Oxfordshire Transformation Programme

Briefing Note 1

Travel Analysis - Approach

Purpose

The purpose of this briefing note is to describe the way in which the Travel Maps to be presented to the Community Partnership Network (CPN) has been developed. This document will provide more detail around the technical approach and how concerns about actual travel times have been addressed within the revised Travel Maps.

Why are travel times important to the process of Service Change

When making changes to clinical services access to clinical services is an important consideration when balancing the various factors. To understand the issue of access, the CCG needs to understand the present experience of patients and careers in terms of accessing services. Once this has been completed, the CCG needs to understand the impact of removing that location and implication on access. The starting point for this is to develop a travel map which shows the differing levels of travel time under the two scenarios. Further factors might need to be considered and explored further, but the travel maps provide a robust starting point for the discussion.

Part 1 – Approach to Developing Journey Time Maps

01 Approach

All travel analysis should consider three main forms of transport.

1. Car (Private)
2. Public Transport
3. Walking

The analysis for these three forms of transport use different sources of information.

Type of Analysis	Data Source
Car (Private)	Ordnance Survey Mastermap ITN road network
Blue Light	Typically derived from Car (Private) data*
Public Transport	IGeolise platform
Walking	Urban Paths" dataset

Figure 1 – **Modes of Travel**

* This is typically tested with Ambulance Providers, to valid the timing as typically an Ambulance Trust does not have enough data to support the mapping required.

Once all the information has been analysed the information is presented in a visual format using Pitney Bowes MapInfo Professional GIS software.

Further information on Pitney Bowes can be found at

http://www.pitneybowes.co.uk

In addition to this, journey time maps are developed with three timings

1. Average Journey Time (across 24 hours / 365 days)
2. Peak Journey Time (between 7:30am and 9:30am)
3. Off Peak Journey Time (between 1:00pm and 3:00pm)

The reason for analysing all three is that it is important to have a single point of reference to understand the wider position. However, so areas such as London have significantly different travel times to that during 'Peak Hours'. As a result the Travel Maps need to consider Peak and Off Peak to understand whether there is a significant difference in journey times between the two time periods.

Finally the analysis needs to include not only Oxfordshire, but also the journey times to the surrounding hospitals relevant to the scope of the Programme.

02a Methodology - (Private) Car
The following section describes how the journey time for a (private) car route is established.

Step 1 - The road network is analysed to produce attributes that identify the average driving speed on each element of the network, depending on road classification, speed limit and urban/rural location (see below). Each section of the road is given these attributes so that a specific section of road will have an average journey time

Step 2 - The default speeds are then adjusted by modifying the speed values until the results compare with a number of known actual journey times across the area.

Step 3 - Those average speeds are then adjusted again by a factor (approximately +/- 4mph) to provide peak-time and off-peak speeds again by comparing with known actual journey times.

Step 4 - The distance isochrones (zones) are calculated using the fastest routes between all the sites selected.

Step 5 - The road network can also include specific road closures/blockages and speed restrictions if required to carry out individual analyses at any time.

02b Methodology – Blue Light
'Blue-light' emergency services vehicle speed takes an uplift of up to 20% on the average private vehicle speed. This would depend upon the environment and the road network as part of the study.

03 Defining Urban / Mega Urban Area / Road definitions
As set out above, the Travel Maps use Ordnance Survey Mastermap ITN road network to calculate the travel times. However, there is a recognition that some large cities act in a different way to smaller cities. As a result in cities (e.g. Bristol, Birmingham) there are different travel times to smaller metropolises (e.g. Oxford), these are classified as Mega-Urban. This is not applicable within the Oxfordshire setting.

04 Traffic Speeds
The table below provides the speeds applied to the national ITN road network:

Traffic speeds (mph)						
Road classification		Private vehicle			Blue Light	Walk
Attribute	Description	Avg Speed	Peak	Off-Peak	Average	
1	Motorway	60	48	72	72	n/a
2	A Road	40	32	48	48	2.5
3	B Road	35	28	42	42	2.5
4	Minor Road	25	20	30	30	2.5
5	Local Road	25	20	30	30	2.5
6	Alley	7	6	8	8.4	2.5
7	Slip Road	25	20	30	30	2.5
8	Roundabout	7	6	8	8.4	2.5
9	Pedestrianised Street	5	4	6	6	2.5
10	Private Road (Public)	15	12	18	18	2.5
11	Private Road (Private)	15	12	18	18	2.5
12	Motorway - Urban	40	32	48	48	n/a
13	A Road - Urban	15	12	18	18	2.5
14	B Road - Urban	15	12	18	18	2.5
15	Minor Road - Urban	15	12	18	18	2.5
16	Slip Road - Urban	10	8	12	12	2.5
17	Mega Urban A Road	5	4	6	6	2.5
18	Mega Urban B Road	5	4	6	6	2.5

Figure 2 – **Timings by Road Type**

05 Walking Analysis

The walking times analysis is based on the same Ordnance Survey road and street network including the “Urban Paths” dataset which includes footpaths and links between roads and streets (public rights of way are not included).

A single average speed of 2.5mph (4kph) is applied to whole network. This is recommended by Bristol Healthy Schools (Bristol City Council) providing an average speed combining all; ages, abilities, road conditions and terrains.

06 Public Transport

The IGeolise platform is used for public transport analysis, in conjunction with the PB Mapinfo GIS software. A web tool has been developed which returns the results of the public transport analysis and converts to a map format, from which map based isochrones can be built within the software.

In order to build a robust travel analysis for public transport, typically a two hour travel window will be specified. The analysis will be re-run multiple times within the ‘time window’, based on the isochrones interval period. The results are then merged to give one average analysis for the two hours window. E.g. if 15 min isochrones are selected up to 60 minutes for a two hour window 10am-12pm, the analysis will be re-run five times (10.00, 10:15, 10.30,10:45, 11:00), in order to cover the two hour time period.

Part 2 – Validation

01 Approach

Network route analysis aims to model reality and as such there will be margin of error with the results obtained. Elements such as the time taken to find a parking space or time taken to get from the car park to specific departments have not been modelled. As a result these will be a difference between the total journey time and the journey time that can be measured within this approach.

The data used is updated on a quarterly basis, to ensure the most up to date road network information is used.

The organisation used by the CCG also has undertaken validation of the Ordnance Survey Mastermap ITN road network data. To do this it has purchased new traffic data and a validation exercise undertaken. This validation was undertaken on travel analysis for the Avon region as a reference case.

1. Default values within the ITN road network data used
2. Known routes applied for the Avon area with the average speeds adjusted accordingly.
3. Navteq Navstreets routing dataset purchased. This dataset was combined with the current dataset.
4. Adjustments made to data used to improve accuracy for urban versus rural areas. Classifications for MegaUrban, Urban and standard created, as described above.
   The result of this classification was that the number of speed categories was increased to thirty.
5. A further validation exercise was undertaken for the Avon area, using the Google Maps. The results from Google were compared against the standard model, with results were broadly in line with those of the current model. The result of this comparison was that model did not require amendments based on this exercise.

02 Oxfordshire Specific Validations

Whilst the approach above provides assurance that the journey times being used are robust, there was a need to ensure that the journey times associated with the changes in Oxfordshire retained the same level of robust data.

The CCG commissioned additional validation against Google Maps journey times, as a commonly used method used by the public and which shares its data with many of the satellite navigation companies (such as TomTom).

Twenty journey times between NHS and GP sites were validated against Google Maps. Locations for these routes were taken from across Oxfordshire and are set out in the following tables. Two separate tables were undertaken for Off-Peak and Peak travel times, to ensure there was a broad spread to journeys and times considered.

Start Location	End Location	Source (Google) Off peak (min)	Source (SCW SCU) Off Peak (min)	Is the SCW CSU model > 15% different to the Google model?
Kidlington ambulance station (23 Evenlode Cresecent)	John Radcliffe Hospital A&E entrance (63 Sandfield Rd)	18.50	21.21	FALSE
Kidlington ambulance station (23 Evenlode Cresecent)	Hospital (The Great Western Hospital - Waterside Way - roundabout at entrance)	49.10	56.35	FALSE
Kidlington ambulance	GP practice - rural (Stowe	38.67	37.52	FALSE

station	School Medical Centre -K82007)			
Kidlington ambulance station	GP practice - urban (Coley Park - K81636)	57.48	64.27	FALSE
Kidlington ambulance station	GP practice - urban (Malthouse - K84027)	22.32	30.4	TRUE
CCG HQ (Oxford)	Hospital (Amersham)	44.60	54.09	TRUE
CCG HQ (Oxford)	CCG building (Swindon)	56.67	62.35	FALSE
CCG HQ (Oxford)	CCG building (Newbury)	44.60	54.09	TRUE
CCG HQ (Newbury)	CCG building (Chiltern)	64.15	75.83	TRUE
CCG HQ (Chiltern)	Hospital (Great Western)	73.72	82.87	FALSE
GP Urban (Whitehill - K82040)	Hospital (Royal Berkshire)	64.18	**58.88**	FALSE
GP Rural (Stowe School - K82007)	Hospital (Horton)	31.07	32.06	FALSE
GP Urban (Coley Park - K81636)	GP Urban (Twyford - K81070)	23.43	**18.1**	TRUE
GP Urban (Deer Park - K84622)	Nursing Home (Manor House, Merton)	33.17	34.61	FALSE
GP Rural (Stowe School - K82007)	Nursing Home (Watlington & District)	49.18	44.74	FALSE
Hospital (John Radcliffe)	Hospital (Horton)	39.70	39.23	FALSE
Hospital (John Radcliffe)	Community (Buckingham)	43.15	41.22	FALSE
Hospital (Great Western)	MLU (Wycombe Hospital)	60.58	65.73	FALSE
Hospital (Chipping Norton)	GP urban (Whitehill - K82040)	57.27	53.91	FALSE
Hospital (John Radcliffe)	GP Rural (The Downland, Compton - K81050)	38.05	41.53	FALSE

Figure 3 – **Off Peak Comparison**

Only two journey times were faster using the data provided by the SCU when compared with Google Maps.

As a result 25% of journey times had a difference of greater than 85% for the Off Peak period.

Start Location	**End Location**	**Source (Google)** Off peak (min)	**Source (SCW SCU)** Off Peak (min)	**Is the SCW CSU model > 15% different to the Google model?**
Kidlington ambulance station (23 Evenlode Cresecent)	John Radcliffe Hospital A&E entrance (63 Sandfield Rd)	30	31.81	FALSE
Kidlington ambulance station (23 Evenlode Cresecent)	Hospital (The Great Western Hospital - Waterside Way - roundabout at entrance)	60	84.52	TRUE
Kidlington ambulance station	GP practice - rural (Stowe School Medical Centre -K82007)	50	56.22	FALSE
Kidlington ambulance station	GP practice - urban (Coley Park - K81636)	75	96.37	TRUE
Kidlington ambulance station	GP practice - urban (Malthouse - K84027)	30	45.56	TRUE
CCG HQ (Oxford)	Hospital (Amersham)	60	81.03	TRUE
CCG HQ (Oxford)	CCG building (Swindon)	70	93.48	TRUE
CCG HQ (Oxford)	CCG building (Newbury)	60	81.03	TRUE
CCG HQ (Newbury)	CCG building (Chiltern)	85	113.56	TRUE
CCG HQ (Chiltern)	Hospital (Great Western)	100	124.23	TRUE
GP Urban (Whitehill - K82040)	Hospital (Royal Berkshire)	90	**88.08**	FALSE
GP Rural (Stowe School - K82007)	Hospital (Horton)	40	47.85	TRUE
GP Urban (Coley Park - K81636)	GP Urban (Twyford - K81070)	35	**27.08**	FALSE
GP Urban (Deer Park - K84622)	Nursing Home (Manor House, Merton)	45	51.83	TRUE
GP Rural (Stowe School - K82007)	Nursing Home (Watlington & District)	60	66.95	FALSE
Hospital (John Radcliffe)	Hospital (Horton)	50	58.65	TRUE

Hospital (John Radcliffe)	Community (Buckingham)	50	61.72	TRUE
Hospital (Great Western)	MLU (Wycombe Hospital)	80	98.54	TRUE
Hospital (Chipping Norton)	GP urban (Whitehill - K82040)	70	80.65	TRUE
Hospital (John Radcliffe)	GP Rural (The Downland, Compton - K81050)	50	62.27	TRUE

Figure 4 – **Peak Comparison**

Only two journey times were faster using the data provided by the SCU when compared with Google Maps.

As above 25% of journey times had a difference of greater than 85% for the Off Peak period.

In summary, given the spot analysis above there is a high coloration between the baseline travel times analysis and the two rounds of validation undertaken. Further work as agreed within the CPN Workshop will consider the impact of parking, as a major factor in the journey time analysis. Detailed proposals will need to be developed with key stakeholders.

An Integrated Impact Assessment will also be undertaken that will independently assess the impact of travel, using a different national dataset to validate the journey times. These inputs will form the basis of the analysis to support Oxfordshire CCG's Decision-Making Business Case.