TRICS Consortium Limited

Cambourne Village TRICS Survey – Technical Report

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Contents

1. Introduction 3
2. Site Details 4
3. Survey Methodology 8
4. Survey Results 14
5. On-Line Data Analysis Tool 31
6. Lessons Learned - Conclusions 33

Tables

Table 1 – Mode Split targets for part of Cambourne West 7
Table 2 – Results of 2015 residents' questionnaire for part of Cambourne West 7
Table 3 – Summary of inbound trips by type at the overall Cambourne site (excluding through-trips) 14
Table 4 – Summary of outbound trips by type at the overall Cambourne site (excluding through-trips) 15
Table 5 – Comparison of inbound/outbound total vehicle trips and vehicular through-trips for the overall Cambourne site 16
Table 6 – Summary of trips by mode for Morrisons 17
Table 7 – Summary of trips by mode for Just for Pets 19
Table 8 – Summary of trips by mode for Cambourne Fitness Centre 21
Table 9 – Summary of trips by mode for Poundworld 23
Table 10 – Summary of trips by mode for Cambourne Library and Health Centre 25
Table 11 – Summary of trips by mode for Cambourne Community Centre 27
Table 12 – Summary of trips by mode for Cambourne Church 29

Figures

Figure 1 - Location of Cambourne in Cambridgeshire (Google Maps) 4
Figure 2 – Internal Structure of Cambourne (Google Maps) 5
Figure 3 – Bus routes passing through and stopping within Cambourne 6
Figure 4 – Locations of the 7 internal developments surveyed within Cambourne Village 9
Figure 5 – Extract of the overall Cambourne TRICS survey specification, detailing instructions given to enumerators aboard buses within the site 11
Figure 6 – Extract from the "Special Conditions" section of the TRICS survey specifications for each of the internal Cambourne developments 12
Figure 7 – Extract from enumerator instructions at an internal Cambourne development, detailing the questions asked to obtain the necessary internalisation splits 13
Figure 8 – Vehicle type split (total count and both directions) for the overall Cambourne site 15
Figure 9 – Modal split (total count and both directions) for the overall Cambourne site 15
Figure 10 – Mode splits for internal and external trips for Morrisons 17
Figure 11 – Mode choice flow profile (all trips) for Morrisons 17
Figure 12 – Internal trips by journey type for Morrisons 18
Figure 13 – External trips by journey type for Morrisons 18
Figure 14 – Mode splits for internal and external trips for Just for Pets 19
Figure 15 – Mode choice flow profile (all trips) for Just for Pets 19
Figure 16 – Internal trips by journey type for Just for Pets 20
Figure 17 – External trips by journey type for Just for Pets 20
Figure 18 – Mode splits for internal and external trips for Cambourne Fitness Centre 21
Figure 19 – Mode choice flow profile (all trips) for Cambourne Fitness Centre 21
Figure 20 – Internal trips by journey type for Cambourne Fitness Centre 22
Figure 21 – External trips by journey type for Cambourne Fitness Centre 22
Figure 22 – Mode splits for internal and external trips for Poundworld 23
Figure 23 – Mode choice flow profile (all trips) for Poundworld 23
Figure 24 – Internal trips by journey time for Poundworld 24
Figure 25 – External trips by journey time for Poundworld 24
Figure 26 – Mode splits for internal and external trips for Cambourne Library and Health Centre 25
Figure 27 – Mode choice flow profile (all trips) for Cambourne Library and Health Centre 25
Figure 28 – Internal trips by journey type for Cambourne Library and Health Centre 26
Figure 29 – External trips by journey type for Cambourne Library and Health Centre 26
Figure 30 – Mode splits for internal and external trips for Cambourne Community Centre 27
Figure 31 – Mode choice flow profile (all trips) for Cambourne Community Centre 27
Figure 32 – Internal trips by journey type for Cambourne Community Centre 28
Figure 33 – External trips by journey type for Cambourne Community Centre 28
Figure 34 – Mode splits for internal and external trips for Cambourne Church 29
Figure 35 – Mode choice flow profile (all trips) for Cambourne Church 29
Figure 36 – Internal trips by journey type for Cambourne Church 30
Figure 37 – External trips by journey type for Cambourne Church 30
Figure 38 – The control area within the Dashboard of the Cambourne on-line data analysis tool 31
Figure 39 – Example of a Portal Filter 32

1. Introduction

1.1. For some years, members of the TRICS Community have raised the question of trip generation, sustainability and internalisation at new and large, residential-dominated developments, known in TRICS as "New Communities". Such developments are now defined in TRICS into three sub-categories, which are as follows.

- Free Standing Settlement: Purpose built new settlements of at least 1,500 dwellings, with at least two miles of relatively undeveloped land between them and the nearest town/city of any scale. They would be likely to be of mixed use, although predominate in housing (e.g. Cambourne in Cambridgeshire).

- Urban Extension: Newly built extensions of at least 1,000 dwellings which physically adjoin an existing established town or city. They would be likely to be of mixed use, although predominate in housing (e.g. Kingsmere in Bicester).

- Other Major Mixed-Use Site: Significantly changed or increased in size communities which might perhaps be based upon an existing community/development, but which increases the quantity of residential. They would be likely to be of mixed use, although predominate in housing (e.g. Bordon in Hampshire).

1.2. A question that has often been asked is just how "sustainable" are these types of development? Also, does the reality of trip generation etc match up to the theory? Prior to this project, there had been a lack of actual trip generation and modal split data for such developments, which are marketed as "sustainable", being designed to minimise external trip generation. So, do such settlements assist in achieving the aim of sustainable transport? And what characteristics are there in terms of internalisation between the residential and non-residential elements of such sites? Would more people live and work within these settlements, and therefore reduce the need for as many external trips? There are many questions, but we thought that perhaps we could at least start off the process of looking for answers by undertaking a unique set of TRICS surveys.

1.3. Prior to 2018, TRICS Consortium Limited undertook a search for a suitable development that could be surveyed and assessed, both in terms of overall trip generation and an analysis of internal and external trips at some of the site's non-residential elements. Cambourne in Cambridgeshire was found to meet our criteria, in that it was largely developed and occupied, and was reasonably self-contained.

1.4. From the outset, TRICS worked with Cambridgeshire County Council and Cambourne Parish Council to enable this major survey project to take place. We consider the co-operation and the assistance of the councils as essential to the completion and success of the project.

1.5. An important caveat we must put in place is that all surveys at the development were undertaken on a single day (Thursday 7th June 2018), at one development, so we consider that any information attained from the results of this project should not be used to draw any conclusions about any other sites. In fact, we do not draw any conclusions of our own from this piece of research, our intention being simply to present the results of the various elements of this survey. We do, however, view this project as an important first step in addressing some of the questions that have been asked about large, residential-dominated mixed use developments.

2. Site Details

2.1. Cambourne Village is a substantial free-standing community in Cambridgeshire, and at the time of the survey (June 2018) had a total site area of 400 hectares. The development comprised 4,250 new homes, split between 2,975 privately owned and 1,275 non-privately owned dwellings. In addition, the site included a varied mix of non-residential developments, including retail, schools, a hotel, a sports centre, a community centre and other uses. Construction of the site commenced in 1998, with final completion of construction for this phase due in 2020. Additional phases to the West of the development, which has started construction, and a little to the East at Bourne Airfield are also proposed in the future. Most of the site had been completed and occupied at the time of the survey, certainly to the extent that a TRICS survey covering the whole development was feasible and practical. The development is marketed as "a thriving, well balanced and sustainable community", and it comprises three parts, these being Great Cambourne, Lower Cambourne and Upper Cambourne.

2.2. The development is accessed on its northern edge from the A428, which heads west towards the junction with the north/south A1, and east towards the junction with the A10 and Cambridge. It is also accessed by vehicle at its southern edge via the A1198. At the site's eastern boundary is Bourn Airport, with mainly open land in other directions, making this a true free-standing development.

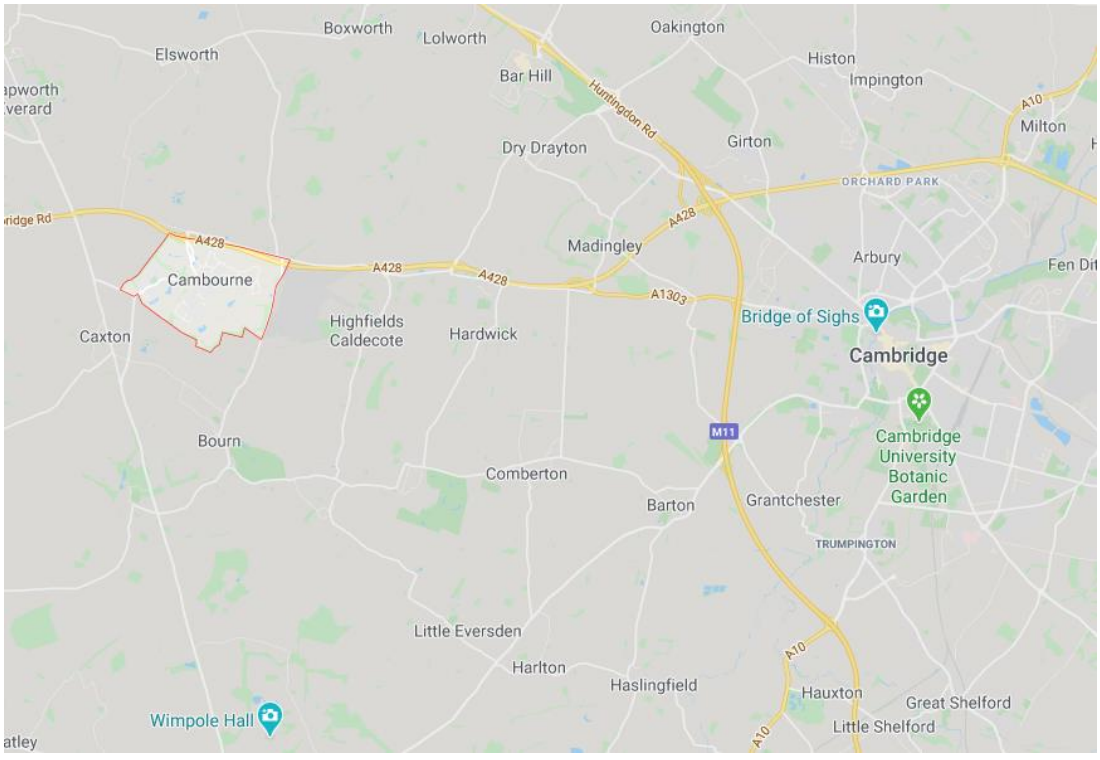


Figure 1 - Location of Cambourne in Cambridgeshire (Google Maps)

2.3. As illustrated in Figure 2 below, Lower Cambourne is situated in the west of the development, Great Cambourne is in the centre (being the largest of the three village areas), and Upper Cambourne is situated in the east. The site has a single vehicular route passing through it, consisting of School Lane, Broad Street and Cambourne Road. Smaller

internal roads connect residents and visitors at each of the three village areas to all other parts of the development.

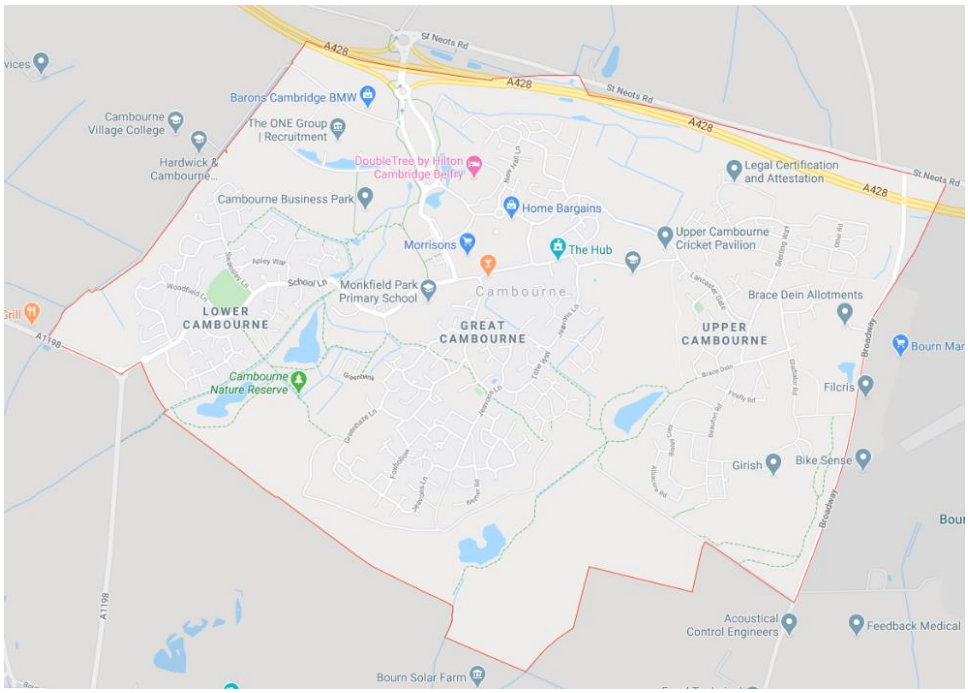


Figure 2 – Internal Structure of Cambourne (Google Maps)

2.4. Cambourne has a network of shared cycleways, footpaths and bridleways throughout the site, which are largely gravelled and off-road, connecting the three village areas together in addition to the internal roads doing the same. Three bus routes pass through the site and stop at various points within it, one of which includes a circular route within the central Great Cambourne area. There is no train station within the development, with the nearest stations being St Neots to the west, Cambridge to the east, and Shepreth and Foxton stations to the south east, all of which are significant distances away. There are two vehicle accesses to the development, one at the site's southern boundary and the other at its northern boundary.

Figure 3 – Bus routes passing through and stopping within Cambourne

2.5. The original planning consent for Cambourne did not require a travel plan as part of conditions. However, a section of the development that was subject to a separate proposal (within Cambourne West) was subject to such planning conditions, and as a result a travel plan exists for this part of the site, which has been subject to monitoring surveys. These were focused on residential travel habits, and the surveys took place in the form of residential household questionnaires. Known as "Cambourne 950", the first travel plan of this part of the development was produced in August 2011. This was followed by a baseline travel plan monitoring report in January 2015, and then by a Year 2 monitoring report in May 2016. The main aim of the travel plan was to constrain the level of single occupancy vehicle trips, and to encourage more sustainable modes of travel. The travel plan objectives are briefly noted as follows:

- Address residents needs for access to a full range of local facilities.
- Reduce traffic generation.
- Encourage travel to and from the site to use car sharing, cycling, walking and public transport.
- Promote healthy lifestyles and sustainable, vibrant local communities.
- Encourage good urban design principles that increase the permeability of the development for walking and cycling.

2.6. The initial travel plan was finalised prior to the occupation of the development. Because of this, there needed to be some interim mode split targets, which were obtained using existing travel patterns of residents of Upper Cambourne, previously known as the Cambourne 950 development, who were there prior to the new development being constructed. A baseline survey was then undertaken in 2014, from which revised mode split targets were produced, which are shown in Table 1.

Mode	Interim Target	Baseline Data (2014)	Revised Target
Car Drive	60%	79%	74%
Car Share	6%	4%	5%
Bus	11%	0%	0%
Walk and Cycle	22%	17%	21%
Other	1%	0%	0%
TOTAL	100%	100%	100%

Table 1 – Mode Split targets for part of Cambourne West

2.7. The travel plan measures that were implemented (or are to be implemented) are summarised as follows:

- Integrate the site with existing communities and employment areas by non-car modes.
- Prioritise movement within the development for pedestrians, cycles, and where appropriate, public transport.
- Promote public transport, cycling and pedestrian information through marketing.
- Provide a Travel Information Welcome Pack.
- Set up a travel information website.
- Ensure service information is provided in the sales office and at bus stops.
- Seek to secure discounts with local cycle shops.
- Investigate the feasibility of setting up a Bicycle User Group.
- Approach car club companies to establish a service at the site and provide a space on site.
- Provide safe and secure cycle parking facilities at key locations within the development.
- Provide a bus route through the proposed site to ensure that a high proportion of the new development lies within 400 metres walk of a bus stop.

2.8. The next monitoring survey that took place was the Year 2 survey in 2015. Household questionnaires were distributed to 580 occupied dwellings, with there being 100 returns (a response rate of 17.4% which is quite good for this type of survey format). This time it was found that, with a bigger number of responses, there was a significant reduction in single occupancy vehicle trips by residents, with all other mode shares being increased since the baseline survey was undertaken. The mode split results are shown in Table 2.

Travel Mode	Interim Baseline	2014 Baseline	Total Travel Modal Split from 2015 Year 2 Survey
Car (alone)	66%	79%	43%
Car (shared)	4%	4%	10%
Bus	9%	0%	15%
Train	-	-	3%
Walk	20%	14%	20%
Cycle		3%	7%
Other	1%	0%	2%

Table 2 – Results of 2015 residents' questionnaire for part of Cambourne West

3. Survey Methodology

3.1. Once Cambourne had been identified as a suitable development for this TRICS project, it was decided by the TRICS Board to get in touch with the local authorities (Cambridgeshire County Council and Cambourne Parish Council), and so representatives of the Board became involved in these initial discussions.

3.2. It was clear from the outset that the TRICS survey methodology would differ significantly from the previous household questionnaire interviews that had been undertaken in part of the Cambourne West area of the site as part of travel plan monitoring. Instead, TRICS would look to survey all trips in and out of the development throughout a single, whole day period (0700-2100). The TRICS Board spent some time discussing what other requirements there would be, and it soon became that a "standard" multi-modal TRICS survey would need to be enhanced to examine some of the more pressing questions there were about these new settlements. It was decided that an analysis of internalisation was very important, and that surveys of internalisation would need to take place on the same day as an overall multi-modal survey of the whole site. TRICS was also seeking to create a template methodology for potentially other future surveys at similar sites.

3.3. We needed to make sure that we got the approach correct, as we only had one shot at the physical set of surveys, and therefore getting the various sets of results that would provide us with the most useful and relevant information. So, prior to site visits being undertaken, the TRICS Board discussed the detail of how we would approach the issue of internalisation, the split between people visiting non-residential elements of the site from within and from outside the greater Cambourne Village development. It was decided to split trips (by mode), inbound and outbound, by various trip "types". These were to be split into the following:

- Resident of Cambourne
- Employee of Cambourne
- Resident AND employee of Cambourne
- Visitor to Cambourne

We considered this approach would give us a wealth of data that would allow a thorough series of post-survey analyses to take place.

3.4. Once the scope of the surveys was agreed in principle, it was then down to the technical team at TRICS to put the survey plan into action. As with all TRICS surveys, there is an established structure in place for the design, preparation and delivery of our multi-modal counts. The key steps for this project were as follows:

- Undertake a comprehensive site visit of the overall development plus each of the internal sites that are shortlisted to be included in the survey.
- Produce detailed TRICS survey specifications.
- Obtain survey permissions for the internal sites.
- Obtain permission and co-operation from the bus companies that run routes through the site.
- Award the surveys to our TRICS-approved data collection companies.
- Agree a survey date and undertake the surveys.

3.5. It was clear that a multi-modal survey of the whole Cambourne Village site would be required, so that total trips to and from Cambourne, excluding all through-trips, could be

obtained by mode. This survey of the whole site would itself provide some useful context for the internal surveys.

3.6. In terms of selecting a good sample of internal non-residential developments within the site, we were conscious of including developments that could attract trips from locations external to Cambourne as well as from within the site. We decided to exclude offices and schools, as these already undertook their own surveys that indicated levels of internalisation, so we were targeting developments with unknown internalisation levels. The site visits took place in February 2017, and a final list of 7 internal developments was agreed upon as follows:

1) Morrisons, Cambourne (TRICS Site Ref: CA 01 A 03)
2) Just for Pets, Cambourne (TRICS Site Ref: CA 01 G 01)
3) Cambourne Fitness Centre, Cambourne (TRICS Site Ref: CA 07 C 02)
4) Cambourne Community Centre, Cambourne (TRICS Site Ref: CA 07 Q 02)
5) Cambourne Church, Cambourne (TRICS Site Ref: CA 07 T 02)
6) Poundworld, Cambourne (TRICS Site Ref: CA 16 A 01)
7) Cambourne Library & Health Centre, Cambourne (TRICS Site Ref: CA 16 B 02)

The physical locations of these developments, as numbered above, are shown in Figure 4.

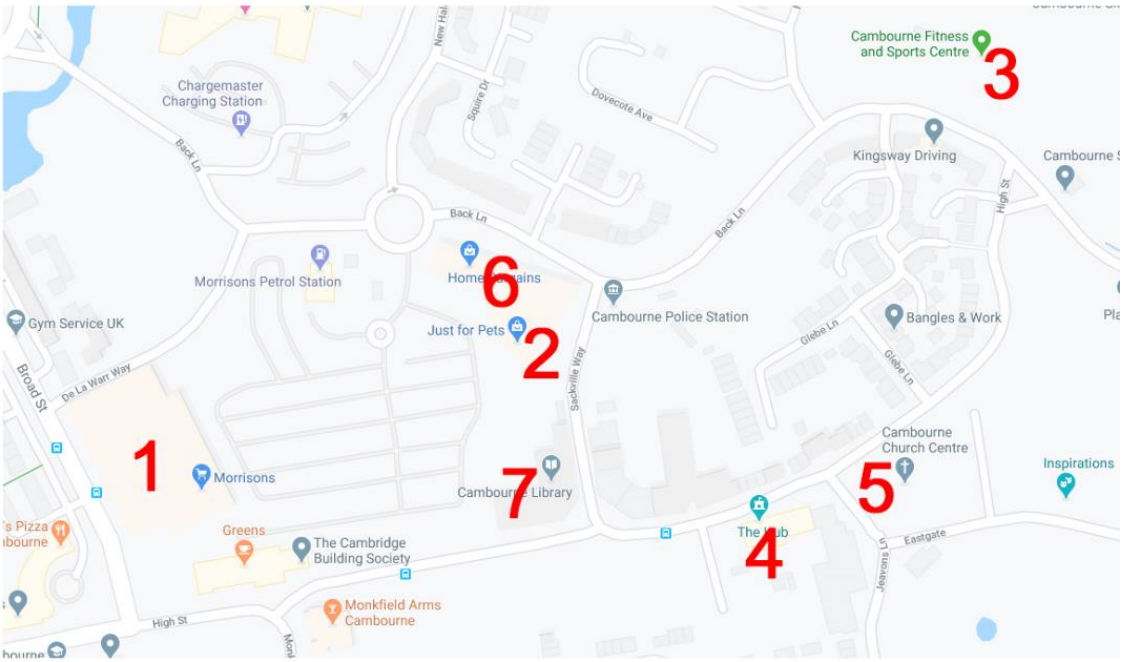


Figure 4 – Locations of the 7 internal developments surveyed within Cambourne Village

3.7. So, in total, there were 8 TRICS surveys undertaken at the Cambourne site, all taking place simultaneously on the same day, and consisting of the overall Cambourne site and then the 7 internal developments. Note the TRICS site reference codes shown above, which will allow anyone using TRICS to view the data for each development. It should also be noted that the overall Cambourne Village site is also available in the TRICS database, with the site reference code for this being CA 17 A 01.

3.8. The survey at the overall Cambourne site was more of a "standard" multi-modal TRICS survey, recording all trips by vehicle type and each non-vehicular mode, to and from the boundaries of the site, by hour, throughout the survey duration. This allowed us to obtain

the total figures for vehicles and people going to and from Cambourne. However, there were a couple of special conditions that meant that our usual approach to a multi-modal TRICS survey needed to be amended.

3.9. The first of these special conditions was the question of vehicular through-trips. As discussed earlier, the Cambourne site has two vehicle access points, one at the southern boundary and the other at the northern boundary, allowing vehicles to pass through the site as well as to visit it. To identify and exclude such through-trip activity, which would be vital for the success of the survey, we incorporated ANPR technology, with cameras put in place at each of the two vehicle accesses. It was then necessary to determine a suitable exclusion period, that would indicate a through-trip taking place. At first, it was estimated that vehicles could pass through the site in either direction within a period of 5 minutes. However, it later emerged (when the results were being analysed) that this period should be extended to 10 minutes, due to vehicle congestion within the site, often a result of the internal bus activity taking place, and increased overall vehicular activity at peak periods. The use of ANPR would also be able to record all vehicle occupants passing through the site, with these trips also excluded.

3.10. The second special condition was the identification of bus passengers arriving at and departing from Cambourne. In a more standard TRICS survey, we would have enumerators positioned at internal bus stops. However, in the case of Cambourne, there are far too many internal stops to have kept this approach feasible, so we decided on an alternative method. Enumerators would be continuously aboard the bus services that stop within the site, interviewing all passengers getting on and off each bus. We needed to also consider the possibility of the main method of a journey being by rail (as TRICS always records the main method of transport by distance), so the instructions for enumerators aboard buses required amending accordingly. An extract from the TRICS survey specification for the overall Cambourne survey is shown below in Figure 5, which details these instructions.

Position of Enumerator	Aboard buses travelling through the site.
Pedestrian/Public Transport User Interviews	All people that alight a bus should be asked the following question: *"Have you travelled from another part of Cambourne or from a destination outside of the village?"* If the answer is "*another part of Cambourne*" then ignore the trip. If the answer is "*a destination outside of the village*" then ask the following question: *"For this particular journey, has your main method of transport been bus or national rail?* If the answer is "bus" then record as a bus passenger arrival. If the answer is "national rail" then record as a national rail passenger arrival. All people that board a bus should be asked the following question: *"Are you travelling to another part of Cambourne or to a destination outside of the village?"* If the answer is "*another part of Cambourne*" then ignore the trip. If the answer is "*a destination outside of the village*" then ask the following question: *"For this particular journey, will your main method of transport been bus or national rail?* If the answer is "bus" then record as a bus passenger departure. If the answer is "national rail" then record as a national rail passenger departure.
Special Conditions	It is very important that all buses that travel through the site throughout the survey duration are covered by an enumerator on board. Care should be taken to ensure that no buses are left without an enumerator.

Figure 5 – Extract of the overall Cambourne TRICS survey specification, detailing instructions given to enumerators aboard buses within the site

3.11. A total of 15 enumerators were required to be operational at any one time at the overall Cambourne survey. Of these, 10 were positioned at the northern and southern vehicular access points, with 5 enumerators aboard the buses running through and stopping within the site.

3.12. As stated earlier, a standard TRICS multi-modal survey specification would be insufficient for any of the surveys at the 7 internal developments, due to the fact that these surveys had the additional requirement of identifying internalisation, the aim being to separate those travelling to and from the developments from within Cambourne and from outside Cambourne. These trips would additionally be split by the "status" of each person being interviewed (residents, employees, live & work, and visitors). In total, there needed to be 9 separate sets of multi-modal directional survey counts for each development, for a full internalisation analysis to be undertaken. Because of this, each internal development would require a full interview "front door" TRICS survey format, with head counts of all people entering and exiting a development used to factor up the inbound and outbound interview samples to 100%. Figure 6 is an extract of an internal development TRICS survey specification, which details these special conditions.

This survey is to include separate internalisation counts, with the aim being to separate those travelling to and from the store from within Cambourne and from outside Cambourne, sub-split by interviewee status (see individual enumerator instructions for details) Nine separate sets of multi-modal results will be required accordingly (including the total count), as follows:

- Total Count
- Internal Cambourne (residents of Cambourne)
- Internal Cambourne (employees of Cambourne)
- Internal Cambourne (live and work in Cambourne)
- Internal Cambourne (visitor to Cambourne)
- External Cambourne (residents of Cambourne)
- External Cambourne (employees of Cambourne)
- External Cambourne (live and work in Cambourne)
- External Cambourne (visitor to Cambourne)

Figure 6 – Extract from the "Special Conditions" section of the TRICS survey specifications for each of the internal Cambourne developments

3.13. The interview questions were adapted from our standard TRICS survey specification format, to incorporate these additional internalisation requirements (allowing the counts to be split by mode across the 8 sub-types). Figure 7 is a typical extract from a TRICS survey specification at an internal development.

Position of Enumerator	By the first set of double doors at the south west access point to the site building (Photograph 1).
All Mode Interviews (Inbound)	All people that walk into the site building at this access should be asked the following question: *"For this particular journey, which of the following has been your main method of transport?* • *Vehicle* • *Walking* • *Cycle* • *Bus* • *National Rail"* If the answer is "vehicle" then the type of vehicle needs to be determined by interview (one of the 7 standard classifications of car, motorcycle, taxi, light goods vehicle, public service vehicle, OGV1, OGV2). The following question will then need to be asked: *"Have you parked, or were you dropped off?"* If the answer is "parked" then record the vehicle as a vehicle arrival, and also record the appropriate number of vehicle occupant arrivals. If the answer is "dropped off" then record the vehicle as both an arrival and a departure, and record the appropriate number of vehicle occupant arrivals. If the answer is "walking" then record as a pedestrian arrival. If the answer is "cycle" then record as a pedal cycle arrival. If the answer is "bus" then record as a bus passenger arrival. If the answer is "national rail" then record as a national rail passenger arrival. The following question should also be asked: *"Do you live in Cambourne, work in Cambourne, both live and work in Cambourne or are you just visiting Cambourne?"* If the answer is "live in Cambourne" then record as only residing in Cambourne. If the answer is "work in Cambourne" then record as only employed in Cambourne. If the answer is "both live and work in Cambourne" then record as both residing and employed in Cambourne. If the answer is "just visiting Cambourne" then record as neither residing or employed in Cambourne. The following question should then be asked: *"Did this particular journey originate from within Cambourne or outside of Cambourne?"* If the answer is "within Cambourne" then record as an internal Cambourne trip. If the answer is "outside of Cambourne" then record as an external Cambourne trip. ***NOTE: This enumerator should take care to ensure that the correct modes and numbers are recorded when groups of people arrive at the site together.***

Figure 7 – Extract from enumerator instructions at an internal Cambourne development, detailing the questions asked to obtain the necessary internalisation splits

3.14. Once all the survey specifications were finalised, and permissions to undertake the surveys obtained from site operators, then a survey date, when all the counts would be undertaken simultaneously, was agreed, this being the 7th of June 2018. Two of our TRICS-approved data collection contractors participated in the surveys, with the number of surveys split evenly (one contractor surveying 4 internal developments, and the other surveying 3 internal developments plus the overall Cambourne Village site). Following data processing, the raw data was forwarded to TRICS for input and validation testing.

4. Survey Results

4.1. On the day of the survey, 7th of June 2018, the weather was warm and sunny throughout. This section of the report presents a summary of the results, firstly for the overall Cambourne site, and then for each of the 7 internal developments that were surveyed on the same day.

4.2. A total of 10,186 inbound vehicle trips were recorded at the overall Cambourne site on the day of the survey, and a total of 13,695 inbound person trips (the sum of all modes). These figures exclude all through-trip activity. Outbound trip totals were very similar. Tables 3 and 4 show a summary by total vehicles, vehicle occupants, each non-vehicular mode, and total people, for inbound and outbound trips, throughout the duration of the survey. Peak periods are also highlighted for each trip type. The vehicle type breakdown (total two-way trips) is shown in figure 8, and the modal split percentages (total two-way trips) are shown in figure 9.

Time Period	Total Vehicles	Vehicle Occup.	Ped.	Cyclists	Public Transp. Users	Total People
0700-0800	309	332	4	1	50	387
0800-0900	486	640	6	1	13	660
0900-1000	537	647	6	0	13	666
1000-1100	506	649	5	0	14	668
1100-1200	447	590	3	0	19	612
1200-1300	576	781	6	0	51	838
1300-1400	523	652	7	0	39	698
1400-1500	556	714	6	1	44	765
1500-1600	918	1115	8	3	44	1170
1600-1700	1149	1489	6	3	95	1593
1700-1800	1536	1990	7	5	65	2067
1800-1900	1322	1736	7	5	49	1797
1900-2000	789	1033	4	4	18	1059
2000-2100	532	698	6	4	7	715
Totals	**10186**	**13066**	**81**	**27**	**521**	**13695**

Table 3 – Summary of inbound trips by type at the overall Cambourne site (excluding through-trips)

Time Period	Total Vehicles	Vehicle Occup.	Ped.	Cyclists	Public Transp. Users	Total People
0700-0800	849	999	2	0	53	1054
0800-0900	1089	1385	3	0	74	1462
0900-1000	875	982	8	2	26	1018
1000-1100	447	571	3	0	14	588
1100-1200	617	767	5	0	19	791
1200-1300	648	818	7	0	65	890
1300-1400	738	871	10	0	49	930
1400-1500	417	536	3	0	50	589
1500-1600	879	1312	11	2	64	1389
1600-1700	894	1105	8	5	82	1200
1700-1800	994	1211	8	6	55	1280
1800-1900	812	1012	2	2	17	1033
1900-2000	541	675	8	6	25	714
2000-2100	385	481	2	0	8	491
Totals	**10185**	**12725**	**80**	**23**	**601**	**13429**

Table 4 – Summary of outbound trips by type at the overall Cambourne site (excluding through-trips)

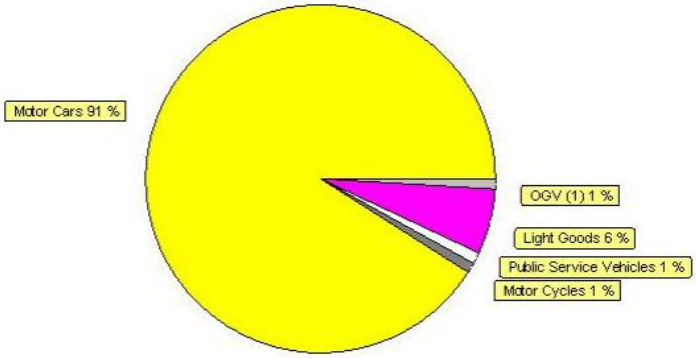


Figure 8 – Vehicle type split (total count and both directions) for the overall Cambourne site

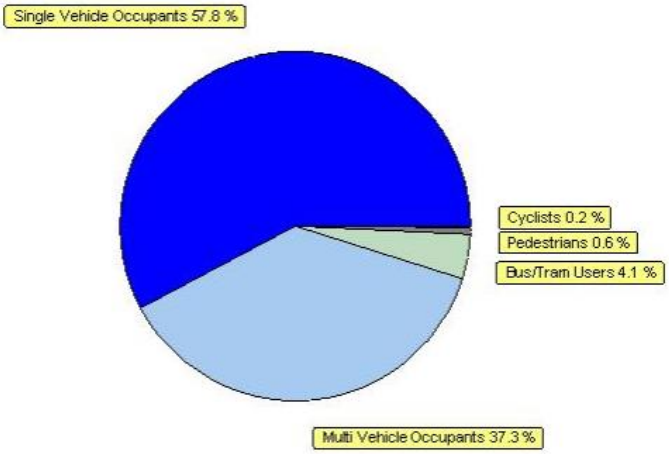


Figure 9 – Modal split (total count and both directions) for the overall Cambourne site

4.3. As previously discussed, ANPR technology was used to identify and exclude all vehicular through-trip activity at the overall Cambourne site. On the day of the survey, a total of 366 vehicles were identified as using the site as a through-route, based on a maximum period of 10 minutes between vehicles appearing at one access and then at the other. This represents 3.5% of the total number of vehicles that physically entered the site. Table 5 provides a comparison of inbound trips of vehicles visiting the site against the through-trips throughout the duration of the survey.

Time Period	Total Vehicles Inbound	Genuine Vehicles Inbound	Vehicular Through Trips	Through Trips Percent
0700-0800	349	309	40	11.5%
0800-0900	512	486	26	5.1%
0900-1000	558	537	21	3.8%
1000-1100	519	506	13	2.5%
1100-1200	464	447	17	3.7%
1200-1300	590	576	14	2.4%
1300-1400	558	523	35	6.3%
1400-1500	576	556	20	3.5%
1500-1600	944	918	26	2.8%
1600-1700	1206	1149	57	4.7%
1700-1800	1587	1536	51	3.2%
1800-1900	1342	1322	20	1.5%
1900-2000	806	789	17	2.1%
2000-2100	541	532	9	1.7%
Totals	**10552**	**10186**	**366**	**3.5%**

Table 5 – Comparison of inbound/outbound total vehicle trips and vehicular through-trips for the overall Cambourne site

4.4. The following sections provide some results for the surveys at the 7 internal developments. As per the overall Cambourne site, the inbound and outbound trips by mode are shown first. This is then followed by mode split pie charts, comparing internal and external trips (both directions and all time periods combined). These results separate all trips made from outside of Cambourne with those made from within Cambourne. This is followed by the mode choice flow profile throughout the survey duration, again combining inbound and outbound trips, but not splitting internal and external trips. Then there is the split of internal/external total people trips by journey type (again being inbound and outbound trips combined), providing a visual summary of the various types of journey discussed earlier (these being residents of Cambourne, visitors to Cambourne, employees of workplaces within Cambourne, and those who are both residents and employees within Cambourne).

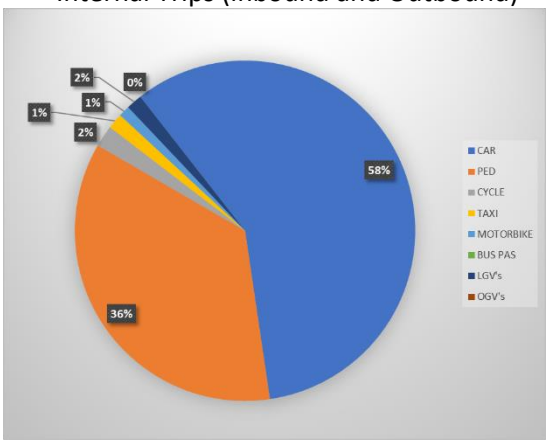
4.5. Results for the Morrisons development are shown in the following tables and figures.

Inbound Trips						
Time Period	Total Veh.	Veh. Occ.	Ped.	Cyc.	Public Tran. Users	Total People
0700-0800	153	178	31	5	0	214
0800-0900	246	298	37	6	0	341
0900-1000	315	387	82	3	5	477
1000-1100	308	398	48	8	13	467
1100-1200	289	371	93	7	21	492
1200-1300	369	478	138	4	9	629
1300-1400	304	421	115	1	11	548
1400-1500	316	420	57	5	9	491
1500-1600	262	351	128	8	8	495
1600-1700	298	380	112	2	8	502
1700-1800	385	515	65	3	5	588
1800-1900	348	458	57	2	11	528
1900-2000	240	334	45	0	2	381
2000-2100	263	332	22	0	3	357
Totals	**4096**	**5321**	**1030**	**54**	**105**	**6510**

Outbound Trips					
Total Veh.	Veh. Occ.	Ped.	Cyc.	Public Tran. Users	Total People
134	151	40	3	0	194
203	244	64	2	0	310
293	350	71	3	0	424
288	366	36	4	8	414
316	403	97	8	9	517
286	408	115	4	16	543
357	451	95	3	9	558
324	424	85	6	8	523
280	366	85	6	8	465
301	380	101	4	7	492
332	455	67	2	7	531
353	477	41	6	15	539
313	406	72	2	4	484
292	369	50	1	2	422
4072	**5250**	**1019**	**54**	**93**	**6416**

Table 6 – Summary of trips by mode for Morrisons

Internal Trips (inbound and Outbound)



External Trips (inbound and outbound)

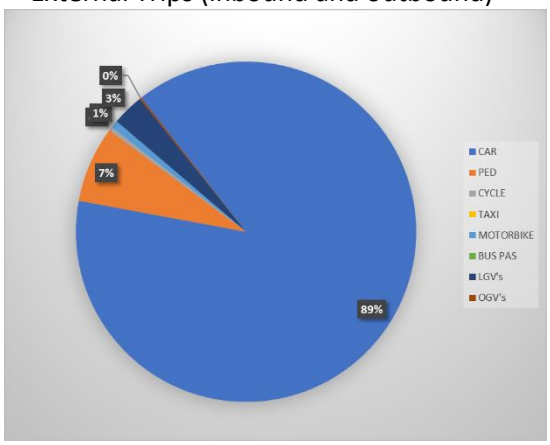


Figure 10 – Mode splits for internal and external trips for Morrisons

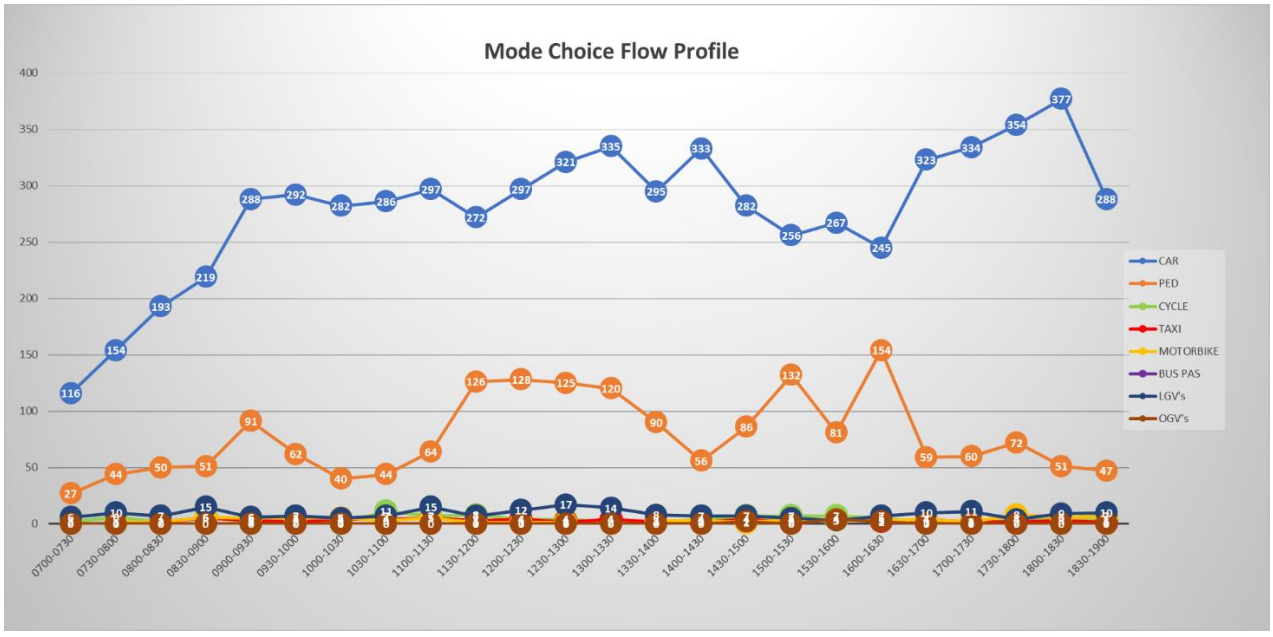


Figure 11 – Mode choice flow profile (all trips) for Morrisons

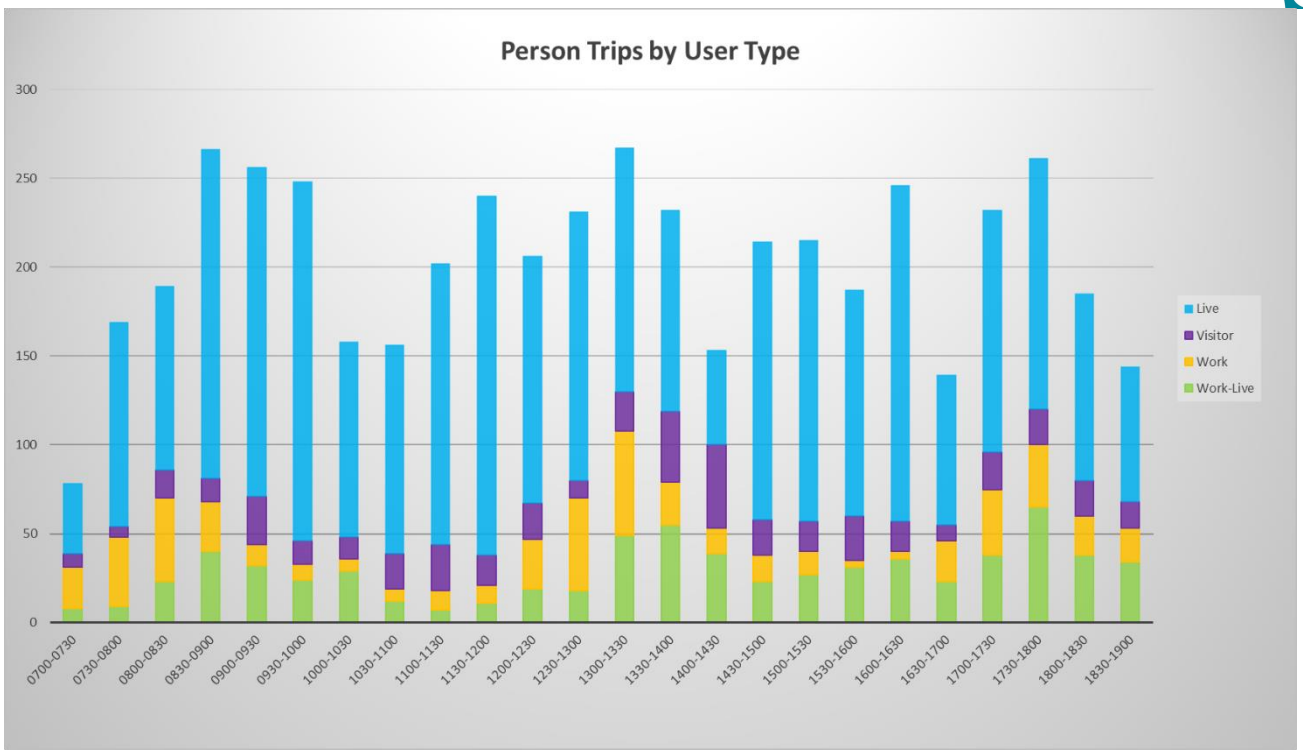


Figure 12 – Internal trips by journey type for Morrisons

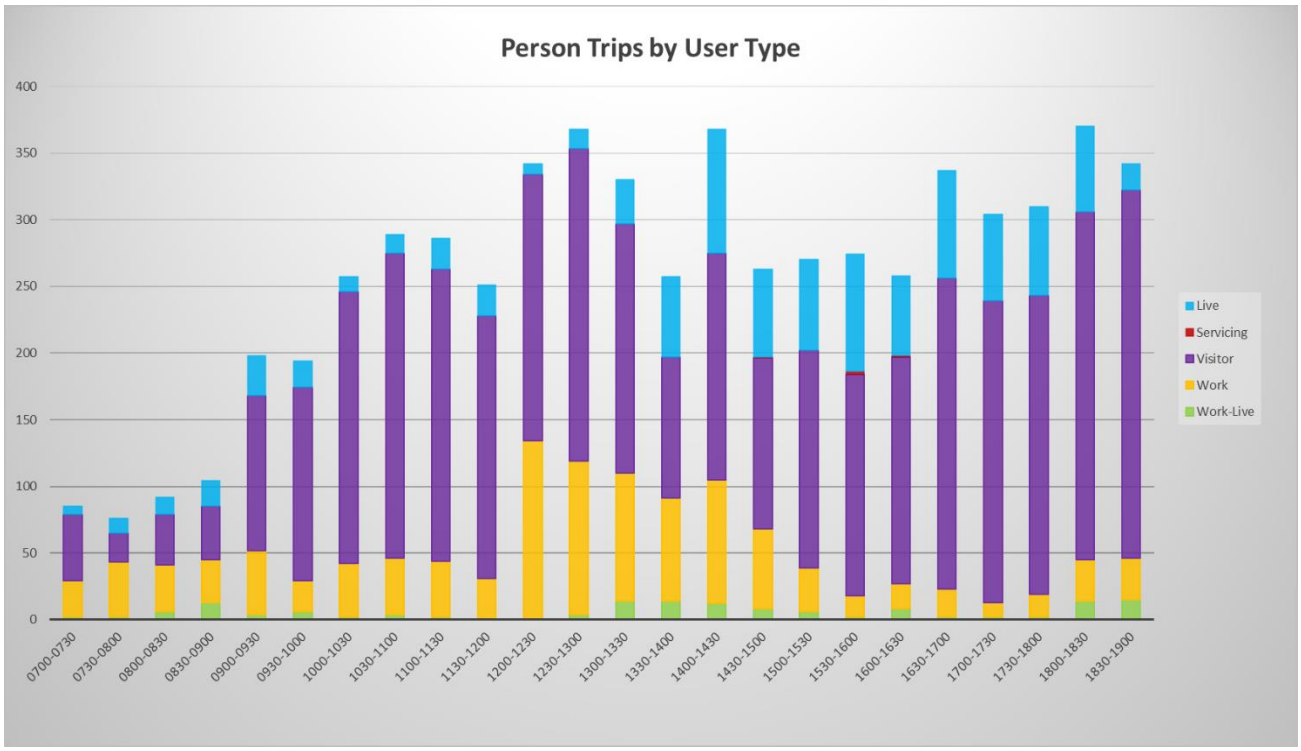


Figure 13 – External trips by journey type for Morrisons

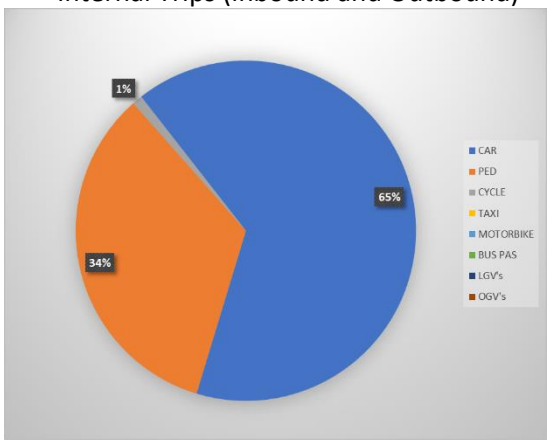
4.6. Results for the Just for Pets development are shown in the following tables and figures.

Inbound Trips						
Time Period	Total Veh.	Veh. Occ.	Ped.	Cyc.	Public Tran. Users	Total People
0700-0800						
0800-0900	1	1	0	0	0	1
0900-1000	14	21	4	1	0	26
1000-1100	13	16	3	0	0	19
1100-1200	17	23	4	0	0	27
1200-1300	15	24	4	0	0	28
1300-1400	15	21	2	1	0	24
1400-1500	15	23	4	0	0	27
1500-1600	11	16	4	0	0	20
1600-1700	14	23	10	0	0	33
1700-1800	27	38	5	0	0	43
1800-1900	11	17	0	0	0	17
1900-2000	0	0	0	0	0	0
2000-2100						
Totals	**153**	**223**	**40**	**2**	**0**	**265**

Outbound Trips					
Total Veh.	Veh. Occ.	Ped.	Cyc.	Public Tran. Users	Total People
0	0	0	0	0	0
12	18	1	0	0	19
13	15	2	0	0	17
13	17	4	0	0	21
20	27	4	0	0	31
14	21	0	1	0	22
12	19	2	0	0	21
14	19	5	0	0	24
14	21	8	0	0	29
27	38	7	0	0	45
11	15	6	1	0	22
4	6	1	0	0	7
154	**216**	**40**	**2**	**0**	**258**

Table 7 – Summary of trips by mode for Just for Pets

Internal Trips (inbound and Outbound)



External Trips (inbound and outbound)

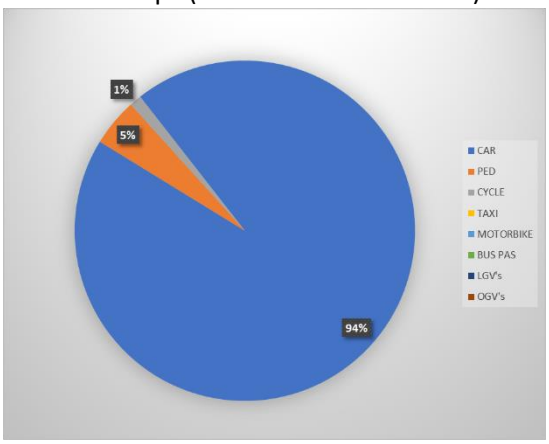


Figure 14 – Mode splits for internal and external trips for Just for Pets

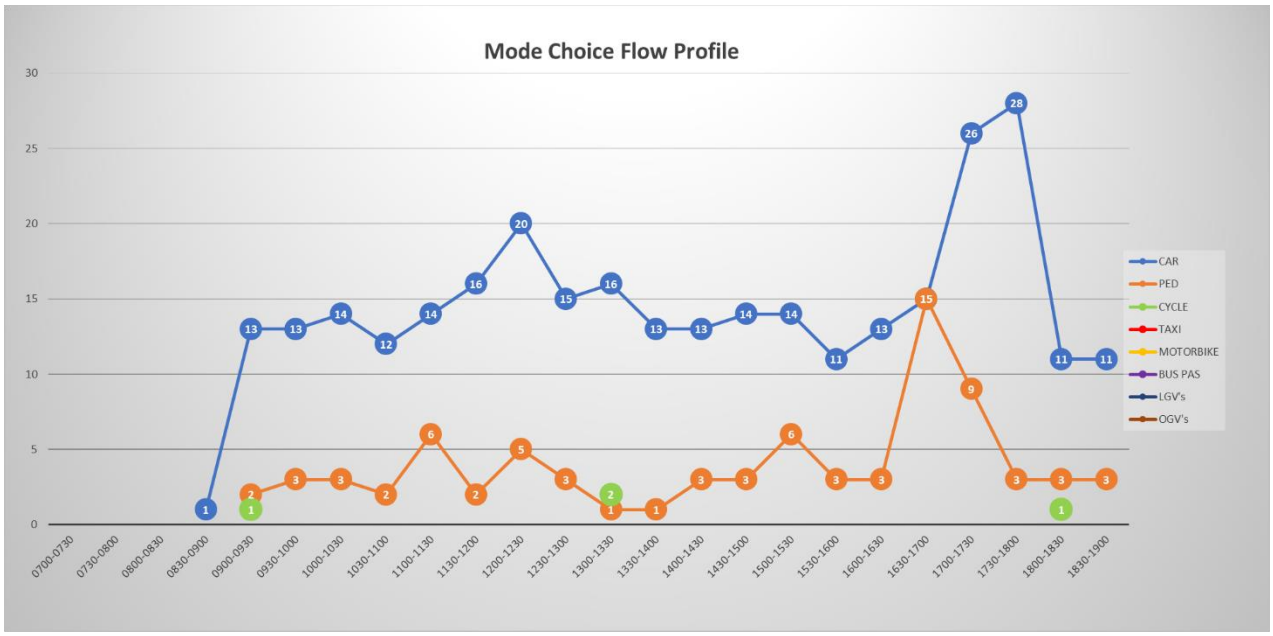


Figure 15 – Mode choice flow profile (all trips) for Just for Pets

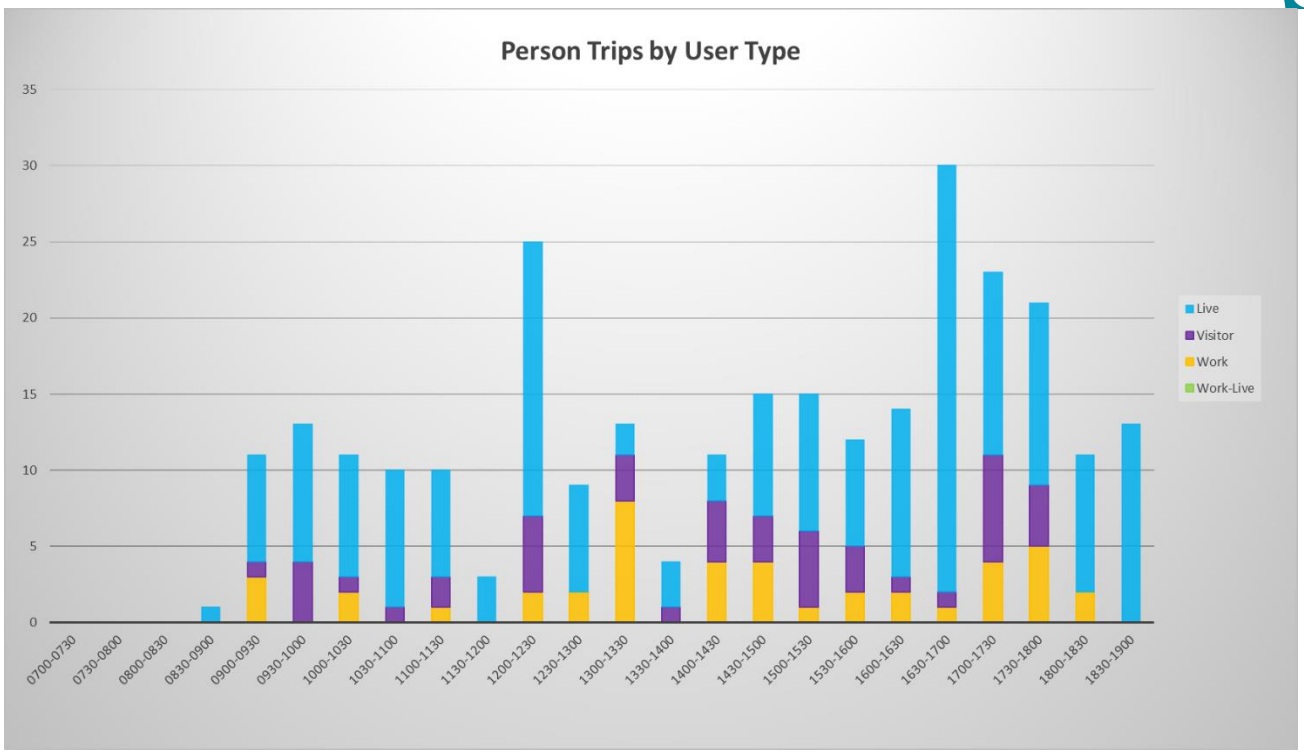


Figure 16 – Internal trips by journey type for Just for Pets

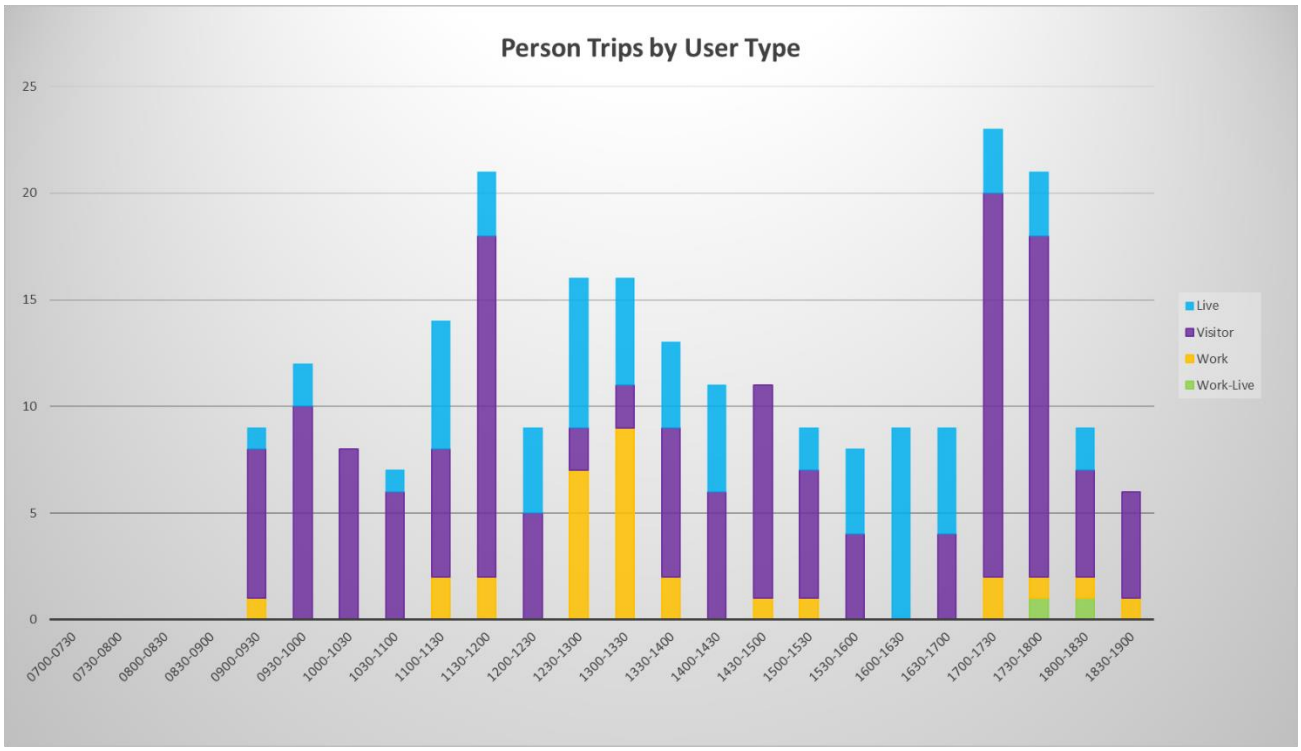


Figure 17 – External trips by journey type for Just for Pets

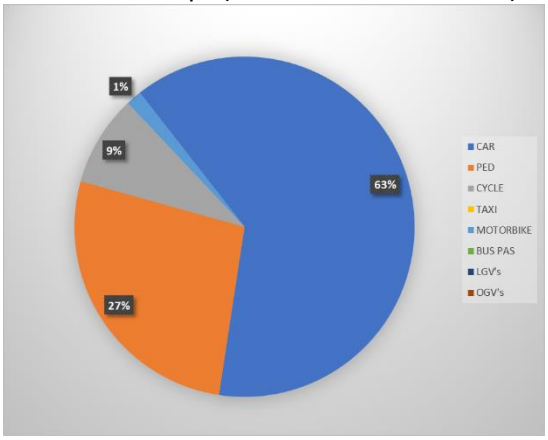
4.7. Results for the Cambourne Fitness Centre development are shown in the following tables and figures.

Inbound Trips						
Time Period	Total Veh.	Veh. Occ.	Ped.	Cyc.	Public Tran. Users	Total People
0700-0800	14	14	6	0	0	20
0800-0900	13	15	5	0	0	20
0900-1000	26	30	4	1	0	35
1000-1100	9	11	3	1	0	15
1100-1200	12	12	5	2	0	19
1200-1300	9	11	2	1	0	14
1300-1400	7	8	2	0	0	10
1400-1500	7	8	1	2	0	11
1500-1600	9	11	4	1	0	16
1600-1700	30	47	17	6	0	67
1700-1800	39	57	7	4	0	68
1800-1900	69	82	9	1	0	92
1900-2000	22	23	0	0	0	23
2000-2100	16	18	4	0	0	22
Totals	**282**	**347**	**66**	**19**	**0**	**432**

Outbound Trips					
Total Veh.	Veh. Occ.	Ped.	Cyc.	Public Tran. Users	Total People
13	15	7	0	0	22
7	7	3	0	0	10
11	2	6	0	0	18
14	17	0	0	0	17
25	28	6	0	0	34
13	14	4	2	0	20
9	11	2	0	0	13
5	5	1	0	0	6
8	8	0	2	0	10
12	14	4	1	0	19
43	68	7	8	0	83
57	76	7	5	0	88
29	37	4	1	0	42
25	29	6	0	0	35
271	**341**	**57**	**19**	**0**	**417**

Table 8 – Summary of trips by mode for Cambourne Fitness Centre

Internal Trips (inbound and Outbound)



External Trips (inbound and outbound)

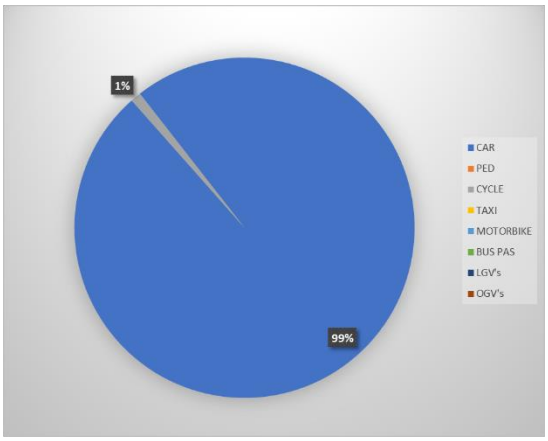


Figure 18 – Mode splits for internal and external trips for Cambourne Fitness Centre

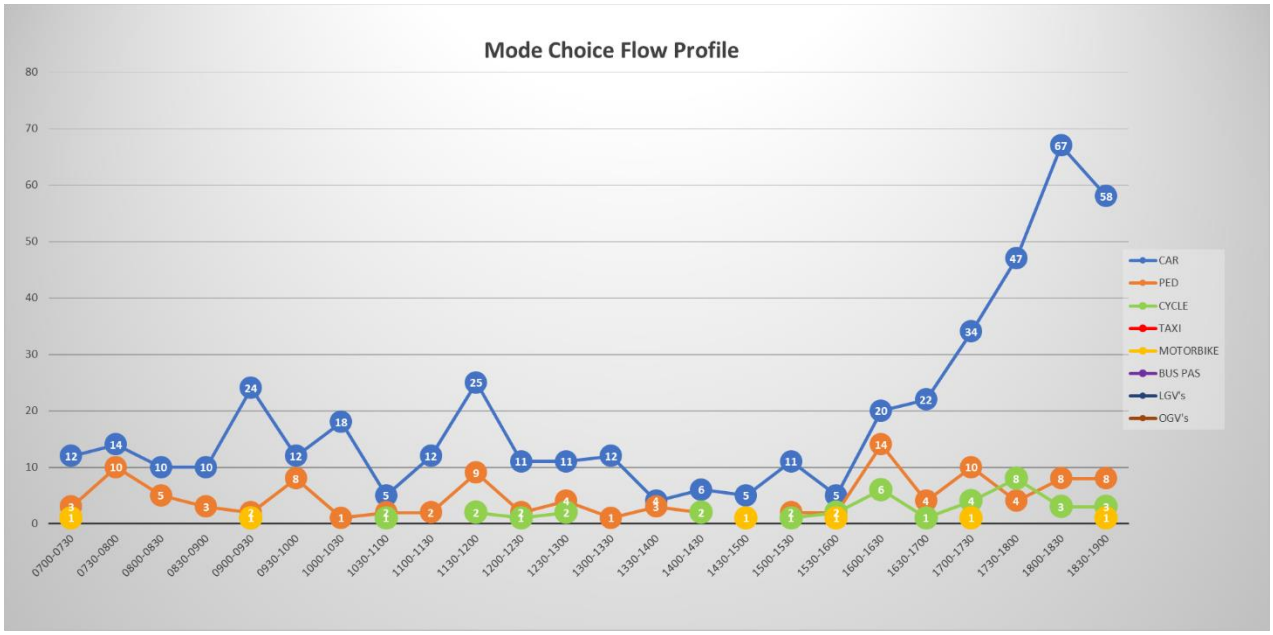


Figure 19 – Mode choice flow profile (all trips) for Cambourne Fitness Centre

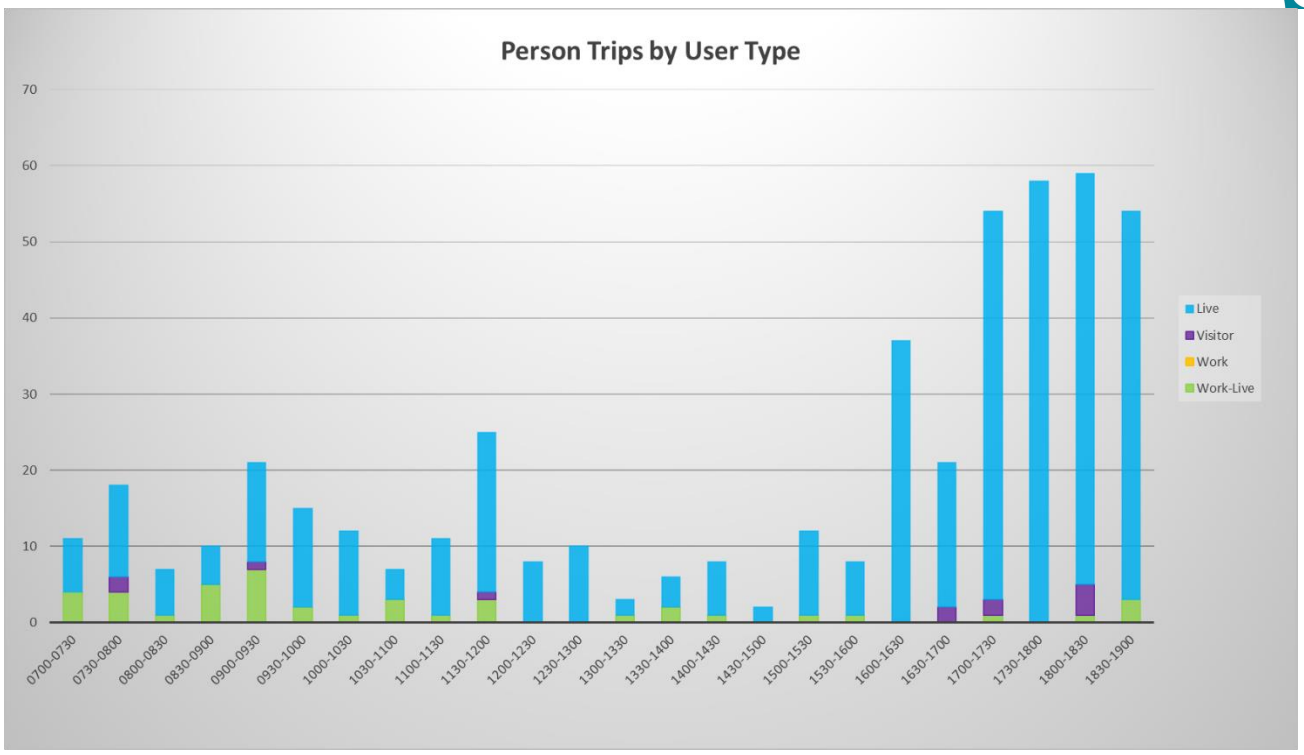


Figure 20 – Internal trips by journey type for Cambourne Fitness Centre

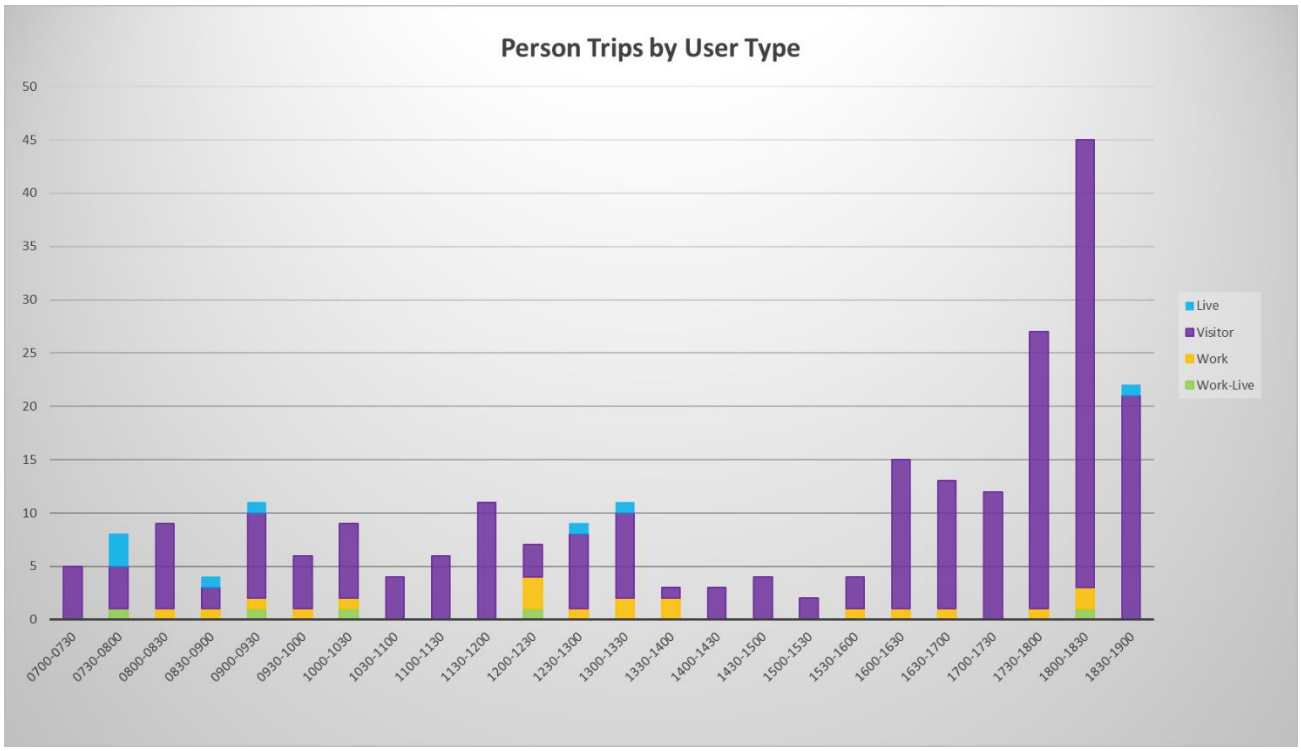


Figure 21 – External trips by journey type for Cambourne Fitness Centre

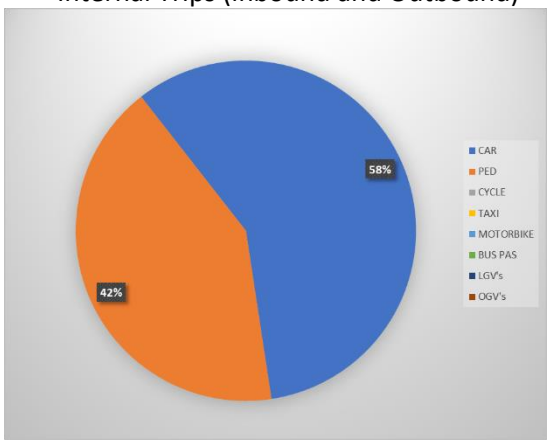
4.8. Results for the Poundworld development are shown in the following tables and figures.

Inbound Trips						
Time Period	Total Veh.	Veh. Occ.	Ped.	Cyc.	Public Tran. Users	Total People
0700-0800	3	3	0	0	0	3
0800-0900	16	16	2	0	0	18
0900-1000	11	17	12	0	0	29
1000-1100	32	41	15	0	0	56
1100-1200	33	48	7	0	0	55
1200-1300	43	56	20	0	0	76
1300-1400	43	55	10	0	0	65
1400-1500	42	60	6	0	0	66
1500-1600	32	44	10	0	0	54
1600-1700	43	57	10	0	0	67
1700-1800	35	42	6	0	0	48
1800-1900	24	38	5	0	0	43
1900-2000	10	11	1	0	0	12
2000-2100	0	0	0	0	0	0
Totals	**367**	**488**	**104**	**0**	**0**	**592**

Outbound Trips					
Total Veh.	Veh. Occ.	Ped.	Cyc.	Public Tran. Users	Total People
0	0	0	0	0	0
16	19	0	0	0	19
17	23	4	0	0	27
31	41	6	0	0	47
43	54	5	0	0	59
52	66	9	0	0	75
44	54	9	0	0	63
31	43	8	0	0	51
29	38	12	0	0	50
29	51	25	0	0	76
29	37	15	0	0	52
26	40	5	0	0	45
16	21	3	0	0	24
3	3	0	0	0	3
366	**490**	**101**	**0**	**0**	**591**

Table 9 – Summary of trips by mode for Poundworld

Internal Trips (inbound and Outbound)



External Trips (inbound and outbound)

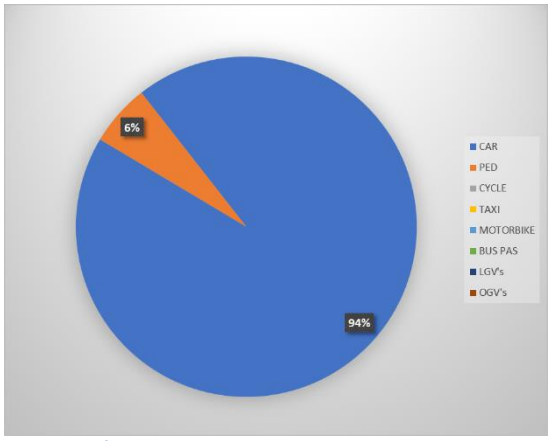


Figure 22 – Mode splits for internal and external trips for Poundworld

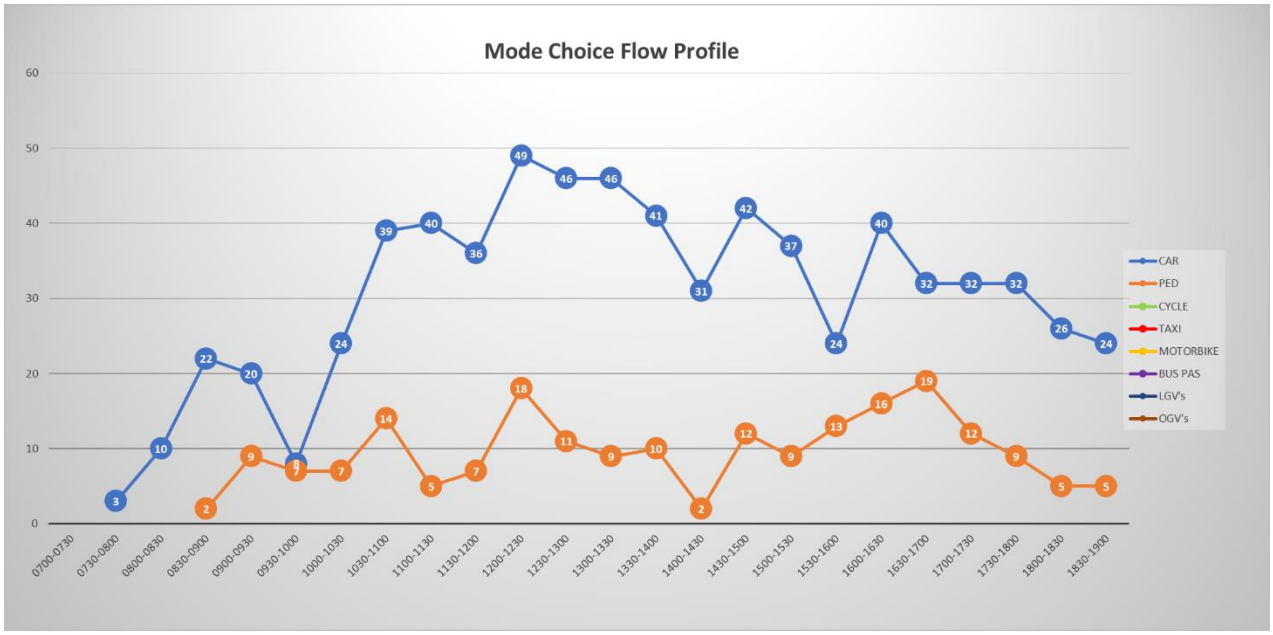


Figure 23 – Mode choice flow profile (all trips) for Poundworld

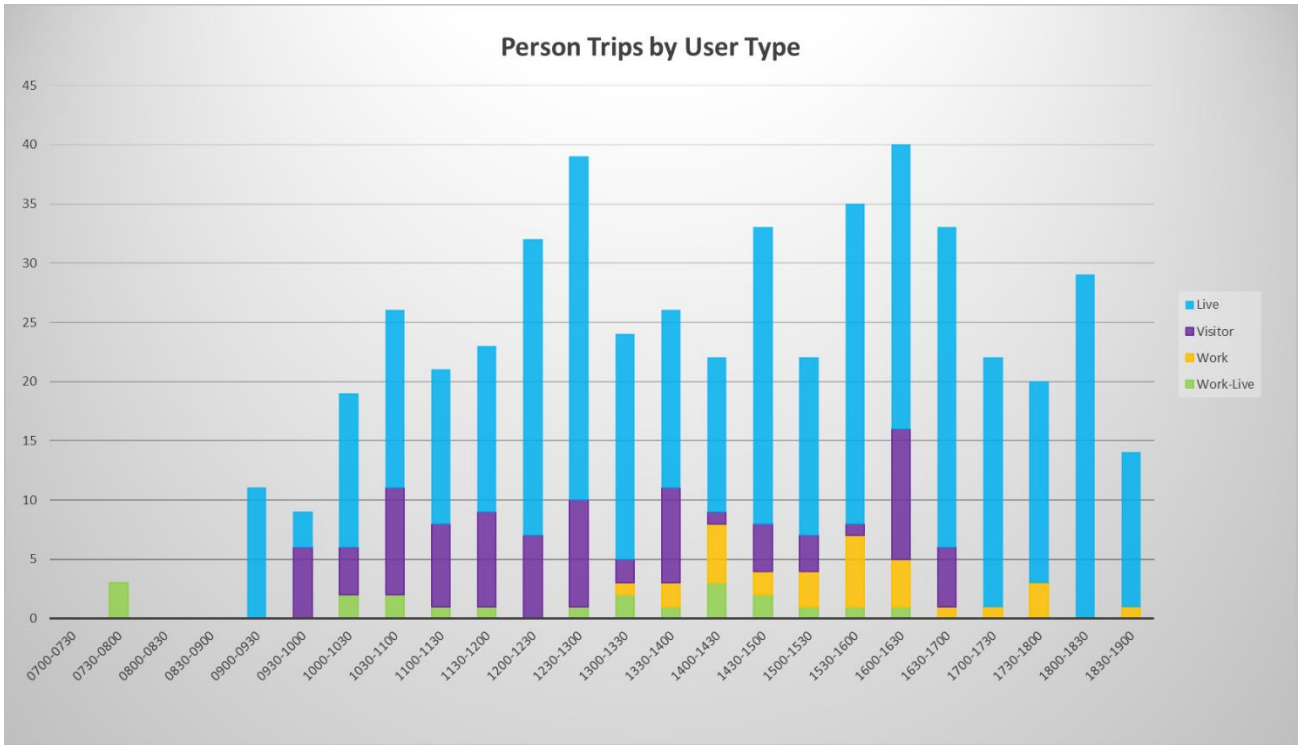


Figure 24 – Internal trips by journey time for Poundworld

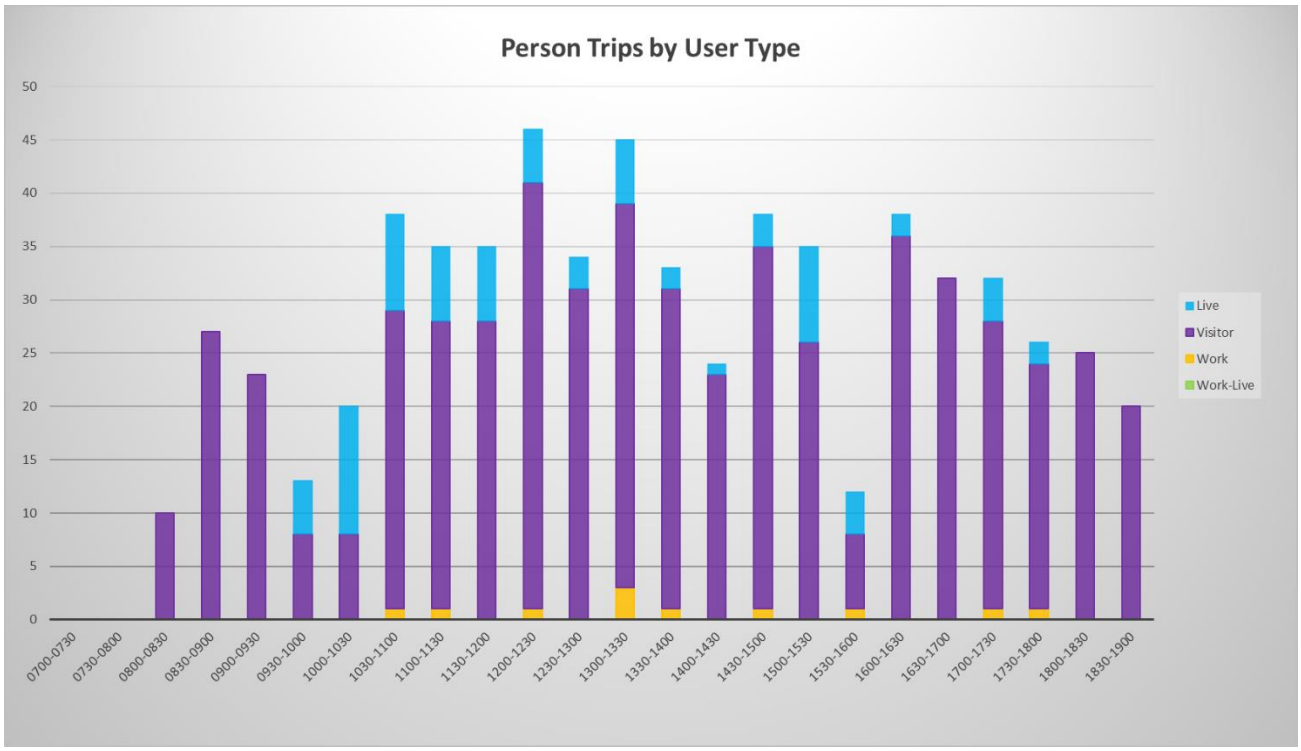


Figure 25 – External trips by journey time for Poundworld

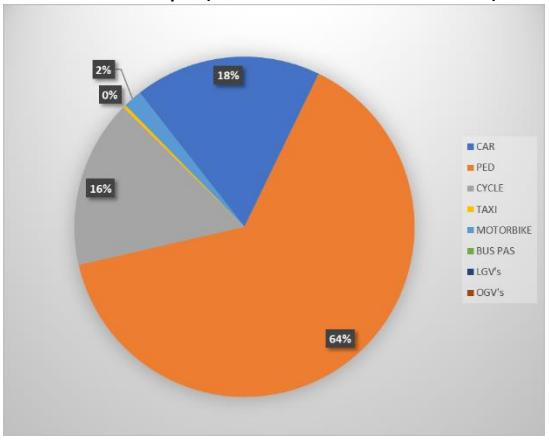
4.9. Results for the Cambourne Library and Health Centre development are shown in the following tables and figures.

Inbound Trips						
Time Period	Total Veh.	Veh. Occ.	Ped.	Cyc.	Public Tran. Users	Total People
0700-0800	6	6	1	0	0	7
0800-0900	10	12	2	0	4	18
0900-1000	15	19	15	5	1	40
1000-1100	15	19	12	3	1	35
1100-1200	9	15	14	2	1	32
1200-1300	9	11	12	4	1	28
1300-1400	10	13	12	0	0	25
1400-1500	5	7	11	0	1	19
1500-1600	9	9	14	7	3	33
1600-1700	10	13	11	5	1	30
1700-1800	4	6	6	2	0	14
1800-1900	0	0	0	0	0	0
1900-2000	0	0	0	0	0	0
2000-2100	0	0	0	0	0	0
Totals	**102**	**130**	**110**	**28**	**13**	**281**

Outbound Trips					
Total Veh.	Veh. Occ.	Ped.	Cyc.	Public Tran. Users	Total People
1	1	0	0	0	1
4	5	0	0	2	7
8	10	6	2	0	18
10	12	10	2	1	25
12	16	14	3	2	35
10	11	13	2	1	27
12	16	8	0	0	24
10	16	14	0	3	33
10	12	11	4	2	29
8	8	13	12	2	35
4	7	11	1	0	19
13	16	10	2	0	28
0	0	0	0	0	0
0	0	0	0	0	0
102	**130**	**110**	**28**	**13**	**281**

Table 10 – Summary of trips by mode for Cambourne Library and Health Centre

Internal Trips (inbound and Outbound)



External Trips (inbound and outbound)

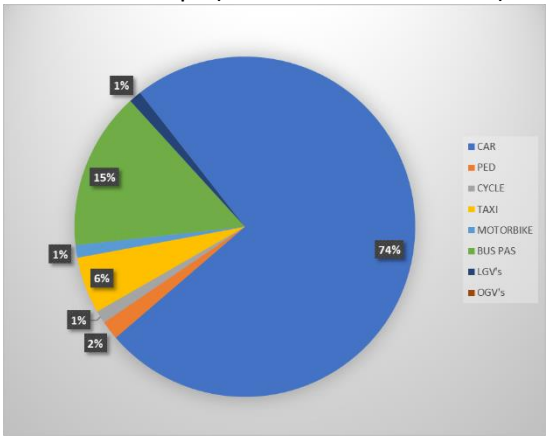


Figure 26 – Mode splits for internal and external trips for Cambourne Library and Health Centre

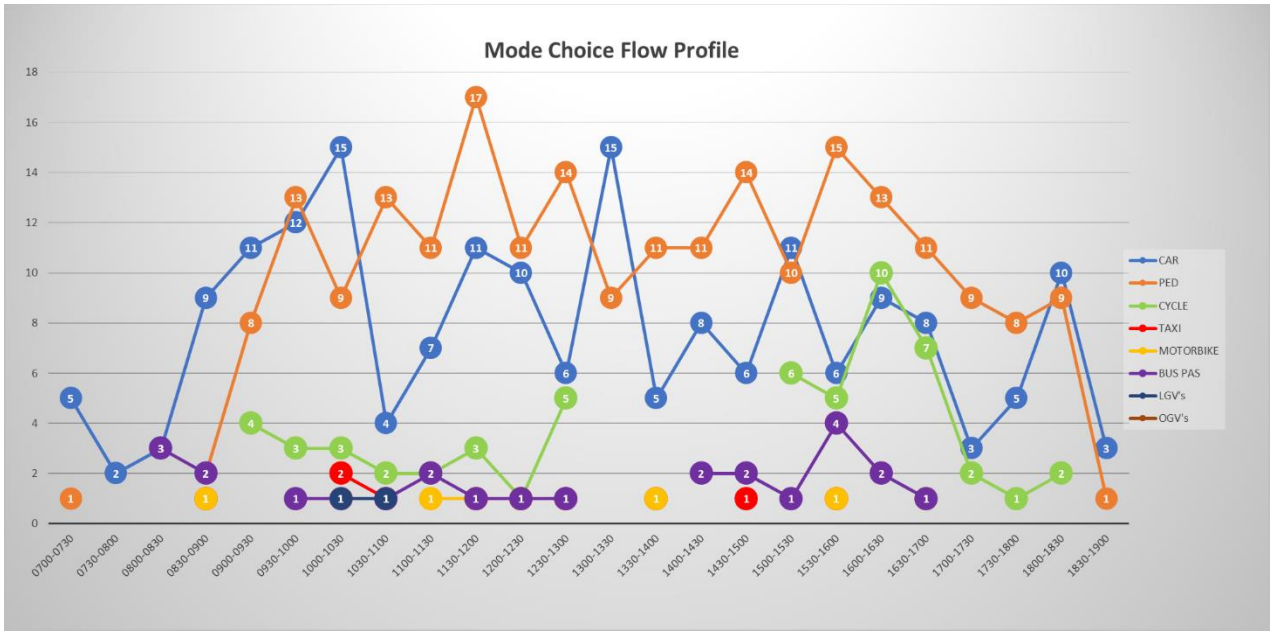


Figure 27 – Mode choice flow profile (all trips) for Cambourne Library and Health Centre

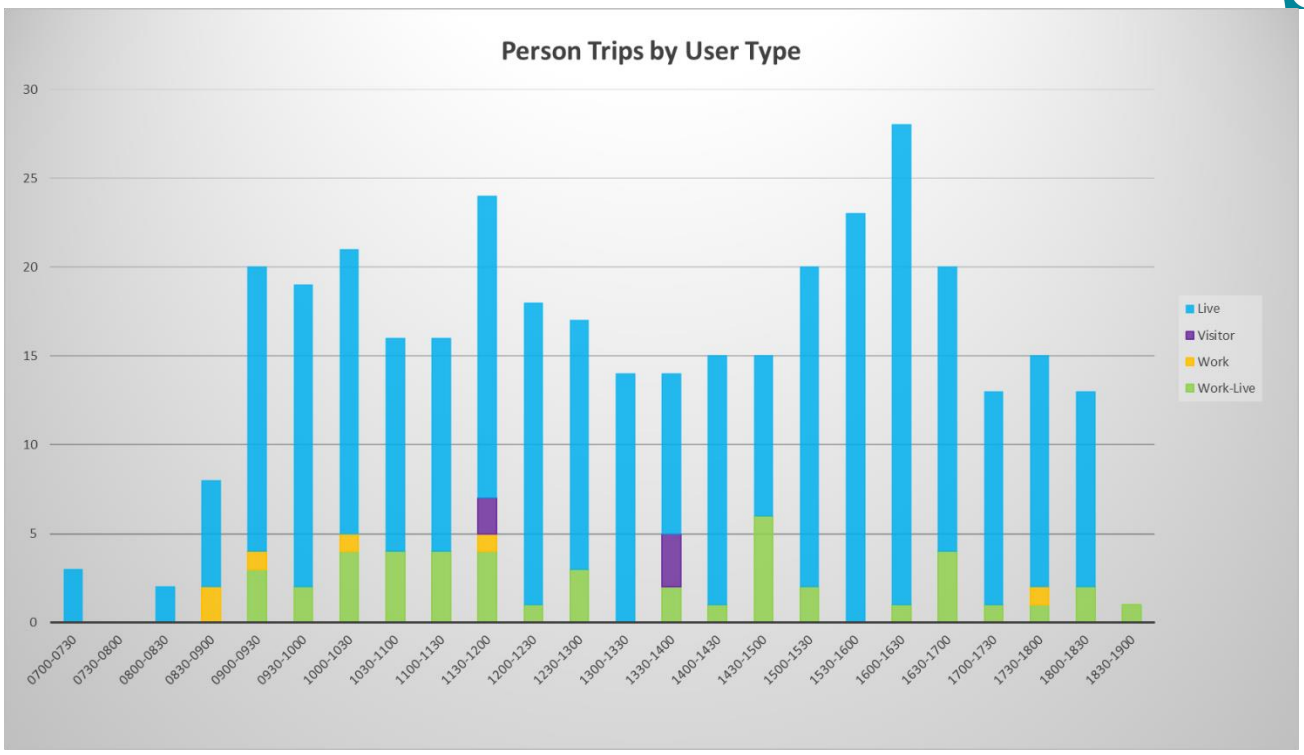


Figure 28 – Internal trips by journey type for Cambourne Library and Health Centre

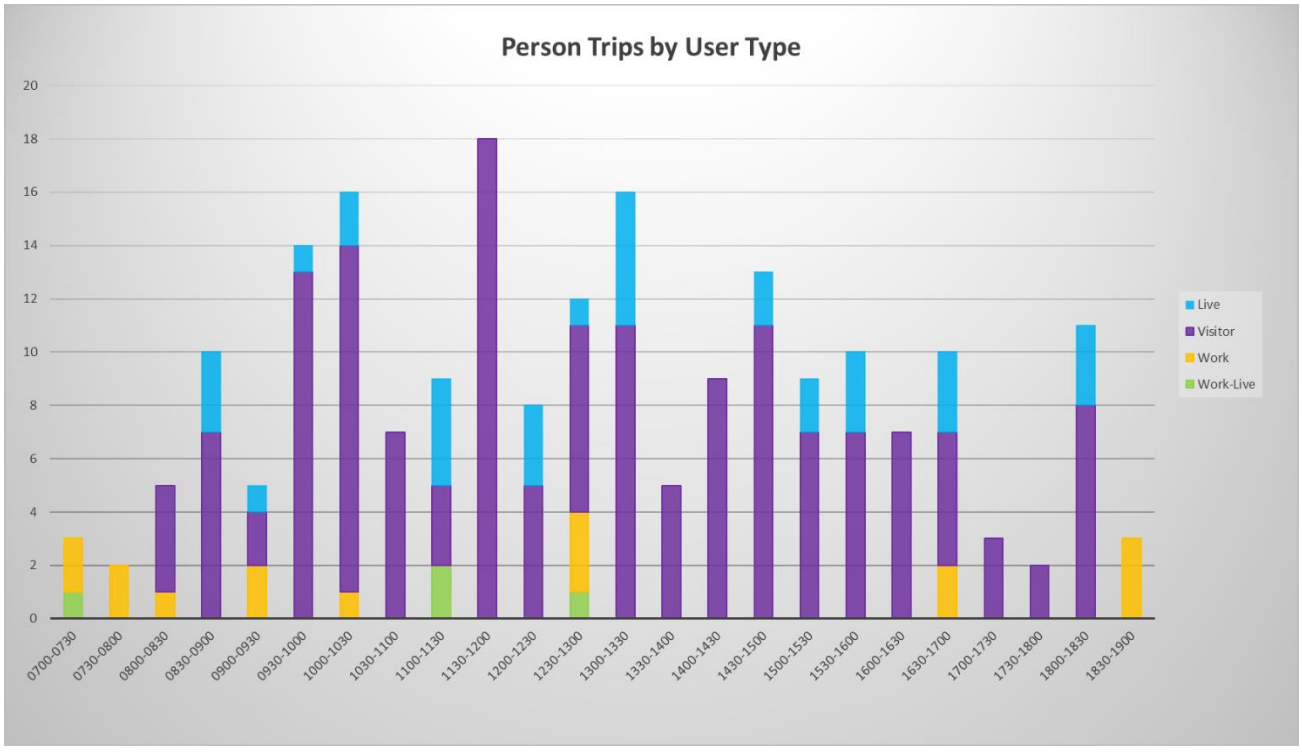


Figure 29 – External trips by journey type for Cambourne Library and Health Centre

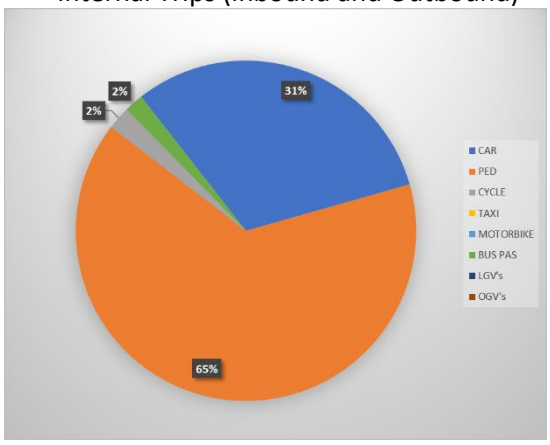
4.10. Results for the Cambourne Community Centre development are shown in Table 11.

Inbound Trips						
Time Period	Total Veh.	Veh. Occ.	Ped.	Cyc.	Public Tran. Users	Total People
0700-0800	2	2	0	0	0	2
0800-0900	12	22	6	0	0	28
0900-1000	9	16	42	1	0	59
1000-1100	7	12	11	0	2	25
1100-1200	1	2	3	0	0	5
1200-1300	1	1	0	0	0	1
1300-1400	1	1	2	0	1	4
1400-1500	2	2	1	0	0	3
1500-1600	3	4	15	1	0	20
1600-1700	1	1	0	1	0	2
1700-1800	19	41	5	0	0	46
1800-1900	10	21	12	0	0	33
1900-2000	9	11	11	2	0	24
2000-2100	0	0	0	0	0	0
Totals	**77**	**136**	**108**	**5**	**3**	**252**

Outbound Trips					
Total Veh.	Veh. Occ.	Ped.	Cyc.	Public Tran. Users	Total People
0	0	0	0	0	0
0	0	1	0	0	1
7	14	1	1	0	16
4	6	10	0	0	16
12	24	47	0	2	73
1	1	1	0	0	2
1	1	2	0	0	3
1	2	0	0	0	2
3	4	6	0	0	10
1	1	1	2	0	4
8	10	9	0	0	19
2	2	4	0	0	6
30	63	19	1	0	83
7	8	8	1	0	17
77	**136**	**109**	**5**	**2**	**252**

Table 11 – Summary of trips by mode for Cambourne Community Centre

Internal Trips (inbound and Outbound)



External Trips (inbound and outbound)

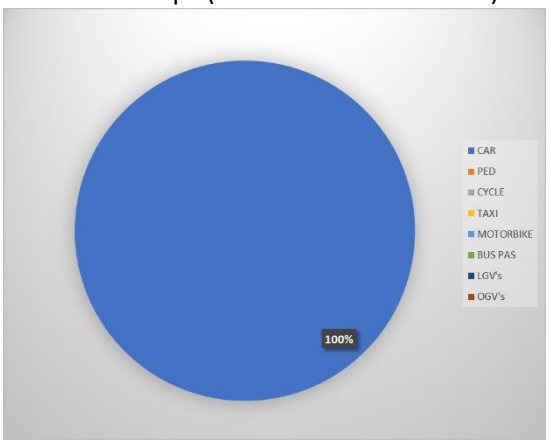


Figure 30 – Mode splits for internal and external trips for Cambourne Community Centre

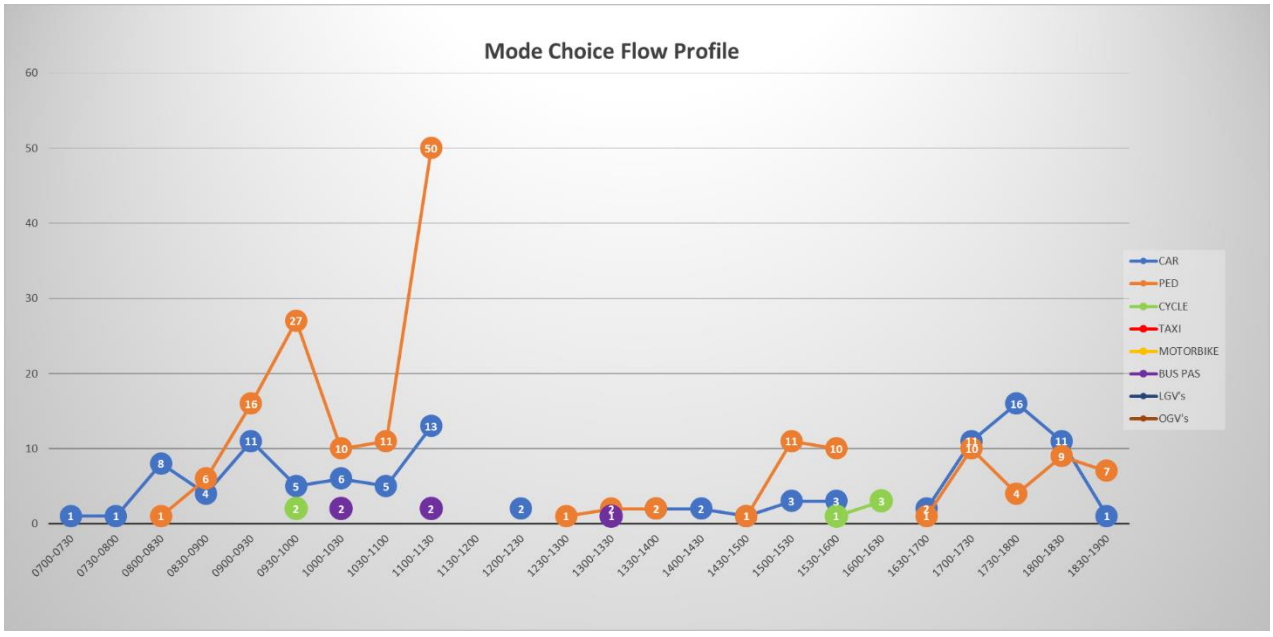


Figure 31 – Mode choice flow profile (all trips) for Cambourne Community Centre

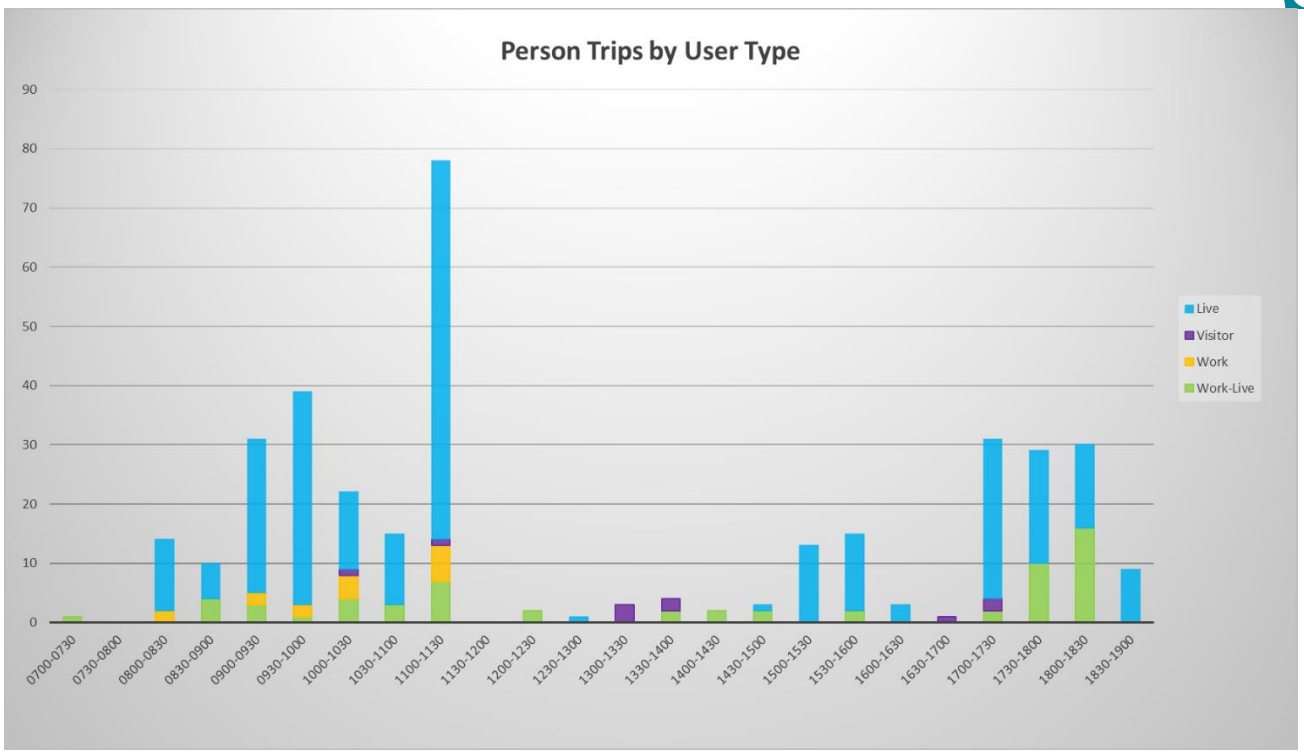


Figure 32 – Internal trips by journey type for Cambourne Community Centre

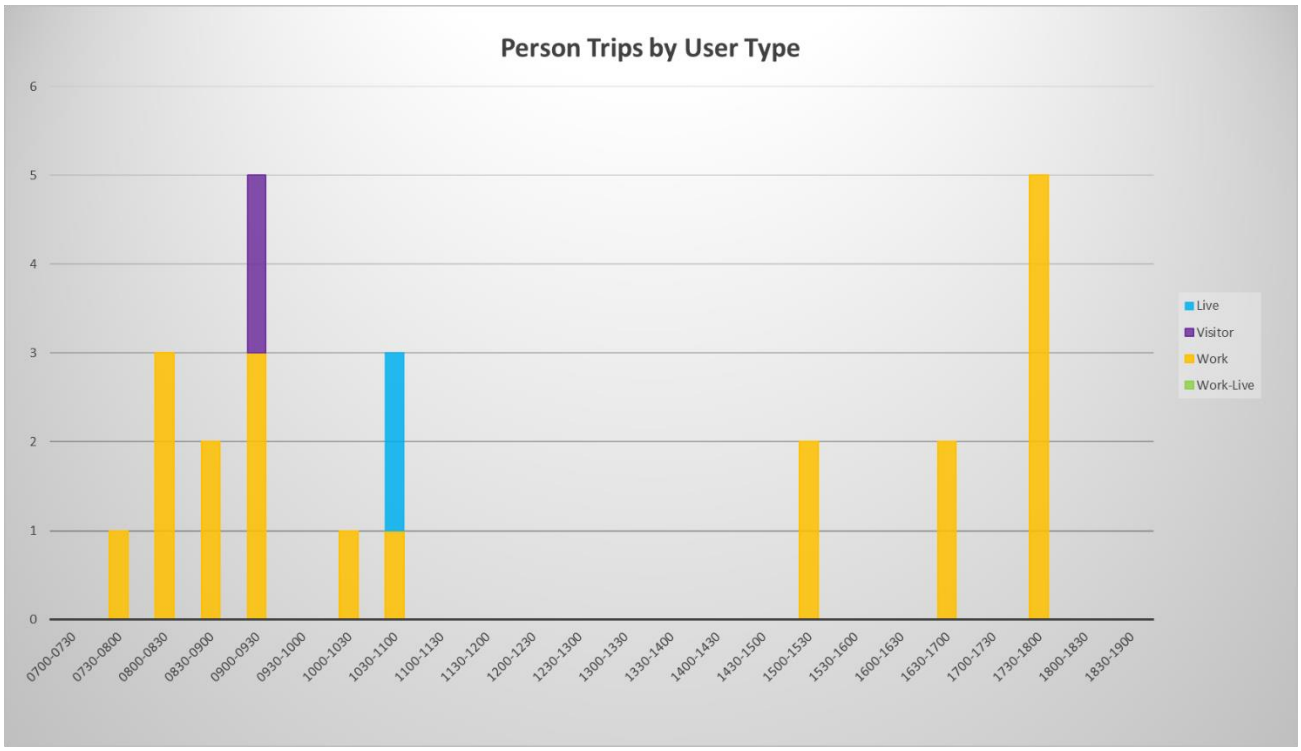


Figure 33 – External trips by journey type for Cambourne Community Centre

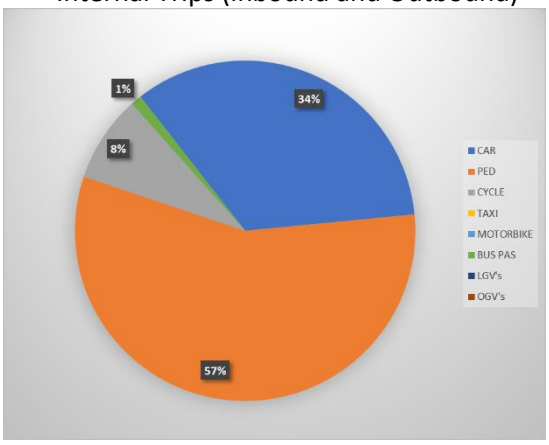
4.11. Results for the Cambourne Church development are shown in Table 12.

Inbound Trips						
Time Period	Total Veh.	Veh. Occ.	Ped.	Cyc.	Public Tran. Users	Total People
0700-0800	0	0	2	3	0	5
0800-0900	3	5	8	4	0	17
0900-1000	8	14	6	0	0	20
1000-1100	11	12	6	0	0	18
1100-1200	4	5	6	0	0	11
1200-1300	2	3	1	0	0	4
1300-1400	0	0	1	0	0	1
1400-1500	2	4	0	0	0	4
1500-1600	9	14	8	0	0	22
1600-1700	17	17	8	0	0	25
1700-1800	13	16	5	1	1	23
1800-1900	3	5	9	0	0	14
1900-2000	8	8	5	0	0	13
2000-2100	0	0	0	0	0	0
Totals	**80**	**103**	**65**	**8**	**1**	**177**

Outbound Trips					
Total Veh.	Veh. Occ.	Ped.	Cyc.	Public Tran. Users	Total People
0	0	1	0	0	1
2	2	3	7	0	12
8	9	3	0	0	12
9	16	12	0	0	28
5	6	3	0	0	9
1	1	3	0	0	4
1	2	1	0	0	3
3	3	1	0	0	4
7	10	5	0	0	15
14	18	6	0	0	24
11	12	6	1	1	20
1	2	8	0	0	10
13	16	11	0	0	27
5	6	2	0	0	8
80	**103**	**65**	**8**	**1**	**177**

Table 12 – Summary of trips by mode for Cambourne Church

Internal Trips (inbound and Outbound)



External Trips (inbound and outbound)

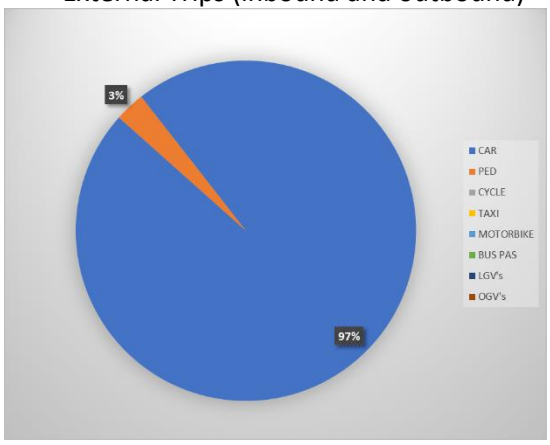


Figure 34 – Mode splits for internal and external trips for Cambourne Church

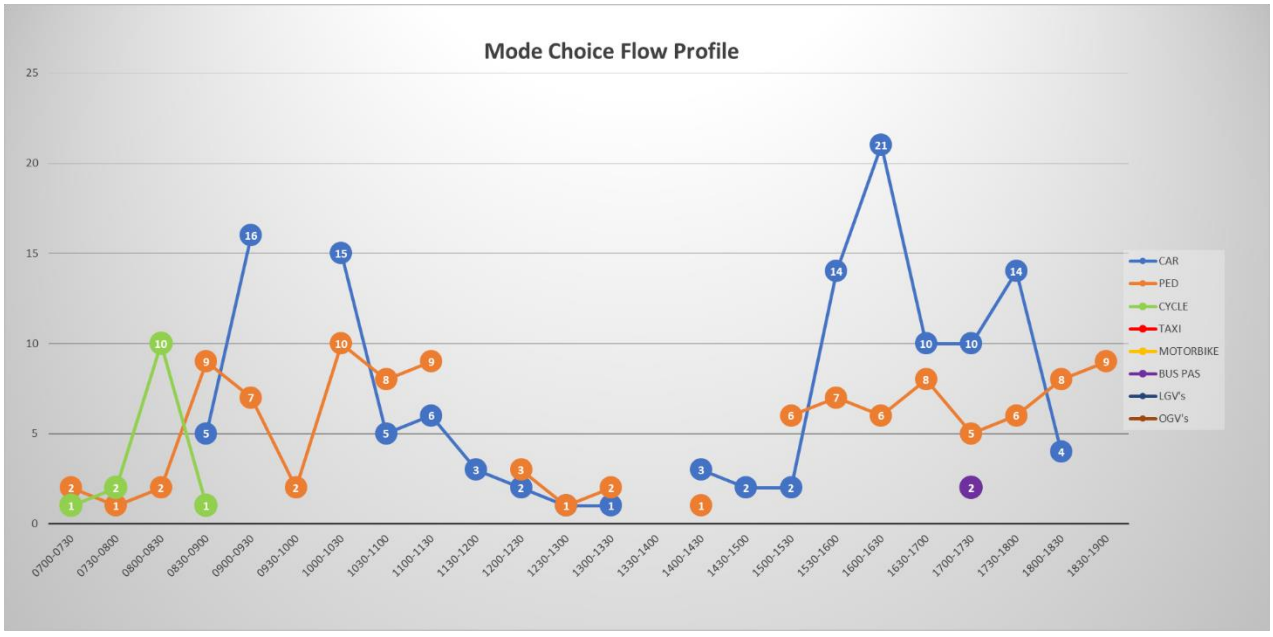


Figure 35 – Mode choice flow profile (all trips) for Cambourne Church

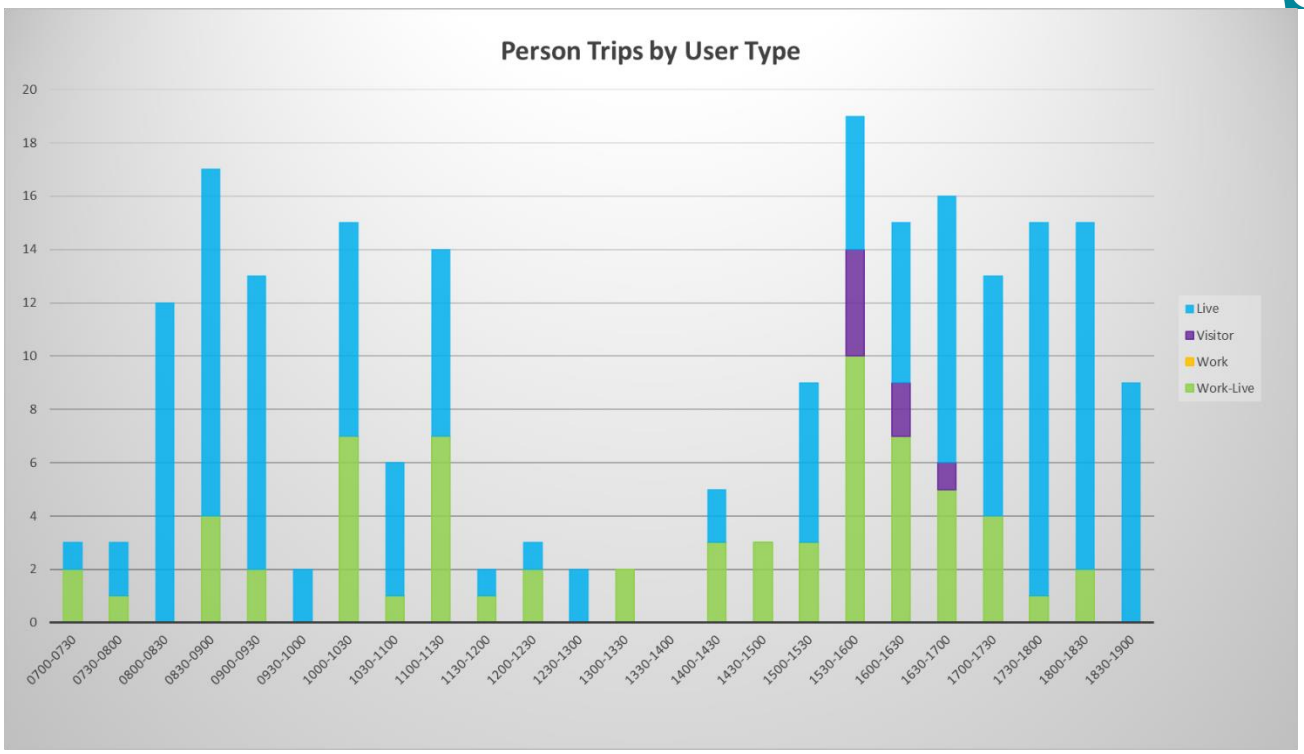


Figure 36 – Internal trips by journey type for Cambourne Church

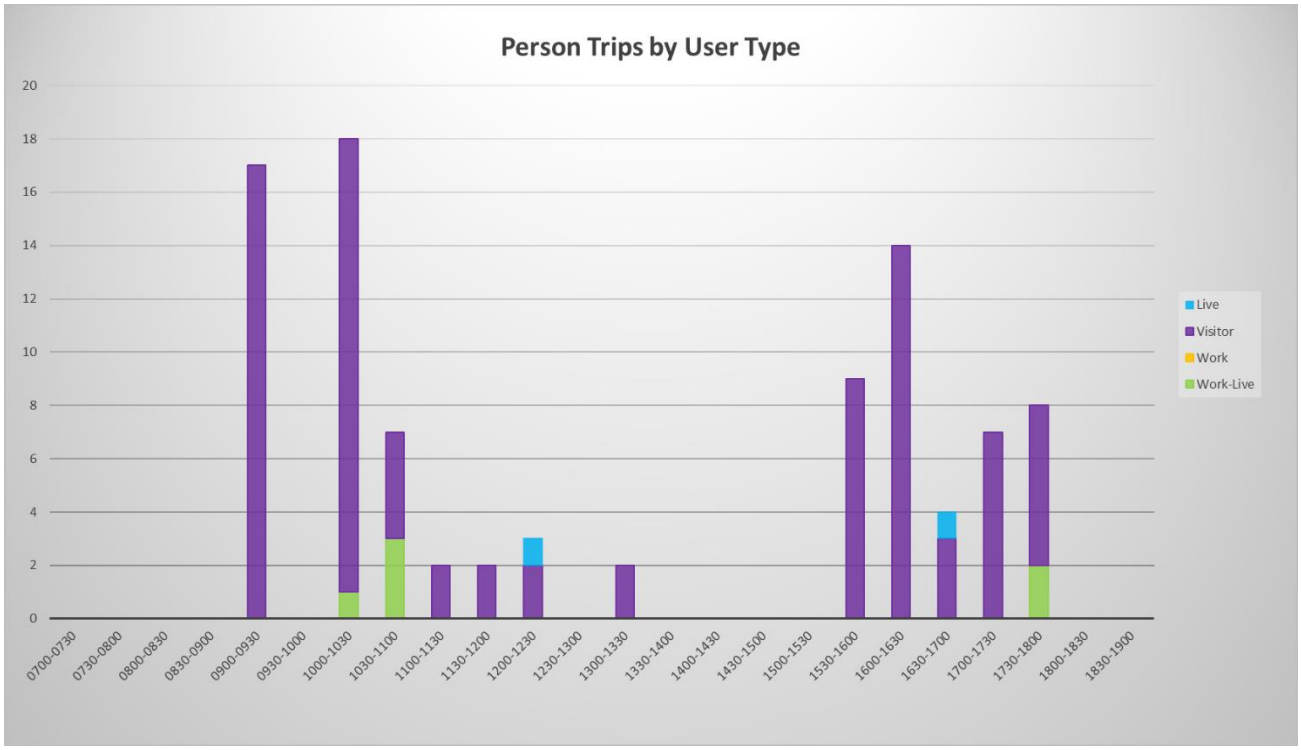


Figure 37 – External trips by journey type for Cambourne Church

5. On-Line Data Analysis Tool

5.1. The results shown in this report are only a basic summary of trip levels, mode splits and internalisation. TRICS has also designed an online data analysis tool, which is available to all TRICS member organisations. This tool will allow users to interrogate the survey data in a much more detailed way. To access this facility, users should go to the TRICS website at www.trics.org, and then log in at the Members Area where it can be found, along with its own user guide.

5.2. The analysis tool is controlled via its Dashboard, where users can select any of the 7 internal developments and then interrogate its data. Time periods, trip direction, internal and external trips, and journey types (as described in this report), can all be selected by the user, allowing variations of the charts, tables and graphs shown in this report to be produced. The results sections of this facility include flow profiles, mode splits, person trips by journey type, person trips per development, vehicle occupancy, and car usage. Users will see that the tool is very flexible indeed, allowing a multitude of separate analyses. An image of the control area of the Dashboard is shown in Figure 38.

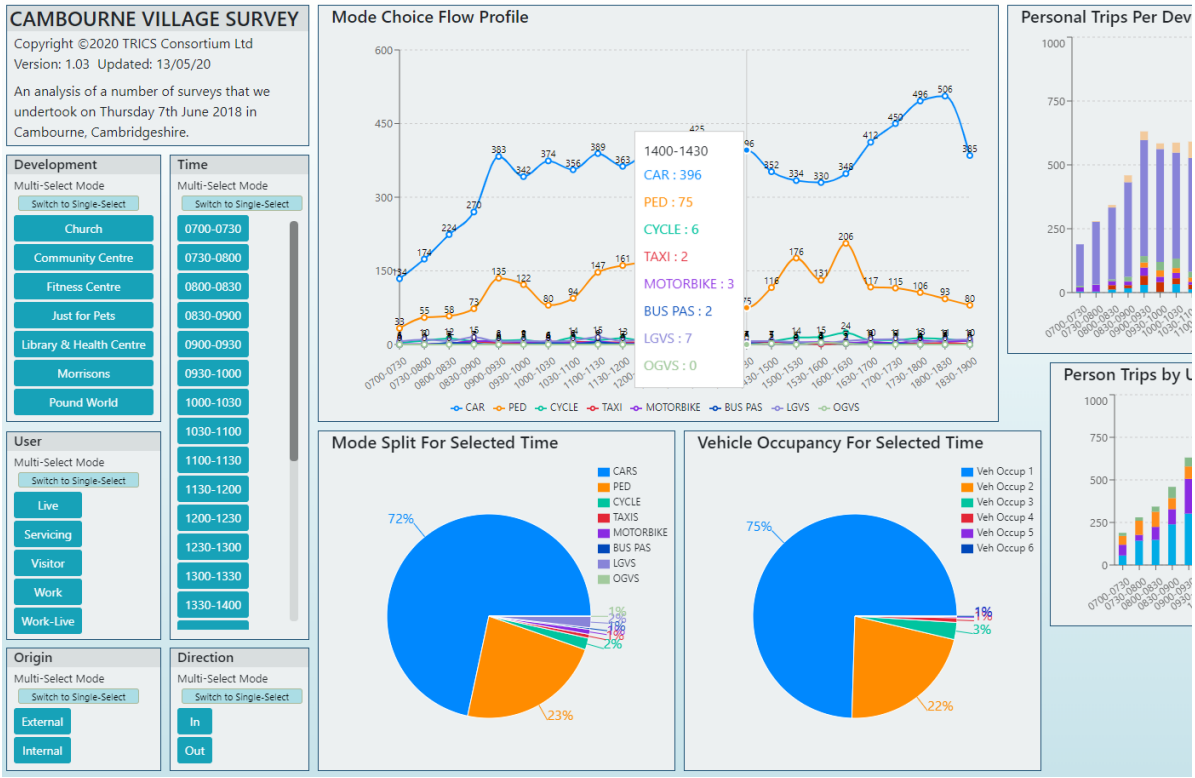


Figure 38 – The control area within the Dashboard of the Cambourne on-line data analysis tool

5.3. The results of the surveys can be filtered by five main criteria:

- Individual Development
- Time Period (in 30-minute intervals)
- User Type
- Direction of Travel (inbound or outbound)
- Origin of Trip (internal or external to the village)

Each of these five main criteria can be individually or multiple selected to filter the results displayed within the provided graphs and charts. At least one status for each option must always be selected to display results. To change between Single-Select and Multi-Select Modes click on the toggle icon at the top of that selection filter, as shown in Figure 39. If Multi-Select Mode is selected the completely blue boxes are the selected options and clicking on these boxes will toggle each option on and off.

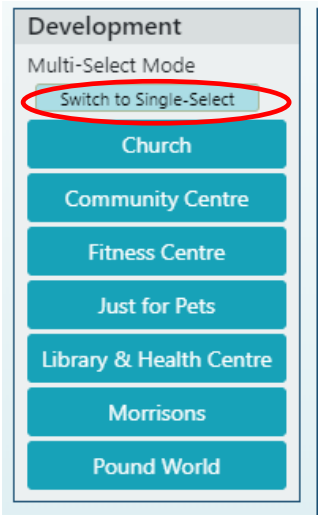


Figure 39 – Example of a Portal Filter

5.4. The five diagrams available on the portal show you the following information for the selections made within the options boxes:

- Mode Choice Flow Profile – Graph of all trips for the selections made.
- Mode Split for Selected Time – Pie chart showing breakdown of all observed travel modes for the selections made.
- Vehicle Occupancy for Selected Time – vehicle occupancy was surveyed for all vehicular modes of transport, and this pie chart shows the breakdown of vehicle occupancy to give an indication of how many single occupant vehicle trips were made.
- Person Trips Per Development – Bar chart of trips in each 30-minute survey period per development.
- Person Trips by User Type – Bar chart showing the makeup of User Type in each 30-minute survey period, based on the selections made.

5.5. As an example – By selecting just Morrisons from the 'Development' filter you can then select just the inbound trips by selecting 'In' from the 'Direction' filter. You can then filter out all the trips that originated outside of the village by deselecting 'External' from the 'Origin' filter. This then shows you the various splits and information for the selected options. You can then start to break this down further by selecting a single 30-minute period, or by selecting multiple time periods to create an AM peak hour or even a 3 hour AM peak period. You can also consider the trips only associated with people that "Live" and "Work-Live" within the village by just selecting these options within the 'User' category.

5.6. As you can see from the above example you can consider many different options and variances to build up a picture of travel behaviour within this village on the day of the survey.

6. Lessons Learned - Conclusions

6.1. This was the first study of a major new development of this type. The aim of the study was not to draw any opinion-based conclusions; our intention was to present its headline results, which are contained within this report, and allow TRICS users to undertake any further and more specific analysis using the online data analysis tool. The study was at one single large development only, with the surveys all taking place simultaneously on one day only. Therefore, we encourage all readers of this report to take this context into account, in terms of extrapolating the study's results and drawing any conclusions of their own.

6.2. We found at an early stage in the preparations of the survey specifications for the internal developments, that it is essential for full interview "front door" surveys to take place for the identification of internalisation trips to be successful. This is because vehicle occupants needed to be interviewed, as well as those travelling to and from the developments by other modes. The only realistic way of interviewing vehicle occupants was at the front door(s) of the developments, as it would not have been practical (and costs would have soared) to stop vehicles and interview vehicle occupants as they entered and exited the developments. We feel that the front door survey approach, backed up by head counts to factor up the interview samples, is essential for studies of this type. As previously explained, we decided to exclude offices and schools, as these were previously surveyed, so we were targeting developments with unknown internalisation levels.

6.3. To obtain a suitable time-period cut-off to identify vehicular through trips (by using ANPR technology) for the survey at the overall Cambourne Village site, we had to adjust our initial estimate of 5 minutes to 10 minutes. When we first looked at through trips, we estimated that these would be able to take place within a period of 5 minutes. However, this initial estimate was based on visiting the site outside of peak hours. When the data first arrived for processing, with a 5 minutes cut-off we found zero through trips, which of course was incorrect. By extending the cut-off to 10 minutes, the through trips then appeared in the data, and a subsequent increase in the cut-off time (which of course we could do as we were using the ANPR system) confirmed that 10 minutes would have identified all vehicular through trip activity. The longer cut-off time to that we initially estimated was mainly due to increased vehicular activity at peak times (during which we found a greater number of through trips taking place), combined with buses travelling through the site and stopping at various points within it (which also caused an element of congestion).

6.4. During the surveys, a significant number of people would have been interviewed more than once, especially if they had visited one or more of the internal developments, as it was necessary for us to conduct interviews for both inbound and outbound trips. We learned that some people were somewhat annoyed at the frequency of interviews during the survey period, which emphasises the need for the questions to be kept to a minimum (and short and to the point), whilst at the same time not compromising the aims of the study. As all surveys took place simultaneously, for the purpose of consistency and comparability in the results, there is a risk for any future surveys that, if interviews were to be made more lengthy and complex, a significantly lower survey sample might be gathered, which could potentially put the final results into question. We feel it is essential that co-operation between organisations involved in future studies is the key, to ensure that residents and staff within such developments are clearly engaged in the process, and therefore understand why the study is taking place, to maximise response rates.

6.5. It is certainly clear to TRICS that further surveys will be required, not just at the Cambourne Village development but also at others, to see how travel behaviours change over time. The questions of sustainability and internalisation at these large new developments will clearly be ongoing, and this initial study can only be treated as a single snapshot in time. The effects of the Cambourne Village development over time, in terms of potentially bringing about the sustainable live/work aims of the site, will need to be studied, so this is something that TRICS may revisit. Only through a second study could we examine any changes over time, and until that happens, any future trends would be purely speculative. The same would apply at any other sites, in that each development of this type needs to be treated as unique, as there are so many possible variables to consider when it comes to comparing Cambourne to anywhere else. However, a second study at Cambourne at an appropriate time would be a very good and obvious starting point in examining trends.

6.6. Careful consideration would need to be made for any future surveys about the level of resources required. Throughout the duration of the surveys many interviews were required, given the "front doors" approach to the survey methodology (which is essential to obtain any reliable information on internalisation and trip type). This is particularly important for the busiest internal developments (for example Morrisons in our study). We also found that, although we managed to achieve our aims in terms of the internal bus passengers approach (with enumerators travelling aboard buses), we could have done with a greater number of enumerators being present for this particular element of the day. We would encourage anyone undertaking a similar study to be cautious if attempting to go with a minimal number of enumerators being present on survey day. TRICS was cautious in terms of the level of enumerators we used, but in any future study we would probably add a few more for the busiest elements of the study for comfort's sake. It should be noted that we worked with two different data collection companies given the scale of this study, and the need for all surveys to take place simultaneously, something else that we suggest should be taken into consideration given the overall workloads involved, both during the actual surveys and subsequently through the significant amount of data processing that is required.