

Designing Streets: Does it Increase Active Travel?

A Polnoon Case Study

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Thanks must also go to Transport Scotland (TS), in particular Dr Jeanine Bezuijen, for providing detailed datasets from the Scottish Household Survey relevant to this study.

Finally, I'd also like to thank the residents of Polnoon for their participation in the study.

Declarations

This report contains 4940 words, excluding figures, tables, references and appendices; where appropriate.

1. Introduction

1.1 Background

Inspired from Hans Monderman's shared space and from 'Manual for Streets' (DfT, 2007), 'Designing Streets' is a Policy Statement produced by The Scottish Government (TSG) in 2010 to promote better street design. In contrast to the roads standards approach which has characterised new residential developments in the post war era, 'Designing Streets' advocates a more holistic approach.

'Designing Streets' is assertive in the notion that 'a sense of place' should form an important component in street design, however, also concedes that "providing for movement along a street is vital." It specifies that "the need to cater for motor vehicles is well understood by designers, but the passage of people on foot and cycle has often been neglected" (TSG, 2010).

To address this, a 'street user hierarchy' is established which provides a framework to ensure the needs of active travel users are prioritised (Figure 1). Design features such as shared space and permeable street layouts are two key measures to prioritise active travel in accordance with this.

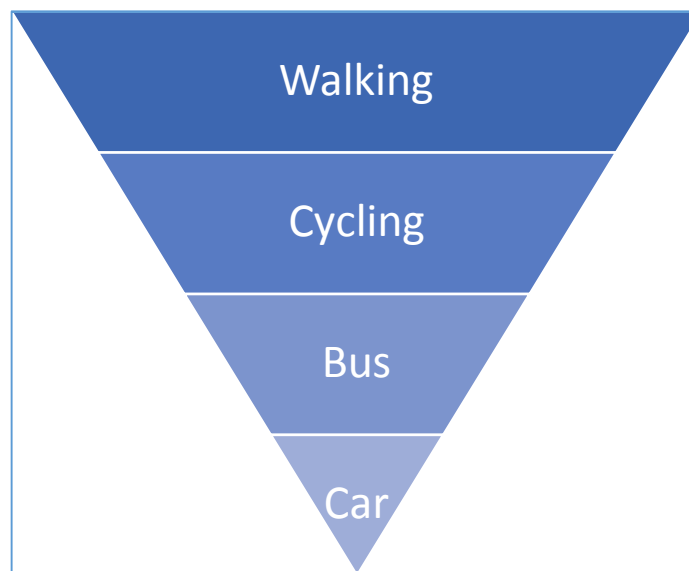


Figure 1: Street User Hierarchy

It further identifies that "streets should be designed, not only to allow for walking but to actively encourage it to take place" and that "attractive and well-connected street networks encourage more people to walk and cycle to local destinations" (TSG, 2010) (see also Gowenlock and Anwar, 2009).

1.2 Research Purpose

'Designing Streets' has now been implemented for seven years and there are a number of residential developments now constructed that adopt its principles. This provides the opportunity to assess the extent to which the policy document delivers on its aim to prioritise and increase active travel propensity; in accordance with TSG's long-term policy drive.

The following research question will therefore be addressed:

Research Question

How successful are residential developments designed in accordance with 'Designing Streets' in increasing and encouraging walking and cycling to local destinations situated out with the site?

Primary research at the recently constructed residential development of Polnoon in Eaglesham has been undertaken. This site is widely regarded as the pioneering site in Scotland which exhibits 'Designing Streets' principles.

The following research study aims have been devised:

Research Aims

Number	Aim
1	To ascertain the facilities and amenities ('local destinations') within a suitable walking and cycling proximity of the Polnoon site.
2	To understand the extent to which Polnoon residents identify that they walk or cycle to local destinations out with the confines of the site ('Stated Active Travel Behaviour').
3	To observe the extent to which Polnoon residents walk or cycle to local destinations out with the confines of the site ('Observed Active Travel Behaviour').
4	To determine how stated and observed active travel behaviour at Polnoon compares with secondary datasets from areas that do not exhibit Designing Streets principles.
5	To gauge residents' opinions on the street design and layout with a specific focus on understanding whether these features influence their propensity to walk or cycle to local destinations.

2. 'Designing Streets' Active Travel Principles

2.1 Shared Space

Originally coined by Hans Monderman (see Kaparias et al. 2015), shared space incorporates all modes on the street without designated segregation. It is a paradoxical concept whereby there is a need to *"think...negotiate and to understand the needs of others"* (Monderman in Hamilton-Bailie Jones, 2005). 'Designing Streets' sets out four objectives for shared space, identified in [Table 10](#).

Shared space has become a divisive issue, particularly since the death of a child pedestrian (BBC, 2016); there is growing pressure that it is unsafe, cannot meet pedestrians' needs and dissuades active travel. For example, a report by Holmes (2015) showed that 35% of 852 participants avoid shared space on pedestrian safety grounds. Methorst et al. (2007) further argue that *"the introduction of danger to incite safe behaviour, is disputable and brings along unacceptable risks."*

Evidence from before and after studies at shared space schemes is limited. A study by Kasparias et al. (2015) was inconclusive in proving that cars and pedestrians mixed well in shared space which contrasts with Karndacharuk et al. (2016) who revealed a positive relationship between pedestrian priority and the perception of safety.

More relevant is Curl et al. (2015) who demonstrated a notable improvement in the perception of walking at dense urban residential shared space schemes, however, there was limited evidence to suggest it increased active travel amongst the older cohort studied.

2.2 Permeable Street Networks

'Designing Streets' identifies that a further component is ensuring streets are well-connected ('permeable'), both internally and externally. This *"encourages walking and cycling and makes navigation through places easier"* (TSG, 2010). There is a consensus that 'permeable' street networks are successful in increasing walking considering they minimise distances to local destinations (see Sarkar et al. 2015 and Koonsari et al. 2017).

3. Polnoon Site Background

3.1 Site Location

The location of Polnoon is shown in [Figure 2](#).

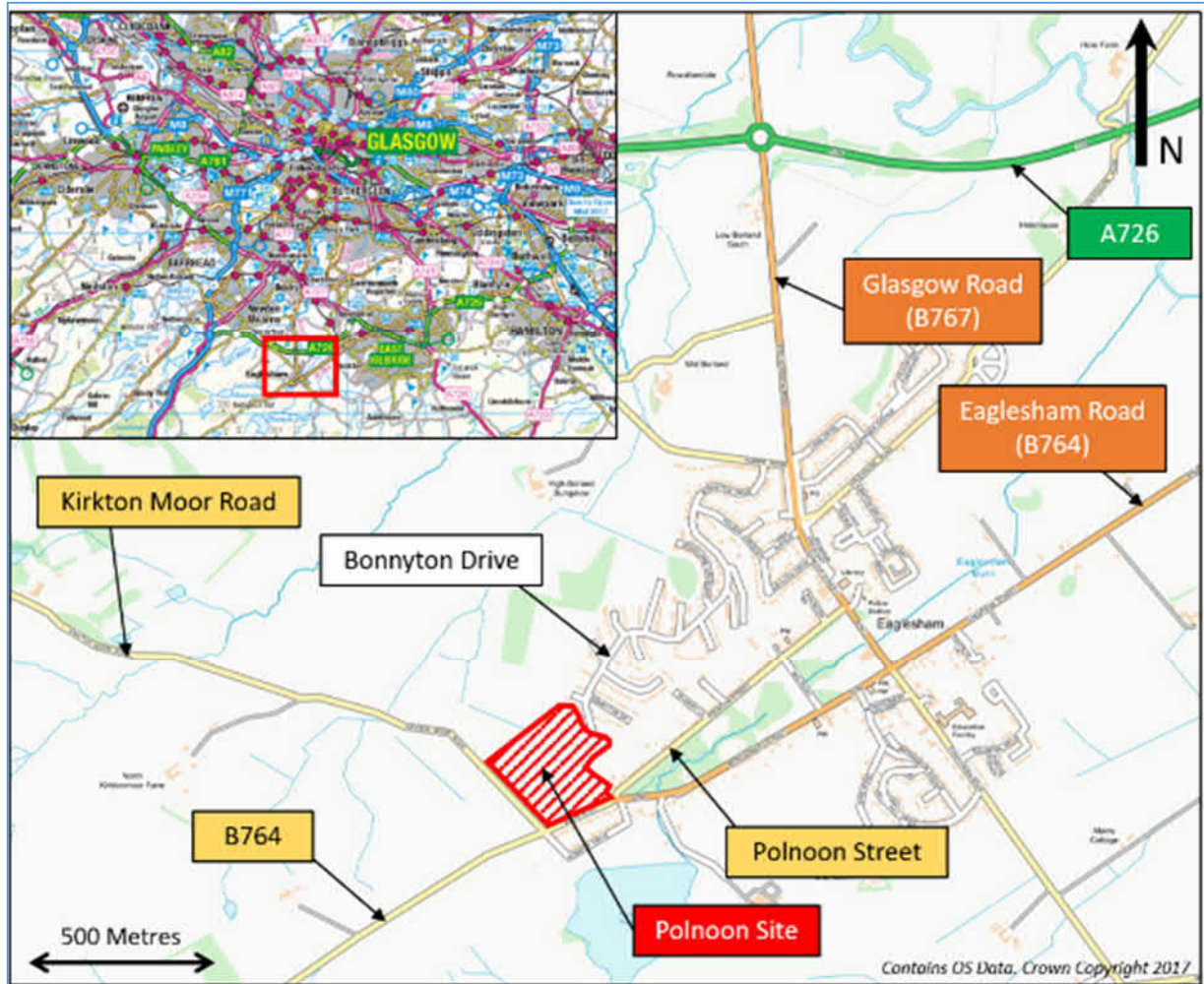


Figure 2: Polnoon Site Location

3.2 Planning History

Consent was originally granted by ERC in 2006 for 92 units. The proposed site layout ([Figure 3](#)) was designed in accordance with more traditional roads standards. A Transport Assessment (TA) was produced, although ERC have been unable to source this.



Figure 3: Polnoon Site Original Layout and Design

The developers, Mactaggart & Mickel Ltd, ERC and TSG worked in collaboration in 2008 to develop a new Masterplan taking cognisance of *'Designing Streets'* principles (see [Figure 4](#)).



Figure 4: Revised Site Layout

In summary, the transport aspirations of the site identified in the Design Statement (Proctor and Matthews, 2009) were:

- *“The proposed site takes into account the wider context and neighbourhood with good connections and routes for both vehicles and pedestrians within the site and to the local area and more widely.”*
- *“The proposals will create the conditions for people to enjoy being in the external environment....”* and
- *“The shared space principle is designed to improve safety on the roads, and the route to school...street planting, parking and the general arrangement of the public realm and buildings are utilised to reduce driver speeds...”*

A further good practice Polnoon Masterplanning document was also retrospectively produced by TSG (2010). Transport related aspects include:

- *“the new design offers a clear hierarchy of shared surface public realm spaces...which will assist in reducing vehicular speeds and create a more pedestrian friendly environment.”*
- *“Together, these will improve the spatial permeability within the site as well as providing effective links between the site and surrounding residential areas to encourage the use of walking, cycling and public transport.”*

Consent was granted for the revised proposals in January 2011 (Planning Reference: 2009/0232/TP).

3.4 Current Site Status

The site has been constructed according to two phases, with the first units occupied in 2013. Phase 2 remains under construction, however, most of the site was complete except for approximately 8 units which are due to be completed in December 2017 (Mactaggart & Mickel, 2017). Units are generally detached and consist of between 3 and 6 bedrooms. There are children’s playparks throughout the site.

It is understood that bus stops that were previously constructed within the site have since been removed on commercial viability grounds.

Photos of the site are provided in [Figure 5 – Figure 8](#).



Figure 5: Polnoon Shared Space



Figure 6: Close Proximity of Buildings



Figure 7: Polnoon Site



Figure 8: Example of Children's Playpark Within the Site

4. Research Methodology

4.1 Overview

Table 1 provides a summary of the research methodology and its relevance to the study aims.

Table 1: Research Methodology Relevance to Research Aims

Research Method	Research Aims				
	Aim 1	Aim 2	Aim 3	Aim 4	Aim 5
Walking and Cycling Accessibility Audit					
Questionnaire					
Multi-Modal Survey					
Secondary Dataset Extraction					

4.2 Walking and Cycling Accessibility Audit

The walking isochrones were prepared taking cognisance of Transport Assessment Guidance (TAG) (2012) which identifies that “*journey times of up to 20-30 minutes are appropriate for walking.*” Journey times were calculated using a walking speed of 1.4 m/s (IHT, 2000); equating to 1680m and 2520m. Planning Advice Note (PAN) - 75 (2005) was also used which identifies that 1600m is appropriate for “*accessibility to local facilities.*”

Cycling isochrones were also prepared using TAG which identifies that “*journey times of...30 – 40 minutes for cycling*” is appropriate. There is no guidance for cycling speeds and therefore an average speed of 10mph has been assumed. This is in accordance with online journey planning tools and remains less than the average cycling speed (Strava, 2016).

4.3 Questionnaire

Questionnaires were undertaken in October 2017. The questionnaire is included within [Appendix A](#).

Two approaches were undertaken to ensure the highest possible sample rate:

- Questionnaires were directly administered; and
- Questionnaires were posted and collected the following weekend.

45 households participated, representing a sample rate of 40%.

4.4 Multi-Modal Survey

A multi-modal camera survey was undertaken by Tracsis (see [Figure 9](#)) on Wednesday 8 November 2017. Necessary permissions were obtained from both Police Scotland and ERC and the footage subsequently destroyed.

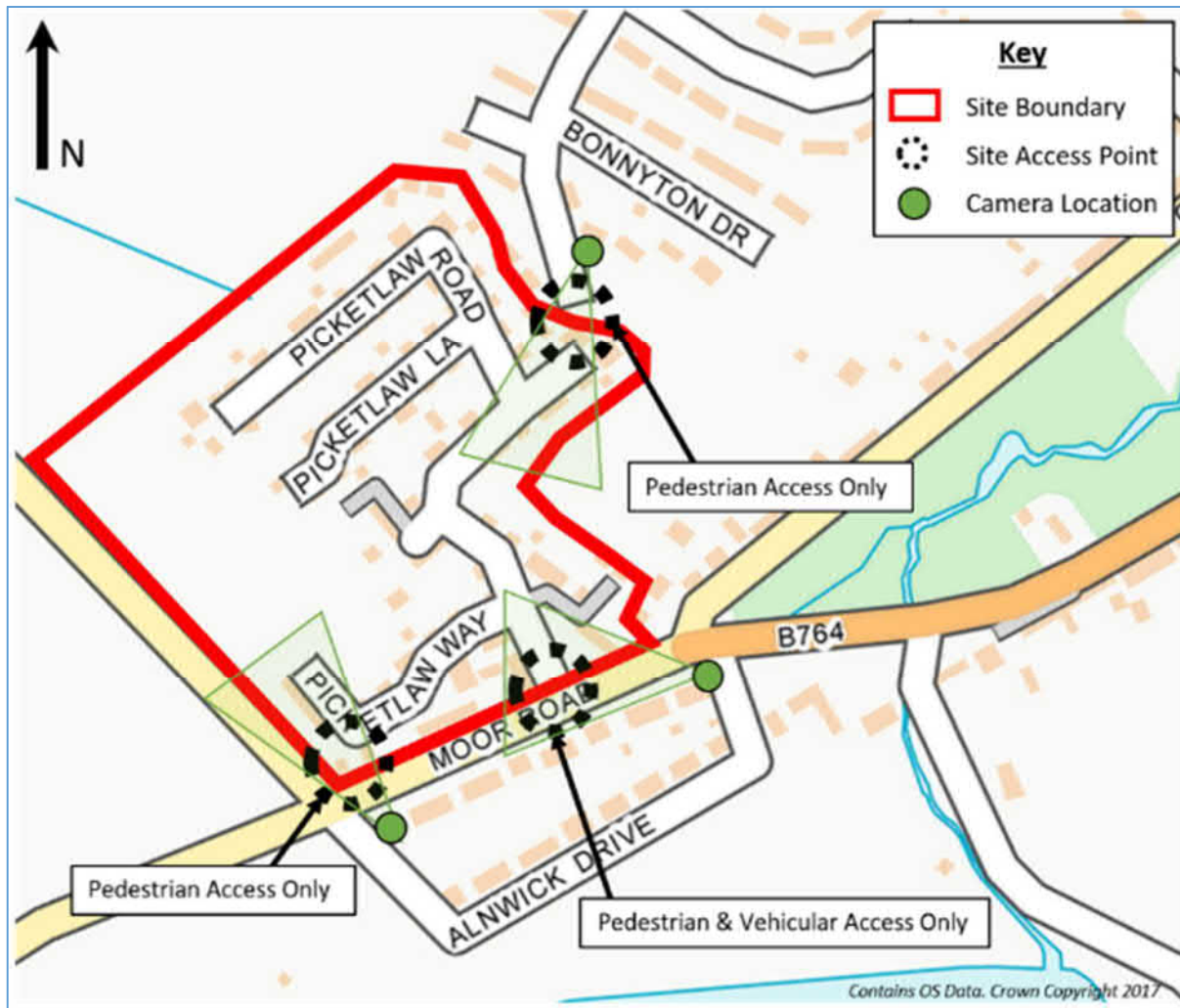


Figure 9: Multi-modal survey method

Survey footage was observed to calculate the total inward and outward multi-modal trips.

4.5 Secondary Dataset Extraction

The collected data was compared with three secondary datasets:

- 2011 Census;
- Scottish Household Survey (SHS); and
- TRICS.

2011 Census data was extracted from Eaglesham output areas located immediately surrounding the site (**Figure 10**). Further data was also extracted for:

- Eaglesham locality;
- ERC; and
- Scotland.

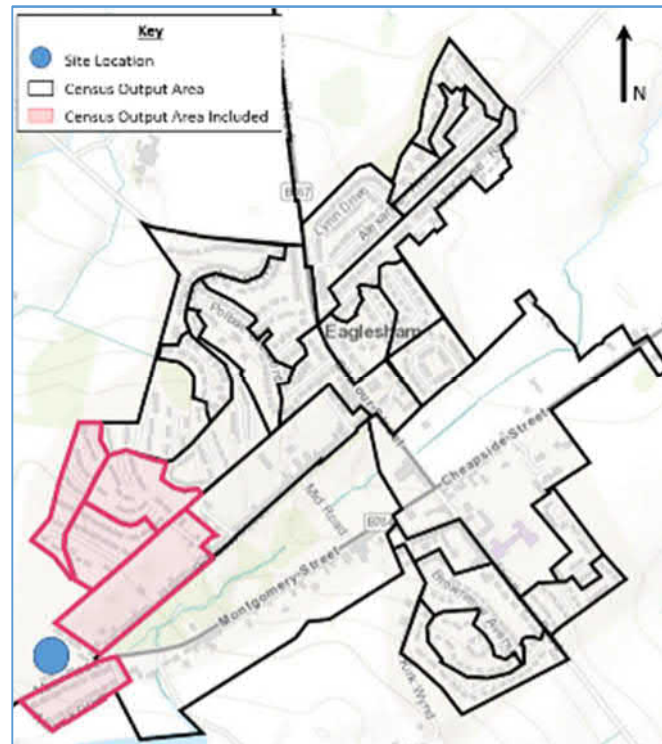


Figure 10: Census Output Areas Considered

Additional modal split data was also extracted from the 2016 SHS. This was directly obtained from TS to ensure consistency with the questionnaire.

Multi-modal surveys were compared with similar sites contained within the TRICS version 7.4.4 database. Sites were additionally filtered to consider sites located a similar proximity away from local facilities (**Appendix B**).

5. Active Travel Accessibility Audit

5.1 Research Aim Relevance

This chapter addresses the following research aim:

Research Aims	
Number	Aim
1	To ascertain the facilities and amenities (<i>'local destinations'</i>) within a suitable walking and cycling proximity of the Polnoon site.

5.2 Walking Accessibility

Figure 11 contains 1600 m walking isochrones whilst Figure 12 contains 20 – 30 minute walking isochrones (see also Appendix C).

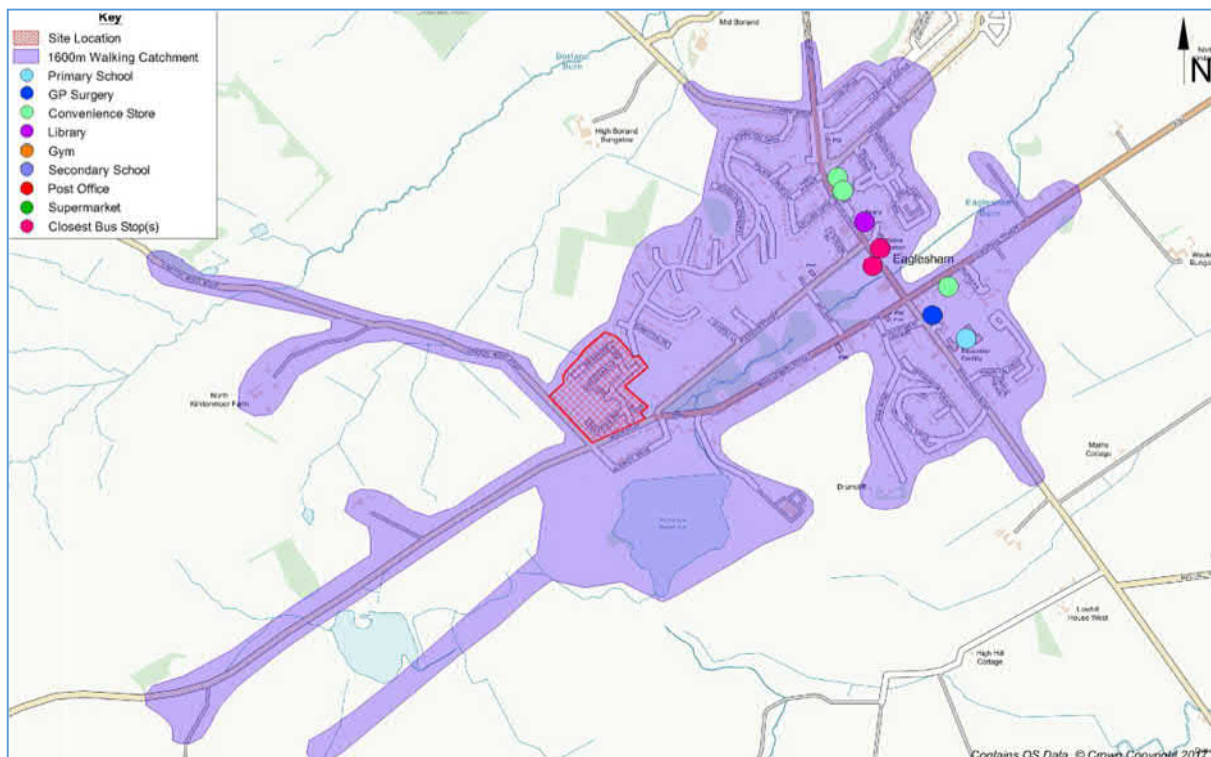


Figure 11: 1600m Walking Isochrones

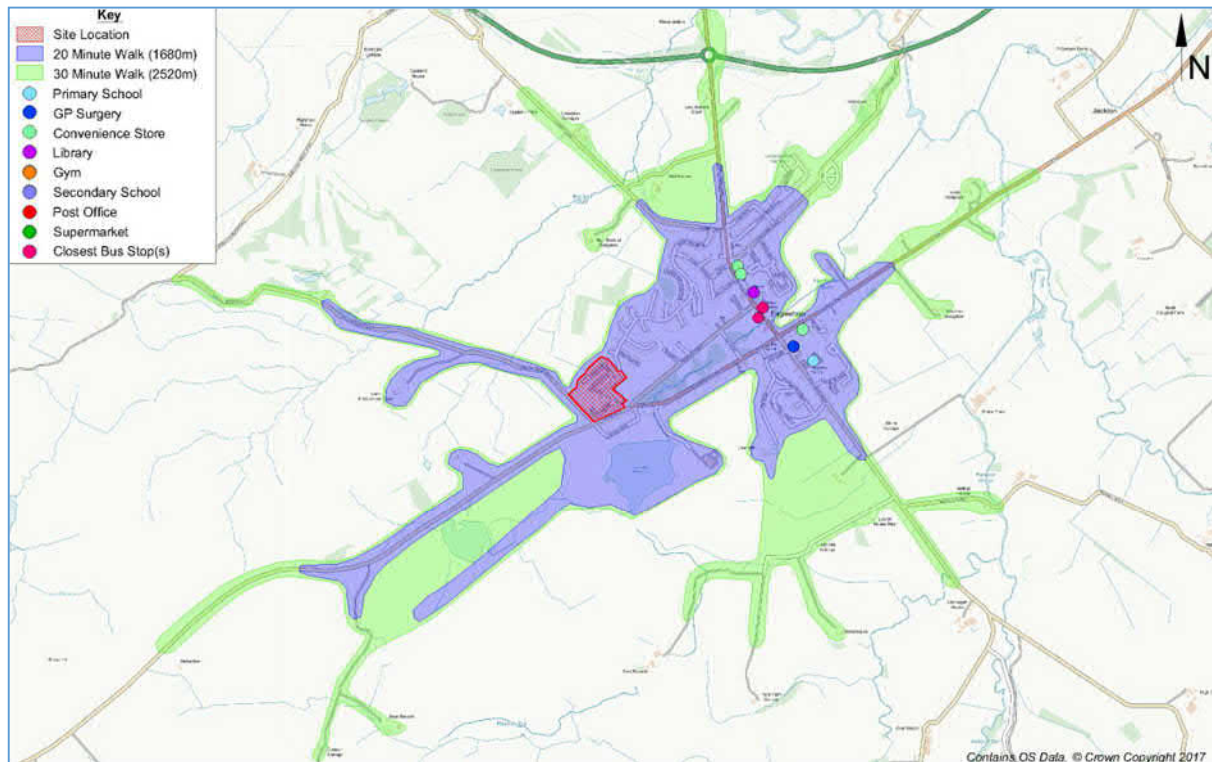


Figure 12: 20 – 30 Minutes Walking Isochrones

There are local facilities located within a reasonable walk. The nearest bus stop is 1000m to the east, which exceeds the 400m requirement identified in TAG.

The exact walking distance to these destinations has been summarised in [Table 2](#).

Table 2: Summary of Local Destinations in Walking Proximity		
Local Amenity / Facility	Distance **	Approximate Walking Time*
Maclean Medical Practice	1000m	12 Minutes
Eaglesham Library	1000m	12 Minutes
Bus Stop for Southbound Services on Gilmour St	1000m	12 Minutes
Bus Stop for Northbound Services on Gilmour St	1100m	13 Minutes
Scotmid Convenience Store	1100m	13 Minutes
Eaglesham Primary School	1200m	14 Minutes
Mel's Food & Wines Convenience Store	1300m	15 Minutes
Martin McColl Convenience Store	1300m	15 Minutes
* Measured from centroid of site		
** Assumes walking speed of 1.4 m/s as per IHT Guidance (2000)		

5.2 Cycling Accessibility

Figure 13 contains 30 – 40 minute cycling isochrones (see also Appendix C).

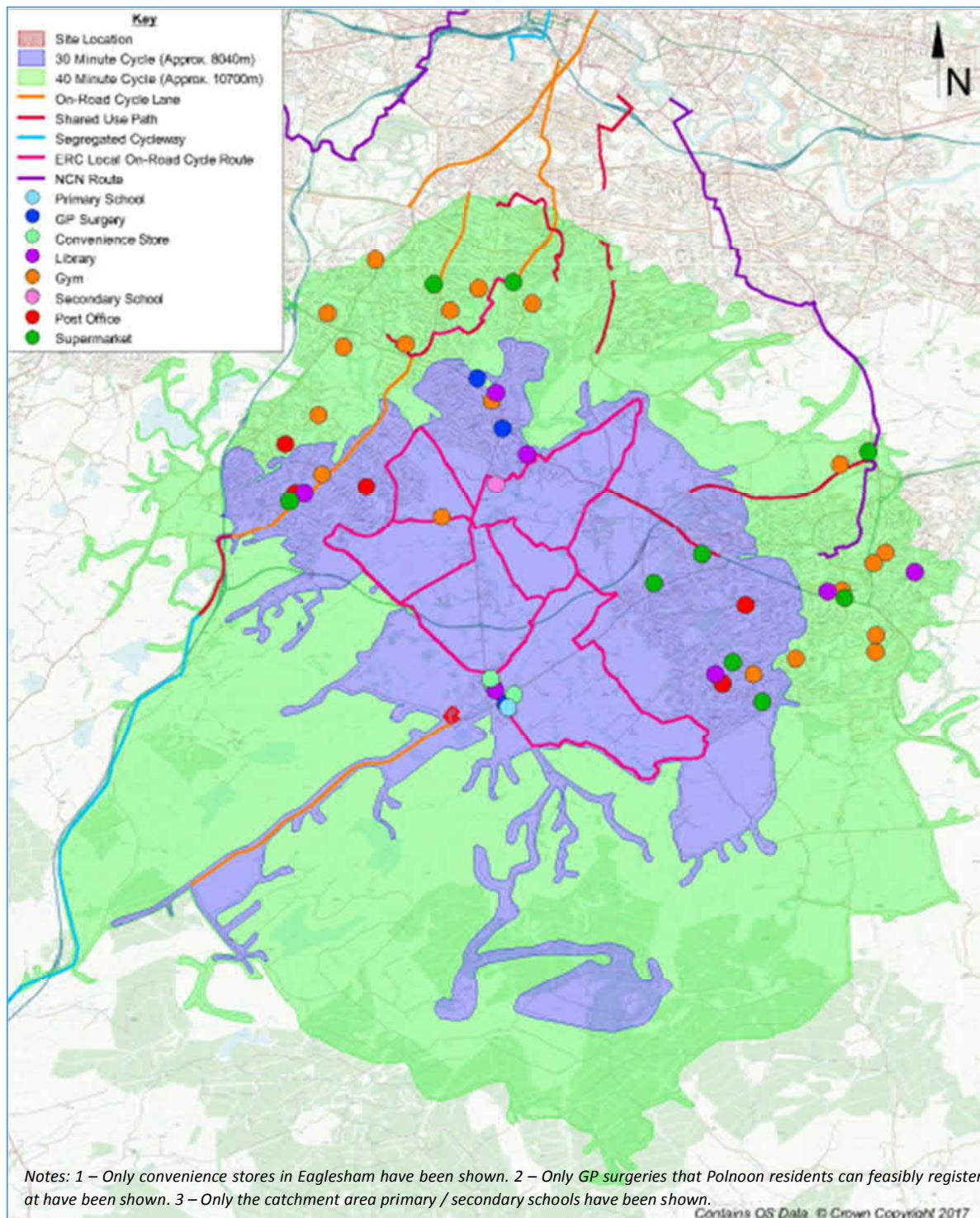


Figure 13: 30 – 40 Minutes Cycling Isochrones

With the exception of on-road cycle lane to the south west, the site is remote from dedicated cycle lane provision serving local destinations to the north. The exact cycling distance to nearest example of these amenities and facilities has been summarised in Table 3.

Table 3: Summary of Nearest Example of Local Destinations in Cycling Proximity

Local Amenity / Facility	Distance	Approximate Cycling Time
Williamwood High School	5200m	14 Minutes
Lidl East Kilbride	4800m	17 Minutes
Sheddens Medical Practice	6000m	17 Minutes
Newton Mearns Post Office	6400m	22 Minutes
Energie Fitness Club	4600m	14 Minutes
Greenhills Library	7000m	26 Minutes

Notes: 1 - Only the closest version of every local facility / amenity is listed. 2 – Cycling time is based on an average cycle speed of 10 mph.

6. Polnoon Residents' Stated and Observed Travel Behaviour

6.1 Research Aim Relevance

This chapter addresses the following research aims:

Research Aims	
Number	Aim
2	To understand the extent to which Polnoon residents identify that they walk or cycle to local destinations out with the confines of the site (<i>'Stated Active Travel Use'</i>).
3	To observe the extent to which Polnoon residents walk or cycle to local destinations out with the confines of the site (<i>'Observed Active Travel Use'</i>).
4	To determine how active travel behaviours at Polnoon compare with secondary datasets from areas that do not exhibit Designing Streets principles.

6.2 Stated Active Travel Behaviour to Place of Work or Study

Figure 14 examines mode choice amongst those aged 16 – 74 travelling to work.

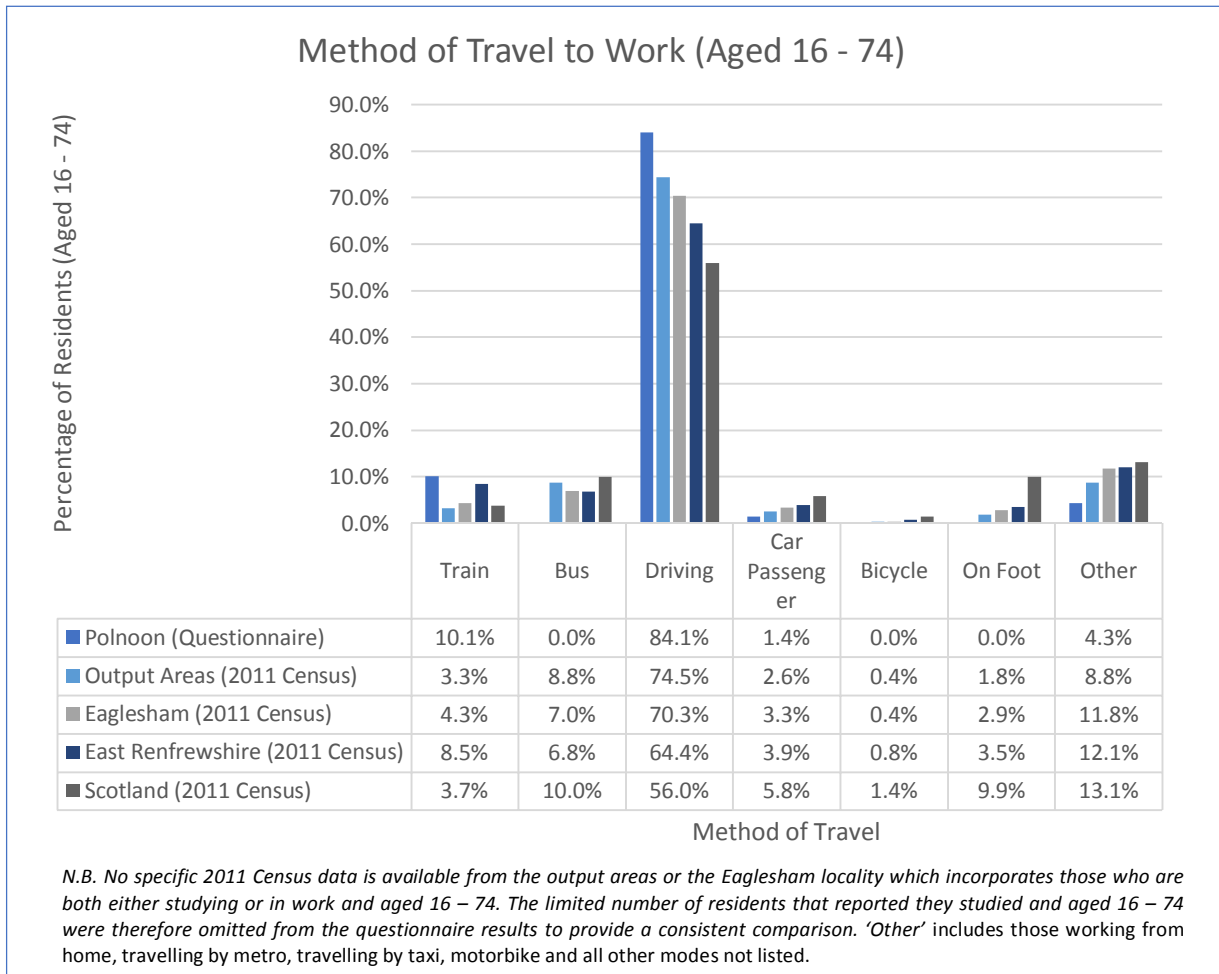


Figure 14: Method of Travel to Place of Work (Aged 16 – 74)

No Polnoon residents make use of active travel modes on their commute to work. This is lower than 2011 Census results. Bus use is also particularly low.

Figure 15 demonstrates that this can largely be explained by the fact that no Polnoon residents live within a suitable commuting walking distance whilst only 24% live within a suitable cycling distance which clearly limits active travel opportunities. As Figure 16 identifies, this is generally lower than the figures from the 2011 Census.

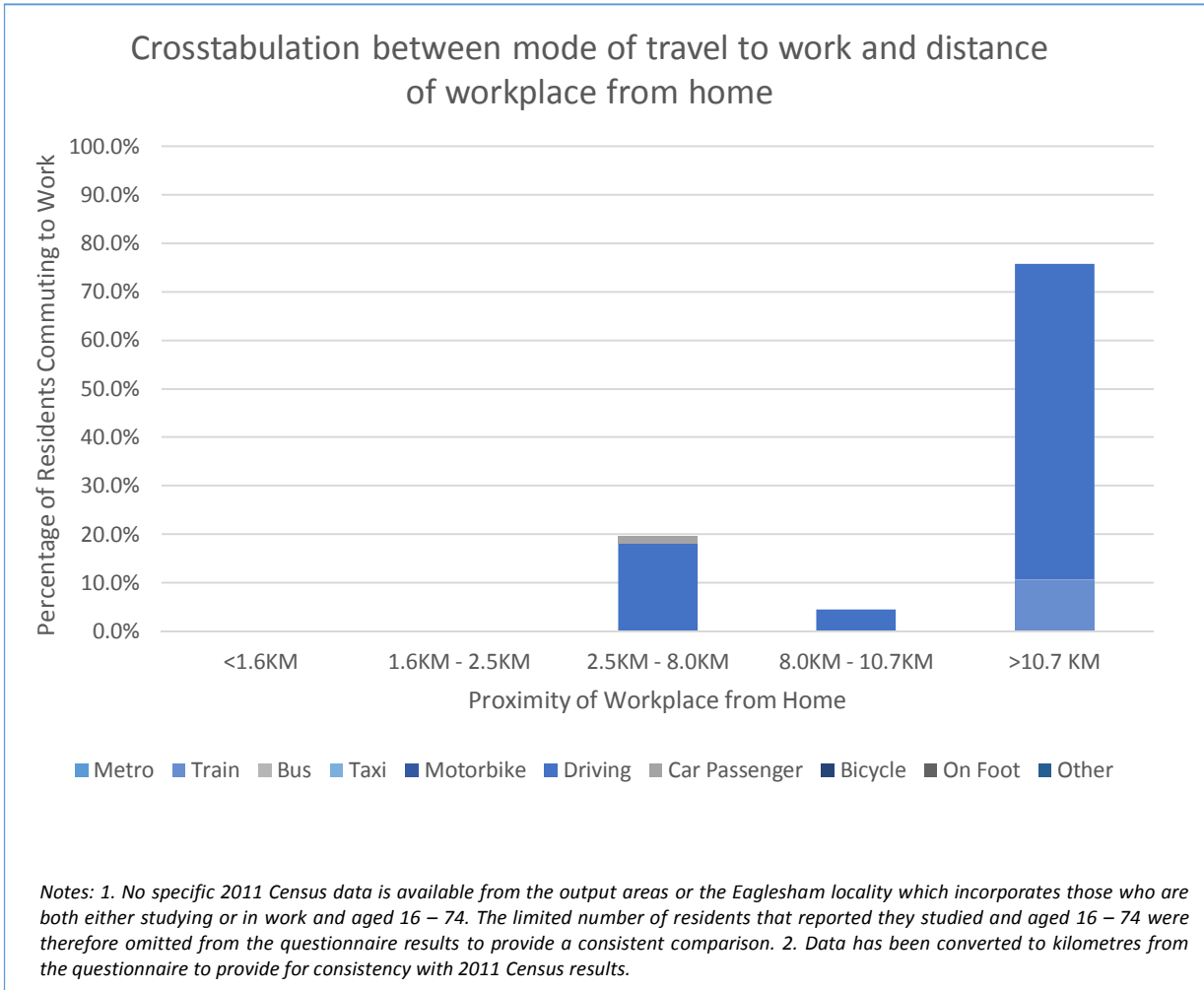


Figure 15: Polnoon Crosstabulation Between Distance to Workplace and Mode of Travel

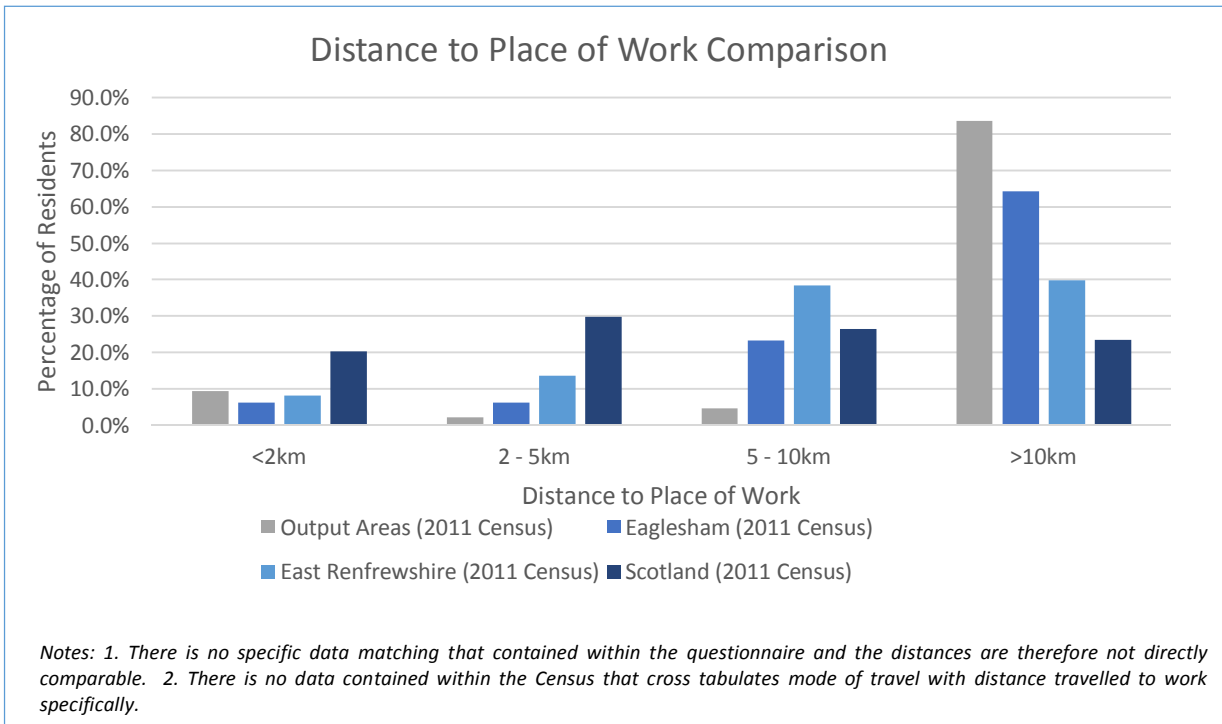


Figure 16: 2011 Census Distance to Place of Work Comparison

In contrast, Polnoon residents aged 4 – 15 are more likely to utilise active travel modes to access school (Table 4). This is marginally lower than ERC behaviour.

Table 4: Mode Choice to Place of Study Amongst Those Aged 4 – 15

Area	Bus	Car Passenger	Bicycle	On Foot	Other
Polnoon (Questionnaire)	25.0%	40.0%	0.0%	35.0%	0.0%
ERC (2011 Census)	13.3%	33.1%	0.2%	41.5%	11.9%
Scotland (2011 Census)	18.5%	22.7%	0.8%	44.5%	13.6%

Notes:

1. No data is available for the output areas or Eaglesham locality to compare with
2. 'Other' incorporates those who study from home, travel by train, metro, taxi, moped and all other modes not listed.

Figure 17 demonstrates an overall higher commuting walking rate for Polnoon when the age groups are combined.

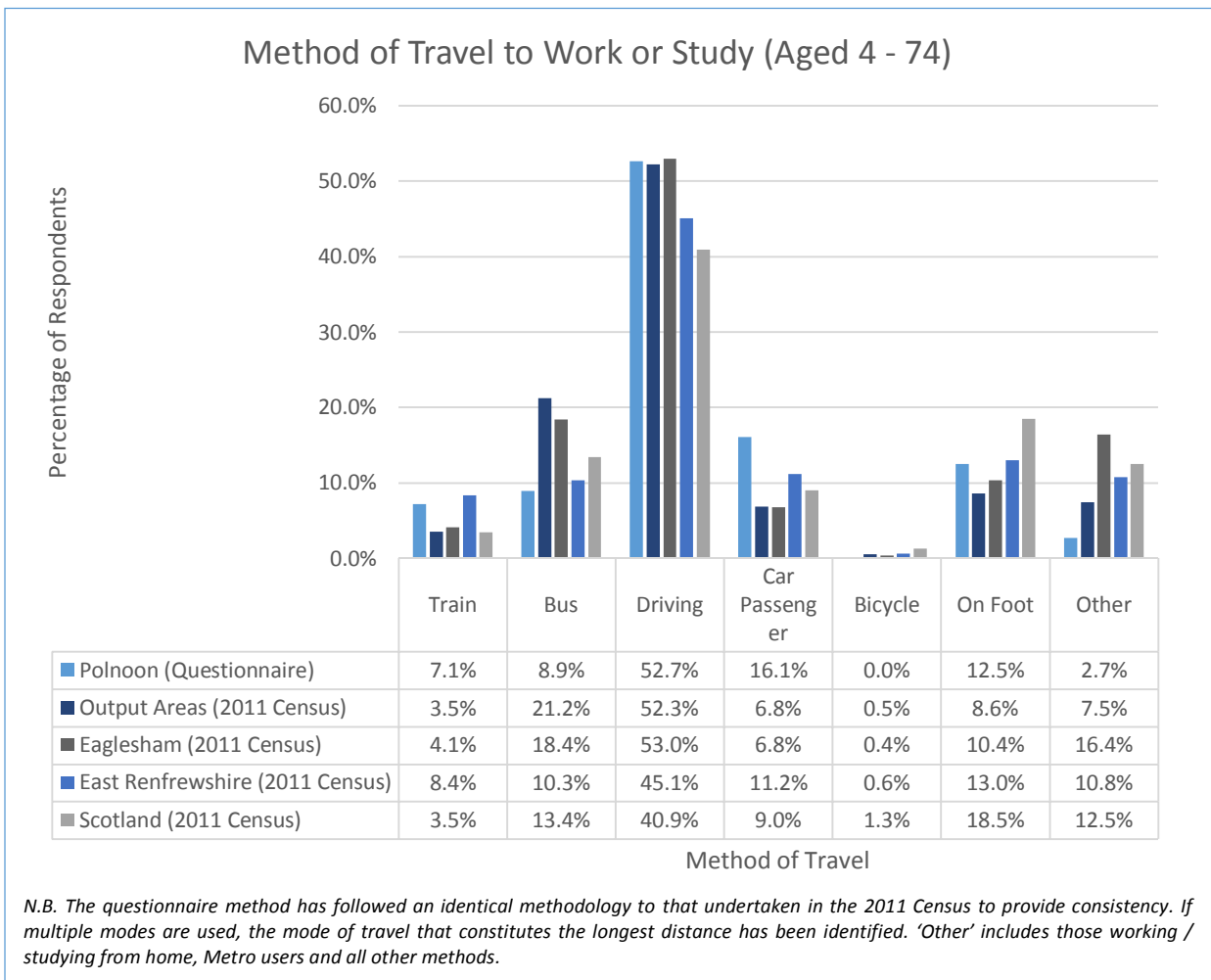


Figure 17: Method of Travel to Work or Study (Aged 4 – 74 Combined)

This can most probably be explained by the higher number of school age residents as opposed to necessarily a higher walking propensity (see [Table 5](#)).

Table 5: Residents Age Structure Comparison					
Area	< 4 Years	Aged 4 – 15	Aged 16 – 74	Aged 75+	Total
Polnoon (Questionnaire)	18.6%	24.8%	55.9%	0.6%	100.0%
Output Areas (2011 Census)	7.0%	15.2%	73.4%	4.4%	100.0%
Eaglesham Locality (2011 Census)	6.0%	13.8%	70.6%	9.7%	100.0%
East Renfrewshire Council (2011 Census)	5.5%	14.3%	71.5%	8.7%	100.0%
Scotland (2011 Census)	5.5%	11.8%	75.0%	7.7%	100.0%

6.3 Stated Active Travel Behaviour to Local Amenities and Facilities

Figure 18 provides a summary of the primary method of travel to various local destinations amongst Polnoon residents. **Table 6** indicates the reported proximity of these.

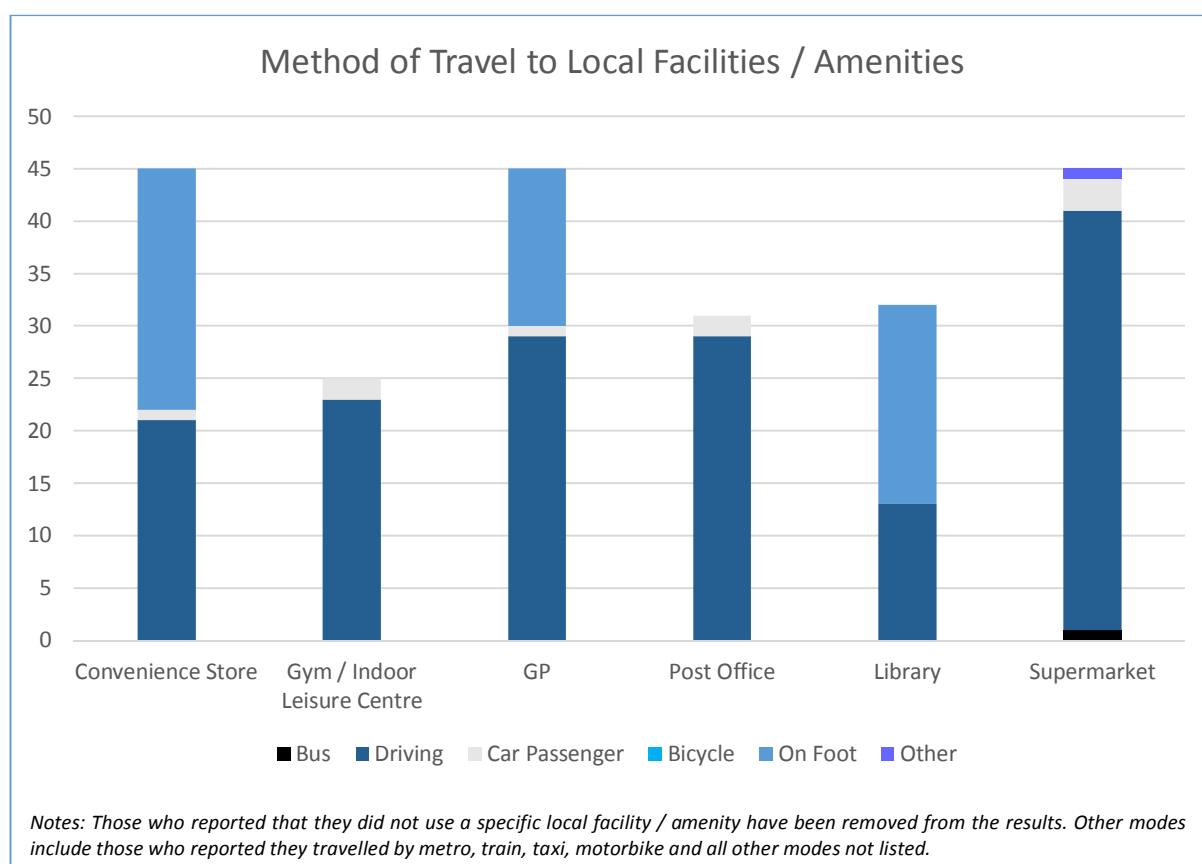


Figure 18: Method of Travel to Local Facilities / Amenities in Polnoon

Table 6: Proximity of Local Facilities / Amenities that Polnoon Residents reported they used

Facility / Amenity	Reported Proximity from Household					Total
	<1.6KM	1.6 – 2.5KM	2.5KM – 7.9KM	8 – 10.7KM	>10.7KM	
Convenience Store	45	0	0	0	0	45
Gym / Leisure Facility	0	0	10	8	7	25
GP / Health Centre	29	0	11	2	3	45
Post Office	0	0	21	4	6	31
Library	29	0	4	1	0	35
Supermarket	0	0	32	7	5	44

Notes

1. Residents were asked to provide the approximate distance to the facility / amenity they used as opposed to the closest type of the facility / amenity.
2. Those that reported that they did not use the specific facility / amenity listed have been omitted from the results.
3. Those who reported that the post office they used was <1.6KM were removed from the results. The Post Office only recently closed in Eaglesham prior to the questionnaire and therefore some residents may have been unaware of this.
4. Some residents reported an incorrect walking distance of 1.6 – 2.5KM to a facility / amenity within Eaglesham which was retrospectively adjusted to <1.6KM in accordance with the accessibility assessment undertaken.

There is limited active travel use for accessing local destinations. No cycling was reported and those facilities which are located out with a reasonable walking distance were almost exclusively accessed by car.

6.3 Combined Stated Active Travel Behaviour

The propensity to walk amongst Polnoon residents aged 16 and above for destinations up to 1.6km is marginally lower (approximately 3%) (Figure 19) than national figures contained in the SHS (Figure 20). Walking rates are also 9.9 percentage points lower at distances of between 2.5 and 8.0 km. The propensity to cycle within the Polnoon site is marginally lower across all distances compared to the SHS. Bus use is also particularly low across all distances which is reflective of how remote bus stops are from the site.

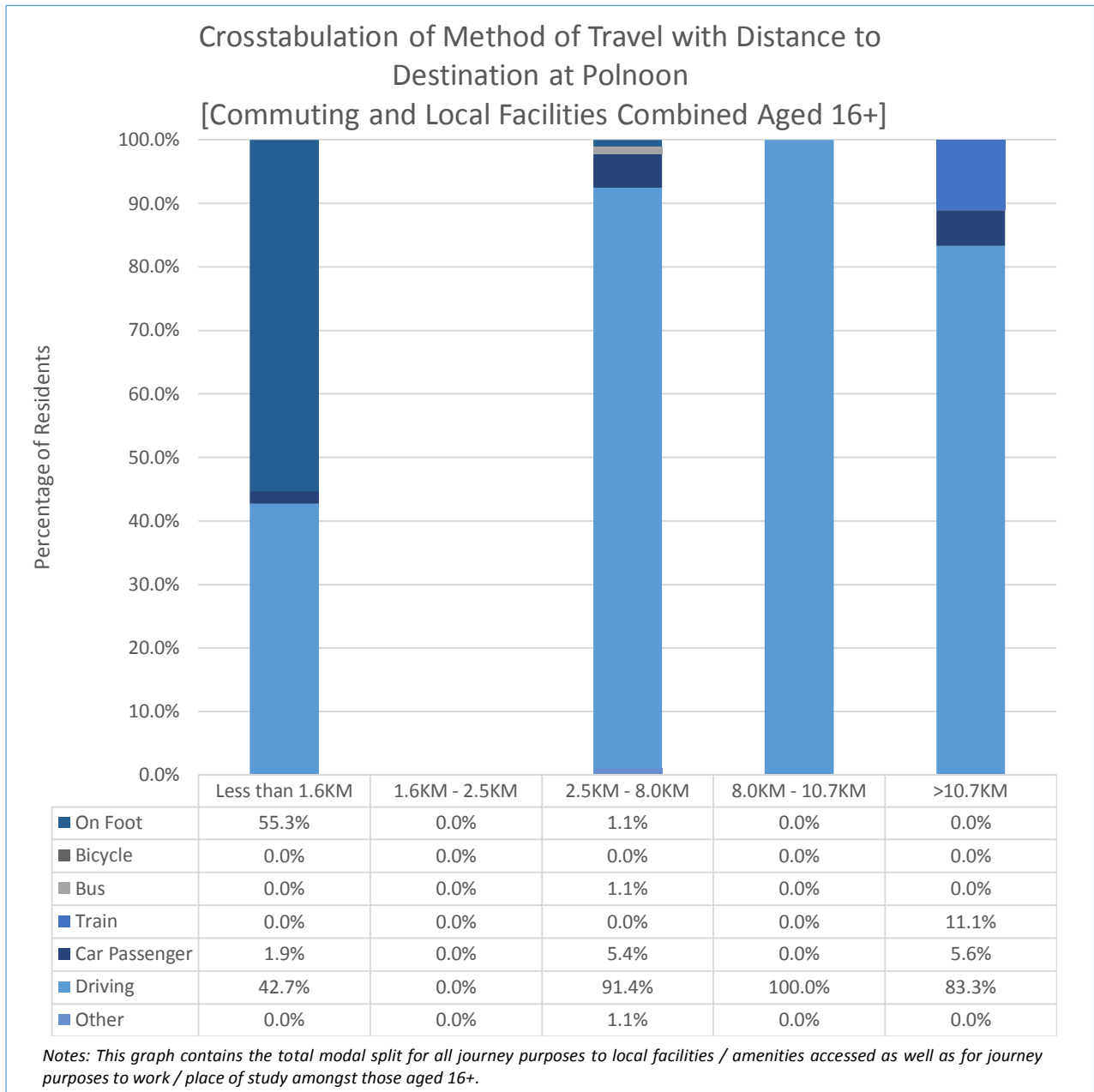


Figure 19: Polnoon Crosstabulation of Method of Travel with Distance to Destination [Both Journey Purposes Combined]

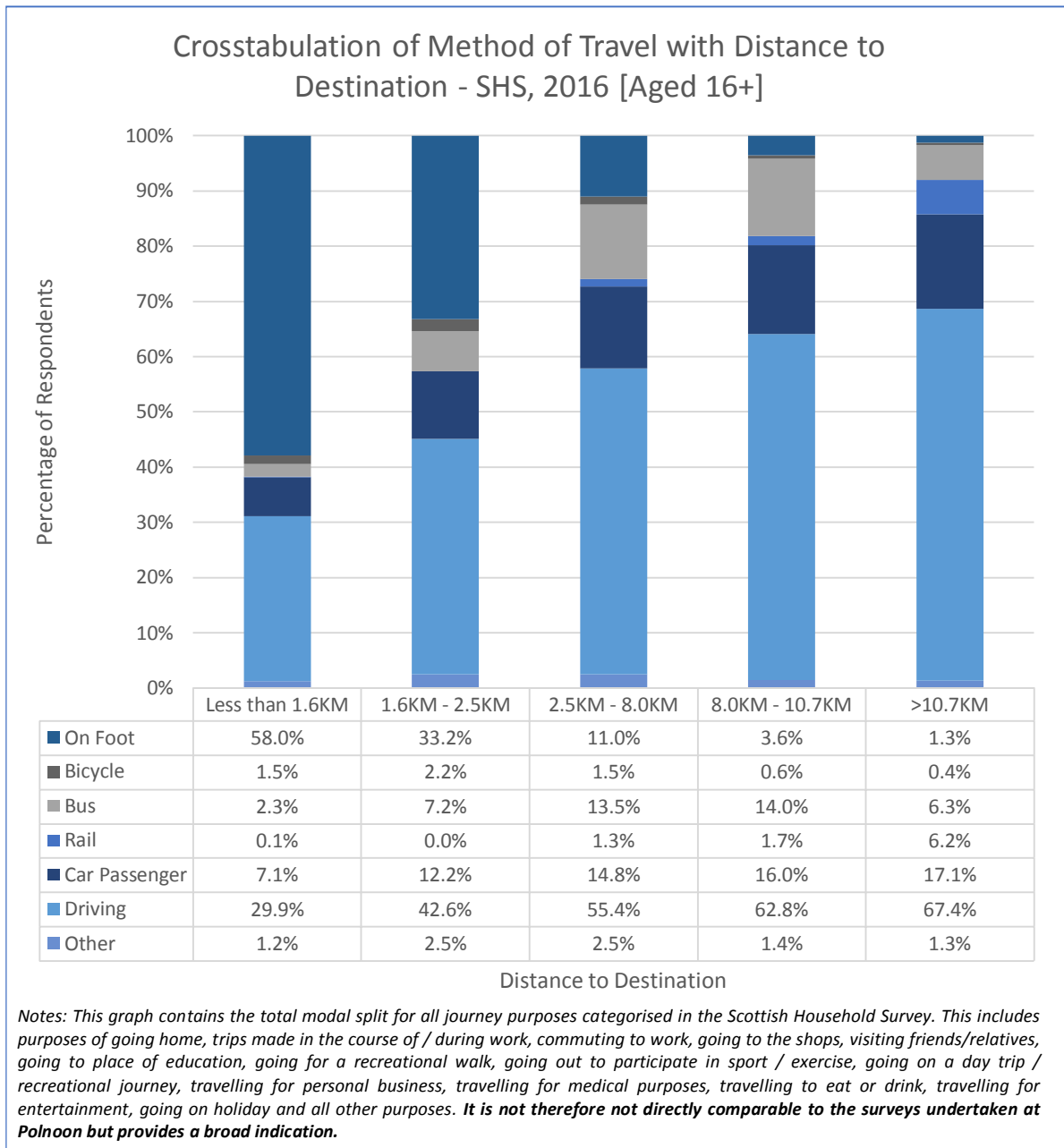


Figure 20: Scottish Household Survey Crosstabulation of Method of Travel with Distance to Destination

6.4 Observed Active Travel Use

Table 7 identifies the trip rate per dwelling for Polnoon. The survey was undertaken by Tracsis.

Table 7: Total Multi-Modal Trip Generation Weekday 07:00 – 19:00 (Undertaken by Tracsis Ltd.)

Mode	Observed Total Trips			Trip Rate per Dwelling (113 Dwellings)		
	In	Out	Total	In	Out	Total
Pedestrians	72	107	179	0.637	0.947	1.584
Cyclists	1	1	2	0.009	0.009	0.018
Vehicles	340	346	686	3.009	3.062	6.071
Other	0	0	0	0.000	0.000	0.000

Notes: 1 – There may be some listed as pedestrians that may travel by bus that are not listed. Due to the remoteness of bus stops from the site, it has not been possible to quantify those that travel by bus. 2 – The trip rates have been calculated on the basis of 113 dwellings being complete and occupied at the time the survey was undertaken. This is an approximation based on on-site observations at the time.

The average pedestrian trip rate across all sites contained within TRICS is 0.83 per dwelling. The trip rate from Polnoon of 1.58 represents the third highest figure of all sites (Figure 21). As demonstrated previously in Table 5, the demographics of the residential area has the potential to notably skew the results, however, it is not possible to extract this information from TRICS which therefore represents a significant shortcoming of this result.

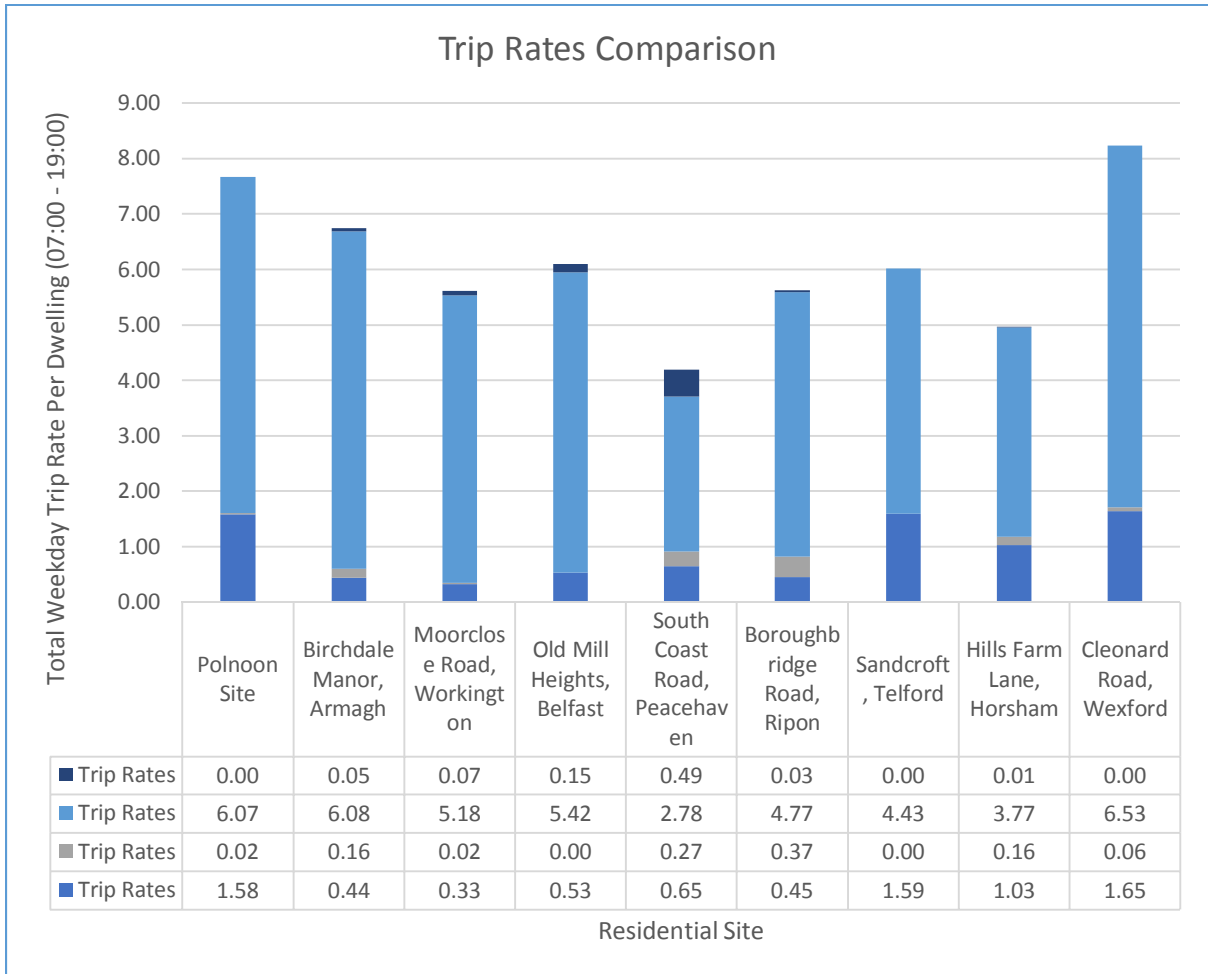


Figure 21: Residential Site Trip Rate Comparison

7. Polnoon Residents' Perception of Street Layout Impact

7.1 Introduction

This chapter addresses the following research aim:

Research Aims	
Number	Aim
5	To gauge residents' opinions on the street design and layout with a specific focus on understanding whether it influences their propensity to walk or cycle.

7.2 Ability to Encourage Walking

Table 8 demonstrates that opinion was largely divided amongst residents as to whether the Polnoon layout creates a pedestrian friendly environment. Despite this, there was a general negativity to the safety merits of shared space whilst most residents also identified that the layout was not easy to navigate on foot.

Table 8: Polnoon Residents' Perception of Pedestrian Related Street Layout and Design Features

Statement	Strongly Agree	Slightly Agree	Neither	Slightly Disagree	Strongly Disagree
<i>"The 'shared space' in Polnoon is more dangerous for walking compared to having traditional separate roads and pavements."</i>	48.9%	13.3%	6.7%	13.3%	17.8%
<i>"Cars generally slow down in Polnoon as a direct result of the different street design compared to more traditional roads with separate roads and pavements."</i>	17.8%	42.2%	11.1%	8.9%	20.0%
<i>"The street layout in Polnoon serves to create a pedestrian friendly environment."</i>	26.7%	20.0%	4.4%	28.9%	20.0%
<i>"The street layout in Polnoon is easy to navigate for pedestrians compared to other residential communities with more traditional road layouts."</i>	22.2%	15.6%	13.3%	26.7%	22.2%

As demonstrated in **Figure 22**, the majority (84%) of residents did not identify that the layout impacted on their propensity to walk. The most popular qualitative responses were the following:

- Affected by proximity of facilities (15 Residents);
- Affected by weather (11);
- Hill is off putting (9);
- Not enough time to walk (6);
- Layout doesn't affect this (5); and
- Dangerous for young children (3).

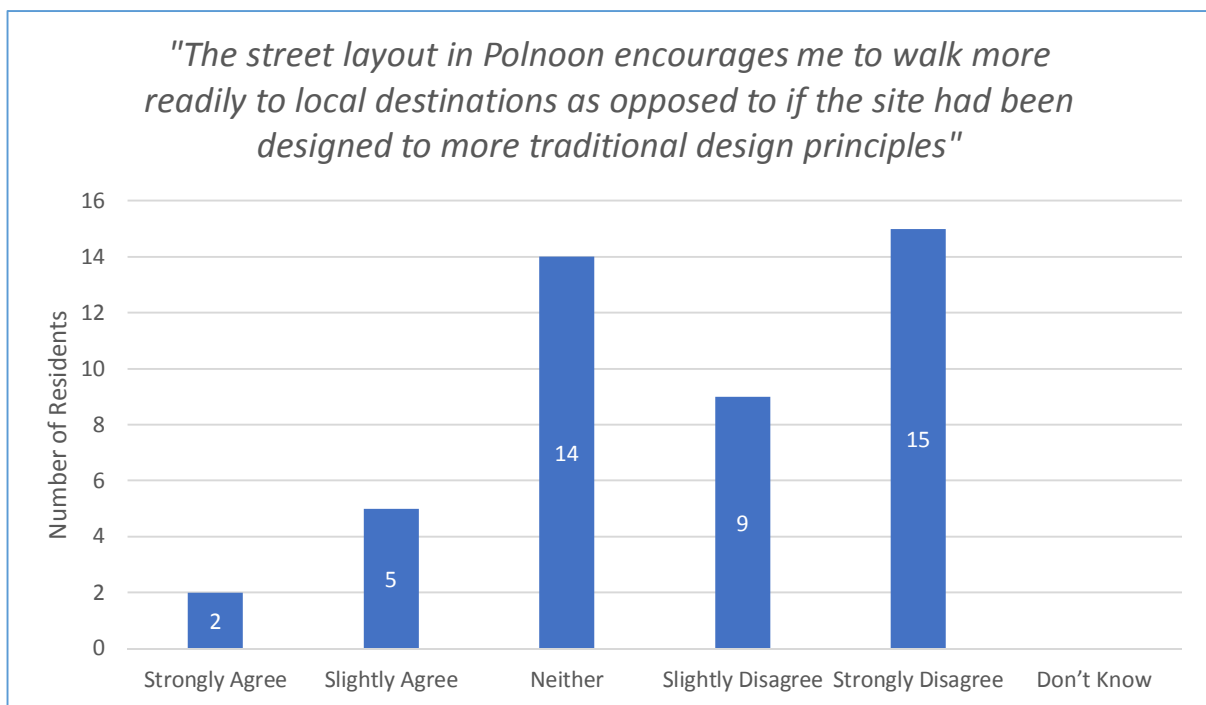


Figure 22: Perception of impact of Polnoon site on propensity to walk to local destinations

Most residents prioritised the proximity of local facilities and the ease of walking out with the confines of the site as opposed to the specific internal design features.

This is echoed in further qualitative responses with regards to what would encourage residents to walk more:

- Closer proximity of facilities (9 Residents);
- Not having a steep hill to walk up (6);
- Not having young children (4); and
- Having pavements.

Despite this, it is worth noting that there remained some residents who identified the design features actively encouraged them to walk to local destinations. The qualitative responses identified that this was

predominantly because of positive neighbourly relations as opposed to the successful prioritisation of pedestrian movement. Comments received were:

- Layout encourages neighbour interaction (3 Residents);
- More of a walking community; and
- Not having a front garden encourages interaction, not isolated by it.

7.3 Ability to Encourage Cycling

In contrast to the perception of the pedestrian environment, Polnoon residents were more positive of the design merits within the site for cycling (see [Table 9](#)).

Table 9: Polnoon Residents' Perception of Cycling Related Street Layout and Design Features					
Statement	Strongly Agree	Slightly Agree	Neither	Slightly Disagree	Strongly Disagree
<i>"The street layout in Polnoon serves to create a more cycle friendly environment than other areas with more traditional road designs."</i>	28.9%	35.6%	6.7%	13.3%	15.6%

Despite this, as [Figure 23](#) suggests, most residents reported the site layout does not encourage them to cycle more.

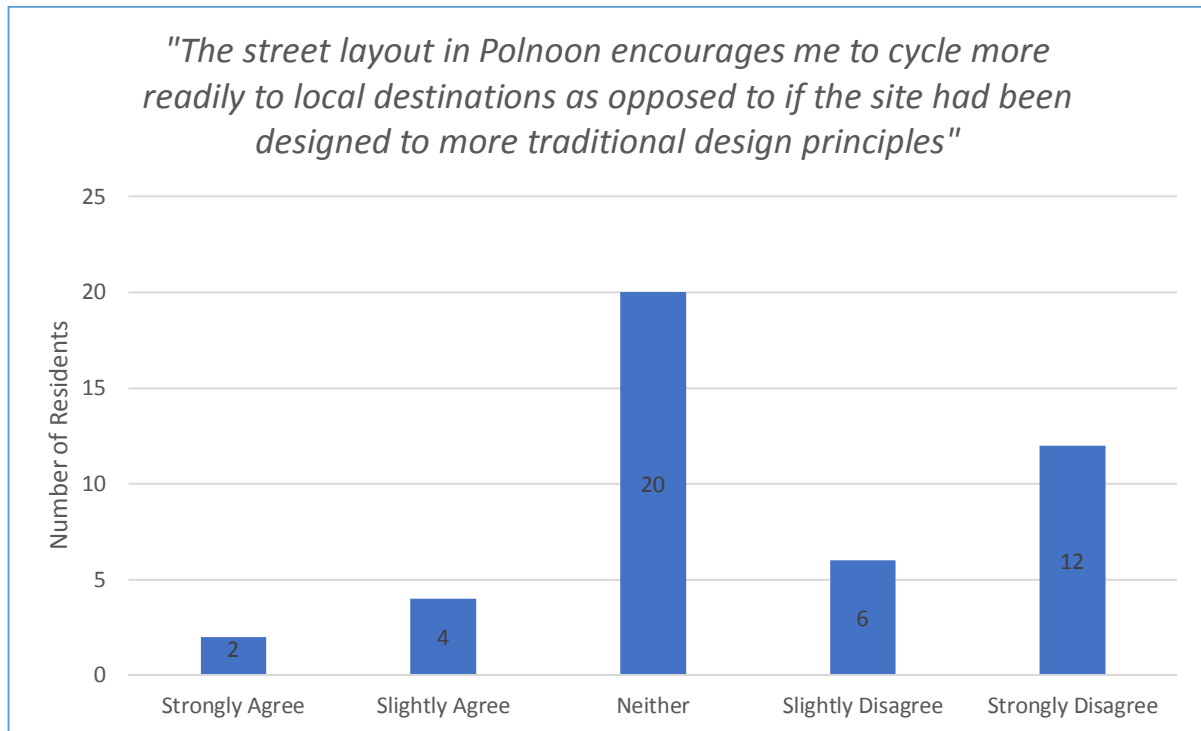


Figure 23: Perception of Impact of Polnoon Layout in encouraging cycling to local destinations

The qualitative responses were generally more receptive of the layout of the site encouraging internal cycling and most advised that conditions external to the site were more of a hindrance as opposed to necessary the distance. The responses received were:

- Don't cycle (6 Residents);
- Cycle round development but not out with (6); and
- Dangerous to cycle outside of development (3).

This was a viewpoint also echoed in further responses to what would encourage residents to cycle more:

- Segregated cycle facilities needed outside of development (20 Residents); and
- Cycling is dangerous (3).

8. Discussion of Findings and Wider Policy Implications

8.1 Stated Active Travel Use

Commuting Purposes

The aggregate walking modal split for residents travelling to work or their place of study was recorded as being four percentage points higher than the 2011 Census for the surrounding output areas, however, the disaggregate of these results likely do not show a greater propensity to walk for three reasons:

- Polnoon has a much younger population relative to surrounding areas contained within the 2011 Census. Those of school age are much more likely to travel on foot to school than those travelling to work;
- The number of those aged 4 – 16 walking to school remains broadly in line with national figures; and
- No residents reported that they walked to work aged 16 and over which is lower than 2011 Census figures for both the surrounding areas and nationally.

A similar finding was also reported for cycling propensity given that no residents reported that they cycled to their place of work or study. This is only very marginally lower than figures for the surrounding area.

Access to Local Facilities / Amenities

Just over half of all residents access local facilities and amenities located within a reasonable walking distance (less than 1600m) on foot with the remainder accessing these by car. The propensity to walk varied according to the type of facility accessed.

The site is within a reasonable cycling distance (less than 10800m) of wider facilities, however, no residents identified that they cycled to these.

Combined Journey Purposes

Walking use for destinations located within 1600m remained marginally lower than established travel behaviour outlined in the 2016 SHS; albeit these are not directly comparable methodologies. Whilst low, cycling rates are broadly similar across all distances. Bus use within the Polnoon site is particularly low which may be reflective of the remoteness of the bus stop; which may suppress walking rates further.

The results therefore suggest that there is no discernible difference in active travel use. The evidence base within the stated active travel use therefore generally suggests that the Polnoon site does not fulfil the original aim identified in 'Designing Streets' to "encourage more people to walk and cycle to local destinations."

8.2 Observed Active Travel Use

Polnoon generally has a slightly higher pedestrian trip rate than similarly located residential areas contained within TRICS, however, there are crucial limitations to this finding:

- TRICS contains both new and well-established residential areas which may exhibit differing travel behaviour;

- TRICS contains differing residential areas that may not exhibit the same demographic characteristics as Polnoon;
- Sites have been selected based on an approximation of distances to local destinations only.

Due to these limitations, the findings are considered to be inconclusive. More detailed future observational comparative research across several new residential developments would therefore be beneficial to build on this understanding.

8.3 Merits of Internal Site Design Features to Encourage Active Travel

The perception of residents as to whether the layout encouraged them to use active travel modes largely echoed the findings of the stated active travel use findings; there was limited evidence to suggest the layout has been successful in increasing active travel propensity.

Shared Space

Table 10 identifies the extent to which the site fulfils objectives of shared space in ‘*Designing Streets*.’

Table 10: Residents Perceptions of Performance Against Transport Related Shared Space Objectives	
Transport Related Objective	Perception of Residents
<i>To encourage low vehicle speeds;</i>	60% of residents agreed, however, this response is only following retrospective traffic calming features being installed.
<i>Create an environment in which pedestrians can walk, or stop and chat without feeling intimidated by motor traffic;</i>	There was no clear consensus, however, 62% residents identified they felt more unsafe as pedestrians.
<i>Make it easier for people to move around, particularly wheelchair users and people using wheeled equipment such as prams; and</i>	38% thought the site easier to navigate compared to 48% who did not.

It is evident that residents do not agree that shared space creates a safe environment for pedestrians. Although shared space’s rationale relies on “*the introduction of danger to incite safe behaviour*” (Methorst et al. 2007), it is surprising how deep rooted this scepticism appears to be; particularly amongst parents with younger children. In addition, some residents have lived in the site for several years and therefore have already likely had the opportunity to adjust to the differing design.

This scepticism amongst residents has been responsible for the installation of retrospective traffic calming features, including bollards and build outs, to reduce vehicular speeds. Although the results demonstrate this appear to have allayed previous concerns from residents regarding vehicle speeds, traffic calming features remain contradictory to the principles of *Designing Streets* to reduce obstructive street clutter. It suggests that a consideration of vehicular speeds should be assigned greater importance at the design stage. Aspects such as

limiting forward visibility and physically forcing vehicles to negotiate obstacles clearly play a more important role in reducing speeds than expected.

Despite these retrospective measures, it is evident that there remain residual safety concerns given that most residents reported that they feel unsafe walking. The common theme amongst residents to explain this was a lack of awareness amongst both young pedestrians and unfamiliar drivers. Residents generally applied a threefold argument: there is insufficient education directed towards young children about how to behave in shared space; shared space is too much of a contrast to the segregated walking environment out with the site and some drivers still do not drive to an appropriate speed.

This raises several issues for policy makers. Firstly, it poses the question whether awareness raising measures communicating the key principles of shared space have been adequately promoted. Further educational or promotional campaigns which specifically target both schoolchildren learning road safety as well as unfamiliar drivers may be necessary to reduce the likelihood of pedestrians feeling vulnerable in shared space.

Secondly, it poses the question whether transitional features that distinguish between shared space and more traditional segregated streetscapes are sufficient for drivers to adjust their behaviour accordingly. The difference between these two environments is deliberately contrasting, however, there is a risk that if shared space is not clearly designated then both drivers and pedestrians will continue to behave as they would on more traditional road designs in terms of assuming pedestrian movement is automatically subservient to vehicles.

Although it is evident that this scepticism has had some impact in dissuading some residents from walking to local destinations, the limitations of this study mean that its specific impact has not been determined or measured. There is a risk that these safety concerns of shared space may simply be being used as an excuse amongst some residents who are unwilling to alter their travel behaviour in any case. Further research involving a longitudinal study examining perceptions and to what extent shared space impacts on travel behaviour would be beneficial.

Dwelling Location

Despite the general negativity towards shared space itself, anecdotal evidence identified the influence that the location of dwellings appears to positively impact upon neighbourly relations in some cases. Residents identified the absence of obstructive front gardens and driveways as being important in promoting this compared to more traditional street layouts. It was identified that knowing neighbours increases the propensity to walk to local destinations with them; particularly for journeys to local shops and to school.

Whilst the Masterplan and *'Designing Streets'* advocates shared spaces' potential to improve neighbourly relations, it does not advocate that this can potentially indirectly lead to a higher propensity to walk to local destinations. It is an unexpected finding and further research to determine the influence of locating houses directly on the street frontage and how this influences modal choice would be valuable to ascertain the exact and the extent of the role it can play.

8.3 Role of External Site Factors

Irrespective of the merits of internal design features, the results also demonstrate a strong underlying theme that no matter the quality of the internal site design for active travel modes, this may remain insufficient independently to encourage active travel. It is evident that factors such as the walking distance and quality of cycling route external to the site remain crucial.

Walking

The site’s permeable design assists in ensuring that the entire site largely fulfils new development planning accessibility criteria identified in PAN-75 and TAG to be located within 1600m and 20 – 30 minutes of local facilities for walking. In addition, it also generally accords with a recent study by Wakenshaw and Bunn (2017) (see [Figure 24](#)) which identifies distances that residents are generally prepared to walk to. The exception to this is bus stops, which are located in excess of both 400m and 810m.

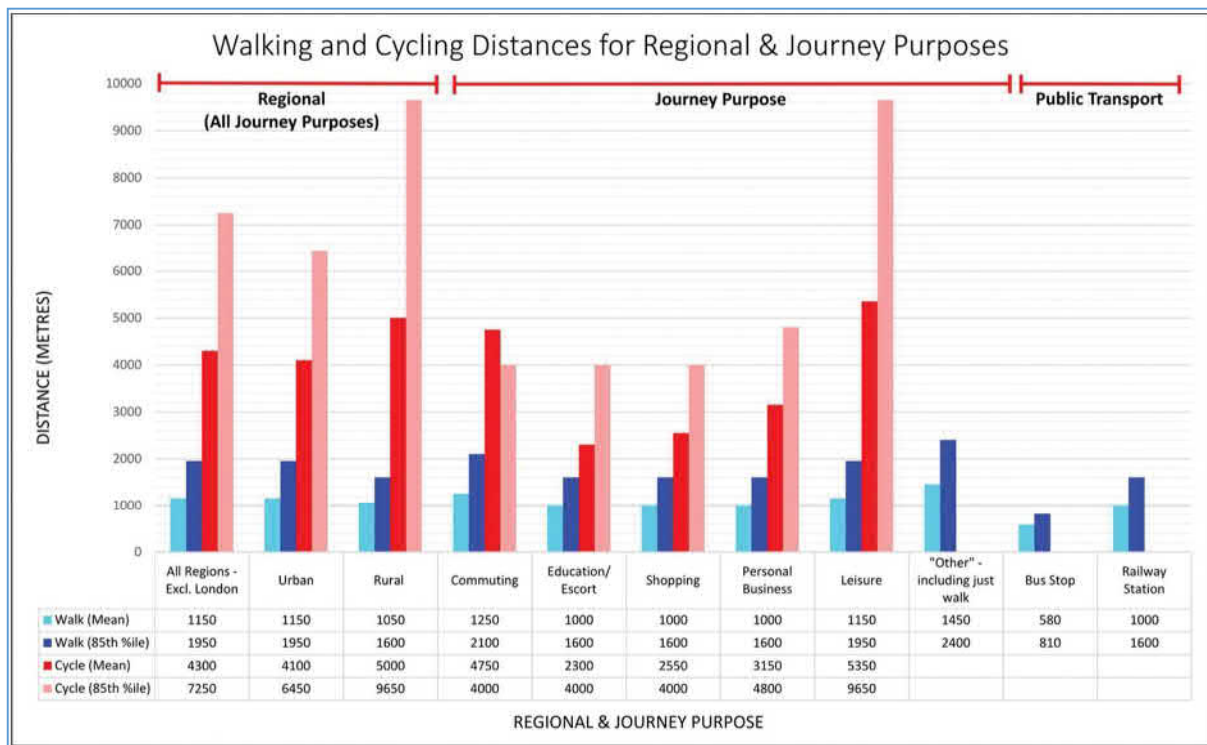


Figure 24: Walking and Cycling Distances for Regional and Journey Purposes [Extracted from Wakenshaw and Bunn (2017)]

Despite this, residents still identified that the distance to local destinations remained a crucial barrier to encouraging a higher rate of walking. Yes, the distances identified in planning guidance may be what most residents are prepared to walk but the crucial question remains; what walking distance to local destinations would actively *encourage* a modal shift from car modes on a regular basis? Moreover, does this propensity to switch modes vary according to journey purpose? For example, a greater walking mode share was identified amongst those travelling to the library than the local convenience store or the GP surgery; despite them all being located similar distances away in Eaglesham.

There is a risk that the application of a distance or time threshold that is universally applied across all local destinations from new residential developments is overly simplistic. Clearly further research is required to address this which may necessitate an even greater cohesivity being drawn between land use and transport planning considerations within the planning process for new residential developments.

Cycling

Whilst the research identified that reducing distances to local destinations may promote greater walking use, it concurrently identified that this may not be as successful in promoting cycling considering no residents identified distance as being a barrier to mode shift. The site is located well within cycling distances and journey times to local destinations identified by existing guidance and research by Wakenshaw and Bunn (2017), yet not one resident reported that they cycled. This suggests that there is little merit in creating an attractive internal cycling environment within the site if residents are simply forced to negotiate roads they perceive to be dangerous out with its confines.

This focuses the spotlight on the importance of ensuring adequate connections to safer external cycling routes as opposed to merely the cycling catchment distance itself at the planning stage. Somewhat contradictory to the principles of *'Designing Streets,'* most residents identified that fully segregated cycling routes would encourage them to cycle more.

9. Conclusion

This study has considered the following research question and aims:

Research Question

How successful are residential developments designed in accordance with 'Designing Streets' in increasing and encouraging walking and cycling to local destinations situated out with the site?

Research Aims

Number	Aim
1	To ascertain the facilities and amenities (' <i>local destinations</i> ') within a suitable walking and cycling proximity of the Polnoon site.
2	To understand the extent to which Polnoon residents identify that they walk or cycle to local destinations out with the confines of the site (' <i>Stated Active Travel Use</i> ').
3	To observe the extent to which Polnoon residents walk or cycle to local destinations out with the confines of the site (' <i>Observed Active Travel Use</i> ').
4	To determine how active travel behaviours at Polnoon compare with secondary datasets from areas that do not exhibit Designing Streets principles.
5	To gauge residents' opinions on the street design and layout with a specific focus on understanding whether these features influence their propensity to walk or cycle to local destinations.

The results of the stated and observed travel patterns demonstrated that whilst the combined aggregate active travel use rates are higher at Polnoon, the disaggregate of these figures suggest walking and cycling rates are broadly comparable, and in some cases lower than, established behaviour. The higher aggregate figures are likely because of the site having a younger cohort and therefore not necessarily because of any greater active travel propensity. These findings therefore suggest that the site does not achieve the aim to "*encourage more people to walk and cycle to local destinations.*"

The perceptions of residents largely echoed this considering most identified that the layout had a negligible impact, and in some cases acted as a disincentive, on walking and cycling propensity to access local destinations.

In terms of the merits of the internal design, the key underlying theme was related to safety and the apparent inability of shared space to deliver on its objective to create an environment in which pedestrians can walk without feeling intimidated by traffic; which accords with previous research undertaken by others including Holmes (2015). This scepticism has resulted in the installation of retrospective traffic calming features which suggests that greater attention to the layout's ability to physically reduce speeds may be required. Additional awareness and education raising measures of the function of shared space may also be necessary.

Although it is evident that this scepticism dissuades some residents from walking, the limitations of this study mean that its specific impact has not been determined. There is a risk that these safety concerns of shared space may simply be being used as an excuse amongst some residents who are unwilling to alter their travel behaviour. Further research involving a longitudinal study examining to what extent shared space impacts on travel behaviour would therefore be beneficial.

Despite the general negativity towards shared space, anecdotal evidence identified the influence that the location of dwellings directly on the street appears to positively impact upon neighbourly relations in some cases. Moreover, it was identified that this interaction increased the propensity to walk to local destinations; particularly for journeys to local shops and to school. This is an unexpected finding and further research to determine the influence of locating houses directly on the street frontage and how this influences modal choice would be valuable to ascertain the exact and the extent of the role it can play.

Irrespective of the merits of internal design features, the results also demonstrate a strong underlying theme that no matter the quality of the internal site design or permeable network for active travel modes, this remains insufficient independently to encourage greater active travel use. It is evident that external factors to the site remain crucial. For walking, it is apparent that the distance to local destinations is the most important factor whilst for cycling, the availability and quality of nearby cycling routes as opposed to the distance is critical.

The development planning process is an imperative method in which TSG can positively influence long term sustainable travel behaviour. The research suggests that continued delivery of *'Designing Streets'* needs to not only address issues emanating internally within the site associated with shared space but include a greater weight to the consideration of external factors that influence active travel. Aspects such as the walking distance and the availability of adequate cycling routes are evidently more important factors in encouraging a modal shift towards active travel for journeys to local destinations.

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Appendix A: Polnoon Questionnaire

Polnoon Designing Streets Study – Residents’ Survey

Background and Purpose of Study

Thanks very much for taking the time to read my survey. My name is Elliot Reid and I am a Transport Consultant who works for an infrastructure consultancy company called AECOM, based in the Glasgow office.

I am currently doing research for the Transport Planning Society (TPS) as part of the young professional’s research bursary competition. The TPS (website: <https://tps.org.uk/>) are a society which develop and promote best practice in transport planning, whether it be for new transport infrastructure (e.g. road and rail), transport policies or through the new development planning process.

My research is focused on the Polnoon residential development that you currently stay in. The reason I am studying Polnoon is that it was one of the first residential sites in Scotland which has been constructed with ‘*Designing Streets*’ principles in mind. As I’m sure you’re aware, the site includes unique aspects such as shared space and other complementary design features to assist in the creation of a distinct sense of place and with the aim of creating a more pedestrian and cycling friendly environment. This is a break in tradition from the more conventional design approach in residential developments. This has typically included roads and pavements as well as street layouts which did not necessarily consider or provide for where pedestrians and cyclists wanted to go to access local facilities / amenities out with the site (“*the pedestrian desire line*”).

The aim of the research is to understand whether the differing street design and overall layout in Polnoon encourages a greater rate of walking and cycling to local destinations amongst residents compared to other similarly located residential developments incorporating more traditional design features.

Residents’ Survey

I’d really appreciate if you could take the time to fill out my survey which gathers information relating to your household, basic travel information as well as your perception on the street design and layout in Polnoon.

I’ve tried to condense the survey as much as possible so it should only take **a maximum of 10 minutes to complete**.

Please be assured that the results will be used for my research purposes only and will not be shared with any other organisations or third parties. The survey is completely voluntary but please be assured that all of your answers will remain completely anonymous. Following the completion of my research, all of the survey results will be destroyed.

I shall be returning to collect the surveys in about a week’s time on 30th October 2017.

Thanks for your time in advance and should you have any questions, please don’t hesitate to send me an email at elliott.reid@aecom.com.

Section A: About Your Household

- 1) Including yourself, please identify the total number of people who currently live in your household and the respective age category that they fall into.

Age Category	Number of Persons in Household
< 4 Years	
4 – 15 Years	
16 – 74 Years	
75+ Years	

- 2) How many cars or vans does your household currently own or have available for use by at least one or more members of your household? Please circle one answer below.

0 Cars	1 Car	2 Cars	3 Cars	4 Cars +
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Section B: Travel to Work or Study

- 3) Including yourself, please identify the employment status for all household members who are aged 16 – 74 (if applicable). Please tick one box per row.

	Full time employee	Part time employee	Full time education	Self employed	Unemployed/ Retired/Not Working
Person 1					
Person 2					
Person 3					
Person 4					
Person 5					
Person 6					

- 4) For each person assigned in Q3 above, please identify the proximity of their workplace / place of study to home. Tick one box per row. Please remain consistent with who has already been assigned 'Person 1' 'Person 2' etc.

	Less than 1 mile	1 - 1.5 miles	1.6 - 4.9 miles	5 – 6.2 miles	More than 6.2 Miles	N/A
Person 1						
Person 2						
Person 3						
Person 4						
Person 5						
Person 6						

- 5) How does each person assigned in Q4 above normally travel to their place of work / place of study? Please tick only one option for each person. Please also remain consistent with who has been assigned 'Person 1,' 'Person 2,' etc. from the two previous questions.

	Method of Travel											
	Work or study mainly from home	Underground, metro, light rail or tram	Train	Bus minibus or coach	Taxi	Motorcycle scooter or moped	Driving a car or van	Passenger in a Car or Van	Bicycle	On Foot	Other	N/A
Person 1												
Person 2												
Person 3												
Person 4												
Person 5												
Person 6												

6) If applicable, how does each child aged 4 - 15 years in your household normally travel to school? Please tick only one option for each child.

	Method of Travel										
	Study mainly from home	Underground, metro, light rail or tram	Train	Bus minibus or coach	Taxi	Motorcycle scooter or moped	Passenger in a Car or Van	Bicycle	On Foot	Other	N/A
Child 1											
Child 2											
Child 3											
Child 4											
Child 5											
Child 6											

Section C: Your Non Work-Related Travel Behaviours

7) Please identify what method of travel you normally use to access the following local facilities / amenities. Please select only one method of travel for each local facility / amenity that you use most frequently.

Local Facility / Amenity that you use	Method of Travel										
	Underground, metro, light rail or tram	Train	Bus minibus or coach	Taxi	Motorcycle scooter or moped	Driving a car or van	Passenger in a Car or Van	Bicycle	On Foot	Other	Do Not Use this facility / amenity
Small local grocery shop (e.g. Co-op, Newsagents)											
Gym / Indoor Leisure Centre											
GP / Health Centre											
Post Office											
Library											
Supermarket (e.g. Sainsbury's, Asda, Lidl)											

8) For the previous local facilities / amenities listed in Q.7, please identify how far away each of them are from your household. Please provide an answer relating to the local facilities / amenities that you use, relating to Q.7, as opposed to just the closest example of the local facility / amenity.

Local Facility / Amenity that you use	Approximate Distance from Home					
	Less than 1 mile	1 - 1.5 miles	1.6 - 4.9 miles	5 – 6.2 miles	More than 6.2 Miles	Do Not Use this facility / amenity
Small local grocery shop						
Gym / Indoor Leisure Facility						
GP / Health Centre						
Post Office						
Library						
Supermarket						

Section D: Perception of Street Design & Layout in Polnoon

9) Prior to living in Polnoon, did you live in an area with a more traditional street design and layout (e.g. with distinct roads and pavements)? (please circle)

YES NO

10) To what extent do you agree / disagree with the following statements in the table below. Please tick one box for each statement only.

	Strongly Agree	Slightly Agree	Neither Agree nor Disagree	Slightly Disagree	Strongly Disagree	Don't Know
<i>"The 'shared space' in Polnoon is more dangerous for walking compared to having traditional separate roads and pavements."</i>						
<i>"Cars generally slow down in Polnoon as a direct result of the different street design compared to more traditional roads with separate roads and pavements."</i>						
<i>"The street layout in Polnoon serves to create a pedestrian friendly environment."</i>						
<i>"The street layout in Polnoon is easy to navigate for pedestrians compared to other residential communities with more traditional road layouts."</i>						
<i>"The street layout in Polnoon serves to create a more cycle friendly environment than other areas with more traditional road designs."</i>						

11) Do you walk more often to access local shops / amenities that are located within approximately 1 mile of your home since moving to Polnoon than when you lived at your previous address (please circle)?

YES NO

12) To what extent do you agree with the following statement: *"The street layout and design in Polnoon encourages me to walk more readily to local destinations (less than 1 mile) as opposed to if the site had been designed with more traditional design principles."* (Please circle the most appropriate answer)

Strongly Agree	Slightly Agree	Neither Agree nor Disagree	Slightly Disagree	Strongly Disagree
----------------	----------------	----------------------------	-------------------	-------------------

Please explain your answer:

13) What, if anything, would encourage you to walk more for trips up to 1 mile (roughly 20 minutes)?

14) Do you cycle more often to access local shops / amenities that are located within approximately 5-6 miles of your home since moving to Polnoon than when you lived at your previous address (please circle)?

YES NO

15) To what extent do you agree with the following statement. *"The street layout and design in Polnoon encourages me to cycle more readily to local destinations (less than 6 miles) as opposed to if the site had been designed with more traditional design principles."*

Strongly Agree	Slightly Agree	Neither Agree nor Disagree	Slightly Disagree	Strongly Disagree
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Please explain your answer (overleaf):

Explanation for Q15):

16) What if anything would encourage you to cycle more for trips up to 6 miles (roughly 30 minutes)?

Thank you for your participation and for completing the questionnaire.

Should you have any further comments to make relating to the study, please enter them in the box below.

Any further comments?

Appendix B: TRICS Outputs

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 03 - RESIDENTIAL
 Category : A - HOUSES PRIVATELY OWNED

MULTI-MODAL VEHICLESSelected regions and areas:

02 SOUTH EAST		
ES EAST SUSSEX		1 days
WS WEST SUSSEX		1 days
06 WEST MIDLANDS		
SH SHROPSHIRE		1 days
07 YORKSHIRE & NORTH LINCOLNSHIRE		
NY NORTH YORKSHIRE		1 days
09 NORTH		
CB CUMBRIA		1 days
14 LEINSTER		
WX WEXFORD		1 days
17 ULSTER (NORTHERN IRELAND)		
AR ARMAGH		1 days
DO DOWN		1 days

This section displays the number of survey days per TRICS® sub-region in the selected set

Secondary Filtering selection:

This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.

Parameter: Number of dwellings
 Actual Range: 34 to 153 (units:)
 Range Selected by User: 25 to 200 (units:)

Public Transport Provision:

Selection by: Include all surveys

Date Range: 01/01/09 to 28/03/17

This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.

Selected survey days:

Tuesday	2 days
Wednesday	1 days
Thursday	3 days
Friday	2 days

This data displays the number of selected surveys by day of the week.

Selected survey types:

Manual count	8 days
Directional ATC Count	0 days

This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaken using machines.

Selected Locations:

Suburban Area (PPS6 Out of Centre)	1
Edge of Town	7

This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.

Selected Location Sub Categories:

Residential Zone	5
No Sub Category	3

This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out of Town, High Street and No Sub Category.

Secondary Filtering selection:Use Class:

C3	8 days
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This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order 2005 has been used for this purpose, which can be found within the Library module of TRICS®.

Population within 1 mile:

1,001 to 5,000	3 days
5,001 to 10,000	2 days
10,001 to 15,000	2 days
15,001 to 20,000	1 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:

25,001 to 50,000	3 days
50,001 to 75,000	1 days
75,001 to 100,000	4 days

This data displays the number of selected surveys within stated 5-mile radii of population.

Car ownership within 5 miles:

0.6 to 1.0	2 days
1.1 to 1.5	6 days

This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling, within a radius of 5-miles of selected survey sites.

Travel Plan:

Yes	2 days
No	6 days

This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place, and the number of surveys that were undertaken at sites without Travel Plans.

PTAL Rating:

No PTAL Present	8 days
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This data displays the number of selected surveys with PTAL Ratings.

LIST OF SITES relevant to selection parameters

1	AR-03-A-01	MIXED HOUSES	ARMAGH
	BIRCHDALE MANOR		
	LURGAN		
	Edge of Town		
	Residential Zone		
	Total Number of dwellings:	153	
	Survey date: TUESDAY	15/06/10	Survey Type: MANUAL
2	CB-03-A-04	SEMI DETACHED	CUMBRIA
	MOORCLOSE ROAD		
	SALTERBACK		
	WORKINGTON		
	Edge of Town		
	No Sub Category		
	Total Number of dwellings:	82	
	Survey date: FRIDAY	24/04/09	Survey Type: MANUAL
3	DO-03-A-03	DETACHED/SEMI DETACHED	DOWN
	OLD MILL HEIGHTS		
	DUNDONALD		
	BELFAST		
	Edge of Town		
	Residential Zone		
	Total Number of dwellings:	79	
	Survey date: WEDNESDAY	23/10/13	Survey Type: MANUAL
4	ES-03-A-02	PRIVATE HOUSING	EAST SUSSEX
	SOUTH COAST ROAD		
	PEACEHAVEN		
	Edge of Town		
	Residential Zone		
	Total Number of dwellings:	37	
	Survey date: FRIDAY	18/11/11	Survey Type: MANUAL
5	NY-03-A-10	HOUSES AND FLATS	NORTH YORKSHIRE
	BOROUGHBRIDGE ROAD		
	RIPON		
	Edge of Town		
	No Sub Category		
	Total Number of dwellings:	71	
	Survey date: TUESDAY	17/09/13	Survey Type: MANUAL
6	SH-03-A-05	SEMI-DETACHED/TERRACED	SHROPSHIRE
	SANDCROFT		
	SUTTON HILL		
	TELFORD		
	Edge of Town		
	Residential Zone		
	Total Number of dwellings:	54	
	Survey date: THURSDAY	24/10/13	Survey Type: MANUAL
7	WS-03-A-04	MIXED HOUSES	WEST SUSSEX
	HILLS FARM LANE		
	BROADBRIDGE HEATH		
	HORSHAM		
	Edge of Town		
	Residential Zone		
	Total Number of dwellings:	151	
	Survey date: THURSDAY	11/12/14	Survey Type: MANUAL
8	WX-03-A-01	SEMI-DETACHED	WEXFORD
	CLONARD ROAD		
	WEXFORD		
	Suburban Area (PPS6 Out of Centre)		
	No Sub Category		
	Total Number of dwellings:	34	
	Survey date: THURSDAY	25/09/14	Survey Type: MANUAL

This section provides a list of all survey sites and days in the selected set. For each individual survey site, it displays a unique site reference code and site address, the selected trip rate calculation parameter and its value, the day of the week and date of each survey, and whether the survey was a manual classified count or an ATC count.

MANUALLY DESELECTED SITES

Site Ref	Reason for Deselection
AN-03-A-07	Too close to local facilities / amenities
DH-03-A-01	Too close to local facilities / amenities
FA-03-A-01	Too close to local facilities / amenities
HC-03-A-18	Too close to local facilities / amenities

MANUALLY DESELECTED SITES (Cont.)

Site Ref	Reason for Deselection
HI-03-A-14	Too close to local facilities / amenities
KC-03-A-03	Too close to local facilities / amenities
NF-03-A-01	Too close to local facilities / amenities
PK-03-A-01	Too close to local facilities / amenities

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED

MULTI-MODAL VEHICLES

Calculation factor: 1 DWELLS

Estimated TRIP rate value per 113 DWELLS shown in shaded columns

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS				DEPARTURES				TOTALS			
	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate
00:00 - 01:00												
01:00 - 02:00												
02:00 - 03:00												
03:00 - 04:00												
04:00 - 05:00												
05:00 - 06:00												
06:00 - 07:00												
07:00 - 08:00	8	83	0.074	8.377	8	83	0.319	36.071	8	83	0.393	44.448
08:00 - 09:00	8	83	0.139	15.728	8	83	0.402	45.474	8	83	0.541	61.202
09:00 - 10:00	8	83	0.160	18.121	8	83	0.192	21.711	8	83	0.352	39.832
10:00 - 11:00	8	83	0.130	14.702	8	83	0.150	16.924	8	83	0.280	31.626
11:00 - 12:00	8	83	0.144	16.241	8	83	0.186	21.027	8	83	0.330	37.268
12:00 - 13:00	8	83	0.177	20.002	8	83	0.130	14.702	8	83	0.307	34.704
13:00 - 14:00	8	83	0.172	19.489	8	83	0.166	18.805	8	83	0.338	38.294
14:00 - 15:00	8	83	0.166	18.805	8	83	0.189	21.369	8	83	0.355	40.174
15:00 - 16:00	8	83	0.245	27.694	8	83	0.180	20.343	8	83	0.425	48.037
16:00 - 17:00	8	83	0.340	38.464	8	83	0.189	21.369	8	83	0.529	59.833
17:00 - 18:00	8	83	0.395	44.619	8	83	0.191	21.540	8	83	0.586	66.159
18:00 - 19:00	8	83	0.295	33.336	8	83	0.192	21.711	8	83	0.487	55.047
19:00 - 20:00												
20:00 - 21:00												
21:00 - 22:00												
22:00 - 23:00												
23:00 - 24:00												
Total Rates:			2.437	275.578			2.486	281.046			4.923	556.624

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.

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Parameter summary

Trip rate parameter range selected:	34 - 153 (units:)
Survey date date range:	01/01/09 - 28/03/17
Number of weekdays (Monday-Friday):	8
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	1
Surveys manually removed from selection:	8

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED

MULTI-MODAL TAXIS

Calculation factor: 1 DWELLS

Estimated TRIP rate value per 113 DWELLS shown in shaded columns

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS				DEPARTURES				TOTALS			
	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate
00:00 - 01:00												
01:00 - 02:00												
02:00 - 03:00												
03:00 - 04:00												
04:00 - 05:00												
05:00 - 06:00												
06:00 - 07:00												
07:00 - 08:00	8	83	0.011	1.197	8	83	0.011	1.197	8	83	0.022	2.394
08:00 - 09:00	8	83	0.011	1.197	8	83	0.011	1.197	8	83	0.022	2.394
09:00 - 10:00	8	83	0.002	0.171	8	83	0.002	0.171	8	83	0.004	0.342
10:00 - 11:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
11:00 - 12:00	8	83	0.006	0.684	8	83	0.006	0.684	8	83	0.012	1.368
12:00 - 13:00	8	83	0.003	0.342	8	83	0.002	0.171	8	83	0.005	0.513
13:00 - 14:00	8	83	0.003	0.342	8	83	0.005	0.513	8	83	0.008	0.855
14:00 - 15:00	8	83	0.006	0.684	8	83	0.006	0.684	8	83	0.012	1.368
15:00 - 16:00	8	83	0.012	1.368	8	83	0.011	1.197	8	83	0.023	2.565
16:00 - 17:00	8	83	0.005	0.513	8	83	0.003	0.342	8	83	0.008	0.855
17:00 - 18:00	8	83	0.005	0.513	8	83	0.003	0.342	8	83	0.008	0.855
18:00 - 19:00	8	83	0.006	0.684	8	83	0.008	0.855	8	83	0.014	1.539
19:00 - 20:00												
20:00 - 21:00												
21:00 - 22:00												
22:00 - 23:00												
23:00 - 24:00												
Total Rates:			0.070	7.695			0.068	7.353			0.138	15.048

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.

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Parameter summary

Trip rate parameter range selected:	34 - 153 (units:)
Survey date date range:	01/01/09 - 28/03/17
Number of weekdays (Monday-Friday):	8
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	1
Surveys manually removed from selection:	8

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED

MULTI-MODAL OGVS

Calculation factor: **1 DWELLS**

Estimated TRIP rate value per 113 DWELLS shown in shaded columns

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS				DEPARTURES				TOTALS			
	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate
00:00 - 01:00												
01:00 - 02:00												
02:00 - 03:00												
03:00 - 04:00												
04:00 - 05:00												
05:00 - 06:00												
06:00 - 07:00												
07:00 - 08:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
08:00 - 09:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
09:00 - 10:00	8	83	0.005	0.513	8	83	0.000	0.000	8	83	0.005	0.513
10:00 - 11:00	8	83	0.005	0.513	8	83	0.006	0.684	8	83	0.011	1.197
11:00 - 12:00	8	83	0.002	0.171	8	83	0.003	0.342	8	83	0.005	0.513
12:00 - 13:00	8	83	0.003	0.342	8	83	0.003	0.342	8	83	0.006	0.684
13:00 - 14:00	8	83	0.002	0.171	8	83	0.002	0.171	8	83	0.004	0.342
14:00 - 15:00	8	83	0.002	0.171	8	83	0.002	0.171	8	83	0.004	0.342
15:00 - 16:00	8	83	0.005	0.513	8	83	0.000	0.000	8	83	0.005	0.513
16:00 - 17:00	8	83	0.002	0.171	8	83	0.006	0.684	8	83	0.008	0.855
17:00 - 18:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
18:00 - 19:00	8	83	0.000	0.000	8	83	0.002	0.171	8	83	0.002	0.171
19:00 - 20:00												
20:00 - 21:00												
21:00 - 22:00												
22:00 - 23:00												
23:00 - 24:00												
Total Rates:			0.026	2.565			0.024	2.565			0.050	5.130

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.

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Parameter summary

Trip rate parameter range selected:	34 - 153 (units:)
Survey date date range:	01/01/09 - 28/03/17
Number of weekdays (Monday-Friday):	8
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	1
Surveys manually removed from selection:	8

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED

MULTI-MODAL PSVS

Calculation factor: 1 DWELLS

Estimated TRIP rate value per 113 DWELLS shown in shaded columns

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS				DEPARTURES				TOTALS			
	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate
00:00 - 01:00												
01:00 - 02:00												
02:00 - 03:00												
03:00 - 04:00												
04:00 - 05:00												
05:00 - 06:00												
06:00 - 07:00												
07:00 - 08:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
08:00 - 09:00	8	83	0.002	0.171	8	83	0.000	0.000	8	83	0.002	0.171
09:00 - 10:00	8	83	0.002	0.171	8	83	0.003	0.342	8	83	0.005	0.513
10:00 - 11:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
11:00 - 12:00	8	83	0.003	0.342	8	83	0.003	0.342	8	83	0.006	0.684
12:00 - 13:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
13:00 - 14:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
14:00 - 15:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
15:00 - 16:00	8	83	0.003	0.342	8	83	0.002	0.171	8	83	0.005	0.513
16:00 - 17:00	8	83	0.000	0.000	8	83	0.002	0.171	8	83	0.002	0.171
17:00 - 18:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
18:00 - 19:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
19:00 - 20:00												
20:00 - 21:00												
21:00 - 22:00												
22:00 - 23:00												
23:00 - 24:00												
Total Rates:			0.010	1.026			0.010	1.026			0.020	2.052

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.

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Parameter summary

Trip rate parameter range selected:	34 - 153 (units:)
Survey date date range:	01/01/09 - 28/03/17
Number of weekdays (Monday-Friday):	8
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	1
Surveys manually removed from selection:	8

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED

MULTI-MODAL CYCLISTS

Calculation factor: 1 DWELLS

Estimated TRIP rate value per 113 DWELLS shown in shaded columns

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS				DEPARTURES				TOTALS			
	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate
00:00 - 01:00												
01:00 - 02:00												
02:00 - 03:00												
03:00 - 04:00												
04:00 - 05:00												
05:00 - 06:00												
06:00 - 07:00												
07:00 - 08:00	8	83	0.003	0.342	8	83	0.003	0.342	8	83	0.006	0.684
08:00 - 09:00	8	83	0.000	0.000	8	83	0.024	2.735	8	83	0.024	2.735
09:00 - 10:00	8	83	0.002	0.171	8	83	0.006	0.684	8	83	0.008	0.855
10:00 - 11:00	8	83	0.003	0.342	8	83	0.011	1.197	8	83	0.014	1.539
11:00 - 12:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
12:00 - 13:00	8	83	0.005	0.513	8	83	0.000	0.000	8	83	0.005	0.513
13:00 - 14:00	8	83	0.006	0.684	8	83	0.006	0.684	8	83	0.012	1.368
14:00 - 15:00	8	83	0.002	0.171	8	83	0.002	0.171	8	83	0.004	0.342
15:00 - 16:00	8	83	0.014	1.539	8	83	0.003	0.342	8	83	0.017	1.881
16:00 - 17:00	8	83	0.012	1.368	8	83	0.008	0.855	8	83	0.020	2.223
17:00 - 18:00	8	83	0.015	1.710	8	83	0.006	0.684	8	83	0.021	2.394
18:00 - 19:00	8	83	0.005	0.513	8	83	0.002	0.171	8	83	0.007	0.684
19:00 - 20:00												
20:00 - 21:00												
21:00 - 22:00												
22:00 - 23:00												
23:00 - 24:00												
Total Rates:			0.067	7.353			0.071	7.865			0.138	15.218

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.

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Parameter summary

Trip rate parameter range selected:	34 - 153 (units:)
Survey date date range:	01/01/09 - 28/03/17
Number of weekdays (Monday-Friday):	8
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	1
Surveys manually removed from selection:	8

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED

MULTI-MODAL VEHICLE OCCUPANTS**Calculation factor: 1 DWELLS****Estimated TRIP rate value per 113 DWELLS shown in shaded columns****BOLD print indicates peak (busiest) period**

Time Range	ARRIVALS				DEPARTURES				TOTALS			
	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate
00:00 - 01:00												
01:00 - 02:00												
02:00 - 03:00												
03:00 - 04:00												
04:00 - 05:00												
05:00 - 06:00												
06:00 - 07:00												
07:00 - 08:00	8	83	0.077	8.719	8	83	0.381	43.080	8	83	0.458	51.799
08:00 - 09:00	8	83	0.163	18.463	8	83	0.590	66.672	8	83	0.753	85.135
09:00 - 10:00	8	83	0.198	22.395	8	83	0.231	26.156	8	83	0.429	48.551
10:00 - 11:00	8	83	0.144	16.241	8	83	0.174	19.660	8	83	0.318	35.901
11:00 - 12:00	8	83	0.188	21.198	8	83	0.227	25.643	8	83	0.415	46.841
12:00 - 13:00	8	83	0.210	23.762	8	83	0.153	17.266	8	83	0.363	41.028
13:00 - 14:00	8	83	0.222	25.130	8	83	0.209	23.592	8	83	0.431	48.722
14:00 - 15:00	8	83	0.195	22.053	8	83	0.219	24.788	8	83	0.414	46.841
15:00 - 16:00	8	83	0.348	39.319	8	83	0.206	23.250	8	83	0.554	62.569
16:00 - 17:00	8	83	0.434	49.064	8	83	0.225	25.472	8	83	0.659	74.536
17:00 - 18:00	8	83	0.498	56.244	8	83	0.230	25.985	8	83	0.728	82.229
18:00 - 19:00	8	83	0.343	38.806	8	83	0.247	27.865	8	83	0.590	66.671
19:00 - 20:00												
20:00 - 21:00												
21:00 - 22:00												
22:00 - 23:00												
23:00 - 24:00												
Total Rates:			3.020	341.394			3.092	349.429			6.112	690.823

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: $COUNT/TRP*FACT$. Trip rates are then rounded to 3 decimal places.

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Parameter summary

Trip rate parameter range selected:	34 - 153 (units:)
Survey date date range:	01/01/09 - 28/03/17
Number of weekdays (Monday-Friday):	8
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	1
Surveys manually removed from selection:	8

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED

MULTI-MODAL PEDESTRIANS**Calculation factor: 1 DWELLS****Estimated TRIP rate value per 113 DWELLS shown in shaded columns****BOLD print indicates peak (busiest) period**

Time Range	ARRIVALS				DEPARTURES				TOTALS			
	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate
00:00 - 01:00												
01:00 - 02:00												
02:00 - 03:00												
03:00 - 04:00												
04:00 - 05:00												
05:00 - 06:00												
06:00 - 07:00												
07:00 - 08:00	8	83	0.014	1.539	8	83	0.024	2.735	8	83	0.038	4.274
08:00 - 09:00	8	83	0.014	1.539	8	83	0.051	5.812	8	83	0.065	7.351
09:00 - 10:00	8	83	0.014	1.539	8	83	0.044	4.958	8	83	0.058	6.497
10:00 - 11:00	8	83	0.036	4.103	8	83	0.024	2.735	8	83	0.060	6.838
11:00 - 12:00	8	83	0.017	1.880	8	83	0.023	2.564	8	83	0.040	4.444
12:00 - 13:00	8	83	0.015	1.710	8	83	0.015	1.710	8	83	0.030	3.420
13:00 - 14:00	8	83	0.036	4.103	8	83	0.015	1.710	8	83	0.051	5.813
14:00 - 15:00	8	83	0.047	5.300	8	83	0.038	4.274	8	83	0.085	9.574
15:00 - 16:00	8	83	0.064	7.180	8	83	0.023	2.564	8	83	0.087	9.744
16:00 - 17:00	8	83	0.050	5.641	8	83	0.030	3.419	8	83	0.080	9.060
17:00 - 18:00	8	83	0.036	4.103	8	83	0.026	2.906	8	83	0.062	7.009
18:00 - 19:00	8	83	0.053	5.983	8	83	0.032	3.590	8	83	0.085	9.573
19:00 - 20:00												
20:00 - 21:00												
21:00 - 22:00												
22:00 - 23:00												
23:00 - 24:00												
Total Rates:			0.396	44.620			0.345	38.977			0.741	83.597

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.

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Parameter summary

Trip rate parameter range selected:	34 - 153 (units:)
Survey date date range:	01/01/09 - 28/03/17
Number of weekdays (Monday-Friday):	8
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	1
Surveys manually removed from selection:	8

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED

MULTI-MODAL BUS/TRAM PASSENGERS

Calculation factor: 1 DWELLS

Estimated TRIP rate value per 113 DWELLS shown in shaded columns

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS				DEPARTURES				TOTALS			
	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate
00:00 - 01:00												
01:00 - 02:00												
02:00 - 03:00												
03:00 - 04:00												
04:00 - 05:00												
05:00 - 06:00												
06:00 - 07:00												
07:00 - 08:00	8	83	0.000	0.000	8	83	0.011	1.197	8	83	0.011	1.197
08:00 - 09:00	8	83	0.005	0.513	8	83	0.006	0.684	8	83	0.011	1.197
09:00 - 10:00	8	83	0.000	0.000	8	83	0.002	0.171	8	83	0.002	0.171
10:00 - 11:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
11:00 - 12:00	8	83	0.002	0.171	8	83	0.002	0.171	8	83	0.004	0.342
12:00 - 13:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
13:00 - 14:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
14:00 - 15:00	8	83	0.003	0.342	8	83	0.002	0.171	8	83	0.005	0.513
15:00 - 16:00	8	83	0.002	0.171	8	83	0.003	0.342	8	83	0.005	0.513
16:00 - 17:00	8	83	0.005	0.513	8	83	0.003	0.342	8	83	0.008	0.855
17:00 - 18:00	8	83	0.006	0.684	8	83	0.002	0.171	8	83	0.008	0.855
18:00 - 19:00	8	83	0.009	1.026	8	83	0.000	0.000	8	83	0.009	1.026
19:00 - 20:00												
20:00 - 21:00												
21:00 - 22:00												
22:00 - 23:00												
23:00 - 24:00												
Total Rates:			0.032	3.420			0.031	3.249			0.063	6.669

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.

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Parameter summary

Trip rate parameter range selected:	34 - 153 (units:)
Survey date date range:	01/01/09 - 28/03/17
Number of weekdays (Monday-Friday):	8
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	1
Surveys manually removed from selection:	8

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED

MULTI-MODAL TOTAL RAIL PASSENGERS

Calculation factor: 1 DWELLS

Estimated TRIP rate value per 113 DWELLS shown in shaded columns

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS				DEPARTURES				TOTALS			
	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate
00:00 - 01:00												
01:00 - 02:00												
02:00 - 03:00												
03:00 - 04:00												
04:00 - 05:00												
05:00 - 06:00												
06:00 - 07:00												
07:00 - 08:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
08:00 - 09:00	8	83	0.000	0.000	8	83	0.002	0.171	8	83	0.002	0.171
09:00 - 10:00	8	83	0.000	0.000	8	83	0.002	0.171	8	83	0.002	0.171
10:00 - 11:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
11:00 - 12:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
12:00 - 13:00	8	83	0.000	0.000	8	83	0.002	0.171	8	83	0.002	0.171
13:00 - 14:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
14:00 - 15:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
15:00 - 16:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
16:00 - 17:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
17:00 - 18:00	8	83	0.002	0.171	8	83	0.000	0.000	8	83	0.002	0.171
18:00 - 19:00	8	83	0.002	0.171	8	83	0.000	0.000	8	83	0.002	0.171
19:00 - 20:00												
20:00 - 21:00												
21:00 - 22:00												
22:00 - 23:00												
23:00 - 24:00												
Total Rates:			0.004	0.342			0.006	0.513			0.010	0.855

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.

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Parameter summary

Trip rate parameter range selected:	34 - 153 (units:)
Survey date date range:	01/01/09 - 28/03/17
Number of weekdays (Monday-Friday):	8
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	1
Surveys manually removed from selection:	8

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED

MULTI-MODAL COACH PASSENGERS

Calculation factor: 1 DWELLS

Estimated TRIP rate value per 113 DWELLS shown in shaded columns

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS				DEPARTURES				TOTALS			
	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate
00:00 - 01:00												
01:00 - 02:00												
02:00 - 03:00												
03:00 - 04:00												
04:00 - 05:00												
05:00 - 06:00												
06:00 - 07:00												
07:00 - 08:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
08:00 - 09:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
09:00 - 10:00	8	83	0.000	0.000	8	83	0.003	0.342	8	83	0.003	0.342
10:00 - 11:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
11:00 - 12:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
12:00 - 13:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
13:00 - 14:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
14:00 - 15:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
15:00 - 16:00	8	83	0.003	0.342	8	83	0.000	0.000	8	83	0.003	0.342
16:00 - 17:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
17:00 - 18:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
18:00 - 19:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
19:00 - 20:00												
20:00 - 21:00												
21:00 - 22:00												
22:00 - 23:00												
23:00 - 24:00												
Total Rates:			0.003	0.342			0.003	0.342			0.006	0.684

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.

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Parameter summary

Trip rate parameter range selected:	34 - 153 (units:)
Survey date date range:	01/01/09 - 28/03/17
Number of weekdays (Monday-Friday):	8
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	1
Surveys manually removed from selection:	8

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED

MULTI-MODAL PUBLIC TRANSPORT USERS

Calculation factor: 1 DWELLS

Estimated TRIP rate value per 113 DWELLS shown in shaded columns

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS				DEPARTURES				TOTALS			
	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate
00:00 - 01:00												
01:00 - 02:00												
02:00 - 03:00												
03:00 - 04:00												
04:00 - 05:00												
05:00 - 06:00												
06:00 - 07:00												
07:00 - 08:00	8	83	0.000	0.000	8	83	0.011	1.197	8	83	0.011	1.197
08:00 - 09:00	8	83	0.005	0.513	8	83	0.008	0.855	8	83	0.013	1.368
09:00 - 10:00	8	83	0.000	0.000	8	83	0.006	0.684	8	83	0.006	0.684
10:00 - 11:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
11:00 - 12:00	8	83	0.002	0.171	8	83	0.002	0.171	8	83	0.004	0.342
12:00 - 13:00	8	83	0.000	0.000	8	83	0.002	0.171	8	83	0.002	0.171
13:00 - 14:00	8	83	0.000	0.000	8	83	0.000	0.000	8	83	0.000	0.000
14:00 - 15:00	8	83	0.003	0.342	8	83	0.002	0.171	8	83	0.005	0.513
15:00 - 16:00	8	83	0.005	0.513	8	83	0.003	0.342	8	83	0.008	0.855
16:00 - 17:00	8	83	0.005	0.513	8	83	0.003	0.342	8	83	0.008	0.855
17:00 - 18:00	8	83	0.008	0.855	8	83	0.002	0.171	8	83	0.010	1.026
18:00 - 19:00	8	83	0.011	1.197	8	83	0.000	0.000	8	83	0.011	1.197
19:00 - 20:00												
20:00 - 21:00												
21:00 - 22:00												
22:00 - 23:00												
23:00 - 24:00												
Total Rates:			0.039	4.104			0.039	4.104			0.078	8.208

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.

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Parameter summary

Trip rate parameter range selected:	34 - 153 (units:)
Survey date date range:	01/01/09 - 28/03/17
Number of weekdays (Monday-Friday):	8
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	1
Surveys manually removed from selection:	8

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED

MULTI-MODAL TOTAL PEOPLE

Calculation factor: 1 DWELLS

Estimated TRIP rate value per 113 DWELLS shown in shaded columns

BOLD print indicates peak (busiest) period

Time Range	ARRIVALS				DEPARTURES				TOTALS			
	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate	No. Days	Ave. DWELLS	Trip Rate	Estimated Trip Rate
00:00 - 01:00												
01:00 - 02:00												
02:00 - 03:00												
03:00 - 04:00												
04:00 - 05:00												
05:00 - 06:00												
06:00 - 07:00												
07:00 - 08:00	8	83	0.094	10.599	8	83	0.419	47.354	8	83	0.513	57.953
08:00 - 09:00	8	83	0.182	20.514	8	83	0.673	76.074	8	83	0.855	96.588
09:00 - 10:00	8	83	0.213	24.104	8	83	0.287	32.481	8	83	0.500	56.585
10:00 - 11:00	8	83	0.183	20.685	8	83	0.209	23.592	8	83	0.392	44.277
11:00 - 12:00	8	83	0.206	23.250	8	83	0.251	28.378	8	83	0.457	51.628
12:00 - 13:00	8	83	0.230	25.985	8	83	0.169	19.147	8	83	0.399	45.132
13:00 - 14:00	8	83	0.265	29.917	8	83	0.230	25.985	8	83	0.495	55.902
14:00 - 15:00	8	83	0.247	27.865	8	83	0.260	29.404	8	83	0.507	57.269
15:00 - 16:00	8	83	0.430	48.551	8	83	0.234	26.498	8	83	0.664	75.049
16:00 - 17:00	8	83	0.501	56.585	8	83	0.266	30.088	8	83	0.767	86.673
17:00 - 18:00	8	83	0.557	62.911	8	83	0.263	29.746	8	83	0.820	92.657
18:00 - 19:00	8	83	0.411	46.499	8	83	0.280	31.626	8	83	0.691	78.125
19:00 - 20:00												
20:00 - 21:00												
21:00 - 22:00												
22:00 - 23:00												
23:00 - 24:00												
Total Rates:			3.519	397.465			3.541	400.373			7.060	797.838

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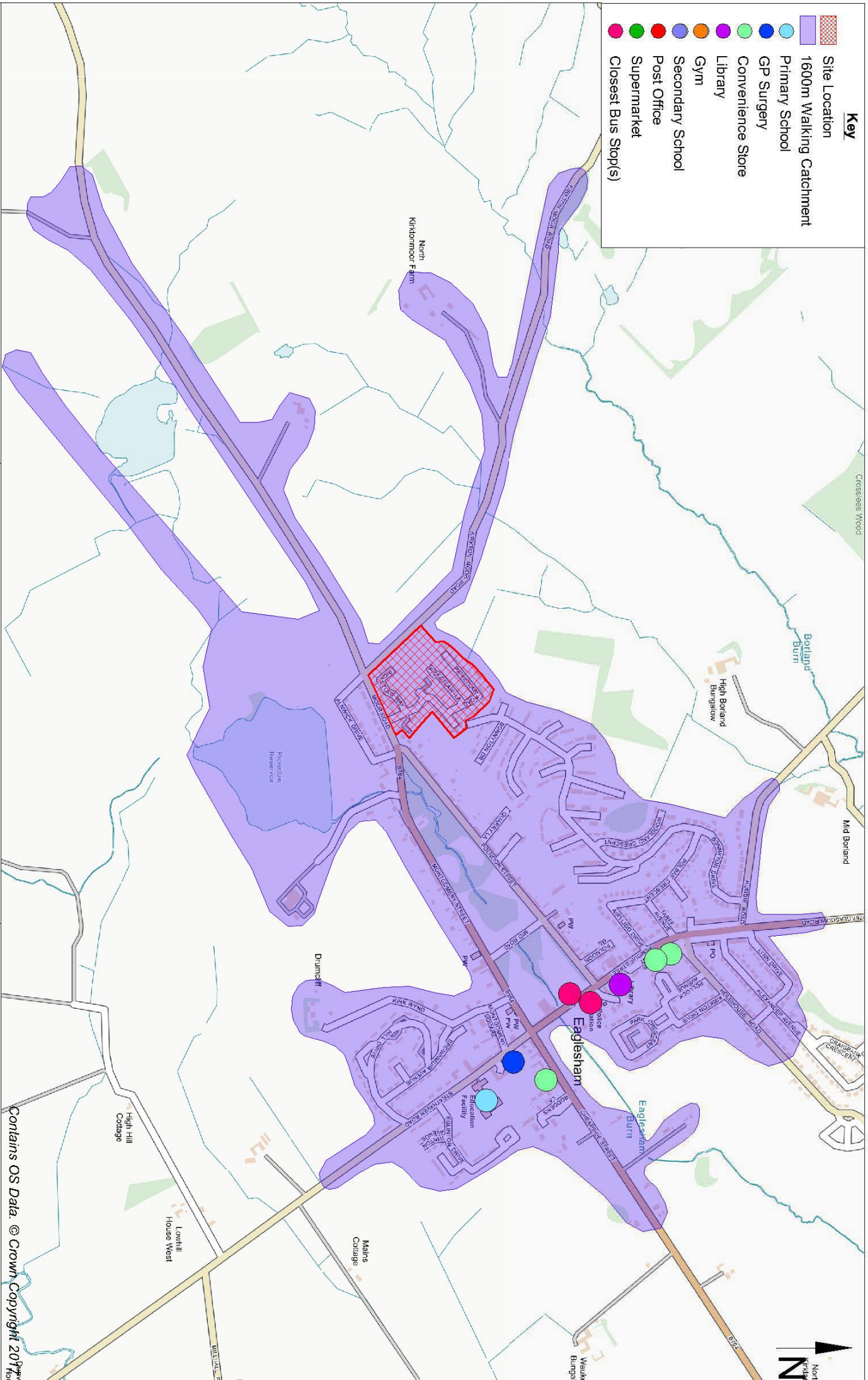
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Appendix C: Walking and Cycling Isochrones and Local Destinations



Key

- Site Location
- 1600m Walking Catchment
- Primary School
- GP Surgery
- Convenience Store
- Library
- Gym
- Secondary School
- Post Office
- Supermarket
- Closest Bus Stops

Designing Streets: Does it Increase Active Travel?













Transport Planning Society

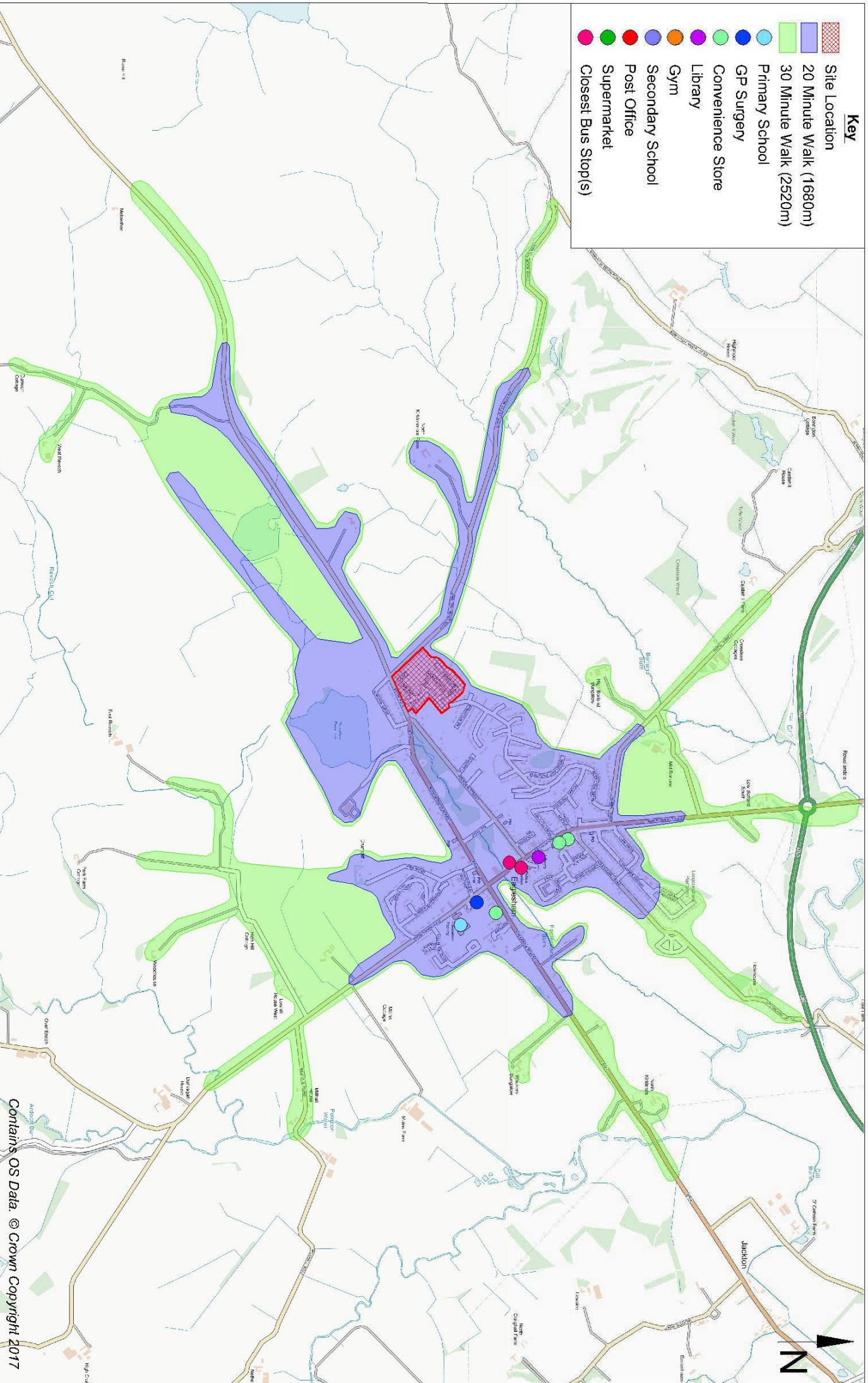
Diagram 1

1600m Walking Catchment

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- Key**
-  Site Location
 -  20 Minute Walk (1680m)
 -  30 Minute Walk (2520m)
 -  Primary School
 -  GP Surgery
 -  Convenience Store
 -  Library
 -  Gym
 -  Secondary School
 -  Post Office
 -  Supermarket
 -  Closest Bus Stop(s)



Designing Streets: Does it Increase Active Travel?


Transport Planning Society

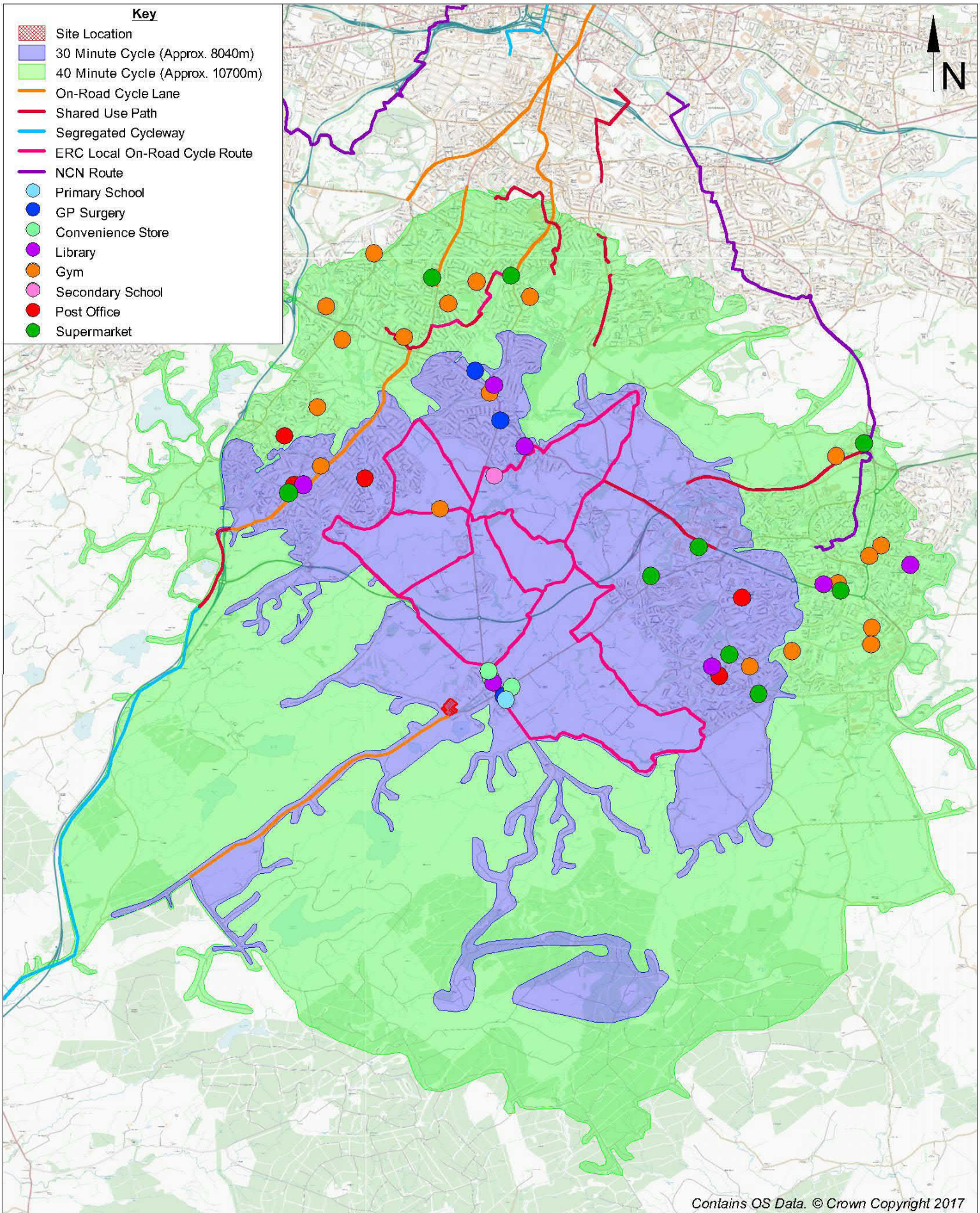
Diagram 2

20 - 30 Minute Walking Catchment

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Key

-  Site Location
-  30 Minute Cycle (Approx. 8040m)
-  40 Minute Cycle (Approx. 10700m)
-  On-Road Cycle Lane
-  Shared Use Path
-  Segregated Cycleway
-  ERC Local On-Road Cycle Route
-  NCN Route
-  Primary School
-  GP Surgery
-  Convenience Store
-  Library
-  Gym
-  Secondary School
-  Post Office
-  Supermarket



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Diagram 3

Designing Streets: Does it Increase Active Travel?

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30 - 40 Minute Cycling Catchment