Transport for London

London Cancer Hub

Transport issues and options report

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Document control

Contents

1 Introduction and background

1.1 The London Cancer Hub (LCH) site, located in Belmont just to the south of Sutton town centre, comprises circa 21 hectares and is currently partly occupied by the Royal Marsden and Institute of Cancer Research's (ICR) Sutton campus. Together they create the fourth largest integrated cancer research and treatment hub in the world. The site also includes Epsom and St Helier Trust's Sutton Hospital, located to the centre and north of the site. Over the past ten years almost all activities from the Sutton Hospital site have been moved to alternative hospitals.

1.2 The site has been developed incrementally over the course of more than a century, without a clear plan or strategy, since the establishment of the complex. The resulting campus is isolated and poorly connected to its surroundings, with incoherent spaces, fragmented architecture and an uninspiring environment. The traffic and movement patterns around the site are unintuitive and complex.

1.3 The transfer of activities from the Sutton Hospital site has created a once-in-a-lifetime opportunity to use the entire site in a more efficient and productive way. Plans have therefore been developed to create a world-leading life-science campus specialising in cancer research, treatment, education and enterprise.

1.4 The total transformation will cost in excess of £1bn over the lifetime of the project and is expected to create more than 13,000 jobs – 7,000 life-science or support jobs, and another 6,200 in the site's construction. It is one of the most significant regeneration projects in London and will require the coordination of multiple public institutions and private partners.

1.5 The London Cancer Hub will form one of three outstanding life-science districts within London, alongside the White City Campus and the Euston Corridor, site of the Francis Crick Institute. It will also be an important component of the London-Oxford-Cambridge 'golden triangle' of life-science research.

1.6 A clear strategy for development is required to allow the site to be developed to its full potential. The LCH strategy aims to establish a new coherent structure for the site, with clear wayfinding and promoting connectivity.

1.7 A Development Framework and Delivery Plan has been produced for the LCH which assumes that a transformational public transport system will be provided to access the site. Should this not materialise then the access and movement strategy will require significant re-assessment, as it is considered that the surrounding highway network will constrain future site regeneration.

1.8 TfL has been developing the case for a tram extension from Morden Road to Sutton which has the potential to be further extended to the LCH. However, in the absence of full funding for the tram extension, alternative options need to be considered to ensure that poor transport accessibility does not impact on the delivery of the LCH. TfL is therefore working with the London Borough of Sutton and other key

stakeholders to review what transport enhancements are necessary to unlock the site's growth potential.

1.9 This report identifies a range of potential options for improving the accessibility of the LCH site which could be explored further. It is not based on detailed trip generation forecasts and does not replace the need for the impact of the development on the transport network to be forecast and any necessary mitigation identified through the development control process. It will be essential for a commitment to be made through the planning process to provide the transport infrastructure necessary to support the high trip generating land uses proposed at the LCH site.

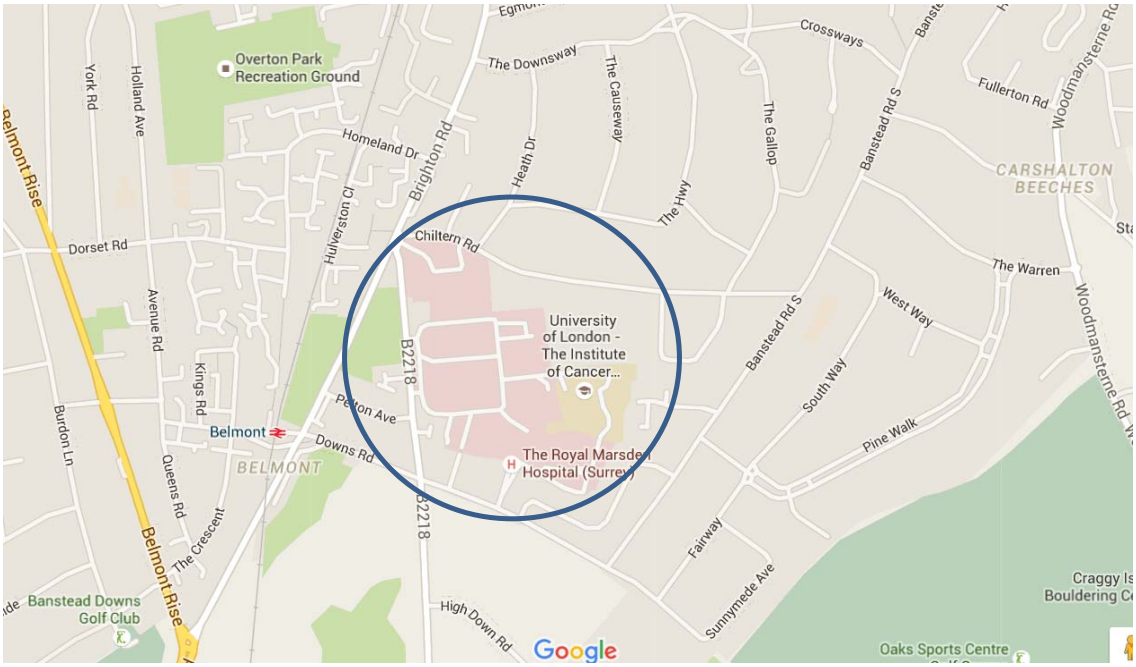
1.10 This report outlines the existing transport conditions, the forecast future demand and modal shift required to realise the proposed development aspirations and six high-level options which could be pursued in order unlock the site's growth potential. The options are focused on journeys to and from London, but additional options may be required to cater for trips to and from the south.

2 Existing situation

2.1 The LCH site is bounded by Cotswold Road to the east, residential properties and Chiltern Road to the north, residential properties which front Woodbury Drive and Furzedown Road to the west and residential properties which front Downs Road to the south. Figure 2-1 shows the location of the site.

2.2 Sutton town centre is located approximately 20 minutes' walk to the north. Downs Road represents the boundary between Greater London and Surrey.

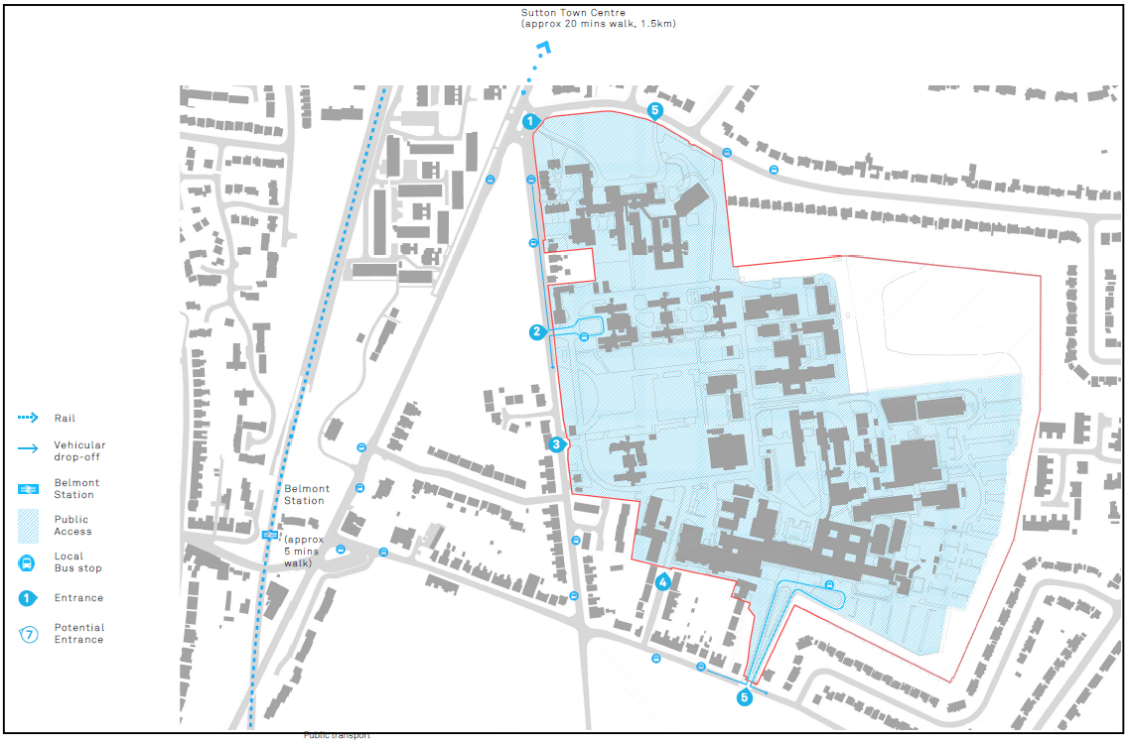
Figure 2-1: Location of LCH site



2.3 The closest section of the Transport for London Road Network (TLRN) to the site is the A217 Belmont Rise which is located approximately 1 km south west of the site, and the A232 which runs through Sutton town centre and is located approximately 3 km from the site. The centre of the site is within approximately 800m of Belmont rail station. There are also bus stops serving five routes within an acceptable (640m) walking distance of the site, with stops located on Cotswold Road and Chiltern Road. The bus routes do not enter directly into the site. An existing shuttle bus is provided from the site to both Sutton town centre and the ICR research hub in Chelsea.

2.4 Figure 2-2 provides an overview of the public transport connectivity of the LCH site.

Figure 2-2: Overview of existing public transport



Source: LCH Development Framework: Concept Design, Consultation, February 2016

2.5 The site has a Public Transport Accessibility Level (PTAL) ranging from 1a on the eastern boundary to 2 for the remainder of the site, on a scale of 1 to 6 where 6b is most accessible. This indicates the relatively poor public transport connectivity of the LCH site.

2.6 Travel plan surveys and reporting for both the Royal Marsden hospital and ICR have been used to identify the current travel to work journeys by mode for the existing employees on the site and this is shown in Table 2-1.

Table 2-1: Current travel to work journeys by employees at the LCH site

Mode	Current Travel to Work Journeys			
	Percentage share			Number of journeys
	Royal Marsden (2015)	ICR (2014)	Current average	
Car (driving alone)	51%	43%	46%	1380
Car share (as driver)	2%	3%	3%	75
Car share (as passenger)	1%	1%	1%	30
Bus	10%	5%	7%	218
Shuttle bus	3%	4%	4%	105
Train / Underground	16%	23%	20%	585
Other / mixture of public transport	1%	10%	6%	165
Scooter / motorbike	1%	1%	1%	23
Bicycle	8%	6%	7%	203
Walking	8%	6%	7%	210

2.7 It is observed that the use of car constitutes a large share for the mode of travel to the site accounting for almost half the trips. On the other hand the total mode share for public transport is 27 per cent with walking and cycling achieving a combined mode share of 14 per cent.

2.8 The ICR has also provided postcode data which provides the approximate home locations of staff who have applied for a parking permit. Whilst this data does not represent a complete picture of where employees at the site travel to and from, it does provide a helpful indication. This data has been plotted geographically as shown in Figures 2-3 and 2-4. Further data is currently being commissioned and it is expected that this would be available around late summer 2016.

Figure 2-3: Postcode data for ICR parking permit applicants, south England

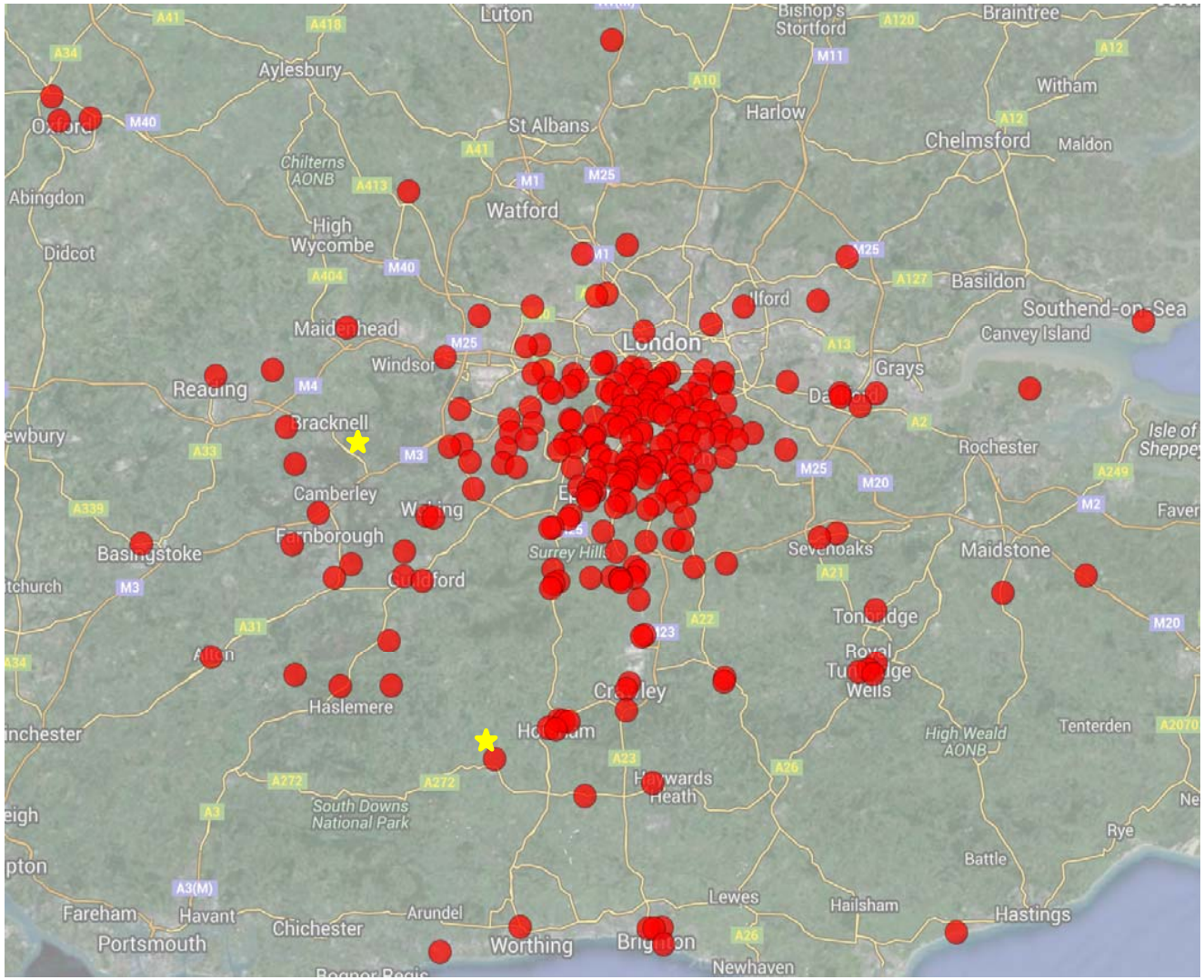
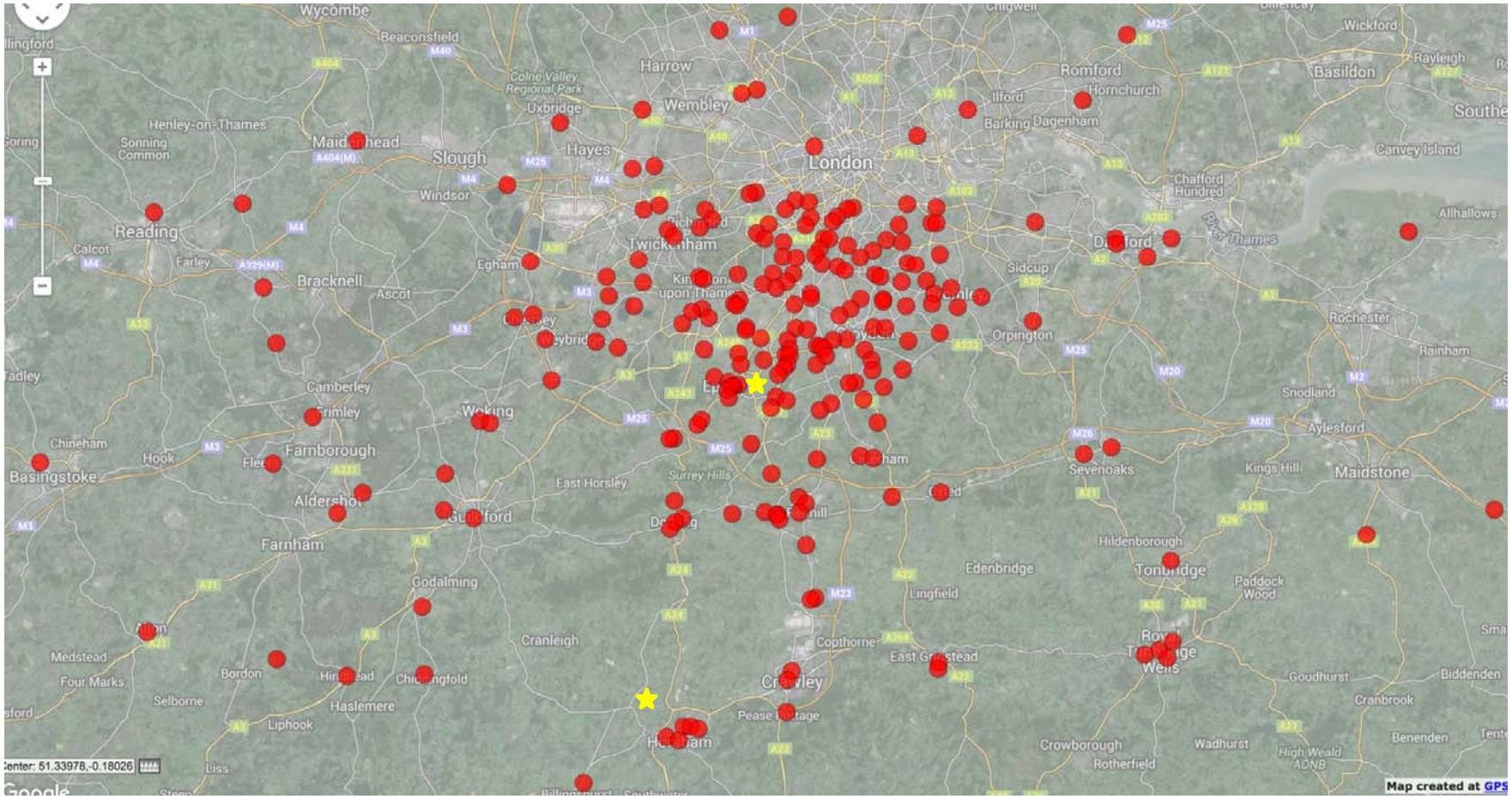


Figure 2-4: Postcode data for ICR parking permit applicants, London and south England



2.9 The diagrams show that the origins of the car trips are fairly dispersed. However there is a clear propensity for employees driving to the site to live in south London and the counties immediately south of London. At a more local level there are no major clusters of origins; however there are small clusters of employees living in Epsom, Sutton town centre and Carshalton.

2.10 The existing pattern of employees driving to the ICR site does not necessarily represent the travel patterns of all people travelling to the expanded LCH site in the future. However, the wide distribution of trips does indicate that no single transport solution will be able to accommodate a significant proportion of the increased number of people travelling to an expanded site. A package of transport enhancements is therefore likely to be required. A better indication of travel patterns can be derived once more data is available later in 2016.

3 Transport objectives for the LCH site

3.1 Three objectives have been identified for the transport options to improve the accessibility of the LCH site. These are:

- To provide the necessary public transport measures to accommodate and enable the predicted mode share – there would need to be an adequate transport mitigation package secured to accommodate the increase in both public transport and vehicular trips.
- To ensure the measures that are delivered are value for money and inclusive to all – transport interventions that are identified should deliver sufficient benefit to justify their cost and be inclusive for all users, for example by offering step free access.
- Interventions should be sustainable both in environmental terms and for whole life costs – they should aim to improve the local environment and be economically viable to operate throughout the lifetime of the asset.

3.2 With regard to the first objective, should the existing mode share be maintained then the redeveloped site could generate an additional 3300 car trips which could cause significant detriment to the local highway network. The promoters of the LCH scheme have identified that there is an essential requirement to create a modal shift in the current site arrival modes and has presented the suggested targets shown in Table 3-1. The existing mode share has been included to allow for comparison.

Table 3-1: Modal shift targets for the LCH site

Mode	Current journeys		Future travel to work journeys with intervention		
	Current average	Number of journeys	Proposed target	Number of journeys	Net change
Car (driving alone)	46%	1380	15%	1551	+171
Car share (as driver)	3%	75	10%	517	+412
Car share (as passenger)	1%	30			
Bus	7%	218	15%	1551	+1333
Shuttle bus	4%	105	40%	4136	+3258
Train / Underground	20%	585			
Other / mixture of public transport	6%	165			
Scooter / motorbike	1%	23			
Bicycle	7%	203	10%	1034	+831
Walking	7%	210	10%	1034	+824

3.3 The proposed mode shift targets aim to approximately halve the current percentage of private car journeys to work. This would result in a relatively small increase in car journeys to the site despite the major expansion. Consequently, a very large increase in public transport trips is required with the percentage of bus journeys to the site increasing by over 1300 trips and other public transport trips increasing by over 3200 trips. With over four times as many public transport trips as today required to meet the mode share objectives, it is clear that substantial investment in public transport will be required.

3.4 TfL has worked with the London Borough of Sutton to review the transport enhancements that may be necessary to unlock the LCH site's potential and how these could be funded and delivered. The options are explored in greater detail in Section 4 of this report.

4 Transport options review

4.1 Shuttle rail link between Sutton and Belmont stations

4.1.1 Belmont station is a short walking distance from the site, however it only offers a low frequency service to London Victoria (via Sutton station) with hourly services at off peak times and two trains per hour (tph) during peak periods. It is currently unstaffed and existing facilities are minimal constituting a ticket machine, single platform shelter and a bicycle rack. Sutton station offers rail services to more destinations and at a higher frequency including both fast services to London Victoria and Thameslink services to Blackfriars and beyond.

4.1.2 Govia Thameslink Railway are franchised to runs these services until 2021. TfL are seeking for the devolution of this franchise and other south London rail services to the Mayor to allow for the delivery of metro style services with the potential for higher frequencies, reliability and capacity.

4.1.3 The Epsom Downs branch was originally laid as double track, however this has since been removed and just a single track remains. Nevertheless, the second platform at Belmont station, albeit in a poor state of repair, remains in situ. The full reinstatement of the double track between Ventnor Junction (south of Sutton station) and Belmont station accompanied by the introduction of a 'turn-back' facility could allow for a rail shuttle service to be operated, which integrated with the current service could provide up to 6 tph – a vast improvement on current service levels. Significant improvements to the station facilities would also be required including a new passenger footbridge and step free access. This would allow a more reliable, higher capacity alternative to bus services; however there is still the challenge to consider how links can be improved between Belmont station and the LCH site. This is covered in more detail in the Section 4.2.

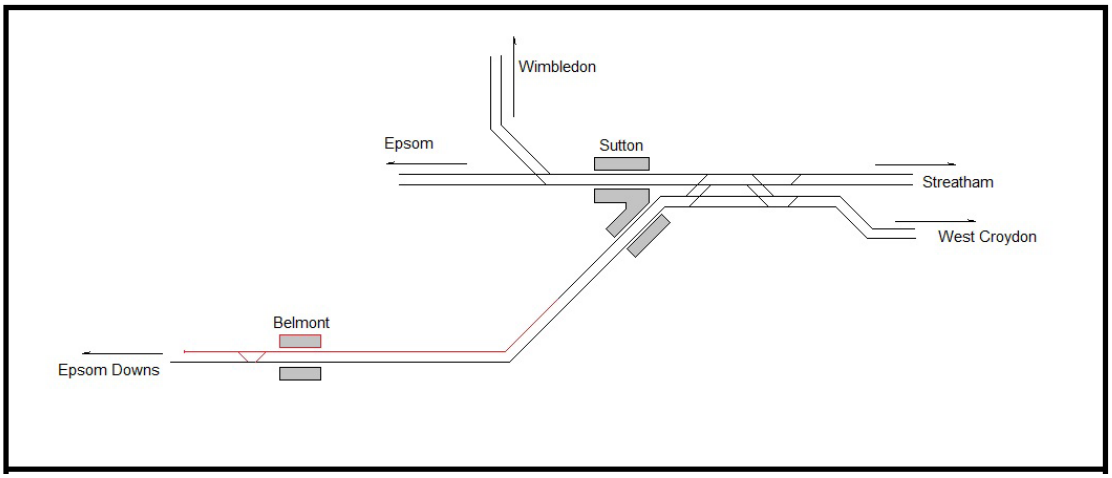
Engineering feasibility

4.1.4 TfL has undertaken a feasibility study for improving train services to Belmont and has outlined a scheme which broadly comprises the following:

- restoration of double track from Ventnor Road junction on the Epsom Downs branch to Belmont station;
- restoration of the second platform complimented by a new footbridge, lifts and improved accessibility;
- turnback facilities to allow for a service with a total frequency of 6 tph to be operated between Belmont and Sutton; and
- maintenance of the service beyond Belmont to Epsom Downs at its current frequency.

4.1.5 The study identified that from an engineering point of view there are no significant issues to prevent the scheme being delivered, other than finding the required funding (discussed in the cost section below). Figure 4-1 shows a potential track layout.

Figure 4-1: Potential track layout for rail shuttle service



4.1.6 It would be desirable for any such scheme to be designed to not prevent the conversion of one of the tracks to tram operation in the longer term, should the Belmont extension of the tram network be approved and funded at a later date with the rail corridor as the preferred route.

Operational feasibility

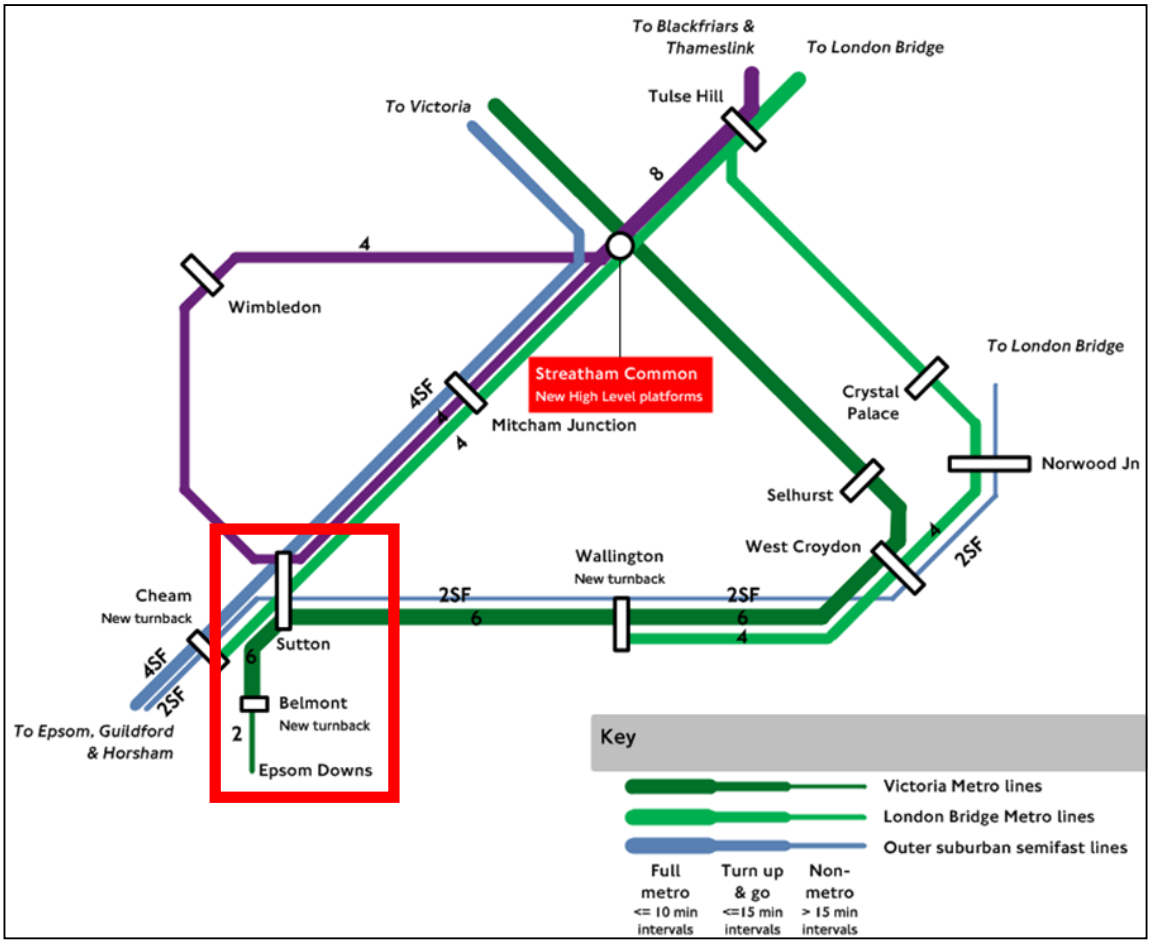
4.1.7 Previous work for Sutton Council and the LCH promoters has demonstrated that there is currently insufficient infrastructure capacity to operate a high frequency service from Belmont beyond Sutton to central London, even with double-tracking of the route between Belmont and Sutton in place. However, a high frequency shuttle to enable a total of 6 tph to operate between Belmont and Sutton could be provided, providing an interchange with the regular rail services to a variety of destinations, including central London.

4.1.8 Shuttle services would need to turn around in one of the Epsom Downs branch platforms at Sutton station. This would reduce the flexibility for other services to turn back from the north in these platforms. However, TfL's high level assessment indicates that there would be sufficient capacity to accommodate all services provided only one platform at Sutton was used to turn back the shuttle service.

4.1.9 A high frequency shuttle service is likely to require additional rolling stock, for which funding would need to be found. A maximum of two additional trains would be required, dependent upon the timetable adopted.

4.1.10 If TfL's full proposals for a south London metro are taken forward, this could allow most or all of the higher frequency services to and from Belmont to continue through to central London, as shown in the example service pattern in Figure 4-2.

Figure 4-2: Example service pattern with metro-style services



Cost

4.1.11 The capital cost of delivery would be comparatively high compared to alternative options. TfL has costed the total at £23m inclusive of £10m for design, risk, project management and Network Rail costs. The most significant components of the total cost are railway possessions (£3m) and the diversion of railway utilities (£1m).

4.1.12 Additional operating and maintenance costs would also be incurred. Further analysis is required to determine whether these could be covered by revenue or if ongoing funding would be needed.

Likely benefits

4.1.13 A shuttle rail service to Sutton station with a train approximately every ten minutes would be able to provide a reliable, high frequency, high capacity service. This would effectively be able to provide a 'turn up and go' service whereby visitors to the LCH site would not need to plan ahead and can be more flexible with their journey. Journey time would be quicker than a bus service (by approximately five minutes) and would be more reliable as vehicular traffic would not impact on journey time.

4.1.14 A station upgrade at Belmont would deliver a step free alternative to Sutton station and therefore mobility impaired rail travellers would not be dependent on having to use alternative modes of transport to access the LCH site from Sutton station.

Adverse impacts

4.1.15 Links between Belmont station and the LCH site would need to be improved to accommodate pedestrians travelling between them. Without this investment many people would be discouraged from using the rail station if the connection to the LCH does not feel safe or attractive.

Stakeholder acceptability

4.1.16 The proposal is likely to be welcomed by most stakeholders in the local area because of the improved rail link. The rail industry would need to approve the proposal and to achieve this a robust demonstration that there is no significant operational or financial impact on the railway would be required.

Funding sources

4.1.17 Potential funding sources could include section 106 funding, borough Community Infrastructure Levy (CIL), TfL's Business Plan, business rates and EU funding. The latter has been included as a potential source as it is expected that the campus would deliver a world class service with international recognition which may make it eligible for EU development funding.

4.2 Tram extension between Sutton station and the LCH site

4.2.1 There is currently an aspiration to extend Tramlink services from Morden Road via a predominantly on-street route to serve Sutton town centre. This scheme is not currently committed and there remains a substantial funding gap. However, should the extension be implemented then this allows for further scope to extend the service onwards to the LCH.

4.2.2 The service could operate either on-street running alongside general traffic, via rail from Sutton station (which would require double tracking – covered in Section 4.1) or a combination of the two.

4.2.3 Highway microsimulation modelling has shown that there would not be any significant detrimental impact on traffic flow should the tram service operate via Brighton Road. Nevertheless, there remains a risk that highway congestion could affect the reliability and performance of a tram service along this route.

4.2.4 The greatest benefit would be delivered if the tram could serve the LCH site directly and therefore a tram alignment between the rail line and the site needs to be identified.

4.2.5 Work to date indicates that the most feasible route would involve trams leaving the rail alignment north of Belmont station and then crossing Belmont Park and Brighton Road, then utilising a route through the allotments, which TfL understands are being considered for relocation by Sutton Council. Alternatively, a tram running on-street would be able to access the site directly from Brighton Road. A tram depot is currently accommodated within the design proposals for the LCH site.

Engineering feasibility

4.2.6 As referred to above two options exist:

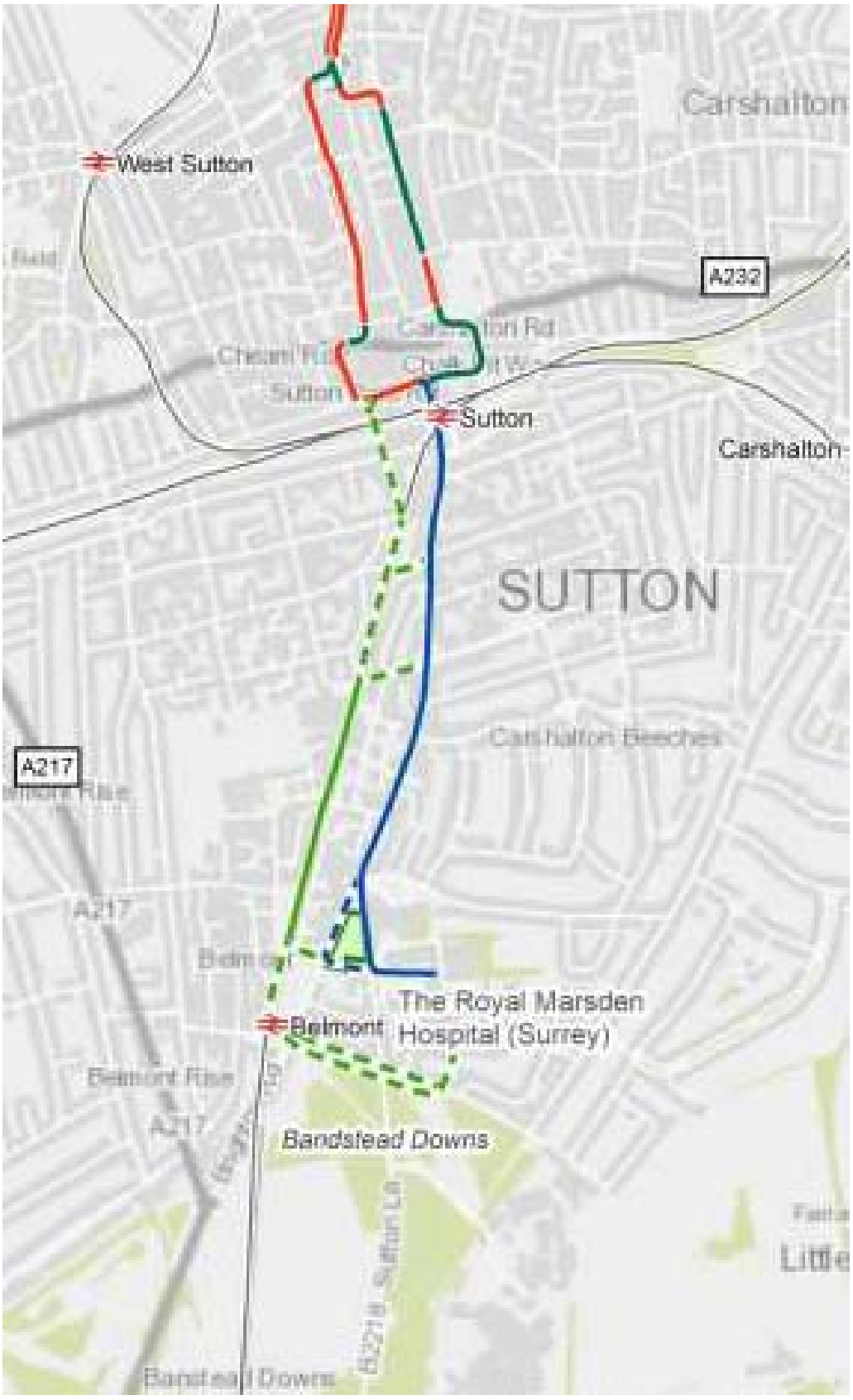
- operate the tram along Brighton Road and access the site directly; or
- operate the tram along a double-tracked rail corridor and then linking into the site across Brighton Road.

4.2.7 The former option would require providing tram tracks on Brighton Road and then accessing the LCH site in the north west corner. The Chiltern Road / Brighton Road junction would require a re-design and tram stops would also be required along the route.

4.2.8 The second (rail corridor) option would require the engineering works referred to above in Section 4.1 (a station upgrade at Belmont may not be deemed necessary should the tram not stop at the station); however a new tram alignment would also be required between the existing rail corridor and the LCH site. As described above, the most probable route is via Belmont Park via the allotments. Alternative routes via Downs Road or Banstead Common have been considered but these would be much more difficult to deliver due to the constrained road width along Downs Road and the sensitivity of using protected open land across the common. Any of these options would also require the introduction of traffic signals on both Brighton Road and Cotswold Road to allow trams to cross.

4.2.9 Potential routes for the tram extension are shown in Figure 4-3.

Figure 4-3: Tram route options between Sutton town centre and the LCH



Operational feasibility

4.2.10 The current tram depot is located at Therapia Lane which is some distance away from the campus. Therefore there would be a significant running time required for trams to transfer to and from the end of the line at the LCH site from the depot at the start and end of the day. On this basis a new depot is required either on the Sutton extension or the further extension to Belmont to make a tram extension to the LCH viable. As described above, a tram depot within the LCH site has been considered.

4.2.11 Additional trams would also be required to operate a longer extension to the LCH.

Cost

4.2.12 The extension between Sutton town centre and the LCH site has not been costed in detail but comparison to similar schemes indicates that it would cost approximately £100 million.

Likely benefits

4.2.13 In terms of service frequencies, benefits would be similar to those outlined for the shuttle rail link in section 4.1. A tram would provide a 'turn up and go' service and which is reliable and high capacity. However, a significant advantage over improving the rail service is that the tram can be routed directly into the site avoiding those issues outlined in section 4.1. and 4.3 (the suitability of walking links between the site and Belmont station). This would provide a far more accessible service than the rail shuttle, therefore increasing the PTAL of the site to between 3 and 4 dependent on frequency. It also makes the transport connection much more prominent and would improve awareness of the service. Furthermore, the route would allow for intermediate stops which would allow the tram to serve the local area.

Adverse impacts

4.2.14 A tram operating along Brighton Road would need to share road space with other traffic. This would mean that when a tram stops then traffic behind would be halted (the ability to overtake would likely be inhibited by a central reservation at the tram stop for safety reasons). Also if the road is congested then trams would only be able to travel at the speed of surrounding traffic. It should be noted however that it is expected that dwell times at tram stops would be only approximately 20 seconds and therefore there would not be a significant delay to road vehicles.

4.2.15 The rail alignment would result in the loss of some land from Belmont Park and while tunnelling could overcome this the costs would likely be prohibitive. The Banstead Common route would involve the loss of a small part of the common and this section of the route would be located outside of the GLA administrative boundary which could make gaining planning consent for the route more difficult.

Stakeholder acceptability

4.2.16 Many local people would be affected by a tram extension so a full range of public consultation would be required. Residents and businesses along the route of the tram extension may have concerns about the impact on traffic and the visual impact of overhead lines and other tram infrastructure. Route alignments that affect

Belmont Park, the allotments or Banstead Downs could prove controversial and TfL would need to demonstrate that any adverse impacts can be mitigated, for example through the enhancement of green space adjacent to the line. However, these issues have been encountered when delivering tram schemes in London and elsewhere in the UK, so they are not considered insurmountable.

Funding sources

4.2.17 Potential funding sources could include section 106 funding, borough CIL, TfL's Business Plan, business rates and EU funding. The latter has been included as a potential source as it is expected that the campus would deliver a world class service with international recognition which may make it eligible for EU development funding.

4.3 Improved footways, pedestrian crossings and wayfinding

4.3.1 Sutton rail station is located 2 km north of the site and this is generally considered to be beyond a reasonable walking distance to a station. Belmont station is however located only 800 metres to the west of the site and therefore it could be expected that many employees and visitors to the site would choose to walk from the station. Dependent on the part of the site that is being accessed, the walking route could be via either Downs Road or Pelton Avenue.

4.3.2 The majority of local bus services can be accessed adjacent to the site and therefore have a nominal walking distance. The exceptions are routes 280 and S1 which are accessible from bus stops located on Brighton Road 550m to the south east and accessed via either Downs Road or Pelton Avenue.

4.3.3 Downs Road has a gradient of approximately 5 per cent and has a footpath only on the northern side of the carriageway. On the southern side there are either residential properties or vegetation. Furthermore, on-street parking is allowed on the northern footway which means that the width is severely restricted, narrowing down to less than a metre in parts. This footway can therefore only be considered suitable to accommodate very low pedestrian flows.

4.3.4 Pelton Avenue runs parallel to Downs Road and has a slightly shallower gradient of approximately 4 per cent. Footways are located on both sides of the carriageway and are generally wider than on Downs Road as parking is not allowed on the pavements. Therefore typical footway widths are 2.0 – 2.4 metres wide. This can be considered suitable for a moderate pedestrian flow (less than 600 persons per hour). If the expected footfall is higher than this then consideration would need to be given as to how the footways could be widened if Pelton Avenue is to be a key route to the site.

4.3.5 One option would be to stop vehicular entry and exit between Brighton Road and Pelton Avenue and introduce a shared surface on Pelton Road enlarging the area available to pedestrians. This would have a significant impact on the character of the road and therefore local residents would need to be consulted with to determine acceptability.

4.3.6 Pedestrian crossing facilities in the local area are relatively limited. There is a signalised crossing across Brighton Road near Belmont station with a further

crossing located near the Brighton Road / Chiltern Road / Cotswold Road junction; however these are the only formal facilities within the local area. There are currently no crossing facilities along Cotswold Road. This could be considered suitable for the existing conditions as both traffic and pedestrian flows along this route are currently relatively light. The proposed development may increase both pedestrian and traffic flows such that it may be necessary to introduce formal pedestrian crossing facilities.

4.3.7 Wayfinding within the locality will need to be improved as the number of visitors to the site who are unfamiliar with the local area would increase. TfL would recommend that the Legible London wayfinding network is introduced into the area and can be connected to the already established network within Sutton town centre.

4.3.8 TfL would expect any redevelopment of the site to be accompanied by both a Pedestrian Environment Review System (PERS) audit and a Pedestrian Comfort Levels audit. These would consider the pedestrian flows from the site, where they would occur and how suitable the local pedestrian environment is in accommodating the flows. These would also provide recommendations on how to improve pedestrian facilities should shortfalls be identified.

Engineering feasibility

4.3.9 Widening the footway at priority locations, for example Downs Road, would be very difficult due to the narrowness of the highway at this location. There is greater width available on Pelton Avenue which can cater for a moderate flow of pedestrians without any intervention. Comfort level audits would be expected and there may be scope to reduce the carriageway width at this location if deemed necessary. The removal of on-street parking on both of these roads would significantly improve footway widths but this is likely to prove unpopular with residents in an area of high car ownership.

4.3.10 The introduction of any new street treatment to create a shared surface on Pelton Avenue would need to be compliant with the local highway authority's standard palette of materials as they would need to be responsible for the ongoing maintenance.

Operational feasibility

4.3.11 The introduction of pedestrian crossings along either Brighton Road or Cotswold Road can impact upon traffic flow as traffic would be required to wait at either a red light or zebra crossing. Highway modelling may be required to understand the journey time delay to establish the feasibility.

Cost

4.3.12 The cost of enhancing pedestrian connections would be dependent on the type of materials used and the scope of the works. Typically materials such as concrete and asphalt would be low cost compared to materials such as granite which have a higher cost.

4.3.13 The installation of a Legible London totem typically costs circa £5,000 however this would vary depending on the type of wayfinding used.

4.3.14 In order to deliver signalised pedestrian crossings, an indicative cost of between £40,000 and £80,000 would be realistic. This would depend upon whether 'straight across' crossings or 'staggered' crossings are required and is also dependent upon the extent of the civils work required.

4.3.15 For a shared surface scheme, an indicative cost of between £2.1m and £4.5m per kilometre would be realistic. Again, this would depend upon the extent of civils works required such as movement of utilities, lighting columns, etc. Pelton Avenue is around 250 metres in length so the cost of providing a shared surface would be between £0.5m and £1.2m dependent on the scope.

Likely benefits

4.3.16 An improved walking environment will increase the propensity of people living within walking distance of the LCH to walk from their home to work or to visit the site. It can also have a benefit on the uptake of public transport for those travelling from further afield, especially if it improves a route from a bus stop or station. If a walking route is either unsafe or unattractive then people may seek to undertake their trip by car as this would allow them to avoid that route.

4.3.17 Safety is also important when considering how pedestrians are catered for. If footway widths are not improved or additional crossings are not introduced then pedestrians may have to step into the carriageway or cross informally which can present a safety risk, particularly if higher volumes of pedestrians are making these journeys.

4.3.18 The introduction of a wayfinding system such as Legible London which connects to the existing network in the town centre can encourage a modal shift away from cars or public transport to walking as people may realise that walking distances are shorter than they had realised and provide an attractive alternative with regard to journey time. It will also improve the familiarity within the local area of those visiting the site and increase their awareness of local bus stops, stations and amenities.

4.3.19 Stopping up the western end of Pelton Avenue at its junction with Brighton Road to provide a shared surface would eliminate rat-running along this residential street. This would be of benefit to local residents and could offset the longer journeys some residents would have by removing the direct connection with Brighton Road.

Adverse impacts

4.3.20 The widening of a footway is likely to require a reduction in carriageway width which may have a detrimental impact on both traffic flows and cycling. In areas where these flows are low then the adverse impact would be minimised. The loss of on street parking would reduce parking supply in the local area which is likely to prove unpopular. The addition of pedestrian crossings could introduce journey time delays for local traffic.

Stakeholder acceptability

4.3.21 The introduction of pedestrian crossings would require approval from the highway authority and TfL because of the potential impact on bus routes. Local residents may object if the nature/character of their street changes significantly especially if it facilitates a higher pedestrian flow adjacent to their property. The highway authority would also need to approve the materials used and scale of intervention to ensure that the maintenance costs are manageable.

Funding sources

4.3.22 Funding could be secured through section 106 agreements, borough CIL receipts or funding through TfL's Local Implementation Plan (LIP) programme. A section 278 agreement could facilitate some cycling improvements should they be located in close proximity to the site's boundary.

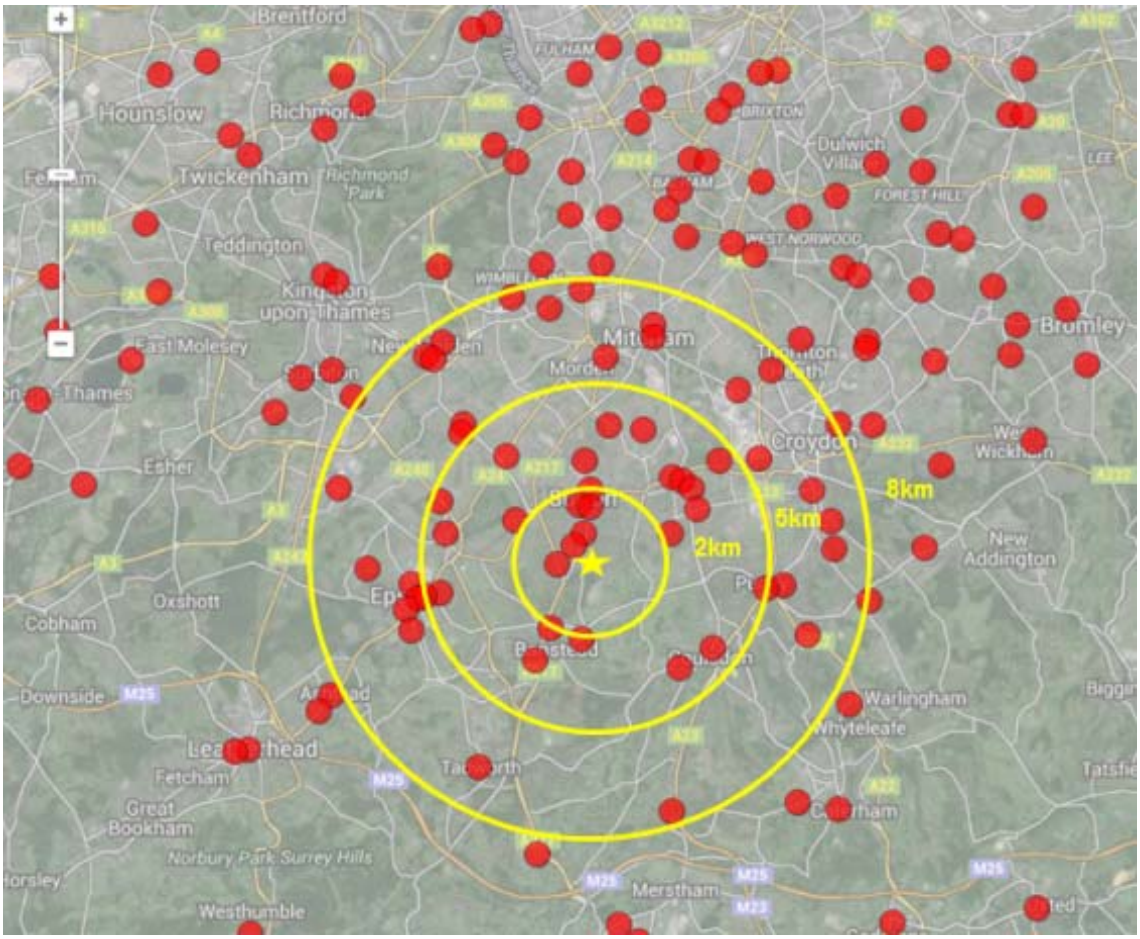
4.4 Segregated cycle routes

4.4.1 The length of the journey and the quality of the route are two of the main considerations when deciding upon cycling as a choice of mode. People may choose to cycle as their final mode of transport i.e. from the station to the LCH site or they may choose to cycle from their home.

4.4.2 In 2010 TfL produced a report which has analysed London's cycling potential. It found that 94 per cent of London cycling trips were 8 km or less and that the greatest potential to increase cycling trips were for journeys between 2 km to 5 km (41 per cent of all journeys could be cycled).

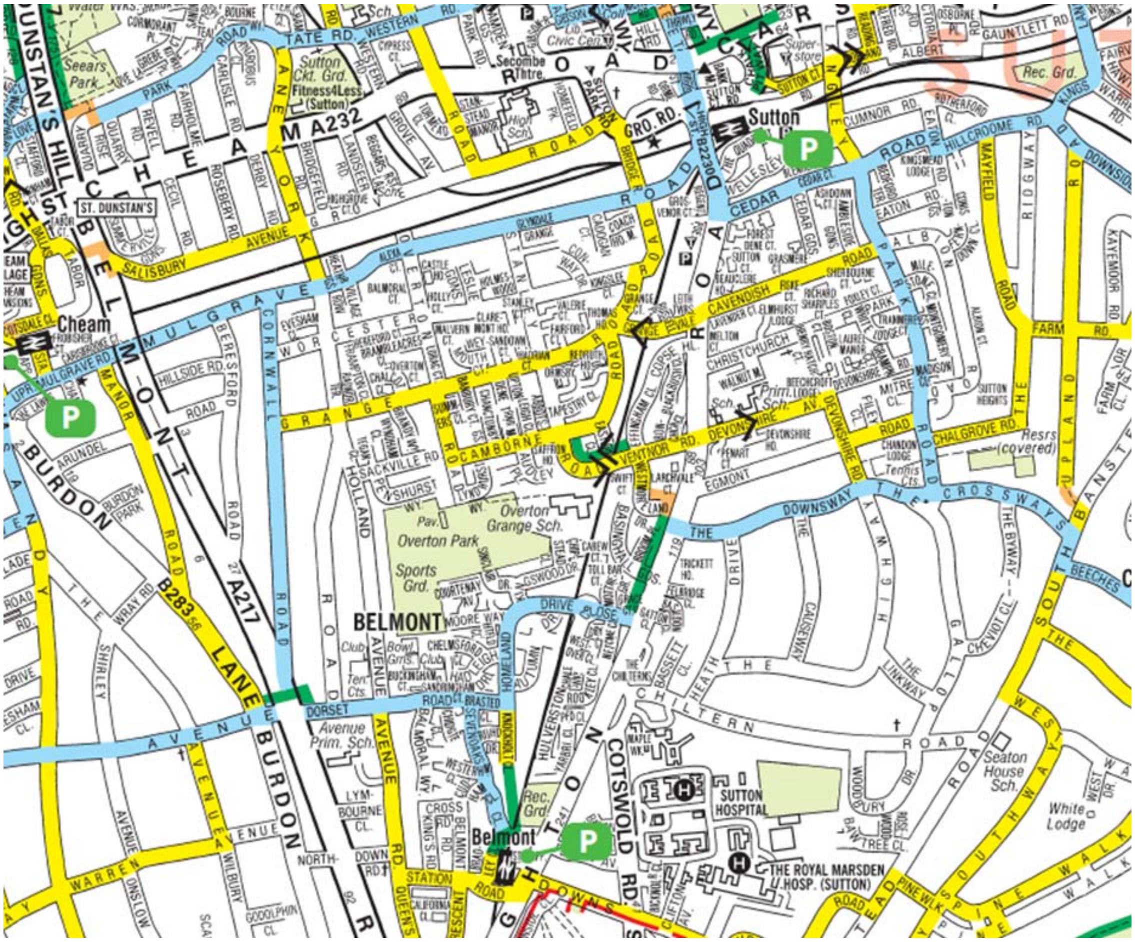
4.4.3 Figure 4-4 overlays rings showing these distances where people are more likely to cycle over the diagram showing those currently driving to work at the ICR site. This shows that there is a significant number of people driving from within 8 km of the site where there is potential for a modal shift to cycling. The majority of the trips within this radius are originating from the north and north east of the site with an additional cluster located at Epsom within the 5-8km boundary.

Figure 4-4: Potential cycling trips to the LCH site



4.4.4 Figure 4-5 is an extract from one of TfL's cycle guides. The light blue roads are routes that are signed or marked for use by cyclists on a mixture of road types. The yellow routes are quieter roads that have been recommended by other cyclists and the green routes are off-road routes.

Figure 4-5: Designated cycle routes around the LCH site



4.4.5 It is clear from Figure 4-5 that there is no well-defined direct cycling route from Sutton town centre to the LCH site. There are local routes that are considered suitable for cyclists however the route from the town centre following these would be convoluted. For example, if a cyclist was to only use recommended routes to access the site then the average journey distance would be 3 km. The most direct route is via Brighton Road and this is less than half the distance at 1.4 km saving up to ten minutes off a cycling journey. There are opportunities, however, for those cyclists who are approaching the site from the north east to benefit from recommended routes

4.4.6 The majority of local roads around the site have gradients of up to 5 per cent. This is sufficient to deter the use of cycling as a mode as people seek alternative modes of transport. As well as being more strenuous, a steeper gradient would affect the speeds of cyclists and as they ride alongside vehicles there can be an increased perception of vulnerability. The introduction of segregation along direct routes to the site could improve conditions for cyclists creating more attractive routes. As the most direct route to and from the town centre, it is recommended that any cycling interventions are focused on Brighton Road as this could deliver significant journey time benefits compared to other local routes that are already considered suitable for cyclists. Chapter 4 of the London Cycling Design Standards (LCDS) includes information on recommended lane and track widths, however these are dependent

on expected cycle flows and also traffic conditions to inform the most appropriate intervention to deliver.

Engineering feasibility

4.4.7 Feasibility would be dependent on carriageway width available to accommodate an intervention. Implementing substantial and consistent segregation for cyclists on Brighton Road is likely to be difficult due to the available carriageway space, but it is likely that some interventions could be made.

Operational feasibility

4.4.8 Once cycle routes have been implemented the operational considerations would primarily relate to maintenance which would be the responsibility of the local highway authority.

Cost

4.4.9 Costs for segregation vary significantly dependent on the type of segregation and the extent of the civil works involved. Light segregation would vary between £160k and £1m per kilometre. Fulll segregation would range from £300k to £1.3m per kilometre.

4.4.10 On this basis a fully segregated two-way 1.7 km cycle route from Sutton town centre to the LCH site could cost in the region of £715k to £2.2m. As full segregation may not be possible, these costs may overestimate the infrastructure that is realistic to deliver.

Likely benefits

4.4.11 Cycle segregation would make cyclists feel more secure and at ease with their surroundings. This may encourage a modal shift away from private vehicles and public transport towards cycling. Cycling also offers health benefits to those who adopt it and in cases where it comprises a modal shift from private vehicles offers air quality improvements.

Adverse impacts

4.4.12 Although dependent on the location of the intervention, cycle segregation may reduce highway and/or footway capacity for buses, private vehicles and pedestrians. This may deliver adverse impacts on traffic flow, bus reliability and may introduce additional conflicts between cyclists and pedestrians.

Stakeholder acceptability

4.4.13 Input would be required from Sutton Council highways department, TfL Buses and local residents and businesses to determine the scope of works to be delivered. It is likely that any cycling scheme would need to demonstrate minimal impact on other road users including pedestrians or be accompanied by mitigation which could alleviate any impact.

Funding sources

4.4.14 Funding opportunities could include funding secured through a section 106 agreement, borough CIL receipts or funding through TfL's LIP programme. A section 278 agreement could facilitate some cycling improvements should they be located in close proximity to the site's boundary.

4.5 Improved bus frequency, access and priority

4.5.1 The LCH site is served by five bus routes within walking distance. In addition, a private shuttle service is currently in operation between the hospital site and Sutton town centre. Two buses are in operation at any one time operating between the hours 06:30 and 10:30, and between 16:00 and 21:00 with a ten-minute frequency. A further bus service operates between the Sutton ICR site and Chelsea ICR site.

4.5.2 An increase in bus frequencies and re-routing bus services closer to the centre of the LCH site can increase the site's PTAL. The following are examples of the improvements in accessibility that could be achieved just through bus interventions:

- To achieve a site PTAL of 2 to 3: re-routing either the 80 or 280 bus route directly into the site and increase the frequency of the re-routed bus route by one (from six to seven buses per hour)
- To achieve a site PTAL of 3 to 4: re-routing both the 80 and 280 bus routes directly into the site, and operate at a very high frequency of 14 buses per hour for each route (an increase from six to fourteen)

4.5.3 Demand for buses would be an important factor in determining whether frequencies could be increased. Demand would need to be high enough to ensure the routes would be self-sufficient in the medium to long term. TfL will be conducting a review of bus services in Sutton in 2017 and in principle there is no objection to the re-routing of buses. Nevertheless, before TfL can consider a re-routing to be acceptable it would need to consider dis-benefit a re-routing may have on the route's journey time and whether it would reduce access to the bus service for others within the local area.

4.5.4 To ensure a reliable bus service, additional bus priority measures may be required along Brighton Road. This would be dependent on there being sufficient road width to accommodate bus lanes which will be difficult to achieve on most sections and therefore the introduction of bus priority along this route may not prove feasible.

4.5.5 Some of the local bus stops would require an upgrade in facilities to make them more attractive to use. This can involve introducing shelters, or providing additional space for passengers to wait. An example is of the current poor quality of bus stops is shown in Figure 4-6.

Figure 4-6: Existing bus stop on Downs Road

4.5.6 It is noted that there is an existing privately operated shuttle service on site however in principle this is generally not something that TfL would seek to be retained as part of any planning application. The primary reason is that should funding be withdrawn and the service cease there would be pressure for TfL to take over the operational responsibility. Nevertheless, this is something that can be considered in further detail at a later date.

Engineering feasibility

4.5.7 Local bus stops could be improved and this would require some low scale intervention such as vegetation clearance, kerb works and improved facilities, however the extent of infrastructure that could be delivered (e.g. bus stop shelters) is dependent on the footway width available.

4.5.8 Due to the size of the site there maybe benefit in running bus services within the site. This would require suitable carriageway geometry to accommodate a bus which may need to be accompanied by turning or standing facilities.

Operational feasibility

4.5.9 Additional services would be operated on behalf of TfL by contracted operators. They would be dependent on demand to and from the site to ensure that they are cost effective. The availability of local bus standing facilities would need to be considered if additional standing space was required.

4.5.10 Local bus journey time delay would need to be assessed as highway congestion could negate any benefit in delivering additional bus services as performance and reliability could be adversely affected. This can be mitigated by delivering bus priority measures; however as referenced above this would be dependent on the highway width available.

Cost

4.5.11 The typical cost of increasing the frequency of a bus route is between £220k and £440k per annum. Typical costs for improved bus stops are £10k for a new shelter and up to £5k for kerb works to improve accessibility.

4.5.12 Converting an existing highway lane with changes to lane markings and the necessary traffic orders would generally cost between £50k and £100k per kilometre. However, the introduction of bus priority measures on a major road, such as Brighton Road, is more likely to be in the region of £500k to £1m per kilometre given the potential impacts on traffic signals, the need to realign kerbs and retain access to, or move, utilities.

Likely benefits

4.5.13 If bus services are re-routed into the site then this would increase the site's PTAL. Furthermore, the re-development of the hospital site would generate a significant number of additional bus trips. To continue to provide an attractive alternative to using private vehicles it is important that there is sufficient bus capacity to accommodate demand. Failure to do so would mean bus users having to wait at bus stops for later services with sufficient room. Additional bus priority measures, i.e. bus lanes can improve bus journey time reliability which can in turn improve the attractiveness of the mode. The upgrading of local bus stops can provide a more attractive waiting environment which can further encourage bus use. For example, if the weather is poor and the local bus stops lack appropriate shelters then people would be discouraged from using bus services.

Adverse impacts

4.5.14 Bus priority measures are likely to require significant highway space and are therefore unlikely to be feasible along long stretches of Brighton Road. Additional bus services may require the further provision of bus standing facilities within the local area which may require the use of land either within the site or off-site. The re-routing of a bus route may reduce access to bus services for local residents, and while this can be mitigated by altering other routes this cannot be guaranteed to be feasible.

Stakeholder acceptability

4.5.15 TfL would need to be satisfied that there is sufficient demand generated by the scheme to justify any increase in frequency or a re-routing of a bus service. Any bus priority would need to be accommodated on the road network and it would need to be demonstrated that any detrimental impact on local traffic flows are manageable. If a bus service is re-routed away from residents then they may object to their reduced access to bus services.

Funding sources

4.5.16 The provision of additional bus services is not considered to be infrastructure by definition and therefore cannot be funded through the CIL. It is instead expected that an increase in frequency or a bus re-routing would be funded and/or secured through a section 106 agreement obligation. Bus priority and/or improved bus

infrastructure could be funded through borough CIL or secured through a section 278 agreement.

4.6 Smarter Travel

4.6.1 A new development of the size of the LCH would be expected to be accompanied by a Travel Plan. A comparison in scale can be made between these proposals and the redevelopment of the BSkyB headquarters in west London.

4.6.2 The proposed redevelopment will take the number of employees within the LCH site to over 12,000 over the next ten years, similar to the number of employees on the BSkyB site. Furthermore, the site has the same PTAL rating and is also located in an environment where encouraging walking and cycling is a challenge. A shuttle bus system is in operation and BSkyB's mode split is very similar to the LCH albeit with a lower car mode share of around 10 per cent.

4.6.3 The BSkyB Travel Plan includes measures tailored towards encouraging walking and cycling and it would be recommended that similar measures are adopted on the LCH site if they are not already in operation, including:

- an on-site cycle centre offering sales, repairs, advice and loan bikes;
- cycle purchase discounts; and
- the provision of lockers, showers and changing facilities on site

4.6.4 Measures should also be adopted to discourage car use. Example measures which are included within the BSkyB Travel Plan are as follows:

- encouraging car sharing through active promotion and dedicated car share parking spaces;
- providing a guaranteed lift home in case of an emergency;
- provision of an on-site car club to support staff who may travel to the site by an alternative mode but need the car for work or private use; and
- restricting parking permits for those who are commuting by car from a location where the site can be accessed within a reasonable timescale by walking, cycling or public transport.

4.6.5 With regard to the latter point, it is likely that the amount of parking on site will need to be restricted to ensure the mode share targets proposed for development can be achieved. Furthermore, with the expansion of the site car use is expected to increase even with the mode share targets proposed. It is therefore likely that some highway improvements will be necessary to accommodate the increased demand. The details of these improvements are outside the scope of this report.

4.6.6 As referred to within section 4.4 there are significant gradients on many local roads which could deter cycle use. The use of electric bicycles (e-bikes) can mitigate against this and TfL's Behaviour Change team are at the early stages of developing the promotion of e-bikes. Measures that could be used in this instance are outlined below:

- promotion and provision of information on e-bikes as they are commonly not well understood – there is an opportunity to dispel myths on cost, legal requirements and the ease of charging;
- partnering with a local store selling e-bikes who may be willing to offer trial periods or bike discounts; and
- the LCH management body could purchase e-bikes and then lease them to staff for a trial period; at the end of the loan period they could be offered for sale by discount.

4.6.7 Furthermore, measures could be adopted to reduce the cost of public transport travel for staff; examples include the provision of season ticket loans and ticket discounts.

Engineering feasibility

4.6.8 Compared to the other options within this report there is little engineering required with smarter travel measures. Suitable land would be required to accommodate priority parking or cycling facilities, however the majority of the measures can be considered 'soft', i.e. not requiring new physical infrastructure.

Operational feasibility

4.6.9 The success of the measures would be dependent on the extent to which the LCH can partner with local operators, for example with the car club or cycle promotion. The size of the LCH site and the number of employees involved suggests that this would prove feasible to operate and demand should be sufficient. TfL would be able to assist with securing and promoting smarter travel measures.

Cost

4.6.10 Behaviour change measures are relatively low cost in comparison to the other interventions referred to within this report. Furthermore, local businesses may wish to offer their services at a reduced cost to the LCH should there be significant demand generated by the site.

Likely benefits

4.6.11 The objective of providing these measures is to promote new ways to travel and to make it more attractive to use these alternative transport options. Smarter travel measures can reduce the barriers that may exist for a mode of transport – for example inadequate cycle parking will deter cyclists and higher travel costs will deter public transport use. Furthermore, 'stick' measures can strongly encourage behaviour change by reducing the convenience of a mode of transport – for example removing parking permits for some car users living close to the site would make it more difficult to access the site by car and encourage a shift to other modes.

Adverse impacts

4.6.12 There are relatively few adverse impacts to introducing behaviour change measures. However, the removal of parking privileges on site could have an adverse impact as those who were able to park their car on site may seek to park elsewhere. There is currently a controlled parking zone (CPZ) in operation which means that only local residents with a parking permit are able to park on the local roads during the hours of 10:00-18:00. There may be a requirement to monitor the pressure on the local parking capacity outside the CPZ and extend or modify the CPZ boundary accordingly if car users are choosing to park outside the CPZ boundary and walk to the site.

Stakeholder acceptability

4.6.13 The removal of on-site parking privileges could prove to be unpopular with those travelling to work or visiting the site by car. This may affect their choice of place to work / visit if they are unable to commute by car and this could have adverse impacts on the ability of the LCH to attract and/or retain staff.

Funding Sources

4.6.14 Behaviour change measures can be secured as a requirement of the section 106 agreement that would accompany any grant of planning permission. They would typically be funded by the occupiers of the site.

5 Summary and recommendations

5.1 This report has summarised a range of transport options for improving the accessibility of the LCH site, comparing the proposed tram extension against potential alternatives that could be delivered in the shorter term. The performance of each option against four key measures are summarised qualitatively in Table 5-1 below.

Table 5-1: Summary comparison of transport options

Option	Cost	Feasibility	Timescale	Benefits
Rail shuttle link	High	High	Medium	Medium
Tramlink extension	Very high	Medium	Long	Very high
Improved pedestrian facilities	Low	Medium	Short	Medium
Improved cycle facilities	Low	Medium	Short	Medium
Bus improvements	Medium	Medium	Short	High
Smarter travel	Low	High	Short	Low

5.2 The qualitative assessment shows that the tram extension would have by far the greatest benefits in serving the LCH site, but it also has a very high relative cost, hence it is likely to be an option for the longer term only.

5.3 Of the shorter term options, despite a relatively high estimated cost of c. £23m, increasing the frequency of trains serving Belmont to 6 tph would only increase the PTAL of the western part of the site to between 1 and 3. Moreover, the PTAL of 1 for the eastern part of the site would remain unchanged as Belmont station is outside the PTAL catchment for that part of the site. Re-routing either the 80 or 280 bus route directly into the site accompanied by an increased service frequency by one bus per hour would offer a PTAL rating of between 2 and 3 at a significantly lower cost.

5.4 No single solution can address all of the LCH sites transport needs. It is therefore recommended that a package of transport solutions is pursued. In order to achieve a PTAL of between 3 and 4 the following combined option packages have been identified:

- **Package One**: Increase frequency of trains serving Belmont to 6 tph **AND** re-route both the 80 and 280 bus routes directly into the site AND increase frequency of the 80 and 280 bus routes by two buses per hour and the frequency of the S1, S3 and S4 by one bus per hour.
- **Package Two**: Re-route both the 80 and 280 bus routes directly into the site and operate a very high frequency of 14 buses per hour for each route.
- **Package Three**: Extend the tram from Sutton town centre directly into the site with a frequency of 7.5 tph (achieving a PTAL of 3) or 15 tph (achieving a PTAL of 4).

5.5 This report has assessed all of the transport options at a very high level only. Therefore much more detailed work would be required to determine the feasibility, costs, benefits and value for money of the options.