



# Stroke Review Pre-Consultation Business Case

## Appendix P

### Travel modelling

*Transforming health and social care in Kent and Medway* is a partnership of all the NHS organisations in Kent and Medway, Kent County Council and Medway Council. We are working together to develop and deliver the Sustainability and Transformation Plan for our area.



# The purpose of the travel time analysis is to assess the impact on hospital access times for the affected population under any potential configuration options

- Quick access to services for patients is one of the most important factors when considering site-specific options
- The following criterion was used as one of the five hurdle criteria to reduce the number of potential options:

## Is the potential configuration option accessible?

Can the population access services within a window of 120 minutes from call to need? (using 95% accessing services within 60 mins (off-peak times\*) as a proxy

- In order to assess against this criterion, a modelling exercise has been undertaken that looks at the shortest travel time from each Lower Super Output Area (LSOA)\* to hospital site under each option
- This makes it possible to determine, under each option, the longest time it will theoretically take someone to access a hospital
- In the evaluation stage of the options appraisal further analysis was undertaken to assess the % of the population able to access a HASU in 30 and 45 minutes under the different configurations

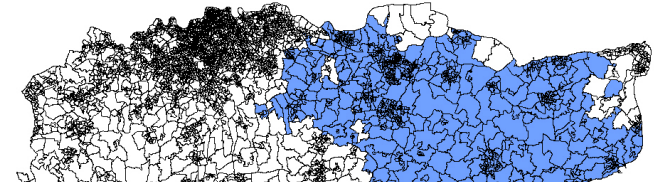
\*An LSOA is a geographical area. LSOAs were designed to improve the reporting of small area statistics in England and Wales. They have a minimum population of 1,000 and mean population of 1,500. Each postcode in the UK can be mapped to an LSOA

\*\*Off-peak times have been taken as a proxy for blue-light travel, this was agreed as an appropriate proxy by the South East Coast Ambulance Service (SecAmb)

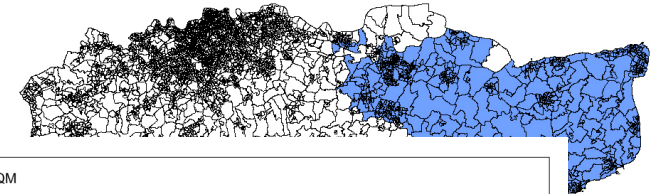
## Basemap have been used as the source data underpinning the travel time analysis

- Basemap ([www.basemap.co.uk](http://www.basemap.co.uk)) is a nationally recognised and trusted digital mapping and transport solution data solution provider that has supported numerous NHS organisations over the years, including being used as the basis for acute reconfigurations
- They provide TRACC software: a desktop application that uses public transport and highway data to create journey times from origins to destinations - in this case, LSOAs to Kent and Medway hospital sites
- The car travel time data is based on GPS captures from sat navs
- This data is used to calculate the mean time taken to travel from one point to another over a year

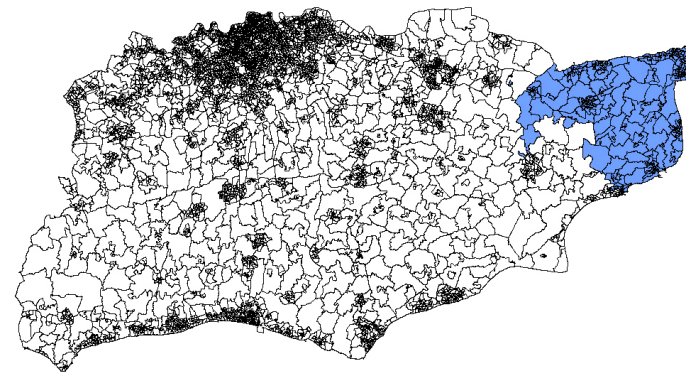
LSOAs within 45 minutes of William Harvey Hospital



LSOAs within 45 minutes of Kent & Canterbury



LSOAs within 45 minutes of QEQM



## The raw data from Basemap consists of travel time from 3,186 LSOAs to 15 hospital sites and four different travel times for each journey

- The travel times from 3,186 LSOAs (with a total population of 5.6 million people) to the following 15 hospital sites
- 8 periphery hospitals with HASUs closest to the K&M border were included in the data set

### Kent and Medway

- WHH
- K&M
- QEQM
- DVH

### Periphery sites

- Brighton (Royal Sussex County Hospital)
- Princess Royal University Hospital
- Basildon Hospital
- King's College Hospital
- East Surrey Hospital
- Eastbourne District General Hospital
- Princess Royal University Hospital
- St George's Hospital

#### 1) Peak car

Using the average speed Monday – Friday  
07:00 – 09:00  
16:00 – 19:00

#### 2) Off-peak car

Using the average speed Monday – Friday  
10:00 – 16:00

#### 3) Peak public transport

#### 4) Off-peak public transport

- For both the peak and off-peak times as given for car the application uses timetable information showing both arrival and departure times at stops from public transport service during peak times
- The journey assumes arrival at the first stop 1 minute before the initial departure, with any subsequent interchange waiting times included as part of the final journey time
- The journey time produced then includes the walk from the origin to the road, from the road to the public transport stops, any interchange of public transport using the road and then from the final stop to the destination via the road

#### Note

- Using sat nav data means that journeys which are actually faster than the speed limit are included, and this can impact on the relative peak and off peak times
- According to Basemap, it is relatively common to find that traffic flows faster in peak than off peak



## Four key steps were taken in analysing travel times under different service configuration options

**1** Population per LSOA and travel time from LSOA to each of the hospital sites captured in base data (Basemap) (all LSOAs for whom the current closest acute stroke service is within the K&M STP were assessed)

**2** Scenarios are modelled by “turning off” sites and diverting patients to the site with the next shortest journey

**3** The proportion of the population who can access a site within a certain time (e.g. 60 minutes) can then be calculated

**4** For the hurdle criterion we looked at the % of the total population, under each scenario, able to access a HASU 60 minutes\*

The analysis assumes that for each option patients will travel to the site with the shortest travel time

For some LSOAs under certain scenarios, this is a non-K&M site



# The hurdle criteria assessed whether 95% of the population could access services within 60 mins (off-peak times)

## Is the potential configuration option accessible?

Can the population access services within a window of 120 minutes from call to needle? (using 95% accessing services within 60 mins (off-peak times<sup>1</sup>) as a proxy)<sup>2</sup>

This proxy was agreed by the Kent and Medway Clinical Reference Group as it is not possible assess the full symptoms to treatment time. The new model will deliver against the national requirement for 120 minutes call to needle. Whilst call to ambulance pick up and door to needle are a key part of this pathway, the most variable is door to door.

### % of total population\* able to access a HASU with 60 minutes for all 20 longlisted options

Sites in option	% total pop access HASU within 60 mins <sup>2</sup>	Sites in option	% total pop access HASU within 60 mins <sup>2</sup>	Sites in option	% total pop access HASU within 60 mins <sup>2</sup>	Sites in option	% total pop access HASU within 60 mins <sup>2</sup>	Sites in option	% total pop access HASU within 60 mins <sup>2</sup>
DVH	91.3%	DVH	99.9%	DVH	100%	MGH	99.9%	TWH	99.9%
MGH		TWH		WHH		MMH		MMH	
TWH		WHH		QEQM		WHH		WHH	
DVH	98.1%	DVH	99.1%	MGH	99.9%	MGH	100%	TWH	100%
MGH		TWH		WHH		WHH		WHH	
MMH		QEQM		QEQM		QEQM		QEQM	
DVH	99.9%	DVH	99.9%	MGH	98.1%	MGH	99.8%	TWH	99.6%
MGH		MMH		TWH		MMH		MMH	
WHH		WHH		MMH		QEQM		QEQM	
DVH	99.8%	MGH	99.9%	DVH	97.6%	DVH	99.5%	MMH	100%
MGH		TWH		MMH		WHH		WHH	
QEQM		WWH		MMH		QEQM		QEQM	

SOURCE: Basemap car driving off-peak travel times 2015/16; Carnall Farrar analysis 2016-17; minutes of the CRG 07/171) Off-peak times have been taken as a proxy for blue-light travel, this was agreed as an appropriate proxy by the South East Coast Ambulance Service (SecAmb). 2) The total population refers to all LSOAs for whom the current closest acute stroke service is within the K&M STP



# All 13 options that had reached the access stage of the hurdle process, passed the criterion allow 95% total K&M population to access a HASU within 60 mins\*

Site      % Total pop  
access HASU  
within  
60 mins<sup>1</sup>

Site      % Total pop  
access HASU  
within  
60 mins<sup>1</sup>

Site      % Total pop access  
HASU within  
60 mins<sup>1</sup>

As is based on travel time from patient LSOA to hospital site

■ Within access criterion

DVH	100%
MGH	
TWH	
MMH	

WHH	100%
K&C	
QEQM	

<b>1</b> DVH	100%
WHH	
QEQM	

<b>2</b> MGH	99.8%
MMH	
QEQM	

<b>3</b> DVH	99.9%
MMH	
WHH	

<b>4</b> DVH	99.5%
MMH	
QEQM	

<b>5</b> DVH	99.9%
MGH	
WHH	

<b>6</b> DVH	99.8%
MGH	
QEQM	

<b>7</b> DVH	99.1%
TWH	
QEQM	

<b>8</b> MGH	99.9%
MMH	
WHH	

<b>9</b> TWH	99.6%
MMH	
QEQM	

<b>10</b> TWH	99.9%
MMH	
WHH	

<b>11</b> DVH	99.9%
TWH	
WHH	

<b>12</b> DVH	98.1%
MGH	
MMH	

<b>13</b> MGH	100%
WHH	
QEQM	

**\* All other options did not pass the clinically sustainable or implementable criteria**

SOURCE: Basemap off- peak travel times 2015/16; Carnall Farrar analysis 2017

1) The total population refers to all LSOAs for whom the current closest acute stroke service is within the K&M STP



# The 13 shortlisted options were evaluated against their ability keep to a minimum the increase in the total time it takes people to get to hospital

## Agreed evaluation question

- Do any options keep to a minimum the increase in the total time it takes people to get to hospital by ambulance, car (at off-peak and peak times) and public transport?

## Analysis undertaken

- % total population able to access within 30 mins (off- peak travel times as a proxy for ambulance<sup>1</sup>)
- % total population able to access within 45 mins (off- peak travel times as a proxy for ambulance<sup>1</sup>)
- % total population able to access within 30 mins (peak travel times)
- % total population able to access within 45 mins (peak travel times)

Public transport travel times were assessed using the data from the basemap data set, but they were felt to be non-differentiating by participants during a full evaluation workshop on 20/09/17. Taxis, relatives and friends were often used in the urgent situation. The Stroke Association often need to support relatives with transport during the rehab phase, but not at the emergency phase, so this is not a differentiator during the acute service reconfiguration.

1) Off-peak times have been taken as a proxy for blue-light travel, this was agreed as an appropriate proxy by the South East Coast Ambulance Service (SecAmb)  
 2) The total population refers to all LSOAs for whom the current closest acute stroke service is within the K&M STP





# % population that can access sites within 30 mins and 45 mins travel time (blue light proxy) – options evaluation

Option	1) DVH, WHH, QEQM	2) MGH, MMH, QEQM	3) DVH, MMH, WHH	4) DVH, MMH, QEQM	5) DVH, MGH, WHH	6) DVH, MGH, QEQM	7) DVH, TWH, QEQM	8) MGH, MMH, WHH	9) TWH, MMH, QEQM	10) TWH, MMH, WHH	11) DVH, TWH, WHH	12) DVH, MGH, MMH	13) MGH, WHH, QEQM	As is*
<b>% Total pop access HASU within 30 mins</b>	79.5	74.9	73.4	71.4	74.2	71.7	71.7	76.2	80.2	82.2	76.9	62.6	85.8	96.3
<b>Agreed evaluation</b>	++	+	+	+	+	+	+	++	++	++	++	--	++	
<b>% Total pop access HASU within 45 mins</b>	98.5	94.9	91.0	93.0	91.3	94.8	92.6	91.3	95.7	92.0	91.9	81.6	99.0	99.0
<b>Agreed evaluation</b>	++	+	+	+	+	+	+	+	++	+	+	--	++	
<b>2a) Overall evaluation</b>	++	+	+	+	+	+	+	++	++	++	++	--	++	

## Key for % Total pop access HASU within 30 mins evaluation:

=>75% access within 30 mins	++
65-74.9% access within 30 mins	+
<65% access within 30 mins	--

## Key for % Total pop access HASU within 45 mins evaluation:

=>95% access within 45 mins	++
85-94.9% access within 45 mins	+
<85% access within 45 mins	--

## Key for overall evaluation

### Combinations of evaluation for 45 min and 30 min

++	++	=	++
++	+	=	++
+	+	=	+
--	--	=	--

### Overall evaluation

++
++
+
--



# % population that can access sites within 30 mins and 45 mins travel time (peak driving) – options evaluation

Option	1) DVH, WHH, QEQM	2) MGH, MMH, QEQM	3) DVH, MMH, WHH	4) DVH, MMH, QEQM	5) DVH, MGH, WHH	6) DVH, MGH, QEQM	7) DVH, TWH, QEQM	8) MGH, MMH, WHH	9) TWH, MMH, QEQM	10) TWH, MMH, WHH	11) DVH, TWH, WHH	12) DVH, MGH, MMH	13) MGH, WHH, QEQM	As is*
<b>% Total pop access HASU within 30 mins</b>	78.3	72.9	71.9	70.6	73.3	71.4	71.5	73.6	78.4	79.8	76.4	62.1	82.9	97.6
<b>Agreed evaluation</b>	++	+	+	+	+	+	+	+	++	++	++	--	++	
<b>% Total pop access HASU within 45 mins</b>	98.4	95.6	91.0	93.4	91.6	95.5	92.4	91.6	96.3	92.2	92.1	81.7	99.1	99.7
<b>Agreed evaluation</b>	++	++	+	+	+	++	+	+	++	+	+	--	++	
<b>2b) Overall evaluation</b>	++	++	+	+	+	++	+	+	++	++	++	--	++	

<p><b>Key for % Total pop access HASU within 30 mins evaluation:</b></p> <ul style="list-style-type: none"> <li>=&gt;75% access within 30 mins <span style="background-color: #4a7c59; color: white; padding: 2px 5px;">++</span></li> <li>65-74.9% access within 30 mins <span style="background-color: #4a7c59; color: white; padding: 2px 5px;">+</span></li> <li>&lt;65% access within 30 mins <span style="background-color: #c6e0b4; color: white; padding: 2px 5px;">--</span></li> </ul>	<p><b>Key for % Total pop access HASU within 45 mins evaluation:</b></p> <ul style="list-style-type: none"> <li>=&gt;95% access within 45 mins <span style="background-color: #4a7c59; color: white; padding: 2px 5px;">++</span></li> <li>85-94.9% access within 45 mins <span style="background-color: #4a7c59; color: white; padding: 2px 5px;">+</span></li> <li>&lt;85% access within 45 mins <span style="background-color: #c6e0b4; color: white; padding: 2px 5px;">--</span></li> </ul>	<p><b>Key for overall evaluation</b></p> <p>Combinations of evaluation for 45 min and 30 min</p> <table style="border-collapse: collapse;"> <tr> <td style="background-color: #4a7c59; color: white; padding: 5px;">++</td> <td style="background-color: #4a7c59; color: white; padding: 5px;">++</td> <td style="font-size: 2em; padding: 0 10px;">=</td> <td style="background-color: #4a7c59; color: white; padding: 5px;">++</td> </tr> <tr> <td style="background-color: #4a7c59; color: white; padding: 5px;">++</td> <td style="background-color: #4a7c59; color: white; padding: 5px;">+</td> <td style="font-size: 2em; padding: 0 10px;">=</td> <td style="background-color: #4a7c59; color: white; padding: 5px;">++</td> </tr> <tr> <td style="background-color: #4a7c59; color: white; padding: 5px;">+</td> <td style="background-color: #4a7c59; color: white; padding: 5px;">+</td> <td style="font-size: 2em; padding: 0 10px;">=</td> <td style="background-color: #4a7c59; color: white; padding: 5px;">+</td> </tr> <tr> <td style="background-color: #c6e0b4; color: white; padding: 5px;">--</td> <td style="background-color: #c6e0b4; color: white; padding: 5px;">--</td> <td style="font-size: 2em; padding: 0 10px;">=</td> <td style="background-color: #c6e0b4; color: white; padding: 5px;">--</td> </tr> </table> <p>Overall evaluation</p> <ul style="list-style-type: none"> <li><span style="background-color: #4a7c59; color: white; padding: 2px 5px;">++</span></li> <li><span style="background-color: #4a7c59; color: white; padding: 2px 5px;">++</span></li> <li><span style="background-color: #4a7c59; color: white; padding: 2px 5px;">+</span></li> <li><span style="background-color: #c6e0b4; color: white; padding: 2px 5px;">--</span></li> </ul>	++	++	=	++	++	+	=	++	+	+	=	+	--	--	=	--
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SOURCE: Basemap peak travel times 2015/16; ONS population figures 2015; Carnall Farrar analysis 2017

\*There are currently no HASUs on any of the 7 acute sites in K&M this refers to general medical assessment

