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Not everyone gets a back pack; developing a targeted approach to travel behavior change

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Abstract

Queensland's Department of Transport and Main Roads' (TMR) TravelSmart program is a voluntary behaviour change program that encourages people to use sustainable travel modes such as public transport, walking, cycling and carpooling rather than single occupancy travel in a car. TravelSmart aims to:

- Reduce traffic congestion on our roads
- Help people change the way they travel, saving them time and money, improving their health and the environment.
- Reduce greenhouse gas emissions

Typically TravelSmart programs adopt a blanket delivery approach within a geographical area; that is they have offered the same interventions to all members of the community, school or workplace irrespective of their specific needs, current travel patterns or access to infrastructure.

TMR has developed a targeted approach to delivering travel behaviour change projects based on location-specific considerations. The process involves a tailored analysis of mode shares, community perceptions and barriers, demographic trends and predictions, and access to infrastructure. The aim is to identify:

- The areas that have the greatest potential for travel behaviour change, and
- The most effective 'fit for purpose' travel behaviour change interventions for a given area.

This paper will provide an overview of an assessment framework being developed by TMR to determine future travel behaviour change interventions and the data analysis underpinning this targeted approach. It will detail examples within South East Queensland where this approach has been used, including rolling out TravelSmart programs in support of infrastructure upgrades such as a new rail corridor from Darra to Springfield.

1.0 Introduction

Building on the success of the current TravelSmart program, the Queensland Department of Transport and Main Roads (TMR) has developed a targeted, integrated and inclusive travel behaviour change program that is based on evidence and seeks to maximise effectiveness while minimising costs. The new targeted approach will achieve this through:

- focusing behaviour change activities on those households, schools and workplaces which have the greatest potential for change based on a set of assessment criteria
- integrating and sequencing these activities to maximise their impact (such as by timing to coincide with new infrastructure and services or major events)
- tailoring information, products and services to individual needs and motivators rather than adopting a 'blanket' approach to program delivery and messaging
- incorporating different types of information to influence a wider audience (e.g. providing information about how to optimise vehicle efficiency for those people who are required to drive a vehicle for a particular reason).

This paper discusses how TMR has developed this new targeted approach, and the impact it will have on the implementation of future travel behaviour change initiatives in Queensland. In particular, this paper will provide some background information on how TravelSmart currently works in Queensland, which includes a brief overview of the three projects that make up the program: Communities, Schools and Workplaces & Destinations. This paper then discusses how TMR has refined its approach through the development of an assessment framework which is informed by data from various sources. Lastly, a case study is included which gives a 'real life' example of the potential of this new targeted approach.

2.0 TravelSmart

TravelSmart is a behaviour change program that has been implemented in various forms across the world, including Australia and the United Kingdom. Although specific details about the program may differ in each country or state, it is essentially about reducing the reliance on private vehicles, and helping people make smarter choices about other more sustainable forms of transport. In Queensland, TMR first began delivering the TravelSmart program in 1996 through its Office of Sustainable Transport (OST). OST's approach to delivering the program has evolved over time to its current model of delivery across three projects of Communities, Schools and Workplaces & Destinations. The Queensland Government committed funding from 2008 to 2012, including $22.6 million for Communities projects, $5.2 million for Workplaces & Destinations projects, and $4.97 million for Schools projects. This paper will now provide an overview of these three projects within the TravelSmart program.

2.1 Communities

The TravelSmart Communities project works directly with individual households in large suburban areas. This program involves extensive personal contact including a mix of letters, phone calls and face-to-face consultations. Households are asked about the types of sustainable transport that interest them and are provided with corresponding information and products, such as timetables, maps showing public transport and active transport routes, personal journey planners and merchandise like backpacks, pedometers, tyre repair kits and water bottles. The most recent Communities project was undertaken in South East Queensland (SEQ) in 2008-2011, with 280,000 households contacted across Brisbane South, the Gold Coast and the Sunshine Coast. The locations within these regions were chosen based on congestion levels and projected population growth without an indepth assessment of which communities had the greatest potential for behaviour change. Although project delivery finished in 2011, the backpacks used for this project are seen all over SEQ

and are synonymous with the TravelSmart program. The back packs also symbolically represent the 'blanket' approach that TravelSmart has previously adopted ('i.e. everyone gets a backpack') rather than the targeted approach which is TravelSmart's future direction ('not everyone gets a back pack').

2.2 Schools

The TravelSmart Schools project works with schools to try reduce the number of children being driven to and from school in private vehicles. Schools receive a range of tools and support, including assistance to undertake a detailed site assessment and develop a tailored school travel plan which establishes current travel behaviour and identifies ways for children and their families to adopt active, shared and public transport alternatives. School communities are encouraged to change their travel behaviour through family events, school challenges, bike education classes, art competitions, and other information provision. Currently, school projects are running throughout 2012, with 98 schools across the state participating in a form of TravelSmart activity. The selection of these schools took into consideration accessibility to active and public transport; student density; and the presence of a strong school 'champion', however in order to meet the program target, not all of these criteria needed to be met for a school to participate.

2.3 Workplaces and Destinations

The TravelSmart Workplaces project partners with organisations to encourage sustainable commuting methods. Support, resources and online tools are available to assist workplaces and their nominated travel coordinator to implement a range of strategies including workshops, challenges, events, flexible work arrangements, end-of-trip facilities and reviews of business practices (such as business travel arrangements and parking provisions).

In 2011-12, 27 TravelSmart Workplaces projects have been undertaken across ten organisations including Queensland Government departments, local councils and private businesses. Choosing workplaces for this program has largely been opportunistic with potential participants usually identified by the department and then approached to gauge their interest in participating. Throughout this process the department generally considers the level of support from a workplace's management; the enthusiasm of the would-be workplace coordinator; and the workplace's potential for change.

A similar approach has been taken to TravelSmart Destinations, where key public facilities are targeted because of high volumes of visitors. This includes hospitals, universities and the city's South Bank tourism and recreation precinct.

2.4 Improvements

Over the past decade, TMR has developed and tested a variety of delivery methods for its various TravelSmart programs. During this time, there have been continual improvements and many successful outcomes. Nevertheless, the department's new approach is looking to remedy the following limitations of the current program:

- Program tailoring has been limited with similar products and messages being rolled out across very different socio-economic groups and geographic areas
- The selection of program sites has been largely ad hoc, with minimal assessment of capacity for travel behaviour change
- Delivery has been focused on public and active transport and does not address more efficient privately owned vehicles – or encouraging more efficient use of existing vehicles
- The three elements of Communities, Schools and Workplaces & Destinations largely operate independently from each other and do not currently leverage on the many opportunities to be gained from an integrated approach in one geographical area.

3.0 An Integrated and Targeted Approach

TravelSmart programs have historically focused on discouraging people from using their cars. Unfortunately though, using public transport, cycling or walking are not always practical or possible. For example, where multiple stops in a journey are required or where access to public and active transport infrastructure is limited. Some people's attitudes to public and active transport present challenges when trying to promote increased use of sustainable transport. As a result, there are segments of the population for whom the current TravelSmart message does not resonate. Despite this, there are still opportunities to make travel by these segments more sustainable, for example, through education on eco-driving or how to purchase 'best in class' vehicles or fuel-efficient components. TMR's OST, which delivers the TravelSmart program, also develops travel behaviour change policy in this area. By expanding the program to integrate these messages, a wider audience can successfully be targeted and encouraged to travel more sustainably.

In reviewing the TravelSmart program internally within TMR, it was proposed that the program moves away from the traditional delivery method of 'blanket' coverage of a given geographic location and develop a more targeted and integrated approach. A more sophisticated assessment framework of potential TravelSmart sites was developed to identify targeted projects with greater capacity for success at less cost to the department. More recently, an independent evaluation of TravelSmart recommended a similar approach (Worley Parsons 2012).

Before selecting the location and type of TravelSmart program, the department will now undertake detailed analysis across many data sources to better understand households in a project area; including population and socio-economic information; the spatial distribution of key infrastructure; and the travel patterns and attitudes of residents. This analysis enables the identification of sub-groups with the potential to change their travel behaviour. Information, products and services can then be tailored to meet their specific needs and motivations. Potential sites will now also be chosen based on new and planned infrastructure, public transport service changes, population growth, major events, and congestion or other traffic issues.

The assessment framework currently being developed by the department is a combination of data analysis and site assessment. It will focus travel behaviour change activities on households, schools and workplaces with the greatest potential for change. For example, if the assessment reveals an already high proportion of people using public and active transport in a given area, then it might be concluded that TravelSmart is unlikely to make further changes to travel behaviour. Equally, if public transport infrastructure in a given area is assessed as lacking and the capacity for public transport take-up is limited, another site may be deemed more suitable.

4.0 The Assessment Framework

The following research questions form the basis of the assessment framework used to inform the targeting of TravelSmart program delivery.

- What are the socio-demographic characteristics of people who live in the area?
- How do people currently travel? Where do they go, and from where?
- What modes of travel do they use?
- How far do passengers travel to access public transport and how far do they travel on it?
- How likely are people to change their current behaviours based on existing views?
- What barriers exist that might prevent them from doing so (climate, topography, safety levels, health, and lifestyles)?
- What public transport infrastructure is already available and where is it located?

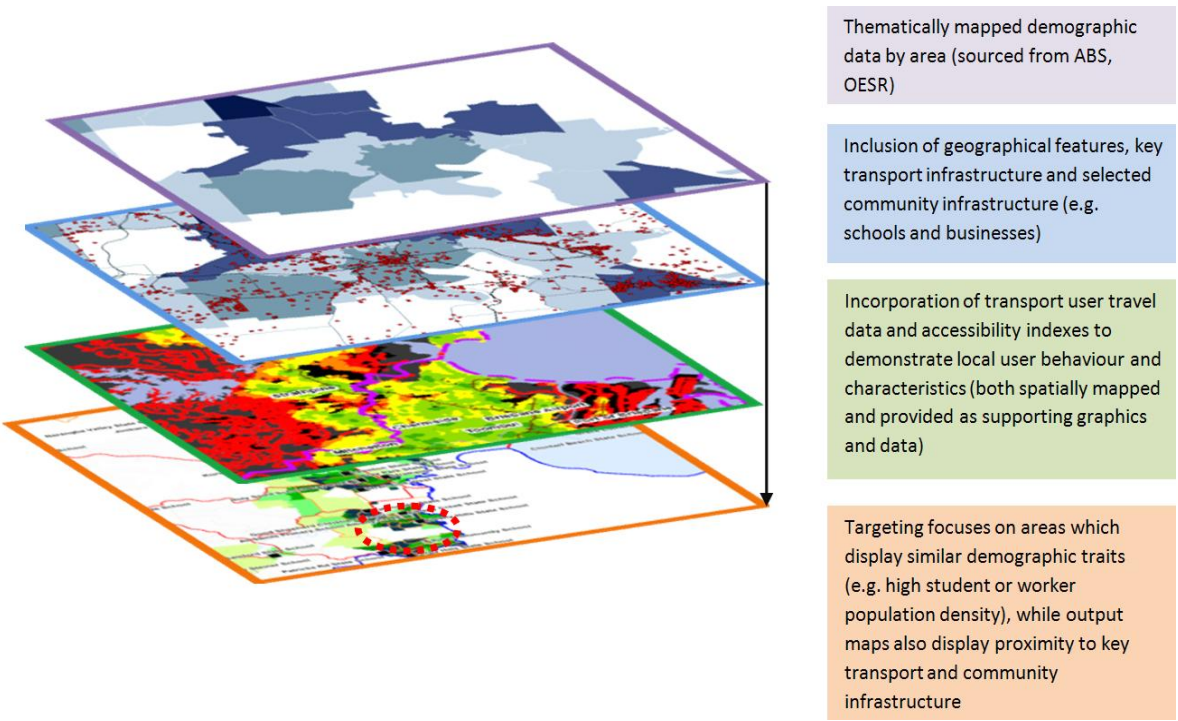
- What supporting active transport infrastructure (bike paths, foot paths) is already available and where is it located?

To answer these questions, OST and the Modelling, Data and Analysis Centre (MDAC) within TMR have used a combination of demographic, spatial (area characteristics and infrastructure location) and travel behaviour data sources to profile the location and travel behaviour of people living in proximity to proposed project areas. The following section of the report details the specific data types used and demonstrates how this information supports TravelSmart's targeted interventions. This data analysis better defines the target population in a geographic area suitable for targeted intervention, increasing efficiency in the allocation of resources and services. MDAC have supported TravelSmart through analysis based on three main types of interrelating data for defined project areas, as follows:

- **Population Characteristics:** Demographic data sourced from the Australian Bureau of Statistics (ABS) census collection and Queensland's Office of Economic and Statistical Research (OESR) provides a representation of a study area's population characteristics. More recently geo-demographic data using MOSAIC profiling has also been used.
- **Travel Behaviour and Attitudes:** A suite of transport user travel surveying and modelling outputs are employed to demonstrate how transport modes are used, for what purpose, distance and time duration.
- **Community Services and Infrastructure:** The location of key community infrastructure within a given area is mapped to accompany population characteristics and travel behaviour information.

The combined data outputs demonstrate groupings of people with similar demographic or transport usage traits which have the greatest potential to benefit from TMR's targeted travel behaviour change interventions.

Figure a: A visual interpretation of how a variety of data types are mapped by TMR during the composition of area studies produced to identify groupings of people best suited to specific interventions.



4.1 Population Characteristics

There are three main groupings of population characteristics; resident population, resident workers and resident students sourced from ABS census collection data, depending on the targeted analysis required. This information is displayed as thematic map outputs which present the data in a readily interpreted format where demographic trends and groupings are shown spatially, alongside infrastructure and geographical features.

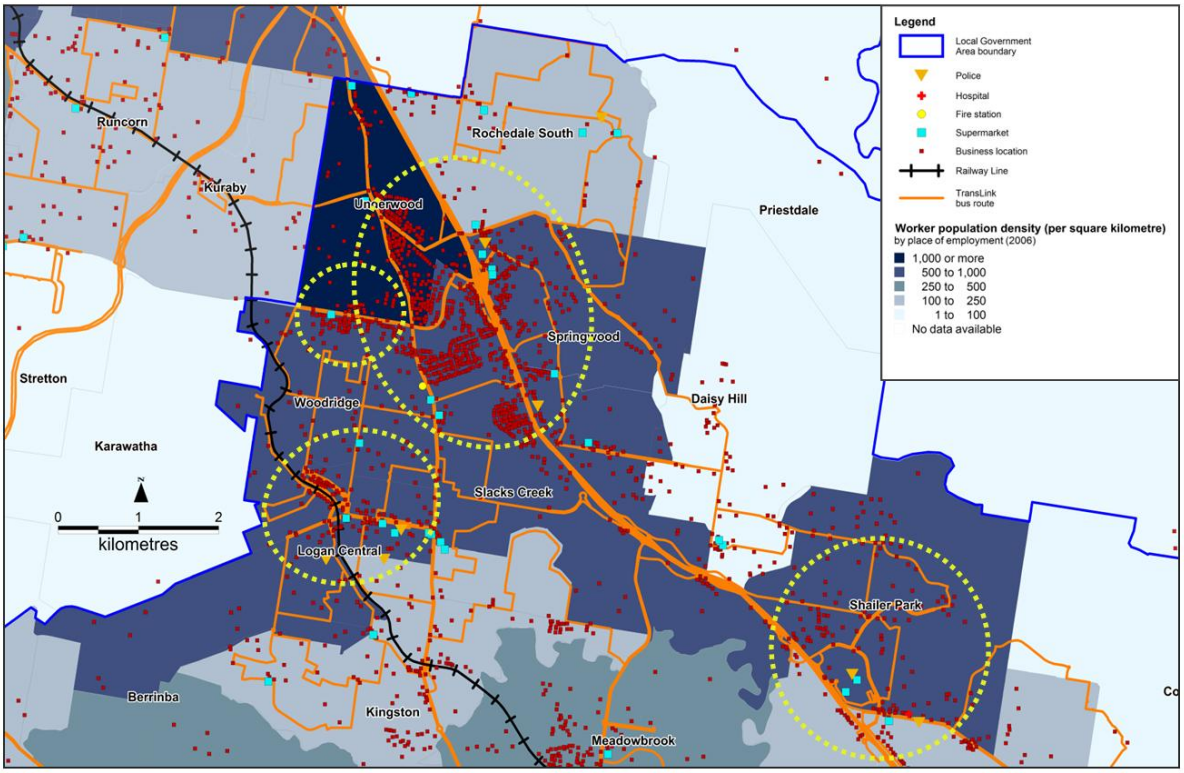
By using resident population data, population densities at a Census Collection District (CCD) level can be thematically mapped within a selected study area using GIS spatial mapping software. This represents the resident population on census night (most recently 2006, with 2011 census data becoming available in mid 2012), and as annually updated estimated resident populations (ERP) based on Queensland's Office of Economic and Statistical Research (OESR) projections. This information assists TMR to understand which parts of a selected study area contain the greatest population, and when coupled with transport and community infrastructure map elements delivers insight into the proximity of population bases to essential services. Other geographical and structural points of interest, such as commercial centres, ambulance stations or hospitals and police stations, complete the comprehensive representation of a community.

ABS Census data is also used to understand worker population densities by place of usual residence (at CCD level boundaries) and workers by place of work (at SLA level boundaries). In addition, the split between white and blue collar workers can be spatially mapped. TravelSmart Workplace targeted interventions focus on white collar workers due to their likely sedentary working habits and also for their lessened dependence on private vehicles for employment. In contrast, blue collar workers are more likely to heavily rely on private vehicles for trade-based employment styles and hence are less able to adopt TravelSmart behaviours. TMR can further understand worker distribution using maps with individual business locations, shopping centres and industrial parks together with worker population densities. Local land use planning maps may also be overlayed to display land zoned for industrial and commercial purposes. Conglomerations of businesses within close proximity to public and active transport corridors displayed on these maps may be considered good candidates for successful targeted interventions (Figure b).

TravelSmart Schools interventions are supported by mapped student population densities derived from ABS Census data, mapped in conjunction with the location of primary, secondary and tertiary education campuses and surrounding public and active transport infrastructure.

Other population characteristics sourced from ABS which inform decision making include the Socio-Economic Index for Areas (SEIFA) which shows areas which have high or low socio-economic disadvantage, and the analysis of car ownership figures.

Figure b: An example of a map displaying the complementary elements of thematically mapped worker population density per square kilometre (at SLA boundary level) in Logan, South East Queensland. Business locations, major employment hubs (such as supermarkets, hospitals) and public transport infrastructure (bus routes and rail) are also mapped. Areas of high worker density, business groupings and proximity to public transport routes (shown grouped) are considered most desirable for TravelSmart targeted interventions.



4.2 Travel Behaviour and Attitudes

A suite of transport user travel surveying and modelling outputs are used to demonstrate how transport modes are used, for what purpose, distance and time duration.

Current Travel Purpose, Distance and Mode

The Household Travel Survey (HTS) reveals the travel patterns of individuals within households in selected regions of Queensland. HTS is administered 'in house' by the MDAC team. Current data available for analysis includes coverage of Brisbane, the Gold Coast and Sunshine Coast, as well as the state's major regional towns, with the most recent data collected between 2009 and the present. Data is collected in SEQ by collection officers in the field who visit individual households within a designated study area, whereas households in regional and rural areas are requested to complete mailed-out surveys.

Data outputs collected display a representative insight into travel behaviour including proportion of total trips by weekday, total trips undertaken per day per area, transport mode, proportion of trips by purpose, peak and off peak travel share comparisons and average travel distance by mode (Figure d). For example, when considering TravelSmart's targeted interventions for schools, HTS data showing the proportion of trips in an area with the purpose of travel to education facilities can be analysed. In addition, the transport mode choice for education trips can be distilled, showing the breakdown of students who are using active and public transport modes and which have a reliance on private vehicle travel. When this information is combined with complementary demographic census data, such as student population density by area and the spatial distribution of school locations, it offers valuable insight for targeting. This may include identifying areas which have under representative patronage on public transport or over reliance on private car use over short distances to educational facilities.

Another valuable insight of HTS data is the *time of travel by purpose data*, which when arranged graphically can display 'peaks and troughs' of trip numbers specific to time of day. This output can demonstrate the differing peak travel times depending on trip purpose of work, education, shopping and personal business, social recreation and accompanying others throughout the day. Distinct population groupings within the study areas are likely to have coinciding peak travel times and hence tailored targeted interventions to promote the staggering of trip travel peaks to these groups can be achieved.

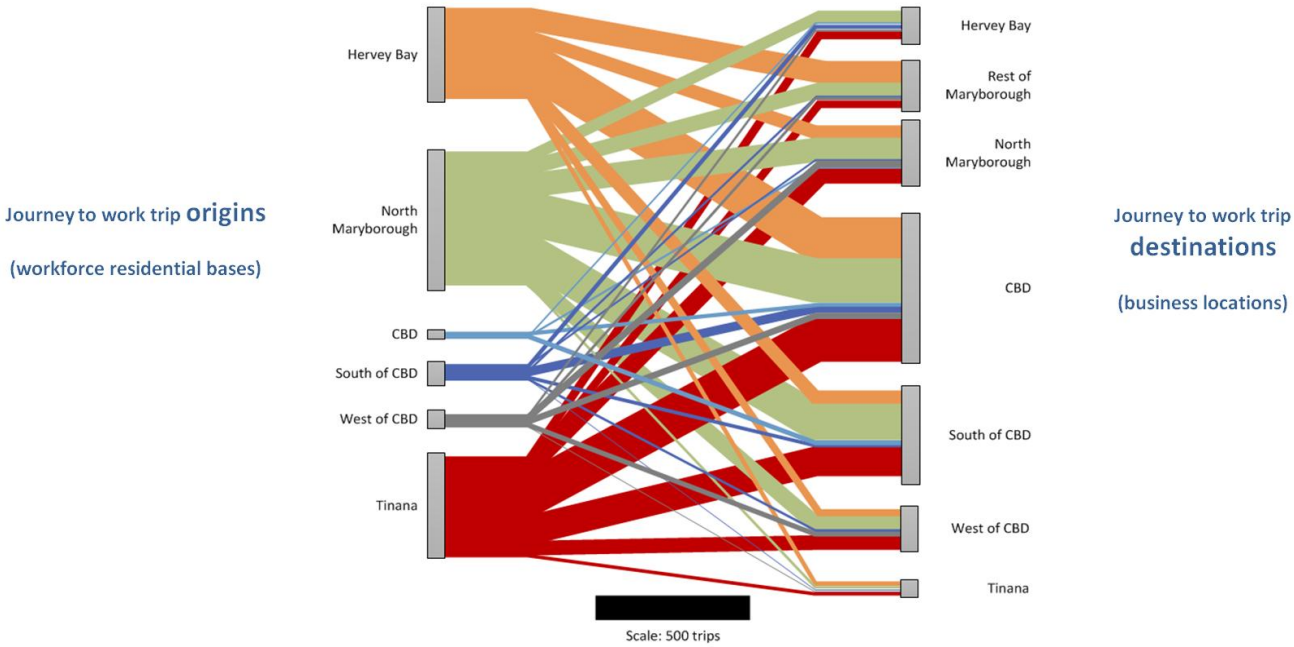
Figure c: A diagram showing some of the various outputs of the Household Travel Survey (HTS).

Journey to Work (JTW) Behaviour

Journey to work (JTW) data obtained from the ABS is an integral component of the regional profiles that support targeted interventions. Work commute trips are of particular interest to TravelSmart considering the regularity of these trips being undertaken during a working week and the AM and PM travel peaks they generate. Generally, three types of information are derived from this data. Firstly, the proportion of a study area's total population which commutes to work is presented, illustrating the net movements of residents within that area. Secondly, a breakdown of the destinations these workers are travelling to is presented. Complementing this data is a breakdown of workers travelling from origins outside of the study area to their place of work within the study area. And thirdly, the travel to work mode share is analysed.

The mode share of journey to work trips undertaken by workers in a particular study area provides knowledge of public transport patronage and active transport utilisation. If the mode shares for these more sustainable JTW modes are underrepresented within a study area, it may serve as an incentive for TravelSmart interventions to be tailored to the commuting population. This mode share data can be particularly useful when coupled with knowledge of public transport routes and active transport infrastructure provision within an area. A Sankey diagram (Figure d) identifies the areas containing major employment bases for a study area's population. This may assist the development of interventions that promote public transport routes that effectively link the worker population base with employment bases.

Figure d: An example of a Sankey diagram showing the journey to work trips originating within various areas with destinations in others in the Maryborough-Hervey Bay area. The weightings of the individual lines within the Sankey diagram are scaled to display relative JTW trip volumes.



Public Transport Behaviour

The south east Queensland Public Transport Origin-Destination Survey (PTOD) is a valuable tool which represents the public transport travel behaviour of residents in SEQ. It provides a sample of users of public transport in the region and offers information on trip mode, purpose, duration and distance as well as a description of the user's age, gender, trip frequency and purchased fare type specific to the user embarking and departing stops. Initially surveys were undertaken in Brisbane, Gold Coast and Sunshine Coast between 2003 and 2006, with further surveys being undertaken in these areas in 2010.

The PTOD survey was commissioned by TransLink (Queensland's transit authority) to update the available data used for transport modelling directed towards informing planners and policy makers (Bitzios Consulting, 2010). Self-completion surveys were distributed to riders on bus, train and ferry public transport modes in SEQ. The survey asked a series of questions about their patron movements and demographic details, intended destination and ingress and egress modes used to access their public transport stops. The results produced from these surveys provide an understanding of public transport demand relative to trip reason and trip route utilisation. These outputs are appropriately weighted in order to simulate a representative data sample of total public transport users, on an average weekday in SEQ.

The two most valuable ways in which the PTOD analysis outputs assist TMR to target travel behaviour change is by giving an understanding of which geographical areas within a set study area produce the greatest and most consistent public transport trip usage and secondly describes the trip purpose. If a particular demographic, for example those aged between 25 and 44 years, is seen to be under represented as users of public transport routes in a study area, through the analysis of the PTOD data, TMR will be able to tailor intervention targeting this specific demographic.

PTOD data contributes knowledge as to which areas are lacking or fulfilling public transport utilisation when coupled with demographic data (e.g. population density) and the presence of key infrastructure (e.g. business clusters, schools). PTOD data has also been used to demonstrate what distance users travelled to reach the point of a mode stop (e.g. railway station) from their place of origin, and by what means. This allows TMR to identify the origins of public transport users choosing less sustainable means of accessing boarding and departure points and to employ a suite of targeted interventions to encourage more desirable ingress and egress modes, such as walking and cycling. This data also highlights the catchment areas of public transport users, portraying the distance thresholds people are willing to travel to access a public transport embarking point. The same is true inversely; the data is able to show the average distance public transport travellers are transiting to reach a given stop as their disembarking point.

Resident Attitudes

Geo-Demographic Segmentation

MOSAIC is a geo-demographic segmentation tool that classifies the Australian population into 11 groups and 47 sub groups (types). This classification uses over 200 variables to determine similar groupings of customers beyond gender, age, income and postcode (using census data, property data, market research and website traffic). MOSAIC profiles can indicate potential barriers that may impact travel behaviour and/or proxies for household attitudes towards the various travel modes. For example, a family with more than one motor vehicle and low disposable income, which does not recycle and believes the threats to the environment are exaggerated, are potentially unlikely to respond directly to environmental messages.

Figure e: The table below shows the 11 groups which are used by MOSAIC to classify the Australian population

	Group	Description
	A	Privileged Prosperity: The most affluent families in the most desirable locations
	B	Academic Achievers: Wealthy areas of educated professional households
	C	Young Ambition: Educated and high-earning young singles and sharers in inner city suburbs
	D	Pushing the Boundaries: Young families living in recent developments on the fringes of major cities
	E	Family Challenge: Mixed family forms with stretched budgets in outer suburbs
	F	Metro Multiculture: Medium to high density areas with much cultural diversity
	G	Learners & Earners: Students and professionals living in high-density, lower cost suburbs
	H	Provincial Optimism: Anglo-Australian blue-collar families in provincial settlements
	I	Farming Stock: Rural landowners and workers in agricultural heartlands
	J	Suburban Subsistence: Low income, low-spending households in major regional/outer metro areas
	K	Community Disconnect: Older blue-collar workers and retirees in country and coastal locations

4.3 Community Services and Infrastructure

The location of key community infrastructure within a given study area is mapped to accompany population characteristics and travel behaviour information.

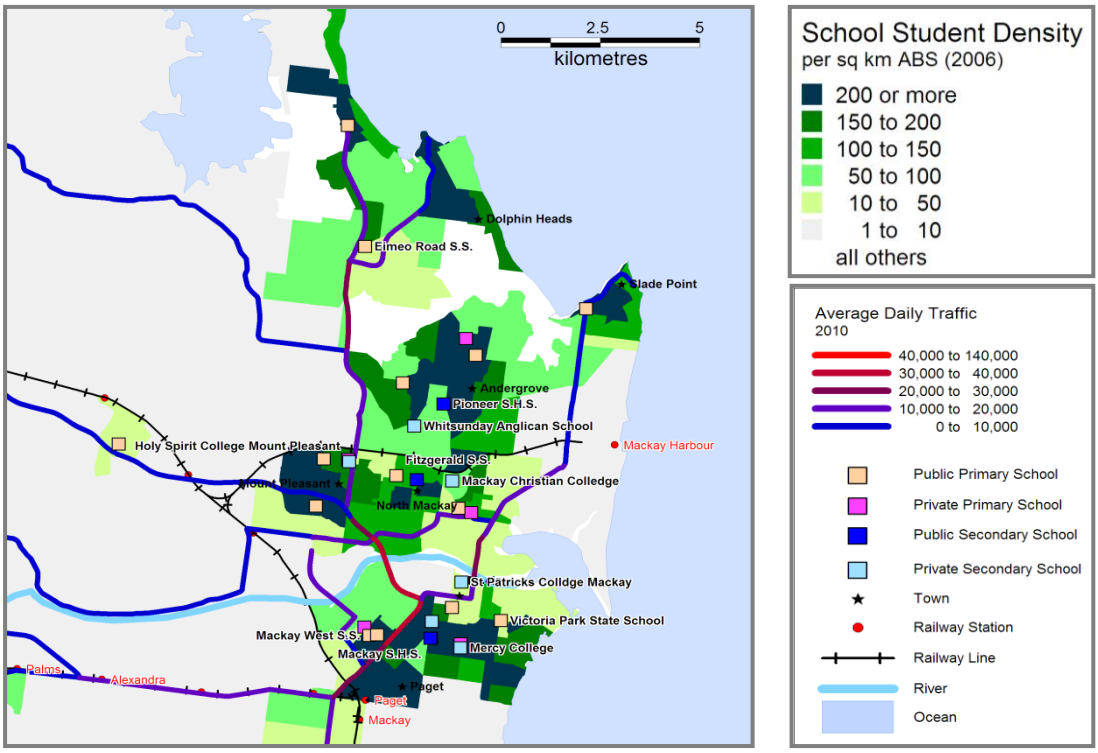
Road Infrastructure Use

A Road Management Information System (ARMIS) is a technical system administered by TMR's Information Branch. The system contains road based data on the characteristics of Queensland's State-controlled road network (Roads Information Branch, 2005). ARMIS presents numerous road infrastructure attributes, with the most supportive data being Average Annual Daily Traffic (AADT). AADT is a measure of the traffic volumes on State-controlled road increments by measuring the number of vehicles passing a portion of road within a 24 hour timeframe, averaged over a calendar year (TARS 2012).

AADT indicates traffic volumes on one kilometre road segments, displaying low to high average daily traffic in a series of increments. This data has been applied to mapping and analysis outputs which assist targeted interventions by highlighting the high-volume and congested roads within a particular area. A possible scenario may involve a school or workplace neighbouring roads with very high daily traffic volume which for example, may pose a challenge to active transport accessibility for students. This issue would need to be addressed by potential TMR interventions. Similarly, if a targeted region features many roads with high recorded AATD, it may present TMR with knowledge of likely road congestion which could influence decisions to encourage active and public transport use by specific demographics as a more suitable travel option as part of the targeted intervention process.

AADT maps provide colour-coded daily traffic volume increments on State-controlled roads that can be presented in conjunction with thematically mapped demographic data (such as student or worker population densities at CCD or SLA ABS boundary levels). These supply a succinct and effective means of identifying potential traffic volume opportunities and constraints in a study area in a spatial context (see Figure f).

Figure f: An example of AADT colour coded road segments for Mackay, Queensland, mapped in conjunction with student population density within ABS Census Collection District boundaries (Population data sourced form ABS, 2006).



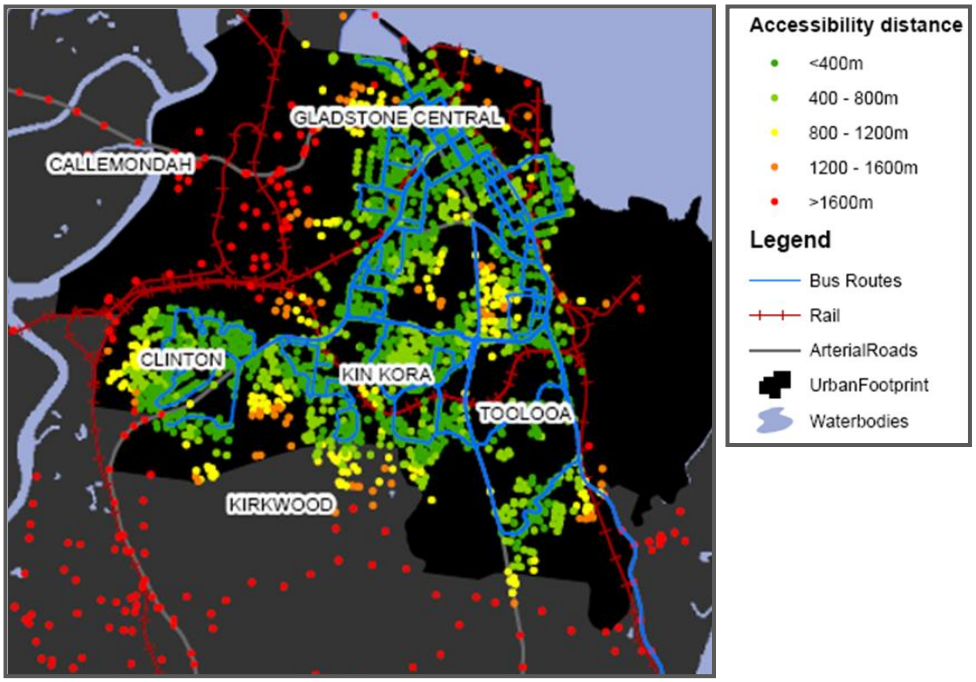
Accessibility to Infrastructure and Services

The Land Use and Public Transport Accessibility Index (LUPTAI) decision aiding tool is a GIS-based process used to quantify the accessibility that the population of an area has to a range of services by means of public transport use and active transport (ClimateQ 2010). This data can be mapped spatially in order to visually communicate what proportion of the population has accessibility to a given land use (e.g. a primary school) within a timeframe (less than 15 minutes, between 15 to 30 minutes, 30 to 45 minutes, 45 to 60 minutes or 60 minutes and more) when travelling by active or public transport. The LUPTAI tool can be applied to present and future scenarios, taking into consideration how population growth or planned infrastructure upgrades may influence a person's accessibility to a land use based on their location (Davidson 2008). Accessibility times can also be calculated for AM and PM travel time peaks and for off peak travel.

The LUPTAI tool outputs are of great significance to TMR when considering targeting interventions for schools, workplaces and communities as it can demonstrate the ability of people living in particular areas to choose public or active transport as a viable travel option. People located in areas having accessibility times to a land use or service of less than 15 minutes are generally more inclined to consider public and active transport as viable access options. The reverse is also true; people located in areas shown by LUPTAI to be greater than 60 minutes in travel time by public or active transport are most likely not inclined to travel by these means to access a selected service.

Another useful application of LUPTAI data is the mapping of accessibility by walking to public transport stops by distance increments. Should areas exist where accessibility is reduced by long walking distances to a public transport stop, car dependency is likely, whereas people living within short travel distances to public transport stops may be ideal candidates for intervention targeting, especially if public transport mode share is inadequate in these areas (see Figure g).

Figure g: An example of a map generated using outputs from the LUPTAI tool showing the accessibility distance from locations to public transport stops. Each coloured dot represents the generalised location of 100 people. Note that bus and rail routes are also shown on the map. TravelSmart may choose to promote active and public transport patronage in areas with good accessibility (green to yellow), whereas interventions may involve the use of car pooling and improved efficiency of private car use in areas which feature poorer accessibility distances (such as park and ride).



5.0 Case Study: The Darra to Springfield Transport Corridor

The following is a case study which demonstrates how TMR has used the specific data types to inform the design of a TravelSmart program in conjunction with an infrastructure project in SEQ, the Darra to Springfield Transport Corridor extension.

The extension of the Darra to Springfield Transport Corridor is a major infrastructure development, which includes the construction of 4.5km of railway line connecting Richlands to Darra; a new train station at Richlands; two new lanes on a 4.35km stretch of the Centenary Highway connecting Richlands to the Logan Motorway and a 5.6km cycle and pedestrian path connecting Darra to the Logan Motorway (TMR 2012). The second phase includes a 9.5km passenger railway line connecting Springfield to Richlands; three new rail stations at Ellen Grove, Springfield and Springfield Lakes; improved public transport links; and new active transport paths and capacity improvements on the Centenary Highway (TMR 2012). The project signifies an investment of $475 million by the Queensland Government and is expected to be completed in its entirety in 2013.

The Darra to Springfield Transport Corridor extension has the potential to alter the travel patterns of people both in the Brisbane and Ipswich local government areas, in particular by providing new commuting opportunities for those working in the major business hubs of Brisbane City and Ipswich City. By drawing on the various types of data analysis outlined previously, a more informed decision could be made as to whether an intervention would be cost-effective and guide how travel behaviour could be improved from the addition of the new infrastructure.

The analysis of the study area utilised the research questions described earlier. The data collected was analysed through the assessment framework to determine the suitability of this development for a TravelSmart intervention. Benchmarks were added to each of the assessment criteria in order to clearly identify the desirable state. These were drawn from TMR targets and strategy documents such as Connecting SEQ 2031 and the Queensland Cycling Strategy.

5.1 Population Characteristics

Census data (2006) sourced from the ABS detailed the number of people by place of usual residence in the Darra to Springfield area. Population densities thematically mapped in conjunction with the future infrastructure improvements showed that on average 685 people per square kilometre lived within the Springfield to Darra study area (ABS 2006). Change in population over time data also obtained from ABS suggested that the population is growing steadily, indicating that the future population base of commuters would increase. This high population density and projected continued growth signifies strong potential for interventions to encourage sustainable travel behaviour.

Student and worker population densities thematically mapped indicated that sizeable populations of workers and students were present close to existing stations and in conjunction with education facilities and business locations. Total worker and student numbers were provided to indicate a complete representation of these two sub-demographics, to inform suitable targeting methodologies.

Analysis highlights areas of reasonably high primary and secondary student density along the path of the railway line, indicating scope for a TravelSmart Schools intervention.

5.2 Travel Behaviour and Attitudes

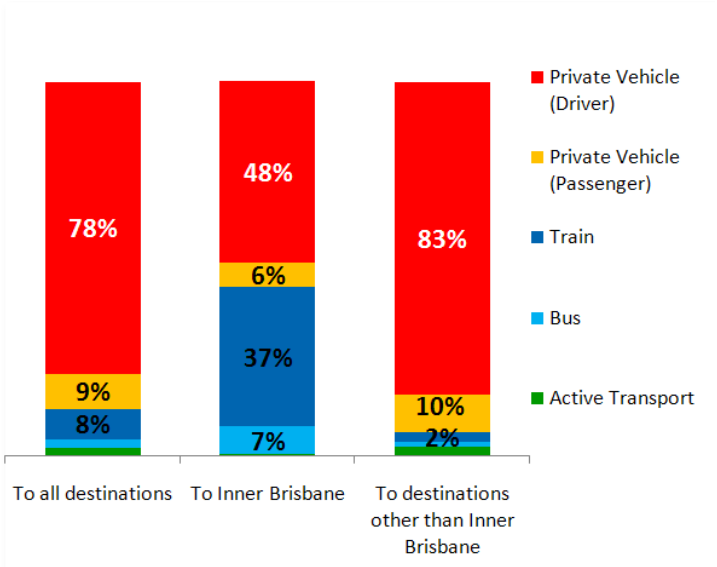
Journey to work 2006 census data in the Darra to Springfield study area showed that 78% of people travelling to work did so by car whilst only 8% travelled by train (see figure g). TMR is targeting a reduction of private vehicle travel across south east Queensland by one fifth – from 83% to 66% by

2031, and corresponding increases in public transport usage (from 7 to 14%) and active travel (from 10 to 20%) (Connecting SEQ 2031).

Major work destinations for residents of the study area included Outer West Brisbane (21%), Inner Brisbane (16%), Outer South Brisbane (16%) and Springfield (self containment 12%). With the provision of the three new stations, new catchment areas would be created increasing the proportion of the region's population with readily accessible train travel.

Although the primary means of travelling to work, both to and from the Darra to Springfield area, is by private vehicle as driver for work trips from Springfield-Darra to inner Brisbane, the use of the private vehicle (driver) is actually well below the average for SEQ at 54% and train usage significantly higher at 37%. However, the extension of the train line provides opportunities to encourage more public transport usage from the area into Ipswich and Brisbane as the increased proximity to the stations and substantially increased capacity will make this an attractive alternative to private vehicle use.

Figure h: Journey to work mode share observed within the Darra to Springfield study area (ABS 2006). Note the larger portion of journey to work travel by train and bus for trips to inner Brisbane.



Analysis of the study area currently shows low accessibility of public transport infrastructure, but the new rail line, stations and bus improvements will alter this dramatically.

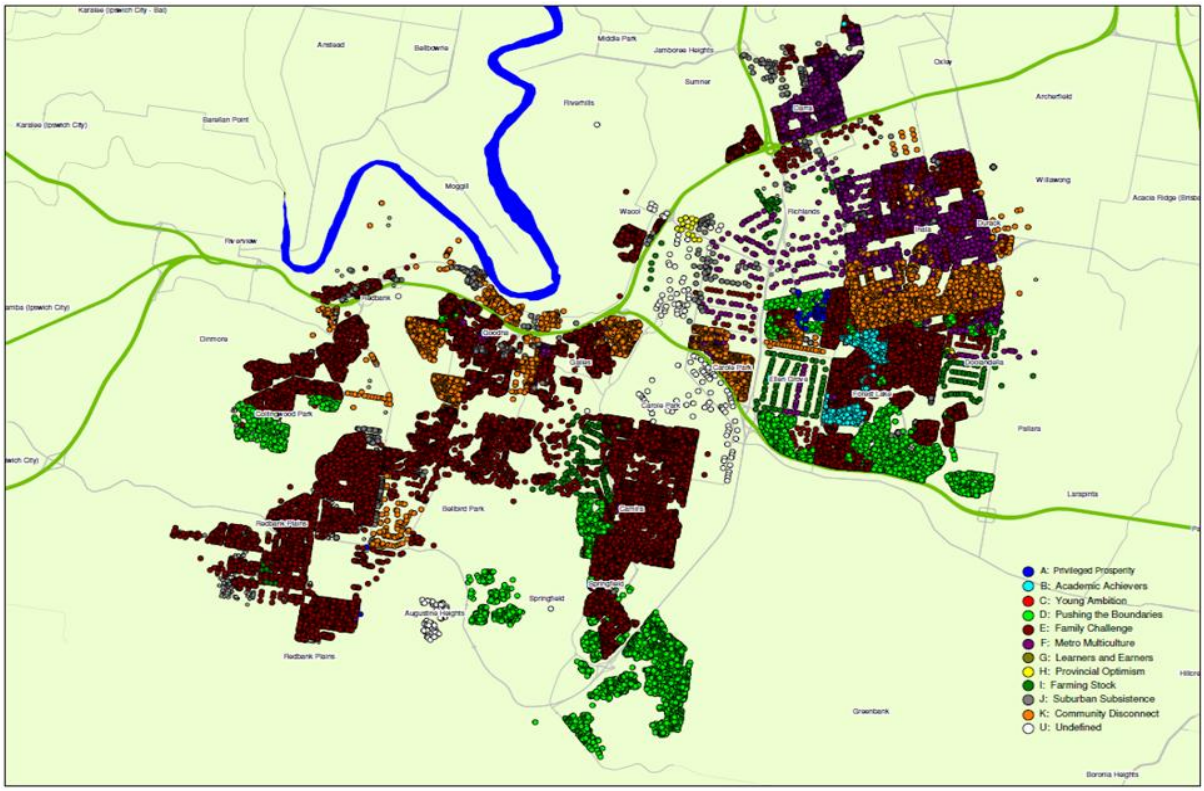
PTOD data for the Darra to Springfield study area revealed that 67% of users of existing railway stations in the area travelled to inner Brisbane. Only 34% of people lived within 3 kilometres or less of existing stations. A challenge exists for TMR to encourage users of existing stations to walk or cycle to the station but an opportunity to encourage potential rail users in catchments associated with the three planned stations. PTOD data reveals 50% of the users of rail services in the region currently travel 5km or more to access a station. Buffers of 5km were drawn around the future station site to give an indication of what population bases would surround the future stations. It was shown that 22,715 people would be located within the 5km buffer at Springfield station, 11,782 at Springfield Lakes and 33,980 at Ellen Grove/Forest Lake. These substantial population bases could be targeted by TMR through the promotion of these new railway station provisions, particularly as the population grows, in order to foster a strong public transport user base in the area.

Currently 22% of those travelling less than 800m and 38% of those travelling 800m-3km use the car to access the station. Car parking may be limited at the new station. Based on these findings TravelSmart can be equipped with the option of promoting improved public and active transport integration as an incentive for prospective travellers who may have considered the network inadequate in the past.

MOSAIC profiling on the study region identified six key segments that together made up 79% of the population. These segments reflected a diverse mix between home owners and renters; new families in gated communities employed in potentially sedentary clerical/administrative roles, and fractured families employed in manual roles such as labourers, machinery operators and drivers, or unemployed households. There was also a diverse cultural mix of Anglo-Australians, migrants from South-East Asia, Pacific Islanders, and indigenous Australians (see Figure i below).

The two largest groups, each comprising 17% of the target population, are *Families in Formation* and *Domestic Divides*: both part of the *Family Challenge* segment. *Families in Formation* largely consist of married couples with young families and an average household size of 4-5 people. The majority are employed full time and many are working in manual roles, such as physical machinery operators or drivers. *Domestic Divides* comprise separated or single parents and typically have larger household sizes. There is high unemployment among this group, but those in work are likely to be in similar unskilled manual roles or childcare occupations. The information contained in the respective MOSAIC profiles can be used to determine a more sophisticated profile of the area and to target appropriate interventions for distinct groupings in the community.

Figure i: An example of a map generated using MOSAIC showing the clusters of key segments in the Darra-Springfield area. Unit of analysis is at street level with each dot representing approximately 20 households. Profiling is based on all persons with a registered vehicle, a drivers' licence, and/or 18+ identity card.



5.3 Community Infrastructure and Services

New bus services are planned to integrate with future railway stations to improve public transport connectivity in the region. An example of this is the 535 bus route which connects Springfield to Richlands Railway Station which began operating in February 2012. These will be adapted to service new stations and to align with the train timetable.

Active transport infrastructure, including cycleways and walkways has been mapped alongside public transport routes. Access was previously limited however active travel accessibility issues will be addressed as a part of the infrastructure expansion.

A new bikeway and shared pathways will be constructed and high quality end of trip facilities will be incorporated at each of the stations to encourage active travel to the station.

5.4 Main application of the findings

The data analysis suggests that there exists within the Darra to Springfield area an opportunity for an effective TravelSmart program which can reduce vehicle kilometres travelled and shift travel mode to a more desirable mix in line with government targets. It has been recommended that a travel behaviour change intervention is designed for the Darra to Springfield Transport Corridor. The potential travel behaviour change intervention could focus on the following two key areas of behaviour change.

Firstly, by encouraging mode shift for the journey to work due to the introduction of new rail services, stations and active transport infrastructure. The analysis concluded that there is potential for a travel behaviour change intervention to increase train patronage for residents travelling to Brisbane city for work, particularly once Stage 2 is completed. More than one half (54%) of residents travelling into inner Brisbane for the purpose of work currently travel by private vehicle. This indicates an opportunity to encourage mode shift to train with the provision of new infrastructure. In addition for travel from Darra-Springfield to the city, the train provides a more cost effective and timely option compared to the associated costs of private vehicle travel.

Secondly, by encouraging residents to travel to the station using public or active transport. There is further scope for a travel behaviour change intervention around the journey to train stations. 22% of those travelling less than 800m, and 38% of those travelling 800m to 3km, use the car to access the station. The opening of new stations will provide an opportunity to encourage current drivers who access these stations (both old and new) to potentially switch to active transport options. The distance travelled to the station will be reduced for many residents with the introduction of new infrastructure, so there is definite potential for an intervention targeting residents within the desired 5km radius.

6.0 Conclusion: The way forward

Behaviour change is most likely when people are targeted in multiple contexts (Southerton et. al., 2011). Queensland's new travel behaviour change program will do this by jointly implementing a range of programs in the one area. For example, a Communities project, Schools project and Workplaces project could all be rolled out in the one suburban area. At a family level, this means that sustainable transport messages will be coming home from school with children, from work with parents, and directly to the household via a community-wide project. By communicating tailored, meaningful messages in suitable formats for each sub-group, the new program will be more effective in motivating change (Southerton et. al., 2011).

Successful targeting with its subsequent impact on message positioning, program development, and delivery and communication requires a greater understanding of individual differences. As such, TMR

explored the kinds of data available in order to assist with these decisions. Based on the analysis and work performed to date, TMR can begin to operationalise an assessment framework for targeting TravelSmart interventions in geographical areas.

This paper has described the collaborative efforts between TMR's OST and MDAC in which demographic data, spatial distribution of key infrastructure and a range of transport user and travel data have been used to guide the targeted intervention process for travel behaviour change activity. It has highlighted data and analysis techniques employed to assist the targeting process and demonstrated how this information applies to specific study areas. By utilising this data, TMR can be made aware of areas in which intervention efforts would be most effective; conserving time and resources. This partnership has ensured an effective, streamlined approach in selecting areas with the greatest potential to adopt travel behaviour change. This ensures those in the population who will benefit most from intervention are identified and educated about sustainable, healthy and affordable travel mode alternatives, and offered the appropriate support and direction to enable them to make changes to how they get around.

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Glossary

AADT	Average Annual Daily Traffic
ABS	Australian Bureau of Statistics
ARMIS	A Road Management Information System
CCD	Census Collection District
ERP	Estimated Resident Population
HTS	Household Travel Survey
JTW	Journey to work
LGA	Local government area
LUPTAI	Land Use and Public Transport Accessibility Index
MDAC	Modelling, Data and Analysis Centre (TMR)
MOSAIC	a geo-demographic segmentation tool
OESR	Queensland's Office of Economic and Statistical Research
OST	Office of Sustainable Transport (TMR)
PTOD	Public Transport Origin-Destination Survey
SEIFA	Socio-Economic Index for Areas
SEQ	South East Queensland
SLA	Statistical Local Area
TARS	Traffic Analysis and Reporting System
TMR	Queensland's Department of Transport and Main Roads
TransLink	Queensland's transit authority