

Leckwith Quays, Cardiff

Applicant Response to Highways Comments from the Vale of Glamorgan and the City and County of Cardiff (Planning Application Reference: 2020/01218/HYB)

Technical Note Included as part of the Environmental Statement, Appendix 4.4

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1. Introduction

1.1 Context

1.1.1 AECOM is working on behalf of Phil Worthing (instructed by Gareth Davies Project Services Ltd), herein referred to as the 'applicant', with regards to the redevelopment of an existing brownfield site for residential uses (circa 250 dwellings) at Leckwith Quays, Cardiff.

1.1.2 A planning application (Reference: 2020/01218/HYB) was submitted in October 2020 for the following:

"Hybrid planning application for residential development for up to 250 dwellings (submitted in OUTLINE), associated highway and bridge improvement / realignment works (submitted in FULL). Development involves the demolition of all buildings on site and of the existing B4267 Leckwith Road Bridge."

1.1.3 A Transport Assessment (TA) and Outline Travel Plan (OTP), both dated 24th March 2020, were prepared by AECOM and submitted with the planning application. AECOM also prepared the 'Highways and Transportation' chapter that was included in the Environmental Statement (ES), dated October 2020.

1.1.4 The preparation of these submissions followed extensive engagement with both the Vale of Glamorgan (VoG), as both the Local Planning Authority (LPA) and Local Highway Authority (LHA), and the City and County of Cardiff (CCC) (given part of the access arrangements and proposed new bridge fall within its administrative area). This included the following:

- Submission of a formal TA Scoping Note as part of a request for a formal screening opinion for an ES, submitted in October 2019. Comments from the VoG and CCC were received on 5th December 2019 and 31st January 2020 respectively, and were referenced in the preparation of the submissions.
- Submission of a draft planning application as part of the Pre-Application Consultation (PAC) process, undertaken from 20th May 2020 to 19th June 2020. The PAC submission included the TA, OTP and ES. Both the VoG and CCC were invited to comment on these submissions, although no responses were received.

1.1.5 The VoG has provided its response to the planning application on its 'Vale of Glamorgan Highway Authority Observation Sheet', dated 12th February 2020. CCC's comments, in response to those made by the VoG, are also included on this same document. The response is included at **Appendix A**. Whilst not referenced in the 'Vale of Glamorgan Highway Authority Observation Sheet', the applicant has been supplied separately with a 'Leckwith Quays Transport Assessment Review', dated 29th January 2020, prepared by a third-party consultant on behalf of the VoG. This is included at **Appendix B**.

1.2 Purpose and Structure of Technical Note

1.2.1 This Technical Note (TN) has been prepared in response to the comments raised in the 'Vale of Glamorgan Highway Authority Observation Sheet' and the 'Leckwith Quays Transport Assessment Review'. For ease of reference, the TN has responded to the comments in separate chapters, at **Chapters 2** and **3** respectively. This TN is included at **Appendix 4.4** of the ES Chapter.

2. Response to 'Vale of Glamorgan Highway Authority Observation Sheet' Comments

2.1 Introduction

- 2.1.1 This chapter responds to the comments raised in the 'Vale of Glamorgan Highway Authority Observation Sheet', included at **Appendix A**. The numbering of comments is as per the supplied format. The comments from both the VoG and CCC are reproduced verbatim below, together with the applicant response.

2.2 Comment 1

Comment from VoG

"Looking at the proposed junction along the B4267 it is considered that the standalone toucan crossing location is too close to signalised junction. It is felt that this will cause will be confusing for vehicles with see-through and will lead to capacity issues at Leckwith. It would be preferable to see cycle provision to be provided up to the junction and the standalone toucan crossing removed."

Comment from CCC

"Agree with this point. It needs to be demonstrated that the impact of this light controlled crossing will not adversely affect roundabout in terms of traffic build up, especially given their proximity to the other proposed light controlled junction. It may be these lights are not required or it needs demonstrated that sequencing of the various proposed light controlled aspects of scheme are acceptable. If the light controlled crossing is to be removed it needs to be evidenced that it will be acceptable in terms of, but not limited to, pedestrian safety and capability to accommodate users of Ely River Trail."

Applicant Response

- 2.2.1 The toucan crossing has been proposed to provide a safe and improved amenity for pedestrians and cyclists using the Ely Trail. This will represent a significant betterment for cyclists and pedestrians over the existing provision, which currently comprises an uncontrolled, refuge crossing (and a footway of inadequate width on the northern side of the road).
- 2.2.2 Whilst it will be possible for cyclists to use the new junction to cross the road, this will require cyclists travelling along the Ely Trail to undertake a significant diversion, across the bridge and back, a movement they are highly unlikely to undertake. Cyclists will instead be more likely to attempt to cross the road at the proposed crossing location in any case, following the desire line of the route. Therefore, some form of crossing will be required whether controlled or uncontrolled. A controlled crossing was considered and proposed in order to allow priority to be given to crossing pedestrians and cyclists over the vehicular traffic, and hence to help promote active travel and the safe use of the Ely Trail, in line with national and local policy objectives.
- 2.2.3 It is, however, accepted that the new signalised crossing will likely need to be coordinated with the existing signals at both Leckwith Interchange and the proposed site access junction, so that queue lengths and capacity are safely managed. This has been recognised at paragraph 7.7.16 of the TA, which states the following:
- "In regard to the toucan crossing between the site access and Leckwith Interchange, it is considered that its operation can be coordinated with either one or both of the following junctions / controllers:*
- *Site access junction: Toucan crossing runs (if called) at the same time as the site accesses to ensure there is no blocking back to the site access junction.*
 - *Leckwith Interchange: Toucan crossing runs (if called) when the A4232 northbound off-slip is running to reduce risk of blocking back onto the Leckwith Interchange. Movements from the off-slip to the B4267 Leckwith Road are reasonably low, at 5-6 PCUs every 60 seconds during the PM peak hour, which, when stopped at the toucan crossing, would not extend back onto the circulatory."*

- 2.2.4 The incorporation of appropriate features (such as queue detection) and integration of the site access junction and Leckwith Interchange through an appropriate signal specification / controller will be subject to consultation and agreement with / between the VoG and CCC at the detailed design stage.
- 2.2.5 It is therefore considered that the crossing in the proposed format and identified location is the most appropriate and safe form of provision that can also be designed to be fully managed in the future. If it is requested that it is removed from the proposals, it must be duly considered that pedestrians and cyclists will still be likely to continue to attempt to cross unaided at the desire line.

2.3 Comment 2

Comment from VoG

“With regard to the signalised junction arrangement:

- *Signalised junction – left turns looks tight at the central island. The junction swept path tracking has been undertaken using a DB32 pantechnicon 9.570m length vehicle; the junction to be re-tracked using a 11.22m long refuse vehicle.*
- *The traffic calming (on the side arms) leading to the junction is not necessary and considered too close to the stop line.*
- *Right-turn taper looks short (turning right into the southern development), is this adequate based on a LinSig model?*
- *Do we require ASL's if there is an off carriageway facility, the removal of these this will go some way to marginally improve inter-visibility.*
- *Existing double yellow lines to be shown on future drawings.”*

Comment from CCC

“No comments to make. It must be ensured that the light controlled junction does not adversely affect the roundabout junction, we have similar concerns as detail above for point 1. The cumulative impact of the light controlled junction and crossing needs to be fully considered in terms of its impact on the roundabout junction.”

Applicant Response

- 2.3.1 The comments have been responded to in turn as follows:
- **Signalised junction:** Additional vehicle tracking has been undertaken for an 11.22m Refuse vehicle which is shown on Drawing 70053561-WSP-XX-XX-CR-DE-110 Sheet 2, included for reference at **Appendix C**. This demonstrates that the proposed layout can accommodate the left-turn movement of this larger vehicle on all arms of the junction. The tracking and kerb alignment can be further refined as part of the detailed design for technical approval.
 - **Traffic calming on the junction side arms:** The traffic calming shown is part of the internal highway layout design, which is illustrative and will be agreed at the reserved matters stage. The traffic calming can be omitted from the design at that time, if deemed appropriate by the VoG / CCC.
 - **Right-turn taper:** The right-turn lane lengths have been designed to accommodate the queue lengths forecast by the junction capacity assessment included as part of the TA. As identified at paragraph 7.7.4 of the TA, the maximum level of demand for right-turn movements to the south-eastern and north-western site accesses is forecast to be 12 and 31 Passenger Car Units (PCUs) respectively. Based on a cycle time of 90 seconds (as modelled in the TA), there will be 40 cycles per hour. On this basis, the demand for right-turn movements to the south-eastern and north-western site accesses will not exceed 1 PCU per cycle. The storage capacity for right-turn movements on these arms is 11.5m (2 PCUs) and 18.5m (3 PCUs) respectively (not including for storage areas in front of the stop line). Therefore, the demand for right-turn movements will be accommodated by the proposed storage, with sufficient reserve capacity.
 - **Advanced Stop Lines (ASLs) at the junction:** Even though off-carriageway cycle provision is catered for within the design, there will always be those cyclists who will choose to ride on-carriageway. It is good practice therefore to provide ASLs for these cyclists. They are not mandatory however, and could be removed from the design, if deemed appropriate by VoG / CCC.

- Double yellow lines: The provision of double yellow lines can be incorporated into the detailed signs and road markings design as part of the technical approval process to ensure parking is adequately controlled.

2.4 Comment 3

Comment from VoG

“The proposed realignment of the B4267 with a relocated bridge and embankment has been designed with several departures from the DMRB standards for vertical and horizontal alignment. Although it is proposed to reduce the speed limit down to 30mph it is felt that a more robust signing strategy is required to enforce the vehicle speeds.

- *Speed limit signs to be on yellow backing boards.*
- *A 2m wide central island, incorporating back to back speed limit sign (leaving 3.65m running carriageways).*
- *Provision of an aluminum bend warning sign, inset in a VAS housing, with LED slow / araf lettering, augment with bilingual slow road markings.*
- *Provision of 30mph VAS LED roundel signs.”*

Comment from CCC

“We have concerns that the signage on the northern side of the bridge, towards the roundabout, may affect the SSD. We would expect the applicant to demonstrate the necessary signage can be positioned acceptably without affecting SSD.”

Applicant Response

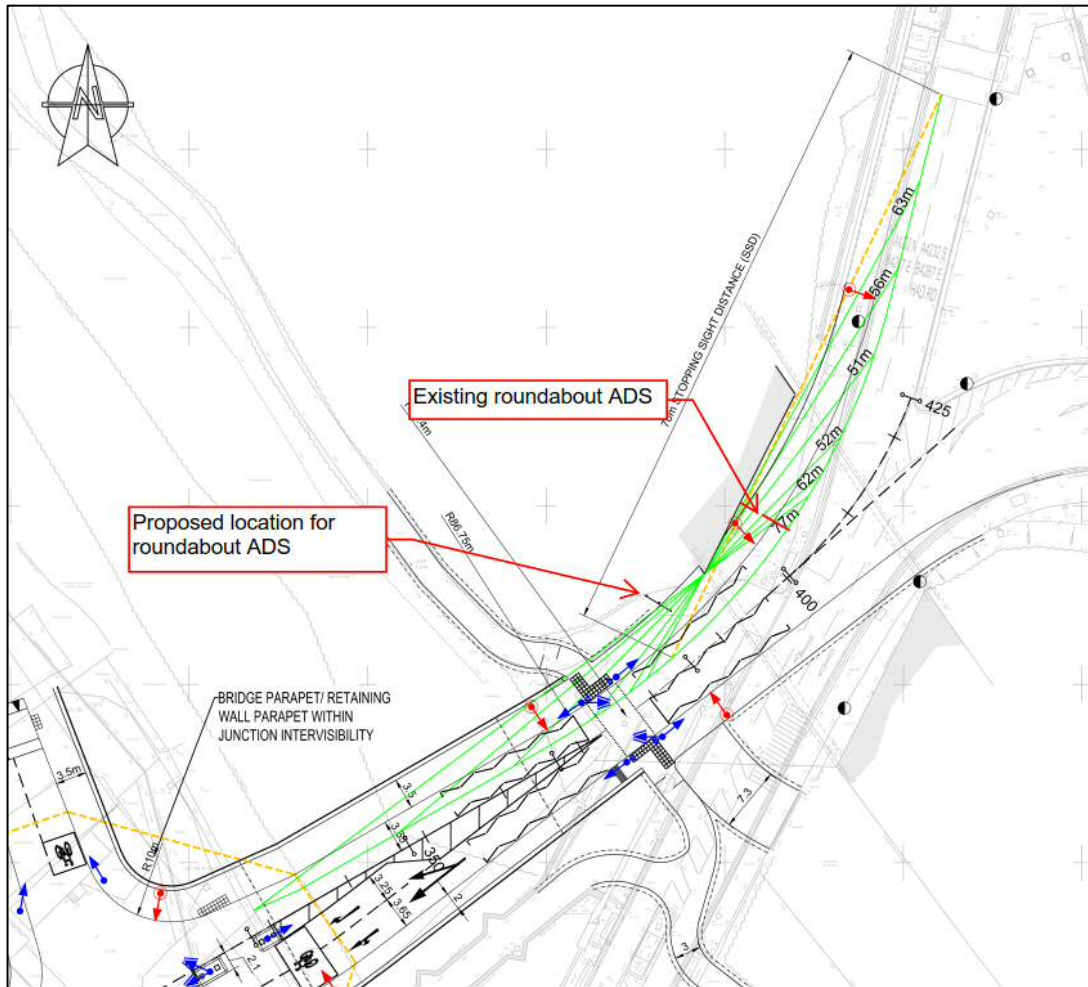
2.4.1 The comments have been responded to in turn as follows:

- Speed limit signs on yellow backing boards: Agreed, this will be part of the detailed signs and road markings design, as part of the technical approval process.
- Central island: The design currently includes a long, hatched ghost island. This could be replaced with a physical central Island leaving 3.65m running lanes but the length of the island will need careful consideration to ensure that in the event of a vehicle break down, other vehicles can still pass at the island location. Long physical islands usually need to ensure that a minimum of 5.5m is retained to allow a stationary vehicle to be passed. This can be reviewed and included within the detailed design for technical approval.
- Vehicle Activation Sign (VAS): Agreed, a VAS at this location will enhance road safety. This will be part of the detailed signs and road markings design, as part of the technical approval process.
- Roundabout approach Stopping Sight Distance (SSD): The existing roundabout approach ADS is located beneath the A4232 bridge deck and will need to be relocated to accommodate the revised highway approach. SSD on the roundabout approach has been reviewed and details are contained in the submitted document ‘Development at Leckwith Quay; B4267 Highway Alignment, Relaxations and Departures’. Appendix A of that document includes Drawing 70053561-WSP-XX-XX-CE-DR-103 which shows the SSD envelope on the proposed roundabout approach. Inset A of that drawing reproduced below, indicates the existing and proposed location for the ADS. The mounting height of the proposed ADS will be increased from the existing (constrained by the bridge headroom) to ensure no obstruction to forward visibility. The exact location of the sign will be agreed as part of the detailed design of the scheme for technical approval.

Existing ADS on roundabout approach



Extract from Drawing 70053561-WSP-XX-XX-CE-DR-103 (Development at Leckwith Quay; B4267 Highway Alignment, Relaxations and Departures; Appendix A; ')



2.5 Comment 4

Comment from VoG

“Looking at the shared cycle / pedestrian facilities shown, considering the existing active travel cycle route facilities, the proposed links to the Northern & Southern development areas and the proposed shared link up the B4267 to Leckwith hill it is considered more appropriate to run the 3.5m wide shared cycle / pedestrian surface on the Southern side of the proposed bridge.”

Comment from CCC

“We agree with point.”

Applicant Response

- 2.5.1 As discussed at Section 3.3 of the TA, the proposed arrangements include the following provision northeast of the junction:
- A 3.5m shared footway / cycleway on the northern side of the carriageway, between the proposed site access junction and the Ely Trail, which will continue northeast to tie-in with provision at Leckwith Interchange; and
 - A 2m footway on the southern side, between the proposed site access junction and the Ely Trail. Northeast of this, the footway will widen to 3.5m to provide a shared footway / cycleway to tie-in with the existing provision at Leckwith Interchange.
- 2.5.2 The provision of the shared footway / cycleway lane on the northern parapet side of the bridge has been considered carefully. The position of the bridge is critical and is constrained to the south by the existing listed masonry bridge. The southern footway cannot therefore be widened (being already very close to the existing bridge) and therefore the whole alignment would need to move north to accommodate the southern footway. This in turn would exacerbate the Departure in Standard near side lane SSD already required for the proposed alignment on the approach to the roundabout, caused by the A4232 bridge abutment. The current alignment requires a Departure in SSD to 52m. This would be further reduced if the alignment were moved north to accommodate a wider footway / cycleway on the southern side of the bridge.
- 2.5.3 Furthermore, the arrangement suggested by the VoG / CCC is not considered conducive to facilitating efficient cycle movements, particularly those to / from the north-western development area. Under the arrangement suggested by VoG / CCC, cyclists routeing northeast would be required to cross at the site access junction to utilise the shared footway / cycleway on the southern side of the bridge, and continue towards the point at which the Ely Trail meets the B4267 Leckwith Road. For movements to the northern section of the Ely Trail, cyclists would then need to undertake a further crossing movement, resulting in two crossing movements within a distance of 60m; this is considered highly inefficient and inconveniences active travel, in contravention of national and local policy objectives. Whilst the suggested arrangement would provide a shared footway / cycleway between the site access junction and Leckwith Interchange, this would not be a betterment over the arrangement proposed (as a shared footway / cycleway between these points is already proposed), rather it would be a detriment by introducing a requirement for a crossing movement to be undertaken (that is not present in the proposed arrangement). The arrangement proposed is therefore considered to be the most appropriate in accommodating desire lines to / from the north-western development area in a balanced and efficient manner.
- 2.5.4 Whilst a shared footway / cycleway on the south side of the bridge would serve desire lines to / from the south-eastern development area, these are already accommodated via the off-carriageway pedestrian / cycle link that will utilise the existing listed bridge; this serves the heart of the south-eastern development area and provides convenient, off-carriageway connections. Through movements at the junction are accommodated via ASLs and dropped kerbs northeast / southwest of the junction (for access to the proposed shared footway / cycleways).
- 2.5.5 Overall, the proposed arrangements, as a comprehensive package, maximise opportunities for pedestrian / cyclist provision and connections within the constraints of the realignment and bridge construction, and will ensure that existing links between Leckwith Interchange and the Ely Trail are maintained and new provision is an improvement for cyclists and pedestrians, supporting national and local policy objectives.

2.6 Comment 5

Comment from VoG

“Looking at both access roads off the proposed B4267 junction they are shown to be raised extending down each side at gradient to the development. More information is required for the proposed embankments (1:4 gradient) and how they interact with the existing topography and the Ely River so that they are protected from wash out and do not adversely affect the river flows up or down stream.”

Comment from CCC

“No comments to make.”

Applicant Response

- 2.6.1 The proposed embankments and retaining wall arrangement are shown on the submitted general arrangement drawing 70053561-WSP-XX-XX-DR-CE-102GA OP2 and bridge general arrangement drawing 70053561-002. The bridge abutment reinforced soil wing walls are shown extending along the side road lengths, on the river side to retain the proposed road level difference and protect the road from erosion by the river.

2.7 Comment 6

Comment from VoG

“Consideration need to be given to the proposed controlled junction system, will this be linked into the telematics system at the Leckwith interchange operated by Cardiff County Council. The proposed system needs to take account of CCTV or traffic flow cameras as required and appropriate real time intelligent traffic control systems including variable and informative messaging signage.”

Comment from CCC

“See response to point 1. Applicant is advised to contact: D.Kinnaird@cardiff.gov.uk to discuss light sequencing.”

Applicant Response

- 2.7.1 As per the response to Comment 1, the incorporation of appropriate features (such as queue detection) and integration of the site access junction and Leckwith Interchange through an appropriate signal specification / controller will be subject to consultation with / between the VoG and CCC at the detailed design stage and formally agreed as part of the technical approval process .

2.8 Comment 7

Comment from VoG

“With regard to public transport facilities looking at the plans provided:

- *No immediate access to local bus services (the walk across the roundabout to the stops located by Asda is, I would consider, not very attractive);*
- *No pick up / drop off points for school transport (assuming catchment will be St Cyres for this estate – where will pupils catch the bus? Similarly I assume Llandough Primary will be catchment primary school);*
- *With 250 dwellings we may require a lot of school transport as only Cardiff schools are in walking distance and all Vale schools would require school transport.*
- *Site could lend itself to an e-bike hire docking station – this would help with AT journeys into Cardiff City Centre.*

The lack of provision of laybys for passenger transport services and that passenger will have to walk across an extremely busy roundabout to catch a bus that will take them back past the estate they live on to get them into the Vale.”

Comment from CCC

“No comments to make since this is mainly a VoG matter. CC do, however, fully support this stance in order to reduce private car trips into Cardiff.”

Applicant Response

2.8.1 The comments have been responded to in turn as follows:

- Quality of links to bus services: Access to bus services is discussed at Section 2.8 of the TA. The nearest stops to the site are the ‘Hadfield Road’ bus stops located on the B4267 Leckwith Road, accessed via Leckwith Interchange and within reasonable walking distance. As discussed at Section 2.6 of the TA, Leckwith Interchange contains a comprehensive network of toucan crossings and links, developed and improved over the recent years to enable a safe range of movements by foot / cycle. The investment and design into this connected network is assumed to have been extensively undertaken in order to provide a safe and attractive route across the junction. Connections to Leckwith Interchange will be improved as part of the proposed site access arrangements.
- Pick-up / drop-off points for school transport: It is not a typical requirement for residential development to provide pick-up and drop-off points for school transport. School catchments and school developments change over time and the availability and choice will be different between now and the completion of construction. The provision of travel support to schools and the choice of schools of attendance are also matters that are under review. Therefore, it cannot be reasonably forecast where any future families may attend schools. What the development can provide is a comprehensive active travel network, as required by policy, to ensure there is a sufficient and safe choice available. Furthermore, it is understood that the VoG policy is to request sustainable travel improvement contributions as a ‘roof tax’ to implement network improvements rather than try to secure both improvements and the contributions. In the case of this development, the provision of a multi-modal replacement bridge structure far out shadows any potential sustainable travel contributions.
- E-bike hire docking station: This request seems to contract previous comments concern for the connections through Leckwith Interchange, with this request actively encouraging it and seeking contributions for enhancing walking / cycling take-up through this route. As set out in the above (with regards to the ‘roof tax’), VoG has a publicly stated approach for securing contributions for active travel and to seek the improvements and financial contribution would be unfair and double-counting. In this case, due to the proposed provision of a sustainable travel connection to Cardiff in the form of a bridge, no further contributions will be made. Notwithstanding this, the applicant does understand the importance of enhancing sustainable travel and has actively promoted it within the design of the external and internal road network. The applicant may consider the safeguarding of an area of land for a docking station and this could be made at the reserved matters stage, although delivery of such infrastructure would be by the VoG via any already gathered or forthcoming financial contributions to sustainable transport.

2.9 Comment 8

Comment from VoG

“With regard to the development estate roads and layout based on the preliminary masterplan drawings provided:

- *Due to the long narrow topography of the development site the primary feeder roads are shown to be long and straight; in line with Manual for Streets the length of these roads shall be limited to 70m before a change in direction with the inclusion of a shared surface/raised square area.*
- *The proposed layout to be checked and tracked for a 11.220m refuse vehicle through all category roads.*
- *The indicative layout shown provides for 300 car spaces – based on the VoGCC maximum parking standards there seems to be a shortfall.*
- *It is not clear if the proposed estate road leading off the northern access into the development is to be adopted. What has been shown would not be acceptable to VoGCC standards, there would also be problems for large vehicles needing to turn around and exit out onto the B4267 in a forward gear.”*

Comment from CCC

“No comments to make.”

Applicant Response

- 2.9.1 The internal road arrangement is presented as illustrative and the final detail will be agreed at the appropriate reserved matters stage. The detailed points above are noted and will need to be considered and addressed at that time.

3. Response to ‘Leckwith Quays Transport Assessment Review’ Comments

3.1 Introduction

- 3.1.1 This chapter responds to the comments raised in the ‘Leckwith Quays Transport Assessment Review’, included at **Appendix B**. The ‘Review’ includes discussion on a number of key topic areas, including clearly defined recommendations for the applicant to address. The recommended actions are reproduced verbatim below, with numbering added for ease of reference. The applicant response to these are provided, including reference to wider commentary within the ‘Review’, as appropriate.

3.2 Topic 1: Highway Operational Conditions

Recommended Action

“It is advised that the raw survey data is submitted separately or included as an appendix to the TA in order to examine the network flows across the time period at which the surveys were undertaken.”

Applicant Response

- 3.2.1 The raw traffic survey data for the study area network is included at **Appendix D**. A summary is included that provides the junction inflows at surveyed locations, to demonstrate that the peak hour time periods selected for assessment are appropriate.

3.3 Topic 2: Road Safety

Recommended Action

“The road safety analysis uses data for the period 1st January 2014 – 31st December 2018. It is understood that more recent collision data is now available. It is recommended that the injury collision analysis is updated to include the most recent data set available.”

Applicant Response

- 3.3.1 The road safety analysis included in the TA was undertaken towards end of 2019 in preparation for the PAC submission in 2020. At that time, the current level of data was only available to the end of 2018. Given the timeframes involved in preparation and undertaking of assessments, and the lengthy period experienced for receiving the consultation responses, it is not unreasonable or indeed outside of normal practice for analysis to not reflect the latest available data at the time of planning submission. The analysis presented in the TA at planning submission in October 2020 is as per that presented in the PAC submission in May 2020. Neither the VoG nor CCC commented on this matter when presented with the analysis at PAC.
- 3.3.2 Notwithstanding the above, AECOM has undertaken a review of online-accessible data (using the ‘Crashmap’ resource) for 2019 and 2020, to identify whether there have been any additional Personal Injury Collisions (PICs) in the study area that could potentially have a material effect on the conclusions of the analysis undertaken in the TA. These have been assigned to the discrete ‘sites’ examined as part of the TA for consistency and ease of reference, and are summarised in **Table 3-1**.

Table 3-1: Personal Injury Collisions in Study Area in 2019 / 2020

Site		Date	Severity	Comments
No.	Description			
1	B4267 Leckwith Road / Sloper Road / Broad Street Junction	15/10/2019	Slight	Child pedestrian casualty
2	B4267 Leckwith Road / Lawrenny Road Junction	16/06/2019	Slight	Pedestrian casualty
3	B4267 Leckwith Road / Fford Fred Keenor Junction	02/02/2019	Serious	Pedestrian casualty
7	B4267 Leckwith Road / Pen-y-Turnpike Road Junction	10/02/2020	Slight	Two vehicle collision (cars)
8	B4267 Leckwith Road, between Pen-y-Turnpike Road and UHL	23/03/2020	Slight	Two vehicle collision (car and motorcycle)
10	Merrie Harrier	18/03/2019	Slight	Four vehicle collision (all cars)

3.3.3 **Table 3-1** shows that six PICs were recorded in the study area during the two-year period from 1st January 2019 to 31st December 2020, of which one was 'serious' and five were 'slight'. These were recorded across six sites examined as part of the TA. Three PICs involved a pedestrian casualty; the locations at which these were recorded all incorporate an appropriate level of crossing provision. **Table 3-2** provides a comparison of the number of PICs per annum at the 'sites' as reported in the TA, averaged across the years considered, with that rate identified for the 2019 / 2020 data now being examined.

Table 3-2: Comparison of Annual Personal Injury Collision Rates

Site		PICs per Annum	
No.	Description	2014 – 2018	2019 – 2020
1	B4267 Leckwith Road / Sloper Road / Broad Street Junction	1.6	0.5
2	B4267 Leckwith Road / Lawrenny Road Junction	0.8	0.5
3	B4267 Leckwith Road / Fford Fred Keenor Junction	0.8	0.5
7	B4267 Leckwith Road / Pen-y-Turnpike Road Junction	0.8	0.5
8	B4267 Leckwith Road, between Pen-y-Turnpike Road and UHL	0.8	0.5
10	Merrie Harrier	0.4	0.5

3.3.4 **Table 3-2** shows that, with the exception of Site 10 (Merrie Harrier), all locations experienced a reduction in the annual PIC rate between 2019 and 2020, when compared with the analysis contained in the TA. A marginal increase was recorded at Site 10, but the rate remains very low. The reductions could be partly explained by a reduction in travel demand during the COVID-19 pandemic (relevant to the 2020 data). In any event, it is considered that no further analysis of the data is required and that the conclusions of the analysis set out in the TA remain valid.

3.4 Topic 3: Public Transport

Recommended Action

"It has been noted that the bus and train timetable information is outdated. The bus time table references September 2019. It is acknowledged that public transport may be disrupted due to Covid-19, however, it is advised that all timetable information is updated to reflect the current service availability."

Applicant Response

3.4.1 The analysis of public transport timetables was undertaken in September 2019, prior to the COVID-19 pandemic, and is therefore considered to represent 'normal' conditions. Numerous operators have made temporary changes to their services (such as frequency and routing) in response to changes in customer demand arising from restrictions associated with the COVID-19 pandemic; these will be reviewed by operators as part of their COVID-19 recovery plans. Temporarily amended timetables are not considered to represent 'normal' conditions and therefore should not be used as the basis of assessment of the level of site accessibility to services in the future.

3.5 Topic 4: Access Strategy

Recommended Action

“It is recommended that consideration be given to the removal of crossing on the B4267 directly on the junction be removed which would increase the stacking capacity at the junction for right turn movements. It is also recommended that the proposed access design be subject to a Stage 1 Road Safety Audit.”

Applicant Response

- 3.5.1 It would appear that the VoG’s consultant has not fully understood what the proposals for the site access junction entail. It references the provision of signalised crossings at the junction itself together with a signalised crossing at the Ely Trail; this is not the proposed arrangement. The arrangement referenced by the VOG’s consultant relates to the discussion on ‘Site Access Options Assessment’ at Section 7.7 of the TA (and the initial design at Appendix I of the TA). The final proposed arrangement is discussed at Section 3.3 (Access Strategy) of the TA (and the design at Appendix C of the TA); this entails uncontrolled crossings at the junction together with a signalised crossing at the Ely Trail.
- 3.5.2 Notwithstanding the above, we have reviewed the recommendation to increase capacity for right-turn movements from the B4267 Leckwith Road to the development areas, with reference to the proposed design (see Appendix C of the TA). As discussed in the response to the VoG / CCC at **Chapter 2** (Comment 2), the right-turn lane lengths have been designed to accommodate the queue lengths forecast by the junction capacity assessment included as part of the TA. As identified at paragraph 7.7.4 of the TA, the maximum level of demand for right-turn movements to the south-eastern and north-western site accesses is forecast to be 12 and 31 Passenger Car Units (PCUs) respectively. Based on a cycle time of 90 seconds (as modelled in the TA), there will be 40 cycles per hour. On this basis, the demand for right-turn movements to the south-eastern and north-western site accesses will not exceed 1 PCU per cycle. The storage capacity for right-turn movements on these arms is 11.5m (2 PCUs) and 18.5m (3 PCUs) respectively (not including for storage areas in front of the stop line). Therefore, the demand for right-turn movements will be accommodated by the proposed storage, with sufficient reserve capacity.
- 3.5.3 Road Safety Audits (RSAs) will be undertaken at the reserved matters stage and through the technical approval process.
- 3.5.4 Whilst not a recommendation, it is acknowledged that the VoG’s consultant suggests an assessment of a scenario that considers the potential implications of the bridge not being replaced and resultant closure. This is a complex and extensive assessment, deemed far beyond the reasonable and justifiable requirements of this scale of the development. The applicant has considered an extensive network of junctions, more than typical for similar scale developments elsewhere, employing detailed assessments. What can be confirmed is that the junctions in the VoG which are of concern to the LHA, and that have been assessed in the TA, would all experience far more demand and detriment to capacity should the bridge be closed. This demand would far outweigh the limited impact forecast by the development.
- 3.5.5 The development is being continually reviewed in snapshot against the low impact on the network, but should be reviewed in the extent of the wider picture, with the provision of a new bridge structure or with one of the key routes to Cardiff potentially being severed in the near future. The identification of impacts from such a closure and the decision itself is for the VoG / CCC to consider, not the applicant.

3.6 Topic 5: Parking Provision

Recommended Action

“The proposed residential dwellings fall within the Vale of Glamorgan and therefore, it is recommended that their parking standards are applied. The 2008 CSS standards adopted by the VoG recommended that ‘maximum’ car parking standards should be used and that there should be further discussion on parking matters with the LPA and Highway Authority.”

Applicant Response

- 3.6.1 Parking provision will be set out in accordance with the adopted parking standards and agreed with the LHA at the reserved matters stage, with appropriate allowances made given its proximity to Cardiff.

3.7 Topic 6: Planning Policy Review

Recommended Action

"It is recommended that the emerging NDF is considered in the TA."

Applicant Response

- 3.7.1 The *Future Wales: The National Plan 2040* (referred to as the 'National Development Framework' by the VoG's consultant) was published by the Welsh Government (WG) in February 2021. It sets out the direction for development in Wales to 2040. Key transport ambitions include making "a Wales" where people "live and work in connected, inclusive and healthy places", "live in places where travel is sustainable" and "live in places which are decarbonised and climate resilient".
- 3.7.2 Policy 12 relates to 'Regional Connectivity'. It makes reference to the following:
- "Active travel must be an essential and integral component of all new developments, large and small. Planning authorities must integrate site allocations, new development and infrastructure with active travel networks and, where appropriate, ensure new development contributes towards their expansion and improvement."*
- 3.7.3 The proposed development places active travel at the heart of its access strategy, delivering improvements to walking and cycling for both existing and future users.
- 3.7.4 Other policies identified within the review relate to national infrastructure and specific growth areas and are not considered to be of significant relevance to the scale and location of the proposed development.
- 3.7.5 Notwithstanding the above review and evidence of compliance, it should be remembered that the scheme was subject to PAC in May 2020 and the planning application submitted in October 2020. The delays in consultation response times outside of the statutory requirements cannot be adequate justification for requests to include changes in policy formally issued after the submission date.

3.8 Topic 7: Vehicle Trip Generation

Recommended Action

"It is therefore recommended that further parameters with regard to population within the immediate vicinity of the site be applied and further justification of the proposed vehicular trip rates be provided."

Applicant Response

- 3.8.1 The trip rates for assessment were presented to the VoG / CCC both within the TA Scoping Note (September 2019) and as part of the PAC submission (May 2020); no response to the trip rates was supplied by the VoG / CCC.
- 3.8.2 Section 5.2 of the TA provides a summary of the criteria applied for the TRICS analysis. The 'Houses Privately Owned' dataset has been utilised. This includes sites with no more than 25% affordable housing provision. Under VoG policies, affordable housing for the location of the proposed development is required at a level of 40% affordable housing. Affordable housing is typically a lower generator of vehicle trips when compared with private housing. No account has been taken of the higher level of affordable housing that would be required for the proposed development (when compared with TRICS sites), and therefore the use of the 'Houses Privately Owned' dataset is considered to be highly robust. Sites with a Travel Plan (TP) were omitted from analysis. The proposed development includes an OTP and therefore the effects of such mitigation are not included for in trip rates, which is considered appropriate (as this is applied in the 'Do-Something' scenarios).
- 3.8.3 The VoG's consultant has highlighted that no adjustments have been made to the population parameters within TRICS. It recommends that these be adjusted together with an expansion of the survey date range to ensure a suitable sample size. The VoG provides the resultant trip rates from its own analysis, based on inclusion of surveys dating back to 2000, but does not include details of the selections that have been applied with regards to the population parameters, so the applicant cannot consider these in detail at this time.

3.8.4 The *TRICS Good Practice Guide 2021*, published in December 2020, provides guidance to users with regards to the use of older TRICS data. As is standard in TRICS, a default minimum cut-off date of eight years prior to the release of the release year of the version of TRICS utilised is applied. Paragraphs 9.3 to 9.5 of the guide raises concerns regarding the expansion of date ranges. TRICS undertook a review of changes in trip rates over time, including in reference to the 'Houses Privately Owned' dataset, identifying a general reduction in vehicular trips and a general shift towards non-vehicular modes. It states:

"Users are encouraged to obtain a statistically sound survey sample without the need to amend the default survey date cut-off wherever possible. More recent data within the TRICS database can be considered more representative of current trip generation levels when assessing a new development scenario, with older TRICS data being more representative of historic trip generation levels."

3.8.5 The expansion of the survey date range to some 21 years, and 13 years beyond the default best practice setting, is therefore not considered to be appropriate. The applicant has applied robust criteria with regards to the housing type and has not taken account of the potential effects of travel planning on trip rates as part of the selection (as these are applied in 'Do-Something' scenarios). A balanced approach has been taken to the site selection parameters, ensuring appropriate relaxations are applied to ensure a reasonable sample size.

3.8.6 Whilst the VoG's consultant has not supplied outputs from TRICS to enable a detailed review, it is considered that the two-way trip rates quoted by the VoG's consultant (of 0.634 for the weekday AM peak hour and 0.640 weekday PM peak hour) are considered highly excessive for the development location and characteristics. Furthermore, the rates utilised in the TA are themselves higher than those accepted by the VoG on neighbouring schemes, and these are discussed below.

3.8.7 A search of the planning portal has identified an outline planning application submitted for a scheme comprising 576 dwellings and a primary school on 'Land at Upper Cosmeston Farm' (Reference: 2020/01170/OUT), located around 6.5km to the south of the proposed development. The submission includes a TA (dated August 2020), appropriate reference to which has been made in this discussion. As per the proposed development, the site is located on the edge of an urban area, in this case Penarth. However, when compared to the proposed development, this is located significantly further from Cardiff (a key destination for employment and other trips), distances to which are likely to make active travel unattractive to many users. The proposed development is also in closer proximity to rail services (1.1km compared with 2.5km) and offers a similar level of accessibility to bus services. The proposed development benefits from a greater range of day-to-day facilities within walking distance.

3.8.8 Chapter 6 of the 'Land at Upper Cosmeston Farm' TA includes discussion on residential trip rates, presenting those derived from analysis of TRICS and 'local' trip rates derived from a survey of a neighbouring residential development. A comparison of these rates with those assessed in the TA for the proposed development is provided in **Table 3-3**

Table 3-3: Comparison of Two-Way Vehicle Trip Rates

Time Period	Two-Way Vehicle Trip Rates (per dwelling)		
	Proposed Development	Land at Upper Cosmeston Farm	
		TRICS	Local
Weekday AM Peak Hour	0.530	0.511	0.479
Weekday PM Peak Hour	0.510	0.467	0.449

3.8.9 In all cases, it can be seen that the vehicle trip rates used in the assessment of the proposed development are higher than those used in the assessment of 'Land at Upper Cosmeston Farm'. It is recognised that the application for the scheme has not yet been consented but, from a review of the correspondence and consultation referenced within the corresponding TA, it appears that the trip rates used in the assessment have been accepted by the VoG.

3.8.10 Overall, the recommendation to prepare revised forecasts based on trip rates presented by the VoG's consultant is neither appropriate nor required. The vehicle trip rates presented in the TA are considered robust with reference to the characteristics of the development and when compared with the trip rates accepted by the VoG on neighbouring schemes. Furthermore, neither the VoG nor CCC raised issues with the trip rates when provided with the opportunity at both the scoping and PAC submission stages.

3.9 Topic 8: Modal Share

Recommended Action

"It is therefore recommended that modal share information be derived from the MSOA locality based on NTM / NTEM data."

Applicant Response

- 3.9.1 The use of data from the NTM / NTEM is just one of a number of acceptable industry practiced methods that can be used by professionals to derive multi-modal trip generation forecasts. Irrespective of the dataset used, any derived mode share and associated forecasts are ultimately for the purposes of informing an indicative baseline for setting of targets in the OTP, and will be subject to review and potential update following a baseline travel survey (as set out in Chapter 8 of the TA). The use of the dataset outlined bears no impact with regards to the traffic impact assessment or their conclusions.
- 3.9.2 Therefore, an update to the multi-modal forecasts and associated indicative mode share is not considered necessary. Furthermore, it is acknowledged that, in its commentary with regards to the Transport Implementation Strategy (TIS) (at Topic 13), the VoG's consultant has stated that the proposed mode share (which is based on the methodology at Chapter 8 of the TA) is acceptable.

3.10 Topic 9: Traffic Distribution

Recommended Action

"It is however, recommended that it is clarified as to whether average proportions of the two MSOA area have been applied and how the internal trip distribution within the individual MSOA's from which distribution has been applied has been derived."

Applicant Response

- 3.10.1 We can confirm that the data extracted from the 2011 Census for the two Middle Super Output Areas (MSOAs) was combined for the purposes of analysis, which is considered reasonable. This is as presented to the VoG / CCC at scoping and PAC submission.
- 3.10.2 Where necessary, owing to the size of the MSOA (i.e. where multiple origins / destinations within an MSOA were considered likely), a further breakdown of the MSOAs was undertaken to the Lower Super Output Area (LSOA) level. This analysis is included at Appendix F of the TA.

3.11 Topic 10: Football Match Days

Recommended Action

"It is however recommended that further information as to the potential impact of match day movements on the site access / Leckwith Interchange junction be investigated to ensure that any safety / operational constraints can be captured and incorporated within the proposals."

Applicant Response

- 3.11.1 The recommendation of the VoG's consultant is in contradiction to its statement in the preceding paragraph of its response at paragraph 5.7, which states:
- "It is accepted that the vehicular movements associated with the development are likely to have an immaterial proportional impact on the local highway network during match days compared to the background movements."*
- 3.11.2 By its own admission, the VoG's consultant accepts that the proposed development is likely to have "an immaterial proportional impact" on match days. This is due to the fact that match days take place on weekends or evenings, outside of the nationally accepted weekday AM and PM peak hours assessed as part of residential developments.
- 3.11.3 The applicant has made its position on the requirement for a match day assessment clear during scoping discussions. Appropriate analysis was presented at PAC submission to respond to the request of the VoG / CCC to undertake an assessment, to which no response was supplied.

- 3.11.4 With reference to Section 5.3 of the TA, the vehicle trip generation of the proposed development during Saturday peak periods is forecast to be well below that of the weekday peak periods, ranging from around 50-75 fewer vehicle trips. Over the 12-hour period, the proposed development is forecast to generate 500 fewer vehicle trips on a Saturday than a weekday. The TA has considered the impact of the proposed development on the study area network during its peak hours of traffic generation, as is the industry normal practice, enabling Local Authorities to consider the worst-case traffic scenario. In this way, by default, the non-peak traffic impacts are considered acceptable. On football match days, the performance of the network and any capacity issues during associated hours is generally attributable to traffic to / from Cardiff City Football Club (CCFC), which will have been considered acceptable to the VoG and CCC in its decision to grant planning consent to the CCFC stadium. The stadium application would have been rigorously tested to ensure that such a large-scale development was situated, as required by local and national policy, in a highly sustainable location. There is an existing wide range of high-quality sustainable travel opportunities, with the stadium benefitting from a nearby train station, bus routes, and walking and cycling routes.
- 3.11.5 The traffic associated with the proposed development will account for a very small proportion of traffic on the network during these periods and will not result in a material change to conditions that are generally attributable to traffic to / from CCFC. This is considering a case where residents would continue to drive during match day conditions. Notwithstanding this immaterial level of traffic, the likely reality is that local residents will be aware of match days and plan their day-to-day needs accordingly. The local conditions on match days are such that residents may choose not to travel by car or select an alternative travel choice. This is in keeping with national and local policy to force a travel choice away from private car use, where driver convenience is no longer protected. The site is located adjacent to a sustainable travel network which will provide both match attendees and future residents with high quality alternatives to driving.
- 3.11.6 Further assessment of the impact of the proposed development on football match days is therefore neither appropriate, nor required.

3.12 Topic 11: Committed Development

Recommended Action

"It is recommended that as part of any future TA revisions that the cross referencing of Appendices be corrected."

Applicant Response

- 3.12.1 It is recognised and accepted that the reference within the main body of the TA is incorrect. For the avoidance of doubt, details of the committed development are included at Appendix G of the TA. Revisions to the TA to address this minor error are not considered appropriate, and no future TA revisions are to be made.

3.13 Topic 12: Leckwith Road Junctions

Recommended Action

"It is therefore recommended that the model also takes into account the signalised junctions along Leckwith Rd up to Sloper Road to ensure that this does not have a material impact on the operation of Leckwith Road in future year scenarios with the inclusion of movements associated with the proposed development."

Applicant Response

- 3.13.1 *Technical Advice Note 18: Transport (TAN 18)*, as a broad guide, considers a 5% increase in traffic using any link of a junction as material and requiring further assessment. This formed the basis of the scope of capacity assessment proposed to the VoG / CCC in the TA Scoping Note (September 2020), as followed in the PAC submission (May 2020), to which the VoG / CCC did not respond.

- 3.13.2 With reference to Table 7.1 of the TA, it can be seen that, on the junctions on the B4267 Leckwith Road to the east of Leckwith Interchange (for which further assessment is sought), the proposed is forecast to result in increases of no more than 2% in terms total traffic entering each junction, and no more than 3% on any one arm. This does present an adequate level of assessment which concludes that the development does not have a material impact on the operation of junctions on the B4267 Leckwith Road corridor.
- 3.13.3 Further assessment of the impact of the proposed development at these junctions is therefore neither appropriate, nor required.

3.14 Topic 13: Pen Y Turnpike Lane Mitigation

Recommended Action

“It is therefore considered that as the proposed development is likely to intensify the situation at the junction and it is recommended that mitigation measures or a S106 contribution to allow for mitigation measures should be put forward at this junction.”

Applicant Response

- 3.14.1 The recommended action is preceded by commentary on the appropriateness of the assessment undertaken. This includes the statement that queue surveys were undertaken on one occasion and that this may not be representative of day-to-day operations. The assessment of the junction has been undertaken in line with nationally accepted methods and, whilst not essential for use in traffic capacity modelling, has also commissioned and made use of queue surveys at the junction. This provides a further layer of validation into the junction model in order to finesse the future operational forecasts. Multiple day queue surveys are rarely undertaken by consultants and usually for more complex strategic modelling. We would consider that the extent of modelling undertaken, the collected evidence and the depth of the future year assessment are more than adequate for the scale of the development which is being proposed.
- 3.14.2 The effect of the proposed development on the junction in 2030 is not considered to be significant. It is recognised that there are forecasts of capacity issues at the junction in 2030, but it is essential to note that it is forecast that these will exist prior to the introduction of development traffic. The introduction of development traffic (a forecast of an additional 26 and 25 movements during the AM and PM peak hours respectively) does not result in a material change in operational performance.
- 3.14.3 As set out in earlier sections of this response, the VoG has a policy of requesting a sustainable travel contribution and this was made clear to the applicant in an initial screening response from the LHA in 2016. This sustainable travel contribution is clearly to be used to reduce traffic impact holistically, with local residents and future residents all benefiting from the spend of this contribution. It is not considered appropriate to request additional contribution requests for specific locational improvements in addition to the levy applied for sustainable travel and is essentially double funding. It is suggested that if there were a policy to improve the operation of local junctions, this would include both mitigation at the junction and at the source of traffic generation itself, i.e. by reducing the need to travel through the design of a high quality choice of travel alternatives. The sustainable travel contribution would, in this way, be made redundant and therefore also unfair in planning terms.
- 3.14.4 Notwithstanding the above additional justification, it should be clearly considered that the real assessment to be made by the LHA is: the contained level of development and the limited, in some cases immaterial impact upon local junctions with the provision of a multi-modal new bridge connection, versus, the closure of the existing bridge and the large scale reassignment of existing and future traffic converging at the junctions which have been continually promoted as essential and sensitive. The development would commit to the replacement of the current bridge, which is confirmed to be approaching closure, in lieu of, and far in excess of, any sustainable travel contribution calculations or requests for localise junction improvements. This multi-modal new connection will ensure that the areas within the VoG retain their sustainable travel choice across the Cardiff border and would also enhance the current level of provision.

3.15 Topic 14: Merrie Harrier

Recommended Action

“It is recommended that any development that results in additional throughput through the junction should contribute proportionally to ensure that the situation at the junction is not intensified further.”

Applicant Response

- 3.15.1 The preceding statement to the recommended action advises that this junction is a known congestion ‘hotspot’, with various studies undertaken to attempt to alleviate congestion. This would suggest that there is / has been funding available to study this route and to inform the cost of works to improve it, once an appropriate mitigation package has been determined. It is suggested that the works that are deemed required for this junction are part of the ongoing costs of operating the network and not as a consequence of this proposed development.
- 3.15.2 To clarify the likely impact, the proposed development is forecast to generate an additional seven two-way vehicle trips at the junction during the weekday AM and PM peak hours. As identified at Section 7.6 of the TA, the impact on the capacity of the junction is forecast to be immaterial. A financial contribution towards upgrades is therefore not appropriate and does not meet planning tests.
- 3.15.3 As set out in this TN, the VoG has a policy of sustainable travel contributions requests and in the case of the proposed development this levy will be far exceeded through the provision of a multi-modal bridge. This will ensure that existing travel options are maintained, and it will also enhance the level of provision for walking, cycling and access to public transport. The material consideration in all cases is that the decommissioning of the existing bridge would significantly increase demand at the remaining junctions into this area. This is likely to far exceed the capacity of this junction, which would in turn continue to have detrimental impact on the operation of junctions along the route, creating a wide area of reassigned impact.

3.16 Topic 15: Site Access

Recommended Action (Part A)

“As part of the access strategy, it would be recommended that signal controllers such as MOVA and queue markers are introduced at the signal-controlled access junction to ensure as efficient an operation as possible.”

Recommended Action (Part B)

“It is therefore recommended that a revised model be submitted of the site access junction which demonstrates that the storage capacity is forecast to be sufficient to accommodate all right turn movements that are likely to occur.”

Applicant Response

- 3.16.1 With regards to Part A, this has been discussed in the response to the VoG / CCC at **Chapter 2** (Comment 1). The incorporation of appropriate features (such as queue detection) and integration of the site access junction and Leckwith Interchange through an appropriate signal specification / controller will be subject to consultation and agreement with / between the VoG and CCC at the detailed design stage.
- 3.16.2 With regards to Part B, this has discussed in the response to the recommendation at Topic 4 and in the response to the VoG / CCC at **Chapter 2** (Comment 2). This has demonstrated that the demand for right-turn movements will be accommodated by the proposed storage, with sufficient reserve capacity. The introduction of optimisation software will serve to further improve an already adequate junction design.

3.17 Topic 16: Transport Implementation Strategy

Recommended Action

“Due to the location of the site on the outskirts of Cardiff and the VoG it would be recommended that the provision of a car club vehicle such as enterprise car club is investigated.”

Applicant Response

- 3.17.1 The commentary on the TIS agrees that the proposed mode share presented in the TA and the projected targets are achievable and are accepted.
- 3.17.2 Notwithstanding the agreement, there is a request that the applicant should consider investigation of the provision of a car club vehicle. The applicant may consider the safeguarding of an area of land for a car club parking space, which could be determined and agreed at the reserved matters stage. Although it is considered that the delivery of associated infrastructure (such as Electric Vehicle Charging) and ongoing fees would be more appropriately promoted by the VoG. In the case that this is not acceptable, the appropriate recourse is to await the findings of the TP monitoring programme.

Appendix A

Vale of Glamorgan Highway Authority Observation Sheet



Vale of Glamorgan Highway Authority Observation Sheet

Planning Application Ref:	2020/01218/HYB
Observations By:	Nigel Rees
Date:	12 th February 2020
Location:	Leckwith Quay, Leckwith Road, Leckwith
Proposal:	Hybrid planning application for residential development for up to 250 dwellings (submitted in OUTLINE), associated highway and bridge improvement / realignment works (submitted in FULL). Development involves the demolition of all buildings on site and of the existing B4267 Leckwith Road Bridge
Case Officer:	Mr. Robert Lankshear

I refer to the above hybrid planning application, notwithstanding the submitted plans and considering the highway implications of the proposal where the Highway Authority would comment as follows:

The demolition of the existing high level highway structures, namely, Leckwith Viaduct and Leckwith River Bridge is advantageous for the full development potential of the Leckwith Quays site to be realised.

The proposal is to realign the B4267 along an adjacent alignment to the north, on an embankment replacing the existing Viaduct, and across a new, simplified, low maintenance, integral bridge crossing the River Ely, replacing the existing Arch Bridge. These proposals are required to facilitate a safe and robust highway access off the B4267 to serve both the northern and southern areas of the proposed development.

The existing structures themselves are nearing 90 years old, only 30 years away from attaining the present day standard design life of 120 years. They are in a poor condition, having been constructed in the 1930s when design and construction standards were less demanding than those of more recent years. They have become a maintenance liability in recent years requiring concrete repairs generally and a regular regime of

structural monitoring of numerous discrete members already found to be weak as a result of structural strength assessment. They have also become a safety liability due to the potential of defective, loosened concrete to fall from the underside of the structure.

1. Looking at the proposed junction along the B4267 it is considered that the standalone toucan crossing location is too close to signalised junction. It is felt that this will cause will be confusing for vehicles with see-through and will lead to capacity issues at Leckwith. It would be preferable to see cycle provision to be provided up to the junction and the standalone toucan crossing removed.
Agree with this point.

It needs to be demonstrated that the impact of this light controlled crossing will not adversely affect roundabout in terms of traffic build up, especially given their proximity to the other proposed light controlled junction. It may be these lights are not required or it needs demonstrated that sequencing of the various proposed light controlled aspects of scheme are acceptable.

If the light controlled crossing is to be removed it needs to be evidenced that it will be acceptable in terms of, but not limited to, pedestrian safety and capability to accommodate users of Ely River Trail.

2. With regard to the signalised junction arrangement:
 - Signalised junction – left turns looks tight at the central island. The junction swept path tracking has been undertaken using a DB32 pantechicon 9.570m length vehicle; the junction to be re-tracked using a 11.22m long refuse vehicle.
 - The traffic calming (on the side arms) leading to the junction is not necessary and considered too close to the stop line.
 - Right-turn taper looks short (turning right into the southern development), is this adequate based on a LinSig model?
 - Do we require ASL's if there is an off carriageway facility, the removal of these this will go some way to marginally improve inter-visibility.
 - Existing double yellow lines to be shown on future drawings.

No comments to make. It must be ensured that the light controlled junction does not adversely affect the roundabout junction, we have similar concerns as detail above for point 1. The cumulative impact of the light controlled junction and crossing needs to be fully considered in terms of its impact on the roundabout junction.

3. The proposed realignment of the B4267 with a relocated bridge and embankment has been designed with several departures from the DMRB standards for vertical and horizontal alignment. Although it is proposed to reduce the speed limit down to 30mph it is felt that a more robust signing strategy is required to enforce the vehicle speeds.

- Speed limit signs to be on yellow backing boards.

- A 2m wide central island, incorporating back to back speed limit sign (leaving 3.65m running carriageways).
- Provision of an aluminum bend warning sign, inset in a VAS housing, with LED slow/araaf lettering, augment with bilingual slow road markings.
- Provision of 30mph VAS LED roundel signs.

We have concerns that the signage on the northern side of the bridge, towards the roundabout, may affect the SSD. We would expect the applicant to demonstrate the necessary signage can be positioned acceptably without affecting SSD.

4. Looking at the shared cycle/pedestrian facilities shown, considering the existing active travel cycle route facilities, the proposed links to the Northern & Southern development areas and the proposed shared link up the B4267 to Leckwith hill it is considered more appropriate to run the 3.5m wide shared cycle/pedestrian surface on the Southern side of the proposed bridge.

We agree with point.

5. Looking at both access roads off the proposed B4267 junction they are shown to be raised extending down each side at gradient to the development. More information is required for the proposed embankments (1:4 gradient) and how they interact with the existing topography and the Ely River so that they are protected from wash out and do not adversely affect the river flows up or down stream.

No comments to make.

6. Consideration need to be given to the proposed controlled junction system, will this be linked into the telematics system at the Leckwith interchange operated by Cardiff County Council. The proposed system needs to take account of CCTV or traffic flow cameras as required and appropriate real time intelligent traffic control systems including variable and informative messaging signage.

See response to point 1. Applicant is advised to contact: D.Kinnaird@cardiff.gov.uk to discuss light sequencing.

7. With regard to public transport facilities looking at the plans provided:

- No immediate access to local bus services (the walk across the roundabout to the stops located by Asda is, I would consider, not very attractive);
- No pick up/drop off points for school transport (assuming catchment will be St Cyres for this estate – where will pupils catch the bus? Similarly I assume Llandough Primary will be catchment primary school);
- With 250 dwellings we may require a lot of school transport as only Cardiff schools are in walking distance and all Vale schools would require school transport.
- Site could lend itself to an e-bike hire docking station – this would help with AT journeys into Cardiff City Centre.

The lack of provision of laybys for passenger transport services and that passenger will have to walk across an extremely busy roundabout to catch a bus that will take them back past the estate they live on to get them into the Vale.

No comments to make since this is mainly a VoG matter. CC do, however, fully support this stance in order to reduce private car trips into Cardiff.

8. With regard to the development estate roads and layout based on the preliminary masterplan drawings provided:
- Due to the long narrow topography of the development site the primary feeder roads are shown to be long and straight; in line with Manual for Streets the length of these roads shall be limited to 70m before a change in direction with the inclusion of a shared surface/raised square area.
 - The proposed layout to be checked and tracked for a 11.220m refuse vehicle through all category roads.
 - The indicative layout shown provides for 300 car spaces based on the VoGCC maximum parking standards there seems to be a shortfall.
 - It is not clear if the proposed estate road leading off the northern access into the development is to be adopted. What has been shown would not be acceptable to VoGCC standards, there would also be problems for large vehicles needing to turn around and exit out onto the B4267 in a forward gear.

No comments to make.

Appendix B

Leckwith Quays Transport Assessment Review (commissioned by Vale of Glamorgan)

ASBRI TRANSPORT LIMITED

LECKWITH QUAYS TRANSPORT ASSESSMENT REVIEW

29th January 2020

Project number	T20.103	Project name	Leckwith Quays, Cardiff
Contact/participants	Vale of Glamorgan	Noted by	Asbri Transport Limited

OVERVIEW

Asbri Transport Limited have been commissioned by the Vale of Glamorgan to undertake a review of a Transport Assessment Report submitted in support of a planning application for proposed residential development of 250 dwellings at Leckwith Quays, Cardiff.

The Transport Assessment (TA) document is referenced as project Number 60608933 A093950-2 and dated March 2020. The TA has been produced by AECOM on behalf of Phil Worthing.

The planning application proposes circa 250 residential dwellings on an existing brownfield site located at Leckwith Quays, Cardiff. The TA advises that the existing site is currently used for a range of long running commercial/light industrial uses and that it is accessed 'via a junction with the B4267 Leckwith Road.'

This Technical Note follows the structure and running order of the Transport Assessment providing comments and recommendation where appropriate.

Recommendations resulting from this review are detailed in a **highlighted text box**.

1. TA Scoping

- 1.1 The TA references at section 1.3 scoping discussion and correspondence with the local Highway Authority and this is included at Appendix B.
- 1.2 It is noted that the Technical Note scoping the TA provides considerable detail on the methodology to be deployed to produce the TA. Appendix B of the TA includes the Authority's response to the request for an ES scoping opinion.
- 1.3 The Highway Authority's comments were as follows:
 - *Parking: The transport section of the ES should refer to the Parking Standards SPG and 'indicate the availability of more sustainable modes of transport that could influence and reduce the use of the private car in order to justify the reduction of one space per dwelling';*
 - *Traffic flows: 'The information related to the traffic flows across the surveyed network needs to be provided in order for the Highway authority to agree the above AM and PM peak hours';*
 - *Trip distribution: The transport section of the ES should clearly explain how the Leckwith park-and-ride facility would reduce the proposal's overall traffic by 6%;*
 - *Future traffic: The transport section of the ES should account for the impact of the proposal until 2030;*
 - *Local impact: The transport section of the ES should assess the proposal's impact on the junction of the Merrie Harrier and Redlands Road;*
 - *Appendices: 'The Appendices have not been provided with the scoping note and [need] to be provided in order for the Highway authority consider the scoping note as a whole'.*

- 1.4 The Highway Authority also requested that assessment be undertaken on football match days at the nearby stadium used by Cardiff FC.

2. Existing Situation & Site Accessibility

- 2.1 This section of the TA notes that the site is located at the border of the Vale of Glamorgan and the City and County of Cardiff. It notes that the site is accessed via a junction with the B4267 Leckwith Road just north of the Ely River.

Site Location and Local Highway Network

- 2.2 Section 2 of the TA describes the site location and the local highway network.

Highway Operational Conditions

- 2.3 The TA details the data collection methods used for identifying the existing traffic generation of the site and the existing highway operational conditions.
- 2.4 These have included Junction Turning Count (JTC) and queue length surveys undertaken by an independent survey company, and JTC data supplied by CCC.

It is advised that the raw survey data is submitted separately or included as an appendix to the TA in order to examine the network flows across the time period at which the surveys were undertaken.

- 2.5 It is noted that the extent of the traffic study area was informed by and agreed with each LHA prior to commission of traffic studies and preparation of the TA.

Walking and Cycling

- 2.6 Section 2.6 details the walking and cycling provision within the vicinity of the site. It is noted that there are several walking and cycling routes of a good standard linking the site to the surrounding area and the retail facilities within Leckwith.
- 2.7 Given the location of the site adjacent to Ely Trail it would be recommended that the potential incorporation of the development into the nextbike network be investigated.

Local Facilities

- 2.8 The TA details a range of facilities and employment opportunities which are deemed to be within an acceptable walking and cycling distance from the site.

Road Safety

- 2.9 The geographic cordon adopted for the road safety analysis is satisfactory.

The road safety analysis uses data for the period 1st January 2014 – 31st December 2018. It is understood that more recent collision data is now available. It is recommended that the injury collision analysis is updated to include the most recent data set available.

Public Transport

- 2.10 Existing public transport services operating in the vicinity of the proposed development have been identified.

It has been noted that the bus and train timetable information is outdated. The bus time table references September 2019. It is acknowledged that public transport may be disrupted due to Covid-19, however, it is advised that all timetable information is updated to reflect the current service availability.

- 2.11 Access to the bus stops currently requires crossing of the A4232 slip road and from the extremities of the site require a walk of up to around 600 metres.

3. Development Proposals

- 3.1 This section of the TA goes into further detail about the proposals at the site in terms of access strategy, parking and construction traffic.

Access Strategy

- 3.2 The TA details that access to the site will be achieved via a new bridge along the existing alignment of the B4267 linking the Merrie Harrier junction with the Leckwith Interchange.
- 3.3 Paragraph 3.3.3 of the TA states that non-provision of a replacement bridge and closure of this link to Leckwith Interchange would inevitably result in a significant reassignment of traffic across the network causing significant detrimental performance implications for other junctions in the VoG and CCC such as Merrie Harrier, Barons Court and Culverhouse Cross.
- 3.4 The potential reassignment of these movements has however not been assessed as part of the base year scenarios carried out within the capacity assessments of the TA. It is therefore considered that a further *Do Nothing* scenario should be included which looks at the potential implications, at the Merrie Harrier and Leckwith Interchange junctions as a minimum, of the bridge not being replaced in the 2030 forecast year when the bridge is likely to have surpassed its life cycle.
- 3.5 The right turn lanes providing access to the proposed development. It is highlighted as part of the review of the capacity assessment for the site access signal-controlled junction that it needs to be demonstrated that the right turn lanes provide sufficient capacity to ensure that vehicular queues do not block back from the junction causing a knock-on effect onto the A4232 slip road / Leckwith Interchange.
- 3.6 This is particularly considered relevant as right turn movements have to give-way to oncoming movements and as such may suffer from entry starvation dependent on the extent of the opposing movements.
- 3.7 The design of the access junction also includes for two signalised pedestrian crossings at the junction itself and at the Ely Trail. It is understood that this provides two crossings along the relevant desire lines. However,

this provides an additional interruption to vehicular movements and a further risk to blocking back to the Leckwith and A4232 slip road occurring.

It is recommended that consideration be given to the removal of crossing on the B4267 directly on the junction be removed which would increase the stacking capacity at the junction for right turn movements.

It is also recommended that the proposed access design be subject to a Stage 1 Road Safety Audit.

Internal Site Layout

- 3.8 The internal layout includes long straight sections of carriageway which do look to curtail vehicular speeds. It is considered that regular build outs should be provided to ensure that there is deflection for vehicles travelling through the proposed development.
- 3.9 In addition, any shared surface environments would need to provide pedestrian safety strips and servicing strips in line with standards set out in Manual for Streets, TAN18 and the Welsh Government DQR Design Standards and Guidance.

Parking Provision

- 3.10 The TA details the required parking standards for both the VoG and CCC. It is noted that both counties operate different parking standards with CCC allowing for a reduced level of car parking in comparison to the VoG.
- 3.11 Due to the fact that the part of the site to be developed for residential purposes is within the administrative area of VoG, it is recommended that their standards are applied to the development and not those of CCC. The indicative layout provides for 300 car parking spaces which is a shortfall of 289 spaces in line with the VoG maximum standards.

The proposed residential dwellings fall within the Vale of Glamorgan and therefore, it is recommended that their parking standards are applied. The 2008 CSS standards adopted by the VoG recommended that 'maximum' car parking standards should be used and that there should be further discussion on parking matters with the LPA and Highway Authority.

4. Planning Policy Review

- 4.1 This section of the TA provides an overview of the national and local transport and policy and references relevant policy applicable in both the Vale of Glamorgan and the City and County of Cardiff.
- 4.2 The chapter references Planning Policy Wales (Edition 10) and the Wales Spatial Plan but does not reference the National Development Framework 2020-2040 which is due to replace the WSP. It is noted that the consultation draft NDF was published in August 2019, but that publication of the final NDF has been delayed.

It is recommended that the emerging NDF is considered in the TA.

5. Trip Generation & Distribution

5.1 This section of the TA looks at the vehicular trip generation and distribution which could be associated with the proposed development site.

Vehicle Trip Generation

5.2 Vehicular trips have been derived by interrogation of the TRICS database which is considered acceptable.

5.3 However, it is noted that no filtering of trip rates has been undertaken based on population. If these parameters are applied and, to ensure there is a wider pool of surveys available, the study period is extended to include surveys dating back to 2000 the below trip rates would be derived.

	ARR	DEP	Total	ARR	DEP	Total
AM	0.187	0.447	0.634	47	112	160
PM	0.413	0.227	0.640	103	57	160

5.4 It is therefore considered that the application of these trip rates would represent a realistic assessment of the trip generation given the location of proposed development adjacent to one of the major arterial routes into and out of Cardiff (A4232) and with good access to the M4.

It is therefore recommended that further parameters with regard to population within the immediate vicinity of the site be applied and further justification of the proposed vehicular trip rates be provided.

Modal Share

5.5 Modal Share information has been derived from a combination of the NTS and 2011 Census data. It is unclear why the TA has not used NTEM / NTM data obtained through Temprow v72 which would provide information as to the local area and multiple journey purposes as opposed to averaging a data from a local and national model.

It is therefore recommended that modal share information be derived from the MSOA locality based on NTM / NTEM data.

Traffic Distribution

5.6 The methodology for traffic distribution based on Table WU03EW of the 2011 Census data is considered acceptable.

It is however, recommended that it is clarified as to whether average proportions of the two MSOA area have been applied and how the internal trip distribution within the individual MSOA's from which distribution has been applied has been derived.

Football Match Days

- 5.7 It is accepted that the vehicular movements associated with the development are likely to have an immaterial proportional impact on the local highway network during match days compared to the background movements.

It is however recommended that further information as to the potential impact of match day movements on the site access / Leckwith Interchange junction be investigated to ensure that any safety / operational constraints can be captured and incorporated within the proposals.

6. Assessment Scenarios

- 6.1 The assessment year scenarios are considered reasonable with a year of opening of 2025 and a future year of 2030 assessed.

Tempo Growth Forecasts

- 6.2 It is also considered a reasonable assessment to utilize the growth forecasts from Tempo V7.2 MSOA Cardiff 040 as this represents both the area in which the majority of junctions are located but also the highest growth forecast for the area.

Committed Development

- 6.3 A number of committed developments have been considered. These are primarily allocated sites which have been included in the LDP. As such, some double counting with Tempo Growth Factors may occur.
- 6.4 Although not relevant to the assessment it should be noted that the Appendix references are not correct in this location. In the text Appendix I should read Appendix G.

It is recommended that as part of any future TA revisions that the cross referencing of Appendices be corrected.

7. Traffic Impact Assessment

Percentage Impact Assessment

- 7.1 The percentage impact assessment states within the text that 'the percentage changes in traffic flows at the junctions between the 'Do-Minimum' and 'Do Nothing' scenarios have been assessed. However, table 7.1 refers to a change in traffic between 2025 'Do Minimum' and 2025 'Do-Something'.
- 7.2 It is however noted that the table does represent the figures as set out in the 'Do Nothing' scenario and therefore the percentage impact assessment is considered acceptable.

Leckwith Interchange

- 7.3 It is understood that the model for Leckwith Interchange has been prepared based on a review of signal specification data provided by CCC and survey footage. This information should be provided as part of the TA to allow for a full review of the junction validation.

- 7.4 Furthermore, on the exit onto the surrounding local highway network two lanes merge into one yet no give-way parameters have been applied and the merge therefore allows free movement without any potential delay being applied. It is therefore recommended that a give-way parameter is applied to the merge.
- 7.5 It is also considered that the model should take into account the potential for the blocking back of the B4267 Leckwith Rd as a significant queue currently forms in the peak period from Sloper Road most of the way to the Leckwith Interchange.
- 7.6 This is likely to be intensified within future year scenarios and could result in a blocking back effect.

It is therefore recommended that the model also takes into account the signalised junctions along Leckwith Rd up to Sloper Road to ensure that this does not have a material impact on the operation of Leckwith Road in future year scenarios with the inclusion of movements associated with the proposed development.

Pen Y Turnpike Lane Mitigation

- 7.7 The original Pen Y Turnpike Road model demonstrates that geometrically the junction currently operates overcapacity with significant queueing.
- 7.8 There is also a concern that queue surveys were carried out in isolation on one occasion. As such, there is no evidence that these queues are representative of the day to day operation of the junction.

It is therefore considered that as the proposed development is likely to intensify the situation at the junction and it is recommended that mitigation measures or a S106 contribution to allow for mitigation measures should be put forward at this junction.

- 7.9 This is especially considered to be the case if improvements to the Leckwith bridge, facilitated by the proposed development, are likely to result in additional background movements utilising this access route to Leckwith and Cardiff as a whole.

Merrie Harrier

- 7.10 The Merrie Harrier junction is a known congestion hotspot within Dinas Powys. Various studies to seek to alleviate congestion have been carried out at this junction.

It is recommended that any development that results in additional throughput through the junction should contribute proportionally to ensure that the situation at the junction is not intensified further.

Site Access

As part of the access strategy, it would be recommended that signal controllers such as MOVA and queue markers are introduced at the signal-controlled access junction to ensure as efficient an operation as possible.

- 7.11 This is especially considered the case as a result of the possible blocking back of right turn movements which could cause additional queues and blocking back occurring on the Leckwith interchange circulatory carriageway.
- 7.12 In addition, due to the space constraints it is noted that the right turn lanes into the proposed development are short with a storage capacity of 2 - 3 PCU's. With the requirement for right turners to wait to turn within gaps there is therefore the potential for blocking back to occur onto the main throughput along the B4267 Leckwith Road which would quickly impact on the operation of Leckwith Interchange and the A4232 NB off-slip.

It is therefore recommended that a revised model be submitted of the site access junction which demonstrates that the storage capacity is forecast to be sufficient to accommodate all right turn movements that are likely to occur.

8. Transport Implementation Strategy

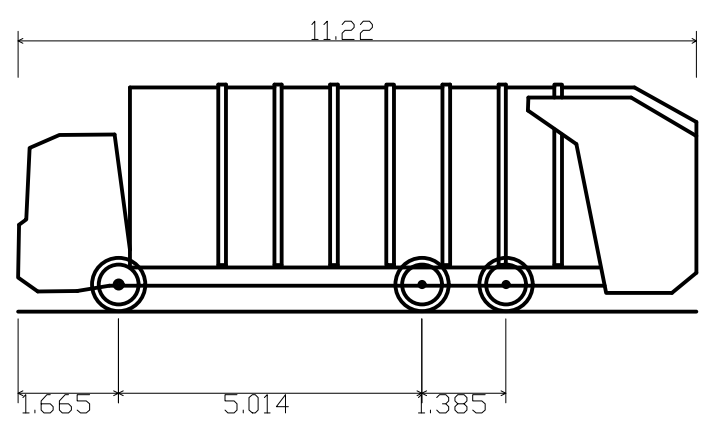
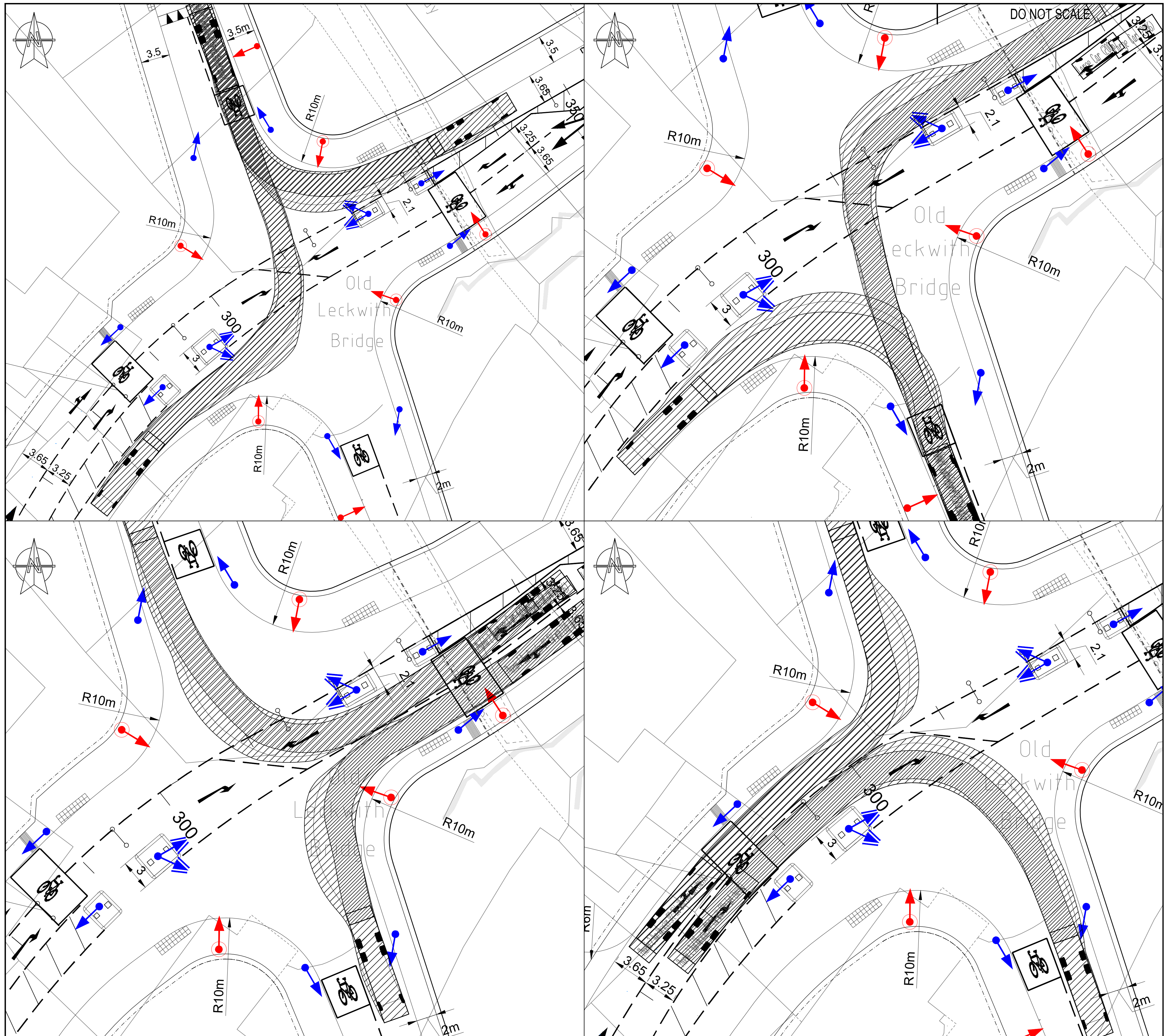
- 8.1 It is considered that the proposed mode share and projected targets derived are achievable and acceptable.

Due to the location of the site on the outskirts of Cardiff and the VoG it would be recommended that the provision of a car club vehicle such as enterprise car club is investigated.

Drafted by: [Redacted]	Date 28/1/21	Approved By [Redacted]	Date 29/1/21
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Appendix C

Proposed Site Access Junction – Swept Path Analysis



Phoenix 2 Duo Recycler (P2-15W with Elite 6x4 chassis)

Overall Length	11.220m
Overall Width	2.530m
Overall Body Height	3.756m
Min Body Ground Clearance	0.309m
Track Width	2.530m
Lock to lock time	4.00s
Kerb to kerb Turning Radius	11.550m

- NOTES
- DO NOT SCALE FROM THIS DRAWING. USE FIGURED DIMENSIONS ONLY.
 - ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM (AOD)
 - ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.
 - THIS DRAWING IS FOR PLANNING PURPOSES ONLY AND IS SUBJECT TO DETAILED DESIGN
 - HIGHWAY GEOMETRY & DESIGN IS SUBJECT TO TECHNICAL APPROVAL OF THE ADOPTING HIGHWAY AUTHORITIES

DRAWING STATUS: DRAFT - FOR PLANNING	<p>1 Capital Quarter Tyndall St Cardiff CF10 4BZ, UK</p> <p>T+ 44 (0) 292 076 9200 wsp.com</p>	CLIENT: PHILIP WORTHING	PROJECT: LECKWITH QUAY	SCALE @ A1: 1:500	CHECKED: SID	APPROVED: GW
		ARCHITECT: LOYN ARCHITECTS	TITLE: B4267 LECKWITH ROAD HIGHWAY IMPROVEMENTS SWEEP PATH ANALYSIS SHEET 2	PROJECT NO: 70053561	DESIGNED: SID	DRAWN: GS
				DRAWING NO: 70053561-WSP--XX-XX-CR-DE-110	REV: -	
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File name: \\UK-WSPGROUP\COMMON\DATA\PROJECTS\70053561-LECKWITH QUAY - CARBONFIX WPC\CARBONFIX WPC\DRAWINGS\70053561-110 VEHICLE TRACKING DWG.dwg, printed on 28-Apr-2021 16:05:43 by Davies, Sion

Appendix D

Traffic Survey Data

***B4267 Leckwith Road / Sloper Road/Broad Street junction
(Junction 1)***



Lockwith, Cardiff - Manual Traffic Survey: Tuesday, 11 June 2019
 Prepared by: Beattie Systems Ltd

Approach: A - (Phase) B&C7 Lockwith Road / B - Sligoj Road / C - (Route) B&C7 Lockwith Road / D - Broad Street

Approach: B - Sligoj Road

TIME	E-W										W-E										S-B										B-S																		
	CAR	LEV	OVN	OVN	OVN	OVN	OVN	OVN	OVN	OVN	CAR	LEV	OVN	OVN	OVN	OVN	OVN	OVN	OVN	OVN	CAR	LEV	OVN	OVN	OVN	OVN	OVN	OVN	OVN	OVN	CAR	LEV	OVN	OVN	OVN	OVN	OVN	OVN	OVN	OVN									
08:00-08:15	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15-08:30	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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15:45-16:00	30	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00-16:15	31	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15-16:30	32	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30-16:45	33	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45-17:00	34	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00-17:15	35	34	0	0	0	0	0	0	0	0	0																																						



Leckwith, Cardiff: Queue Length Survey - Tuesday, 11 June 2019

Produced by Streetwise Services Ltd.

Junction: A - (North) B4267 Leckwith Road / B - Sloper Road / C - (South) B4267 Leckwith Road / D - Broad Street

Survey Period	A - (North) B4267 Leckwith Road			B - Sloper Road		C - (South) B4267 Leckwith Road		D - Broad Street	
	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 1	Lane 2	Lane 1	Lane 2
	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX
07:00 - 07:05	10	3	0	2	5	9	4	6	8
07:05 - 07:10	10	6	1	4	6	13	5	9	11
07:10 - 07:15	7	4	2	5	8	11	5	10	6
07:15 - 07:20	11	3	0	2	8	18	7	8	6
07:20 - 07:25	15	9	0	4	12	15	9	5	5
07:25 - 07:30	13	7	0	5	11	27	9	6	11
07:30 - 07:35	15	12	1	8	12	15	6	9	12
07:35 - 07:40	15	8	0	14	14	21	8	11	11
07:40 - 07:45	12	10	0	12	11	20	8	12	18
07:45 - 07:50	14	7	1	9	13	21	11	12	20
07:50 - 07:55	13	12	0	7	12	25	5	13	18
07:55 - 08:00	13	12	0	9	14	14	4	6	18
08:00 - 08:05	20	12	0	8	23	25	4	10	16
08:05 - 08:10	13	10	1	26	22	25	10	13	17
08:10 - 08:15	13	11	1	28	15	23	8	13	16
08:15 - 08:20	17	10	1	24	12	25	15	13	16
08:20 - 08:25	18	10	2	23	12	26	17	13	17
08:25 - 08:30	14	10	0	29	15	25	12	12	15
08:30 - 08:35	15	6	0	22	13	26	13	12	21
08:35 - 08:40	10	5	1	14	15	26	12	10	17
08:40 - 08:45	16	9	1	13	16	28	6	13	19
08:45 - 08:50	12	9	1	16	8	29	6	6	10
08:50 - 08:55	13	7	1	13	7	25	6	7	17
08:55 - 09:00	13	12	1	10	7	20	9	7	10
09:00 - 09:05	14	10	0	12	9	22	10	11	16
09:05 - 09:10	13	8	1	13	9	24	8	6	15
09:10 - 09:15	13	6	0	14	15	24	6	8	15
09:15 - 09:20	19	5	1	8	12	26	11	6	18
09:20 - 09:25	12	6	1	10	15	20	7	4	19
09:25 - 09:30	13	6	0	7	5	22	12	13	20
09:30 - 09:35	19	7	1	9	7	26	10	7	12
09:35 - 09:40	13	4	0	7	5	22	14	8	13
09:40 - 09:45	14	8	0	9	6	8	2	9	15
09:45 - 09:50	14	6	0	16	7	17	4	7	7
09:50 - 09:55	13	3	1	10	9	25	4	12	16
09:55 - 10:00	13	6	0	12	11	20	6	8	6
10:00 - 10:05	21	10	1	10	9	15	8	9	13
10:05 - 10:10	13	7	0	14	16	24	10	9	21
10:10 - 10:15	13	8	1	25	20	24	10	13	19
10:15 - 10:20	26	10	0	24	19	30	7	9	10
10:20 - 10:25	18	11	1	25	8	30	8	7	14
10:25 - 10:30	18	9	1	26	16	18	11	11	7
10:30 - 10:35	18	5	0	17	16	30	6	8	11
10:35 - 10:40	13	5	1	19	27	24	6	12	13
10:40 - 10:45	21	6	1	27	27	31	10	10	19
10:45 - 10:50	17	10	1	28	20	20	8	6	16
10:50 - 10:55	13	10	1	27	27	23	10	6	18
10:55 - 11:00	18	10	0	29	27	25	6	12	20
11:00 - 11:05	13	6	1	29	20	29	7	5	9
11:05 - 11:10	26	11	0	30	21	28	12	8	14
11:10 - 11:15	21	11	1	29	26	26	10	7	15
11:15 - 11:20	28	10	0	29	21	28	8	8	17
11:20 - 11:25	19	11	0	30	23	28	7	6	18
11:25 - 11:30	16	8	1	28	28	30	6	7	21
11:30 - 11:35	25	10	0	27	27	21	6	11	20
11:35 - 11:40	25	11	0	30	22	25	12	13	24
11:40 - 11:45	25	7	0	28	27	29	12	13	23
11:45 - 11:50	24	11	1	29	26	27	8	13	22
11:50 - 11:55	19	8	0	26	16	23	7	12	23
11:55 - 12:00	19	11	2	16	12	23	10	12	15
12:00 - 12:05	18	7	1	26	12	12	7	7	9
12:05 - 12:10	13	7	1	27	8	26	4	11	12
12:10 - 12:15	18	6	0	26	13	32	6	12	11
12:15 - 12:20	13	8	0	24	14	21	3	9	9
12:20 - 12:25	14	8	0	24	10	8	3	9	9
12:25 - 12:30	13	9	1	13	10	10	5	8	10
12:30 - 12:35	13	10	1	22	5	10	2	6	11
12:35 - 12:40	13	7	1	24	12	2	0	8	13
12:40 - 12:45	12	7	0	9	5	10	3	9	9
12:45 - 12:50	13	5	0	11	10	13	3	8	13
12:50 - 12:55	11	4	0	10	8	9	2	6	10
12:55 - 13:00	13	5	0	9	5	7	3	7	8

B4267 Leckwith Road / Ffordd Fred Keenor junction (Junction 3)



Leckwith, Cardiff - Manual Traffic Survey, Thursday, 20 June 2019

Produced by Streetscene Services Ltd

Approach: A - (North) B4207 Leckwith Road / B - Link Road / C - (South) B4207 Leckwith Road

Approach: A - (North) B4207 Leckwith Road

Table with columns for Time, Lane, and Vehicle Type (CAR, LOV, OVHT, OVOG, BUS, MOTO, CYCLE, PCU, TOTAL) for Approach A. Includes a 'Senses Total' row at the bottom.

Table with columns for Time, Lane, and Vehicle Type (CAR, LOV, OVHT, OVOG, BUS, MOTO, CYCLE, PCU, TOTAL) for Approach B. Includes a 'Senses Total' row at the bottom.



Leckwith, Cardiff - Manual Traffic Survey: Thursday, 20 June 2019

Produced by Transport Research Laboratory

Approach: A - (North) B4207 Leckwith Road / B - Link Road / C - (South) B4207 Leckwith Road

Approach: B - Link Road

Table with columns for Time, Category, and Vehicle Type (CAR, LOV, OGV1, OGV2, BUS, MOTO, PCYCLE, PCU, TOTAL, etc.) for direction B to A. Includes sub-totals for 5-minute intervals and a Grand Total.

Table with columns for Time, Category, and Vehicle Type (CAR, LOV, OGV1, OGV2, BUS, MOTO, PCYCLE, PCU, TOTAL, etc.) for direction F to B. Includes sub-totals for 5-minute intervals and a Grand Total.



Leckwith, Cardiff - Manual Traffic Survey, Thursday, 20 June 2019

Produced by Transport Research Laboratory

Approach: A - (North) B4237 Leckwith Road / B - Link Road / C - (South) B4237 Leckwith Road

C - (South) B4237 Leckwith Road

Table with 20 columns: TIME, CAR, LCV, OVHT, OVOS, BUS, MOTO, MOTO, PCY, TOTAL, CAR, LCV, OVHT, OVOS, BUS, MOTO, MOTO, PCY, TOTAL. Rows include time intervals from 07:00-07:15 to 18:45-19:00 and a Grand Total row.

Table with 20 columns: TIME, CAR, LCV, OVHT, OVOS, BUS, MOTO, MOTO, PCY, TOTAL, CAR, LCV, OVHT, OVOS, BUS, MOTO, MOTO, PCY, TOTAL. Rows include time intervals from 07:00-07:15 to 18:45-19:00 and a Grand Total row.



Leckwith, Cardiff: Queue Length Survey - Thursday, 20 June 2019
 Produced by Streetwise Services Ltd.

Junction: A - (North) B4267 Leckwith Road / B - Link Road / C - (South) B4267 Leckwith Road

Survey Period	A - (North) B4267 Leckwith Road			B - Link Road			C - (South) B4267 Leckwith Road				
	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 3	Lane 4	
	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	
07:00 - 07:05	1	1	0	1	0	0	0	0	0	0	0
07:05 - 07:10	2	4	3	1	0	0	0	0	0	0	2
07:10 - 07:15	1	2	4	0	1	0	4	3	0	2	
07:15 - 07:20	3	6	3	0	0	1	7	5	0	2	
07:20 - 07:25	2	4	2	2	0	2	2	1	0	1	
07:25 - 07:30	2	1	0	0	0	0	0	0	1	0	
07:30 - 07:35	3	1	0	0	0	1	1	4	4	0	
07:35 - 07:40	1	2	3	0	0	0	0	0	4	0	
07:40 - 07:45	4	5	4	1	9	1	3	2	0	0	
07:45 - 07:50	1	4	3	0	0	2	2	2	4	1	
07:50 - 07:55	2	3	1	2	0	2	11	0	2	2	
07:55 - 08:00	6	4	3	2	0	1	21	3	0	2	
08:00 - 08:05	2	1	1	1	0	1	9	6	0	1	
08:05 - 08:10	2	4	3	0	0	0	10	3	3	0	
08:10 - 08:15	2	1	2	0	0	0	16	15	0	2	
08:15 - 08:20	4	5	2	1	0	1	14	8	0	2	
08:20 - 08:25	1	7	6	2	0	0	13	18	1	3	
08:25 - 08:30	6	3	2	1	0	2	17	19	1	3	
08:30 - 08:35	4	6	5	1	0	1	20	14	0	3	
08:35 - 08:40	1	3	2	0	0	1	25	22	0	3	
08:40 - 08:45	3	3	1	1	2	0	18	18	2	4	
08:45 - 08:50	3	5	2	0	2	3	10	3	2	3	
08:50 - 08:55	4	4	0	1	0	2	3	2	0	5	
08:55 - 09:00	7	4	0	1	0	2	1	0	0	2	
09:00 - 09:05	7	5	0	0	0	1	4	0	2	1	
09:05 - 09:10	2	3	1	2	0	0	1	0	1	2	
09:10 - 09:15	4	3	1	0	0	0	1	1	1	4	
09:15 - 09:20	8	2	2	1	0	1	6	1	1	8	
09:20 - 09:25	10	2	3	1	0	0	2	0	0	1	
09:25 - 09:30	3	5	3	2	0	0	7	2	1	0	
09:30 - 09:35	5	4	1	1	0	1	6	3	1	2	
09:35 - 09:40	3	8	1	0	0	1	9	3	0	2	
09:40 - 09:45	4	3	0	0	0	0	0	0	3	0	
09:45 - 09:50	3	5	1	1	0	0	4	1	1	0	
09:50 - 09:55	5	5	1	0	1	1	6	2	2	0	
09:55 - 10:00	5	4	1	2	1	0	4	1	0	2	
10:00 - 10:05	6	7	2	2	1	1	18	14	3	2	
10:05 - 10:10	7	8	3	2	1	2	19	17	3	2	
10:10 - 10:15	5	4	3	0	1	3	17	17	3	4	
10:15 - 10:20	5	4	2	2	1	2	15	19	4	1	
10:20 - 10:25	6	5	3	2	1	0	17	17	4	6	
10:25 - 10:30	7	8	2	1	0	1	23	19	7	0	
10:30 - 10:35	5	3	5	2	1	2	19	20	3	3	
10:35 - 10:40	7	8	3	3	1	3	22	18	5	1	
10:40 - 10:45	1	2	2	2	1	1	18	21	3	2	
10:45 - 10:50	5	5	3	2	1	2	18	19	7	5	
10:50 - 10:55	5	4	1	2	1	2	17	17	3	1	
10:55 - 11:00	6	8	2	1	0	1	20	17	3	2	
11:00 - 11:05	5	4	1	1	1	5	19	14	5	1	
11:05 - 11:10	3	5	6	2	0	5	21	15	4	3	
11:10 - 11:15	5	5	1	0	0	4	17	14	6	2	
11:15 - 11:20	3	7	3	2	0	5	20	14	5	2	
11:20 - 11:25	3	4	2	2	0	2	19	22	3	3	
11:25 - 11:30	7	6	5	1	0	1	17	16	6	7	
11:30 - 11:35	6	4	2	2	3	3	19	15	4	4	
11:35 - 11:40	7	4	2	4	2	3	20	17	3	7	
11:40 - 11:45	9	9	2	4	0	1	20	19	2	7	
11:45 - 11:50	4	7	1	1	0	1	22	16	5	6	
11:50 - 11:55	5	6	6	3	1	2	18	14	5	8	
11:55 - 12:00	9	6	2	2	0	3	15	18	7	10	
12:00 - 12:05	5	4	3	2	1	3	18	14	3	6	
12:05 - 12:10	7	5	2	3	0	2	20	21	2	5	
12:10 - 12:15	9	7	4	2	0	2	14	9	4	3	
12:15 - 12:20	7	3	3	3	0	1	18	5	5	7	
12:20 - 12:25	10	6	6	0	0	1	14	5	3	5	
12:25 - 12:30	2	3	3	1	1	3	16	4	4	4	
12:30 - 12:35	9	3	3	2	0	0	1	6	4	3	
12:35 - 12:40	7	3	1	1	0	0	1	9	5	3	
12:40 - 12:45	5	3	0	0	0	1	11	4	4	3	
12:45 - 12:50	5	3	0	2	1	0	13	5	4	4	
12:50 - 12:55	7	4	1	0	1	1	10	5	5	4	
12:55 - 13:00	7	7	2	1	1	4	9	5	2	1	

Ffordd Fred Keenor / Access to CCFC and P&R junction (Junction 4)

***B4267 Leckwith Road / Brian Clarke Way / CISC junction
(Junction 5)***



Leckwith, Cardiff: Queue Length Survey - Tuesday, 11 June 2019

Produced by Streetwise Services Ltd.

Junction: A - (North) B4267 Leckwith Road / B - Retail Access / C - (South) B4267 Leckwith Road / D - Access Road

Survey Period	A - (North) B4267 Leckwith Road				B - Retail Access			C - (South) B4267 Leckwith Road				D - Access Road	
	Lane 1	Lane 2	Lane 3	Lane 4	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 3	Lane 4	Lane 1	Lane 2
	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX
07:00 - 07:05	0	0	0	0	2	0	2	0	0	1	2	0	0
07:05 - 07:10	0	0	0	1	2	0	3	2	0	1	3	0	0
07:10 - 07:15	0	0	0	0	1	1	1	0	0	1	0	0	1
07:15 - 07:20	0	0	0	0	1	1	2	3	0	1	1	0	0
07:20 - 07:25	1	0	2	0	1	0	2	0	0	0	0	0	0
07:25 - 07:30	3	2	0	0	3	0	2	0	0	0	1	0	0
07:30 - 07:35	0	0	0	0	2	1	2	0	0	0	4	0	0
07:35 - 07:40	0	0	0	0	3	1	1	0	0	0	1	0	0
07:40 - 07:45	1	1	0	0	2	1	3	0	3	0	4	0	0
07:45 - 07:50	0	0	0	0	2	0	3	0	0	0	0	0	0
07:50 - 07:55	0	0	0	0	9	2	3	1	2	0	2	0	0
07:55 - 08:00	0	2	1	0	1	2	3	5	3	3	6	0	0
08:00 - 08:05	0	0	2	0	3	3	2	8	3	0	2	0	1
08:05 - 08:10	0	1	1	0	3	1	3	0	0	1	1	0	0
08:10 - 08:15	0	0	0	0	2	2	5	7	3	0	0	0	0
08:15 - 08:20	0	0	0	1	2	1	3	15	5	1	4	0	0
08:20 - 08:25	0	0	0	0	2	2	2	28	35	3	1	0	1
08:25 - 08:30	7	1	0	0	2	1	2	35	35	0	0	0	1
08:30 - 08:35	0	0	0	0	1	1	3	35	35	2	5	0	0
08:35 - 08:40	0	0	0	0	2	1	2	35	35	2	1	0	1
08:40 - 08:45	2	1	1	1	7	2	4	35	35	2	7	0	0
08:45 - 08:50	3	2	2	0	4	1	8	35	35	6	7	1	1
08:50 - 08:55	1	1	1	0	6	1	6	28	28	4	7	0	1
08:55 - 09:00	3	2	0	0	6	1	5	28	12	3	6	1	1
09:00 - 09:05	2	2	1	0	5	1	5	35	32	3	6	1	1
09:05 - 09:10	2	2	1	0	6	2	4	35	32	3	7	0	0
09:10 - 09:15	5	1	1	1	6	1	6	35	33	6	8	0	1
09:15 - 09:20	5	2	2	1	4	1	3	35	32	11	8	0	2
09:20 - 09:25	6	2	1	0	6	1	6	18	8	9	8	1	1
09:25 - 09:30	2	2	1	0	3	3	8	18	10	9	10	1	0
09:30 - 09:35	5	3	2	1	4	2	6	15	6	5	8	1	1
09:35 - 09:40	2	1	1	1	5	3	5	12	3	9	10	1	1
09:40 - 09:45	3	0	0	0	8	3	4	12	10	7	7	0	1
09:45 - 09:50	2	1	0	0	5	3	5	6	4	4	6	2	0
09:50 - 09:55	4	2	1	0	5	1	4	6	1	4	10	0	1
09:55 - 10:00	4	2	1	1	7	7	9	9	7	11	11	1	0
10:00 - 10:05	3	3	3	2	10	6	11	11	8	7	3	3	3
10:05 - 10:10	4	4	3	1	8	3	12	9	9	8	7	1	2
10:10 - 10:15	3	3	4	2	15	7	12	15	6	7	6	2	1
10:15 - 10:20	2	2	3	3	10	3	15	9	12	8	9	1	2
10:20 - 10:25	3	2	2	0	14	7	15	18	10	6	12	3	3
10:25 - 10:30	3	4	2	2	10	12	15	13	11	5	6	2	1
10:30 - 10:35	4	4	2	2	8	5	15	15	10	5	6	0	3
10:35 - 10:40	3	3	2	2	10	8	9	12	9	5	8	3	3
10:40 - 10:45	3	2	4	0	8	5	12	14	15	5	6	1	2
10:45 - 10:50	3	1	2	2	9	5	10	10	11	8	9	0	3
10:50 - 10:55	4	3	1	1	8	4	13	11	8	8	12	1	2
10:55 - 17:00	2	1	2	2	10	6	9	9	7	5	6	2	4
17:00 - 17:05	3	3	2	0	6	5	9	10	7	6	7	1	3
17:05 - 17:10	2	4	3	0	11	11	10	8	5	4	8	4	4
17:10 - 17:15	5	3	1	1	5	4	8	9	8	5	6	5	4
17:15 - 17:20	3	3	2	2	8	7	13	12	7	6	9	6	7
17:20 - 17:25	4	2	0	3	6	7	12	11	9	9	8	4	7
17:25 - 17:30	11	10	4	3	6	9	15	20	15	10	12	4	2
17:30 - 17:35	5	4	1	2	11	6	15	26	19	7	12	4	1
17:35 - 17:40	6	8	3	1	8	6	15	19	14	8	11	1	1
17:40 - 17:45	8	2	3	0	9	7	12	16	10	10	9	0	0
17:45 - 17:50	11	4	1	0	4	1	6	22	11	4	5	1	1
17:50 - 17:55	11	11	1	2	7	4	11	12	5	12	3	0	2
17:55 - 18:00	5	3	2	1	7	0	12	14	11	4	6	1	1
18:00 - 18:05	6	4	2	1	8	8	10	8	5	4	6	0	0
18:05 - 18:10	8	3	3	0	7	6	13	12	9	7	12	0	2
18:10 - 18:15	11	3	3	0	6	4	11	14	9	6	6	0	0
18:15 - 18:20	11	3	5	0	9	5	10	13	10	2	10	0	1
18:20 - 18:25	4	2	1	0	5	4	10	15	5	3	7	0	1
18:25 - 18:30	8	2	2	0	4	3	11	13	4	4	7	0	0
18:30 - 18:35	11	2	1	1	6	3	11	9	5	5	6	0	0
18:35 - 18:40	10	2	2	3	6	3	8	10	5	3	6	0	0
18:40 - 18:45	11	2	2	5	6	7	12	10	12	4	5	0	0
18:45 - 18:50	7	2	1	3	6	2	11	18	10	4	6	0	1
18:50 - 18:55	10	1	1	3	11	3	12	8	6	2	0	0	0
18:55 - 19:00	10	11	3	1	4	2	8	14	6	3	6	0	0

Leckwith Interchange (Junction 6)



Leckwith, Cardiff: Queue Length Survey - Tuesday, 11 June 2019
 Produced by Streetwise Services Ltd.

Junction: A - (North) B4267 Leckwith Road / B - Hadfield Road / C - A4232 S Slips / D - (South) B4267 Leckwith Road / E - A4232 N Slips

Survey Period	A - (North) B4267 Leckwith Road			B - Hadfield Road		C - A4232 S Slips		D - (South) B4267 Leckwith Road		E - A4232 N Slips			
	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 1	Lane 2	Lane 1	Lane 2	Lane 1	Lane 2	Lane 3	Lane 4
	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX
07:00 - 07:05	9	5	3	3	2	2	3	7	7	1	4	11	5
07:05 - 07:10	6	7	4	2	2	1	1	7	7	2	4	7	1
07:10 - 07:15	5	4	4	5	3	1	6	14	6	1	3	9	2
07:15 - 07:20	3	6	4	5	2	2	4	8	7	0	3	13	3
07:20 - 07:25	6	2	6	5	2	2	3	15	11	3	4	8	3
07:25 - 07:30	4	6	3	4	2	2	3	15	7	3	4	10	1
07:30 - 07:35	10	6	6	6	3	2	3	11	6	2	3	8	4
07:35 - 07:40	12	9	6	7	4	2	5	13	5	2	4	15	4
07:40 - 07:45	9	12	6	5	2	4	4	13	9	1	5	6	2
07:45 - 07:50	8	11	5	4	5	2	4	9	9	2	8	11	2
07:50 - 07:55	15	11	6	2	3	1	2	15	8	2	9	13	3
07:55 - 08:00	8	12	4	7	2	4	5	6	7	1	3	10	3
08:00 - 08:05	6	9	7	3	2	2	3	29	8	2	8	13	2
08:05 - 08:10	13	6	4	5	3	4	4	18	9	1	10	14	1
08:10 - 08:15	9	9	4	7	3	3	2	8	5	1	9	11	1
08:15 - 08:20	11	8	7	7	5	2	6	8	9	1	7	19	2
08:20 - 08:25	12	6	3	4	6	1	6	9	9	3	9	9	2
08:25 - 08:30	9	8	5	3	3	3	3	8	6	2	9	9	2
08:30 - 08:35	8	10	7	7	6	3	4	10	9	1	4	9	4
08:35 - 08:40	8	11	7	4	3	3	3	9	9	0	0	6	8
08:40 - 08:45	9	8	4	6	2	1	3	8	7	0	1	6	4
08:45 - 08:50	8	8	5	8	3	1	3	5	7	1	1	8	5
08:50 - 08:55	11	8	1	5	3	2	4	10	9	1	3	12	4
08:55 - 09:00	8	7	1	7	3	2	2	11	5	0	2	6	14
09:00 - 09:05	9	6	5	7	4	4	6	2	2	2	2	10	7
09:05 - 09:10	8	7	8	6	3	1	2	32	9	0	2	8	3
09:10 - 09:15	4	10	3	7	2	1	3	12	9	0	7	9	7
09:15 - 09:20	7	7	3	6	3	1	3	12	9	2	7	10	4
09:20 - 09:25	11	5	4	6	4	1	6	9	7	1	3	8	7
09:25 - 09:30	10	7	3	8	5	1	2	8	6	1	4	8	3
09:30 - 09:35	11	3	3	13	8	3	7	7	9	2	5	3	2
09:35 - 09:40	9	4	3	4	4	2	3	5	4	1	4	4	1
09:40 - 09:45	9	9	4	7	10	2	3	6	3	5	2	12	1
09:45 - 09:50	7	7	5	5	6	0	4	10	5	2	3	8	1
09:50 - 09:55	9	7	1	4	3	3	5	11	6	1	5	8	1
09:55 - 10:00	11	5	3	8	8	2	4	7	6	2	5	8	1
16:00 - 16:05	9	10	12	15	10	8	6	18	6	1	7	3	4
16:05 - 16:10	10	8	9	28	12	7	18	13	1	1	3	4	7
16:10 - 16:15	8	7	6	28	11	11	19	14	2	1	1	2	3
16:15 - 16:20	5	14	10	14	6	11	7	12	3	3	3	3	3
16:20 - 16:25	11	12	8	12	5	9	7	13	4	2	2	7	4
16:25 - 16:30	8	16	7	14	7	5	12	16	4	2	2	2	5
16:30 - 16:35	12	12	12	14	11	9	8	16	4	2	3	7	4
16:35 - 16:40	11	15	4	31	9	11	12	9	5	0	3	6	2
16:40 - 16:45	9	14	9	27	10	12	10	18	5	3	4	7	1
16:45 - 16:50	7	9	8	7	4	11	10	8	5	0	2	5	4
16:50 - 16:55	6	8	5	5	3	9	3	11	2	1	3	11	8
16:55 - 17:00	6	12	8	8	4	9	7	7	6	1	2	3	1
17:00 - 17:05	8	10	7	11	10	8	4	10	3	0	2	3	6
17:05 - 17:10	9	6	9	25	14	8	7	8	2	1	3	12	9
17:10 - 17:15	8	7	13	28	14	5	6	10	7	1	2	4	2
17:15 - 17:20	9	10	11	31	11	6	7	11	3	1	3	3	4
17:20 - 17:25	9	20	8	27	14	3	6	3	2	1	2	3	4
17:25 - 17:30	5	8	5	15	10	7	6	8	4	1	4	10	7
17:30 - 17:35	10	12	7	9	3	5	5	13	3	6	7	8	4
17:35 - 17:40	8	15	10	6	7	9	6	7	1	3	6	3	5
17:40 - 17:45	9	10	8	7	8	10	7	6	3	5	6	7	5
17:45 - 17:50	6	11	4	9	4	6	5	6	2	3	4	5	4
17:50 - 17:55	8	13	9	8	6	6	6	7	1	3	2	5	8
17:55 - 18:00	8	8	6	5	4	4	3	4	2	2	3	3	3
18:00 - 18:05	8	11	10	12	12	8	4	3	3	0	2	3	3
18:05 - 18:10	6	11	10	10	7	8	5	2	4	1	5	2	3
18:10 - 18:15	7	10	8	6	5	4	3	4	6	3	4	4	3
18:15 - 18:20	6	12	6	6	4	4	4	9	2	3	4	5	1
18:20 - 18:25	11	12	13	5	3	7	2	8	6	2	3	4	4
18:25 - 18:30	5	11	6	6	2	2	5	8	6	2	4	2	3
18:30 - 18:35	5	14	6	7	2	4	4	8	5	3	3	7	3
18:35 - 18:40	6	5	6	4	2	3	7	3	1	6	2	3	2
18:40 - 18:45	6	13	9	4	2	3	6	10	3	3	2	3	2
18:45 - 18:50	3	5	5	5	2	3	2	10	3	5	4	2	2
18:50 - 18:55	4	8	4	3	3	3	4	1	2	3	2	3	1
18:55 - 19:00	14	2	3	9	3	2	3	4	3	2	3	4	2

***B4267 Leckwith Road / Access to Industrial Uses and Ely Trail
junction (Junction 7)***



Leckwith, Cardiff - Manual Traffic Survey: Tuesday, 11 June 2019

Produced by Streetwise Ltd

Junction: A - North B4207 Leckwith Road / B - South B4207 Leckwith Road / C - Azzam Road

Approach: B - South B4207 Leckwith Road

Table with 20 columns: TIME, CAR, LGV, OGV1, OGV2, BUS, MICYCLE, PICYCLE, PCU, TOTAL, CAR, LGV, OGV1, OGV2, BUS, MICYCLE, PICYCLE, PCU, TOTAL, CAR, LGV, OGV1, OGV2, BUS, MICYCLE, PICYCLE, PCU, TOTAL. Rows include time intervals from 07:00-07:15 to 18:45-19:00 and a Session Total row.

Table with 20 columns: TIME, CAR, LGV, OGV1, OGV2, BUS, MICYCLE, PICYCLE, PCU, TOTAL, CAR, LGV, OGV1, OGV2, BUS, MICYCLE, PICYCLE, PCU, TOTAL, CAR, LGV, OGV1, OGV2, BUS, MICYCLE, PICYCLE, PCU, TOTAL. Rows include time intervals from 07:00-07:15 to 18:45-19:00 and a Session Total row.

B4267 Leckwith Road / Pen-y-Turnpike Road junction (Junction 8)



Leckwith, Cardiff: Queue Length Survey - Thursday, 20 June 2019

Produced by Transport Services Ltd

Junction: A - (East) B4207 Leckwith Road / B - (West) B4207 Leckwith Road

Approach: B - Post V Turpin Road

Table with columns for TIME, CAR, LGV, OGV1, OGV2, BUS, MICYCLE, PCYCLE, PCU, TOTAL, CAR, LGV, OGV1, OGV2, BUS, MICYCLE, PCYCLE, PCU, TOTAL. It contains data for various time intervals from 07:00 to 18:00, including session totals.

Table with columns for TIME, CAR, LGV, OGV1, OGV2, BUS, MICYCLE, PCYCLE, PCU, TOTAL, CAR, LGV, OGV1, OGV2, BUS, MICYCLE, PCYCLE, PCU, TOTAL. It contains data for various time intervals from 07:00 to 18:00, including session totals.



Leckwith, Cardiff: Queue Length Survey - Thursday, 20 June 2019

Produced by Transport Services Ltd

Junction: A - (East) B4207 Leckwith Road / B - Post Tumpole Road / C - (West) B4207 Leckwith Road

Approach: C - (West) B4207 Leckwith Road

Table with columns for TIME, CAR, LGV, OGV1, OGV2, BUS, MCVLE, PCVLE, PCU, TOTAL, and sub-columns for C10A, C10B, C10C. Rows include time intervals from 07:00-07:15 to 18:45-19:00 and a Session Total row.

Table with columns for TIME, CAR, LGV, OGV1, OGV2, BUS, MCVLE, PCVLE, PCU, TOTAL, and sub-columns for F10A, F10B, F10C, T10A, T10B, T10C. Rows include time intervals from 07:00-07:15 to 18:45-19:00 and a Session Total row.



Leckwith, Cardiff: Queue Length Survey - Thursday, 20 June 2019

Produced by Streetwise Services Ltd.

Junction: A - (East) B4267 Leckwith Road / B - Pen Y Turnpie Road / C - (West) B4267 Leckwith Road

Survey Period	A - (East) B4267 Leckwith			B - Pen Y Turnpie Road		C - (West) B4267 Leckwith Road	
	Lane 1	Lane 1	Lane 2	Lane 1	Lane 2	Lane 1	Lane 2
	MAX	MAX	MAX	MAX	MAX	MAX	MAX
07:00 - 07:05	0	8	1	0	0	1	1
07:05 - 07:10	0	6	0	0	0	0	0
07:10 - 07:15	0	8	1	0	0	0	1
07:15 - 07:20	0	14	1	0	0	1	1
07:20 - 07:25	0	21	1	0	0	2	2
07:25 - 07:30	1	21	1	0	0	1	1
07:30 - 07:35	0	10	1	0	0	1	1
07:35 - 07:40	0	14	1	0	0	1	1
07:40 - 07:45	0	9	1	0	0	1	1
07:45 - 07:50	0	18	1	0	0	1	1
07:50 - 07:55	0	14	1	0	0	1	1
07:55 - 08:00	0	12	1	0	0	1	1
08:00 - 08:05	0	9	1	0	0	1	1
08:05 - 08:10	1	13	1	0	0	1	1
08:10 - 08:15	0	18	1	0	0	3	3
08:15 - 08:20	0	17	1	0	0	3	3
08:20 - 08:25	0	19	1	0	0	2	2
08:25 - 08:30	0	13	1	0	0	1	1
08:30 - 08:35	0	13	1	0	0	0	0
08:35 - 08:40	0	13	1	0	0	2	2
08:40 - 08:45	0	4	1	0	0	1	1
08:45 - 08:50	1	6	1	0	0	1	1
08:50 - 08:55	0	5	1	0	0	1	1
08:55 - 09:00	0	8	1	0	0	1	1
09:00 - 09:05	0	3	1	0	0	1	1
09:05 - 09:10	0	9	1	0	0	1	1
09:10 - 09:15	1	4	1	0	0	1	1
09:15 - 09:20	0	9	1	0	0	1	1
09:20 - 09:25	0	3	1	0	0	1	1
09:25 - 09:30	0	8	1	0	0	1	1
09:30 - 09:35	0	2	1	0	0	2	2
09:35 - 09:40	1	8	1	0	0	1	1
09:40 - 09:45	0	8	1	0	0	1	1
09:45 - 09:50	0	3	1	0	0	2	2
09:50 - 09:55	1	9	1	0	0	3	3
09:55 - 10:00	0	5	1	0	0	2	2
10:00 - 10:05	1	1	0	0	0	6	6
10:05 - 10:10	1	1	0	0	0	10	10
10:10 - 10:15	1	3	1	0	0	5	5
10:15 - 10:20	1	5	1	0	0	7	7
10:20 - 10:25	1	4	0	0	0	14	14
10:25 - 10:30	1	3	1	0	0	8	8
10:30 - 10:35	1	2	0	0	0	4	4
10:35 - 10:40	1	4	1	0	0	15	15
10:40 - 10:45	1	3	1	0	0	16	16
10:45 - 10:50	1	2	1	0	0	15	15
10:50 - 10:55	1	4	0	0	0	17	17
10:55 - 11:00	1	1	0	0	0	16	16
11:00 - 11:05	2	0	0	0	0	18	18
11:05 - 11:10	1	2	0	0	0	16	16
11:10 - 11:15	1	9	1	0	0	18	18
11:15 - 11:20	1	1	1	0	0	19	19
11:20 - 11:25	1	3	1	0	0	6	6
11:25 - 11:30	2	2	1	0	0	15	15
11:30 - 11:35	1	3	0	0	0	17	17
11:35 - 11:40	2	3	1	0	0	10	10
11:40 - 11:45	1	1	0	0	0	16	16
11:45 - 11:50	2	2	1	0	0	10	10
11:50 - 11:55	1	4	1	0	0	10	10
11:55 - 12:00	1	1	1	0	0	5	5
12:00 - 12:05	1	2	1	0	0	3	3
12:05 - 12:10	1	1	1	0	0	9	9
12:10 - 12:15	1	1	1	0	0	8	8
12:15 - 12:20	1	2	0	0	0	2	2
12:20 - 12:25	1	2	0	0	0	2	2
12:25 - 12:30	1	2	1	0	0	2	2
12:30 - 12:35	1	1	0	0	0	3	3
12:35 - 12:40	1	3	0	0	0	2	2
12:40 - 12:45	1	0	0	0	0	1	1
12:45 - 12:50	1	1	1	0	0	1	1
12:50 - 12:55	0	0	0	0	0	1	1
12:55 - 13:00	1	0	0	0	0	1	1

Leckwith Quays, Cardiff

B4267 Leckwith Road / UHL junction (Junction 9)



Leckwith, Cardiff - Manual Traffic Survey: Tuesday, 11 June 2019

Produced by Streetwise Traffic Ltd

Junction: A - North Park Road / B - South Park Road / C - Hospital Access

Approach: A - North Park Road

Table with columns for TIME, CAR, LOV, OGV1, OGV2, BUS, MICYCLE, PICYCLE, PCU, TOTAL, and sub-columns for A1A, A1B, A1C, A1D, A1E, A1F, A1G, A1H, A1I, A1J, A1K, A1L, A1M, A1N, A1O, A1P, A1Q, A1R, A1S, A1T, A1U, A1V, A1W, A1X, A1Y, A1Z.

Table with columns for TIME, CAR, LOV, OGV1, OGV2, BUS, MICYCLE, PICYCLE, PCU, TOTAL, and sub-columns for B1A, B1B, B1C, B1D, B1E, B1F, B1G, B1H, B1I, B1J, B1K, B1L, B1M, B1N, B1O, B1P, B1Q, B1R, B1S, B1T, B1U, B1V, B1W, B1X, B1Y, B1Z.



Leckwith, Cardiff - Manual Traffic Survey: Tuesday, 11 June 2019

Produced by Transport Services Ltd

Junction: A - North Park Road / B - South Park Road / C - Hospital Access

Approach: B - South Park Road

Table with 24 columns: TIME, CAR, LOV, OGV1, OGV2, BUS, MICYCLE, PCYCLE, PCU, TOTAL, CAR, LOV, OGV1, OGV2, BUS, MICYCLE, PCYCLE, PCU, TOTAL, CAR, LOV, OGV1, OGV2, BUS, MICYCLE, PCYCLE, PCU, TOTAL. Rows include time intervals from 07:00-07:15 to 18:45-19:00 and a Session Total row.

Table with 24 columns: TIME, CAR, LOV, OGV1, OGV2, BUS, MICYCLE, PCYCLE, PCU, TOTAL, CAR, LOV, OGV1, OGV2, BUS, MICYCLE, PCYCLE, PCU, TOTAL, CAR, LOV, OGV1, OGV2, BUS, MICYCLE, PCYCLE, PCU, TOTAL. Rows include time intervals from 07:00-07:15 to 18:45-19:00 and a Session Total row.



Leckwith, Cardiff: Queue Length Survey - Tuesday, 11 June 2019
 Produced by Streetwise Services Ltd.

Junction: A - (North) Penlan Road / B - (South) Penlan Road / C - Hospital Access

Survey Period	A - (North) Penlan Road		B - (South) Penlan Road / C - Hospital Access	
	Lane 1	Lane 2	Lane 1	Lane 1
	MAX	MAX	MAX	MAX
07:00 - 07:05	2	3	10	2
07:05 - 07:10	1	3	7	2
07:10 - 07:15	4	3	9	3
07:15 - 07:20	1	6	7	5
07:20 - 07:25	2	6	11	5
07:25 - 07:30	7	8	17	19
07:30 - 07:35	11	7	25	34
07:35 - 07:40	8	7	38	12
07:40 - 07:45	7	7	38	6
07:45 - 07:50	9	7	17	4
07:50 - 07:55	9	7	23	4
07:55 - 08:00	15	7	20	3
08:00 - 08:05	4	7	27	6
08:05 - 08:10	8	7	25	2
08:10 - 08:15	15	7	38	5
08:15 - 08:20	6	7	37	2
08:20 - 08:25	17	7	45	7
08:25 - 08:30	9	7	45	5
08:30 - 08:35	9	7	45	7
08:35 - 08:40	10	7	36	7
08:40 - 08:45	4	6	36	7
08:45 - 08:50	5	7	22	5
08:50 - 08:55	7	4	21	5
08:55 - 09:00	4	7	25	3
09:00 - 09:05	10	4	12	7
09:05 - 09:10	3	5	21	3
09:10 - 09:15	2	2	11	3
09:15 - 09:20	3	4	11	6
09:20 - 09:25	4	4	10	4
09:25 - 09:30	1	3	12	6
09:30 - 09:35	1	5	8	6
09:35 - 09:40	3	5	10	6
09:40 - 09:45	2	3	5	6
09:45 - 09:50	3	6	8	12
09:50 - 09:55	3	3	14	6
09:55 - 10:00	4	5	13	9
10:00 - 10:05	3	3	18	32
10:05 - 10:10	3	1	11	33
10:10 - 10:15	4	2	9	31
10:15 - 10:20	5	1	8	25
10:20 - 10:25	11	1	6	10
10:25 - 10:30	13	1	4	21
10:30 - 10:35	9	2	14	13
10:35 - 10:40	9	1	12	34
10:40 - 10:45	14	2	8	33
10:45 - 10:50	3	2	9	20
10:50 - 10:55	7	1	9	11
10:55 - 11:00	6	1	12	17
11:00 - 11:05	4	1	6	20
11:05 - 11:10	13	2	11	23
11:10 - 11:15	12	2	9	32
11:15 - 11:20	9	4	9	16
11:20 - 11:25	10	3	8	28
11:25 - 11:30	7	0	5	8
11:30 - 11:35	5	2	6	7
11:35 - 11:40	4	2	3	8
11:40 - 11:45	9	1	12	14
11:45 - 11:50	3	2	5	16
11:50 - 11:55	3	2	9	13
11:55 - 12:00	5	2	7	4
12:00 - 12:05	2	2	5	3
12:05 - 12:10	5	2	7	7
12:10 - 12:15	3	1	4	5
12:15 - 12:20	6	2	7	4
12:20 - 12:25	4	1	5	4
12:25 - 12:30	2	1	2	3
12:30 - 12:35	4	2	6	4
12:35 - 12:40	2	1	3	4
12:40 - 12:45	2	2	5	2
12:45 - 12:50	6	3	4	4
12:50 - 12:55	2	1	4	3
12:55 - 13:00	1	1	2	3

Leckwith Quays, Cardiff

Merrie Harrier (Junction 10)



Leckwith, Cardiff: Queue Length Survey - Tuesday, 11 June 2019
 Produced by Streetwise Services Ltd.

Junction: A - B4267 Penlan Road / B - A4055 Barry Road / C - Andrew Road / D - B4267 Redlands Road / E - A4055 Cardiff Road / F - Corbett Road

Survey Period	A - B4267 Penlan Road		B - A4055 Barry Road		C - Andrew Road		D - B4267 Redlands Road		E - A4055 Cardiff Road		F - Corbett Road
	Lane 1	Lane 2	Lane 1	Lane 2	Lane 1	Lane 2	Lane 1	Lane 2	Lane 1	Lane 2	Lane 1
	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX
07:00 - 07:05	4	1	10	5	0	2	10	16	1	0	
07:05 - 07:10	2	1	11	4	0	8	8	10	2	0	
07:10 - 07:15	4	3	9	3	0	7	22	23	1	0	
07:15 - 07:20	5	1	9	2	0	12	26	37	1	0	
07:20 - 07:25	5	2	4	4	0	8	22	128	1	0	
07:25 - 07:30	4	4	12	4	0	11	32	125	2	0	
07:30 - 07:35	8	6	4	3	0	18	43	75	2	0	
07:35 - 07:40	11	8	14	8	0	18	49	72	2	1	
07:40 - 07:45	7	2	15	3	0	14	85	68	1	0	
07:45 - 07:50	5	4	14	5	0	18	93	65	1	0	
07:50 - 07:55	12	5	12	5	0	14	93	132	4	0	
07:55 - 08:00	12	5	16	7	0	16	93	68	2	0	
08:00 - 08:05	16	4	15	7	1	14	93	63	4	1	
08:05 - 08:10	12	3	16	8	0	18	93	117	1	0	
08:10 - 08:15	14	2	13	11	0	18	93	124	1	0	
08:15 - 08:20	10	1	17	14	0	18	93	119	1	0	
08:20 - 08:25	11	1	10	16	0	18	93	128	3	1	
08:25 - 08:30	10	1	16	13	0	18	93	121	4	1	
08:30 - 08:35	5	2	12	6	0	16	93	123	2	0	
08:35 - 08:40	5	2	8	7	0	18	93	126	2	0	
08:40 - 08:45	7	3	10	9	0	19	93	122	1	0	
08:45 - 08:50	8	1	15	11	0	18	33	125	5	0	
08:50 - 08:55	12	3	8	11	0	18	23	119	5	0	
08:55 - 09:00	8	4	12	5	0	15	16	125	4	0	
09:00 - 09:05	11	4	10	9	0	17	36	124	1	1	
09:05 - 09:10	9	3	4	3	0	18	40	125	5	0	
09:10 - 09:15	9	3	9	3	0	18	33	128	3	0	
09:15 - 09:20	10	1	12	5	0	16	34	120	3	0	
09:20 - 09:25	11	4	13	6	0	12	12	119	4	0	
09:25 - 09:30	4	3	3	4	0	7	18	128	3	0	
09:30 - 09:35	4	3	12	6	0	8	11	119	4	0	
09:35 - 09:40	9	4	10	5	0	7	12	123	1	0	
09:40 - 09:45	12	6	9	7	0	10	15	118	1	0	
09:45 - 09:50	9	3	7	8	0	18	18	124	3	1	
09:50 - 09:55	8	3	13	7	0	10	15	119	1	0	
09:55 - 10:00	7	3	7	3	0	6	13	69	2	0	
16:00 - 16:05	33	4	12	2	0	17	32	22	2	0	
16:05 - 16:10	28	4	30	5	0	17	54	29	2	1	
16:10 - 16:15	17	5	30	3	0	12	49	43	5	0	
16:15 - 16:20	14	9	30	5	0	10	42	23	5	0	
16:20 - 16:25	15	4	10	5	0	11	31	19	2	0	
16:25 - 16:30	27	6	21	6	2	8	15	27	2	0	
16:30 - 16:35	23	5	30	4	0	11	8	21	3	0	
16:35 - 16:40	9	7	30	7	0	9	25	21	5	0	
16:40 - 16:45	35	7	23	4	0	6	15	25	1	0	
16:45 - 16:50	32	5	30	3	0	6	15	26	9	1	
16:50 - 16:55	22	5	21	2	0	11	20	21	3	0	
16:55 - 17:00	25	2	19	5	0	10	13	28	3	0	
17:00 - 17:05	25	5	23	5	0	12	8	15	7	0	
17:05 - 17:10	15	7	22	6	0	6	9	11	2	0	
17:10 - 17:15	22	6	24	3	0	10	10	10	2	0	
17:15 - 17:20	19	7	19	2	0	9	10	23	1	0	
17:20 - 17:25	32	5	30	7	0	8	14	34	1	0	
17:25 - 17:30	30	4	30	6	0	4	12	20	4	0	
17:30 - 17:35	24	5	12	2	0	7	17	13	2	0	
17:35 - 17:40	13	3	30	6	0	8	8	13	3	0	
17:40 - 17:45	21	9	26	3	0	10	10	19	5	0	
17:45 - 17:50	14	11	30	4	0	6	7	7	3	0	
17:50 - 17:55	16	3	20	5	0	10	13	22	3	0	
17:55 - 18:00	7	2	30	6	0	4	10	20	3	0	
18:00 - 18:05	6	3	18	3	0	8	11	26	3	0	
18:05 - 18:10	13	2	10	5	0	6	12	10	1	0	
18:10 - 18:15	5	3	18	6	0	6	8	14	3	0	
18:15 - 18:20	9	1	19	6	0	7	11	14	5	0	
18:20 - 18:25	9	7	18	4	0	12	7	31	2	0	
18:25 - 18:30	8	3	12	5	0	5	8	24	3	0	
18:30 - 18:35	7	3	19	4	0	8	7	9	3	0	
18:35 - 18:40	6	2	10	9	0	7	6	17	6	0	
18:40 - 18:45	7	2	15	5	0	9	10	13	3	0	
18:45 - 18:50	5	1	18	7	0	3	12	10	3	0	
18:50 - 18:55	7	2	12	2	0	10	12	17	5	1	
18:55 - 19:00	4	2	19	5	0	5	7	6	5	1	

Barons Court (Junction 11)



Lockwith, Cardiff - Manual Traffic Survey: Tuesday, 11 June 2019
 Produced by Business Systems Ltd

Approach: A - A140 Penarth Road / B - A955 / C - A4140 Cogan Hill / D - A955 Bury Road
 Junction: B - A955

Time	East										West									
	Car	Lev	OVN	OVN	Bus	Motor	PCDLA	PCDLA	PCDLA	TOTAL	Car	Lev	OVN	OVN	Bus	Motor	PCDLA	PCDLA	PCDLA	TOTAL
07:00-07:15	48	7	1	0	0	1	0	0	0	56	10	7	0	0	0	0	0	0	0	17
07:15-07:30	45	3	1	0	0	0	0	0	49	10	4	0	0	0	0	0	0	0	14	
07:30-07:45	45	2	0	0	1	0	0	0	48	10	2	0	0	0	0	0	0	0	12	
07:45-08:00	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
08:00-08:15	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
08:15-08:30	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
08:30-08:45	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
08:45-09:00	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
09:00-09:15	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
09:15-09:30	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
09:30-09:45	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
09:45-10:00	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
10:00-10:15	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
10:15-10:30	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
10:30-10:45	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
10:45-11:00	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
11:00-11:15	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
11:15-11:30	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
11:30-11:45	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
11:45-12:00	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
12:00-12:15	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
12:15-12:30	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
12:30-12:45	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
12:45-13:00	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
13:00-13:15	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
13:15-13:30	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
13:30-13:45	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
13:45-14:00	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
14:00-14:15	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
14:15-14:30	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
14:30-14:45	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
14:45-15:00	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
15:00-15:15	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
15:15-15:30	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
15:30-15:45	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
15:45-16:00	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
16:00-16:15	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
16:15-16:30	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
16:30-16:45	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
16:45-17:00	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
17:00-17:15	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
17:15-17:30	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
17:30-17:45	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
17:45-18:00	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
18:00-18:15	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
18:15-18:30	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
18:30-18:45	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
18:45-19:00	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
19:00-19:15	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
19:15-19:30	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
19:30-19:45	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
19:45-20:00	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
20:00-20:15	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
20:15-20:30	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
20:30-20:45	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
20:45-21:00	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
21:00-21:15	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
21:15-21:30	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
21:30-21:45	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
21:45-22:00	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
22:00-22:15	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
22:15-22:30	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
22:30-22:45	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
22:45-23:00	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
23:00-23:15	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
23:15-23:30	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
23:30-23:45	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	
23:45-00:00	45	2	0	0	0	0	0	0	47	10	1	0	0	0	0	0	0	0	11	

Time	East										West									
	Car	Lev	OVN	OVN	Bus	Motor	PCDLA	PCDLA	PCDLA	TOTAL	Car	Lev	OVN	OVN	Bus	Motor	PCDLA	PCDLA	PCDLA	TOTAL
07:00-07:15	120	20	0	0	0	1	0	0	141	140	10	0	0	0	0	0	0	0	150	
07:15-07:30	120	20	0	0	0	1	0	0	141	140	10	0	0	0	0	0	0	0	150	
07:30-07:45	120	20	0	0	0	1	0	0	141	140	10	0	0	0	0	0	0	0	150	
07:45-08:00	120	20	0	0	0	1	0	0	141	140	10	0	0	0	0	0	0	0	150	
08:00-08:15	120	20	0	0	0	1														



Leckwith, Cardiff: Queue Length Survey - Tuesday, 11 June 2019
Produced by Streetwise Services Ltd.

Junction: A - A4160 Penarth Road / B - A4055 / C - AA4160 Cogan Hill / D - A4055 Barry Road

Survey Period	A - A4160 Penarth Road			B - A4055				C - AA4160 Cogan Hill			D - A4055 Barry Road				
	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 3	Lane 4	Lane 1	Lane 2	Lane 3	Lane 4	Lane 1	Lane 2	Lane 3	Lane 4
	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX
07:00 - 07:05	0	5	3	0	11	2	3	0	3	10	5	0	22	23	5
07:05 - 07:10	0	5	4	0	10	3	1	0	2	12	5	0	18	18	1
07:10 - 07:15	0	6	5	0	13	3	4	0	2	8	4	0	22	23	3
07:15 - 07:20	0	6	5	1	10	2	3	0	2	10	5	0	20	23	3
07:20 - 07:25	0	5	3	0	18	2	4	0	4	11	6	0	48	48	2
07:25 - 07:30	4	2	3	3	14	2	2	0	11	18	5	0	42	40	1
07:30 - 07:35	0	5	9	2	13	3	3	0	4	21	4	0	36	36	6
07:35 - 07:40	0	8	9	4	16	4	3	0	12	16	5	0	62	57	0
07:40 - 07:45	0	6	5	2	15	1	6	0	10	17	6	0	62	37	2
07:45 - 07:50	0	9	7	9	20	5	5	0	13	16	5	0	62	62	0
07:50 - 07:55	0	10	11	9	25	4	5	0	8	18	6	0	62	61	5
07:55 - 08:00	0	5	13	9	43	4	2	0	13	19	4	0	62	62	1
08:00 - 08:05	4	6	9	11	55	3	2	1	15	17	6	0	60	56	4
08:05 - 08:10	4	11	11	11	36	5	9	3	10	16	5	0	58	56	5
08:10 - 08:15	0	11	11	15	45	4	5	1	13	15	4	0	39	36	3
08:15 - 08:20	0	5	12	14	52	1	2	3	15	16	5	0	38	37	2
08:20 - 08:25	4	13	7	10	45	1	3	0	13	16	4	0	36	36	2
08:25 - 08:30	0	9	8	6	38	4	2	3	11	16	6	0	40	36	4
08:30 - 08:35	0	9	8	10	33	4	4	0	14	19	6	0	39	38	3
08:35 - 08:40	0	16	5	13	42	3	4	0	12	16	6	0	36	36	1
08:40 - 08:45	4	8	7	4	34	3	4	0	11	16	4	0	57	57	3
08:45 - 08:50	0	9	8	11	25	5	1	0	10	17	6	0	52	48	1
08:50 - 08:55	0	12	4	4	23	2	3	0	13	15	6	0	57	57	2
08:55 - 09:00	4	5	15	3	28	3	6	0	11	16	5	0	52	48	5
09:00 - 09:05	6	10	13	10	25	1	4	0	10	16	5	0	58	56	4
09:05 - 09:10	6	9	2	2	23	1	2	0	8	16	6	0	62	56	4
09:10 - 09:15	4	12	6	6	28	1	3	0	15	16	6	0	62	62	2
09:15 - 09:20	0	12	7	6	24	2	1	0	9	16	6	0	62	62	0
09:20 - 09:25	0	11	5	5	21	3	4	0	7	22	5	0	62	62	3
09:25 - 09:30	0	6	6	12	13	2	6	0	6	9	5	0	62	62	2
09:30 - 09:35	3	8	5	2	16	2	4	0	5	10	4	0	62	62	3
09:35 - 09:40	0	5	2	3	14	2	4	0	9	16	6	0	62	62	6
09:40 - 09:45	0	10	6	7	15	2	3	1	10	12	5	0	58	56	5
09:45 - 09:50	2	6	9	2	4	4	4	0	22	11	5	0	36	36	7
09:50 - 09:55	6	11	4	4	12	3	3	0	12	13	5	0	38	13	4
09:55 - 10:00	0	4	5	4	12	2	5	0	6	14	5	0	36	18	4
16:00 - 16:05	6	14	9	12	36	3	4	0	15	17	4	0	22	19	7
16:05 - 16:10	0	16	10	17	39	3	4	1	12	19	5	0	20	19	14
16:10 - 16:15	0	16	10	15	45	3	7	0	13	20	6	0	17	16	3
16:15 - 16:20	0	20	14	14	49	4	1	0	9	20	5	0	21	16	6
16:20 - 16:25	0	23	7	18	46	3	5	0	12	17	6	0	23	18	6
16:25 - 16:30	0	9	10	36	50	5	3	0	11	19	6	0	18	16	9
16:30 - 16:35	0	11	13	42	46	3	4	0	6	18	5	0	13	9	6
16:35 - 16:40	0	15	12	11	58	1	5	1	10	12	6	0	21	13	5
16:40 - 16:45	0	11	16	29	55	2	5	0	15	15	4	0	23	18	8
16:45 - 16:50	0	17	13	24	52	4	2	0	12	15	4	0	21	17	8
16:50 - 16:55	0	13	12	65	54	0	5	0	12	14	4	0	23	14	14
16:55 - 17:00	0	14	14	68	70	1	4	0	7	16	5	0	14	13	8
17:00 - 17:05	0	12	24	72	74	2	3	0	13	11	6	0	17	10	8
17:05 - 17:10	0	13	22	70	72	2	4	0	12	20	5	0	20	17	4
17:10 - 17:15	0	19	11	71	73	3	1	0	11	21	5	0	18	12	0
17:15 - 17:20	0	19	13	62	52	3	6	0	9	18	5	0	14	11	4
17:20 - 17:25	0	18	17	65	58	5	3	0	16	21	5	0	21	14	5
17:25 - 17:30	3	11	23	54	56	4	4	0	14	16	3	0	22	15	7
17:30 - 17:35	0	15	14	52	58	2	1	4	7	17	5	0	15	13	2
17:35 - 17:40	0	15	17	62	60	4	1	0	16	20	5	0	23	21	4
17:40 - 17:45	0	12	17	70	68	4	3	3	15	15	2	0	12	9	6
17:45 - 17:50	0	12	16	72	73	5	1	4	11	15	4	0	16	11	6
17:50 - 17:55	0	12	14	71	67	3	2	4	17	17	5	0	14	8	6
17:55 - 18:00	0	19	13	70	65	2	1	0	10	9	4	0	14	10	10
18:00 - 18:05	0	16	15	48	50	2	2	0	11	11	5	0	11	7	2
18:05 - 18:10	0	16	15	18	35	3	2	4	5	23	6	0	13	13	7
18:10 - 18:15	0	16	14	28	39	3	3	0	12	24	5	0	14	14	6
18:15 - 18:20	0	12	9	29	26	3	3	0	16	10	6	0	11	8	4
18:20 - 18:25	0	15	9	11	32	4	2	0	18	17	6	0	9	9	5
18:25 - 18:30	0	11	14	11	27	2	2	0	14	6	6	0	11	8	5
18:30 - 18:35	0	4	11	17	28	4	1	0	12	10	5	0	10	6	5
18:35 - 18:40	0	10	7	12	40	3	5	0	13	11	5	0	6	3	6
18:40 - 18:45	0	7	4	15	23	4	3	0	12	7	5	0	11	8	8
18:45 - 18:50	0	5	8	23	25	4	2	5	11	9	6	0	15	6	8
18:50 - 18:55	0	10	5	15	26	2	0	0	10	5	5	0	9	4	7
18:55 - 19:00	0	7	6	4	16	4	0	0	7	9	5	0	14	11	4

Derivation of Peak Hours

Traffic Data Analysis

Derivation of Peak Hours

15-Minute Intervals

Time		Junction										Total
		J1	J3	J4	J5	J6	J7	J8	J9	J10	J11	
AM	07:00-07:15	467	346	8	413	680	279	275	171	461	670	3,770
	07:15-07:30	570	419	11	500	812	354	400	228	572	829	4,695
	07:30-07:45	733	488	19	574	962	433	415	348	664	924	5,560
	07:45-08:00	707	545	20	624	984	406	438	322	669	980	5,695
	08:00-08:15	775	485	18	607	982	408	410	324	660	1,039	5,708
	08:15-08:30	792	450	24	520	973	357	364	313	638	1,023	5,454
	08:30-08:45	730	496	35	535	898	348	325	314	630	1,013	5,324
	08:45-09:00	767	447	29	587	897	334	315	283	648	946	5,253
	09:00-09:15	679	449	20	576	853	300	287	239	609	876	4,888
	09:15-09:30	677	452	28	576	763	281	237	207	544	819	4,584
09:30-09:45	624	440	19	558	757	222	184	192	546	858	4,400	
09:45-10:00	628	424	14	566	721	234	204	221	569	800	4,381	
PM	16:00-16:15	749	537	59	762	1,004	369	357	300	702	1,055	5,894
	16:15-16:30	786	540	56	744	1,021	433	415	269	676	1,036	5,976
	16:30-16:45	779	553	65	762	1,112	452	400	292	699	1,081	6,195
	16:45-17:00	775	570	67	732	972	409	411	262	694	1,053	5,945
	17:00-17:15	825	551	64	744	1,015	374	436	262	668	1,050	5,989
	17:15-17:30	778	559	76	809	1,081	405	417	278	721	1,087	6,211
	17:30-17:45	798	562	82	763	971	346	419	224	706	1,055	5,926
	17:45-18:00	802	557	110	673	820	314	318	208	688	1,013	5,503
	18:00-18:15	734	532	85	719	795	229	258	152	604	993	5,101
	18:15-18:30	655	557	79	637	662	229	234	170	625	957	4,805
18:30-18:45	673	475	64	624	648	198	210	154	598	879	4,523	
18:45-19:00	571	492	58	585	536	132	168	142	595	814	4,093	

Hourly Breakdown

Time		Junction										Total
		J1	J3	J4	J5	J6	J7	J8	J9	J10	J11	
AM	07:00-08:00	2,477	1,798	58	2,111	3,438	1,472	1,528	1,069	2,366	3,403	19,720
	07:15-08:15	2,785	1,937	68	2,305	3,740	1,601	1,663	1,222	2,565	3,772	21,658
	07:30-08:30	3,007	1,968	81	2,325	3,901	1,604	1,627	1,307	2,631	3,966	22,417
	07:45-08:45	3,004	1,976	97	2,286	3,837	1,519	1,537	1,273	2,597	4,055	22,181
	08:00-09:00	3,064	1,878	106	2,249	3,750	1,447	1,414	1,234	2,576	4,021	21,739
	08:15-09:15	2,968	1,842	108	2,218	3,621	1,339	1,291	1,149	2,525	3,858	20,919
	08:30-09:30	2,853	1,844	112	2,274	3,411	1,263	1,164	1,043	2,431	3,654	20,049
	08:45-09:45	2,747	1,788	96	2,297	3,270	1,137	1,023	921	2,347	3,499	19,125
	09:00-10:00	2,608	1,765	81	2,276	3,094	1,037	912	859	2,268	3,353	18,253
PM	16:00-17:00	3,089	2,200	247	3,000	4,109	1,663	1,583	1,123	2,771	4,225	24,010
	16:15-17:15	3,165	2,214	252	2,982	4,120	1,668	1,662	1,085	2,737	4,220	24,105
	16:30-17:30	3,157	2,233	272	3,047	4,180	1,640	1,664	1,094	2,782	4,271	24,340
	16:45-17:45	3,176	2,242	289	3,048	4,039	1,534	1,683	1,026	2,789	4,245	24,071
	17:00-18:00	3,203	2,229	332	2,989	3,887	1,439	1,590	972	2,783	4,205	23,629
	17:15-18:15	3,112	2,210	353	2,964	3,667	1,294	1,412	862	2,719	4,148	22,741
	17:30-18:30	2,989	2,208	356	2,792	3,248	1,118	1,229	754	2,623	4,018	21,335
	17:45-18:45	2,864	2,121	338	2,653	2,925	970	1,020	684	2,515	3,842	19,932
	18:00-19:00	2,633	2,056	286	2,565	2,641	788	870	618	2,422	3,643	18,522

Network peak hours are 07:30-08:30 and 16:30-17:30.

