out above such as public transport improvements, walking/cycling improvements, car clubs and secure cycle parking. The 'soft' measures include initiatives such as providing Welcome Packs, and provision of information on sustainable travel services through Travel Notice Boards and Real Time Information (RTI). It may also include the new technology features such as app based facilities, and data facilities being trialled in Glasgow City or it will include the features included within the THISTLE proposal which is currently being discussed with Scottish Enterprise.

Monitoring and Review

7.11 A comprehensive monitoring and review programme will be agreed with the Authorities and MEPC, and will set out the type and frequency of travel surveys for each land use. This will be coordinated by the Travel Plan Manager and surveys will be funded by the developers/occupiers of the various land uses.

7.12 If the THISTLE proposal is successful monitoring will take place of each individual measure against criteria agreed with the Transport Review Group.

Transport Review Group (TRG)

7.13 It will be important to create a Transport Review Group, comprising key stakeholders and representatives of the Site Owner and Managing Agent, who will meet periodically to monitor and review the achievements of the Travel Plan.

7.14 This will also include representatives of Glasgow City Council, Renfrewshire Council, Transport Scotland and SPT.

7.15 In the event that the THISTLE proposal is successful, the TRG will also have a member of Scottish Enterprise on the board and will decide on the innovative smart mobility measures which are implemented and the funding mechanisms required including grants.

Fighting Fund

7.16 A fighting fund will be set up by the Site Owner (MEPC) to fund remedial measures and mitigation measures.

7.17 Should the TRG determine that the targets are not on track to be met and remedial measures are required then the Travel Plan Manager will propose measures to improve the achievement of the targets. The proposal will include the estimated cost of implementing the measures. If the TRG agree with the remedial measures proposed, the TRG will authorise expenditure from the Contingency Fund up to the estimated cost of those measures.

8 SUMMARY OF INITIATIVES

8.1 In summary, these are the initiatives that this report considers:

- The Hub;
- Walk and Cycling Routes;
- Improved ambiance;
- Cycle Hire;
- Electric Covered Buses / Rickshaws / Cycles;
- Demand responsive vehicles (electric);
- Awareness and Education; and
- Travel Planning and Management.

8.2 The report also includes the possibility that the THISTLE proposal is successful and demonstrates that it will be managed by the TRG and will have adequate funding to encourage modal shift across the site.

Appendix A

Milton Park Travel Plan

Milton Park

MEPC

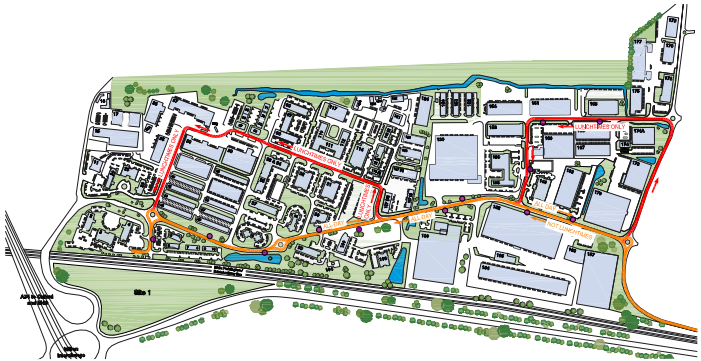
Travel Information

A Better Place To Work

Introduction

Milton Park is located near Didcot, close to the A34 and Didcot Parkway station, which provides rapid links to the surrounding regions.

Travelling to and from Milton Park is very simple. As part of our commitment to sustainability we actively encourage and support those who wish to journey in a more environmentally responsible manner.



Travel Co-ordinator

Milton Park has a full time Travel Co-ordinator for helping meet the travel demands of our customers.

The Travel Co-ordinator will offer a comprehensive set of travel initiatives to help staff and visitors travel to and from Milton Park.

These include:

- Personalised travel plans for individuals working at Milton Park
- A managed car share scheme
- Online interactive public transport maps and timetables
- Shuttle bus service information and bus passes
- Cycle and walking information
- Regular customer feedback survey

For more details contact Dawn Crawford

Tel: 01235 865555 Email: dcrawford@mepc.com

Milton Park

By Public Bus

Local bus service

There are eight bus stops strategically placed around the Estate serving local bus companies. RH Transport Services, The Oxford Bus Company and Thames Travel all run regular local bus services between Milton Park and outlying towns, such as Grove, Wantage, Didcot and Abingdon, and beyond to Oxford and Reading.

Timetables for each of these services can be found on our website www.miltonpark.co.uk/peopleandthepark

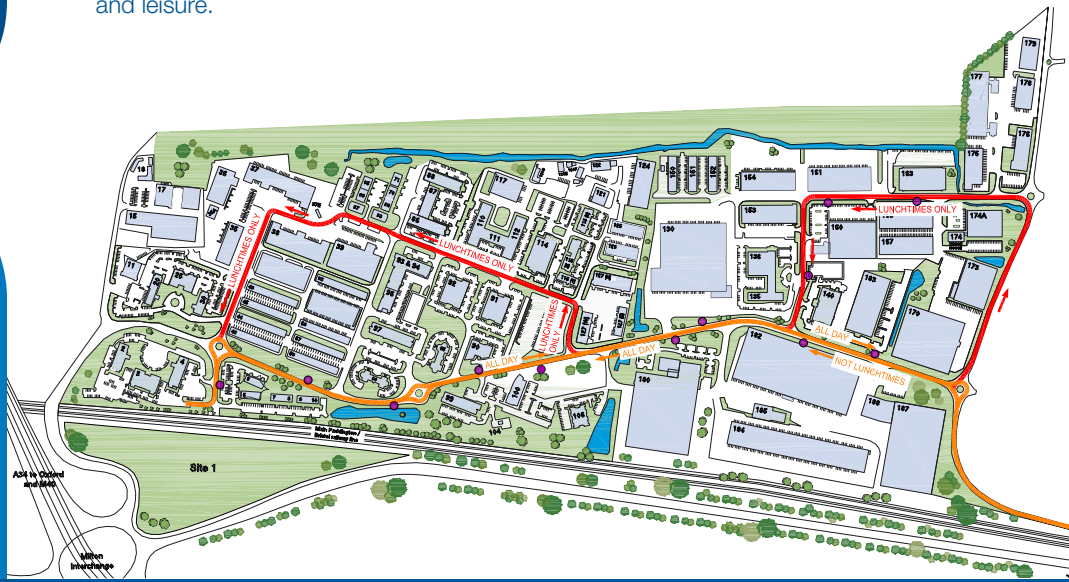
RH Travel Services -
www.rhtransportservices.co.uk

The Oxford Bus Company -
www.oxfordbus.co.uk

Thames Travel -
www.thames-travel.co.uk National bus service

By Shuttle Bus

Milton Park run a shuttle bus that connects with local transport links at Didcot Parkway Station from Monday to Friday (excluding bank holidays). A shuttle bus pass can be purchased by people working on the Estate from The Innovation Centre at 99 Milton Park for a one off fee of £5.00. If you wish to use the shuttle bus but do not have a shuttle bus pass the cost is £1.30 for a single trip and £2.00 for a return journey. During the lunch period the shuttle bus also runs to the Orchard Centre in Didcot, a centre for shopping and leisure.



The shuttle bus timetable can be downloaded from our website: www.miltonpark.co.uk/peopleandthepark

For more details
contact Dawn Crawford
Tel: 01235 865555
Email: dcrawford@mepc.com

Morning Service

MORNING SERVICE FROM MILTON PARK

*Double decker service

Depart Milton Park	06.55*	07.05	07.20*	07.35	07.45*	08.00
Arrive Didcot Parkway	07.05*	07.15	07.30*	07.45	07.55*	08.10
Depart Milton Park	08.10*	08.25	08.35*	08.50	09.00*	09.15
Arrive Didcot Parkway	08.20*	08.35	08.45*	09.00	09.10*	09.25
Depart Milton Park	09.25*	09.40	09.50*			
Arrive Didcot Parkway	09.35*	09.50	10.00*			

MORNING SERVICE FROM DIDCOT PARKWAY

*Double decker service

Depart Didcot Parkway	07.05*	07.15	07.30*	07.45	07.55*	08.10
Arrive Milton Park	07.20*	07.30	07.45*	08.00	08.10*	08.25
Depart Didcot Parkway	08.20*	08.35	08.45*	09.00	09.10*	09.25
Arrive Milton Park	08.35*	08.50	09.00*	09.15	09.25*	09.40
Depart Didcot Parkway	09.35*	09.50	10.00*			
Arrive Milton Park	09.50*	10.05	10.15*			

Lunchtime Service

LUNCHTIME SERVICE FROM DIDCOT PARKWAY

*Double decker service

Depart Milton Park	11.45*	12.00	12.15*	12.30	12.45*	13.00
Stops at Orchard Centre			12.32*	12.47	13.02*	13.17
Arrive Didcot Parkway	12.00*	12.15	12.30*	12.45	13.00*	13.15
Depart Milton Park	13.15*	13.30	13.45*	14.00		
Stops at Orchard Centre	13.32*	13.30	14.02*	14.17		
Arrive Didcot Parkway	13.30*	13.45	14.00*	14.15		

Lunchtime Service

LUNCHTIME SERVICE FROM DIDCOT PARKWAY

*Double decker service

Depart Didcot Parkway	12.00*	12.15	12.30*	12.45	13.00*	13.15
Arrive Orchard Centre			12.32*	12.47	13.02*	13.17
Arrive Milton Park	12.15*	12.30	12.45*	13.00	13.15*	13.30
Depart Didcot Parkway	13.30*	13.45	14.00*	14.15		
Arrive Orchard Centre	13.32*	13.47	14.02*	14.17		
Arrive Milton Park	13.45*	14.00	14.15*	14.30		

Afternoon Service

AFTERNOON SERVICE FROM MILTON PARK

*Double decker service

Depart Milton Park	15.20*	15.30	15.45*	15.55	16.10*	16.20
Arrive Didcot Parkway	15.35*	15.45	16.00*	16.10	16.25*	16.35
Depart Milton Park	16.35*	16.45	17.00*	17.10	17.25*	17.35
Arrive Didcot Parkway	16.50*	17.00	17.15*	17.25	17.40*	17.50
Depart Milton Park	17.50*	18.00	18.15*	18.25		
Arrive Didcot Parkway	18.05*	18.15	18.30*	18.40		

AFTERNOON SERVICE FROM DIDCOT PARKWAY

*Double decker service

Depart Didcot Parkway	15.35*	15.45	16.00*	16.10	16.25*	16.35
Arrive Milton Park	15.45*	15.55	16.10*	16.20	16.35*	16.45
Depart Didcot Parkway	16.50*	17.00	17.15*	17.25	17.40*	17.50
Arrive Milton Park	17.00*	17.10	17.25*	17.35	17.50*	18.00
Depart Didcot Parkway	18.05*	18.15	18.30*			
Arrive Milton Park	18.15*	18.25	18.40*			

Milton Park

By Bike

Milton Park is ideally situated close to many cycle paths connecting to Didcot, Abingdon, Oxford and surrounding villages. Cycling is a healthy alternative to the car and MEPC is continually investing in facilities for cyclists. Cycle shelters can now be found at all our managed buildings and close to amenities across the Estate, allowing you to feel confident your bike is secure whilst you are at work. Milton Park has also installed showers in all new developments allowing cyclists to freshen up after your journey to work.

Cycle Routes

Sustrans is a charity that works on practical projects to encourage people to walk or cycle, and is an excellent place to find routes and information about cycle networks not only around Milton Park but across the UK. For more information visit www.sustrans.org.uk

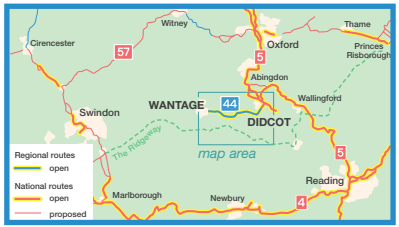
Bike User Group

Milton Park BUG has been created to provide an online user group so cyclists can get the most out of cycling to, from and on Milton Park. Milton Park BUG gives you access to:

• A community of cyclists • Cycle routes • Events - Oxford • Cycling news

Once registered to the Milton Park BUG group you will be able to chat with other members on the Forum page and you can also:

• Advertise local cycle events • Report any damages or concerns regarding local cycle paths which the MEPC Travel Co-ordinator can report to local authorities • Chat to like minded people



Cycle Purchase and Maintenance

MEPC Milton Park is pleased to be working with Mountain Mania cycles of Didcot to offer businesses and employees a customised cycle support service on-site during the working day. This is carried out by Mania's unique fully equipped mobile workshop. In addition, Mountain Mania will help you to develop the 'Cycle to Work' scheme for your employees.

For more information please contact Jamie Lynn, Mountain Mania Cycles,
Email: Jamie@balfa.co.uk Tel: 01235 759366

Bicycle Loan

MEPC Milton Park has launched a bicycle loan scheme providing four hybrid bicycles, which all employees working at Milton Park will be able to hire free or for a minimal charge (depending on length of hire)

Day time hire	FOC	(Cycle returned before 17.30)
Overnight hire (2 days)	£2.00	
Overnight hire (3 or mor days)	£2.00	(Maximum hire 5 days not including weekend)
Weekend hire	£8.00	(collect Friday after 10.00, return Monday before 17.30)

Users will be required to complete a short booking form on each occasion to ensure safe return of the equipment after use. If you would like any further information on this scheme please contact Dawn Crawford at **dcrawford@mepc.com**

By Train

Didcot Parkway Station is five minutes by bus from Milton Park and can be reached by our regular shuttle bus service. Didcot Parkway provides frequent and fast connections to London Paddington (only 45 minutes journey time), Oxford, Bristol and the west of England. The Heathrow Express leaves from Paddington every quarter hour to make the 15 minute journey to London Heathrow airport.

First Great Western 08457 000 125
(open 07:00 to 22:00 daily)
www.firstgreatwestern.co.uk

National Rail Enquiries 08457 48 49 50
www.nationalrail.co.uk

Car Share Scheme

It's absolutely free to use

The Milton Park car share scheme has been designed for every possible user, whether you are a driver / passenger or if you would simply be interested in finding an alternative method of green transport.

How do you begin sharing your journeys

Please visit the car share registration page by following the travel and car share links on www.miltonpark.co.uk/peopleandthepark

Registration will only take a few minutes, if possible car share matches are available you will then be informed via email.

All personal details used in the process will not be passed to a third party without your consent.

By Car

Milton Park is adjacent to the A34 trunk road, and is clearly signposted in both directions near the turning for the Milton Interchange. To the north of Milton Park the A34 links directly to junction 9 of the M40. It also links to junction 8 of the M40, via short stretches on the A4142 and A40. Heading south from Milton Park, the A34 links directly with junction 13 of the M4.

Major centres by road

Oxford - 12 miles
Reading - 23 miles
Swindon - 28 miles
London West End - 60 miles
Bristol - 74 miles

By Taxi

Please see below for details of local taxi firms within easy access of Milton Park.

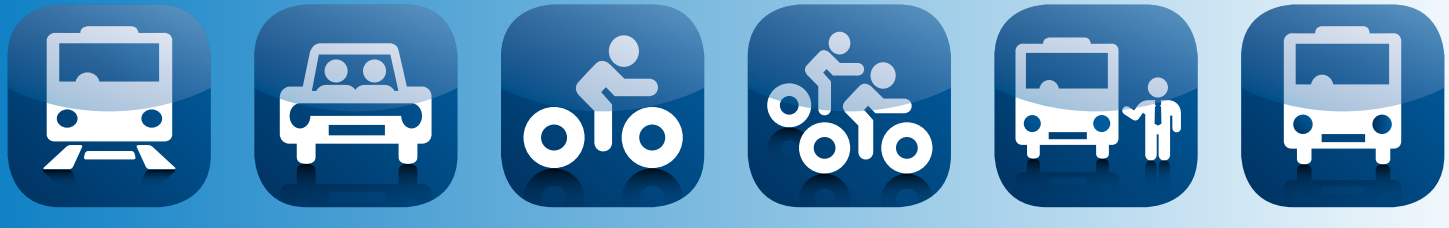
Abbey Executive Travel, Milton	(01235) 820808
Busby's Taxis, Abingdon	(01235) 555735
B.H. Cars	(01235) 200635
Compass Cars	(01235) 282838
Findlay	(01844) 281555
Harold's Taxis, Didcot	(01235) 512345
LadyCars (ladies and children)	(07779) 760391
M40 Cars	(01844) 281555
Pryor's Taxis, Didcot	(01235) 812345
Star Cars of Didcot	(07702) 800 999
Toot's Taxis	(01235) 555599

By Air

Milton Park is well connected to the national motorway network and as a result all major airports are within easy reach by road. Both motorways lead to the section of the M25 closest to London Heathrow. It is also simple to follow the M25 clockwise to the junction with the M1 to London Luton and further to the M11 leading to London Stansted, or anticlockwise to the junction with the M23 leading to London Gatwick. The airports at Bristol and Southampton are also within easy reach.

Airports	**Journey time to Milton Park by road**
Heathrow Airport - www.heathrowairport.com (Tel +44 (0)870 000 0123)	45mins
Luton Airport - www.london-luton.co.uk (Tel +44 (0) 1582 405 100)	1hr
Stansted Airport - www.stanstedairport.com (Tel +44 (0)870 000 0303)	2hrs
Gatwick Airport - www.gatwickairport.com (Tel +44 (0)870 000 2468)	1hr 45mins
Southampton Airport - www.southamptonairport.com (Tel +44 (0)870 040 0009)	45mins
Bristol Airport - www.bristolairport.co.uk (Tel +44 (0)870 121 2747)	1hr 15mins

Innovation Centre, 99 Milton Park,
Abingdon, Oxon OX14 4RY
Tel: 01235 865555 Fax: 01235 865560
Email: enquiries@miltonpark.co.uk
www.miltonpark.co.uk/peopleandthepark



APPENDIX H

Arcady Outputs for Proposed Access

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: Import of 110825_A_5 (AM Peak) 150414.arc8
Path: X:\Projects\120000\120825 - Hillington Park, Glasgow\Modelling\Arcady\Hillington_Mossland (110825_A_05)
Report generation date: 15/04/2014 15:13:34

Summary of junction performance

	AM				
	Queue (Veh)	Delay (min)	RFC	LOS	Network Residual Capacity
	A1 - Hillington Park, Glasgow: Development Case Flows, AM Peak Hour - Peak Profile				
Arm A	0.08	0.01	0.08	A	48 %
Arm B	1.50	0.07	0.60	A	
Arm C	0.82	0.07	0.45	A	[Arm C]

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Network Residual Capacity indicates the amount by which network flow could be increased before a user-definable threshold (see Analysis Options) is met.

'D1 - Hillington Park, Glasgow: Development Case Flows, AM Peak Hour - Peak Profile, AM '' model duration: 07:45 - 09:15

Run using Junctions 8.0.2.316 at 15/04/2014 15:13:33

File summary

File Description

Title	Hillington Park, Glasgow: Development Case Flows, AM Peak Hour - Peak Profile
Location	Hillington Road / Mossland Drive
Site Number	
Date	31/01/2014
Version	
Status	Proposed Layout (Drg. No: 110825/A/5)
Identifier	
Client	MEPC
Jobnumber	120825
Enumerator	David Noyce
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (min)	Queue Threshold (PCU)
5.75		✓	Delay	0.85	0.60	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	Veh	Veh	perHour	min	-Min	perMin

(Default Analysis Set) - Hillington Park, Glasgow: Development Case Flows, AM Peak Hour - Peak Profile, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm A - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	Geometry	Arm C - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.
Warning	DemandSets	D1 - Hillington Park, Glasgow: Development Case Flows, AM Peak Hour - Peak Profile, AM	Demand Set 1: Scenario Name includes Time Period Name ('AM'). Are you sure this is correct?

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	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)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relat
Hillington Park, Glasgow: Development Case Flows, AM Peak Hour - Peak Profile, AM	Hillington Park, Glasgow: Development Case Flows, AM Peak Hour - Peak Profile	AM		Varies by Arm	07:45	09:15	90	15				✓		

Junction Network

Junctions

Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (min)	Junction LOS
(untitled)	Roundabout	A,B,C				0.06	A

Junction Network Options

Driving Side	Lighting	Network Residual Capacity (%)	First Arm Reaching Threshold
Left	Normal/unknown	48	Arm C

Arms

Arms

Arm	Name	Description
A	Hillington Road (North)	
B	Hillington Road (South)	
C	Mossland Drive	

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
A	0.00	99999.00		0.00
B	0.00	99999.00		0.00
C	0.00	99999.00		0.00

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
A	12.00	16.00	500.00	50.00	58.00	30.00	
B	7.00	9.10	19.20	30.00	65.00	18.10	
C	7.00	10.50	30.50	20.00	65.00	34.00	

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
A	None
B	None
C	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)
A		(calculated)	(calculated)	1.152	4959.100
B		(calculated)	(calculated)	0.716	2741.634
C		(calculated)	(calculated)	0.717	2856.460

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 (Veh/hr)	Flow Scaling Factor (%)
A	ONE HOUR	✓	342.00	100.000
B	ONE HOUR	✓	1239.00	100.000
C	ONE HOUR	✓	681.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (Veh/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (Veh/hr)	Direct Demand Pedestrian Flow (Ped/hr)
07:45-08:00	A	257.48	262.63		
07:45-08:00	B	932.78	1013.00		
07:45-08:00	C	512.69	554.22		
08:00-08:15	A	307.45	313.60		
08:00-08:15	B	1113.84	1209.63		
08:00-08:15	C	612.21	661.79		
08:15-08:30	A	376.55	384.08		
08:15-08:30	B	1364.16	1481.48		
08:15-08:30	C	749.79	810.53		
08:30-08:45	A	376.55	384.08		
08:30-08:45	B	1364.16	1481.48		
08:30-08:45	C	749.79	810.53		
08:45-09:00	A	307.45	313.60		
08:45-09:00	B	1113.84	1209.63		
08:45-09:00	C	612.21	661.79		
09:00-09:15	A	257.48	262.63		
09:00-09:15	B	932.78	1013.00		
09:00-09:15	C	512.69	554.22		

Turning Proportions

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

		To		
		A	B	C
From	A	0.000	0.000	342.000
	B	1239.000	0.000	0.000
	C	681.000	0.000	0.000

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

		To		
		A	B	C
From	A	0.00	0.00	1.00
	B	1.00	0.00	0.00
	C	1.00	0.00	0.00

Vehicle Mix

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

		To		
		A	B	C
From	A	1.000	1.000	1.020
	B	1.086	1.000	1.000
	C	1.081	1.000	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To		
		A	B	C
From	A	0.000	0.000	2.000
	B	8.600	0.000	0.000
	C	8.100	0.000	0.000

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (min)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)	Total Queueing Delay (Veh-min)	Average Queueing Delay (min)	Rate Of Queueing Delay (Veh-min/min)	Inclusive Total Queueing Delay (Veh-min)	Inclusive Average Queueing Delay (min)
A	0.08	0.01	0.08	A	313.83	470.74	6.21	0.01	0.07	6.21	0.01
B	0.60	0.07	1.50	A	1136.93	1705.39	91.56	0.05	1.02	91.57	0.05
C	0.45	0.07	0.82	A	624.90	937.35	49.75	0.05	0.55	49.75	0.05

Main Results for each time segment

Main results: (07:45-08:00)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (min)	LOS
A	257.48	64.37	257.25	1441.45	0.00	0.00	4861.86	4861.86	0.053	0.00	0.06	0.013	A
B	932.78	233.20	930.17	0.00	257.25	0.00	2351.58	0.00	0.397	0.00	0.65	0.042	A
C	512.69	128.17	511.29	257.25	930.17	0.00	1972.54	2642.42	0.260	0.00	0.35	0.041	A

Main results: (08:00-08:15)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (min)	LOS
A	307.45	76.86	307.40	1724.39	0.00	0.00	4861.86	4861.86	0.063	0.06	0.07	0.013	A
B	1113.84	278.46	1112.78	0.00	307.40	0.00	2317.86	0.00	0.481	0.65	0.92	0.050	A
C	612.21	153.05	611.62	307.40	1112.78	0.00	1841.03	2642.42	0.333	0.35	0.50	0.049	A

Main results: (08:15-08:30)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (min)	LOS
A	376.55	94.14	376.48	2110.40	0.00	0.00	4861.86	4861.86	0.077	0.07	0.08	0.013	A
B	1364.16	341.04	1361.89	0.00	376.48	0.00	2271.42	0.00	0.601	0.92	1.49	0.066	A
C	749.79	187.45	748.51	376.48	1361.89	0.00	1661.62	2642.42	0.451	0.50	0.82	0.066	A

Main results: (08:30-08:45)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (min)	LOS
A	376.55	94.14	376.55	2113.90	0.00	0.00	4861.86	4861.86	0.077	0.08	0.08	0.013	A
B	1364.16	341.04	1364.13	0.00	376.55	0.00	2271.37	0.00	0.601	1.49	1.50	0.066	A
C	749.79	187.45	749.78	376.55	1364.13	0.00	1660.01	2642.42	0.452	0.82	0.82	0.066	A

Main results: (08:45-09:00)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (min)	LOS
A	307.45	76.86	307.52	1729.57	0.00	0.00	4861.86	4861.86	0.063	0.08	0.07	0.013	A
B	1113.84	278.46	1116.09	0.00	307.52	0.00	2317.78	0.00	0.481	1.50	0.93	0.050	A
C	612.21	153.05	613.48	307.52	1116.09	0.00	1838.64	2642.42	0.333	0.82	0.50	0.049	A

Main results: (09:00-09:15)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (min)	LOS
A	257.48	64.37	257.52	1447.15	0.00	0.00	4861.86	4861.86	0.053	0.07	0.06	0.013	A
B	932.78	233.20	933.87	0.00	257.52	0.00	2351.40	0.00	0.397	0.93	0.66	0.042	A
C	512.69	128.17	513.29	257.52	933.87	0.00	1969.88	2642.42	0.260	0.50	0.35	0.041	A

Queueing Delay Results for each time segment

Queueing Delay results: (07:45-08:00)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
A	0.83	0.06	0.013	A	A
B	9.62	0.64	0.042	A	A
C	5.16	0.34	0.041	A	A

Queueing Delay results: (08:00-08:15)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
A	1.01	0.07	0.013	A	A
B	13.54	0.90	0.050	A	A
C	7.32	0.49	0.049	A	A

Queueing Delay results: (08:15-08:30)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
A	1.25	0.08	0.013	A	A
B	21.67	1.44	0.066	A	A
C	11.95	0.80	0.066	A	A

Queueing Delay results: (08:30-08:45)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
A	1.26	0.08	0.013	A	A
B	22.39	1.49	0.066	A	A
C	12.28	0.82	0.066	A	A

Queueing Delay results: (08:45-09:00)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
A	1.02	0.07	0.013	A	A
B	14.28	0.95	0.050	A	A
C	7.66	0.51	0.049	A	A

Queueing Delay results: (09:00-09:15)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
A	0.84	0.06	0.013	A	A
B	10.07	0.67	0.042	A	A
C	5.37	0.36	0.041	A	A

Junctions 8

ARCADY 8 - Roundabout Module

Filename: Import of 110825_A_5 (PM Peak) 150414.arc8
Path: X:\Projects\120000\120825 - Hillington Park, Glasgow\Modelling\Arcady\Hillington_Mossland (110825_A_05)
Report generation date: 15/04/2014 15:51:42

« (Default Analysis Set) - Hillington Park, Glasgow: Development Case Flows, PM Peak Hour - Peak Profile, AM
» Junction Network
» Arms
» Traffic Flows
» Entry Flows
» Direct/Resultant Flows
» Turning Proportions
» Vehicle Mix
» Results

Summary of junction performance

	AM				
	Queue (Veh)	Delay (min)	RFC	LOS	Network Residual Capacity
	A1 - Hillington Park, Glasgow: Development Case Flows, PM Peak Hour - Peak Profile				
Arm A	0.05	0.01	0.05	A	14 %
Arm B	2.04	0.07	0.67	A	
Arm C	2.63	0.14	0.73	A	[Arm C]

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Network Residual Capacity indicates the amount by which network flow could be increased before a user-definable threshold (see Analysis Options) is met.

'D1 - Hillington Park, Glasgow: Development Case Flows, PM Peak Hour - Peak Profile, AM '' model duration: 16:45 - 18:15

Run using Junctions 8.0.2.316 at 15/04/2014 15:51:41

File summary

File Description

Title	Hillington Park, Glasgow: Development Case Flows, PM Peak Hour - Peak Profile
Location	Hillington Road / Mossland Drive
Site Number	
Date	31/01/2014
Version	
Status	Proposed Layout (Drg. No: 110825/A/5)
Identifier	
Client	MEPC
Jobnumber	120825
Enumerator	David Noyce
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	RFC Threshold	Average Delay Threshold (min)	Queue Threshold (PCU)
5.75		✓	Delay	0.85	0.60	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	Veh	Veh	perHour	min	-Min	perMin

(Default Analysis Set) - Hillington Park, Glasgow: Development Case Flows, PM Peak Hour - Peak Profile, AM

Data Errors and Warnings

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

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set (s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	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)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relat
Hillington Park, Glasgow: Development Case Flows, PM Peak Hour - Peak Profile, AM	Hillington Park, Glasgow: Development Case Flows, PM Peak Hour - Peak Profile	AM		Varies by Arm	16:45	18:15	90	15				✓		

Junction Network

Junctions

Name	Junction Type	Arm Order	Grade Separated	Large Roundabout	Do Geometric Delay	Junction Delay (min)	Junction LOS
(untitled)	Roundabout	A,B,C				0.09	A

Junction Network Options

Driving Side	Lighting	Network Residual Capacity (%)	First Arm Reaching Threshold
Left	Normal/unknown	14	Arm C

Arms

Arms

Arm	Name	Description
A	Hillington Road (North)	
B	Hillington Road (South)	
C	Mossland Drive	

Capacity Options

Arm	Minimum Capacity (PCU/hr)	Maximum Capacity (PCU/hr)	Assume Flat Start Profile	Initial Queue (PCU)
A	0.00	99999.00		0.00
B	0.00	99999.00		0.00
C	0.00	99999.00		0.00

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
A	12.00	16.00	500.00	50.00	58.00	30.00	
B	7.00	9.10	19.20	30.00	65.00	18.10	
C	7.00	10.50	30.50	20.00	65.00	34.00	

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
A	None
B	None
C	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)
A		(calculated)	(calculated)	1.152	4959.100
B		(calculated)	(calculated)	0.716	2741.634
C		(calculated)	(calculated)	0.717	2856.460

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 (Veh/hr)	Flow Scaling Factor (%)
A	ONE HOUR	✓	206.00	100.000
B	ONE HOUR	✓	1543.00	100.000
C	ONE HOUR	✓	1042.00	100.000

Direct/Resultant Flows

Direct Flows Data

Time Segment	Arm	Direct Demand Entry Flow (Veh/hr)	DirectDemandEntryFlowInPCU (PCU/hr)	Direct Demand Exit Flow (Veh/hr)	Direct Demand Pedestrian Flow (Ped/hr)
16:45-17:00	A	155.09	155.09		
16:45-17:00	B	1161.65	1186.05		
16:45-17:00	C	784.47	803.30		
17:00-17:15	A	185.19	185.19		
17:00-17:15	B	1387.13	1416.25		
17:00-17:15	C	936.74	959.22		
17:15-17:30	A	226.81	226.81		
17:15-17:30	B	1698.87	1734.55		
17:15-17:30	C	1147.26	1174.80		
17:30-17:45	A	226.81	226.81		
17:30-17:45	B	1698.87	1734.55		
17:30-17:45	C	1147.26	1174.80		
17:45-18:00	A	185.19	185.19		
17:45-18:00	B	1387.13	1416.25		
17:45-18:00	C	936.74	959.22		
18:00-18:15	A	155.09	155.09		
18:00-18:15	B	1161.65	1186.05		
18:00-18:15	C	784.47	803.30		

Turning Proportions

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

		To		
		A	B	C
From	A	0.000	0.000	206.000
	B	1543.000	0.000	0.000
	C	1042.000	0.000	0.000

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

		To		
		A	B	C
From	A	0.00	0.00	1.00
	B	1.00	0.00	0.00
	C	1.00	0.00	0.00

Vehicle Mix

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

		To		
		A	B	C
From	A	1.000	1.000	1.000
	B	1.021	1.000	1.000
	C	1.024	1.000	1.000

Heavy Vehicle Percentages - Junction 1 (for whole period)

		To		
		A	B	C
From	A	0.000	0.000	0.000
	B	2.100	0.000	0.000
	C	2.400	0.000	0.000

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (min)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)	Total Queueing Delay (Veh-min)	Average Queueing Delay (min)	Rate Of Queueing Delay (Veh-min/min)	Inclusive Total Queueing Delay (Veh-min)	Inclusive Average Queueing Delay (min)
A	0.05	0.01	0.05	A	189.03	283.54	3.57	0.01	0.04	3.57	0.01
B	0.67	0.07	2.04	A	1415.88	2123.83	120.08	0.06	1.33	120.09	0.06
C	0.73	0.14	2.63	A	956.16	1434.24	128.24	0.09	1.42	128.24	0.09

Main Results for each time segment

Main results: (16:45-17:00)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (min)	LOS
A	155.09	38.77	154.96	1940.20	0.00	0.00	4959.10	4959.10	0.031	0.00	0.03	0.012	A
B	1161.65	290.41	1158.38	0.00	154.96	0.00	2576.61	0.00	0.451	0.00	0.82	0.042	A
C	784.47	196.12	781.82	154.96	1158.38	0.00	1961.55	2789.51	0.400	0.00	0.66	0.051	A

Main results: (17:00-17:15)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (min)	LOS
A	185.19	46.30	185.16	2320.76	0.00	0.00	4959.10	4959.10	0.037	0.03	0.04	0.013	A
B	1387.13	346.78	1385.68	0.00	185.16	0.00	2555.43	0.00	0.543	0.82	1.18	0.051	A
C	936.74	234.18	935.08	185.16	1385.68	0.00	1799.08	2789.51	0.521	0.66	1.08	0.069	A

Main results: (17:15-17:30)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (min)	LOS
A	226.81	56.70	226.77	2836.73	0.00	0.00	4959.10	4959.10	0.046	0.04	0.05	0.013	A
B	1698.87	424.72	1695.49	0.00	226.77	0.00	2526.26	0.00	0.672	1.18	2.02	0.072	A
C	1147.26	286.82	1141.24	226.77	1695.49	0.00	1577.64	2789.51	0.727	1.08	2.58	0.136	A

Main results: (17:30-17:45)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (min)	LOS
A	226.81	56.70	226.81	2845.87	0.00	0.00	4959.10	4959.10	0.046	0.05	0.05	0.013	A
B	1698.87	424.72	1698.82	0.00	226.81	0.00	2526.23	0.00	0.672	2.02	2.04	0.073	A
C	1147.26	286.82	1147.06	226.81	1698.82	0.00	1575.27	2789.51	0.728	2.58	2.63	0.140	A

Main results: (17:45-18:00)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (min)	LOS
A	185.19	46.30	185.23	2333.36	0.00	0.00	4959.10	4959.10	0.037	0.05	0.04	0.013	A
B	1387.13	346.78	1390.49	0.00	185.23	0.00	2555.39	0.00	0.543	2.04	1.20	0.052	A
C	936.74	234.18	942.86	185.23	1390.49	0.00	1795.64	2789.51	0.522	2.63	1.10	0.071	A

Main results: (18:00-18:15)

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Entry Flow (Veh/hr)	Exit Flow (Veh/hr)	Circulating Flow (Veh/hr)	Pedestrian Demand (Ped/hr)	Capacity (Veh/hr)	Saturation Capacity (Veh/hr)	RFC	Start Queue (Veh)	End Queue (Veh)	Delay (min)	LOS
A	155.09	38.77	155.11	1949.32	0.00	0.00	4959.10	4959.10	0.031	0.04	0.03	0.013	A
B	1161.65	290.41	1163.13	0.00	155.11	0.00	2576.50	0.00	0.451	1.20	0.83	0.043	A
C	784.47	196.12	786.19	155.11	1163.13	0.00	1958.15	2789.51	0.401	1.10	0.67	0.051	A

Queueing Delay Results for each time segment

Queueing Delay results: (16:45-17:00)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
A	0.48	0.03	0.012	A	A
B	11.99	0.80	0.042	A	A
C	9.71	0.65	0.051	A	A

Queueing Delay results: (17:00-17:15)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
A	0.58	0.04	0.013	A	A
B	17.31	1.15	0.051	A	A
C	15.71	1.05	0.069	A	A

Queueing Delay results: (17:15-17:30)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
A	0.72	0.05	0.013	A	A
B	29.28	1.95	0.072	A	A
C	36.17	2.41	0.136	A	A

Queueing Delay results: (17:30-17:45)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
A	0.72	0.05	0.013	A	A
B	30.49	2.03	0.073	A	A
C	39.19	2.61	0.140	A	A

Queueing Delay results: (17:45-18:00)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
A	0.58	0.04	0.013	A	A
B	18.40	1.23	0.052	A	A
C	17.15	1.14	0.071	A	A

Queueing Delay results: (18:00-18:15)

Arm	Queueing Total Delay (Veh-min)	Queueing Rate Of Delay (Veh-min/min)	Average Delay Per Arriving Vehicle (min)	Unsignalised Level Of Service	Signalised Level Of Service
A	0.49	0.03	0.013	A	A
B	12.60	0.84	0.043	A	A
C	10.29	0.69	0.051	A	A