CBO

Transport

Project:

Proposed Residential Development
Chapel Hill, Longridge

Client:

United Utilities

Document:

Transport Assessment

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CBO Transport

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1 Introduction

1.1 CBO Transport Ltd [CBO] has been commissioned by United Utilities [UU] to undertake an assessment of the potential transport issues arising from a proposed residential development on land to the south of Chapel Hill, Longridge.

Background

1.2 Whilst employed by JMP Consultants Ltd, CBO Director Steven Bowers provided preliminary traffic and transportation advice to UU back in February 2007 in relation to access solutions for a proposed development comprising residential uses on the current application site and B1 uses on the parcel of land to the north of the household recycling centre. As a result of this preliminary advice, a full Access Feasibility Report was produced in August 2008 which included an appraisal of the existing highway network surrounding the site, the production of preliminary access sketch layouts and initial operational assessments of these access solutions for various development scenarios.

1.3 Following on from this work, UU produced plans for the redevelopment of both the application site and the parcel of land to the north of the household recycling centre in 2009 incorporating:

- Up to 3,500sq.m (34,660sq.ft) Gross Floor Area [GFA] of office use and a 1,277sq.m (13,745sq.ft) Gross Internal Area [GIA] gymnasium, including a crèche on the northern site; and
- Up to 70 residential dwellings on the southern site (i.e. the application site)

1.4 As part of this process and whilst still employed at JMP Consultants Ltd, CBO Director Steven Bowers held extensive discussions with highways officers at Lancashire County Council [LCC] during 2009 regarding the then proposed schemes potential transport impact. Through this work, agreement was reached in relation to traffic flows, speeds, access / visibility provision and traffic impact in relation to the residential and employment elements of the scheme.

Current Position

1.5 Since preparing the above scheme in 2009 and due to a number of influencing factors, UU are now proposing to progress with redevelopment of the southern site only, with the northern site left in its current form.

1.6 As a result and given the work that has gone before, CBO held scoping discussions with LCC on the 24th August 2011 regarding this current proposal. Through these discussions it was agreed that, in light of the proposed development reducing in size and now only taking in the southern site, the scope of work agreed in 2009 remains valid and just requires updating to reflect current conditions. LCC therefore requested that new traffic surveys be carried out at the Chapel Hill / Household recycling centre access during week commencing 12th September 2011.

Scope of Report

1.7 In light of the above, the purpose of this report is to provide LCC with the necessary information to support the residential proposals and consider their transport implications. In order to provide this information, this report has been produced in 8 sections including this introduction.

1.8 Section 2 reviews existing highway conditions and provides details of the study area, whilst Section 3 considers the accessibility of the site by the sustainable modes.

1.9 Section 4 details the development proposals and transport network improvements, whilst Section 5 considers the traffic generations associated with the proposal.

1.10 Details of the base traffic flows are provided in Section 6, whilst Section 7 includes details of the traffic impact of the proposal.

1.11 The conclusions and recommendations of the report are included in Section 8.

2 Existing Conditions and Study Area

Site Description

2.1 The application site is bound by the B6243 Chapel Hill to the north, Alston Reservoir Number 2 to the south / west and a row of houses to the north-east. It is within the main settlement boundary for Longridge and partly within a conservation area. The location of the site is shown in **Figure 2.1**.

2.2 Access to the wider site is currently gained via an access adjacent to Number 18 Chapel Brow. A further access is also provided directly off Chapel Hill, although this access solely serves number 53 Chapel Hill. There is currently no public access to the site.

Highway Network

2.3 The B6243 Chapel Hill is a single carriageway road of between 7 and 9.5 metres in width travelling in an east – west direction. The route is lit and subject to a 30mph speed limit. In the vicinity of the site, Chapel Hill curves to the right travelling in an eastbound direction, left in the westbound direction. It is also on an incline when travelling eastbound past St Cecilla's RC High School. As a result of this curvature and the existing stone wall fronting the application site, forward visibility is restricted along a short length past the site.

2.4 To the east of the site, the B6243 Chapel Hill provides the southern route into the centre of Longridge and goes on to provide a direct link to Clitheroe. To the west, Chapel Hill joins the B6244 Preston Road via a mini roundabout arrangement.

2.5 The B6244 Preston Road continues in a westbound direction, passing through Grimsargh and ultimately providing a direct link to the M6 at Junction 31a and Preston via the B6242.

Highway Study Area and 2011 Observed Traffic Flows

2.6 As part of the work previously undertaken in relation to the site, two locations were agreed with LCC for consideration, namely:

- B6243 Chapel Hill / Household recycling centre (northern site access); and
- B6243 Chapel Hill / Southern site access.

2.7 As part of this work, independent traffic surveys were commissioned at the Chapel Hill / Household recycling centre junction in July 2008. These surveys showed the weekday morning and evening peaks to be 8:00 – 9:00 and 17:00 – 18:00 respectively.

2.8 Whilst the northern site no longer forms part of the proposed development, it does still form the existing access to the household recycling centre and the employment unit. It will also continue to interact with the southern site access. As a result, it was agreed with LCC on the 24th August 2011 that these two junctions continue to form the study area. LCC also requested that updated traffic count data be collected.

2.9 In light of the above, updated traffic counts were undertaken by an independent survey company on Thursday 15th September 2011 between the hours 7:00 – 10:00 and 16:00 – 19:00. Based on the above surveys, which again identified the weekday morning and evening peak hours as being 8:00 - 9:00 and 17:00 - 18:00 respectively, the observed 2011 weekday morning and evening peak hour traffic flows are shown in **Figure 2.2 (A&B)**.

2.10 In addition to these numerical surveys, observations were carried out on Chapel Hill between 14:50 and 15:30 on Monday 19th September 2011 to understand how parents / buses arriving to collect pupils from St Cecilia's RC High School impacted on conditions. From these observations, which it is assumed will have represented the worst traffic conditions at the end of the school day given the poor, wet weather, it was apparent that no parking took place on the south side of Chapel Hill and that parking on the north side does not extend too far west along Chapel Hill, with no more than 25 cars being observed to be waiting at any one time. It was also apparent that buses picking up pupils were to a degree staggered in their arrival times, that there was minimal cross over between buses and that parents in cars tended to leave the bus stop outside the school clear for use by buses. In terms of operation, the observations suggest that waiting parents and buses did not result in significant queuing and that other road users were aware of the activity and adjusted their driving behaviour accordingly. As a result, it was apparent that conditions outside St Cecilia's RC High School are no worse than at any other school at this time of day and do not significantly impact on highway safety in the area.

Speed Survey

2.11 As part of the traffic surveys undertaken on the 15th September 2011 and in order to determine existing vehicle speeds passing the site along the B6243 Chapel Hill, speed surveys were also carried out in accordance with Design Manual for Roads & Bridges [DMRB] TA 22/81: Vehicle Speed Measurements on All Purpose Roads.

2.12 In considering the results of these surveys, DMRB requires that 85th percentile wet weather speeds be used and, where they are measured on a dry day as was the case at Chapel Hill, that the recorded speeds be reduced by 4kph (2.5mph) to derive this wet weather value. Adopting this approach, Table 2.1 below sets out the average speed, 85th percentile dry weather speed and 85th percentile wet weather speed observed past the proposed site.

Table 2.1: B6243 Chapel Hill Speed Survey Results

Direction	Average (mph)	85th Percentile Dry (mph)	85th Percentile Wet (mph)
Eastbound	29	32	30
Westbound	30	34	32

2.13 As can be seen from the above table, the average speeds along the B6243 Chapel Hill in both directions are in the order of the roads speed limit, with an average of 29mph in the eastbound direction and 30mph in the westbound direction. With regard to the adjusted wet weather 85th percentile speeds used when considering visibility provision at accesses, these are shown to be 30mph in the eastbound direction and 32mph in the westbound direction.

Accident Analysis

2.14 In order to determine the most recent highway safety record in close vicinity to the site, Personal Injury Accident [PIA] data has been obtained from LCC's Mario database for the length of the B6243 Chapel Hill from the houses to the west of St Cecilla's RC High School to its junction with Lower Lane. This area, together with the location of the accidents which occurred in that period, is shown in **Figure 2.3**.

2.15 As can be seen from **Figure 2.3**, only two PIA's have occurred in the area identified, with both being classified as 'slight' and none involving a child, cyclist or pedestrian. Based on these findings, it is concluded that there is no existing highway safety issue in the vicinity of the site.

3 Site Accessibility by the Sustainable Modes

Accessibility for Pedestrians & Cyclists

3.1 Whilst a footway is provided along the northern side of Chapel Hill to the east and west of the proposed site, this does vary in width from approximately 2 metres to approximately 1.5 metres in the vicinity of Number 52 Chapel Hill and St Cecilia's RC High school. There is also currently no footway on the southern side of Chapel Hill in the vicinity of the site. However, further afield and especially to the east towards Longridge Centre, footways are provided on Chapel Hill that link to the wider pedestrian network.

3.2 PPG13 states that:

"Walking is the most important mode of travel at the local level and offers the greatest potential to replace short car trips, particularly under two kilometres"

3.3 Whilst the Institution of Highways and Transportation "Guidelines for Providing for Journeys on Foot" states that:

"Walking accounts for over a quarter of all journeys and four fifths of journeys less than one mile" and suggests a distance of 1.0 kilometres is acceptable for rural journeys on foot.

3.4 In this context, the entire Longridge area is within the 2km walking distance, including all of the services offered by the town. Furthermore, a large proportion of Longridge and its core services are within a 1km walk distance of the site.

3.5 Based on the above, the site is accessible on foot.

3.6 With regard to cycling, there are no dedicated cycling provisions along Chapel Hill or in the wider area. However, the route is conducive to cycle use given the levels of vehicular movements.

Accessibility by Public Transport

Bus

3.7 Bus stops are located on both sides of the B6244 Preston Road to the west of the site. These stops are 400 metres from the western boundary of the site and therefore within the 400 metres deemed by guidance to be an acceptable walking distance from a bus stop. Whilst it is accepted that people living at the eastern end of the scheme will be more than 400 metres from a bus stop, it is considered that the nature of the walk through the development would not discourage people from walking a short distance extra. As a result, these stops are ideally situated to serve all residents of the proposed site. The bus routes served by these bus stops are therefore shown in Table 3.1 below.

Table 3.1: Bus Services Travelling along the B6244 Preston Road

Service	Route	Frequency
1	Longridge - Grimsargh – Ribbleton – Preston	Mon – Sat. Frequent Intervals

3.8 The number 1 service runs on a regular basis throughout the day. Although the service times vary considerably through the day, they run with a 10 to 15 minute frequency during the weekday morning peak. With timetabled morning peak journey times of 7 minutes to Grimsargh, 14 minutes to Ribbleton and only 30 minutes to Preston bus station, it offers a real alternative to travel by car for residents of Longridge.

3.9 The site is therefore connected to the primary local bus network.

4 Proposed Development and Transport Network Improvements

Proposed Development

4.1 As set out in the introduction, the revised scheme removes the northern site and proposes development on the southern site only. As a result and as shown in **Figure 4.1**, the proposals seek full planning permission for access, landscaping and the erection of 53 new build residential properties, the conversion of the former barn to one dwelling unit and refurbishment of existing residential dwelling unit (53 Chapel Hill).

4.2 With regard to the number of dwellings, discussions with LCC and the work undertaken to date related to the delivery of up to 70 dwellings on the southern site. Whilst the 53 now proposed is below this level, the 70 dwellings figure has been retained for robustness when considering traffic generation and impact.

Site Access

4.3 With regard to the proposed access arrangement to the application site and in accordance with the Lancashire Residential Road Design Guide, it was agreed with LCC as part of the previous work in 2009 that it would take the form of a 5.5 metre carriageway with 2 metre footways to both sides. Given that this access would be serving a residential development and would be accessing a local distributor road, it was also agreed that the junction be designed with 10 metre radii, again in accordance with LCC guidance.

4.4 To enhance the access's interaction with the B6243 Chapel Hill and the Household recycling centre access opposite, it was also proposed that a ghost island right turn lane be provided for vehicles turning into the site. This ghost island was then to also extend to provide a right turn lane for the household recycling centre, with an uncontrolled pedestrian crossing and pedestrian refuge provided across Chapel Hill between the two accesses.

4.5 Given that the proposals for the southern site are not significantly different to those previously agreed, the access arrangement described above has been retained as part of this application. Details of the proposed layout are therefore provided on **Drawing Number CBO-0037-001** at **Appendix A**.

4.6 Considering visibility, it was agreed with LCC as part of the previous work that the advice set out in DB32 would be adopted in this instance. Based on the strict application of the advice provided in paragraph 3.64 and Table A of DB32 and the observed 85th percentile speeds of 30mph eastbound and 32mph westbound, there would be a requirement for a 'y' distance of 70 metres to the west and 90 metres to the east. With regard to the 'x' distance it was previously agreed that the traditional 4.5m distance be adopted.

4.7 Based on the above, drawing number CBO-0037-001 demonstrates that the provision of a 4.5 x 70 metre visibility splay can be achieved to the west and that the access satisfies the requirements of DB32 in this direction. With regard to provision to the west and as again shown on drawing number CBO-0037-001 the maximum achievable 'y' is 74 metres, which falls short of the 90 metre provision. However, the 90 metre provision set out in DB32 relates to an 85th percentile speed of 37.5mph, which is clearly considerably above the 32mph observed. Furthermore, strict application of the calculation used to determine 'y' distances in DB32, which is a formula based around speed, driver perception / reaction time and deceleration, requires a 70 metre 'y' distance at a speed of 32mph, not the 30mph quoted in Table A.

4.8 In addition to the above, consideration should also be given to the more recent research included in Manual for Streets [MfS]. This provides revised stopping sight distances for use in determining 'y' distances based on more recent research into driver perception / reaction times and deceleration. As a result of this more recent research, MfS suggests that the 'y' distance required at 31mph should be as low as 45 metres. The 74 metres achievable to the east is therefore far in excess of this revised figure.

4.9 In light of the above, it is suggested that the provision shown on drawing number CBO-0037-001 provides an adequate level of visibility for the proposed access to operate safely and efficiently.

Internal Highway Arrangements

4.10 The masterplan shown in **Figure 4.1** is 'indicative' given that the scheme is in outline and is intended to show that the scale of development proposed can be practically delivered within the site constraints. As a result, the internal highway arrangements shown are by no means definitive and will change as the scheme progresses. However, it is intended that all internal highway arrangements will be designed in accordance with Manual for Streets.

Parking Provision

4.11 Given that the final composition of dwelling types is not known at this stage, it is not possible to define a final level of parking provision for the proposed development. However, parking provision will be based on the standards set out in the Regional Spatial Strategy and LCC's previously adopted Joint Structure Plan, with a maximum of 1 space per 1 bedroom dwelling, 2 spaces per 2 to 3 bedroom dwelling and 3 spaces per 4+ bedroom dwellings.

Transport Network Improvements

Pedestrian Provision

4.12 As already identified, it is proposed as part of the access arrangements to include an uncontrolled pedestrian crossing point on the section of the B6243 Chapel Hill between the proposed site access and the household recycling centre. This crossing point, which would include dropped crossings, tactile paving and a pedestrian refuge island, would provide a safe facility for users of the proposed development to access the footway on the northern side of the B6243 Chapel Hill and the wider area already identified.

4.13 In addition to the above and to further enhance pedestrian connectivity, it is also proposed that a new 2 metre wide footway be provided on the southern side of the B6243 Chapel Hill between the western boundary of the proposed site and number 53 Chapel Hill. This footway would link to the internal pedestrian routes within the proposed development to provide a link between the western area of the site and the wider Chapel Hill area.

4.14 With regard to the internal arrangement of the development and whilst the final layout is not known at this outline stage, this would be designed in such a way as to ensure all pedestrian desire lines are catered for and would include sufficient facilities to ensure that the site is permeable to all pedestrians.

Forward Visibility Improvements on Chapel Hill

4.15 In light of the forward visibility constraints identified as part of the review of the existing network, and as part of the delivery of the new footway on the southern side of Chapel Hill, it is also proposed that the stone wall fronting Chapel Hill be re-aligned. This will deliver a forward visibility of 70 metres on the curved section of Chapel Hill for westbound traffic and significantly enhance highway safety in the area. This re-alignment is shown in drawing number CBO-0037-001.

5 Traffic Generation and Assignment

General

5.1 As part of the work undertaken in 2009, trip rates and generations were agreed with LCC for the proposed development of the application site. These trip rates and generations are therefore reproduced in this section.

Previously Agreed Trip Rates and Traffic Generation

5.2 With regard to the trip rates agreed in relation to the residential element of the previous proposals, these are set out in Table 5.1 below, along with the resultant traffic generations based on the site delivering up to 70 dwellings, which as already identified exceeds the 53 now proposed. Full TRICS outputs from the previous work have been replicated in the latest version of TRICS and are included at **Appendix B**.

Table 5.1: Traffic Generations Based on Previously Agreed Trip Rates

	Weekday Morning Peak			Weekday Evening Peak		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Trip Rate	0.162	0.402	0.564	0.449	0.244	0.693
Generation	11	28	39	31	17	48

Traffic Distribution / Assignment

5.3 Given the low levels of development traffic which would be using the access roads, it was agreed with LCC as part of the work in 2009 that the trip generation for the scheme be assigned to the highway network based on the existing traffic flows observed at the Chapel Hill / Household recycling access. Based on this approach, traffic was assigned with circa 60% arriving to and from the west and 40% to and from the east during the weekday morning peak. During the weekday evening peak, circa 70% arrived from the west and 30% from the east, with circa 60% leaving the site travelling east and 40% travelling west.

5.4 If this approach were to be applied to the recent traffic surveys, circa 60% would arrive from the west and 40% from the east during the weekday morning peak, with circa 55% leaving the site travelling east and 45% travelling west. During the weekday evening peak, circa 45% would arrive from the west and 55% from the east, with circa 55% leaving the site travelling east and 45% travelling west.

5.5 Considering the above, it is suggested that the use of the recent survey data would assign too much traffic east of the site to Longridge, particularly leaving the site during the weekday morning peak and arriving at the site during the weekday evening peak. As a result, the assignments derived in 2009 have been retained and are shown in **Figure 5.1 (A&B)**.

5.6 Based on the above assignment, **Figure 5.1 (C&D)** also shows the development flows during the weekday morning and evening peaks.

6 Base Traffic Flows

Traffic Growth

6.1 It was agreed in 2009 that the 2008 traffic counts be growthed to a future year 10 years after the then proposed date of application. As a result, future year base flows were derived for the year 2020 based on the National Transport Model [NTM] Indices, adjusted to local conditions using the geographical area of 'Longridge' within TEMPRO 6.2.

6.2 The Guidance on Transport Assessment [GTA] document states that future year assessments should be carried out based on a year either 5 years (local road network) or 10 years (strategic road network) after the year of registration of the planning application. On this basis, assessment of the potential impact on Chapel Hill strictly need only have been considered at 2015. However, notwithstanding this point and in accordance with the agreed approach, the observed 2011 flows have again been growthed to a 10 year future year, in this case 2021, based on the 2009 National Transport Model [NTM] Indices, adjusted to local conditions using the geographical area of 'Longridge' within TEMPRO 6.2. This is considered to represent a highly robust scenario.

6.3 Based on the above, Table 6.1 details the growth factors applied based on this methodology.

Table 6.1: TEMPRO Adjusted Growth Factors for Longridge

	Weekday Morning Peak	Weekday Evening Peak
2011 – 2021	1.071	1.077

Committed Development

6.4 A number of residential schemes have recently obtained planning consent in the Longridge area including:

- An outline application to reduce the size of the existing Royal British Legion Clubhouse and erect 5No. terraced houses at Townley Road;
- An outline application for 60No. residential dwellings at land off Preston Road; and
- A full application for 49no. residential dwellings at land bounded by Dilworth Lane and Lower Lane.

6.5 In addition to the above 114 dwellings, a further 28 dwellings have been granted consent between October 2010 and November 2011.

6.6 Based on the above and in order to make some allowance for committed development, the trip generations have been determined for the three sites listed at paragraph 6.5 based on the trip rates included in section 5 for the proposed scheme. All of these resultant trips have then been assigned to Chapel Hill past the proposed site frontage. As a result, all traffic arriving at the Townley Road and Dilworth Lane sites has been assumed to travel eastbound past the proposed site whilst all departing traffic has been assumed to travel westbound past the proposed site. For the Preston Road site, all traffic arriving at the site has been assumed to travel westbound past the proposed site, whilst all departing traffic has been assumed to travel eastbound past the proposed site.

6.7 Adopting the above methodology, which has been agreed with LCC, the resultant traffic generations for these schemes assumed to be passing the proposed site are as shown in Table 6.2 below. These flows are also shown diagrammatically in **Figure 2.2 (C&D)**.

Table 6.2: Committed Development Traffic Flows Assumed to be Passing Proposed Site

Site	Weekday Morning Peak			Weekday Evening Peak		
	Eastbound	Westbound	Total	Eastbound	Westbound	Total
Townley Rd	1	2	3	2	1	3
Preston Rd	24	10	34	15	27	42
Dilworth Ln	8	20	28	22	12	34
Total	33	32	65	39	40	79

2021 Base Traffic Flows

6.8 Based on the application of the TEMPRO derived traffic growth factors to the 2011 observed traffic flows and the addition of the committed development traffic flows set out above, **Figure 6.1 (A&B)** shows the 2021 base traffic flows for the weekday morning and evening peaks.

7 Traffic Impact

General

7.1 Section 5 provides details of the development traffic flows around the study network, whilst Section 6 includes details of the base traffic flows for the 2021 future year. Based on this information, **Figure 6.1 (C&D)** also shows the 2021 base plus development traffic flows for the proposed development.

7.2 Based on these traffic flows, this section considers the traffic impact of the access proposals and sets out the findings of the operational assessments.

Operational Assessments: Chapel Hill / Household recycling centre / Site Access

7.3 Based on the proposed access arrangement shown in **drawing number CBO-0037-001** and the assessment flows shown in **Figure 7.1**, Table 7.1 below show the results of the junction modelling of the proposed layout at 2021 with the development in place. Full PICADY outputs are included at **Appendix C**.

Table 7.1: Chapel Hill / Household Recycling / Site Access: 2021 Base Plus Development

	Weekday Morning		Weekday Evening	
	RFC	Q	RFC	Q
Chapel Hill (W): Right turn into site access	0.012	0	0.041	0
Site Access	0.035	0	0.034	0
Chapel Hill (E): Right turn into household recycling	0.038	0	0.034	0
Household recycling centre	0.033	0	0.084	0

7.4 As can be seen from the above tables, the PICADY modelling indicates that there would be no operational issues at the Chapel Hill / Household recycling centre / site access junction at 2021 with the development proposals in place. The maximum reserve flow capacity [RFC] of 0.038 during the weekday morning peak and 0.084 during the weekday evening peak is significantly below the traditional 0.850 design capacity, whilst there are no modelled queues.

8 Conclusions and Recommendations

Conclusions

8.1 Based on the findings of this report it is concluded that:

- The site is accessible by the sustainable modes. There are good pedestrian links to Longridge and key services are within 1km and 2km walk distances. The bus stops on the B6244 Preston Road are also within walking distance of the site and provide good links to the wider area;
- There are no existing highway safety issues, with only two personal injury accidents resulting in 'slight' injuries occurring in the area. Furthermore, it is apparent from observations outside St Cecilia's RC High School during the end of the school day that conditions are no worse than at any other school at this time of day and do not significantly impact on highway safety in the area;
- Footway provision in the immediate vicinity of the site is below standard in places. However, it is proposed to provide a new footway on the southern side of the B6243 Chapel Hill along the site frontage. It is also proposed to provide a new pedestrian crossing, complete with dropped crossings, tactile paving and a pedestrian refuge, on Chapel Hill between the proposed site access and the existing household recycling centre access. This provision, coupled with the new pedestrian facilities within the site, will enhance pedestrian provision in the area and link the development to the wider pedestrian network and facilities within Longridge;
- There are currently forward visibility constraints on the B6243 Chapel Hill along the site frontage and in the vicinity of St Cecilia's RC High School. However, as part of the delivery of the new footway on the southern side of Chapel Hill, it is also proposed that the stone wall fronting Chapel Hill be re-aligned. This will deliver a forward visibility of 70 metres on the curved section of Chapel Hill for westbound traffic and significantly enhance highway safety in the area;
- There would be no safety issues surrounding the introduction of the new priority controlled junction accessing the site, which would accord with LCC's requirements in terms of layout and geometry and provide adequate visibility splays;
- The proposed access arrangement would operate well within its design capacity in a future year of 2021 with the proposed development in place;

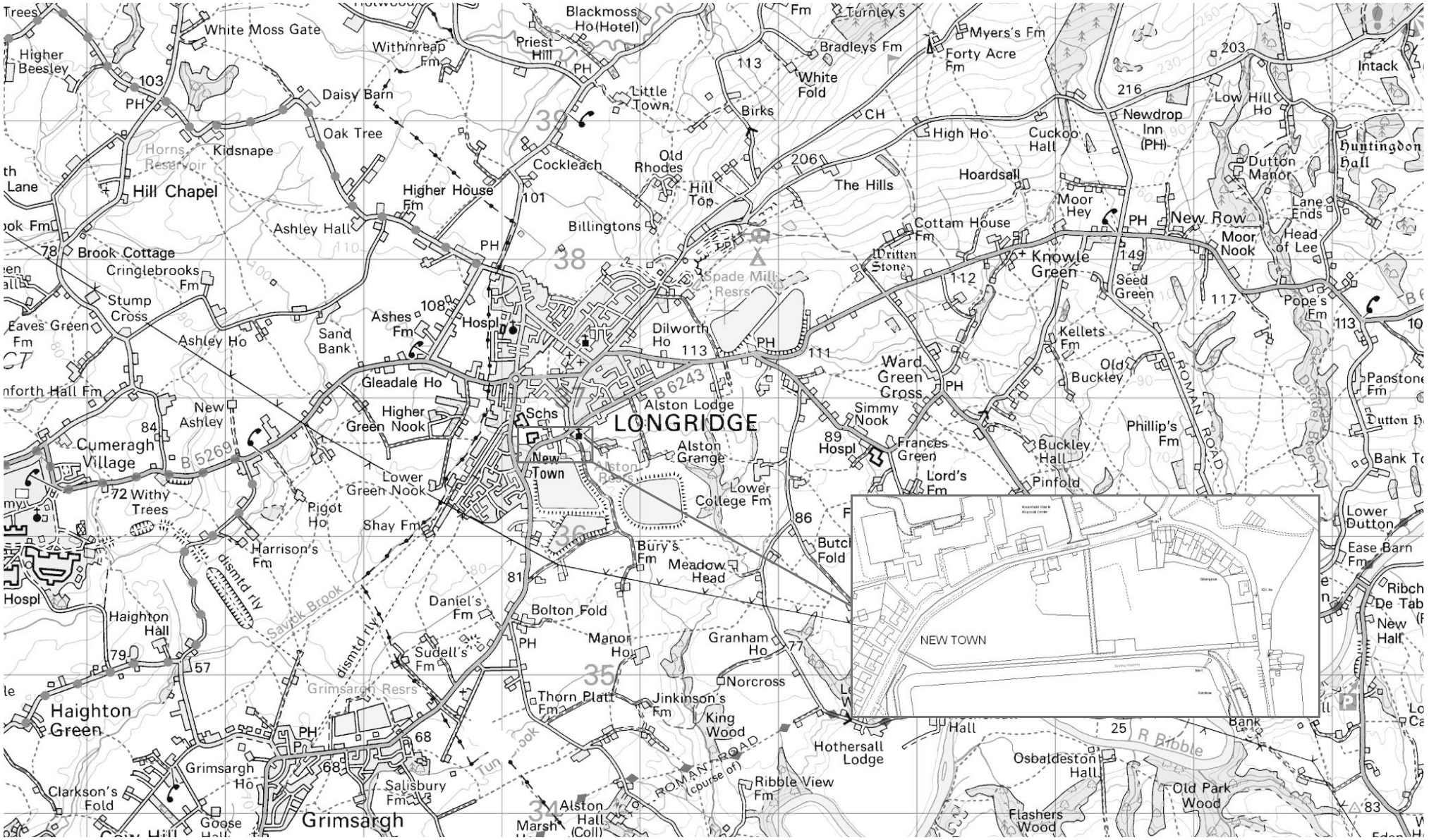
Recommendations

8.2 In light of the above it is the recommendation of CBO Transport that there are no traffic or transportation grounds on which to refuse this application.

Chapel Hill, Longridge

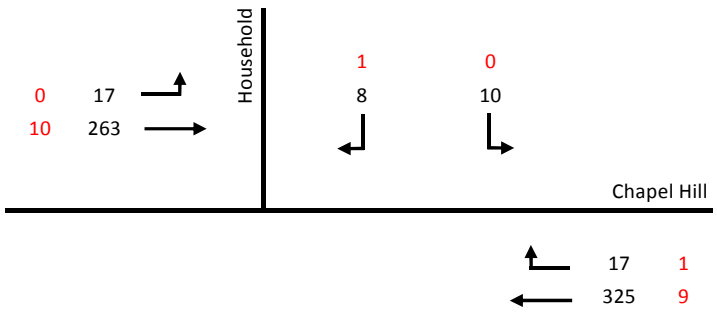
Figures

CBO Transport

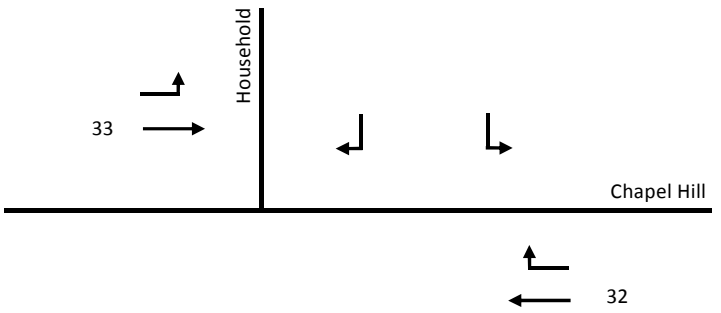


Site Location **Figure 2.1**

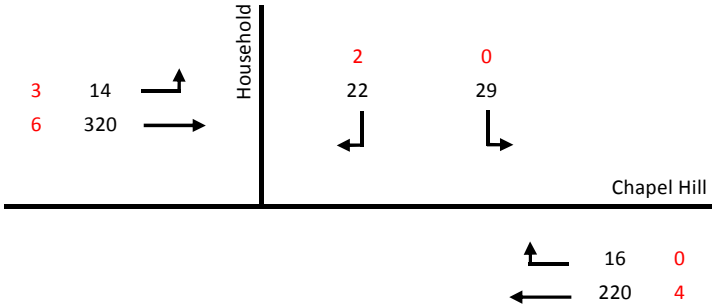
2.2(A): 2011 Weekday Morning Peak: 8:00 - 9:00



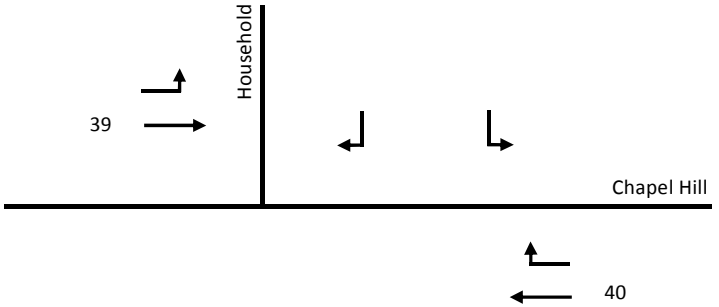
2.2(C): Committed Dev Weekday Morning Peak



2.2(B): 2011 Weekday Evening Peak: 17:00 - 18:00



2.2(D): Committed Dev Weekday Evening Peak



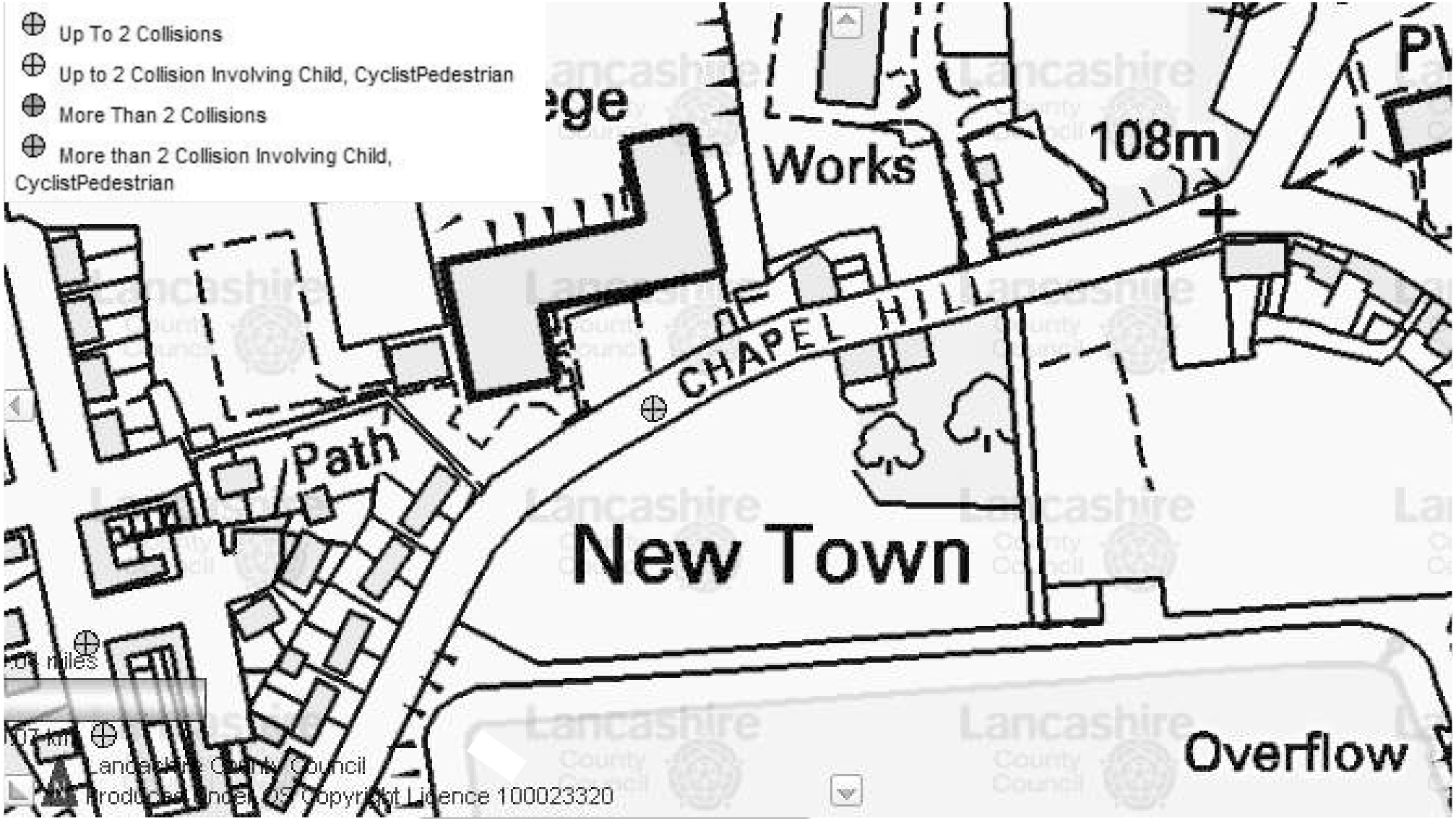
Key:

100 Total Traffic

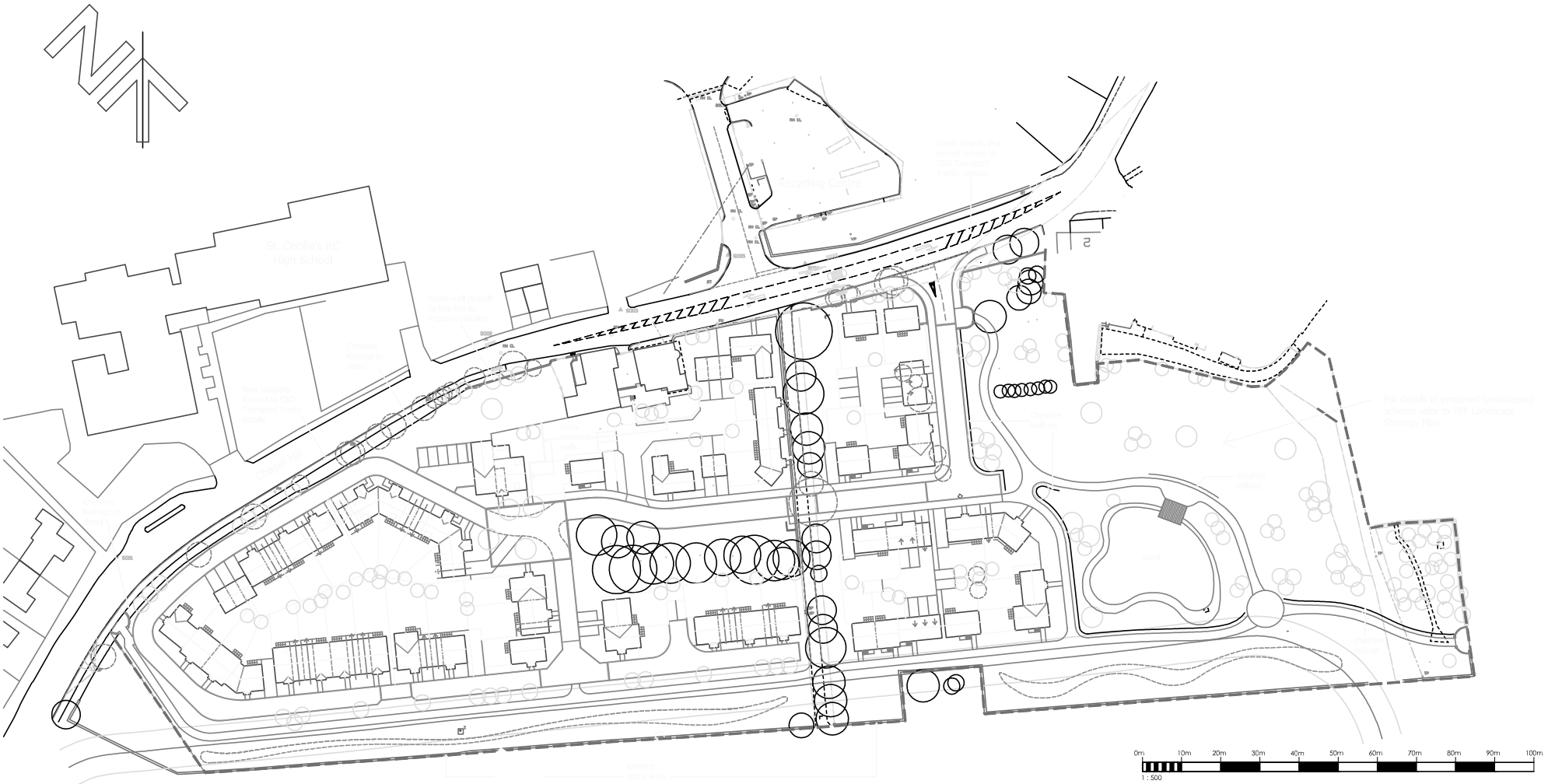
100 HGV's

2011 Observed / Committed Development Traffic Flows

Figure 2.2



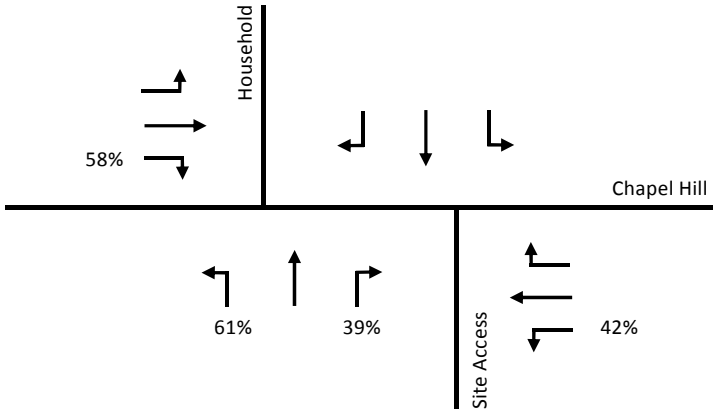
Screen dump from Lancashire County Council MARIO site



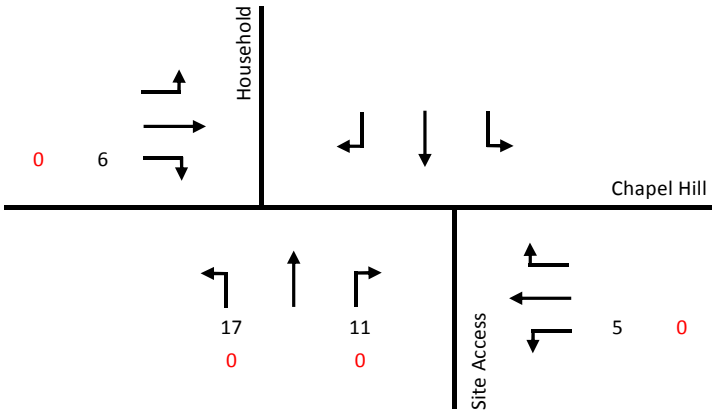
Extract from MCK Associates Drawing Number 1010

Proposed Site Layout **Figure 4.1**

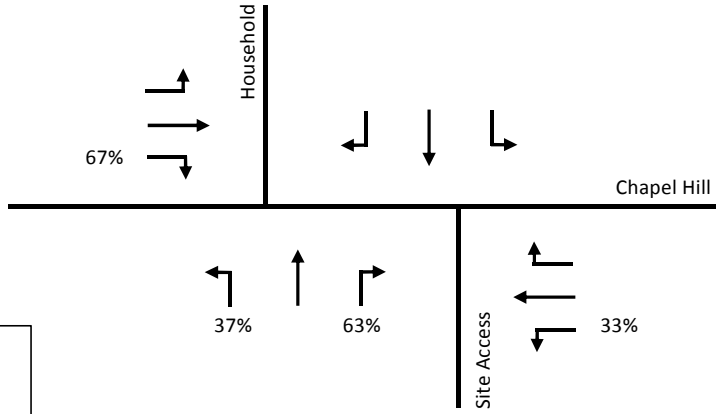
5.1(A): Weekday Morning Peak Traffic Assignment



5.1(C): Weekday Morning Peak Traffic Generation



5.1(B): Weekday Evening Peak Traffic Assignment

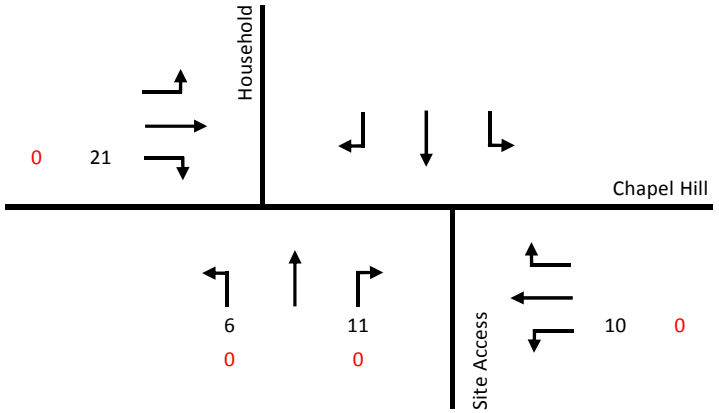


Key:

100 Total Traffic

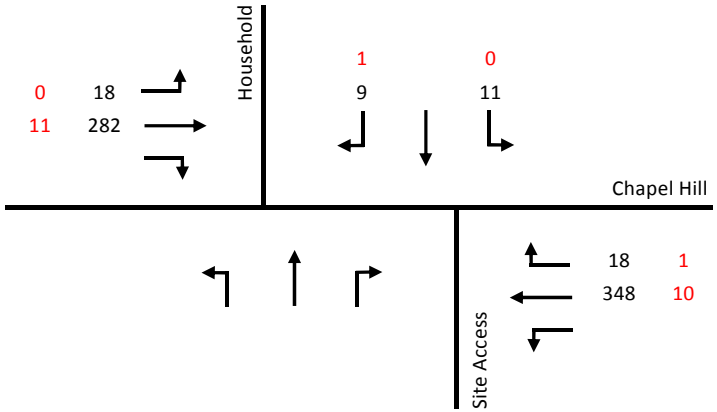
100 HGV's

5.1(D): Weekday Evening Peak Traffic Generation

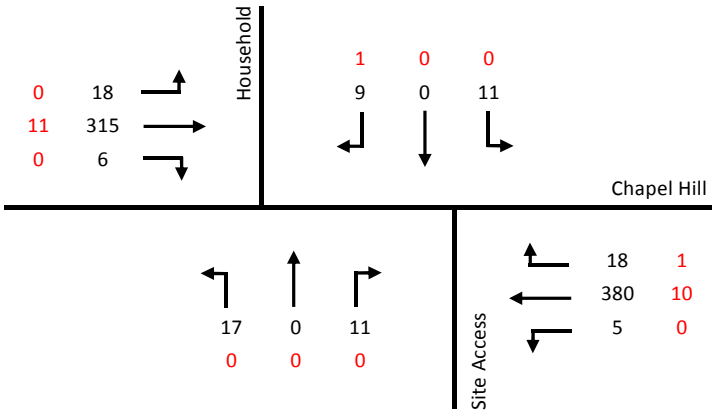


Proposed Development: Traffic Assignment & Flows **Figure 5.1**

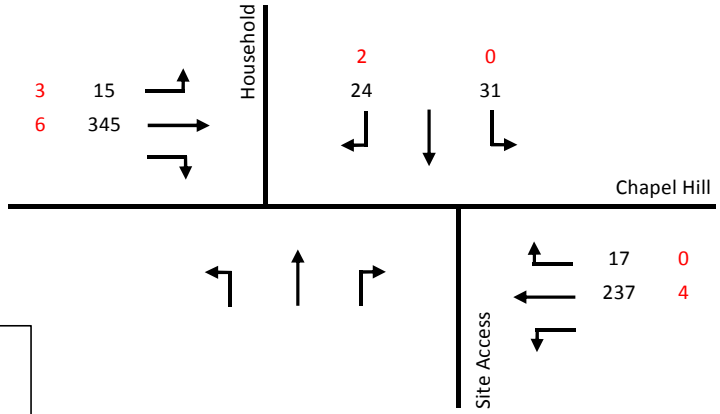
6.1(A): 2021 Base Weekday Morning Peak



6.1(C): 2021 Base Plus Dev Weekday Morning Peak



6.1(B): 2021 Base Weekday Evening Peak

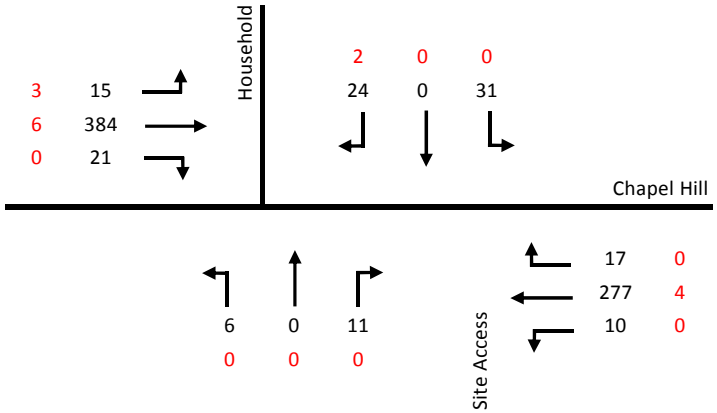


Key:

100 Total Traffic

100 HGV's

6.1(D): 2021 Base Plus Dev Weekday Evening Peak



2021 Base and 2021 Base Plus Development Traffic Flows

Figure 6.1

Chapel Hill, Longridge

Appendix A:
CBO Drawing Number CBO-0037-001

CBO Transport

SURVEY STATIONS		
Easting	Northing	Height
360226.49	436604.75	100.12
360320.87	436660.35	104.85
360355.24	436667.88	106.91
360402.36	436679.72	107.90
360382.64	436681.84	107.64
360376.25	436741.00	107.37
360430.78	436759.67	108.40
360408.04	436864.04	114.88
360375.75	436864.34	114.89

360250E

360300E

360350E

436700N

436650N

436600N

UNABLE TO SURVEY BOUNDARIES DUE TO DENSE VEGETATION POSITIONS TAKEN FROM ORDNANCE SURVEY DATA

DENSE TREES UNABLE TO SURVEY

4.5m x 70m Visibility splay

4.5m x 74m Visibility splay

Stone wall to be removed and back of new footway to be moved back on bend to provide 70 metre forward visibility on Chapel Hill

New 2m wide footway along site frontage

CHAPEL HILL

ST. CECILIA'S R.C. HIGH SCHOOL

HOUSING

EXISTING BUILDING

OUT BUILDING

EXISTING GARAGE

ROUGH GROUND

GRASS

TARMAC

CONCRETE

GRAVEL

STONE WALL

BUSHES

CONTAINERS

CBO Transport

Barnett House
53 Fountain Street
Manchester
M2 2AN
T: 0161 235 6365
F: 0161 235 6566
E: info@cbotransport.co.uk
W: www.cbotransport.co.uk

Client
United Utilities Property Services

Project
Chapel Hill, Longridge

Drawing Title
Proposed Access Arrangements & Wall Re-alignment

Drawn	Checked	Approved
SFB	PRC	SFB

Scale / Size	Date
1:500 @ A2	23 Sep 2011

Status	Drg No	Rev
Information	CBO-0037-001	A

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 03 - RESIDENTIAL
Category : A - HOUSES PRIVATELY OWNED
VEHICLES

Selected regions and areas:

03	SOUTH WEST		
	WL	WILTSHIRE	1 days
04	EAST ANGLIA		
	CA	CAMBRIDGESHIRE	1 days
	SF	SUFFOLK	1 days
06	WEST MIDLANDS		
	WM	WEST MIDLANDS	1 days
09	NORTH		
	TW	TYNE & WEAR	1 days
10	WALES		
	WR	WREXHAM	1 days
11	SCOTLAND		
	AS	ABERDEENSHIRE	1 days
17	ULSTER (NORTHERN IRELAND)		
	AN	ANTRIM	1 days
	DE	DERRY	1 days
	FE	FERMANAGH	1 days

Filtering Stage 2 selection:

Parameter: Number of dwellings
Range: 81 to 132 (units:)

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/00 to 08/10/07

Selected survey days:

Monday	5 days
Tuesday	1 days
Wednesday	1 days
Thursday	1 days
Friday	2 days

Selected survey types:

Manual count	7 days
Directional ATC Count	3 days

Selected Locations:

Edge of Town	10

Selected Location Sub Categories:

Residential Zone	8
Out of Town	1
No Sub Category	1

LIST OF SITES relevant to selection parameters

1 AN-03-A-03 SEMI DETACHED, LISBURN ANTRIM
KNOCKMORE ROAD

LISBURN
Edge of Town
Residential Zone
Total Number of dwellings: 86
Survey date: THURSDAY 14/11/02 Survey Type: MANUAL

2 AS-03-A-01 DETACHED/SEMI D., PORTLETHEN ABERDEENSHIRE
BERRYMUIR ROAD

PORTLETHEN
Edge of Town
Residential Zone
Total Number of dwellings: 104
Survey date: FRIDAY 11/02/00 Survey Type: DIRECTIONAL ATC COUNT

3 CA-03-A-01 SEMI D./TERRACED, CAMBRIDGE CAMBRIDGESHIRE
FALLOWFIELD
CHESTERTON
CAMBRIDGE
Edge of Town
Residential Zone
Total Number of dwellings: 124
Survey date: TUESDAY 06/02/01 Survey Type: MANUAL

4 DE-03-A-01 SEMI.D./DETACHED, MAGHERAFLT DERRY
STATION ROAD

MAGHERAFELT
Edge of Town
Residential Zone
Total Number of dwellings: 106
Survey date: MONDAY 11/11/02 Survey Type: DIRECTIONAL ATC COUNT

5 FE-03-A-01 MIXED HOUSES, ENNISKILLEN FERMANAGH
CASTLECOOLE ROAD

ENNISKILLEN
Edge of Town
Residential Zone
Total Number of dwellings: 132
Survey date: FRIDAY 08/11/02 Survey Type: DIRECTIONAL ATC COUNT

6 SF-03-A-03 MIXED HOUSES, BURY ST EDMDS SUFFOLK
BARTON HILL
FORNHAM ST MARTIN
BURY ST EDMUNDS
Edge of Town
Out of Town
Total Number of dwellings: 101
Survey date: MONDAY 15/05/06 Survey Type: MANUAL

7 TW-03-A-01 SEMI DETACHED, SUNDERLAND TYNE & WEAR
LEECHMERE ROAD
HILLVIEW
SUNDERLAND
Edge of Town
Residential Zone
Total Number of dwellings: 81
Survey date: WEDNESDAY 18/09/02 Survey Type: MANUAL

LIST OF SITES relevant to selection parameters (Cont.)

8 WL-03-A-01 SEMI D./TERRACED W. BASSETT WILTSHIRE
MAPLE DRIVE

WOOTTON BASSETT
Edge of Town
Residential Zone
Total Number of dwellings: 99
Survey date: MONDAY 02/10/06 Survey Type: MANUAL

9 WM-03-A-03 MIXED HOUSING, COVENTRY WEST MIDLANDS
BASELEY WAY
ROWLEYS GREEN
COVENTRY
Edge of Town
Residential Zone
Total Number of dwellings: 84
Survey date: MONDAY 24/09/07 Survey Type: MANUAL

10 WR-03-A-01 SEMI DETACHED, WREXHAM WREXHAM
MOLD ROAD
RHOSDDU
WREXHAM
Edge of Town
No Sub Category
Total Number of dwellings: 82
Survey date: MONDAY 05/07/04 Survey Type: MANUAL

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED
VEHICLES
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00	3	114	0.015	3	114	0.012	3	114	0.027
01:00 - 02:00	3	114	0.020	3	114	0.018	3	114	0.038
02:00 - 03:00	3	114	0.000	3	114	0.000	3	114	0.000
03:00 - 04:00	3	114	0.012	3	114	0.012	3	114	0.024
04:00 - 05:00	3	114	0.006	3	114	0.006	3	114	0.012
05:00 - 06:00	3	114	0.012	3	114	0.047	3	114	0.059
06:00 - 07:00	3	114	0.061	3	114	0.184	3	114	0.245
07:00 - 08:00	10	100	0.086	10	100	0.403	10	100	0.489
08:00 - 09:00	10	100	0.162	10	100	0.402	10	100	0.564
09:00 - 10:00	10	100	0.173	10	100	0.206	10	100	0.379
10:00 - 11:00	10	100	0.153	10	100	0.169	10	100	0.322
11:00 - 12:00	10	100	0.211	10	100	0.188	10	100	0.399
12:00 - 13:00	10	100	0.250	10	100	0.194	10	100	0.444
13:00 - 14:00	10	100	0.237	10	100	0.250	10	100	0.487
14:00 - 15:00	10	100	0.232	10	100	0.228	10	100	0.460
15:00 - 16:00	10	100	0.340	10	100	0.261	10	100	0.601
16:00 - 17:00	10	100	0.408	10	100	0.243	10	100	0.651
17:00 - 18:00	10	100	0.449	10	100	0.244	10	100	0.693
18:00 - 19:00	10	100	0.312	10	100	0.284	10	100	0.596
19:00 - 20:00	3	114	0.275	3	114	0.249	3	114	0.524
20:00 - 21:00	3	114	0.219	3	114	0.152	3	114	0.371
21:00 - 22:00	3	114	0.158	3	114	0.135	3	114	0.293
22:00 - 23:00	3	114	0.114	3	114	0.088	3	114	0.202
23:00 - 24:00	3	114	0.085	3	114	0.044	3	114	0.129
Total Rates:			3.990			4.019			8.009

Parameter summary

Trip rate parameter range selected:	81 - 132 (units:)
Survey date date range:	01/01/00 - 08/10/07
Number of weekdays (Monday-Friday):	14
Number of Saturdays:	0
Number of Sundays:	0
Surveys manually removed from selection:	25

Chapel Hill, Longridge

Appendix C:
PICADY Outputs: Chapel Hill / Site Access

CBO Transport

PICADY

GUI Version: 5.1 AE
Analysis Program Release: 5.0 (MAY 2010)

For sales and distribution information, program advice and maintenance, contact:

TRL Limited
Crowthorne House
Nine Mile Ride
Wokingham, Berks.
RG40 3GA, UK

Tel: +44 (0)1344 770758
Fax: +44 (0)1344 770864
E-mail: software@trl.co.uk
Web: www.trlsoftware.co.uk

Run Analysis

Parameter	Values
File Run	C:\..\Chapel Hill\2021 Base + Development.vpi
Date Run	06 December 2011
Time Run	16:04:19
Driving Side	Drive On The Left

Arm Names and Flow Scaling Factors

Arm	Arm Name	Flow Scaling Factor (%)
Arm A	Chapel Hill (E)	100
Arm B	Site Access	100
Arm C	Chapel Hill (W)	100
Arm D	Household Waste Centre	100

Stream Labelling Convention

Stream A-B contains traffic going from A to B etc.

Run Information

Parameter	Values
Run Title	2021 Base + Proposed Development
Location	Chapel Hill Site Access
Date	26 September 2011
Enumerator	Paul Corbett
Job Number	CBO 0037
Status	Preliminary
Client	United Utilities
Description	-

Errors and Warnings

Parameter	Values
Warning	No Errors Or Warnings

Geometric Data

Geometric Parameters

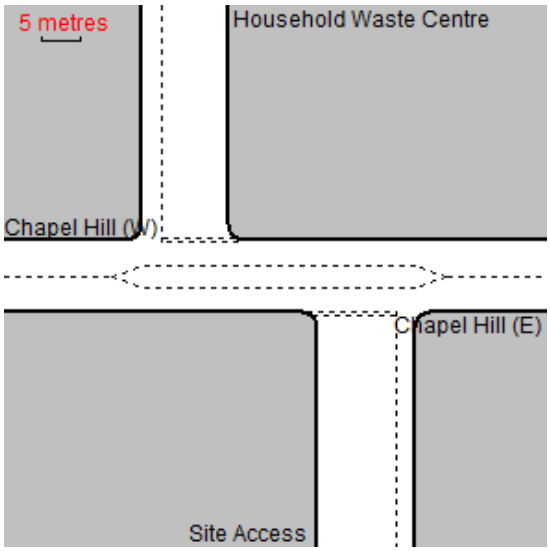
Parameter	Minor Arm B	Minor Arm D
Major Road Carriageway Width (m)	6.00	6.00
Major Road Kerbed Central Reserve Width (m)	0.00	0.00
Major Road Right Turning Lane Width (m)	3.00	3.00
Minor Road Width 0m Back from Junction (m)	10.00	8.40
Minor Road Width 5m Back from Junction (m)	4.70	2.60
Minor Road Width 10m Back from Junction (m)	2.70	2.50
Minor Road Width 15m Back from Junction (m)	2.70	2.50
Minor Road Width 20m Back from Junction (m)	2.70	2.50
Minor Road Flare Length (veh)	1	1
Minor Road Visibility To Right (m)	22	25
Minor Road Visibility To Left (m)	25	29
Major Road Right Turn Visibility (m)	50	92
Major Road Right Turn Blocks Traffic	No	No

Slope and Intercept Values

Stream	Intercept for Stream	Slope for A-B	Slope for A-C	Slope for A-D	Slope for B-C	Slope for B-D	Slope for C-A	Slope for C-B	Slope for C-D	Slope for D-A	Slope for D-B
B-CD	0.000	0.000	0.000	0.000	-	-	-	-	-	-	-
B-A	0.000	0.000	0.000	0.000	-	-	0.000	0.000	-	0.000	0.000
D-AB	0.000	-	-	-	-	-	0.000	0.000	0.000	-	-
D-C	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-
CD-B	681.854	0.254	0.254	0.000	-	-	-	-	-	-	-
AB-D	681.854	-	-	-	-	-	-	-	0.264	-	-

Note: Streams may be combined in which case capacity will be adjusted
These values do not allow for any site-specific corrections

Junction Diagram



Demand Data

Modelling Periods

Parameter	Period	Duration (min)	Segment Length (min)
First Modelling Period	07:45-09:15	90	15
Second Modelling Period	17:00-18:30	90	15

ODTAB Turning Counts

Demand Set: 2021 Base + Development, Weekday Morning Peak
Modelling Period: 07:45-09:15

From / To	Arm A	Arm B	Arm C	Arm D
Arm A	0.0	5.0	390.0	19.0
Arm B	11.0	0.0	17.0	0.0
Arm C	326.0	6.0	0.0	18.0
Arm D	11.0	0.0	10.0	0.0

Demand Set: 2021 Base + Development, Weekday Evening Peak
Modelling Period: 17:00-18:30

From / To	Arm A	Arm B	Arm C	Arm D
Arm A	0.0	10.0	281.0	17.0
Arm B	11.0	0.0	6.0	0.0
Arm C	390.0	21.0	0.0	18.0
Arm D	31.0	0.0	26.0	0.0

ODTAB Synthesised Flows

Demand Set: 2021 Base + Development, Weekday Morning Peak
Modelling Period: 07:45-09:15

Arm	Rising Time	Rising Flow (veh / min)	Peak Time	Peak Flow (veh / min)	Falling Time	Falling Flow (veh / min)
Arm A	08:00	5.175	08:30	7.763	09:00	5.175
Arm B	08:00	0.350	08:30	0.525	09:00	0.350
Arm C	08:00	4.375	08:30	6.563	09:00	4.375
Arm D	08:00	0.262	08:30	0.394	09:00	0.262

Heavy Vehicles Percentages

Demand Set: 2021 Base + Development, Weekday Morning Peak
Modelling Period: 07:45-09:15

From / To	Arm A	Arm B	Arm C	Arm D
Arm A	-	0.0	2.8	5.3
Arm B	0.0	-	0.0	0.0
Arm C	3.8	0.0	-	0.0
Arm D	0.0	0.0	10.0	-

Demand Set: 2021 Base + Development, Weekday Evening Peak
Modelling Period: 17:00-18:30

From / To	Arm A	Arm B	Arm C	Arm D
Arm A	-	0.0	1.7	0.0
Arm B	0.0	-	0.0	0.0
Arm C	1.7	0.0	-	16.7
Arm D	0.0	0.0	7.7	-

Queues & Delays

Demand Set: Sum of Demand Sets for Modelling Period: 07:45 - 09:15
Modelling Period: 07:45-09:15

Segment	Stream	Demand (veh / min)	Capacity (veh / min)	RFC	Ped. Flow (ped / min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min / segment)	Delay (veh.min / segment)	Mean Arriving Vehicle Delay (min)
07:45-08:00	B-CD	0.21	9.45	0.023	-	0.00	0.02	-	0.3	0.11
	B-A	0.14	6.68	0.021	-	0.00	0.02	-	0.3	0.15
	D-AB	0.14	9.43	0.015	-	0.00	0.01	-	0.2	0.11
	D-C	0.13	6.47	0.019	-	0.00	0.02	-	0.3	0.16
	CD-A	4.23	-	-	-	-	-	-	-	-
	CD-B	0.08	9.57	0.008	-	0.00	0.01	-	0.1	0.11
	C-A	4.09	-	-	-	-	-	-	-	-
	C-B	0.08	-	-	-	-	-	-	-	-
	C-D	0.23	-	-	-	-	-	-	-	-
	AB-C	5.11	-	-	-	-	-	-	-	-
	AB-D	0.24	9.65	0.025	-	0.00	0.03	-	0.4	0.11
	A-B	0.06	-	-	-	-	-	-	-	-
	A-C	4.89	-	-	-	-	-	-	-	-
	A-D	0.24	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh / min)	Capacity (veh / min)	RFC	Ped. Flow (ped / min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min / segment)	Delay (veh.min / segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-CD	0.25	9.18	0.028	-	0.02	0.03	-	0.4	0.11
	B-A	0.16	6.30	0.026	-	0.02	0.03	-	0.4	0.16
	D-AB	0.16	9.20	0.018	-	0.01	0.02	-	0.3	0.11
	D-C	0.15	6.11	0.025	-	0.02	0.02	-	0.4	0.17
	CD-A	5.05	-	-	-	-	-	-	-	-
	CD-B	0.09	9.30	0.010	-	0.01	0.01	-	0.1	0.11
	C-A	4.88	-	-	-	-	-	-	-	-
	C-B	0.09	-	-	-	-	-	-	-	-
	C-D	0.27	-	-	-	-	-	-	-	-
	AB-C	6.10	-	-	-	-	-	-	-	-
	AB-D	0.28	9.43	0.030	-	0.03	0.03	-	0.5	0.11
	A-B	0.07	-	-	-	-	-	-	-	-
	A-C	5.84	-	-	-	-	-	-	-	-
	A-D	0.28	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh / min)	Capacity (veh / min)	RFC	Ped. Flow (ped / min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min / segment)	Delay (veh.min / segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-CD	0.31	8.80	0.035	-	0.03	0.04	-	0.5	0.12
	B-A	0.20	5.78	0.035	-	0.03	0.04	-	0.5	0.18
	D-AB	0.20	8.90	0.023	-	0.02	0.02	-	0.3	0.11
	D-C	0.18	5.61	0.033	-	0.02	0.03	-	0.5	0.18
	CD-A	6.18	-	-	-	-	-	-	-	-
	CD-B	0.11	8.94	0.012	-	0.01	0.01	-	0.2	0.11
	C-A	5.98	-	-	-	-	-	-	-	-
	C-B	0.11	-	-	-	-	-	-	-	-
	C-D	0.33	-	-	-	-	-	-	-	-
	AB-C	7.47	-	-	-	-	-	-	-	-
	AB-D	0.35	9.12	0.038	-	0.03	0.04	-	0.6	0.11
	A-B	0.09	-	-	-	-	-	-	-	-
	A-C	7.16	-	-	-	-	-	-	-	-
	A-D	0.35	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh / min)	Capacity (veh / min)	RFC	Ped. Flow (ped / min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min / segment)	Delay (veh.min / segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-CD	0.31	8.80	0.035	-	0.04	0.04	-	0.5	0.12
	B-A	0.20	5.78	0.035	-	0.04	0.04	-	0.5	0.18
	D-AB	0.20	8.90	0.023	-	0.02	0.02	-	0.3	0.11
	D-C	0.18	5.61	0.033	-	0.03	0.03	-	0.5	0.18
	CD-A	6.18	-	-	-	-	-	-	-	-
	CD-B	0.11	8.94	0.012	-	0.01	0.01	-	0.2	0.11
	C-A	5.98	-	-	-	-	-	-	-	-
	C-B	0.11	-	-	-	-	-	-	-	-
	C-D	0.33	-	-	-	-	-	-	-	-
	AB-C	7.47	-	-	-	-	-	-	-	-
	AB-D	0.35	9.12	0.038	-	0.04	0.04	-	0.6	0.11
	A-B	0.09	-	-	-	-	-	-	-	-
	A-C	7.16	-	-	-	-	-	-	-	-
	A-D	0.35	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh / min)	Capacity (veh / min)	RFC	Ped. Flow (ped / min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min / segment)	Delay (veh.min / segment)	Mean Arriving Vehicle Delay (min)
08:45-09:00	B-CD	0.25	9.18	0.028	-	0.04	0.03	-	0.4	0.11
	B-A	0.16	6.30	0.026	-	0.04	0.03	-	0.4	0.16
	D-AB	0.16	9.20	0.018	-	0.02	0.02	-	0.3	0.11
	D-C	0.15	6.11	0.025	-	0.03	0.03	-	0.4	0.17
	CD-A	5.05	-	-	-	-	-	-	-	-
	CD-B	0.09	9.30	0.010	-	0.01	0.01	-	0.2	0.11
	C-A	4.88	-	-	-	-	-	-	-	-
	C-B	0.09	-	-	-	-	-	-	-	-
	C-D	0.27	-	-	-	-	-	-	-	-
	AB-C	6.10	-	-	-	-	-	-	-	-
	AB-D	0.28	9.43	0.030	-	0.04	0.03	-	0.5	0.11
	A-B	0.07	-	-	-	-	-	-	-	-
	A-C	5.84	-	-	-	-	-	-	-	-
	A-D	0.28	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh / min)	Capacity (veh / min)	RFC	Ped. Flow (ped / min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min / segment)	Delay (veh.min / segment)	Mean Arriving Vehicle Delay (min)
09:00-09:15	B-CD	0.21	9.45	0.023	-	0.03	0.02	-	0.4	0.11
	B-A	0.14	6.68	0.021	-	0.03	0.02	-	0.3	0.15
	D-AB	0.14	9.43	0.015	-	0.02	0.01	-	0.2	0.11
	D-C	0.13	6.47	0.019	-	0.03	0.02	-	0.3	0.16
	CD-A	4.23	-	-	-	-	-	-	-	-
	CD-B	0.08	9.57	0.008	-	0.01	0.01	-	0.1	0.11
	C-A	4.09	-	-	-	-	-	-	-	-
	C-B	0.08	-	-	-	-	-	-	-	-
	C-D	0.23	-	-	-	-	-	-	-	-
	AB-C	5.11	-	-	-	-	-	-	-	-
	AB-D	0.24	9.65	0.025	-	0.03	0.03	-	0.4	0.11
	A-B	0.06	-	-	-	-	-	-	-	-
	A-C	4.89	-	-	-	-	-	-	-	-
	A-D	0.24	-	-	-	-	-	-	-	-

Demand Set: Sum of Demand Sets for Modelling Period: 17:00 - 18:30
Modelling Period: 17:00-18:30

Segment	Stream	Demand (veh / min)	Capacity (veh / min)	RFC	Ped. Flow (ped / min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min / segment)	Delay (veh.min / segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-CD	0.08	9.95	0.008	-	0.00	0.01	-	0.1	0.10
	B-A	0.14	6.69	0.021	-	0.00	0.02	-	0.3	0.15
	D-AB	0.39	9.16	0.042	-	0.00	0.04	-	0.6	0.11
	D-C	0.33	6.53	0.050	-	0.00	0.05	-	0.7	0.16
	CD-A	5.28	-	-	-	-	-	-	-	-
	CD-B	0.26	9.93	0.027	-	0.00	0.03	-	0.4	0.10
	C-A	4.89	-	-	-	-	-	-	-	-
	C-B	0.26	-	-	-	-	-	-	-	-
	C-D	0.23	-	-	-	-	-	-	-	-
	AB-C	3.60	-	-	-	-	-	-	-	-
	AB-D	0.21	9.91	0.022	-	0.00	0.02	-	0.3	0.10
	A-B	0.13	-	-	-	-	-	-	-	-
	A-C	3.53	-	-	-	-	-	-	-	-
	A-D	0.21	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh / min)	Capacity (veh / min)	RFC	Ped. Flow (ped / min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min / segment)	Delay (veh.min / segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-CD	0.09	9.74	0.009	-	0.01	0.01	-	0.1	0.10
	B-A	0.16	6.34	0.026	-	0.02	0.03	-	0.4	0.16
	D-AB	0.46	8.87	0.052	-	0.04	0.05	-	0.8	0.12
	D-C	0.39	6.17	0.063	-	0.05	0.07	-	1.0	0.17
	CD-A	6.31	-	-	-	-	-	-	-	-
	CD-B	0.31	9.73	0.032	-	0.03	0.03	-	0.5	0.11
	C-A	5.84	-	-	-	-	-	-	-	-
	C-B	0.31	-	-	-	-	-	-	-	-
	C-D	0.27	-	-	-	-	-	-	-	-
	AB-C	4.30	-	-	-	-	-	-	-	-
	AB-D	0.25	9.63	0.026	-	0.02	0.03	-	0.4	0.11
	A-B	0.15	-	-	-	-	-	-	-	-
	A-C	4.21	-	-	-	-	-	-	-	-

	A-D	0.25	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh / min)	Capacity (veh / min)	RFC	Ped. Flow (ped / min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min / segment)	Delay (veh.min / segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-CD	0.11	9.46	0.012	-	0.01	0.01	-	0.2	0.11
	B-A	0.20	5.86	0.034	-	0.03	0.04	-	0.5	0.18
	D-AB	0.57	8.48	0.067	-	0.05	0.07	-	1.0	0.13
	D-C	0.48	5.68	0.084	-	0.07	0.09	-	1.3	0.19
	CD-A	7.72	-	-	-	-	-	-	-	-
	CD-B	0.39	9.47	0.041	-	0.03	0.04	-	0.6	0.11
	C-A	7.16	-	-	-	-	-	-	-	-
	C-B	0.39	-	-	-	-	-	-	-	-
	C-D	0.33	-	-	-	-	-	-	-	-
	AB-C	5.27	-	-	-	-	-	-	-	-
	AB-D	0.31	9.24	0.034	-	0.03	0.03	-	0.5	0.11
	A-B	0.18	-	-	-	-	-	-	-	-
	A-C	5.16	-	-	-	-	-	-	-	-
	A-D	0.31	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh / min)	Capacity (veh / min)	RFC	Ped. Flow (ped / min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min / segment)	Delay (veh.min / segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-CD	0.11	9.46	0.012	-	0.01	0.01	-	0.2	0.11
	B-A	0.20	5.86	0.034	-	0.04	0.04	-	0.5	0.18
	D-AB	0.57	8.48	0.067	-	0.07	0.07	-	1.1	0.13
	D-C	0.48	5.68	0.084	-	0.09	0.09	-	1.4	0.19
	CD-A	7.73	-	-	-	-	-	-	-	-
	CD-B	0.39	9.47	0.041	-	0.04	0.04	-	0.6	0.11
	C-A	7.16	-	-	-	-	-	-	-	-
	C-B	0.39	-	-	-	-	-	-	-	-
	C-D	0.33	-	-	-	-	-	-	-	-
	AB-C	5.27	-	-	-	-	-	-	-	-
	AB-D	0.31	9.24	0.034	-	0.03	0.03	-	0.5	0.11
	A-B	0.18	-	-	-	-	-	-	-	-
	A-C	5.16	-	-	-	-	-	-	-	-
	A-D	0.31	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh / min)	Capacity (veh / min)	RFC	Ped. Flow (ped / min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min / segment)	Delay (veh.min / segment)	Mean Arriving Vehicle Delay (min)
18:00-18:15	B-CD	0.09	9.74	0.009	-	0.01	0.01	-	0.1	0.10
	B-A	0.16	6.34	0.026	-	0.04	0.03	-	0.4	0.16
	D-AB	0.46	8.87	0.052	-	0.07	0.06	-	0.9	0.12
	D-C	0.39	6.17	0.063	-	0.09	0.07	-	1.1	0.17
	CD-A	6.31	-	-	-	-	-	-	-	-
	CD-B	0.31	9.73	0.032	-	0.04	0.03	-	0.5	0.11
	C-A	5.84	-	-	-	-	-	-	-	-
	C-B	0.31	-	-	-	-	-	-	-	-
	C-D	0.27	-	-	-	-	-	-	-	-
	AB-C	4.30	-	-	-	-	-	-	-	-
	AB-D	0.25	9.63	0.026	-	0.03	0.03	-	0.4	0.11
	A-B	0.15	-	-	-	-	-	-	-	-
	A-C	4.21	-	-	-	-	-	-	-	-
	A-D	0.25	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh / min)	Capacity (veh / min)	RFC	Ped. Flow (ped / min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min / segment)	Delay (veh.min / segment)	Mean Arriving Vehicle Delay (min)
18:15-18:30	B-CD	0.08	9.95	0.008	-	0.01	0.01	-	0.1	0.10
	B-A	0.14	6.69	0.021	-	0.03	0.02	-	0.3	0.15
	D-AB	0.39	9.16	0.042	-	0.06	0.04	-	0.7	0.11
	D-C	0.33	6.53	0.050	-	0.07	0.05	-	0.8	0.16
	CD-A	5.28	-	-	-	-	-	-	-	-
	CD-B	0.26	9.93	0.027	-	0.03	0.03	-	0.4	0.10
	C-A	4.89	-	-	-	-	-	-	-	-
	C-B	0.26	-	-	-	-	-	-	-	-
	C-D	0.23	-	-	-	-	-	-	-	-
	AB-C	3.60	-	-	-	-	-	-	-	-
	AB-D	0.21	9.91	0.022	-	0.03	0.02	-	0.3	0.10
	A-B	0.13	-	-	-	-	-	-	-	-
	A-C	3.53	-	-	-	-	-	-	-	-
	A-D	0.21	-	-	-	-	-	-	-	-

Entry capacities marked with an '(X)' are dominated by a pedestrian crossing in that time segment.
In time segments marked with a '(B)', traffic leaving the junction may block back from a crossing so impairing normal operation of the junction.
Delays marked with '##' could not be calculated.

Overall Queues & Delays

Queueing Delay Information Over Whole Period

Demand Set: Sum of Demand Sets for Modelling Period: 07:45 - 09:15
Modelling Period: 07:45-09:15

Stream	Total Demand (veh)	Total Demand (veh / h)	Queueing Delay (min)	Queueing Delay (min / veh)	Inclusive Delay (min)	Inclusive Delay (min / veh)
B-CD	23.4	15.6	2.6	0.1	2.6	0.1
B-A	15.1	10.1	2.5	0.2	2.5	0.2
D-AB	15.1	10.1	1.7	0.1	1.7	0.1
D-C	13.8	9.2	2.3	0.2	2.3	0.2
CD-A	463.8	309.2	-	-	-	-
CD-B	8.3	5.5	0.9	0.1	0.9	0.1
C-A	448.7	299.1	-	-	-	-
C-B	8.3	5.5	-	-	-	-
C-D	24.8	16.5	-	-	-	-
AB-C	560.2	373.5	-	-	-	-
AB-D	26.2	17.4	2.9	0.1	2.9	0.1
A-B	6.9	4.6	-	-	-	-
A-C	536.8	357.9	-	-	-	-
A-D	26.2	17.4	-	-	-	-
All	**1119.0**	**746.0**	**12.9**	**0.0**	**12.9**	**0.0**

Demand Set: Sum of Demand Sets for Modelling Period: 17:00 - 18:30
Modelling Period: 17:00-18:30

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-CD	8.3	5.5	0.9	0.1	0.9	0.1
B-A	15.1	10.1	2.5	0.2	2.5	0.2
D-AB	42.7	28.4	5.1	0.1	5.1	0.1
D-C	35.8	23.9	6.3	0.2	6.3	0.2
CD-A	579.4	386.3	-	-	-	-
CD-B	28.9	19.3	3.1	0.1	3.1	0.1
C-A	536.8	357.9	-	-	-	-
C-B	28.9	19.3	-	-	-	-
C-D	24.8	16.5	-	-	-	-
AB-C	395.0	263.4	-	-	-	-
AB-D	23.4	15.6	2.5	0.1	2.5	0.1
A-B	13.8	9.2	-	-	-	-
A-C	386.8	257.9	-	-	-	-
A-D	23.4	15.6	-	-	-	-
All	**1116.3**	**744.2**	**20.3**	**0.0**	**20.3**	**0.0**

Delay is that occurring only within the time period.
Inclusive delay includes delay suffered by vehicles which are still queuing after the end of the time period.
These will only be significantly different if there is a large queue remaining at the end of the time period.

PICADY 5 Run Successful