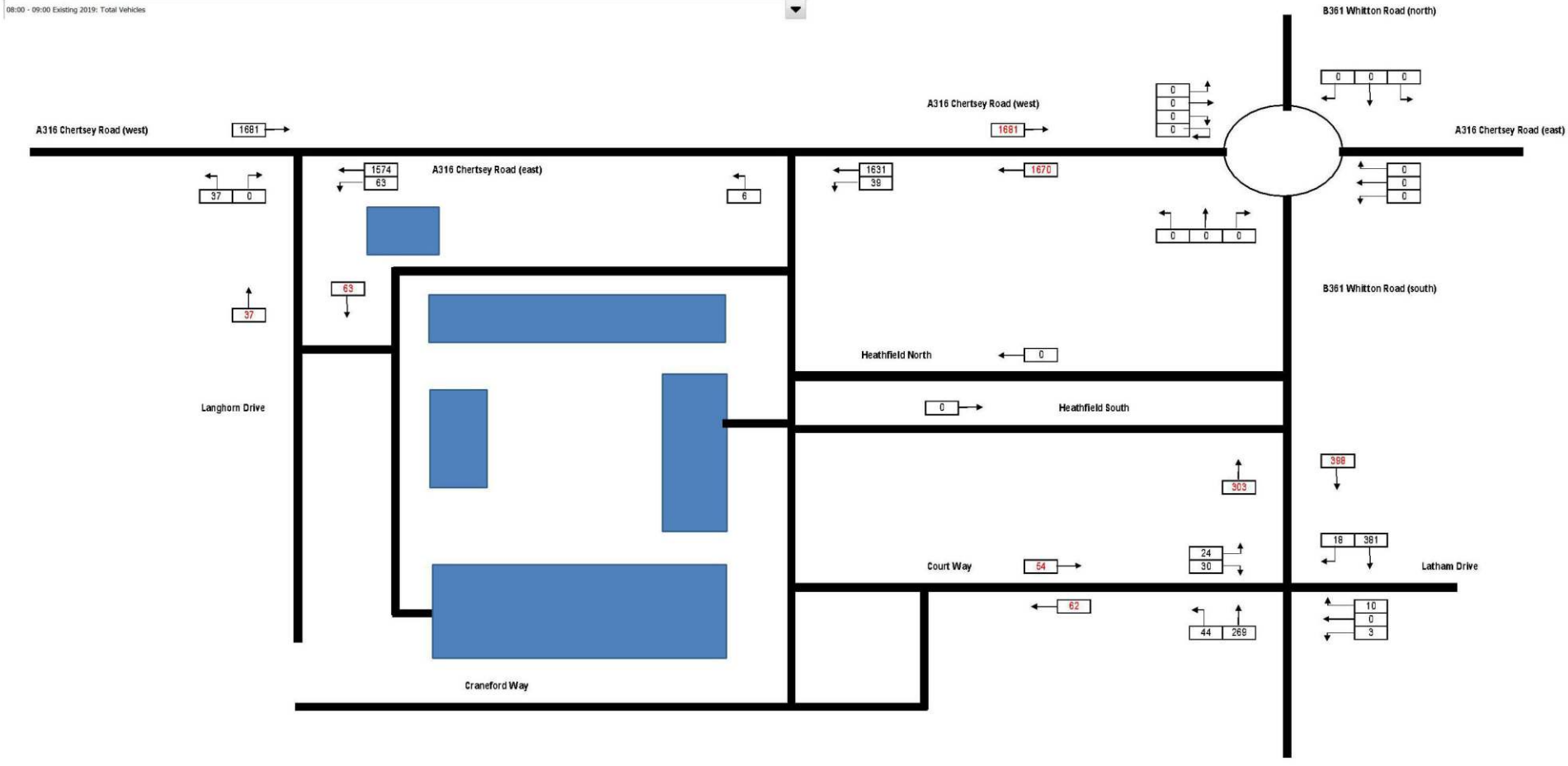
CHAPTER 8 – APPENDICES

CONTENTS

Appendix 8.1: 2019 Baseline Traffic Flow Diagrams

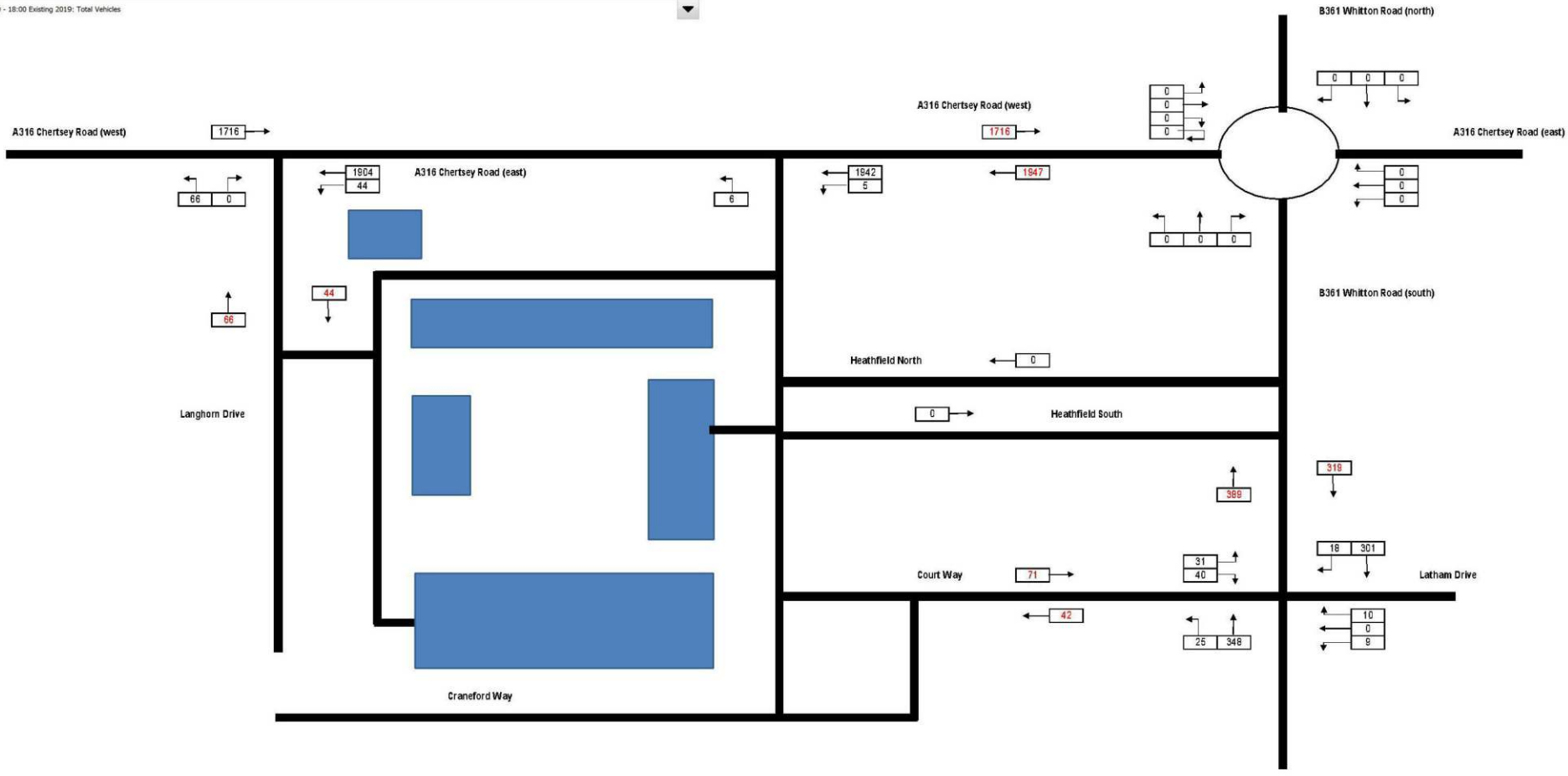
30713 Richmond Education and Enterprise Campus

08:00 - 09:00 Existing 2019: Total Vehicles



30713 Richmond Education and Enterprise Campus

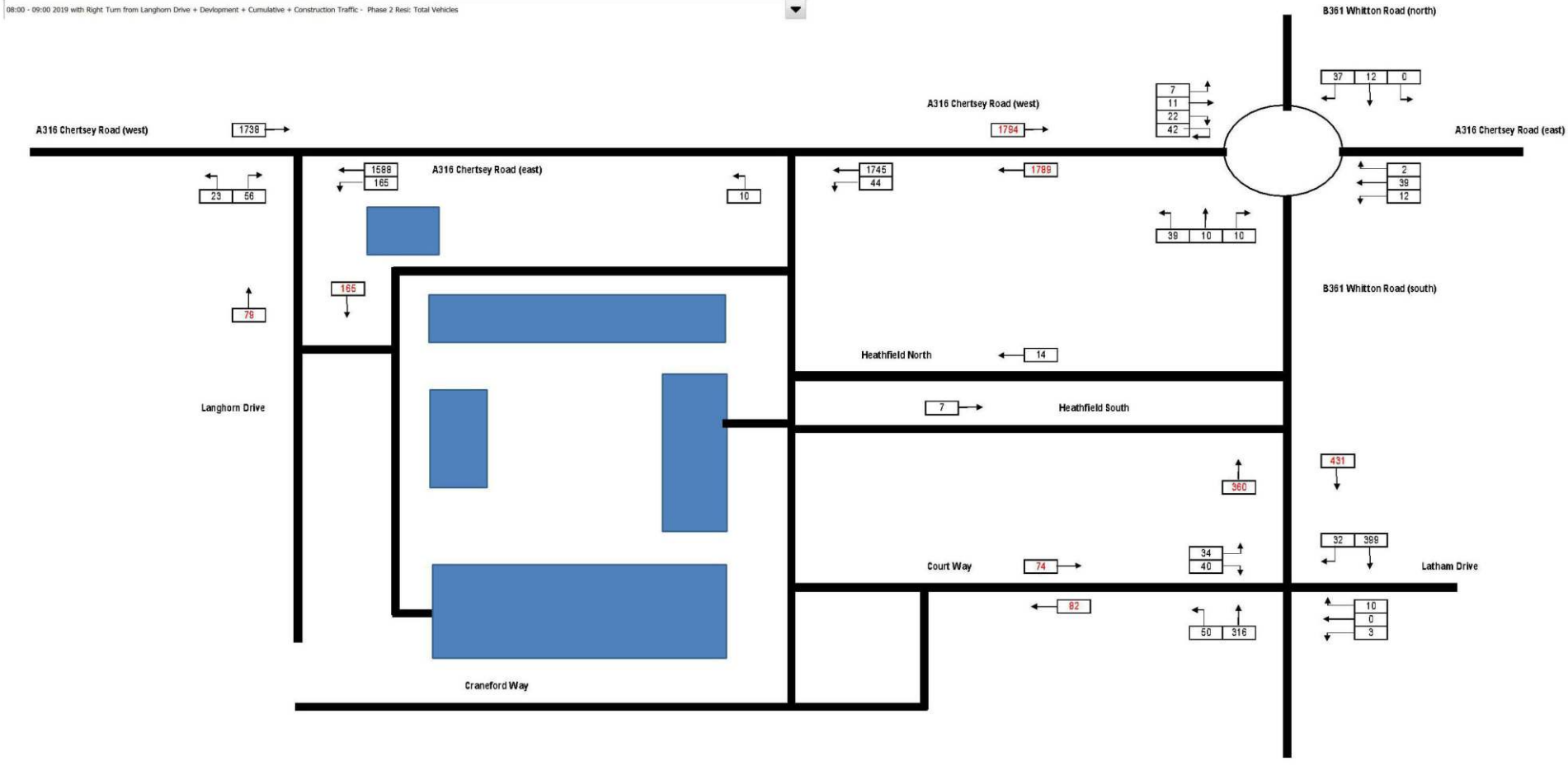
17:00 - 18:00 Existing 2019: Total Vehicles



Appendix 8.2: 2019 Construction Phase 3 Traffic Flow Diagrams

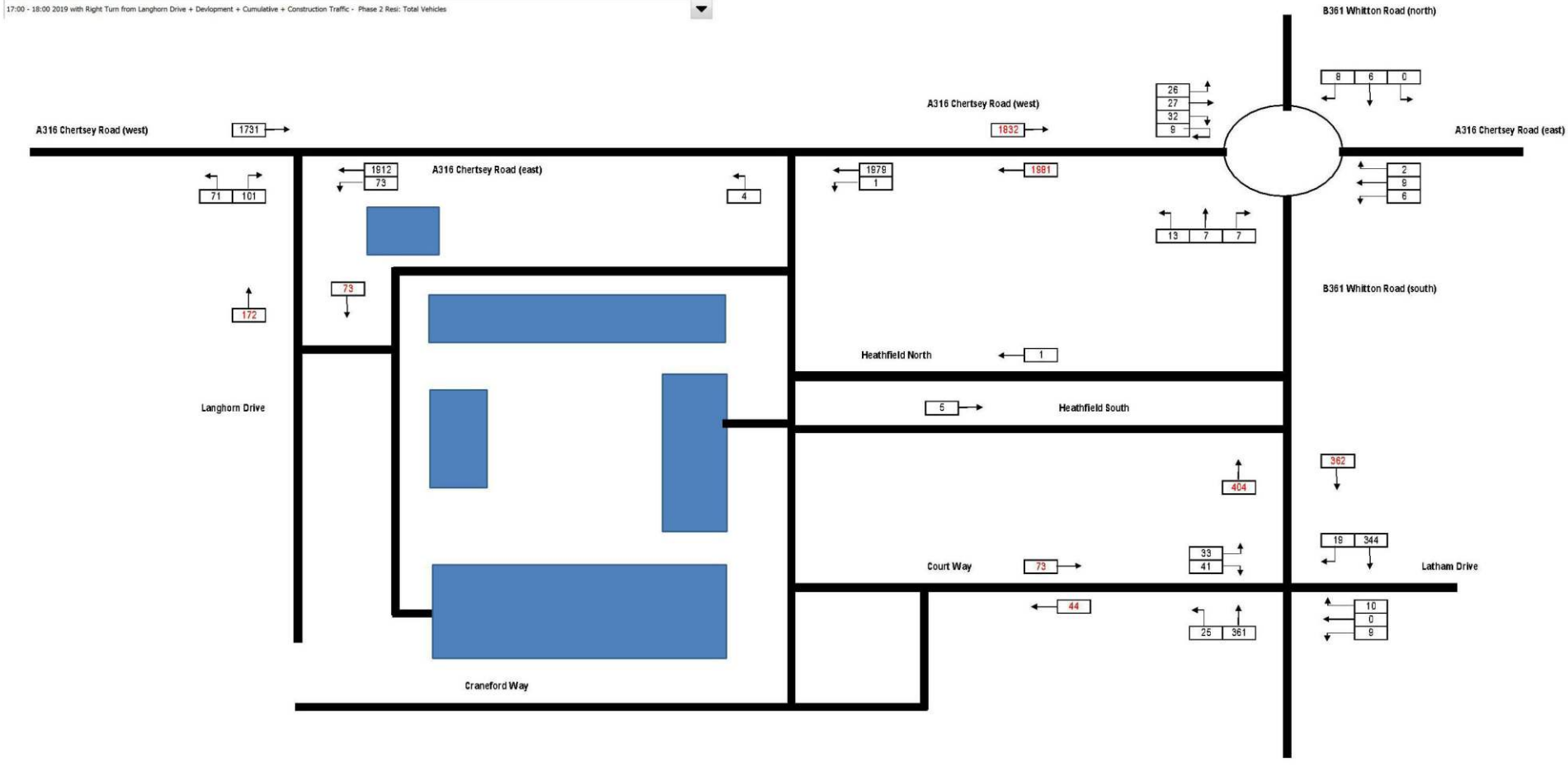
30713 Richmond Education and Enterprise Campus

08:00 - 09:00 2019 with Right Turn from Langhorn Drive + Devlopment + Cumulative + Construction Traffic - Phase 2 Resi: Total Vehicles



30713 Richmond Education and Enterprise Campus

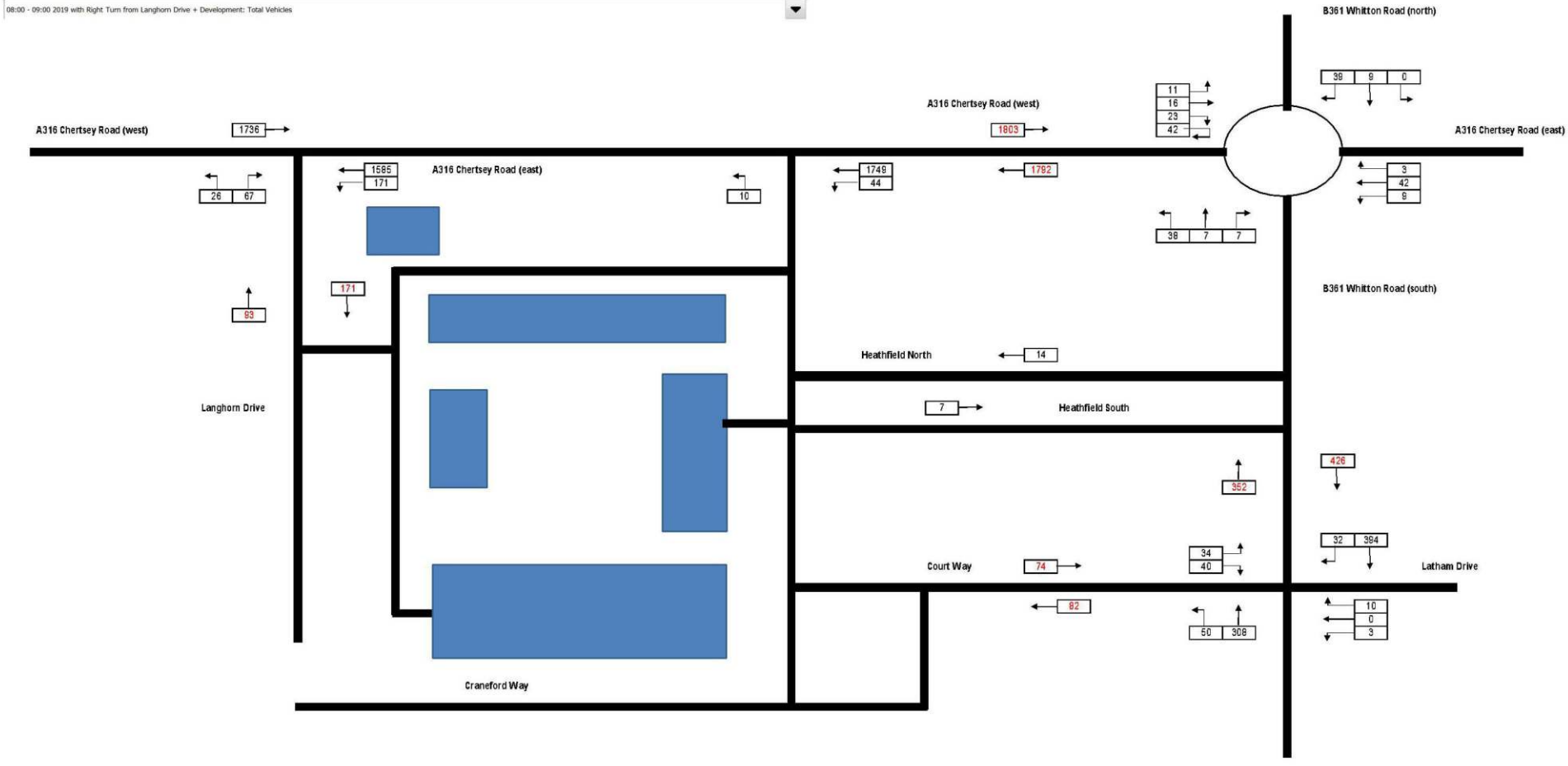
17:00 - 18:00 2019 with Right Turn from Langhorn Drive + Devlopment + Cumulative + Construction Traffic - Phase 2 Resi: Total Vehicles



Appendix 8.3: 2019 Completed Development Traffic Flow Diagrams

30713 Richmond Education and Enterprise Campus

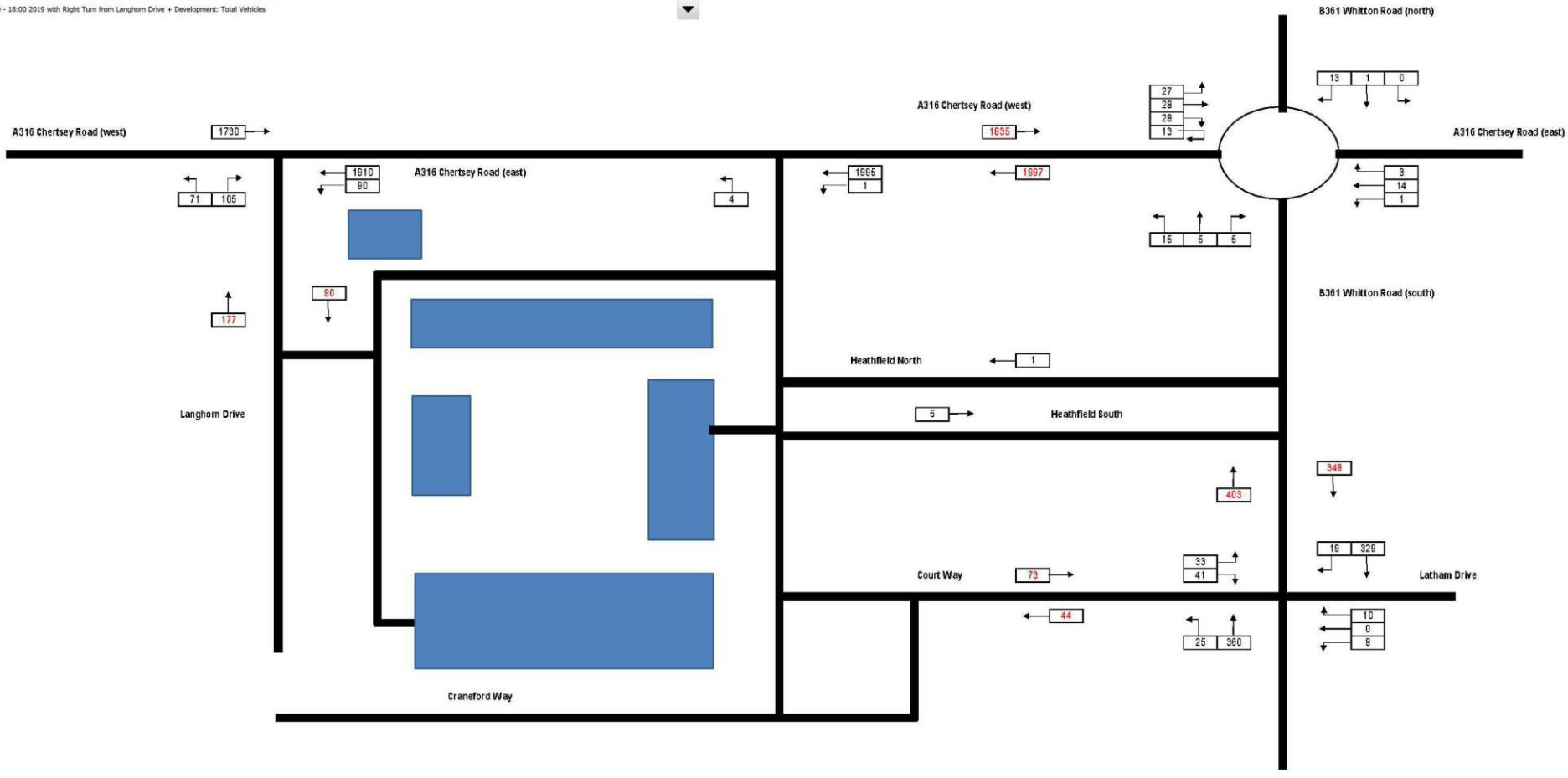
08:00 - 09:00 2019 with Right Turn from Langhorn Drive + Development: Total Vehicles



30713 Richmond Education and Enterprise Campus

17:00 - 18:00 2019 with Right Turn from Langhorn Drive + Development: Total Vehicles

17:00 - 18:00 2019 with Right Turn from Langhorn Drive + Development: Total Vehicles

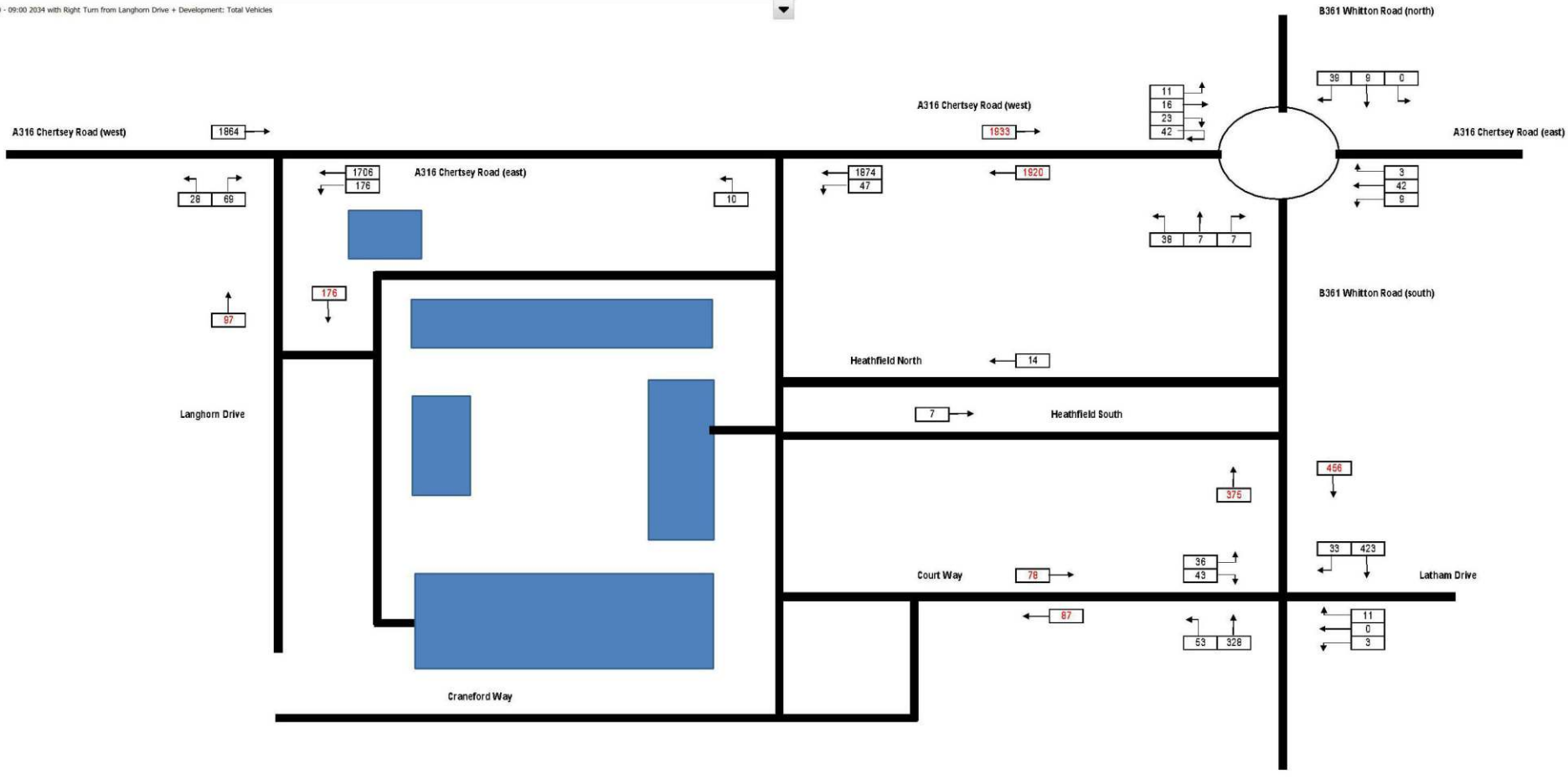


Appendix 8.4: 2034 Traffic Flow Diagrams

30713 Richmond Education and Enterprise Campus

08:00 - 09:00 2034 with Right Turn from Langhorn Drive + Development: Total Vehicles

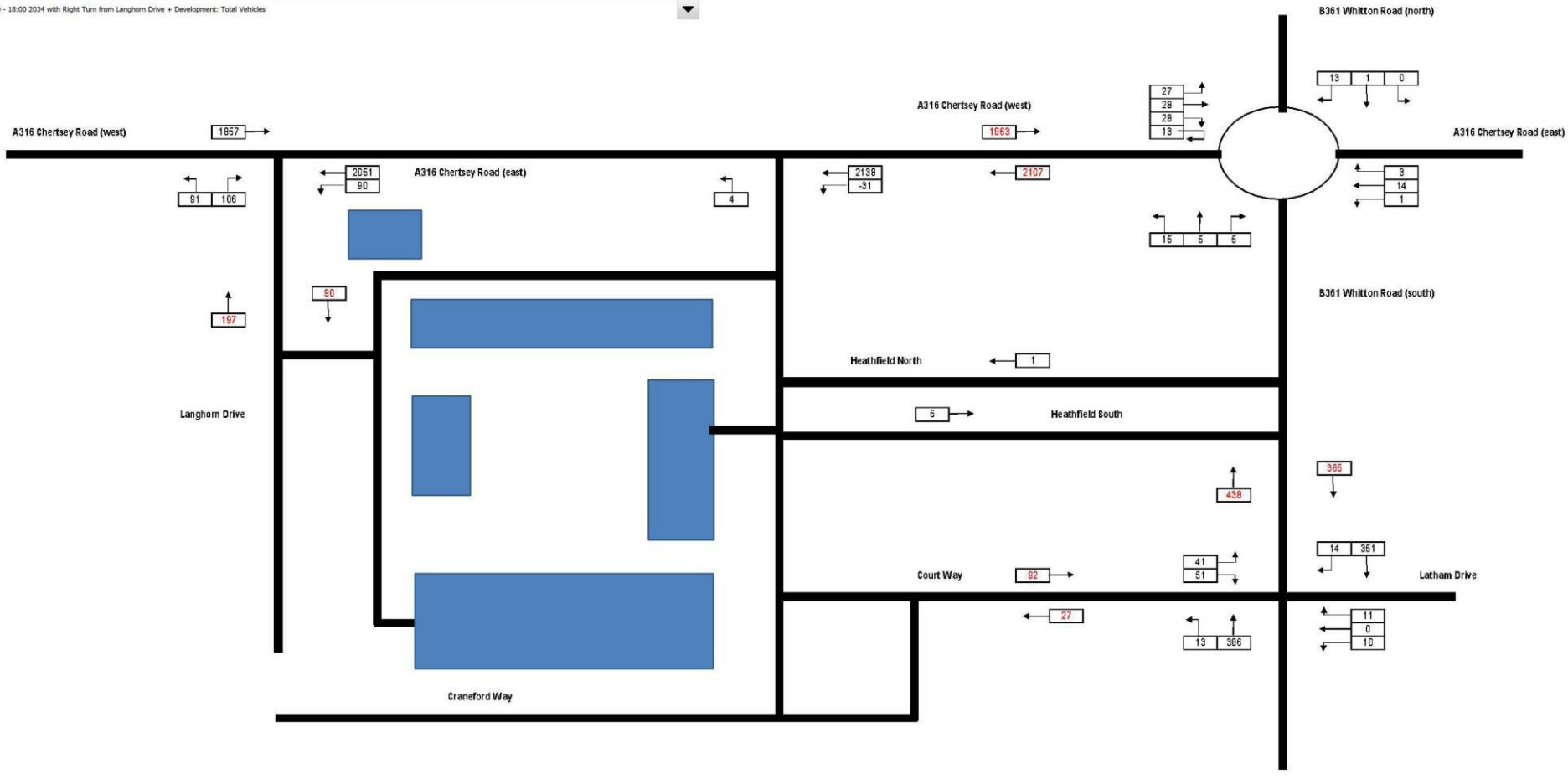
08:00 - 09:00 2034 with Right Turn from Langhorn Drive + Development: Total Vehicles



30713 Richmond Education and Enterprise Campus

17:00 - 18:00 2034 with Right Turn from Langhorn Drive + Development: Total Vehicles

17:00 - 18:00 2034 with Right Turn from Langhorn Drive + Development: Total Vehicles



Appendix 8.5: Framework Travel Plan

Richmond upon Thames College

Richmond Education and Enterprise Campus
Framework Travel Plan

June 2015

TPP
transport planning practice

Contents

Transport Planning Practice
70 Cowcross Street
London
EC1M 6EL
020 7608 0008
email@tppweb.co.uk
www.tppweb.co.uk

1. INTRODUCTION

1.1 Transport Planning Practice were appointed to prepare a Framework Travel Plan (FTP) for the proposed redevelopment of Richmond upon Thames College (RuTC).

1.2 The existing site consists of Richmond upon Thames College with associated playing fields, vehicle and cycle parking. The site located to the north west of Twickenham town centre, it is bounded by Chertsey Road immediately to the north, Egerton Road to the east, residential dwellings on Craneford Way to the south and Marsh Farm Lane (footpath) to the west.

1.3 This FTP will consider the following uses associated with the proposals including non-residential education (D1), residential (C3) and business (B1) as well as assessing proposed Travel Plan measures required for each of the three uses.

1.4 The purpose of this FTP is to set out a strategy for minimising residents, students and employees dependence on travel by private car and to maximise the use of public transport, walking and cycling. Objectives include promoting sustainable modes of travel, which reflects current Government policy objectives in respect of this site.

1.5 It is envisaged that detailed site specific Travel Plans will be developed as part of the detailed applications for the various elements of the development. These would then be undertaken at a time when the end users requirements would be better understood.

1.6 The contact details of the author of this FTP are as follows:

Henry Binnian
Transport Planning Practice
[redacted]

Proposal

1.7 The proposal is to redevelop RuTC to create Richmond Education and Enterprise Campus. The proposals will re-provide Richmond College in a new development, introduce a new Secondary School and a Special Educational Needs School. Additionally a new media 'Tech Hub' and Residential dwellings will be built. Further to this there will be an upgrade of the sports fields and sport centre facilities associated with the education uses at the development. Table 1.0 presents the land use breakdown of the proposed site.

Table 1.0: Land use breakdown, car and cycle provision

Land use	No. of units/m^2 GEA	Car parking	Cycle parking
Tech Hub (B1 use)	Up to 1,700m^2	10	Cycle parking will be provided in accordance with the London Plan (March 2015)
Residential	180 dwellings	In line with London Plan	
Sport Centre	Up to 3,900 m^2	-	
Richmond College	Up to 16,000 m^2	150	
Secondary School	Up to 7,000 m^2	40	
Special Educational Needs School	Up to 4,000 m^2	30	

1.8 The remaining chapters within this report are outlined below:

- **Section 2: Policy background –** summarises the current policy related to Travel Plans.
- **Section 3**: **Site assessment –** describes the accessibility of the site by a range of different transport modes.
- **Section 4: Travel survey** – sets out how the baseline surveys could be carried out.
- **Section 5: Travel Plan objectives and targets** – sets out the objectives and aims of the document and targets against which the FTP will be assessed.
- **Section 6: Proposed School Travel Plan measures –** gives details of the measures that will be implemented as part of the FTP to help deliver sustainable patterns of travel for students, staff and visitors.
- **Section 7: Proposed Commercial Travel Plan measures –** gives details of the measures that will be implemented as part of the FTP to help deliver sustainable patterns of travel for commercial occupiers.
- **Section 8: Proposed Residential Travel Plan measures –** gives details of the measures that will be implemented as part of the FTP to help deliver sustainable patterns of travel for residential occupiers.
- **Section 9: Travel Plan management and monitoring –** explains how the TP will be managed and monitored. An action plan is also provided.
- **Section 10: Travel Plan securing, enforcement and funding** – sets out how the Travel Plan will be secured, enforced and funded.

2. POLICY CONTEXT

2.1 This chapter provides a summary of the relevant transport policy against which the proposals are assessed.

National policy

National Planning Policy Framework

2.2 The National Planning Policy Framework (NPPF) was published on the 27th March 2012 and supersedes all previous national planning policy documents. It focuses on a presumption in favour of sustainable development. One of the core planning principles relates to actively managing patterns of growth to make the fullest possible use of public transport, walking and cycling and focusing significant developments in locations which are or can be made sustainable.

2.3 The NPPF recognises that the transport system should be balanced in favour of sustainable transport modes so that people are given a real choice about how they travel.

2.4 The NPPF states that developments should be located and designed where practical to:

- Accommodate the efficient delivery of goods and supplies.
- Give priority to pedestrian and cycle movements, and have access to high quality public transport facilities.
- Create safe and secure layouts which minimise conflicts between traffic and cyclists or pedestrians.
- Incorporate facilities for charging plug-in and other ultra-low emission vehicles.
- Consider the needs of people with disabilities by all modes of transport.

2.5 It goes on to state that a key tool to facilitate this will be a Travel Plan. All developments which generate significant amount of movement should be required to provide a Travel Plan.

2.6 In respect of parking standards, the NPPF states that local planning authorities should take into account the following:

- Accessibility of the development.
- Type, mix and use of development.
- Availability of and opportunities for public transport.
- Local car ownership levels.
- Overall need to reduce the use of high-emission vehicles.

Regional policy

Further Alterations to the London Plan (FALP) (March 2015)

2.7 The London Plan Spatial Development Strategy for Greater London 2011 sets out the spatial development strategy for London, and provides the London wide context within which individual Boroughs set their local planning policies. A key objective of the London Plan is to improve London's accessibility, which, amongst other issues, includes tackling traffic congestion. An issue that assists closer integration between transport and spatial development is encouraging patterns and forms of development that reduce the need to travel, especially by car.

2.8 With regard to parking strategy, The Mayor of London, in conjunction with the Boroughs, seeks to ensure that on-site parking at new developments is kept to a minimum. Maximum parking standards are set, which can be reduced in areas of good public transport accessibility, and, in the most accessible locations, can lead to car–free developments.

2.9 The London Plan also recognises the importance of site accessibility and location as inherent within the objective of making the most sustainable and efficient use of space by encouraging development intensification in areas that have good public transport accessibility. The Plan also provides further guidance and sets out an approach to determining appropriate maximum parking standards within a policy context. The approach set out in Policy 6.13 seeks to regulate parking in order to minimise additional car travel, reduce trip lengths and encourage use of other more sustainable means of travel.

2.10 The London Plan recognises that improving conditions for cycling makes this sustainable mode an increasingly viable alternative to the private car, and requires cycle parking facilities within all new developments.

2.11 Travel Plans can help to deliver many of the transport objectives set out within the London Plan's Policy 6.1 'Strategic Approach' which include reducing the need to travel, reducing car use and supporting measures that encourage shift to more sustainable modes and technology. The use of Travel Plans can help reduce emissions by promoting alternatives to the car.

2.12 The London Plan encourages and supports the use of Travel Plans for development proposals. Policy 6.3 'Assessing Transport Capacity' states that Travel Plans should be provided for applications above the thresholds set out in TfL guidance.

2.13 Policies 6.9 and 6.10 aim to increase cycling and walking in London, in particular, to achieve a 5% modal share by 2026 for cycling. Proposed developments should therefore provide secure and accessible cycle parking facilities and ensure there is a high quality pedestrian environment and street space. Table 2.1 sets out the FALP cycle parking minimum standards for the land uses associated with this development.

Table 2.1: Cycle parking Standards

Land Use	Cycle parking standards	
	Long-stay	Short-stay
B1 Tech hub	1 space per 250 m^2	1 space per 1000 m^2
Residential C3	1 space per studio a nd 1 bedroom unit 2 spaces per all other dwellings	1 space per 40 units
Schools D1	1 space per 8 staff & 1 per 8 students	1 space per 100 students

The Mayor's Transport Strategy (2010)

2.14 The Mayor's Transport Strategy recognises that through setting appropriate parking standards, encourage smarter travel planning and making public transport more attractive, the Mayor will encourage the use of public transport, walking, cycling and car sharing.

Local Policy

2.15 The Local Plan (formerly known as the Local Development Framework) sets out the priorities for the development of the borough and will be used for making decisions on planning applications.

LBRuT Core Strategy (2009)

2.16 This document sets out the Strategic Planning Framework for the Borough over the next 15 years, it considers other plans and strategies and is the delivery mechanism for the spatial elements of the community. This document outlines the council's transport objectives and policies.

2.17 The following transport policies in CP5 – Sustainable Travel that are associated with this development are stated below:

2.18 Policy 5.C – Cycling and Walking

- Prioritise the needs of pedestrians and cyclists in the design of new developments including links to existing networks and requiring the provision of adequate cycle parking.

2.19 Policy 5.F – Car Parking and Travel

- Provide car share facilities and car clubs in appropriate new developments and encourage the use of low emission vehicles in order to reduce congestion and pollution.

2.20 Policy 5.G – Sustainable Travel

- Encourage major employers and schools to develop Green Travel Plans and require these where appropriate with planning applications.

- The council and its partners will welcome the development of green Travel Plans for all types of developments. All Travel Plans should be produced in line with TfL Guidance on Workplace and Travel Planning and Residential Travel Planning.

Development Management Plan (2011)

2.21 The Development Management Plan (DMP) includes the detailed policies which will be used when new developments are considered. The DMP takes forward the strategic objectives in the Core Strategy and is consistent with National and Regional Policies.

2.22 5.4 Transport and Parking – this chapter takes forward CP5 in the Core Strategy as well as complementing LBRuT Implementation Plan. The relevant policies are stated below:

2.23 Policy DM TP 1 – Higher trip generating developments will only be permitted in areas which are, or at the time of implementation are, easily accessible by transport other than the private car, and well located with respect to local services.

2.24 Policy DM TP 2 – The impact of new developments on the transport network will be assessed against other plan policies and transport standards. All planning applications for major developments should be accompanied by a Transport Assessment. Matters to be included are set out in DfT/ TfL guidance.

2.25 Policy DM TP 3 – New developments will be expected to create or improve links with the local and wider transport networks, including links to cycle and pedestrian networks. All new developments must be designed to improve accessibility including:

- Maximise permeability, with safe, convenient accessible and appropriate road, cycle and pedestrian routes within and in the immediate vicinity of the scheme, as well as accessible walking and cycling links to the wider transport network including to public transport node and key land uses, taking account the need to connect people to jobs, to town centres and to schools.

2.26 Policy DM TP 6 – New developments and schemes improve the safety and security of the pedestrian environment where appropriate.

2.27 Policy DM TP 7 – To maintain and improve conditions for cyclists, the council will ensure that new developments do not adversely impact on the cycling network or cyclists and provide appropriate cycle access and sufficient, secure cycle parking facilities.

2.28 Policy DM TP 8 – Vehicle and cycle parking standards are set out in table 2.1. Developers may provide fewer car parking spaces if they can show that there would be no adverse impact on amenity, street scene, road safety or emergency access. In general it is expected that in low PTAL areas (1-4) the standards should be met, but in higher PTAL areas (5-6) provision at a lower level may be appropriate in exceptional circumstances. Additionally electronic charging points are welcomed where there is demand.

Table 2.1: Parking Standards

Land Use	Vehicle Parking Space Required (All floor space referred to is gross)		Cycle parking standard
	Controlled parking zones	The remainder of the Borough	
Schools D1	1 space per 2 staff, Arrangements must also be made for adequate setting down areas and visitor parking spaces. Adequate facilities for the setting down of coaches shall also be considered	1 space per 2 staff	5 spaces per classroom depending on the nature of the school
Residential C3	1-2 bedrooms 1 spaces	1-2 bedrooms 1 spaces	1 space
	3 bedrooms For 1 unit, 2 spaces; for two or more units 1 allocated space plus sufficient unallocated spaces to provide a total of 1.5 spaces overall per unit.	3 bedrooms For 1 unit, 2 spaces; for two or more units 1 allocated space plus sufficient unallocated spaces to provide a total of 1.5 spaces overall per unit.	1 space
	4+ bedrooms 2 spaces	4+ bedrooms 2 spaces (negotiable)	2 spaces
B1	1 space per 300sqm Plus 1 lorry parking space per 250sqm (minimum 1 per unit)	Within 400m of a rail station, 1 space per 200sqm. Elsewhere 1 per 100sqm plus 1 lorry parking space per 2500sqm (minimum 1 per unit)	1 per 200 sqm

Planning Brief Richmond upon Thames College (December 2008)

2.29 There are a number of key access and movement principles which the redevelopment will be based on. As stated in the document, these are:

- The primary access for vehicular traffic to the college should continue to be off the A316.
- The majority of pedestrian visitors should arrive from the eastern boundary (via Twickenham Station), secondary access for pedestrians and cyclists should be provided around the site as visitors arrive from all directions.
- Any residential development on the site should be accessed off Egerton Road to separate college and residential traffic (subject to size of residential development).

2.30 Car parking provision within the redevelopment scheme is an important consideration. Car parking should be provided on site and integrated into the design of the campus and sports facilities.

2.31 A Travel Plan will be prepared and implemented to promote sustainable forms of transport and measures to reduce car travel to the site for students, staff and visitors.

Twickenham Area Action Plan (July 2013)

2.32 The Twickenham Area Action Plan places great focus on improving walking routes to create an accessible pedestrian environment. In turn this will encourage residents to make greater use of facilities within the town centre and so reduce their need to travel.

2.33 New developments should provide sufficient parking to avoid adverse impact on on-street parking, in line with the parking standards set out in the Development Management Plan DM TP8.

2.34 Any new developments should have adequate, convenient and safe servicing arrangements in line with the Council's SPD on Transport Standards. Further, servicing hours will be controlled where necessary for safety or amenity reasons.

3. SITE ASSESSMENT

Site location and land use

3.1 It is proposed to demolish the existing Richmond upon Thames College and re-develop the site to provide Richmond Education and Enterprise Campus, which will consist of a replacement College, Secondary School, Special Educational Needs School, Tech Hub, sports centre and playing fields, and associated vehicle and cycle parking. In addition there will be a Residential development on part of the existing college site.

3.2 The site located to the north west of Twickenham town centre, it is bounded by Chertsey Road immediately to the north, Egerton Road to the east, residential dwellings on Craneford Way to the south and Marsh Farm Lane (footpath) and Harlequin's Stoop Stadium to the west. The site is located approximately 750m north-west of Twickenham Station and 500m south of Twickenham Stadium within the London Borough of Richmond upon Thames.

Site access

3.3 The primary vehicular access will be taken from Langhorn Drive. Cars will access the staff and visitor car park via the existing College site access from the mini-roundabout junction with Langhorn Drive. This entrance will provide access to the replacement College, Tech Hub, Residential units and the sports centre. Vehicular access to the special needs school and Secondary School will be taken from Egerton Road. There will be pedestrian and cycle access via Craneford Way, Egerton Road and Langhorn Drive. Access to the playing fields will be taken from Craneford Way via Court Way.

Local area

3.4 Twickenham town centre is located 800m to the south of the site as the crow flies and offers a range of shops and amenities typically offered by a small town centre. The nearest doctors surgery is The Green Surgery located approximately 950m south of the site, which is a 10 - 12 minute walk based on a walking speed of approximately 80m-100m per minute and which can be accessed via Marsh Farm Lane. The land use of the local area comprises of predominately residential properties.

Public transport

Public transport accessibility level (PTAL)

3.5 The PTAL value for the site ranges from 1b on the western side of the site to 2 on the eastern side. This shows that it has a poor level of public transport accessibility. The PTAL calculation has been carried out using the TfL website http://www.webptals.org.uk/.

Bus

3.6 The site is served by four bus routes which include the 267, 281, 481 and the 681. The bus routes can be accessed by a number of bus stops which surround the site. Below is a list of the nearest bus stops surrounding the site including the most direct route and distance to the bus stops from the College pedestrian entrances on Egerton Road and the bus routes they are served by:

- Stops 'C' and 'N' on Whitton Road are reached via Egerton Road, Chertsey Road and Chudleigh Road; are 490m away; and are served by 281, 481 and 681.
- Stops 'L' and 'S' on Whitton Road are reached via Egerton Road and Court Way; are 507m away; and are served by 281 and 681.
- Stops 'B' and 'P' on Whitton Road are reached via Egerton Road, Chertsey Road and Tayben Avenue; are 537m away; and are served by 281, 481 and 681.
- Stops 'M' and 'R' on Whitton Road are reached via Egerton Road and Heathfield North; are 545m away; and are served by 281 and 681.
- Stops 'B' and 'C' on London Road are reached via Egerton Road, Court Way and Whitton Road; are 460m away; and are served by 267, 481 and 681.

3.7 Table 3.2 below shows a summary of the bus services serving the site.

Table 3.2: Summary of existing bus services

Bus Route	Direction (towards)	Monday – Friday			Sat	Sun
		AM	Inter peak	PM		
267	Hammersmith Bus Station	7	6	6	5	4
	Fulwell Rail Station	5	6	6	5	4
281	Hounslow Bus Station	8	8	8	8	5
	Tolworth (Ewell Road)	8	8	7	7	5
481	West Middlesex University Hospital	1	1	1	1	0
	Kingston (Cromwell Road Bus Station)	1	1	1	1	0
Total		30	30	29	27	18

3.8 The above table shows that the site is served by 30 buses in the morning peak and inter-peak hour and 29 buses in the evening peak hour in both directions. On weekends, the frequency is reduced to 27 buses per hour on Saturday and 18 buses per hour on Sunday.

Rail

3.9 Twickenham National Rail Station is located to the south east from the site (a 7 to 9 minute walk). The station and all trains serving it are operated by South West Trains. The station provides key links to Richmond, Waterloo, Reading, Kingston and Hounslow. Table 3.3 shows the directional frequency in the peak hours.

Table 3.3: Twickenham Station rail service frequencies

National Rail	Westbound		Eastbound	
	AM Peak	PM Peak	AM Peak	PM Peak
Twickenham	11	10	11	8

Walking

3.10 The surrounding footways are generally satisfactory, being a minimum of 2.0m in width, with dropped kerbs, tactile paving and street lighting. On the A316 Chertsey Road, there is a crash barrier on the central reservation preventing pedestrians from crossing the road. There is a signal controlled pedestrian crossing on Chertsey Road approximately 100m east of the site and a pedestrian footbridge directly north of the site. Many of the residential roads have traffic calming by means of speed cushions located at regular intervals, and there is a fire access gate across Egerton Road which reduces traffic on the residential roads to access only.

3.11 The cycle/footpath of Marsh Farm Lane runs along the western boundary of the site between the junction of the A316 Chertsey Road/ Langhorn Drive and Craneford Way. From Craneford Way, the cycle/footpath runs through the Craneford Way playing fields, across the railway line via a footbridge and onto Marsh Farm Road.

3.12 Marsh Farm Lane footpath is proposed to be upgraded and widened to allow cyclists and pedestrians to use the route at the same time. A new east-west shared cycle / footway is to connect London Road and Twickenham Station to Marsh Farm Lane, passing through land the former sorting office site and land known as the Twickenham Rough.

3.13 The bus routes on Whitton Road (section north of the A316) can be accessed via the footbridge or signalised pedestrian crossing on Chertsey Road. The route has dropped kerbs, tactile paving and street lighting. The footways leading to Twickenham Station, either via Court Way, Heathfield North or Heathfield South and Whitton Road and London Road have similar characteristics with a zebra crossing on Whitton Road and signal controlled pedestrian crossings at the junction of Whitton Road / London Road and on London Road. The cycle / footway on both sides of the A316 are to be upgraded by TfL with work due to be complete in 2016.

Cycling

3.14 Transport for London's 2013 Local Cycling Guide 9 advises on a number of routes recommended by cyclists within the vicinity of the site and cycle routes that have signing or road markings. The site is well connected by cycle routes providing links to locations including; Twickenham Station, Richmond, Isleworth and Teddington. Chertsey Road has off-road shared cycle/ footway routes adjacent to it providing segregation from cyclists and motorists.

Parking

Car

3.15 The different land uses of the development mean that parking spaces are distributed throughout the site. The car parking provision meets the standards set out in the local and regional policy. Students will not be allowed to park in the school parking spaces which are for the use of staff and visitors only. Table 3.4 presents the breakdown of car parking spaces allocated to each use.

Table 3.4: Summary of proposed car parking spaces

Land Use		Parking spaces
School	Richmond College	150
	Secondary School	40
	Special Needs School	30
Residential		Based on London Plan standards
Tech hub		10
Total		**420**

Cycle

3.16 Cycle parking will be allocated to each use in accordance with the London Plan (March 2015) minimum standards.

3.17 The Tech Hub will be provided with a minimum of one cycle space per 200m^2 of GEA which meets local policy standards. Residential cycle parking will be provided to meet the local parking standards as set out in table 3.5.

Table 3.5: Residential cycle parking standards

Unit Type	Studio and 1 bedroom unit	2 + Bedroom units	Visitor
Cycle parking	1 space per unit	2 spaces per unit	1 space per 40 units

Car clubs

3.18 Zipcar, one of the world's leading car club companies has four car club parking bays within the vicinity of Twickenham Station, one on London Road, March Road, Station Road and Grosvenor Road. All four car club bays are within a 7 to 12 minute walk from the site. More information can be found at http://www.zipcar.co.uk/.

Local highway network

3.19 The A316 Chertsey Road, which is part of Transport for London's Road Network (TLRN), is a dual carriageway and runs in a northeast-southwest direction along the northern boundary of the site. The road links the site to central London to the east and the M3 Motorway and wider national strategic road network to the west and has a speed limit of 40mph near the site. Locally, the road is intersected by the B538 Hospital Bridge Road to the west and the B361 Whitton Road to the east with semi signalised roundabout junctions.

3.20 The A316 Chertsey Road, has shared cycle/footways along both sides of the carriageways. There is a signal controlled pedestrian crossing over the A316 near Chudleigh Road and a pedestrian footbridge near Talma Gardens and Langhorn Drive. There are two other pedestrian bridges over the A316 further to the west.

3.21 The site is accessed from two locations off of the A316 Chertsey Road. The first is from Egerton Road into the student car park and the second is from Langhorn Drive which provides access to the northern part of the site and some of the staff parking areas. The A316 Chertsey Road / Langhorn Drive will be upgraded from a

simple priority left in – left out junction, to a fully signal controlled left in – left and right out junction. A dedicated pedestrian crossing phase will be provided in the signal phasing across the A316 Chertsey Road and a pedestrian crossing assisted by traffic signal phasing will be provided across Langhorn Drive. As a result of the right turn facility being provided at the junction, the vehicular link between Langhorn Drive and Craneford Way will be removed. The access road between the mini-roundabout and the site will be widened to 6.0m to enable all purpose vehicle access.

3.22 Egerton Road has footways on both sides of the carriageway, street lighting and has a 30mph speed limit. There is a vehicle restriction immediately south of the student car park access which is controlled with a fire gate. The vehicle restriction is in place to prevent rat-running by vehicles travelling from Whitton Road to Chertsey Road (westbound), thereby avoiding the semi signal controlled roundabout. Langhorn Drive, which has a speed limit of 20mph provides access into the site for pedestrians and cyclists via the Marsh Farm Lane cycle/footpath which has street lighting. Marsh Farm Lane runs south to Craneford Way.

3.23 The B361 Whitton Road, which has a speed limit of 30mph, runs in a northwest-southeast direction to the east of the residential area of Heatham and is connected to the site via the residential roads of roads of Court Way, Heathfield North and Heathfield South. Adjacent to the Court Way/Whitton Road junction is a zebra crossing. Heathfield North is one-way in a westerly direction and Heathfield South is one-way in an easterly direction. Each of these residential roads provides access to Egerton Road which in turn provides access to Craneford Way.

3.24 The residential roads of Court Way, Heathfield North, Heathfield South, Egerton Road and Craneford Way are accessed via simple priority junctions and have a speed limit of 20mph. Each road has street lighting, footways on both sides of the carriageway, except for Craneford Way which has a footway on its northern side of the carriageway only.

3.25 The site is accessed from two locations from Egerton Road. The first is via the Main College access and the second is via the secondary College access, both of which provide access to the main staff car parking areas. The site is also accessed from Craneford Way, which provides access to the rear of the College (western side) where the servicing area is located.

3.26 To the south, the B361 Whitton Road joins the A310 London Road via signal controlled junction which has pedestrian signal phases. The A310 London Road provides access to Twickenham station and Twickenham town centre via the A305 King Street. There is a signalised pedestrian crossing over the A310 London Road directly opposite Twickenham station.

Delivery and servicing

3.27 Deliveries and servicing vehicles associated with the Tech Hub and the three schools will access the site via Langhorn Drive and egress the site via either Langhorn Drive or Egerton Road back on to the A316 Chertsey Road. Deliveries associated with the Residential units will take place on the residential roads within the site.

4. TRAVEL SURVEY

4.1 As the proposed development has not been built it is not possible to establish the travel patterns of the future occupants for each land use, aside from the preliminary assessment set out within the Transport Assessment.

4.2 Upon occupation of the various elements of the development baseline surveys will be undertaken within agreed time periods or in the case of the Residential site, once 75% of units or office space has been occupied.

4.3 The surveys are likely to include vehicle counts at access points. In addition to this there will be travel questionnaire surveys. Due to multiple land uses on site, there will be three types of travel surveys to capture the different travel patterns associated with each category of use i.e. residential, educational, and commercial uses. This allows the surveys to target residents, staff and students as there travel method and modes are likely to not be similar.

Commercial use travel survey (Tech Hub)

4.4 An online survey tool, such as Survey Monkey, could be used to distribute the travel survey questionnaires to all employees occupied in the development, as it is more than likely the majority of employees will have access to a computer and have an email account. This method of data collection allows a quick and economic way of distributing, collecting and analysing the travel surveys. The results of the surveys can then be sent to LBRuT for review. A basic paper survey could be handed out to visitors and delivery drivers for completion before they leave the site to establish their mode and travel patterns.

Educational use travel survey

4.5 A baseline travel survey will be undertaken within three months of opening. The survey will gather initial information about travel characteristics and perceived travel choices. From this baseline travel survey, the future targets of the Travel Plan going forward can be set.

4.6 As the site is education use, the surveys will be carried out by performing a 'Hands Up' survey using the methodology set out in Transport for London's "A Guide to Conducting Hand up Surveys" (December 2008) prepared by WSP.

4.7 After the initial baseline survey, the travel survey will be repeated regularly (as agreed with Richmond Council) to monitor as to whether targets have been achieved and to set new targets going forward.

4.8 The results of the travel survey will be uploaded to STAR (School Travel Accredited and Recognised). STAR is a strategic framework that encourages and rewards schools to adopt safer and active travel behaviour. The STAR Accreditation Scheme recognises and rewards schools at one of three levels with travel plans that not only promote safe and active travel but achieve it as well.

Residential use travel survey

4.9 A baseline travel survey will be undertaken once 75% of units are occupied or six months after first occupation and the FTP will be updated accordingly.

4.10 A questionnaires could be distributed to residents asking them about their travel patterns in order to determine a full modal split. The questionnaire based survey will aim to achieve a minimum response rate of 30% from residents. To seek to achieve this, an advanced warning letter will be issued to residents explaining the need for the surveys as part of the Travel Plan. A reminder postcard could be issued to encourage residents to complete the questionnaires. The first survey will be used to establish the baseline modal split.

5. TRAVEL PLAN OBJECTIVES AND TARGETS

5.1 This section outlines the overarching objectives and the proposed targets.

Aims and Objectives

5.2 This Framework Travel Plan sets out a holistic package of measures aimed at encouraging environmentally sustainable travel choices. The objective is to bring together a co-ordinated approach to encourage the use of non-car transport modes and further encourage walking and cycling modes.

5.3 The implementation of this Framework Travel Plan supports national, regional and local planning legislation which emphasises the importance of sustainable travel. The main objectives of this Framework Travel Plan are set out below in the context of DfT and TfL guidance on Travel Plans:

1. Encourage residents, staff, students and commercial occupiers to make well-informed and sustainable decisions about the way they travel to and from the development;

2. Ensure that residents, staff, students and commercial occupiers are aware of the range of travel choices available to them and address needs for access to a full range of facilities and services – for health, leisure, recreation and shopping;

3. Promote healthy lifestyles and sustainable, vibrant local communities by promoting the health benefits of walking and cycling, and raising awareness on the impacts of transport modes on the environment;

4. Reduce traffic generated by the development by discouraging private car and taxi use; and

5. To promote sustainable practices for the delivery of goods.

Targets

5.4 Targets are used to measure the success of the TP and should be SMART targets. Smart Targets are: Specific, Measurable, Achievable, Realistic and Time-bound.

5.5 The main target of the Travel Plan will be to minimise car trips made to and from the development and to promote the use of alternative, sustainable travel modes. Additional targets could also include:

- Increasing the mode share of cycling to work/ college by 5% within two years of completion of the development.

- Increasing the mode share of employees/students walking to work/school by 10% within one year of the baseline survey being undertaken.

- 80% of residents/employees of the development to be aware of the Travel Plan within three months of full occupation.

- There will be no more than one return residential vehicle trip per day per unit.

6. PROPOSED SCHOOL TRAVEL PLAN MEASURES

6.1 A Travel Plan Co-ordinator (TPC) will be appointed who will be responsible for implementing, managing and promoting the FTP to the schools. This FTP will form the basis from which each school based within the development can prepare their own full Travel Plan's. The measures set out in this FTP could be used by the schools.

6.2 Measures set out below contribute to increasing the use of sustainable transport by the users of the site.

Walking & Cycling

6.3 Walking and cycling to the site will be encouraged through schemes such as walk/cycle to school/work week. Such schemes often show students and staff how feasible it is to access the site by walking and cycling when they may have not thought possible. Further encouragement could be provided by the provision of maps showing safe walking and cycling routes to the site and presentations in classes highlighting the health benefits of walking and cycling.

6.4 In accordance to the London Plan FALP (March 2015). To encourage cycling, staff cycle training will be available to encourage safer cycling to the site. LBRuT provides free cycle proficiency training levels 1 and 2 to school years 5 and 6 respectively.

Public Transport

6.5 The schools could offer all staff season ticket loans for public transport use. Students are eligible to receive public transport ticket discount from TfL. More information can be found at http://www.tfl.gov.uk/tickets/default.aspx

Car Travel

6.6 In line with the development plans there will be no allocated on-site parking spaces for students. A total of 220 parking spaces will be provided for staff and visitors of the three schools. The level of visitor and staff parking meets LBRuT maximum parking standards. The proposed provision of parking is lower than what is currently in place relative to staff levels.

Car Clubs

6.7 Car clubs provide a useful alternative to owning a private car. Although the site is education use, a car club car may be beneficial to users of the site who may need the occasional use of a car for work related reasons.

6.8 Zipcar, one of the world's leading car club companies has four car club parking bays within the vicinity of Twickenham Station, one on London Road, March Road, Station Road and Grosvenor Road. More information can be found at http://www.zipcar.co.uk/.

Reducing the Need to Travel

6.9 Teaching staff are usually required to be present on working days, however providing staff with the option to home-working, teleconferencing and flexi working provides flexibility allowing some staff members to reduce their need to travel. This practice should be extended to the proposed site.

6.10 The site will also have a cafeteria and eating facilities for staff and students, further reducing the need to travel away from the site throughout the day.

Management of Deliveries

6.11 To remove the risk of conflict between the students and the servicing vehicles, access will not be permitted between school start and finish times.

6.12 The school websites could have information for suppliers providing details of the site whereabouts, the location of servicing bays and the time periods they can access the development. A link to the a map showing the Transport for London Road Network will also be available to encourage suppliers to use the capital's strategic road network rather than local roads.

7. PROPOSED TECH HUB TRAVEL PLAN MEASURES

Marketing and promotion

7.1 A TPC will be appointed who will be responsible for implementing, managing and promoting the FTP to commercial occupier (intended to be Haymarket Publishing) of the site. This FTP will form the basis from which the company based within the proposed Tech Hub can prepare their own full Travel Plan's. The measures set out in this FTP could be used by future Tech Hub occupiers.

7.2 The TPC will advise the commercial occupiers of the Tech Hub on implementing a range of marketing measures to ensure that all building users are aware of their role in achieving the aims of the FTP and to help to encourage new employees to use sustainable travel alternatives. The following are examples of such measures:

- ***Website:*** Providing information on the location of the nearest transport links, including local buses and rail stations, cycling routes and Car Club bays on the company website. Information on the purpose of the FTP would also be provided along with the strategies and measures implemented. This would encourage visitors, new members of staff (and potentially interviewees seeking employment) to use sustainable modes of transport.

- ***Intranet:*** In addition to the company website, travel information could also be provided on the occupier's intranet which would be accessible by staff. This would provide more targeted information, such as cycle facilities and promotional events.

- ***Notice boards***: Provision of notice boards in the entrance foyers, clearly displaying the information to staff and visitors. This would provide travel information and updates on improvements and any proposed measures. The notice boards would keep employees and visitors up-to-date with changes in the travel options available which would keep them travelling by sustainable modes and to encourage others to use such modes either for the first time or on a more regular basis.

- ***Forum meetings***: Holding bi-yearly Travel Plan forum meetings or staff meetings within the development to discuss transport matters and any suggested improvements that could be put forward to the TPC. These meetings could be more regular during the early stages of occupation to

help identify the perceived barriers to travelling by certain modes and ways to overcome such barriers at the outset. First forum meeting will be organised by the TPC.

Information packs

7.3 A Travel Information Pack could be prepared by the commercial occupiers in collaboration with the TPC, who will advise them with regards to the sustainable transport modes available. The provision of such information is essential in fostering sustainable travel habits early, before employees settle into unsustainable habits when a sustainable alternative may be more suitable.

7.4 The Travel Information Packs are expected to include the following:

- an explanation of the FTP, its purpose, aims and objectives;
- contact details for the site management team;
- information on the local amenities and services including the location of the nearest car club (Zipcar) bays;
- information on the health benefits of walking and a map showing the accessible areas on foot within typical journey times;
- TfL cycle network maps relevant to Richmond upon Thames including a map of the nearby cycle ways and information on the cycle tools in TfL journey planner;
- information on cycle training available to people working in LBRuT.
- information on travel planning website services such as TfL and DfT journey planners, to raise awareness of transport options, and alternatives in case of delays or cancellations; and
- train and bus service maps and timetables, including late night travel advice, to highlight the services available.

Initiatives to reduce car use and the need to travel

7.5 The provision of a secure cycle parking together with changing rooms and shower facilities will encourage employees to cycle to work rather than commute by car.

7.6 Further methods to reduce the need to travel include conference calling, this lets employees attend meetings in their own office mitigating the need to travel.

Employees who are provided with remote login services have more flexibility allowing them to work from home or other locations removing the need to travel.

Measures to encourage cycling

7.7 Cycling forms an important part of the Mayor's Transport Strategy for London, particularly as the road network and public transport network become more congested and the challenge to provide additional capacity becomes more difficult. It is often the fastest mode of travel in congested networks and offers opportunities for exercise and the associated health benefits. It has the potential to form an important role with regards to short local trips as well as longer trips to employment and leisure locations within central London and the surrounding areas.

7.8 As part of the Travel Information Pack, information could be provided to employees showing the areas within cycling distance of Richmond Education and Enterprise Campus. This will complement the London Cycle Network Maps that will also be provided in the information pack. Occupiers will also be made aware by the TPC of the additional cycle tools available using the TfL journey planner software.

7.9 The TPC will also advise the occupiers on the following measures that could encourage cycling by the staff:

- ***Route maps***: Provision of cycle route maps to staff so that they are aware of the opportunities available to them.
- ***Cycle training***: Provision of information on cycle safety training or refresher courses offered by the Council and privately, for less confident cyclists to encourage them to take up cycling within 12 months of first occupancy. The aim of the courses will be for new cyclists to gain confidence to use London's busy roads as well as advising on good cycling techniques, so encouraging staff to take up cycling.
- ***Bikes4Work scheme***: Provision of interest free loans to purchase a bicycle free of tax to their staff.
- ***Bicycle Users Group***: Setting up a bicycle users group for employees to provide a useful forum to bring together cyclists within the development so that they can share best practice and information, and organise

promotional events. This forum could also encourage experienced cyclists to become a 'buddy' for new or less confident cyclists.

- ***Promotional events:*** Promotion and organising events to encourage staff to cycle to work. These could include service and repair sessions, free breakfasts for cyclists and promoting National Bike Week.

Promotion of public transport

7.10 The TPC will inform the occupiers regarding the following initiatives that could be considered to assist building users to use the public transport network:

- ***Route maps***: Making public transport information, including bus route maps and timetables, available to all staff to highlight the services available. In particular, this would assist in informing staff of the most efficient way to travel to meetings and other business-related journeys.

- ***Travel Planning Service***: Organising personalised staff travel planning sessions to provide information, such as those provided by TfL and DfT online journey planners to raise awareness of transport options, and alternatives in case of delays or cancellations.

- ***Interest-free season ticket loans***: Provision of interest-free season ticket loans to staff. This would reduce the financial burden of travelling by public transport.

Promotion of sustainable practices for deliveries

7.11 The baseline survey will collect information on the delivery patterns and the TPC will advise the occupiers about the following measures that could be implemented to make the servicing operations more sustainable:

- ***Consolidating deliveries***: Discussing the feasibility of consolidating deliveries which would involve combining and reducing the number of vehicle trips with the delivery operators.
- ***Green vehicles***: Use of hybrid, electric and other low carbon emission vehicles that are less harmful to the environment. Encouraging the use of delivery and collection companies which use green vehicles.
- ***Time restrictions***: Restricting deliveries taking place during the peak traffic hours to help reduce congestion on local roads.

8. PROPOSED RESIDENTIAL TRAVEL PLAN MEASURES

8.1 This chapter sets out measures which could be implemented to bring together a co-ordinated approach to encourage Travel Plan residents use to sustainable modes of transport.

Physical Design

8.2 'Hard' engineering measures will be incorporated into the design of the development which will influence travel patterns, and will have a significant impact upon reducing dependence upon the private car from the outset. It should be noted that appropriate hard engineering measures will be provided during the construction and landscaping within the development prior to occupation and will be funded by the developer.

8.3 *Electric car charging points* – Electric car charging points will be available within the development car park. A minimum provision of 20% of car parking bays will be fitted with electric vehicle charging points (EVCP). A further 20% of spaces will have a passive EVCP provisions enabling further electric car charging facilities to be provided readily following a request from residents in the future.

8.4 Cycle parking provision - The proposed development will provide secure cycle parking which will meet the London Plan (March 2015) minimum standards.

Provision of Travel Information

8.5 Informing future residents of the range of travel choices available to them and the Travel Plan measures which will be implemented at the development will be key to the success of the Travel Plan. The ways in which travel information would be provided are set out below. Electronic versions of the travel information could also be made available.

8.6 Travel Information Pack - containing travel information would be provided to each household and commercial occupier before they move into the development. Providing this information in advance ensures that residents become aware of the various modes of transport and existing services that are available to them at the earliest opportunity.

8.7 The packs are expected to include the following:

- an explanation of the Travel Plan, its purpose, aims and objectives;
- contact details for the estate management team;
- information on the local amenities and services including the location of the nearest car club bay;
- information on the health benefits of walking and a map showing the accessible areas on foot within typical journey times;
- TfL cycle network maps relevant to Richmond including the map of the nearby cycle superhighway and information on the cycle tools in TfL journey planner;
- information on cycle training available to people living or working in LBRuT.
- information on travel planning website services such as TfL and DfT journey planners, to raise awareness of transport options, and alternatives in case of delays or cancellations; and
- train and bus service maps and timetables, including late night travel advice, to highlight the services available.

8.8 Community noticeboards - providing travel and community information to residents within the site would be placed in convenient locations. Maps of the immediate local area will be displayed on the communal notice boards identifying locations of cycle parking, car club bays and public transport service access points. The noticeboards will also be used to inform residents of any new travel initiatives or events organised by the TPCs.

8.9 Personalised Journey Planner - To further inform residents of the travel options available, the TPC could discuss travel requirements with residents and provide information on possible routes for residents travelling to work, schools and other key facilities. The personalised journey planning service would also extend to the cover the specific journey planning requirements of mobility impaired persons residing within the site.

Initiatives to encourage walking

8.10 To further encourage walking as a main mode of transport for local trips, the following measures could be implemented by the TPCs:

- *Promotional material* - Walking will be promoted within the Travel Packs which will be issued to residents. This could include the health benefits of walking and highlight the network of walking routes in the local area.

Initiatives to encourage cycling

8.11 The proposed development will include cycle parking facilities and cycle information will be provided to residents within their Travel Packs. The Travel Plan measures to encourage cycling could include:

- *Cycle parking* - The proposed development will provide secure cycle parking which will meet the London Plan (March 2015) minimum standards, this provision will include spaces for visitors.

- *Cycle maps and routes* - Cycle information, including cycle maps showing key routes and other facilities such as local cycle parking locations and cycle shops, would be provided to residents in their Travel Packs and also on the community noticeboards.

- *Cycle training* – LBRuT offer cycle training to anyone who works, studies or live in the borough. The training is one to one and costs £10 for a 90 minute sessions. This will help new cyclists to gain confidence and develop skills. This helps them to understand and cycle the safest and most convenient route. The cycle training would be promoted by the SMT / TPCs.

Initiatives to encourage the use of public transport

8.12 The site is accessible by public transport and has a PTAL of 1b/2. Future residents will be made aware of the full range of buses, national rail and LUL services available to them through the following measures:

- *Promotional material* - Public transport information, such as route maps, timetables and fares, would be included in the Travel Packs.

- *Journey planners* – Links to the TfL and National Rail journey planners will be promoted within the Travel Packs.

9. MANAGEMENT, MONITORING AND ACTION PLAN

Travel Plan Co-ordinator

9.1 A Travel Plan Co-ordinator (TPC) will be appointed to oversee the FTP for the whole development and to liaise with key staff at each of the occupiers of the development i.e. College, Secondary School, Special Needs School, Residential and 'Tech Hub', who will be responsible for implementing, managing and promoting Travel Plans in their organisations/residents.

9.2 The responsibilities of the TPC's would include the following:

- Implement the various marketing and promotional measures and campaigns as set out in the full Travel Plan.
- Liaise with the occupiers to ensure they are aware of the objectives and initiatives of the full Travel Plan.
- Produce up-to-date information on walking, cycling and public transport.
- Undertake manual ad-hoc inspections to monitor the use of car and cycle parking.
- Coordinate the travel surveys and monitor reports prepared by the various occupiers of the development.
- Produce a Travel Plan summary reports for the development at intervals agreed with Richmond Council.

Monitoring

9.3 The monitoring of the TP will be undertaken in line with the iTRACE compliant methodology. Therefore, a workplace, school and residential iTRACE travel survey will be undertaken within six months of occupation or when 75% of the developments have been occupied (whichever comes soonest). This will ascertain the baseline travel patterns and help set travel mode split targets. The actual targets will be set following the result of the initial survey.

9.4 The surveys will be commissioned by TPC and will take place in years 1, 3 and 5 after the initial baseline survey. The TPC will examine the survey results against the Travel Plan targets and produce a monitoring report which will be submitted to LBRuT for input into iTRACE.

Action plan

9.5 This section includes a check list of the proposed measures detailing who will be responsible for ensuring that the actions identified in previous sections are delivered. The Action Plan is included in Table 9.1. The proposed measures have been linked to the overall objectives of the FTP. This action plan has been design for the overall proposed development, the action plans in the Travel Plans produced for each of the uses will be more detailed.

Table 9.1: Action Plan

Objective	Measures/Actions	When	By Whom
Raise awareness of sustainable modes of travel available	Appoint named Travel Plan Co-ordinator.	Prior to first occupation	Developer
	Provide Information Packs.	Upon occupation	TPC
	Provide Information Packs.	Upon occupation	TPC
To ensure Travel Plan is monitored and targets are being met.	Ensure baseline surveys are undertaken by the occupiers of the various elements of the development	Within agreed periods following occupation or when 75% of units are occupied	TPC
	Ensure TRAVL compliant survey and monitoring reports are prepared	Years 1, 3 and 5 following the baseline surveys of each occupier	TPC

10. SECURING, ENFORCEMENT AND FUNDING

Enforcement

10.1 The Travel Plan for each element of the development will be reviewed after five years at which point if targets have not been achieved, possible amendments will be agreed between LBRuT, the TPC and the operator of the College/Secondary School/Special Educational Needs School/Tech Hub or Residential development.

Funding and securing the Travel Plan

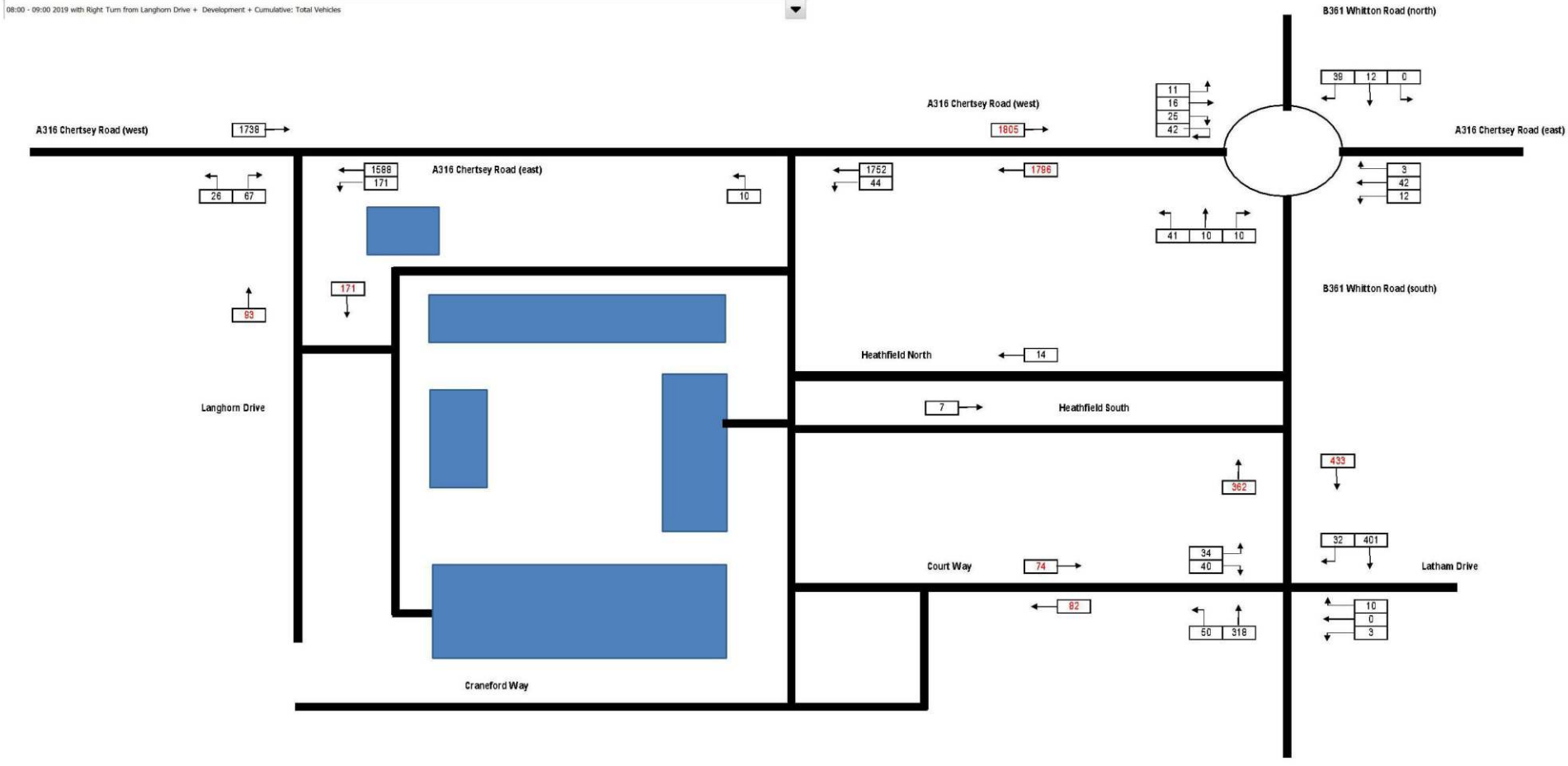
10.2 The Travel Plan for each element of the development will be secured through planning conditions / s.106 obligations arising from the detailed and outline planning applications for the separate elements of the development proposals.

10.3 The Travel Plan measures will be funded by the operators of the various elements of the development / the developer of Residential site.

Appendix 8.6: 2019 Completed Development + Cumulative Traffic Flow Diagrams

30713 Richmond Education and Enterprise Campus

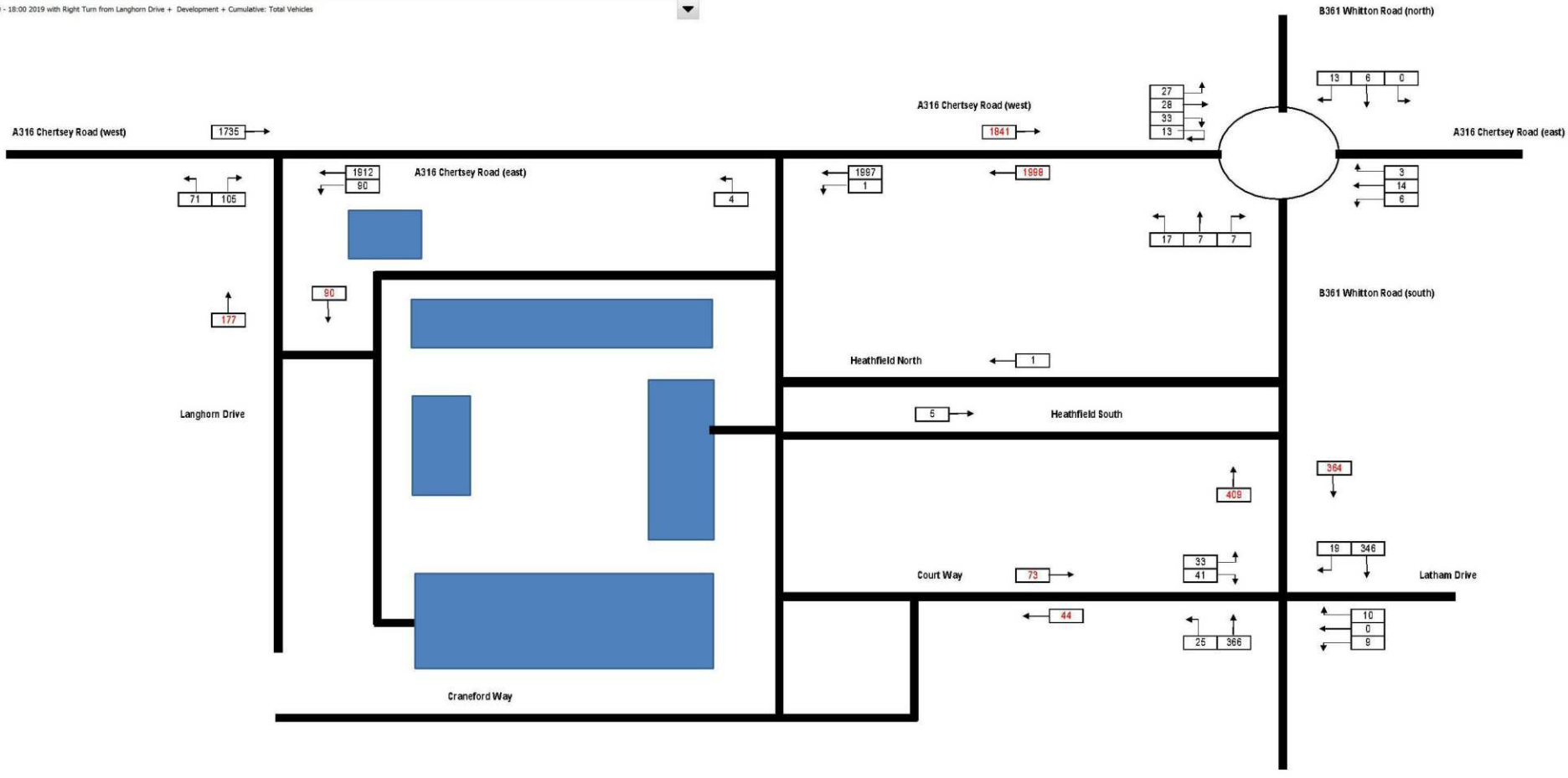
08:00 - 09:00 2019 with Right Turn from Langhorn Drive + Development + Cumulative: Total Vehicles



30713 Richmond Education and Enterprise Campus

17:00 - 18:00 2019 with Right Turn from Langhorn Drive + Development + Cumulative: Total Vehicles

17:00 - 18:00 2019 with Right Turn from Langhorn Drive + Development + Cumulative: Total Vehicles



Appendix 8.7: 2034 Cumulative Traffic Flow Diagrams

CHAPTER 9 – APPENDICES

CONTENTS

Appendix 9.1: Detailed Results of Baseline Noise Measurements

1. Long Term Measurements on College Roof

Date	Time	LAeq	LAmax	LA1	LA10	LA90
		dB	dB	dB	dB	dB
24-Apr	1030	59.4	73.2	66.6	61.5	56.0
	1130	58.6	72.0	67.2	60.7	55.2
	1230	59.2	75.3	71.3	61.0	55.5
	1330	58.7	69.3	66.0	60.8	55.4
	1430	60.1	73.2	70.2	62.2	56.2
	1530	60.4	74.1	70.4	62.4	56.6
	1630	58.8	79.3	72.7	60.9	54.9
	1730	58.5	69.7	66.5	61.2	53.9
	1830	60.8	69.1	66.9	62.9	56.8
	1930	60.9	75.4	71.2	62.9	57.4
	2030	60.1	70.4	66.5	62.3	56.3
	2130	62.8	81.6	79.0	63.0	55.0
	2230	64.5	81.2	79.1	67.4	53.2
	2330	56.0	66.9	64.5	59.2	49.8
25-Apr	0030	54.3	73.8	68.1	57.4	46.5
	0130	51.6	62.1	61.0	55.6	45.6
	0230	51.4	66.4	63.8	55.1	44.3
	0330	52.9	67.0	64.3	56.7	45.7
	0430	55.5	66.2	63.8	59.0	50.2
	0530	60.9	77.0	73.2	63.1	55.1
	0630	63.2	77.8	73.3	65.2	59.2
	0730	63.0	73.5	70.8	65.0	59.5
	0830	62.3	77.7	72.6	64.5	57.8
	0930	62.1	71.6	69.3	64.2	58.5
	1030	62.3	80.9	73.6	64.1	58.4
	1130	62.6	75.1	72.6	64.3	59.1
	1230	62.4	77.0	74.7	64.0	58.4
	1330	63.8	81.2	79.3	64.6	59.2
	1430	63.3	81.3	76.2	64.6	59.0
	1530	60.3	77.8	74.6	62.1	56.3
	1630	60.4	82.3	75.9	61.8	56.9
	1730	60.4	70.9	67.6	62.5	57.2
	1830	62.2	70.0	67.6	64.3	58.8
	1930	62.7	79.6	73.1	64.7	59.2
	2030	61.4	75.9	68.2	63.6	57.8
	2130	60.2	67.4	66.6	62.6	56.2
	2230	59.0	74.3	71.6	61.6	53.8
	2330	57.1	72.7	64.8	60.0	50.0
26-Apr	0030	55.3	65.8	63.9	58.6	47.6
	0130	53.3	66.0	62.8	57.0	46.5

Date	Time	LAeq	LAmax	LA1	LA10	LA90
		dB	dB	dB	dB	dB
	0230	51.2	66.0	61.2	55.2	44.9
	0330	51.4	64.9	63.0	55.2	46.1
	0430	54.2	69.7	65.0	57.5	48.9
	0530	56.8	76.3	72.7	59.0	50.1
	0630	62.5	83.8	79.8	63.5	54.3
	0730	62.9	80.9	76.6	65.8	56.0
	0830	64.0	82.8	80.7	65.9	56.5
	0930	62.0	82.6	78.7	62.9	56.2
	1030	62.8	85.8	81.9	61.4	54.3
	1130	57.7	69.8	66.3	59.9	54.4
	1230	56.4	72.2	64.8	58.6	52.7
	1330	55.8	69.4	62.0	58.0	52.2
	1430	56.2	69.7	66.7	58.8	50.9
	1530	58.2	73.1	69.0	60.7	53.6
	1630	59.2	79.0	73.1	61.1	54.8
	1730	62.6	85.2	80.8	62.8	51.0
	1830	62.1	84.4	80.0	63.2	54.3
	1930	61.4	80.3	76.4	63.7	54.1
	2030	61.1	81.0	78.2	62.1	53.1
	2130	65.6	84.1	80.9	69.1	53.1
	2230	62.1	83.4	79.3	63.9	52.4
	2330	57.9	77.5	74.4	59.7	50.8
27-Apr	0030	55.2	64.3	62.9	58.4	48.7
	0130	54.5	75.7	68.1	57.8	46.9
	0230	52.8	65.6	62.6	56.5	45.0
	0330	52.8	65.3	62.9	56.3	46.3
	0430	53.8	67.4	63.8	57.2	47.1
	0530	56.0	77.6	72.4	58.7	49.7
	0630	60.2	80.7	75.0	61.9	52.2
	0730	61.2	78.9	74.5	63.7	54.9
	0830	63.9	80.6	78.7	66.1	57.4
	0930	62.6	81.6	76.8	63.9	57.6
	1030	62.5	83.1	78.0	63.4	56.4
	1130	63.4	82.2	78.6	65.3	57.5
	1230	64.3	83.8	80.6	65.9	57.4
	1330	63.6	80.3	77.1	66.2	57.6
	1430	64.1	81.9	79.3	66.0	57.6
	1530	63.9	81.0	77.7	66.2	58.0
	1630	64.3	86.2	81.6	66.0	57.8
	1730	63.1	78.9	75.4	64.9	58.4
	1830	63.6	83.6	78.4	65.0	58.2
	1930	62.4	78.7	74.2	64.7	57.5

Date	Time	LAeq	LAmax	LA1	LA10	LA90
		dB	dB	dB	dB	dB
	2030	61.9	78.9	75.7	63.9	55.9
	2130	64.5	84.3	79.7	67.0	54.7
	2230	61.1	80.8	78.2	62.5	51.9
	2330	54.8	65.6	63.7	58.2	49.0
28-Apr	0030	52.9	67.6	63.4	56.6	47.8
	0130	51.2	66.4	62.7	55.3	46.3
	0230	50.5	65.5	62.0	54.6	45.7
	0330	51.7	67.2	63.0	55.4	45.9
	0430	56.3	76.1	65.6	59.4	49.9
	0530	60.8	72.9	69.9	63.4	55.6
	0630	63.4	76.5	73.5	65.3	59.3
	0730	63.0	78.5	75.2	64.8	58.6
	0830	63.5	80.2	76.9	65.6	58.0
	0930	62.9	78.5	75.3	64.5	58.1
	1030	63.4	82.1	78.5	64.0	57.3
	1130	62.7	82.9	78.5	63.7	57.5
	1230	64.4	84.5	80.9	64.8	56.9
	1330	62.6	81.5	78.0	63.8	57.1
	1430	61.9	81.6	75.7	63.6	56.7
	1530	63.1	79.6	76.3	64.8	57.3
	1630	62.8	78.2	75.3	64.7	57.7
	1730	62.3	78.5	75.7	64.0	57.1
	1830	62.5	80.9	76.5	64.1	57.4
	1930	61.5	77.0	73.7	63.9	55.3
	2030	61.6	81.5	78.4	61.7	53.5
	2130	63.9	83.8	79.4	65.2	53.1
	2230	57.7	70.0	65.7	60.8	50.9
	2330	56.2	66.1	64.0	59.5	48.1
29-Apr	0030	53.1	71.4	63.3	56.8	46.6
	0130	52.7	79.0	69.4	56.4	47.0
	0230	52.2	64.1	61.9	56.1	44.9
	0330	52.9	65.0	62.0	56.4	45.2
	0430	57.3	68.8	65.6	60.6	49.5
	0530	61.4	75.9	72.0	63.8	56.4
	0630	63.6	79.4	75.6	65.2	58.1
	0730	62.6	80.3	74.7	64.5	56.8
	0830	62.4	81.3	77.6	64.0	54.3
	0930	63.2	85.5	78.1	64.4	54.7
	1030	64.1	81.7	78.6	65.3	57.3
	1130	62.2	82.2	76.9	63.4	57.0
	1230	64.9	86.0	82.1	65.5	57.7
	1330	62.7	79.5	77.3	64.0	57.6

Date	Time	LAeq	LAmax	LA1	LA10	LA90
		dB	dB	dB	dB	dB
	1430	64.8	88.8	83.9	65.2	57.4
	1530	63.4	86.8	78.5	64.4	57.0
	1630	62.8	80.3	75.6	64.7	55.6
	1730	64.1	78.7	75.3	65.2	61.8
	1830	64.3	80.7	77.3	65.7	59.6
	1930	64.7	81.2	75.9	66.4	60.7
	2030	65.0	87.1	85.8	63.8	55.3
	2130	64.9	84.0	80.3	66.8	54.4
	2230	62.2	83.1	77.6	63.0	51.2
	2330	54.5	68.9	64.4	57.9	49.7
30-Apr	0030	56.2	76.3	75.0	57.3	48.0
	0130	52.3	65.0	63.5	56.2	46.7
	0230	51.5	66.4	63.0	55.5	45.9
	0330	52.7	65.7	63.0	56.5	45.6
	0430	57.3	70.9	66.7	61.0	49.9
	0530	60.8	70.4	67.4	63.5	55.3
	0630	61.7	72.7	68.1	63.9	57.3
	0730	61.4	76.6	72.2	64.0	55.8
	0830	61.6	74.0	68.7	63.8	57.1
	0930	63.1	72.0	69.4	64.5	61.3
	1030	63.1	73.5	68.3	64.4	61.6
	1130	62.9	74.2	69.2	64.3	61.3
	1230	62.6	71.1	67.7	63.9	61.2
	1330	61.3	71.5	68.2	63.6	56.3
	1430	58.0	70.9	66.4	60.1	54.8
	1530	58.2	80.9	71.5	59.8	54.6
	1630	56.4	72.7	63.2	58.7	53.1
	1730	56.7	71.9	66.4	59.1	53.0
	1830	58.5	72.6	69.3	60.8	54.0
	1930	58.9	71.5	67.2	61.0	55.3
	2030	58.7	73.5	69.4	60.9	54.2
	2130	58.2	67.1	64.5	60.8	53.5
	2230	57.9	73.1	68.2	60.6	52.6
	2330	55.5	73.8	68.9	58.5	47.8
01-May	0030	52.2	66.2	62.0	56.0	47.0
	0130	51.6	63.4	61.8	55.6	46.1
	0230	50.8	62.6	60.8	54.9	45.0
	0330	53.2	67.8	64.2	57.1	45.7
	0430	57.5	68.9	66.7	60.9	48.2
	0530	61.2	71.6	67.9	63.9	56.1
	0630	62.3	70.7	68.4	64.5	58.3
	0730	61.5	79.1	75.3	63.4	57.1

Date	Time	LAeq	LAmax	LA1	LA10	LA90
		dB	dB	dB	dB	dB
	0830	61.1	74.2	70.5	63.6	57.1
	0930	61.4	77.7	70.0	63.3	58.1

2. 24 Hour Measurement at Craneford Road Boundary, 1-2 May 2014

Time	LAeq	LAmax	LA1	LA10	LA90
	dB	dB	dB	dB	dB
1330	59.0	80.6	78.3	58.3	43.0
1430	62.1	82.8	79.5	64.5	41.7
1530	59.0	76.6	73.9	62.5	37.9
1630	58.8	84.2	75.5	62.4	40.2
1730	59.0	76.9	72.4	62.9	39.9
1830	56.7	77.5	73.0	59.7	41.3
1930	56.6	80.5	73.1	60.2	39.7
2030	54.5	74.3	71.7	58.1	39.2
2130	55.4	80.4	75.3	53.9	38.0
2230	59.6	80.1	77.5	62.6	41.2
2330	55.2	76.8	73.7	51.0	36.9
0030	35.6	54.4	46.1	37.2	33.4
0130	33.8	46.7	43.5	35.6	31.2
0230	32.7	42.8	40.3	34.5	30.4
0330	37.1	53.4	48.2	39.9	32.3
0430	60.7	81.9	76.5	64.0	38.6
0530	58.0	79.0	74.6	60.3	41.5
0630	56.0	80.7	73.2	58.4	43.3
0730	58.8	78.6	75.3	61.9	43.6
0830	58.7	78.6	75.3	61.5	44.2
0930	57.2	79.9	76.4	59.2	41.6
1030	58.9	86.8	76.8	60.0	42.1
1130	57.6	78.8	75.9	58.0	42.1
1230	60.9	82.3	79.8	61.8	43.5

3. 24 Hour Measurement at Egerton Road Boundary, 2-3 May 2014

Time	LAeq	LAmax	LA1	LA10	LA90
	dB	dB	dB	dB	dB
1300	61.5	82.5	78.6	59.7	44.4
1400	63.4	82.2	79.8	66.3	44.4
1500	60.6	75.0	73.9	64.0	39.3
1600	59.9	85.4	75.7	63.5	41.4
1700	61.3	77.4	72.5	64.4	42.7
1800	58.0	77.1	73.1	60.7	43.5
1900	58.1	79.7	73.4	62.0	41.2
2000	55.9	72.3	72.5	60.0	41.9
2100	58.4	79.6	75.8	55.4	39.2
2200	62.4	81.5	78.2	64.0	42.6
2300	56.7	78.0	74.5	53.0	38.1
0000	38.5	54.0	47.0	38.4	36.2
0100	35.7	46.9	43.8	37.5	34.0
0200	35.3	44.0	40.9	36.2	31.9
0300	38.7	53.0	48.9	41.5	34.4
0400	63.0	83.7	77.3	65.6	39.6
0500	59.7	78.5	75.2	61.4	43.2
0600	58.3	80.2	73.4	59.4	45.5
0700	61.7	78.9	75.5	63.9	45.1
0800	59.7	78.2	75.8	63.3	46.6
0900	59.1	79.1	77.2	61.1	42.9
1000	61.2	88.3	77.5	61.7	45.1
1100	60.3	80.1	75.9	60.0	44.2
1200	63.4	84.1	80.8	63.4	45.0
1300	60.6	73.8	73.3	64.3	44.9

4. Attended Measurements on A316 Boundary

Date	Time	LAeq	LAmax	LA1	LA10	LA90
24-Apr	1030	69.3	76.5	74.5	72.6	62.2
	1130	69.2	76.4	74.2	72.1	63.9
	1230	69.0	76.4	74.4	72.2	62.4
	1330	69.7	77.7	75.1	72.4	65.1
	1430	68.9	76.0	74.0	71.8	62.5
	1530	69.5	76.8	74.3	72.7	64.2
02-May	2300	64.7	75.8	73.0	67.6	54.8
	0000	64.2	76.3	74.1	67.8	51.6
	0100	61.0	71.2	68.6	64.7	48.5
	0200	59.5	73.5	70.4	62.3	46.1
	0300	61.2	70.9	69.1	63.9	44.3
	0400	64.6	76.2	74.2	67.5	52.1
	0500	66.3	77.1	74.8	70.1	59.7
	0600	67.8	77.3	75.0	71.3	61.9

5. Attended Measurements at Heatham Park

Time	LAeq	LAmax	LA90
1000	48.7	62.7	41.7
1100	48.5	63.6	43.2
1200	48.1	55.8	44.0
1300	51.0	61.8	43.7
1400	47.8	58.7	42.6
1500	48.0	63.0	38.9
1600	47.2	60.3	40.5
1700	51.0	62.8	41.3
1800	52.1	67.3	43.7

6. Attended Measurements at Egerton Road South

Time	LAeq	LAmax	LA90
0930	56.6	71.0	45.9
1030	55.1	67.2	42.5
1130	56.4	75.7	44.5
1230	54.3	65.8	46.1
1330	53.6	67.9	42.3
1430	50.9	62.1	44.3
1530	59.4	74.7	45.7
1630	54.4	64.5	47.4
1730	52.8	60.9	46.8

Appendix 9.2: Plant used for Construction Noise Calculations

Plant used for construction noise calculations

PHASE	ACTIVITY	TYPICAL PLANT	BS5228 Ref.	NO.	Source at 10m	% on time
Phase 1						
1b	Demolition	Excavator+muncher	C1.4	1	76	75
		Backhoe Excavator	C1.1	1	82	10
		Breakers	C2.11	1	79	50
		Tracked Crusher	C1.14	1	82	50
		10t Dumper	C4.4	2	76	25
		Mobile Crane	C4.30	1	80	20
		Cherry picker	C4.54	1	79	30
		Generator	C6.39	1	65	75
		Hand tools		4	65	75
		Cutting Plant	C4.91	1	78	25
1b	Haul Road	Excavator 8t	C2.16	2	72	75
		Roller	C2.39	2	74	25
		Dozer	C2.13	1	78	50
		Mini Excavator	C4.68	1	65	75
		Dumper 10t	C4.4	2	76	50
		Excavator loader	C1.12	1	82	25
1c	Construction	Roller	C2.39	1	74	30
		Generator	C4.83	1	65	100
		Concrete Truck/Pump	C4.28	1	75	30
		Cherry picker	C4.54	1	79	30
		Excavator 16t	C2.39	1	74	30
		Excavator 8t	C2.16	2	72	75
		Roller	C2.39	1	74	25
		Telehandler	C4.54	1	79	30
		Excavator loader	C1.12	1	82	50
		Hammer drills	C4.69	1	85	10
		CFA Rig	C12.42	1	81	20
		Mobile Crane	C4.30	1	80	20
1e	Demolition	Excavator+muncher	C1.4	1	76	75
		Backhoe Excavator	C1.1	1	82	10
		Beakers	C2.11	1	79	50
		Tracked Crusher	C1.14	1	82	50
		10t Dumper	C4.4	2	76	25

PHASE	ACTIVITY	TYPICAL PLANT	BS5228 Ref.	NO.	Source at 10m	% on time
		Mobile Crane	C4.30	1	80	20
		Cherry picker	C4.54	1	79	30
		Generator	C6.39	1	65	75
		Hand tools		4	65	75
		Cutting Plant	C4.91	1	78	25
Phase 2						
2a	Construction	Roller	C2.39	1	74	30
		Generator	C4.83	1	65	100
		Concrete Truck/Pump	C4.28	1	75	30
		Cherry picker	C4.54	1	79	30
		Excavator 16t	C2.39	1	74	30
		Excavator 8t	C2.16	2	72	75
		Roller	C2.39	1	74	25
		Telehandler	C4.54	1	79	30
		Excavator loader	C1.12	1	82	50
		Hammer drills	C4.69	1	85	10
		CFA Rig	C12.42	1	81	20
		Mobile Crane	C4.30	1	80	20
2a	Pitches	Excavator 8t	C2.16	2	72	75
		Roller	C2.39	2	74	25
		Dozer	C2.13	1	78	50
		Mini Excavator	C4.68	1	65	75
		Dumper 10t	C4.4	1	76	50
		Excavator 16t	C2.39	1	74	30
2b	Construction	Roller	C2.39	1	74	30
		Generator	C4.83	1	65	100
		Concrete Truck/Pump	C4.28	1	75	30
		Cherry picker	C4.54	1	79	30
		Excavator 16t	C2.39	1	74	30
		Excavator 8t	C2.16	2	72	75
		Roller	C2.39	1	74	25
		Telehandler	C4.54	1	79	30
		Excavator loader	C1.12	1	82	50
		Hammer drills	C4.69	1	85	10
		CFA Rig	C12.42	1	81	20

PHASE	ACTIVITY	TYPICAL PLANT	BS5228 Ref.	NO.	Source at 10m	% on time
		Mobile Crane	C4.30	1	80	20
2d	Demolition	Excavator+muncher	C1.4	1	76	75
		Backhoe Excavator	C1.1	1	82	10
		Beakers	C2.11	1	79	50
		Tracked Crusher	C1.14	1	82	50
		10t Dumper	C4.4	2	76	25
		Mobile Crane	C4.30	1	80	20
		Cherry picker	C4.54	1	79	30
		Generator	C6.39	1	65	75
		Hand tools		4	65	75
		Cutting Plant	C4.91	1	78	25
Phase 3						
3a	Construction	Roller	C2.39	1	74	30
		Generator	C4.83	1	65	100
		Concrete Truck/Pump	C4.28	1	75	30
		Cherry picker	C4.54	1	79	30
		Excavator 16t	C2.39	1	74	30
		Excavator 8t	C2.16	2	72	75
		Roller	C2.39	1	74	25
		Telehandler	C4.54	1	79	30
		Excavator loader	C1.12	1	82	50
		Hammer drills	C4.69	1	85	10
		CFA Rig	C12.42	1	81	20
		Mobile Crane	C4.30	1	80	20
3b	Construction	Roller	C2.39	1	74	30
		Generator	C4.83	1	65	100
		Concrete Truck/Pump	C4.28	1	75	30
		Cherry picker	C4.54	1	79	30
		Excavator 16t	C2.39	1	74	30
		Excavator 8t	C2.16	2	72	75
		Roller	C2.39	1	74	25
		Telehandler	C4.54	1	79	30
		Excavator loader	C1.12	1	82	50
		Hammer drills	C4.69	1	85	10
		CFA Rig	C12.42	1	81	20

PHASE	ACTIVITY	TYPICAL PLANT	BS5228 Ref.	NO.	Source at 10m	% on time
		Mobile Crane	C4.30	1	80	20
3b	Completion	Roller	C2.39	1	74	30
	Works	Cherry picker	C4.54	1	79	30
		Excavator 16t	C2.39	1	74	30
		Excavator 8t	C2.16	2	72	75
		Roller	C2.39	1	74	25
		Telehandler	C4.54	1	79	30
		Mobile Crane	C4.30	1	80	20

Appendix 9.3: Noise from Sports Activities

Noise from Sports Activities

Extract from a report to Preston Manor Primary School by Sandy Brown Associates, 16 April 2011

4 Sports pitch noise survey review

As part of SBAs involvement in various similar projects, measurements of noise created by various sports pitches at different sites across the country have been taken. The key findings from these surveys are summarised below.

4.1 Adults playing football on synthetic pitches

Noise levels were measured at 'Pitz', Westbank Street, Portobello, Edinburgh. This venue has 8 pitches and is in proximity to a residential areas. Typical noise levels at 12 metres from the pitches with all pitches in operation were L_{Aeq} 58-60 dB.

Noise levels were also measured at Saughtonhall Park, Edinburgh, where two pitches were in use. Typical sound levels at 50 metres from the edge of the pitches were LAeq 48 dB.

4.2 Youth football match played on a grass pitch

Noise levels were measured at Middleshot Square, Prestonpans. One pitch was being used for a football match between two youth teams. Typical sound levels at 30 metres from the goal end of the pitch were L_{Aeq} 48-52 dB.

4.3 School children playing football on synthetic pitches

Noise levels were measured at Coatbridge on a large '3G' synthetic sports pitch. There were three boys' football matches being played simultaneously across the width of the single large pitch. Although they were boys' matches, adult coaches and parents shouting from the sideline were the often the dominant noise sources.

Typical noise levels at 10 metres from the wire mesh fence surrounding the pitches were L_{Aeq} 59-61 dB.

4.4 Summary of noise levels

When all of the above measurement data is corrected to sound pressure levels at the same distance from the noise source, there is good agreement between the various datasets.

The measurements show that there is only a very small difference in noise levels created by adult's and children's matches or when played on grass or synthetic pitches. The measurements also show that the noise levels around sports pitches are reasonably constant and that there is little difference between noise levels measured behind the goals and near the half-way line.

In summary, noise levels around pitches are typically in the region of L_{Aeq} 60 dB and at worst case L_{Aeq} 62 dB at a distance of10 metres.

CHAPTER 10 – APPENDICES

CONTENTS

Appendix 10.1: Atmospheric Dispersion Modelling System (ADMS) Roads Model Input Parameters

Table 1: ADMS-Roads Input Parameters (2014)

Road Link	Existing Baseline		Average Speed (kph)
	AADT	HGV	
A316 EB (west of Langhorn Drive)	22,977	11.7%	40
A316 EB (Langhorn Drive to Chudleigh Road)	22,977	11.7%	60
A316 EB (Chudleigh Road to Whitton Road)	22,977	11.7%	40
A316 WB (Whitton Road to Chudleigh Road)	22,302	9.3%	40
A316 WB (Chudleigh Road to junction approach)	22,302	9.3%	60
A316 WB (junction approach to Langhorn Drive)	22,302	9.3%	40
A316 WB (west of Langhorn Drive)	22,302	9.3%	50
Whitton Road	9,473	7.7%	30
Langhorn Drive	1,934	19.8%	20

Table 2: ADMS-Roads Input Parameters (2019)

Road Link	Baseline		Baseline + Construction + Operational (minus Phase 2 Residential)		Baseline + Operational (Complete)		Average Speed (kph)
	AADT	HGV	AADT	HGV	AADT	HGV	
A316 EB (west of Langhorn Drive)	23,797	11.7%	24,589	11.5%	24,748	11.4%	40
A316 EB (Langhorn Drive to Chudleigh Road)	23,797	11.7%	24,589	11.5%	24,748	11.4%	60
A316 EB (Chudleigh Road to Whitton Road)	23,797	11.7%	24,589	11.5%	24,748	11.4%	40
A316 WB (Whitton Road to Chudleigh Road)	23,098	9.3%	23,702	9.2%	23,860	9.1%	40
A316 WB (Chudleigh Road to junction approach)	23,098	9.3%	23,702	9.2%	23,860	9.1%	60
A316 WB (junction approach to Langhorn Drive)	23,098	9.3%	23,702	9.2%	23,860	9.1%	40
A316 WB (west of Langhorn Drive)	23,098	9.3%	23,702	9.2%	23,860	9.1%	50
Whitton Road	10,154	7.5%	10,331	7.5%	10,413	7.3%	30
Langhorn Drive	1,998	19.8%	3,363	14.0%	3,681	12.3%	20

Table 3: ADMS-Roads Input Parameters (2034)

Road Link	Baseline		Baseline + Operational		Average Speed (kph)
	AADT	HGV	AADT	HGV	
A316 EB (west of Langhorn Drive)	25,582	11.7%	26,533	11.4%	40
A316 EB (Langhorn Drive to Chudleigh Road)	25,582	11.7%	26,533	11.4%	60
A316 EB (Chudleigh Road to Whitton Road)	25,582	11.7%	26,533	11.4%	40
A316 WB (Whitton Road to Chudleigh Road)	24,830	9.3%	25,592	9.1%	40
A316 WB (Chudleigh Road to junction approach)	24,830	9.3%	25,592	9.1%	60
A316 WB (junction approach to Langhorn Drive)	24,830	9.3%	25,592	9.1%	40
A316 WB (west of Langhorn Drive)	24,830	9.3%	25,592	9.1%	50
Whitton Road	10,890	7.5%	11,148	7.3%	30
Langhorn Drive	2,148	19.7%	3,831	12.6%	20

Appendix 10.2: Model Verification

Most nitrogen dioxide (NO_2) is produced in the atmosphere by the reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions. Verification of concentrations predicted by the ADMS-Roads model has followed the methodology presented in LAQM. TG(09)**Error! Bookmark not defined.**.

Predicted annual mean concentrations of NO_2 have been compared with the 2013 annual mean concentration measured by LBRuT diffusion tube 31, located on Chertsey road, approximately 75m from the proposed development.

The measured NO_2 concentration has been converted into an equivalent measured Road-NOx (i.e. the component of total NOx coming from road traffic) concentrations using the Defra NOx from NO_2 calculator.

The ratio of the measured and modelled Road-NOx contributions provides an adjustment factor for the modelled Road-NOx concentrations. This factor is then applied to the modelled road NOx concentrations, before they are converted to Road-NO_2 using the Defra NOx to NO_2 calculator and added to the background NO_2 concentration for each location to produce a total adjusted modelled NO_2 concentration.

The model verification calculation is presented in Table 1. In the absence of particulate monitoring data suitable for verification, the average adjustment factor has also been applied to the modelled Road-PM_{10} and Road-$PM_{2.5}$ concentrations, in accordance with the guidance.

Table 1: Verification Calculation

Parameter	**LBRuT Tube 31**
Measured NO_2 Concentration (2013)	61 µg/m³
Measured Road-NOx Concentration	92.6 µg/m³
Modelled Road-NOx Concentration (using EFT6.0.1 2013 factors for Outer London)	31.5 µg/m³
Adjustment Factor	**2.94**
Adjusted Modelled Road-NOx Concentration	92.6 µg/m³
Adjusted Modelled Road-NO_2 Concentration	34.7 µg/m³
Background NO_2 Concentration	26.3 µg/m³
Final Adjusted Total NO_2 Concentration	61.0 µg/m³

CHAPTER 8 – APPENDICES

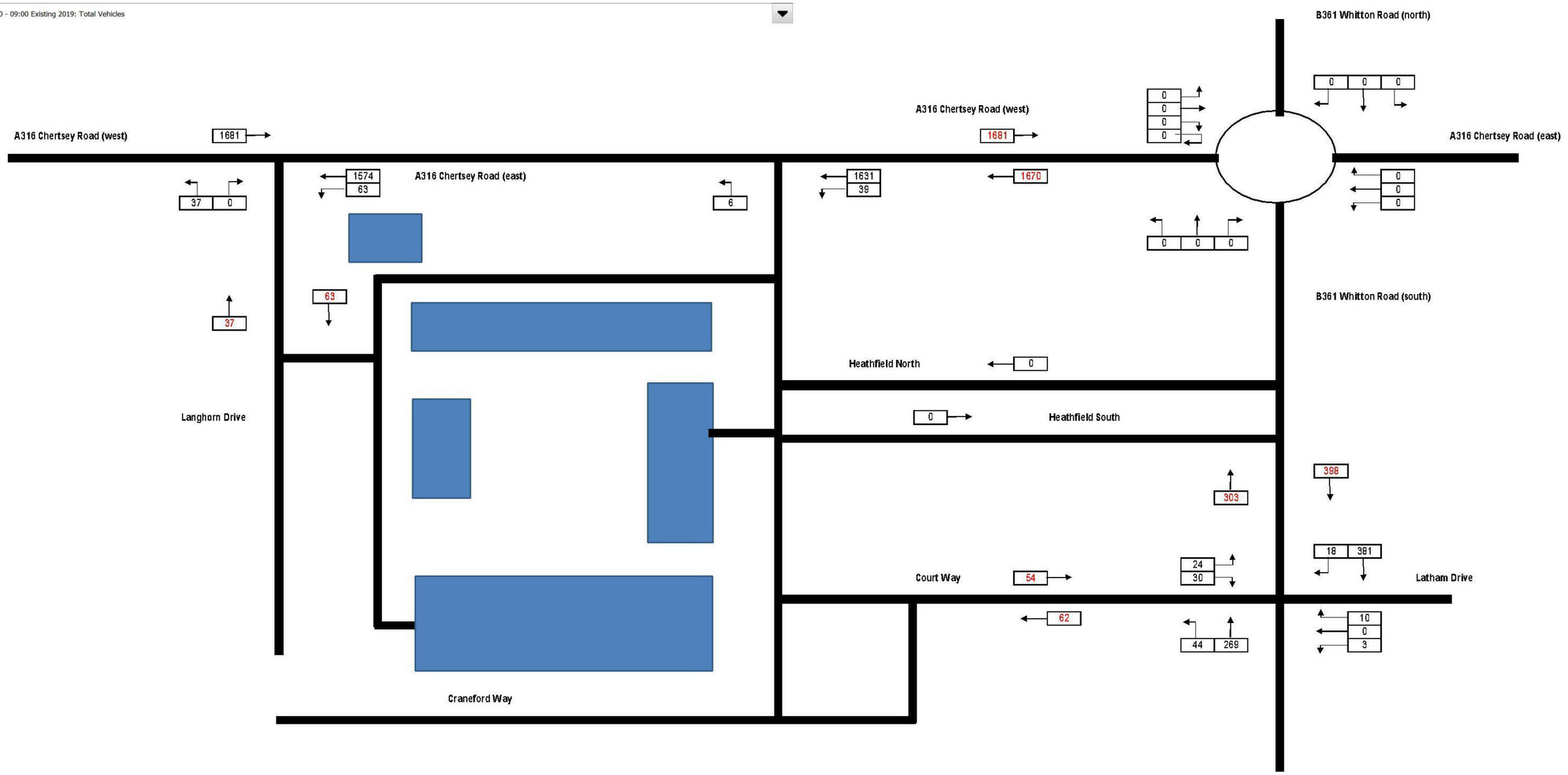
CONTENTS

Appendix 8.1: 2019 Baseline Traffic Flow Diagrams

30713 Richmond Education and Enterprise Campus

08:00 - 09:00 Existing 2019: Total Vehicles

08:00 - 09:00 Existing 2019: Total Vehicles

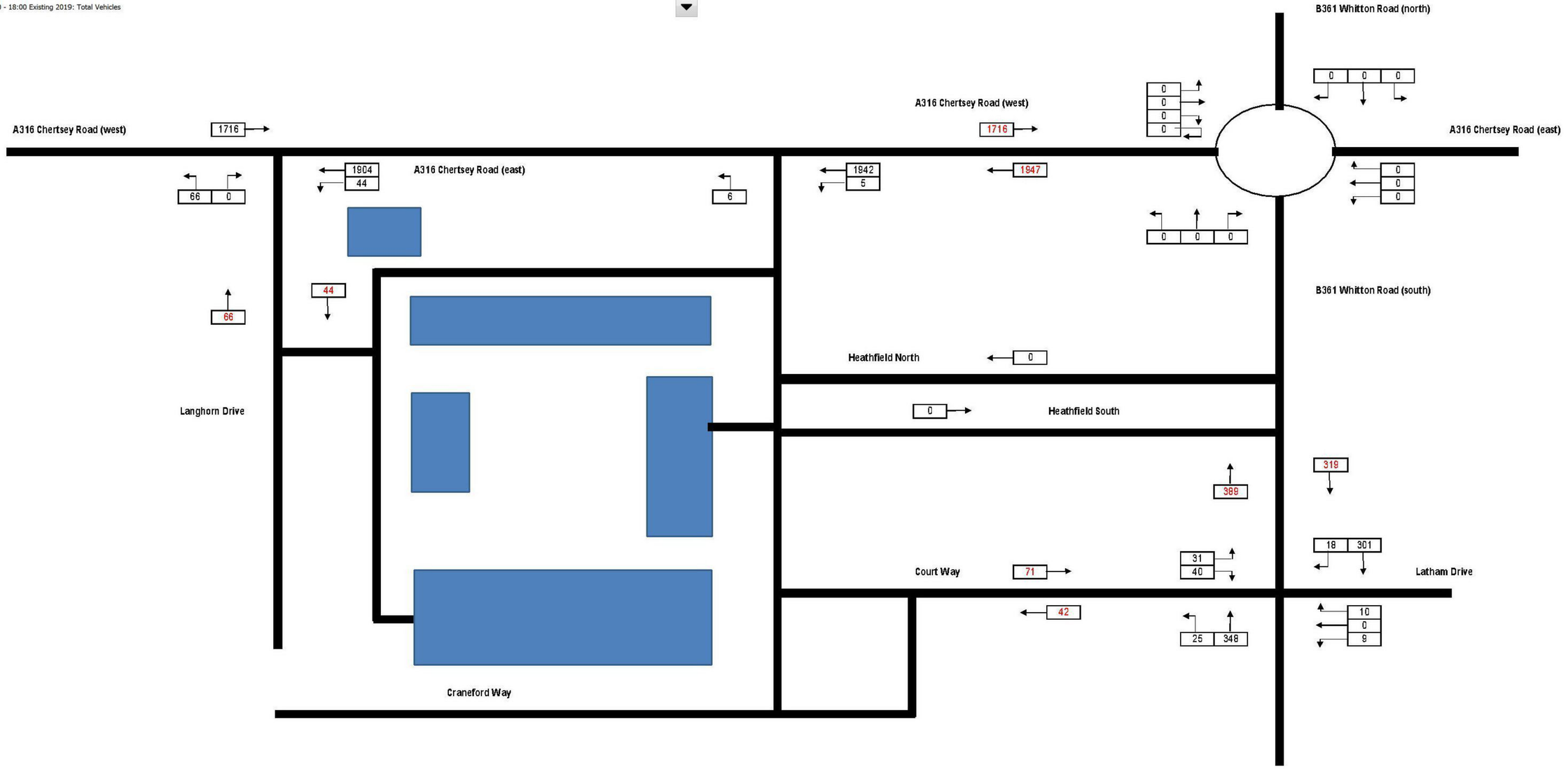


T:\30000_projects\30713 Richmond Education and Enterprise Campus\Calculations\Revised Scheme\Junction Assessment\Richmond Education and Enterprise Campus Flow Diagram AM Peak Hour - 2019 and 2034_Rev A

30713 Richmond Education and Enterprise Campus

17:00 - 18:00 Existing 2019: Total Vehicles

17:00 - 18:00 Existing 2019: Total Vehicles

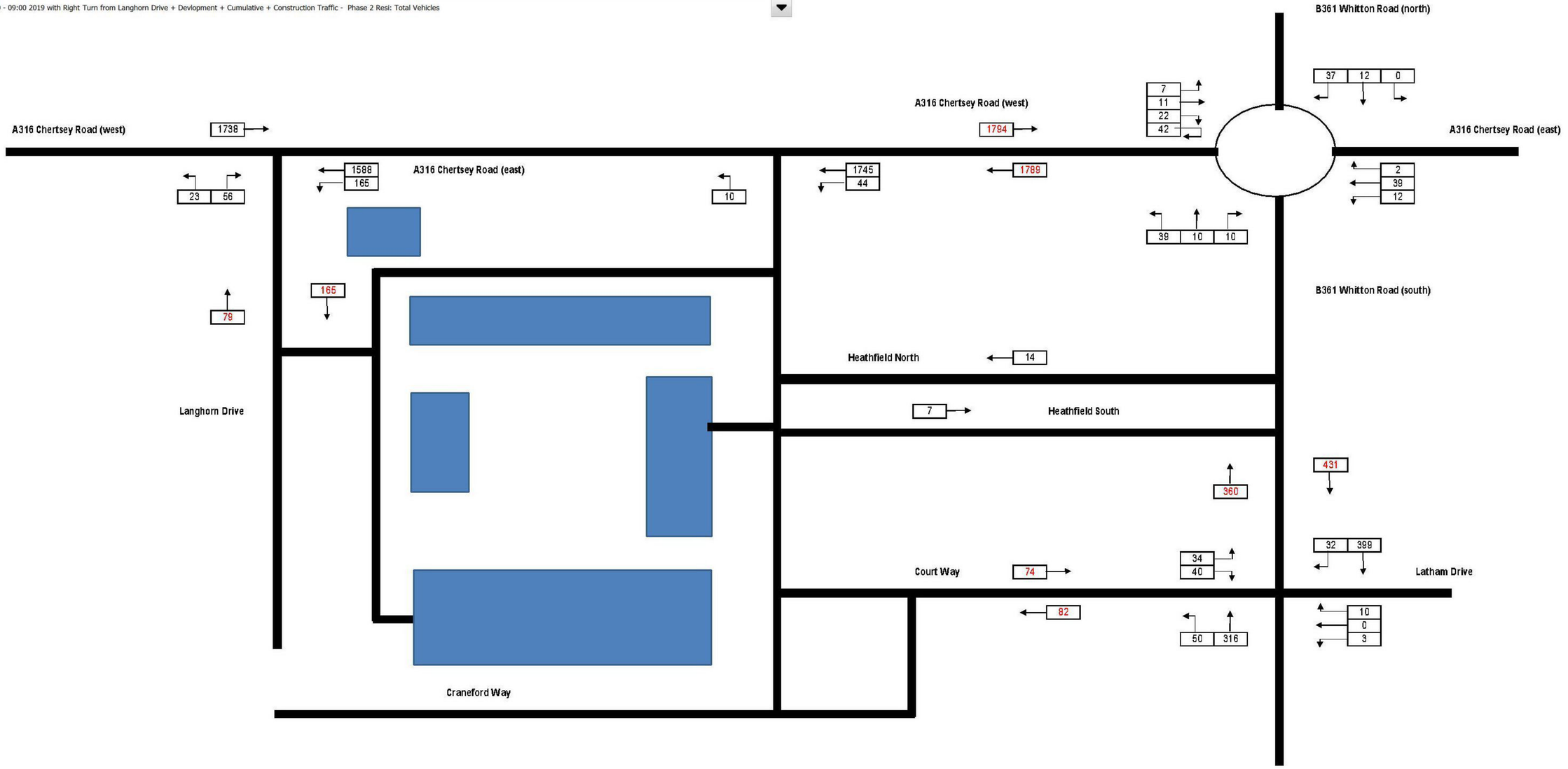


Appendix 8.2: 2019 Construction Phase 3 Traffic Flow Diagrams

30713 Richmond Education and Enterprise Campus

08:00 - 09:00 2019 with Right Turn from Langhorn Drive + Devlopment + Cumulative + Construction Traffic - Phase 2 Resi: Total Vehicles

08:00 - 09:00 2019 with Right Turn from Langhorn Drive + Devlopment + Cumulative + Construction Traffic - Phase 2 Resi: Total Vehicles

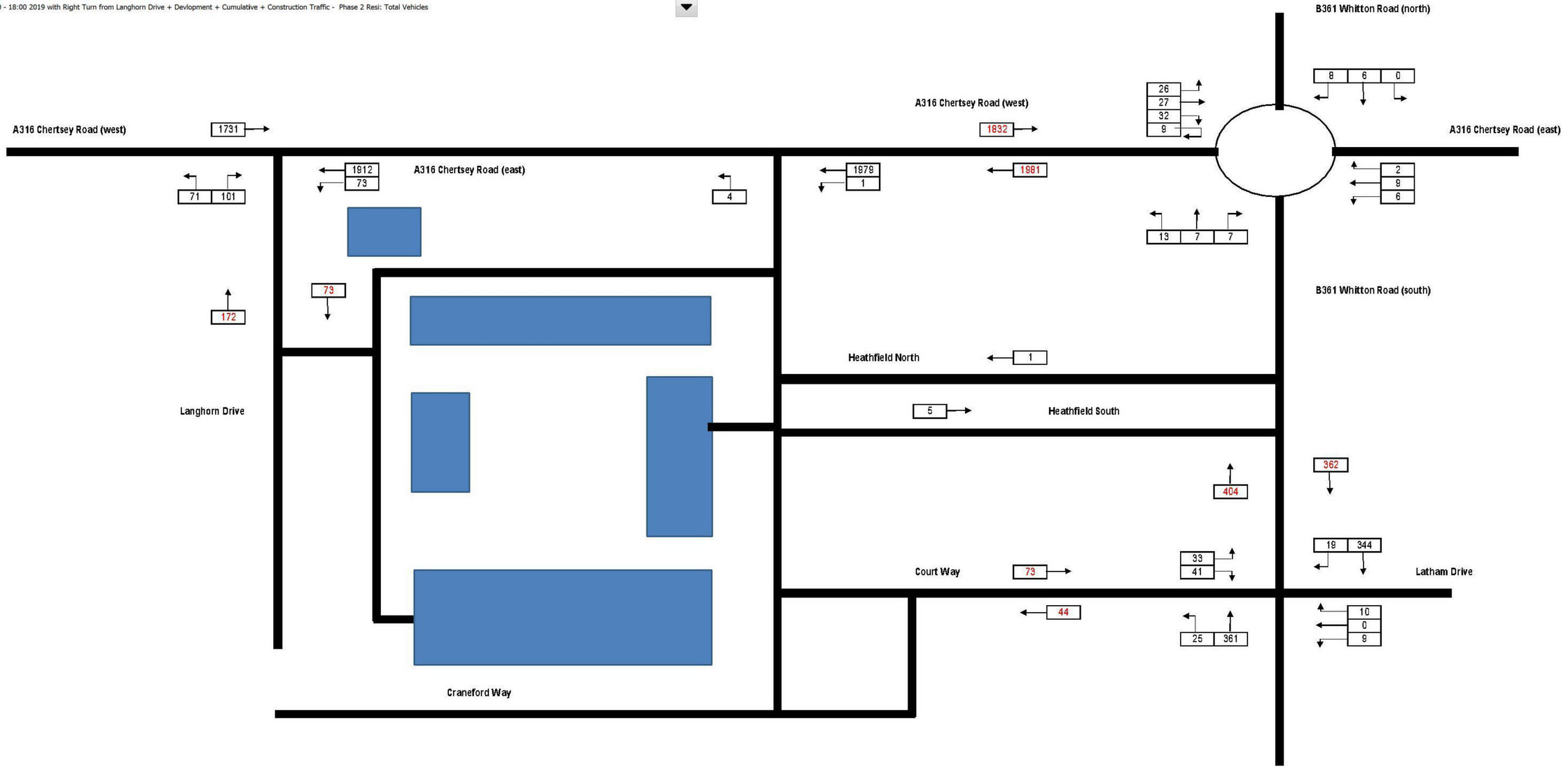


T:\30000_projects\30713 Richmond Education and Enterprise Campus\Calculations\Revised Scheme\Junction Assessment\Richmond Education and Enterprise Campus Flow Diagram AM Peak Hour - 2019 and 2034_Rev A

30713 Richmond Education and Enterprise Campus

17:00 - 18:00 2019 with Right Turn from Langhorn Drive + Devlopment + Cumulative + Construction Traffic - Phase 2 Resi: Total Vehicles

17:00 - 18:00 2019 with Right Turn from Langhorn Drive + Devlopment + Cumulative + Construction Traffic - Phase 2 Resi: Total Vehicles

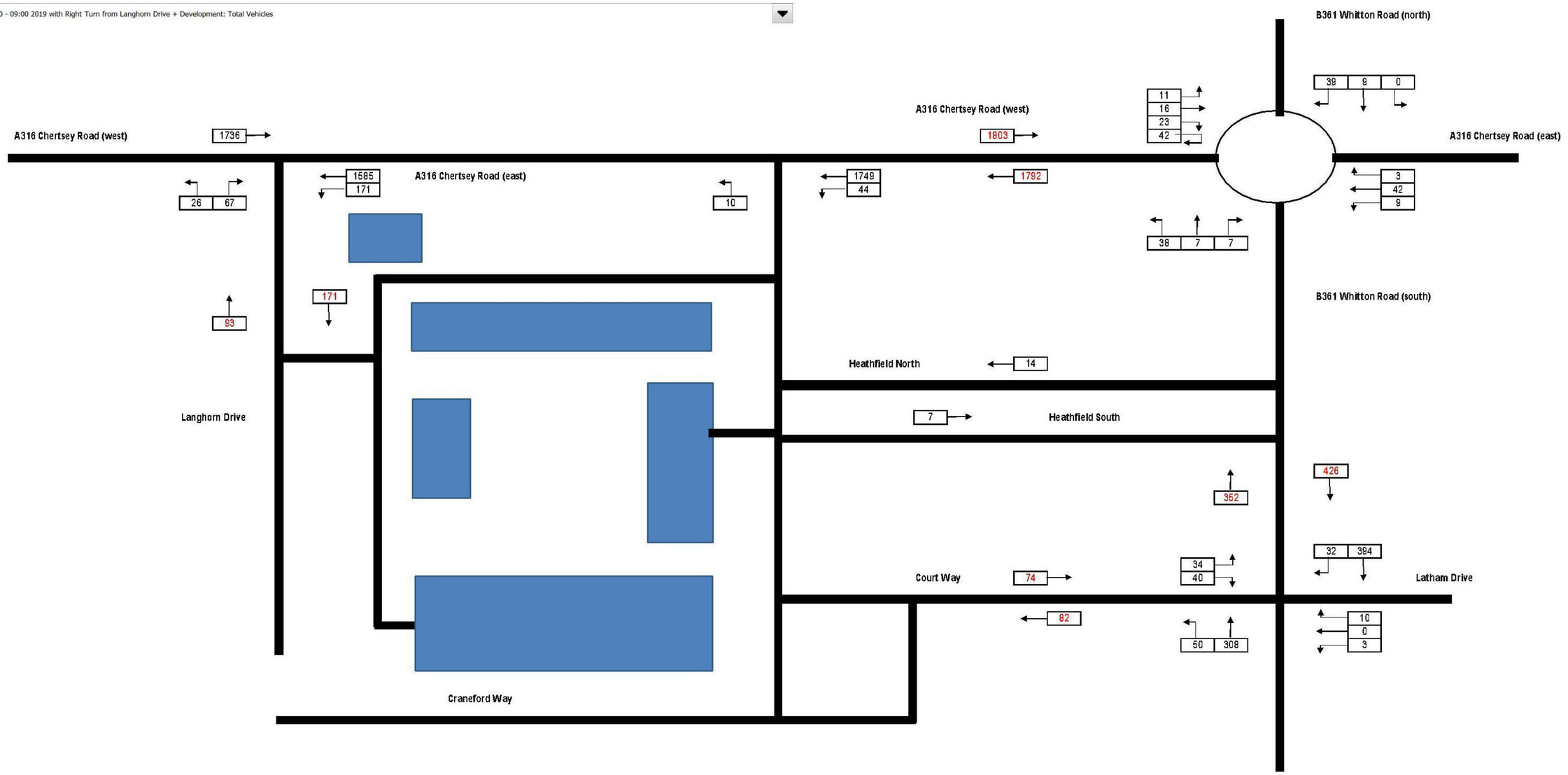


Appendix 8.3: 2019 Completed Development Traffic Flow Diagrams

30713 Richmond Education and Enterprise Campus

08:00 - 09:00 2019 with Right Turn from Langhorn Drive + Development: Total Vehicles

08:00 - 09:00 2019 with Right Turn from Langhorn Drive + Development: Total Vehicles

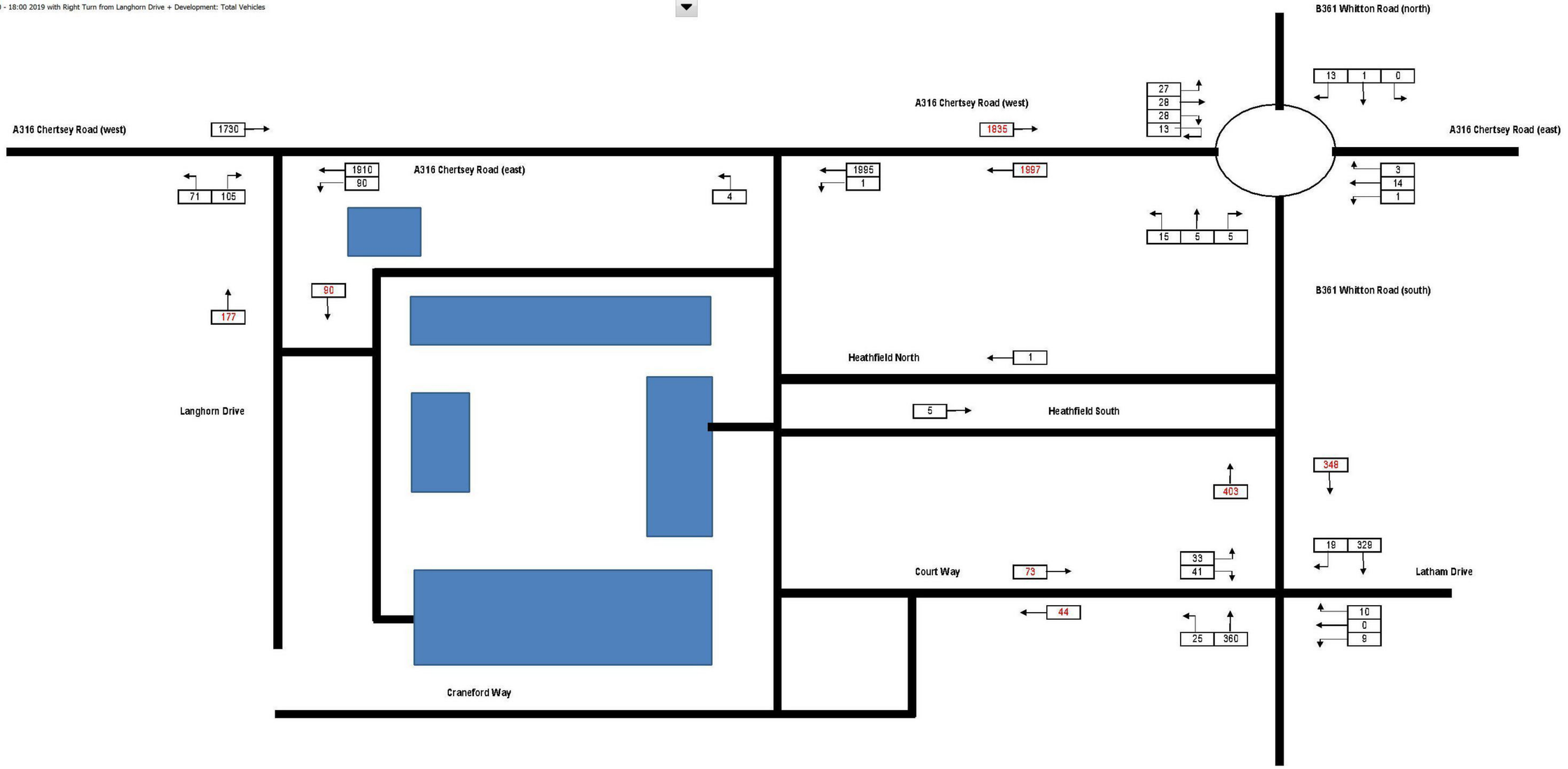


T:\30000_projects\30713 Richmond Education and Enterprise Campus\Calculations\Revised Scheme\Junction Assessment\Richmond Education and Enterprise Campus Flow Diagram AM Peak Hour - 2019 and 2034_Rev A

30713 Richmond Education and Enterprise Campus

17:00 - 18:00 2019 with Right Turn from Langhorn Drive + Development: Total Vehicles

17:00 - 18:00 2019 with Right Turn from Langhorn Drive + Development: Total Vehicles



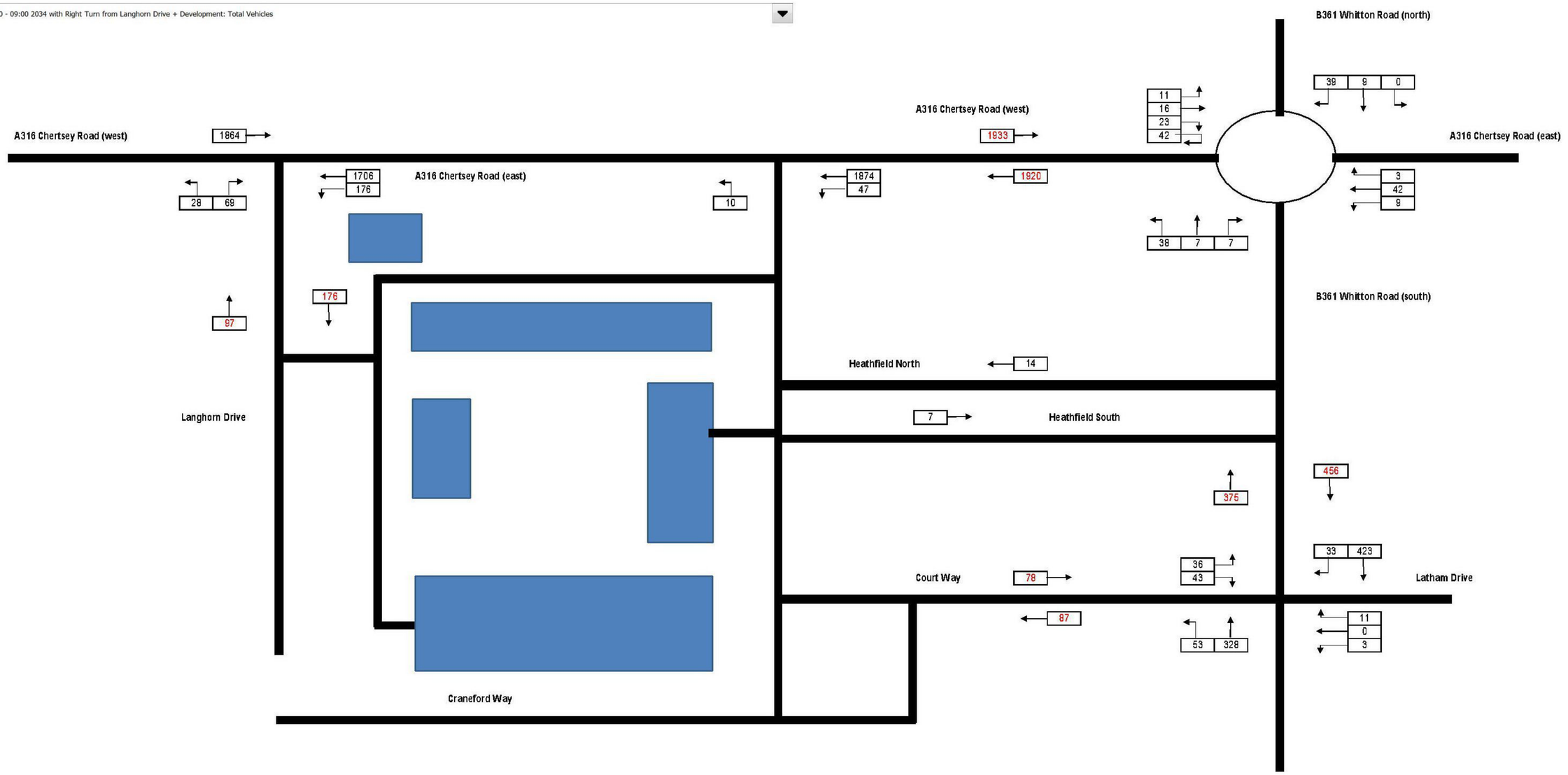
T:\30000_projects\30713 Richmond Education and Enterprise Campus\Calculations\Revised Scheme\Junction Assessment\Richmond Education and Enterprise Campus Flow Diagram PM Peak Hour - 2019 and 2034_A

Appendix 8.4: 2034 Traffic Flow Diagrams

30713 Richmond Education and Enterprise Campus

08:00 - 09:00 2034 with Right Turn from Langhorn Drive + Development: Total Vehicles

08:00 - 09:00 2034 with Right Turn from Langhorn Drive + Development: Total Vehicles

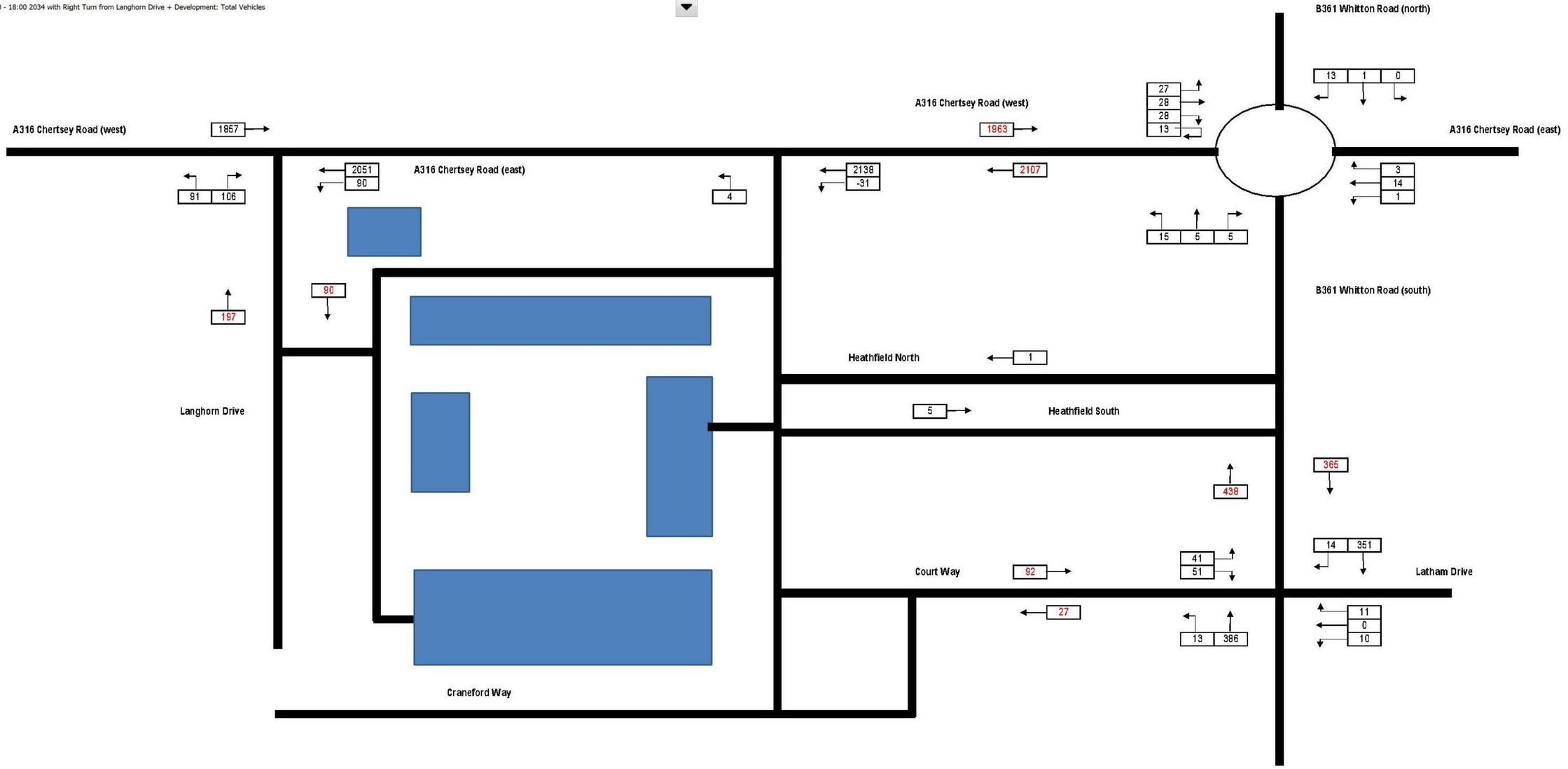


T:\30000_projects\30713 Richmond Education and Enterprise Campus\Calculations\Revised Scheme\Junction Assessment\Richmond Education and Enterprise Campus Flow Diagram AM Peak Hour - 2019 and 2034_Rev A

30713 Richmond Education and Enterprise Campus

17:00 - 18:00 2034 with Right Turn from Langhorn Drive + Development: Total Vehicles

17:00 - 18:00 2034 with Right Turn from Langhorn Drive + Development: Total Vehicles



Appendix 8.5: Framework Travel Plan

Richmond upon Thames College

Richmond Education and Enterprise Campus
Framework Travel Plan

June 2015

TPP
transport planning practice

Contents

Transport Planning Practice
70 Cowcross Street
London
EC1M 6EL
020 7608 0008
email@tppweb.co.uk
www.tppweb.co.uk

1. INTRODUCTION

1.1 Transport Planning Practice were appointed to prepare a Framework Travel Plan (FTP) for the proposed redevelopment of Richmond upon Thames College (RuTC).

1.2 The existing site consists of Richmond upon Thames College with associated playing fields, vehicle and cycle parking. The site located to the north west of Twickenham town centre, it is bounded by Chertsey Road immediately to the north, Egerton Road to the east, residential dwellings on Craneford Way to the south and Marsh Farm Lane (footpath) to the west.

1.3 This FTP will consider the following uses associated with the proposals including non-residential education (D1), residential (C3) and business (B1) as well as assessing proposed Travel Plan measures required for each of the three uses.

1.4 The purpose of this FTP is to set out a strategy for minimising residents, students and employees dependence on travel by private car and to maximise the use of public transport, walking and cycling. Objectives include promoting sustainable modes of travel, which reflects current Government policy objectives in respect of this site.

1.5 It is envisaged that detailed site specific Travel Plans will be developed as part of the detailed applications for the various elements of the development. These would then be undertaken at a time when the end users requirements would be better understood.

1.6 The contact details of the author of this FTP are as follows:

Henry Binnian
Transport Planning Practice
[redacted]

Proposal

1.7 The proposal is to redevelop RuTC to create Richmond Education and Enterprise Campus. The proposals will re-provide Richmond College in a new development, introduce a new Secondary School and a Special Educational Needs School. Additionally a new media 'Tech Hub' and Residential dwellings will be built. Further to this there will be an upgrade of the sports fields and sport centre facilities associated with the education uses at the development. Table 1.0 presents the land use breakdown of the proposed site.

Table 1.0: Land use breakdown, car and cycle provision

Land use	No. of units/m^2 GEA	Car parking	Cycle parking
Tech Hub (B1 use)	Up to 1,700m^2	10	Cycle parking will be provided in accordance with the London Plan (March 2015)
Residential	180 dwellings	In line with London Plan	
Sport Centre	Up to 3,900 m^2	-	
Richmond College	Up to 16,000 m^2	150	
Secondary School	Up to 7,000 m^2	40	
Special Educational Needs School	Up to 4,000 m^2	30	

1.8 The remaining chapters within this report are outlined below:

- **Section 2: Policy background –** summarises the current policy related to Travel Plans.
- **Section 3**: **Site assessment –** describes the accessibility of the site by a range of different transport modes.
- **Section 4: Travel survey** – sets out how the baseline surveys could be carried out.
- **Section 5: Travel Plan objectives and targets** – sets out the objectives and aims of the document and targets against which the FTP will be assessed.
- **Section 6: Proposed School Travel Plan measures –** gives details of the measures that will be implemented as part of the FTP to help deliver sustainable patterns of travel for students, staff and visitors.
- **Section 7: Proposed Commercial Travel Plan measures –** gives details of the measures that will be implemented as part of the FTP to help deliver sustainable patterns of travel for commercial occupiers.
- **Section 8: Proposed Residential Travel Plan measures –** gives details of the measures that will be implemented as part of the FTP to help deliver sustainable patterns of travel for residential occupiers.
- **Section 9: Travel Plan management and monitoring –** explains how the TP will be managed and monitored. An action plan is also provided.
- **Section 10: Travel Plan securing, enforcement and funding** – sets out how the Travel Plan will be secured, enforced and funded.

2. POLICY CONTEXT

2.1 This chapter provides a summary of the relevant transport policy against which the proposals are assessed.

National policy

National Planning Policy Framework

2.2 The National Planning Policy Framework (NPPF) was published on the 27th March 2012 and supersedes all previous national planning policy documents. It focuses on a presumption in favour of sustainable development. One of the core planning principles relates to actively managing patterns of growth to make the fullest possible use of public transport, walking and cycling and focusing significant developments in locations which are or can be made sustainable.

2.3 The NPPF recognises that the transport system should be balanced in favour of sustainable transport modes so that people are given a real choice about how they travel.

2.4 The NPPF states that developments should be located and designed where practical to:

- Accommodate the efficient delivery of goods and supplies.
- Give priority to pedestrian and cycle movements, and have access to high quality public transport facilities.
- Create safe and secure layouts which minimise conflicts between traffic and cyclists or pedestrians.
- Incorporate facilities for charging plug-in and other ultra-low emission vehicles.
- Consider the needs of people with disabilities by all modes of transport.

2.5 It goes on to state that a key tool to facilitate this will be a Travel Plan. All developments which generate significant amount of movement should be required to provide a Travel Plan.

2.6 In respect of parking standards, the NPPF states that local planning authorities should take into account the following:

- Accessibility of the development.
- Type, mix and use of development.
- Availability of and opportunities for public transport.
- Local car ownership levels.
- Overall need to reduce the use of high-emission vehicles.

Regional policy

Further Alterations to the London Plan (FALP) (March 2015)

2.7 The London Plan Spatial Development Strategy for Greater London 2011 sets out the spatial development strategy for London, and provides the London wide context within which individual Boroughs set their local planning policies. A key objective of the London Plan is to improve London's accessibility, which, amongst other issues, includes tackling traffic congestion. An issue that assists closer integration between transport and spatial development is encouraging patterns and forms of development that reduce the need to travel, especially by car.

2.8 With regard to parking strategy, The Mayor of London, in conjunction with the Boroughs, seeks to ensure that on-site parking at new developments is kept to a minimum. Maximum parking standards are set, which can be reduced in areas of good public transport accessibility, and, in the most accessible locations, can lead to car–free developments.

2.9 The London Plan also recognises the importance of site accessibility and location as inherent within the objective of making the most sustainable and efficient use of space by encouraging development intensification in areas that have good public transport accessibility. The Plan also provides further guidance and sets out an approach to determining appropriate maximum parking standards within a policy context. The approach set out in Policy 6.13 seeks to regulate parking in order to minimise additional car travel, reduce trip lengths and encourage use of other more sustainable means of travel.

2.10 The London Plan recognises that improving conditions for cycling makes this sustainable mode an increasingly viable alternative to the private car, and requires cycle parking facilities within all new developments.

2.11 Travel Plans can help to deliver many of the transport objectives set out within the London Plan's Policy 6.1 'Strategic Approach' which include reducing the need to travel, reducing car use and supporting measures that encourage shift to more sustainable modes and technology. The use of Travel Plans can help reduce emissions by promoting alternatives to the car.

2.12 The London Plan encourages and supports the use of Travel Plans for development proposals. Policy 6.3 'Assessing Transport Capacity' states that Travel Plans should be provided for applications above the thresholds set out in TfL guidance.

2.13 Policies 6.9 and 6.10 aim to increase cycling and walking in London, in particular, to achieve a 5% modal share by 2026 for cycling. Proposed developments should therefore provide secure and accessible cycle parking facilities and ensure there is a high quality pedestrian environment and street space. Table 2.1 sets out the FALP cycle parking minimum standards for the land uses associated with this development.

Table 2.1: Cycle parking Standards

Land Use	Cycle parking standards	
	Long-stay	Short-stay
B1 Tech hub	1 space per 250 m^2	1 space per 1000 m^2
Residential C3	1 space per studio a nd 1 bedroom unit 2 spaces per all other dwellings	1 space per 40 units
Schools D1	1 space per 8 staff & 1 per 8 students	1 space per 100 students

The Mayor's Transport Strategy (2010)

2.14 The Mayor's Transport Strategy recognises that through setting appropriate parking standards, encourage smarter travel planning and making public transport more attractive, the Mayor will encourage the use of public transport, walking, cycling and car sharing.

Local Policy

2.15 The Local Plan (formerly known as the Local Development Framework) sets out the priorities for the development of the borough and will be used for making decisions on planning applications.

LBRuT Core Strategy (2009)

2.16 This document sets out the Strategic Planning Framework for the Borough over the next 15 years, it considers other plans and strategies and is the delivery mechanism for the spatial elements of the community. This document outlines the council's transport objectives and policies.

2.17 The following transport policies in CP5 – Sustainable Travel that are associated with this development are stated below:

2.18 Policy 5.C – Cycling and Walking

- Prioritise the needs of pedestrians and cyclists in the design of new developments including links to existing networks and requiring the provision of adequate cycle parking.

2.19 Policy 5.F – Car Parking and Travel

- Provide car share facilities and car clubs in appropriate new developments and encourage the use of low emission vehicles in order to reduce congestion and pollution.

2.20 Policy 5.G – Sustainable Travel

- Encourage major employers and schools to develop Green Travel Plans and require these where appropriate with planning applications.

- The council and its partners will welcome the development of green Travel Plans for all types of developments. All Travel Plans should be produced in line with TfL Guidance on Workplace and Travel Planning and Residential Travel Planning.

Development Management Plan (2011)

2.21 The Development Management Plan (DMP) includes the detailed policies which will be used when new developments are considered. The DMP takes forward the strategic objectives in the Core Strategy and is consistent with National and Regional Policies.

2.22 5.4 Transport and Parking – this chapter takes forward CP5 in the Core Strategy as well as complementing LBRuT Implementation Plan. The relevant policies are stated below:

2.23 Policy DM TP 1 – Higher trip generating developments will only be permitted in areas which are, or at the time of implementation are, easily accessible by transport other than the private car, and well located with respect to local services.

2.24 Policy DM TP 2 – The impact of new developments on the transport network will be assessed against other plan policies and transport standards. All planning applications for major developments should be accompanied by a Transport Assessment. Matters to be included are set out in DfT/ TfL guidance.

2.25 Policy DM TP 3 – New developments will be expected to create or improve links with the local and wider transport networks, including links to cycle and pedestrian networks. All new developments must be designed to improve accessibility including:

- Maximise permeability, with safe, convenient accessible and appropriate road, cycle and pedestrian routes within and in the immediate vicinity of the scheme, as well as accessible walking and cycling links to the wider transport network including to public transport node and key land uses, taking account the need to connect people to jobs, to town centres and to schools.

2.26 Policy DM TP 6 – New developments and schemes improve the safety and security of the pedestrian environment where appropriate.

2.27 Policy DM TP 7 – To maintain and improve conditions for cyclists, the council will ensure that new developments do not adversely impact on the cycling network or cyclists and provide appropriate cycle access and sufficient, secure cycle parking facilities.

2.28 Policy DM TP 8 – Vehicle and cycle parking standards are set out in table 2.1. Developers may provide fewer car parking spaces if they can show that there would be no adverse impact on amenity, street scene, road safety or emergency access. In general it is expected that in low PTAL areas (1-4) the standards should be met, but in higher PTAL areas (5-6) provision at a lower level may be appropriate in exceptional circumstances. Additionally electronic charging points are welcomed where there is demand.

Table 2.1: Parking Standards

Land Use	Vehicle Parking Space Required (All floor space referred to is gross)		Cycle parking standard
	Controlled parking zones	**The remainder of the Borough**	
Schools D1	1 space per 2 staff, Arrangements must also be made for adequate setting down areas and visitor parking spaces. Adequate facilities for the setting down of coaches shall also be considered	1 space per 2 staff	5 spaces per classroom depending on the nature of the school
Residential C3	1-2 bedrooms 1 spaces	1-2 bedrooms 1 spaces	1 space
	3 bedrooms For 1 unit, 2 spaces; for two or more units 1 allocated space plus sufficient unallocated spaces to provide a total of 1.5 spaces overall per unit.	3 bedrooms For 1 unit, 2 spaces; for two or more units 1 allocated space plus sufficient unallocated spaces to provide a total of 1.5 spaces overall per unit.	1 space
	4+ bedrooms 2 spaces	4+ bedrooms 2 spaces (negotiable)	2 spaces
B1	1 space per 300sqm Plus 1 lorry parking space per 250sqm (minimum 1 per unit)	Within 400m of a rail station, 1 space per 200sqm. Elsewhere 1 per 100sqm plus 1 lorry parking space per 2500sqm (minimum 1 per unit)	1 per 200 sqm

Planning Brief Richmond upon Thames College (December 2008)

2.29 There are a number of key access and movement principles which the redevelopment will be based on. As stated in the document, these are:

- The primary access for vehicular traffic to the college should continue to be off the A316.

- The majority of pedestrian visitors should arrive from the eastern boundary (via Twickenham Station), secondary access for pedestrians and cyclists should be provided around the site as visitors arrive from all directions.

- Any residential development on the site should be accessed off Egerton Road to separate college and residential traffic (subject to size of residential development).

2.30 Car parking provision within the redevelopment scheme is an important consideration. Car parking should be provided on site and integrated into the design of the campus and sports facilities.

2.31 A Travel Plan will be prepared and implemented to promote sustainable forms of transport and measures to reduce car travel to the site for students, staff and visitors.

Twickenham Area Action Plan (July 2013)

2.32 The Twickenham Area Action Plan places great focus on improving walking routes to create an accessible pedestrian environment. In turn this will encourage residents to make greater use of facilities within the town centre and so reduce their need to travel.

2.33 New developments should provide sufficient parking to avoid adverse impact on on-street parking, in line with the parking standards set out in the Development Management Plan DM TP8.

2.34 Any new developments should have adequate, convenient and safe servicing arrangements in line with the Council's SPD on Transport Standards. Further, servicing hours will be controlled where necessary for safety or amenity reasons.

3. SITE ASSESSMENT

Site location and land use

3.1 It is proposed to demolish the existing Richmond upon Thames College and re-develop the site to provide Richmond Education and Enterprise Campus, which will consist of a replacement College, Secondary School, Special Educational Needs School, Tech Hub, sports centre and playing fields, and associated vehicle and cycle parking. In addition there will be a Residential development on part of the existing college site.

3.2 The site located to the north west of Twickenham town centre, it is bounded by Chertsey Road immediately to the north, Egerton Road to the east, residential dwellings on Craneford Way to the south and Marsh Farm Lane (footpath) and Harlequin's Stoop Stadium to the west. The site is located approximately 750m north-west of Twickenham Station and 500m south of Twickenham Stadium within the London Borough of Richmond upon Thames.

Site access

3.3 The primary vehicular access will be taken from Langhorn Drive. Cars will access the staff and visitor car park via the existing College site access from the mini-roundabout junction with Langhorn Drive. This entrance will provide access to the replacement College, Tech Hub, Residential units and the sports centre. Vehicular access to the special needs school and Secondary School will be taken from Egerton Road. There will be pedestrian and cycle access via Craneford Way, Egerton Road and Langhorn Drive. Access to the playing fields will be taken from Craneford Way via Court Way.

Local area

3.4 Twickenham town centre is located 800m to the south of the site as the crow flies and offers a range of shops and amenities typically offered by a small town centre. The nearest doctors surgery is The Green Surgery located approximately 950m south of the site, which is a 10 - 12 minute walk based on a walking speed of approximately 80m-100m per minute and which can be accessed via Marsh Farm Lane. The land use of the local area comprises of predominately residential properties.

Public transport

Public transport accessibility level (PTAL)

3.5 The PTAL value for the site ranges from 1b on the western side of the site to 2 on the eastern side. This shows that it has a poor level of public transport accessibility. The PTAL calculation has been carried out using the TfL website http://www.webptals.org.uk/.

Bus

3.6 The site is served by four bus routes which include the 267, 281, 481 and the 681. The bus routes can be accessed by a number of bus stops which surround the site. Below is a list of the nearest bus stops surrounding the site including the most direct route and distance to the bus stops from the College pedestrian entrances on Egerton Road and the bus routes they are served by:

- Stops 'C' and 'N' on Whitton Road are reached via Egerton Road, Chertsey Road and Chudleigh Road; are 490m away; and are served by 281, 481 and 681.
- Stops 'L' and 'S' on Whitton Road are reached via Egerton Road and Court Way; are 507m away; and are served by 281 and 681.
- Stops 'B' and 'P' on Whitton Road are reached via Egerton Road, Chertsey Road and Tayben Avenue; are 537m away; and are served by 281, 481 and 681.
- Stops 'M' and 'R' on Whitton Road are reached via Egerton Road and Heathfield North; are 545m away; and are served by 281 and 681.
- Stops 'B' and 'C' on London Road are reached via Egerton Road, Court Way and Whitton Road; are 460m away; and are served by 267, 481 and 681.

3.7 Table 3.2 below shows a summary of the bus services serving the site.

Table 3.2: Summary of existing bus services

Bus Route	Direction (towards)	Monday – Friday			Sat	Sun
		AM	Inter peak	PM		
267	Hammersmith Bus Station	7	6	6	5	4
	Fulwell Rail Station	5	6	6	5	4
281	Hounslow Bus Station	8	8	8	8	5
	Tolworth (Ewell Road)	8	8	7	7	5
481	West Middlesex University Hospital	1	1	1	1	0
	Kingston (Cromwell Road Bus Station)	1	1	1	1	0
Total		30	30	29	27	18

3.8 The above table shows that the site is served by 30 buses in the morning peak and inter-peak hour and 29 buses in the evening peak hour in both directions. On weekends, the frequency is reduced to 27 buses per hour on Saturday and 18 buses per hour on Sunday.

Rail

3.9 Twickenham National Rail Station is located to the south east from the site (a 7 to 9 minute walk). The station and all trains serving it are operated by South West Trains. The station provides key links to Richmond, Waterloo, Reading, Kingston and Hounslow. Table 3.3 shows the directional frequency in the peak hours.

Table 3.3: Twickenham Station rail service frequencies

National Rail	Westbound		Eastbound	
	AM Peak	PM Peak	AM Peak	PM Peak
Twickenham	11	10	11	8

Walking

3.10 The surrounding footways are generally satisfactory, being a minimum of 2.0m in width, with dropped kerbs, tactile paving and street lighting. On the A316 Chertsey Road, there is a crash barrier on the central reservation preventing pedestrians from crossing the road. There is a signal controlled pedestrian crossing on Chertsey Road approximately 100m east of the site and a pedestrian footbridge directly north of the site. Many of the residential roads have traffic calming by means of speed cushions located at regular intervals, and there is a fire access gate across Egerton Road which reduces traffic on the residential roads to access only.

3.11 The cycle/footpath of Marsh Farm Lane runs along the western boundary of the site between the junction of the A316 Chertsey Road/ Langhorn Drive and Craneford Way. From Craneford Way, the cycle/footpath runs through the Craneford Way playing fields, across the railway line via a footbridge and onto Marsh Farm Road.

3.12 Marsh Farm Lane footpath is proposed to be upgraded and widened to allow cyclists and pedestrians to use the route at the same time. A new east-west shared cycle / footway is to connect London Road and Twickenham Station to Marsh Farm Lane, passing through land the former sorting office site and land known as the Twickenham Rough.

3.13 The bus routes on Whitton Road (section north of the A316) can be accessed via the footbridge or signalised pedestrian crossing on Chertsey Road. The route has dropped kerbs, tactile paving and street lighting. The footways leading to Twickenham Station, either via Court Way, Heathfield North or Heathfield South and Whitton Road and London Road have similar characteristics with a zebra crossing on Whitton Road and signal controlled pedestrian crossings at the junction of Whitton Road / London Road and on London Road. The cycle / footway on both sides of the A316 are to be upgraded by TfL with work due to be complete in 2016.

Cycling

3.14 Transport for London's 2013 Local Cycling Guide 9 advises on a number of routes recommended by cyclists within the vicinity of the site and cycle routes that have signing or road markings. The site is well connected by cycle routes providing links to locations including; Twickenham Station, Richmond, Isleworth and Teddington. Chertsey Road has off-road shared cycle/ footway routes adjacent to it providing segregation from cyclists and motorists.

Parking

Car

3.15 The different land uses of the development mean that parking spaces are distributed throughout the site. The car parking provision meets the standards set out in the local and regional policy. Students will not be allowed to park in the school parking spaces which are for the use of staff and visitors only. Table 3.4 presents the breakdown of car parking spaces allocated to each use.

Table 3.4: Summary of proposed car parking spaces

Land Use		Parking spaces
School	Richmond College	150
	Secondary School	40
	Special Needs School	30
Residential		Based on London Plan standards
Tech hub		10
Total		**420**

Cycle

3.16 Cycle parking will be allocated to each use in accordance with the London Plan (March 2015) minimum standards.

3.17 The Tech Hub will be provided with a minimum of one cycle space per 200m^2 of GEA which meets local policy standards. Residential cycle parking will be provided to meet the local parking standards as set out in table 3.5.

Table 3.5: Residential cycle parking standards

Unit Type	Studio and 1 bedroom unit	2 + Bedroom units	Visitor
Cycle parking	1 space per unit	2 spaces per unit	1 space per 40 units

Car clubs

3.18 Zipcar, one of the world's leading car club companies has four car club parking bays within the vicinity of Twickenham Station, one on London Road, March Road, Station Road and Grosvenor Road. All four car club bays are within a 7 to 12 minute walk from the site. More information can be found at http://www.zipcar.co.uk/.

Local highway network

3.19 The A316 Chertsey Road, which is part of Transport for London's Road Network (TLRN), is a dual carriageway and runs in a northeast-southwest direction along the northern boundary of the site. The road links the site to central London to the east and the M3 Motorway and wider national strategic road network to the west and has a speed limit of 40mph near the site. Locally, the road is intersected by the B538 Hospital Bridge Road to the west and the B361 Whitton Road to the east with semi signalised roundabout junctions.

3.20 The A316 Chertsey Road, has shared cycle/footways along both sides of the carriageways. There is a signal controlled pedestrian crossing over the A316 near Chudleigh Road and a pedestrian footbridge near Talma Gardens and Langhorn Drive. There are two other pedestrian bridges over the A316 further to the west.

3.21 The site is accessed from two locations off of the A316 Chertsey Road. The first is from Egerton Road into the student car park and the second is from Langhorn Drive which provides access to the northern part of the site and some of the staff parking areas. The A316 Chertsey Road / Langhorn Drive will be upgraded from a

simple priority left in – left out junction, to a fully signal controlled left in – left and right out junction. A dedicated pedestrian crossing phase will be provided in the signal phasing across the A316 Chertsey Road and a pedestrian crossing assisted by traffic signal phasing will be provided across Langhorn Drive. As a result of the right turn facility being provided at the junction, the vehicular link between Langhorn Drive and Craneford Way will be removed. The access road between the mini-roundabout and the site will be widened to 6.0m to enable all purpose vehicle access.

3.22 Egerton Road has footways on both sides of the carriageway, street lighting and has a 30mph speed limit. There is a vehicle restriction immediately south of the student car park access which is controlled with a fire gate. The vehicle restriction is in place to prevent rat-running by vehicles travelling from Whitton Road to Chertsey Road (westbound), thereby avoiding the semi signal controlled roundabout. Langhorn Drive, which has a speed limit of 20mph provides access into the site for pedestrians and cyclists via the Marsh Farm Lane cycle/footpath which has street lighting. Marsh Farm Lane runs south to Craneford Way.

3.23 The B361 Whitton Road, which has a speed limit of 30mph, runs in a northwest-southeast direction to the east of the residential area of Heatham and is connected to the site via the residential roads of roads of Court Way, Heathfield North and Heathfield South. Adjacent to the Court Way/Whitton Road junction is a zebra crossing. Heathfield North is one-way in a westerly direction and Heathfield South is one-way in an easterly direction. Each of these residential roads provides access to Egerton Road which in turn provides access to Craneford Way.

3.24 The residential roads of Court Way, Heathfield North, Heathfield South, Egerton Road and Craneford Way are accessed via simple priority junctions and have a speed limit of 20mph. Each road has street lighting, footways on both sides of the carriageway, except for Craneford Way which has a footway on its northern side of the carriageway only.

3.25 The site is accessed from two locations from Egerton Road. The first is via the Main College access and the second is via the secondary College access, both of which provide access to the main staff car parking areas. The site is also accessed from Craneford Way, which provides access to the rear of the College (western side) where the servicing area is located.

3.26 To the south, the B361 Whitton Road joins the A310 London Road via signal controlled junction which has pedestrian signal phases. The A310 London Road provides access to Twickenham station and Twickenham town centre via the A305 King Street. There is a signalised pedestrian crossing over the A310 London Road directly opposite Twickenham station.

Delivery and servicing

3.27 Deliveries and servicing vehicles associated with the Tech Hub and the three schools will access the site via Langhorn Drive and egress the site via either Langhorn Drive or Egerton Road back on to the A316 Chertsey Road. Deliveries associated with the Residential units will take place on the residential roads within the site.

4. TRAVEL SURVEY

4.1 As the proposed development has not been built it is not possible to establish the travel patterns of the future occupants for each land use, aside from the preliminary assessment set out within the Transport Assessment.

4.2 Upon occupation of the various elements of the development baseline surveys will be undertaken within agreed time periods or in the case of the Residential site, once 75% of units or office space has been occupied.

4.3 The surveys are likely to include vehicle counts at access points. In addition to this there will be travel questionnaire surveys. Due to multiple land uses on site, there will be three types of travel surveys to capture the different travel patterns associated with each category of use i.e. residential, educational, and commercial uses. This allows the surveys to target residents, staff and students as there travel method and modes are likely to not be similar.

Commercial use travel survey (Tech Hub)

4.4 An online survey tool, such as Survey Monkey, could be used to distribute the travel survey questionnaires to all employees occupied in the development, as it is more than likely the majority of employees will have access to a computer and have an email account. This method of data collection allows a quick and economic way of distributing, collecting and analysing the travel surveys. The results of the surveys can then be sent to LBRuT for review. A basic paper survey could be handed out to visitors and delivery drivers for completion before they leave the site to establish their mode and travel patterns.

Educational use travel survey

4.5 A baseline travel survey will be undertaken within three months of opening. The survey will gather initial information about travel characteristics and perceived travel choices. From this baseline travel survey, the future targets of the Travel Plan going forward can be set.

4.6 As the site is education use, the surveys will be carried out by performing a 'Hands Up' survey using the methodology set out in Transport for London's "A Guide to Conducting Hand up Surveys" (December 2008) prepared by WSP.

4.7 After the initial baseline survey, the travel survey will be repeated regularly (as agreed with Richmond Council) to monitor as to whether targets have been achieved and to set new targets going forward.

4.8 The results of the travel survey will be uploaded to STAR (School Travel Accredited and Recognised). STAR is a strategic framework that encourages and rewards schools to adopt safer and active travel behaviour. The STAR Accreditation Scheme recognises and rewards schools at one of three levels with travel plans that not only promote safe and active travel but achieve it as well.

Residential use travel survey

4.9 A baseline travel survey will be undertaken once 75% of units are occupied or six months after first occupation and the FTP will be updated accordingly.

4.10 A questionnaires could be distributed to residents asking them about their travel patterns in order to determine a full modal split. The questionnaire based survey will aim to achieve a minimum response rate of 30% from residents. To seek to achieve this, an advanced warning letter will be issued to residents explaining the need for the surveys as part of the Travel Plan. A reminder postcard could be issued to encourage residents to complete the questionnaires. The first survey will be used to establish the baseline modal split.

5. TRAVEL PLAN OBJECTIVES AND TARGETS

5.1 This section outlines the overarching objectives and the proposed targets.

Aims and Objectives

5.2 This Framework Travel Plan sets out a holistic package of measures aimed at encouraging environmentally sustainable travel choices. The objective is to bring together a co-ordinated approach to encourage the use of non-car transport modes and further encourage walking and cycling modes.

5.3 The implementation of this Framework Travel Plan supports national, regional and local planning legislation which emphasises the importance of sustainable travel. The main objectives of this Framework Travel Plan are set out below in the context of DfT and TfL guidance on Travel Plans:

1. Encourage residents, staff, students and commercial occupiers to make well-informed and sustainable decisions about the way they travel to and from the development;

2. Ensure that residents, staff, students and commercial occupiers are aware of the range of travel choices available to them and address needs for access to a full range of facilities and services – for health, leisure, recreation and shopping;

3. Promote healthy lifestyles and sustainable, vibrant local communities by promoting the health benefits of walking and cycling, and raising awareness on the impacts of transport modes on the environment;

4. Reduce traffic generated by the development by discouraging private car and taxi use; and

5. To promote sustainable practices for the delivery of goods.

Targets

5.4 Targets are used to measure the success of the TP and should be SMART targets. Smart Targets are: Specific, Measurable, Achievable, Realistic and Time-bound.

5.5 The main target of the Travel Plan will be to minimise car trips made to and from the development and to promote the use of alternative, sustainable travel modes. Additional targets could also include:

- Increasing the mode share of cycling to work/ college by 5% within two years of completion of the development.

- Increasing the mode share of employees/students walking to work/school by 10% within one year of the baseline survey being undertaken.

- 80% of residents/employees of the development to be aware of the Travel Plan within three months of full occupation.

- There will be no more than one return residential vehicle trip per day per unit.

6. PROPOSED SCHOOL TRAVEL PLAN MEASURES

6.1 A Travel Plan Co-ordinator (TPC) will be appointed who will be responsible for implementing, managing and promoting the FTP to the schools. This FTP will form the basis from which each school based within the development can prepare their own full Travel Plan's. The measures set out in this FTP could be used by the schools.

6.2 Measures set out below contribute to increasing the use of sustainable transport by the users of the site.

Walking & Cycling

6.3 Walking and cycling to the site will be encouraged through schemes such as walk/cycle to school/work week. Such schemes often show students and staff how feasible it is to access the site by walking and cycling when they may have not thought possible. Further encouragement could be provided by the provision of maps showing safe walking and cycling routes to the site and presentations in classes highlighting the health benefits of walking and cycling.

6.4 In accordance to the London Plan FALP (March 2015). To encourage cycling, staff cycle training will be available to encourage safer cycling to the site. LBRuT provides free cycle proficiency training levels 1 and 2 to school years 5 and 6 respectively.

Public Transport

6.5 The schools could offer all staff season ticket loans for public transport use. Students are eligible to receive public transport ticket discount from TfL. More information can be found at http://www.tfl.gov.uk/tickets/default.aspx

Car Travel

6.6 In line with the development plans there will be no allocated on-site parking spaces for students. A total of 220 parking spaces will be provided for staff and visitors of the three schools. The level of visitor and staff parking meets LBRuT maximum parking standards. The proposed provision of parking is lower than what is currently in place relative to staff levels.

Car Clubs

6.7 Car clubs provide a useful alternative to owning a private car. Although the site is education use, a car club car may be beneficial to users of the site who may need the occasional use of a car for work related reasons.

6.8 Zipcar, one of the world's leading car club companies has four car club parking bays within the vicinity of Twickenham Station, one on London Road, March Road, Station Road and Grosvenor Road. More information can be found at http://www.zipcar.co.uk/.

Reducing the Need to Travel

6.9 Teaching staff are usually required to be present on working days, however providing staff with the option to home-working, teleconferencing and flexi working provides flexibility allowing some staff members to reduce their need to travel. This practice should be extended to the proposed site.

6.10 The site will also have a cafeteria and eating facilities for staff and students, further reducing the need to travel away from the site throughout the day.

Management of Deliveries

6.11 To remove the risk of conflict between the students and the servicing vehicles, access will not be permitted between school start and finish times.

6.12 The school websites could have information for suppliers providing details of the site whereabouts, the location of servicing bays and the time periods they can access the development. A link to the a map showing the Transport for London Road Network will also be available to encourage suppliers to use the capital's strategic road network rather than local roads.

7. PROPOSED TECH HUB TRAVEL PLAN MEASURES

Marketing and promotion

7.1 A TPC will be appointed who will be responsible for implementing, managing and promoting the FTP to commercial occupier (intended to be Haymarket Publishing) of the site. This FTP will form the basis from which the company based within the proposed Tech Hub can prepare their own full Travel Plan's. The measures set out in this FTP could be used by future Tech Hub occupiers.

7.2 The TPC will advise the commercial occupiers of the Tech Hub on implementing a range of marketing measures to ensure that all building users are aware of their role in achieving the aims of the FTP and to help to encourage new employees to use sustainable travel alternatives. The following are examples of such measures:

- ***Website:*** Providing information on the location of the nearest transport links, including local buses and rail stations, cycling routes and Car Club bays on the company website. Information on the purpose of the FTP would also be provided along with the strategies and measures implemented. This would encourage visitors, new members of staff (and potentially interviewees seeking employment) to use sustainable modes of transport.

- ***Intranet:*** In addition to the company website, travel information could also be provided on the occupier's intranet which would be accessible by staff. This would provide more targeted information, such as cycle facilities and promotional events.

- ***Notice boards***: Provision of notice boards in the entrance foyers, clearly displaying the information to staff and visitors. This would provide travel information and updates on improvements and any proposed measures. The notice boards would keep employees and visitors up-to-date with changes in the travel options available which would keep them travelling by sustainable modes and to encourage others to use such modes either for the first time or on a more regular basis.

- ***Forum meetings***: Holding bi-yearly Travel Plan forum meetings or staff meetings within the development to discuss transport matters and any suggested improvements that could be put forward to the TPC. These meetings could be more regular during the early stages of occupation to

help identify the perceived barriers to travelling by certain modes and ways to overcome such barriers at the outset. First forum meeting will be organised by the TPC.

Information packs

7.3 A Travel Information Pack could be prepared by the commercial occupiers in collaboration with the TPC, who will advise them with regards to the sustainable transport modes available. The provision of such information is essential in fostering sustainable travel habits early, before employees settle into unsustainable habits when a sustainable alternative may be more suitable.

7.4 The Travel Information Packs are expected to include the following:

- an explanation of the FTP, its purpose, aims and objectives;
- contact details for the site management team;
- information on the local amenities and services including the location of the nearest car club (Zipcar) bays;
- information on the health benefits of walking and a map showing the accessible areas on foot within typical journey times;
- TfL cycle network maps relevant to Richmond upon Thames including a map of the nearby cycle ways and information on the cycle tools in TfL journey planner;
- information on cycle training available to people working in LBRuT.
- information on travel planning website services such as TfL and DfT journey planners, to raise awareness of transport options, and alternatives in case of delays or cancellations; and
- train and bus service maps and timetables, including late night travel advice, to highlight the services available.

Initiatives to reduce car use and the need to travel

7.5 The provision of a secure cycle parking together with changing rooms and shower facilities will encourage employees to cycle to work rather than commute by car.

7.6 Further methods to reduce the need to travel include conference calling, this lets employees attend meetings in their own office mitigating the need to travel.

Employees who are provided with remote login services have more flexibility allowing them to work from home or other locations removing the need to travel.

Measures to encourage cycling

7.7 Cycling forms an important part of the Mayor's Transport Strategy for London, particularly as the road network and public transport network become more congested and the challenge to provide additional capacity becomes more difficult. It is often the fastest mode of travel in congested networks and offers opportunities for exercise and the associated health benefits. It has the potential to form an important role with regards to short local trips as well as longer trips to employment and leisure locations within central London and the surrounding areas.

7.8 As part of the Travel Information Pack, information could be provided to employees showing the areas within cycling distance of Richmond Education and Enterprise Campus. This will complement the London Cycle Network Maps that will also be provided in the information pack. Occupiers will also be made aware by the TPC of the additional cycle tools available using the TfL journey planner software.

7.9 The TPC will also advise the occupiers on the following measures that could encourage cycling by the staff:

- ***Route maps***: Provision of cycle route maps to staff so that they are aware of the opportunities available to them.
- ***Cycle training***: Provision of information on cycle safety training or refresher courses offered by the Council and privately, for less confident cyclists to encourage them to take up cycling within 12 months of first occupancy. The aim of the courses will be for new cyclists to gain confidence to use London's busy roads as well as advising on good cycling techniques, so encouraging staff to take up cycling.
- ***Bikes4Work scheme***: Provision of interest free loans to purchase a bicycle free of tax to their staff.
- ***Bicycle Users Group***: Setting up a bicycle users group for employees to provide a useful forum to bring together cyclists within the development so that they can share best practice and information, and organise

promotional events. This forum could also encourage experienced cyclists to become a 'buddy' for new or less confident cyclists.

- ***Promotional events:*** Promotion and organising events to encourage staff to cycle to work. These could include service and repair sessions, free breakfasts for cyclists and promoting National Bike Week.

Promotion of public transport

7.10 The TPC will inform the occupiers regarding the following initiatives that could be considered to assist building users to use the public transport network:

- ***Route maps***: Making public transport information, including bus route maps and timetables, available to all staff to highlight the services available. In particular, this would assist in informing staff of the most efficient way to travel to meetings and other business-related journeys.

- ***Travel Planning Service***: Organising personalised staff travel planning sessions to provide information, such as those provided by TfL and DfT online journey planners to raise awareness of transport options, and alternatives in case of delays or cancellations.

- ***Interest-free season ticket loans***: Provision of interest-free season ticket loans to staff. This would reduce the financial burden of travelling by public transport.

Promotion of sustainable practices for deliveries

7.11 The baseline survey will collect information on the delivery patterns and the TPC will advise the occupiers about the following measures that could be implemented to make the servicing operations more sustainable:

- ***Consolidating deliveries***: Discussing the feasibility of consolidating deliveries which would involve combining and reducing the number of vehicle trips with the delivery operators.

- ***Green vehicles***: Use of hybrid, electric and other low carbon emission vehicles that are less harmful to the environment. Encouraging the use of delivery and collection companies which use green vehicles.

- ***Time restrictions***: Restricting deliveries taking place during the peak traffic hours to help reduce congestion on local roads.

8. PROPOSED RESIDENTIAL TRAVEL PLAN MEASURES

8.1 This chapter sets out measures which could be implemented to bring together a co-ordinated approach to encourage Travel Plan residents use to sustainable modes of transport.

Physical Design

8.2 'Hard' engineering measures will be incorporated into the design of the development which will influence travel patterns, and will have a significant impact upon reducing dependence upon the private car from the outset. It should be noted that appropriate hard engineering measures will be provided during the construction and landscaping within the development prior to occupation and will be funded by the developer.

8.3 *Electric car charging points* – Electric car charging points will be available within the development car park. A minimum provision of 20% of car parking bays will be fitted with electric vehicle charging points (EVCP). A further 20% of spaces will have a passive EVCP provisions enabling further electric car charging facilities to be provided readily following a request from residents in the future.

8.4 Cycle parking provision - The proposed development will provide secure cycle parking which will meet the London Plan (March 2015) minimum standards.

Provision of Travel Information

8.5 Informing future residents of the range of travel choices available to them and the Travel Plan measures which will be implemented at the development will be key to the success of the Travel Plan. The ways in which travel information would be provided are set out below. Electronic versions of the travel information could also be made available.

8.6 Travel Information Pack - containing travel information would be provided to each household and commercial occupier before they move into the development. Providing this information in advance ensures that residents become aware of the various modes of transport and existing services that are available to them at the earliest opportunity.

8.7 The packs are expected to include the following:

- an explanation of the Travel Plan, its purpose, aims and objectives;
- contact details for the estate management team;
- information on the local amenities and services including the location of the nearest car club bay;
- information on the health benefits of walking and a map showing the accessible areas on foot within typical journey times;
- TfL cycle network maps relevant to Richmond including the map of the nearby cycle superhighway and information on the cycle tools in TfL journey planner;
- information on cycle training available to people living or working in LBRuT.
- information on travel planning website services such as TfL and DfT journey planners, to raise awareness of transport options, and alternatives in case of delays or cancellations; and
- train and bus service maps and timetables, including late night travel advice, to highlight the services available.

8.8 Community noticeboards - providing travel and community information to residents within the site would be placed in convenient locations. Maps of the immediate local area will be displayed on the communal notice boards identifying locations of cycle parking, car club bays and public transport service access points. The noticeboards will also be used to inform residents of any new travel initiatives or events organised by the TPCs.

8.9 Personalised Journey Planner - To further inform residents of the travel options available, the TPC could discuss travel requirements with residents and provide information on possible routes for residents travelling to work, schools and other key facilities. The personalised journey planning service would also extend to the cover the specific journey planning requirements of mobility impaired persons residing within the site.

Initiatives to encourage walking

8.10 To further encourage walking as a main mode of transport for local trips, the following measures could be implemented by the TPCs:

- *Promotional material* - Walking will be promoted within the Travel Packs which will be issued to residents. This could include the health benefits of walking and highlight the network of walking routes in the local area.

Initiatives to encourage cycling

8.11 The proposed development will include cycle parking facilities and cycle information will be provided to residents within their Travel Packs. The Travel Plan measures to encourage cycling could include:

- *Cycle parking* - The proposed development will provide secure cycle parking which will meet the London Plan (March 2015) minimum standards, this provision will include spaces for visitors.

- *Cycle maps and routes* - Cycle information, including cycle maps showing key routes and other facilities such as local cycle parking locations and cycle shops, would be provided to residents in their Travel Packs and also on the community noticeboards.

- *Cycle training* – LBRuT offer cycle training to anyone who works, studies or live in the borough. The training is one to one and costs £10 for a 90 minute sessions. This will help new cyclists to gain confidence and develop skills. This helps them to understand and cycle the safest and most convenient route. The cycle training would be promoted by the SMT / TPCs.

Initiatives to encourage the use of public transport

8.12 The site is accessible by public transport and has a PTAL of 1b/2. Future residents will be made aware of the full range of buses, national rail and LUL services available to them through the following measures:

- *Promotional material* - Public transport information, such as route maps, timetables and fares, would be included in the Travel Packs.

- *Journey planners* – Links to the TfL and National Rail journey planners will be promoted within the Travel Packs.

9. MANAGEMENT, MONITORING AND ACTION PLAN

Travel Plan Co-ordinator

9.1 A Travel Plan Co-ordinator (TPC) will be appointed to oversee the FTP for the whole development and to liaise with key staff at each of the occupiers of the development i.e. College, Secondary School, Special Needs School, Residential and 'Tech Hub', who will be responsible for implementing, managing and promoting Travel Plans in their organisations/residents.

9.2 The responsibilities of the TPC's would include the following:

- Implement the various marketing and promotional measures and campaigns as set out in the full Travel Plan.
- Liaise with the occupiers to ensure they are aware of the objectives and initiatives of the full Travel Plan.
- Produce up-to-date information on walking, cycling and public transport.
- Undertake manual ad-hoc inspections to monitor the use of car and cycle parking.
- Coordinate the travel surveys and monitor reports prepared by the various occupiers of the development.
- Produce a Travel Plan summary reports for the development at intervals agreed with Richmond Council.

Monitoring

9.3 The monitoring of the TP will be undertaken in line with the iTRACE compliant methodology. Therefore, a workplace, school and residential iTRACE travel survey will be undertaken within six months of occupation or when 75% of the developments have been occupied (whichever comes soonest). This will ascertain the baseline travel patterns and help set travel mode split targets. The actual targets will be set following the result of the initial survey.

9.4 The surveys will be commissioned by TPC and will take place in years 1, 3 and 5 after the initial baseline survey. The TPC will examine the survey results against the Travel Plan targets and produce a monitoring report which will be submitted to LBRuT for input into iTRACE.

Action plan

9.5 This section includes a check list of the proposed measures detailing who will be responsible for ensuring that the actions identified in previous sections are delivered. The Action Plan is included in Table 9.1. The proposed measures have been linked to the overall objectives of the FTP. This action plan has been design for the overall proposed development, the action plans in the Travel Plans produced for each of the uses will be more detailed.

Table 9.1: Action Plan

Objective	Measures/Actions	When	By Whom
Raise awareness of sustainable modes of travel available	Appoint named Travel Plan Co-ordinator.	Prior to first occupation	Developer
	Provide Information Packs.	Upon occupation	TPC
	Provide Information Packs.	Upon occupation	TPC
To ensure Travel Plan is monitored and targets are being met.	Ensure baseline surveys are undertaken by the occupiers of the various elements of the development	Within agreed periods following occupation or when 75% of units are occupied	TPC
	Ensure TRAVL compliant survey and monitoring reports are prepared	Years 1, 3 and 5 following the baseline surveys of each occupier	TPC

10. SECURING, ENFORCEMENT AND FUNDING

Enforcement

10.1 The Travel Plan for each element of the development will be reviewed after five years at which point if targets have not been achieved, possible amendments will be agreed between LBRuT, the TPC and the operator of the College/Secondary School/Special Educational Needs School/Tech Hub or Residential development.

Funding and securing the Travel Plan

10.2 The Travel Plan for each element of the development will be secured through planning conditions / s.106 obligations arising from the detailed and outline planning applications for the separate elements of the development proposals.

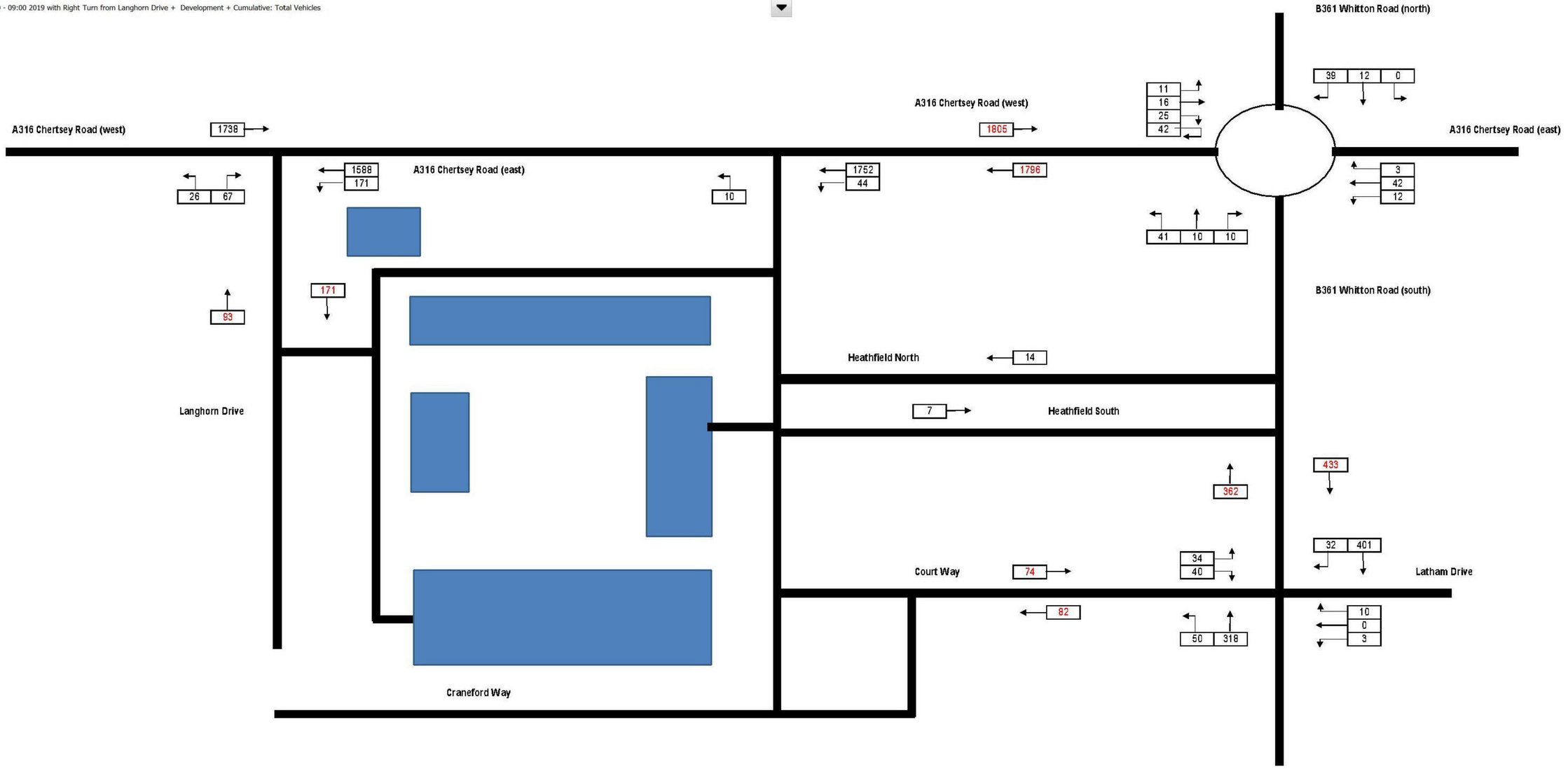
10.3 The Travel Plan measures will be funded by the operators of the various elements of the development / the developer of Residential site.

Appendix 8.6: 2019 Completed Development + Cumulative Traffic Flow Diagrams

30713 Richmond Education and Enterprise Campus

08:00 - 09:00 2019 with Right Turn from Langhorn Drive + Development + Cumulative: Total Vehicles

08:00 - 09:00 2019 with Right Turn from Langhorn Drive + Development + Cumulative: Total Vehicles

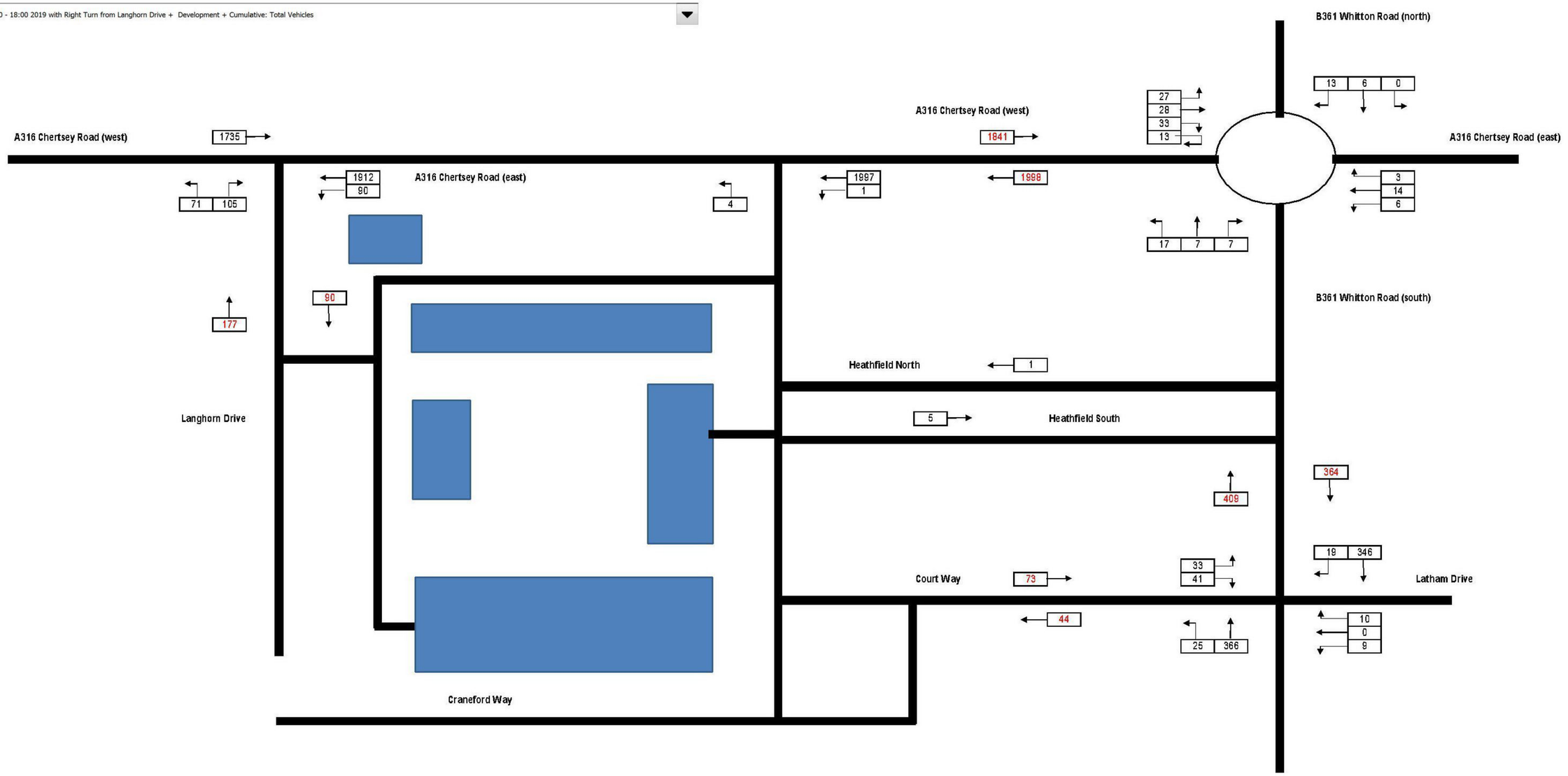


T:\30000_projects\30713 Richmond Education and Enterprise Campus\Calculations\Revised Scheme\Junction Assessment\Richmond Education and Enterprise Campus Flow Diagram AM Peak Hour - 2019 and 2034_Rev A

30713 Richmond Education and Enterprise Campus

17:00 - 18:00 2019 with Right Turn from Langhorn Drive + Development + Cumulative: Total Vehicles

17:00 - 18:00 2019 with Right Turn from Langhorn Drive + Development + Cumulative: Total Vehicles



T:\30000_projects\30713 Richmond Education and Enterprise Campus\Calculations\Revised Scheme\Junction Assessment\Richmond Education and Enterprise Campus Flow Diagram PM Peak Hour - 2019 and 2034_A

Appendix 8.7: 2034 Cumulative Traffic Flow Diagrams

CHAPTER 9 – APPENDICES

CONTENTS

Appendix 9.1: Detailed Results of Baseline Noise Measurements

1. Long Term Measurements on College Roof

Date	Time	LAeq	LAmax	LA1	LA10	LA90
		dB	dB	dB	dB	dB
24-Apr	1030	59.4	73.2	66.6	61.5	56.0
	1130	58.6	72.0	67.2	60.7	55.2
	1230	59.2	75.3	71.3	61.0	55.5
	1330	58.7	69.3	66.0	60.8	55.4
	1430	60.1	73.2	70.2	62.2	56.2
	1530	60.4	74.1	70.4	62.4	56.6
	1630	58.8	79.3	72.7	60.9	54.9
	1730	58.5	69.7	66.5	61.2	53.9
	1830	60.8	69.1	66.9	62.9	56.8
	1930	60.9	75.4	71.2	62.9	57.4
	2030	60.1	70.4	66.5	62.3	56.3
	2130	62.8	81.6	79.0	63.0	55.0
	2230	64.5	81.2	79.1	67.4	53.2
	2330	56.0	66.9	64.5	59.2	49.8
25-Apr	0030	54.3	73.8	68.1	57.4	46.5
	0130	51.6	62.1	61.0	55.6	45.6
	0230	51.4	66.4	63.8	55.1	44.3
	0330	52.9	67.0	64.3	56.7	45.7
	0430	55.5	66.2	63.8	59.0	50.2
	0530	60.9	77.0	73.2	63.1	55.1
	0630	63.2	77.8	73.3	65.2	59.2
	0730	63.0	73.5	70.8	65.0	59.5
	0830	62.3	77.7	72.6	64.5	57.8
	0930	62.1	71.6	69.3	64.2	58.5
	1030	62.3	80.9	73.6	64.1	58.4
	1130	62.6	75.1	72.6	64.3	59.1
	1230	62.4	77.0	74.7	64.0	58.4
	1330	63.8	81.2	79.3	64.6	59.2
	1430	63.3	81.3	76.2	64.6	59.0
	1530	60.3	77.8	74.6	62.1	56.3
	1630	60.4	82.3	75.9	61.8	56.9
	1730	60.4	70.9	67.6	62.5	57.2
	1830	62.2	70.0	67.6	64.3	58.8
	1930	62.7	79.6	73.1	64.7	59.2
	2030	61.4	75.9	68.2	63.6	57.8
	2130	60.2	67.4	66.6	62.6	56.2
	2230	59.0	74.3	71.6	61.6	53.8
	2330	57.1	72.7	64.8	60.0	50.0
26-Apr	0030	55.3	65.8	63.9	58.6	47.6
	0130	53.3	66.0	62.8	57.0	46.5

Date	Time	LAeq	LAmax	LA1	LA10	LA90
		dB	dB	dB	dB	dB
	0230	51.2	66.0	61.2	55.2	44.9
	0330	51.4	64.9	63.0	55.2	46.1
	0430	54.2	69.7	65.0	57.5	48.9
	0530	56.8	76.3	72.7	59.0	50.1
	0630	62.5	83.8	79.8	63.5	54.3
	0730	62.9	80.9	76.6	65.8	56.0
	0830	64.0	82.8	80.7	65.9	56.5
	0930	62.0	82.6	78.7	62.9	56.2
	1030	62.8	85.8	81.9	61.4	54.3
	1130	57.7	69.8	66.3	59.9	54.4
	1230	56.4	72.2	64.8	58.6	52.7
	1330	55.8	69.4	62.0	58.0	52.2
	1430	56.2	69.7	66.7	58.8	50.9
	1530	58.2	73.1	69.0	60.7	53.6
	1630	59.2	79.0	73.1	61.1	54.8
	1730	62.6	85.2	80.8	62.8	51.0
	1830	62.1	84.4	80.0	63.2	54.3
	1930	61.4	80.3	76.4	63.7	54.1
	2030	61.1	81.0	78.2	62.1	53.1
	2130	65.6	84.1	80.9	69.1	53.1
	2230	62.1	83.4	79.3	63.9	52.4
	2330	57.9	77.5	74.4	59.7	50.8
27-Apr	0030	55.2	64.3	62.9	58.4	48.7
	0130	54.5	75.7	68.1	57.8	46.9
	0230	52.8	65.6	62.6	56.5	45.0
	0330	52.8	65.3	62.9	56.3	46.3
	0430	53.8	67.4	63.8	57.2	47.1
	0530	56.0	77.6	72.4	58.7	49.7
	0630	60.2	80.7	75.0	61.9	52.2
	0730	61.2	78.9	74.5	63.7	54.9
	0830	63.9	80.6	78.7	66.1	57.4
	0930	62.6	81.6	76.8	63.9	57.6
	1030	62.5	83.1	78.0	63.4	56.4
	1130	63.4	82.2	78.6	65.3	57.5
	1230	64.3	83.8	80.6	65.9	57.4
	1330	63.6	80.3	77.1	66.2	57.6
	1430	64.1	81.9	79.3	66.0	57.6
	1530	63.9	81.0	77.7	66.2	58.0
	1630	64.3	86.2	81.6	66.0	57.8
	1730	63.1	78.9	75.4	64.9	58.4
	1830	63.6	83.6	78.4	65.0	58.2
	1930	62.4	78.7	74.2	64.7	57.5

Date	Time	LAeq	LAmax	LA1	LA10	LA90
		dB	dB	dB	dB	dB
	2030	61.9	78.9	75.7	63.9	55.9
	2130	64.5	84.3	79.7	67.0	54.7
	2230	61.1	80.8	78.2	62.5	51.9
	2330	54.8	65.6	63.7	58.2	49.0
28-Apr	0030	52.9	67.6	63.4	56.6	47.8
	0130	51.2	66.4	62.7	55.3	46.3
	0230	50.5	65.5	62.0	54.6	45.7
	0330	51.7	67.2	63.0	55.4	45.9
	0430	56.3	76.1	65.6	59.4	49.9
	0530	60.8	72.9	69.9	63.4	55.6
	0630	63.4	76.5	73.5	65.3	59.3
	0730	63.0	78.5	75.2	64.8	58.6
	0830	63.5	80.2	76.9	65.6	58.0
	0930	62.9	78.5	75.3	64.5	58.1
	1030	63.4	82.1	78.5	64.0	57.3
	1130	62.7	82.9	78.5	63.7	57.5
	1230	64.4	84.5	80.9	64.8	56.9
	1330	62.6	81.5	78.0	63.8	57.1
	1430	61.9	81.6	75.7	63.6	56.7
	1530	63.1	79.6	76.3	64.8	57.3
	1630	62.8	78.2	75.3	64.7	57.7
	1730	62.3	78.5	75.7	64.0	57.1
	1830	62.5	80.9	76.5	64.1	57.4
	1930	61.5	77.0	73.7	63.9	55.3
	2030	61.6	81.5	78.4	61.7	53.5
	2130	63.9	83.8	79.4	65.2	53.1
	2230	57.7	70.0	65.7	60.8	50.9
	2330	56.2	66.1	64.0	59.5	48.1
29-Apr	0030	53.1	71.4	63.3	56.8	46.6
	0130	52.7	79.0	69.4	56.4	47.0
	0230	52.2	64.1	61.9	56.1	44.9
	0330	52.9	65.0	62.0	56.4	45.2
	0430	57.3	68.8	65.6	60.6	49.5
	0530	61.4	75.9	72.0	63.8	56.4
	0630	63.6	79.4	75.6	65.2	58.1
	0730	62.6	80.3	74.7	64.5	56.8
	0830	62.4	81.3	77.6	64.0	54.3
	0930	63.2	85.5	78.1	64.4	54.7
	1030	64.1	81.7	78.6	65.3	57.3
	1130	62.2	82.2	76.9	63.4	57.0
	1230	64.9	86.0	82.1	65.5	57.7
	1330	62.7	79.5	77.3	64.0	57.6

Date	Time	LAeq	LAmax	LA1	LA10	LA90
		dB	dB	dB	dB	dB
	1430	64.8	88.8	83.9	65.2	57.4
	1530	63.4	86.8	78.5	64.4	57.0
	1630	62.8	80.3	75.6	64.7	55.6
	1730	64.1	78.7	75.3	65.2	61.8
	1830	64.3	80.7	77.3	65.7	59.6
	1930	64.7	81.2	75.9	66.4	60.7
	2030	65.0	87.1	85.8	63.8	55.3
	2130	64.9	84.0	80.3	66.8	54.4
	2230	62.2	83.1	77.6	63.0	51.2
	2330	54.5	68.9	64.4	57.9	49.7
30-Apr	0030	56.2	76.3	75.0	57.3	48.0
	0130	52.3	65.0	63.5	56.2	46.7
	0230	51.5	66.4	63.0	55.5	45.9
	0330	52.7	65.7	63.0	56.5	45.6
	0430	57.3	70.9	66.7	61.0	49.9
	0530	60.8	70.4	67.4	63.5	55.3
	0630	61.7	72.7	68.1	63.9	57.3
	0730	61.4	76.6	72.2	64.0	55.8
	0830	61.6	74.0	68.7	63.8	57.1
	0930	63.1	72.0	69.4	64.5	61.3
	1030	63.1	73.5	68.3	64.4	61.6
	1130	62.9	74.2	69.2	64.3	61.3
	1230	62.6	71.1	67.7	63.9	61.2
	1330	61.3	71.5	68.2	63.6	56.3
	1430	58.0	70.9	66.4	60.1	54.8
	1530	58.2	80.9	71.5	59.8	54.6
	1630	56.4	72.7	63.2	58.7	53.1
	1730	56.7	71.9	66.4	59.1	53.0
	1830	58.5	72.6	69.3	60.8	54.0
	1930	58.9	71.5	67.2	61.0	55.3
	2030	58.7	73.5	69.4	60.9	54.2
	2130	58.2	67.1	64.5	60.8	53.5
	2230	57.9	73.1	68.2	60.6	52.6
	2330	55.5	73.8	68.9	58.5	47.8
01-May	0030	52.2	66.2	62.0	56.0	47.0
	0130	51.6	63.4	61.8	55.6	46.1
	0230	50.8	62.6	60.8	54.9	45.0
	0330	53.2	67.8	64.2	57.1	45.7
	0430	57.5	68.9	66.7	60.9	48.2
	0530	61.2	71.6	67.9	63.9	56.1
	0630	62.3	70.7	68.4	64.5	58.3
	0730	61.5	79.1	75.3	63.4	57.1

Date	Time	LAeq	LAmax	LA1	LA10	LA90
		dB	dB	dB	dB	dB
	0830	61.1	74.2	70.5	63.6	57.1
	0930	61.4	77.7	70.0	63.3	58.1

2. 24 Hour Measurement at Craneford Road Boundary, 1-2 May 2014

Time	LAeq	LAmax	LA1	LA10	LA90
	dB	dB	dB	dB	dB
1330	59.0	80.6	78.3	58.3	43.0
1430	62.1	82.8	79.5	64.5	41.7
1530	59.0	76.6	73.9	62.5	37.9
1630	58.8	84.2	75.5	62.4	40.2
1730	59.0	76.9	72.4	62.9	39.9
1830	56.7	77.5	73.0	59.7	41.3
1930	56.6	80.5	73.1	60.2	39.7
2030	54.5	74.3	71.7	58.1	39.2
2130	55.4	80.4	75.3	53.9	38.0
2230	59.6	80.1	77.5	62.6	41.2
2330	55.2	76.8	73.7	51.0	36.9
0030	35.6	54.4	46.1	37.2	33.4
0130	33.8	46.7	43.5	35.6	31.2
0230	32.7	42.8	40.3	34.5	30.4
0330	37.1	53.4	48.2	39.9	32.3
0430	60.7	81.9	76.5	64.0	38.6
0530	58.0	79.0	74.6	60.3	41.5
0630	56.0	80.7	73.2	58.4	43.3
0730	58.8	78.6	75.3	61.9	43.6
0830	58.7	78.6	75.3	61.5	44.2
0930	57.2	79.9	76.4	59.2	41.6
1030	58.9	86.8	76.8	60.0	42.1
1130	57.6	78.8	75.9	58.0	42.1
1230	60.9	82.3	79.8	61.8	43.5

3. 24 Hour Measurement at Egerton Road Boundary, 2-3 May 2014

Time	LAeq	LAmax	LA1	LA10	LA90
	dB	dB	dB	dB	dB
1300	61.5	82.5	78.6	59.7	44.4
1400	63.4	82.2	79.8	66.3	44.4
1500	60.6	75.0	73.9	64.0	39.3
1600	59.9	85.4	75.7	63.5	41.4
1700	61.3	77.4	72.5	64.4	42.7
1800	58.0	77.1	73.1	60.7	43.5
1900	58.1	79.7	73.4	62.0	41.2
2000	55.9	72.3	72.5	60.0	41.9
2100	58.4	79.6	75.8	55.4	39.2
2200	62.4	81.5	78.2	64.0	42.6
2300	56.7	78.0	74.5	53.0	38.1
0000	38.5	54.0	47.0	38.4	36.2
0100	35.7	46.9	43.8	37.5	34.0
0200	35.3	44.0	40.9	36.2	31.9
0300	38.7	53.0	48.9	41.5	34.4
0400	63.0	83.7	77.3	65.6	39.6
0500	59.7	78.5	75.2	61.4	43.2
0600	58.3	80.2	73.4	59.4	45.5
0700	61.7	78.9	75.5	63.9	45.1
0800	59.7	78.2	75.8	63.3	46.6
0900	59.1	79.1	77.2	61.1	42.9
1000	61.2	88.3	77.5	61.7	45.1
1100	60.3	80.1	75.9	60.0	44.2
1200	63.4	84.1	80.8	63.4	45.0
1300	60.6	73.8	73.3	64.3	44.9

4. Attended Measurements on A316 Boundary

Date	Time	LAeq	LAmax	LA1	LA10	LA90
24-Apr	1030	69.3	76.5	74.5	72.6	62.2
	1130	69.2	76.4	74.2	72.1	63.9
	1230	69.0	76.4	74.4	72.2	62.4
	1330	69.7	77.7	75.1	72.4	65.1
	1430	68.9	76.0	74.0	71.8	62.5
	1530	69.5	76.8	74.3	72.7	64.2
02-May	2300	64.7	75.8	73.0	67.6	54.8
	0000	64.2	76.3	74.1	67.8	51.6
	0100	61.0	71.2	68.6	64.7	48.5
	0200	59.5	73.5	70.4	62.3	46.1
	0300	61.2	70.9	69.1	63.9	44.3
	0400	64.6	76.2	74.2	67.5	52.1
	0500	66.3	77.1	74.8	70.1	59.7
	0600	67.8	77.3	75.0	71.3	61.9

5. Attended Measurements at Heatham Park

Time	LAeq	LAmax	LA90
1000	48.7	62.7	41.7
1100	48.5	63.6	43.2
1200	48.1	55.8	44.0
1300	51.0	61.8	43.7
1400	47.8	58.7	42.6
1500	48.0	63.0	38.9
1600	47.2	60.3	40.5
1700	51.0	62.8	41.3
1800	52.1	67.3	43.7

6. Attended Measurements at Egerton Road South

Time	LAeq	LAmax	LA90
0930	56.6	71.0	45.9
1030	55.1	67.2	42.5
1130	56.4	75.7	44.5
1230	54.3	65.8	46.1
1330	53.6	67.9	42.3
1430	50.9	62.1	44.3
1530	59.4	74.7	45.7
1630	54.4	64.5	47.4
1730	52.8	60.9	46.8

Appendix 9.2: Plant used for Construction Noise Calculations

Plant used for construction noise calculations

PHASE	ACTIVITY	TYPICAL PLANT	BS5228 Ref.	NO.	Source at 10m	% on time
Phase 1						
1b	Demolition	Excavator+muncher	C1.4	1	76	75
		Backhoe Excavator	C1.1	1	82	10
		Breakers	C2.11	1	79	50
		Tracked Crusher	C1.14	1	82	50
		10t Dumper	C4.4	2	76	25
		Mobile Crane	C4.30	1	80	20
		Cherry picker	C4.54	1	79	30
		Generator	C6.39	1	65	75
		Hand tools		4	65	75
		Cutting Plant	C4.91	1	78	25
1b	Haul Road	Excavator 8t	C2.16	2	72	75
		Roller	C2.39	2	74	25
		Dozer	C2.13	1	78	50
		Mini Excavator	C4.68	1	65	75
		Dumper 10t	C4.4	2	76	50
		Excavator loader	C1.12	1	82	25
1c	Construction	Roller	C2.39	1	74	30
		Generator	C4.83	1	65	100
		Concrete Truck/Pump	C4.28	1	75	30
		Cherry picker	C4.54	1	79	30
		Excavator 16t	C2.39	1	74	30
		Excavator 8t	C2.16	2	72	75
		Roller	C2.39	1	74	25
		Telehandler	C4.54	1	79	30
		Excavator loader	C1.12	1	82	50
		Hammer drills	C4.69	1	85	10
		CFA Rig	C12.42	1	81	20
		Mobile Crane	C4.30	1	80	20
1e	Demolition	Excavator+muncher	C1.4	1	76	75
		Backhoe Excavator	C1.1	1	82	10
		Beakers	C2.11	1	79	50
		Tracked Crusher	C1.14	1	82	50
		10t Dumper	C4.4	2	76	25

PHASE	ACTIVITY	TYPICAL PLANT	BS5228 Ref.	NO.	Source at 10m	% on time
		Mobile Crane	C4.30	1	80	20
		Cherry picker	C4.54	1	79	30
		Generator	C6.39	1	65	75
		Hand tools		4	65	75
		Cutting Plant	C4.91	1	78	25
Phase 2						
2a	Construction	Roller	C2.39	1	74	30
		Generator	C4.83	1	65	100
		Concrete Truck/Pump	C4.28	1	75	30
		Cherry picker	C4.54	1	79	30
		Excavator 16t	C2.39	1	74	30
		Excavator 8t	C2.16	2	72	75
		Roller	C2.39	1	74	25
		Telehandler	C4.54	1	79	30
		Excavator loader	C1.12	1	82	50
		Hammer drills	C4.69	1	85	10
		CFA Rig	C12.42	1	81	20
		Mobile Crane	C4.30	1	80	20
2a	Pitches	Excavator 8t	C2.16	2	72	75
		Roller	C2.39	2	74	25
		Dozer	C2.13	1	78	50
		Mini Excavator	C4.68	1	65	75
		Dumper 10t	C4.4	1	76	50
		Excavator 16t	C2.39	1	74	30
2b	Construction	Roller	C2.39	1	74	30
		Generator	C4.83	1	65	100
		Concrete Truck/Pump	C4.28	1	75	30
		Cherry picker	C4.54	1	79	30
		Excavator 16t	C2.39	1	74	30
		Excavator 8t	C2.16	2	72	75
		Roller	C2.39	1	74	25
		Telehandler	C4.54	1	79	30
		Excavator loader	C1.12	1	82	50
		Hammer drills	C4.69	1	85	10
		CFA Rig	C12.42	1	81	20

PHASE	ACTIVITY	TYPICAL PLANT	BS5228 Ref.	NO.	Source at 10m	% on time
		Mobile Crane	C4.30	1	80	20
2d	Demolition	Excavator+muncher	C1.4	1	76	75
		Backhoe Excavator	C1.1	1	82	10
		Beakers	C2.11	1	79	50
		Tracked Crusher	C1.14	1	82	50
		10t Dumper	C4.4	2	76	25
		Mobile Crane	C4.30	1	80	20
		Cherry picker	C4.54	1	79	30
		Generator	C6.39	1	65	75
		Hand tools		4	65	75
		Cutting Plant	C4.91	1	78	25
Phase 3						
3a	Construction	Roller	C2.39	1	74	30
		Generator	C4.83	1	65	100
		Concrete Truck/Pump	C4.28	1	75	30
		Cherry picker	C4.54	1	79	30
		Excavator 16t	C2.39	1	74	30
		Excavator 8t	C2.16	2	72	75
		Roller	C2.39	1	74	25
		Telehandler	C4.54	1	79	30
		Excavator loader	C1.12	1	82	50
		Hammer drills	C4.69	1	85	10
		CFA Rig	C12.42	1	81	20
		Mobile Crane	C4.30	1	80	20
3b	Construction	Roller	C2.39	1	74	30
		Generator	C4.83	1	65	100
		Concrete Truck/Pump	C4.28	1	75	30
		Cherry picker	C4.54	1	79	30
		Excavator 16t	C2.39	1	74	30
		Excavator 8t	C2.16	2	72	75
		Roller	C2.39	1	74	25
		Telehandler	C4.54	1	79	30
		Excavator loader	C1.12	1	82	50
		Hammer drills	C4.69	1	85	10
		CFA Rig	C12.42	1	81	20

PHASE	ACTIVITY	TYPICAL PLANT	BS5228 Ref.	NO.	Source at 10m	% on time
		Mobile Crane	C4.30	1	80	20
3b	Completion	Roller	C2.39	1	74	30
	Works	Cherry picker	C4.54	1	79	30
		Excavator 16t	C2.39	1	74	30
		Excavator 8t	C2.16	2	72	75
		Roller	C2.39	1	74	25
		Telehandler	C4.54	1	79	30
		Mobile Crane	C4.30	1	80	20

Appendix 9.3: Noise from Sports Activities

Noise from Sports Activities

Extract from a report to Preston Manor Primary School by Sandy Brown Associates, 16 April 2011

4 Sports pitch noise survey review

As part of SBAs involvement in various similar projects, measurements of noise created by various sports pitches at different sites across the country have been taken. The key findings from these surveys are summarised below.

4.1 Adults playing football on synthetic pitches

Noise levels were measured at 'Pitz', Westbank Street, Portobello, Edinburgh. This venue has 8 pitches and is in proximity to a residential areas. Typical noise levels at 12 metres from the pitches with all pitches in operation were L_{Aeq} 58-60 dB.

Noise levels were also measured at Saughtonhall Park, Edinburgh, where two pitches were in use. Typical sound levels at 50 metres from the edge of the pitches were LAeq 48 dB.

4.2 Youth football match played on a grass pitch

Noise levels were measured at Middleshot Square, Prestonpans. One pitch was being used for a football match between two youth teams. Typical sound levels at 30 metres from the goal end of the pitch were L_{Aeq} 48-52 dB.

4.3 School children playing football on synthetic pitches

Noise levels were measured at Coatbridge on a large '3G' synthetic sports pitch. There were three boys' football matches being played simultaneously across the width of the single large pitch. Although they were boys' matches, adult coaches and parents shouting from the sideline were the often the dominant noise sources.

Typical noise levels at 10 metres from the wire mesh fence surrounding the pitches were L_{Aeq} 59-61 dB.

4.4 Summary of noise levels

When all of the above measurement data is corrected to sound pressure levels at the same distance from the noise source, there is good agreement between the various datasets.

The measurements show that there is only a very small difference in noise levels created by adult's and children's matches or when played on grass or synthetic pitches. The measurements also show that the noise levels around sports pitches are reasonably constant and that there is little difference between noise levels measured behind the goals and near the half-way line.

In summary, noise levels around pitches are typically in the region of L_{Aeq} 60 dB and at worst case L_{Aeq} 62 dB at a distance of10 metres.

CHAPTER 10 – APPENDICES

CONTENTS

Appendix 10.1: Atmospheric Dispersion Modelling System (ADMS) Roads Model Input Parameters

Table 1: ADMS-Roads Input Parameters (2014)

Road Link	Existing Baseline		Average Speed (kph)
	AADT	HGV	
A316 EB (west of Langhorn Drive)	22,977	11.7%	40
A316 EB (Langhorn Drive to Chudleigh Road)	22,977	11.7%	60
A316 EB (Chudleigh Road to Whitton Road)	22,977	11.7%	40
A316 WB (Whitton Road to Chudleigh Road)	22,302	9.3%	40
A316 WB (Chudleigh Road to junction approach)	22,302	9.3%	60
A316 WB (junction approach to Langhorn Drive)	22,302	9.3%	40
A316 WB (west of Langhorn Drive)	22,302	9.3%	50
Whitton Road	9,473	7.7%	30
Langhorn Drive	1,934	19.8%	20

Table 2: ADMS-Roads Input Parameters (2019)

Road Link	Baseline		Baseline + Construction + Operational (minus Phase 2 Residential)		Baseline + Operational (Complete)		Average Speed (kph)
	AADT	HGV	AADT	HGV	AADT	HGV	
A316 EB (west of Langhorn Drive)	23,797	11.7%	24,589	11.5%	24,748	11.4%	40
A316 EB (Langhorn Drive to Chudleigh Road)	23,797	11.7%	24,589	11.5%	24,748	11.4%	60
A316 EB (Chudleigh Road to Whitton Road)	23,797	11.7%	24,589	11.5%	24,748	11.4%	40
A316 WB (Whitton Road to Chudleigh Road)	23,098	9.3%	23,702	9.2%	23,860	9.1%	40
A316 WB (Chudleigh Road to junction approach)	23,098	9.3%	23,702	9.2%	23,860	9.1%	60
A316 WB (junction approach to Langhorn Drive)	23,098	9.3%	23,702	9.2%	23,860	9.1%	40
A316 WB (west of Langhorn Drive)	23,098	9.3%	23,702	9.2%	23,860	9.1%	50
Whitton Road	10.154	7.5%	10,331	7.5%	10,413	7.3%	30
Langhorn Drive	1,998	19.8%	3,363	14.0%	3,681	12.3%	20

Table 3: ADMS-Roads Input Parameters (2034)

Road Link	Baseline		Baseline + Operational		Average Speed (kph)
	AADT	HGV	AADT	HGV	
A316 EB (west of Langhorn Drive)	25,582	11.7%	26,533	11.4%	40
A316 EB (Langhorn Drive to Chudleigh Road)	25,582	11.7%	26,533	11.4%	60
A316 EB (Chudleigh Road to Whitton Road)	25,582	11.7%	26,533	11.4%	40
A316 WB (Whitton Road to Chudleigh Road)	24,830	9.3%	25,592	9.1%	40
A316 WB (Chudleigh Road to junction approach)	24,830	9.3%	25,592	9.1%	60
A316 WB (junction approach to Langhorn Drive)	24,830	9.3%	25,592	9.1%	40
A316 WB (west of Langhorn Drive)	24,830	9.3%	25,592	9.1%	50
Whitton Road	10,890	7.5%	11,148	7.3%	30
Langhorn Drive	2,148	19.7%	3,831	12.6%	20

Appendix 10.2: Model Verification

Most nitrogen dioxide (NO_2) is produced in the atmosphere by the reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emissions. Verification of concentrations predicted by the ADMS-Roads model has followed the methodology presented in LAQM. TG(09)**Error! Bookmark not defined.**.

Predicted annual mean concentrations of NO_2 have been compared with the 2013 annual mean concentration measured by LBRuT diffusion tube 31, located on Chertsey road, approximately 75m from the proposed development.

The measured NO_2 concentration has been converted into an equivalent measured Road-NOx (i.e. the component of total NOx coming from road traffic) concentrations using the Defra NOx from NO_2 calculator.

The ratio of the measured and modelled Road-NOx contributions provides an adjustment factor for the modelled Road-NOx concentrations. This factor is then applied to the modelled road NOx concentrations, before they are converted to Road-NO_2 using the Defra NOx to NO_2 calculator and added to the background NO_2 concentration for each location to produce a total adjusted modelled NO_2 concentration.

The model verification calculation is presented in Table 1. In the absence of particulate monitoring data suitable for verification, the average adjustment factor has also been applied to the modelled Road-PM_{10} and Road-$PM_{2.5}$ concentrations, in accordance with the guidance.

Table 1: Verification Calculation

Parameter	**LBRuT Tube 31**
Measured NO_2 Concentration (2013)	61 µg/m³
Measured Road-NOx Concentration	92.6 µg/m³
Modelled Road-NOx Concentration (using EFT6.0.1 2013 factors for Outer London)	31.5 µg/m³
Adjustment Factor	**2.94**
Adjusted Modelled Road-NOx Concentration	92.6 µg/m³
Adjusted Modelled Road-NO_2 Concentration	34.7 µg/m³
Background NO_2 Concentration	26.3 µg/m³
Final Adjusted Total NO_2 Concentration	61.0 µg/m³