3046-01-TA01
December 2022

PROPOSED ACCESS ROAD AND LORRY PARK

KRONOSPAN - NORTHERN INFRASTRUCTURE

Transport Assessment

Prepared on behalf of:

AXIS
Camellia House
76 Water Lane
Wilmslow
SK9 5BB

Tel: 0844 8700 007

www.axisped.co.uk

CONTENTS

PLANS

TABLES

APPENDICES

1.0 INTRODUCTION

1.1 Purpose of This Report

1.1.1 AXIS has been appointed by Kronospan Ltd. to provide transport planning and highways advice in relation to the construction and operation of a north access road into the Kronospan Facility, lorry park (comprising 91 heavy goods vehicles (HGV) parking bays), roundwood storage areas and associated structures, 132kV substation, and ancillary works (the Proposed Development) on land immediately north of the existing Kronospan facility, Holyhead Road, Chirk (hereafter referred to as the Site). The proposed access road to the north of the Site would be facilitated by a priority roundabout from Holyhead Road.

1.1.2 The proposed site layout plans are provided in **Appendix 1** at the end of this report.

1.1.3 This Transport Assessment (TA) has been prepared to inform the Local Planning Authority (LPA) and Local Highway Authority (LHA) of the highways and transport related implications of the Proposed Development. The LPA in this context is Wrexham County Borough Council (WCBC).

1.2 Background

1.2.1 Kronospan is an important local and national business. In 2020, it was the 9th largest manufacturing business in Wales and provides direct employment for over 600 people of which 90% live within 10 miles of the existing Facility. As such, ensuring that the Kronospan site in Chirk remains a competitive and sustainable business is important to the local and national economy. The intention of future developments is to improve efficiency and to safeguard existing jobs.

1.2.2 It is Kronospan's intention to ensure that the Chirk manufacturing site remains a world leading production site. Several projects have been delivered as part of the Kronospan Vision 2020 investment and development programme, and they allow Kronospan to deliver continued environmental improvements at the Site. Future developments are intended to consolidate this and make further improvements to ensure the business remains sustainable at the Site.

1.3 Pre-App Consultation

1.3.1 AXIS provided an initial pre-application advice request to WCBC for a proposed north access road dated 14th February 2020. A response to the pre-app consultation was

received from WCBC on the 7th January 2022. The transport related comments are provided below:

"It is unclear from the details submitted with this enquiry whether the access road is intended to allow the existing main entrance to be closed entirely, to be closed to all HGV traffic or whether only a proportion of traffic to/from the site would utilise the new access. This would need to be clarified in any formal planning application, although on the basis of the details submitted with your later enquiry (ENQ/2021/0315) it is assume the latter is the case".

"It is acknowledged that there would be benefits from removing some vehicles from Holyhead Road, particularly in in respect of residential amenity and potentially air quality. The reduction in traffic is not quantified in the enquiry submissions therefore it is difficult to determine the weight that should be attributed to the benefits of the scheme versus the conflict with policy and concerns regarding intrusion into the landscape. This is a matter I am prepared to give further consideration to should additional information be provided".

1.3.2 AXIS provided a subsequent pre-application advice request to WCBC for the Proposed Development, including a brief description of the proposals dated 2nd November 2021. A response to the pre-app consultation was received from WCBC on the 7th January 2022. The transport related comments are provided below:

"*A formal application would need to be subject to a Transport Assessment (TA). It is unclear at this stage whether a single application would be submitted for all the proposed developments or whether they would come as individual applications. Nevertheless I would advise that the cumulative impact of all of the developments on the local highway network as well as the A5 and A483 trunk roads is assessed. In respect of the latter, the potential impact of any additional vehicular movements on the A5/A483 junction at Halton, particularly at peak times, is potentially a matter of concern.*

I understand that the proposed link road is not intended to replace the existing main entrance to the site. The TA would need to set out the likely change in volume of traffic utilising the existing entrance. Details of the arrangements to be put in place to ensure that there was a reduction in traffic using the main entrance would also need to be provided".

1.3.3 The following chapters of this report respond to the above comments.

1.4 Report Structure

1.4.1 The structure of this TA is therefore as follows:

- **Chapter 2** describes the existing conditions of the site including the site location, local highway network, baseline traffic data, weighbridge data analysis, highway safety, and accessibility;
- **Chapter 3** describes the existing Kronospan site operations including information regarding the current and historical site operation;
- **Chapter 4** provides a description of the Proposed Development, including the north access road, proposed roundabout junction and HGV parking, site operations and changes in distribution and assignment;
- **Chapter 5** describes the construction traffic impacts, including the phasing, trip generation during construction, construction traffic management plan, abnormal load strategy and construction vehicle types;
- **Chapter 6** presents the highways analysis including the assessment time periods, future year traffic growth assumptions, committed development traffic, traffic generation and redistribution / re-assignment;
- **Chapter 7** provides the assessment of anticipated development traffic impact which includes a comparison to historical operational demand, link flow impact assessment and junction operational impact;
- **Chapter 8** describes the proposed mitigation measures; and
- **Chapter 9** summarises the report with a series of conclusions.

2.0 EXISTING CONDITIONS

2.1 Site Location

2.1.1 The Proposed Development Site is located to the north of the existing Kronospan Facility, approximately 1.5km to the north of Chirk Town Centre.

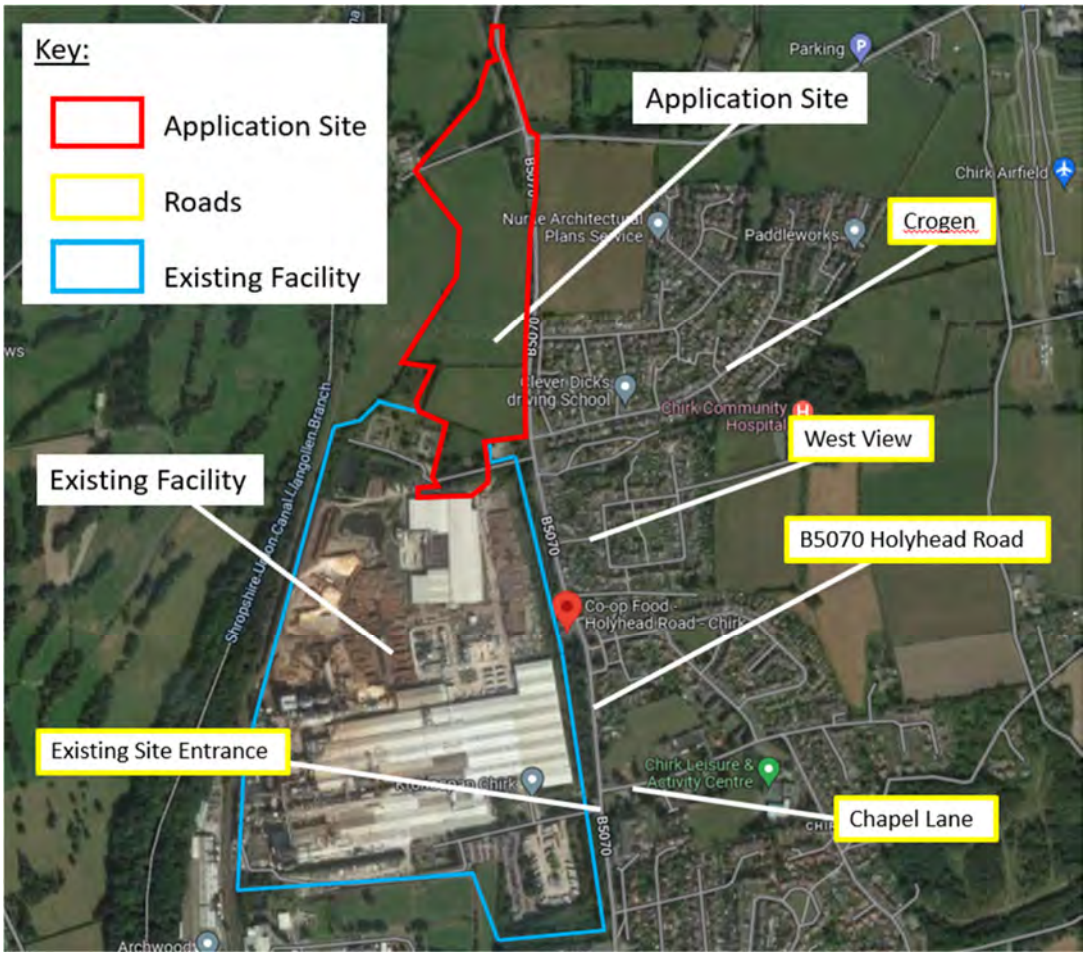
2.1.2 The Site is bordered by the existing Kronospan Facility in the south, a vacant field and the Shrewsbury to Chester railway line to the west, Afon Bradley farm to the north-west and the B5070 Holyhead Road to the east.

2.1.3 The Proposed Development Site currently comprises a vacant field. Vehicular access to the site is currently via the access road to the Afon Bradley farm to the north-west of the Site.

2.2 Local Highway Network

2.2.1 The location of the Site in relation to the local highway network is shown on **Plan 2.1**.

Plan 2.1 – Local Highway Network



Holyhead Road (B5070)

2.2.2 Holyhead Road is a two-way single carriageway road that runs in a north-south alignment along the eastern boundary of both the existing facility and the application site. The road provides a strategic route between the A5 in the north and the B4500 in the south. Beyond the site the B5070 becomes Chirk Road and joins the A5 Chirk Bypass to the south at the Gledrid Roundabout.

2.2.3 In the vicinity of the Site, Holyhead Road features a circa 7.0m carriageway, and is subject to a 50mph speed-limit, rising to the national speed limit on the approach to the A5 roundabout. The speed limit is reduced to 30mph just prior to the point where it meets Crogen.

2.2.4 Residential properties line the majority of the eastern side of Holyhead Road. There are footways of approximately 2.0m in width positioned on both sides of the carriageway and street lighting columns are present at regular intervals on both sides of the road. There are on-street cycle lanes marked out on both sides of the road. A bus stop is situated approximately 25m to the north of the existing site entrance, which provides both a shelter and timetable information.

Strategic Highway Network A5 & A483

2.2.5 Both the A5 and A483 constitute part of the Strategic Road Network (SRN) in North Wales as managed by the North and Mid-Wales Trunk Road Authority (NMWTRA) on behalf of the Welsh Government (WG).

2.2.6 The A5 links Llangollen in the west to the M54 (and ultimately the M6) in the West Midlands via Shrewsbury. The route converges with the A483 at Halton Roundabout, before then diverging in a southeast direction at Mile End Roundabout, Oswestry. The A483 constitutes a north – south strategic link between Chester and the western termination of the M4 at Llanelli. Halton Roundabout (A5 / A483) has undergone several recent upgrades by NMWTRA and is subject to a programme of continual review and upgrade where required. The Halton Roundabout is currently characterised by two lanes at each approach. Street lighting is present at regular intervals around the roundabout.

2.2.7 The A5 then joins the B5070 Holyhead Road via a priority compact roundabout. At this location the A5 forms a two-way strategic route. Lighting columns are present at regular intervals on either side of the road. The A5 is subject to the national speed limit at this location.

2.2.8 The combined A5 / A483 form part of the Trans-European Network (TEN) between Holyhead and Felixstowe, facilitating wider freight movement by road from Ireland to the Benelux countries via the UK strategic highway network. The A483 is also defined as 'Core' to the Strategic Network in North Wales by the NMWTRA. Both routes can be defined predominantly as Single 2 (S2) in the vicinity of the site, encompassing a one metre hard strip; however, there are short sections of 2+1 alignment on the A483. Principal junctions are predominantly accessed via roundabouts with no minor road access to the A483 or the Chirk Bypass sections of the A5.

Old Black Park Road

2.2.9 Old Black Park Road provides a route between the Afon Bradley Farm and Chirk Retail Park to the east. The road is rural in nature, has no footway provision and is unlit. The carriageway is approximately 4.25 m in width, increasing to approximately 4.75m further to the east.

Afon Bradley Farm Access

2.2.10 This is also an unclassified route and simply provides a dedicated access to and from the Afon Bradley Farm. The road joins the B5070 Holyhead Road via a priority junction. The dedicated cycleway / footway along the B5070 crosses the mouth of the junction. The access route to the farm is approximately 3.75m in width and is unlit.

Crogen

2.2.11 Crogen is a residential route situated approximately 670 m to the north of the existing Kronospan access. The route provides access to a small network of residential cul-de-sacs to the east of the site. Crogan is accessed via a priority junction where it intersects with the B5070. It is approximately 7.0m in width, there are footways of approximately 2.0 m width on either side of the carriageway. Street lighting is located at regular intervals on either side of the carriageway, the road is subject to a 30mph

speed limit and this is re-enforced by the incidence of speed bump traffic calming measures.

Chapel Lane

2.2.12 Chapel Lane is located approximately 33m north and opposite the existing Kronospan site access and provides access to several residential areas within Chirk. Chapel Lane is an unclassified route, providing two-way traffic and a single lane in each direction. The road is subject to a 20mph limit for its entire length. Traffic calming measures in the form of speed bumps are also in place for its entire length. The route is lit with lighting columns being provided at regular intervals along the road.

Existing Kronospan Access

2.2.13 The existing Kronospan Access joins the B5070 Holyhead Road via a priority junction. The radii provided at the junction allow for extended visibility splays onto the adjoining Holyhead Road. The access is approximately 7.5 m in width and a 20mph private speed limit is enforced along the access road. A segregated footway is situated on the northern side of the carriageway.

2.2.14 Baseline traffic levels to and from the existing facility are described within the following section.

2.3 Baseline Traffic Data

2.3.1 To provide an indication of local network operating conditions on the immediate road routes to the Kronospan site, base traffic flow patterns have been established via Manual Classified Turning Count (MCC) surveys undertaken in at the following key network locations:

- The B5070 Holyhead Road / Farm Access / Old Black Park Road junction;
- The B5070 Holyhead Road / A5 roundabout; and
- The A5 / A483 Roundabout (Halton Roundabout).

2.3.2 The above surveys were collected during a neutral weekday (Tuesday 8th March 2022) during both the AM and PM peak periods.

2.3.3 An additional MCC was conducted at the existing Kronospan Facility access over a period of 7-days (from Tuesday 8th March 2022 to Monday 14th March 2022 inclusive), covering 12 hour per day (7:00am – 7:00pm)

2.3.4 ATC data was collected to ascertain both traffic volumes and speed. The data was collected over a 7-day period between 8th and 15th March 2022:

- North of the B5070 Holyhead Road / Farm Access / Old Black Park Road junction; and,
- South of the B5070 Holyhead Road / Farm Access / Old Black Park Road junction.

2.3.5 The results of this data collection have been used to inform the design of the north access junction and also the junction capacity analysis presented within **Chapter 7** of this report.

2.3.6 Full copies of all traffic survey data collected are contained within **Appendix 2** at the end of this document. **Figure 1** and **Figure 2** located within **Appendix 3** of this report summarise the recorded traffic flows on the immediate local highway network for the AM (8:00am – 9:00am) and PM (5:00pm – 6:00pm) network peak hours.

B5070 Holyhead Road

2.3.7 Reference to the recorded peak hour traffic data identifies that, at the Kronospan access junction with the B5070 Holyhead Road, traffic flows on the mainline carriageway stand at c700 two-way movements during the AM peak period, whilst during the PM peak flows are higher at c800 two-way movements. Flows are marginally higher to the north of the Kronospan access, as would be expected given the routing restrictions on heavy vehicle movements to the south. Over the course of the 12-hour core daytime period (07:00-19:00) two-way movements stand at c9,900.

A5/B5070 Whitehurst Roundabout

2.3.8 Traffic flows on the A5, as recorded at its junction with the B5070, identify broadly similar traffic levels to those reviewed above for the B5070 near the Kronospan access i.e. two-way flows of c700 in the AM period and c1,000 in the PM period. In terms of direction of travel, eastbound flows are marginally higher than westbound flows on the A5, although any difference is fairly limited

A5/A483 Halton Roundabout

2.3.9 With regard to traffic levels at the A5/A483 Halton roundabout junction, two-way movements on the A483/A5 north-south corridor are c2,000 during the AM and PM peak periods.

2.3.10 It should be noted that the A5/A483 Halton roundabout junction is observed to operate under variable capacity conditions, in particular during the traditional rush hour peak periods. Indeed, the junction is the subject of ongoing monitoring by WG/NMWTRA and their framework highway consultants, with several improvements having been made over the years. This ongoing monitoring seeks to identify any new operational issues, review the effectiveness of any improvement measures that have been implemented, as well as identify opportunities for further improvements to be made in the future.

Existing Kronospan Movements

2.3.11 A review of the Kronospan access junction identifies that, over the course of the 12-hour daytime period, up to 266 HGVs were recorded as exiting the site towards the north, with a further 10 turning to the south. In terms of total traffic over this period, a total of 771 vehicles were recorded leaving the access, of which 78% travelled north on the B5070. Incoming movements are noted as being broadly similar, with 674 total vehicles turning into the access (78% from the north), of which 254 comprise HGVs from the north and 10 from the south.

2.3.12 During the AM and PM peak periods two-way vehicle movements on the Kronospan Facility access road were noted as 83 and 256 respectively, of which 48 and 28 respectively were HGVs. Through further review of the count data it has been possible to identify a profile of HGV traffic movements to and from the site across a 12 hour period. **Table 2.1** below identifies this profile of HGV movements:

Table 2.1 – Observed 12hr Profile of HGV movements to/from Kronospan Facility

Hour Commencing	Arrivals		Departures		Total
07:00-08:00	10.19%	27	10.51%	29	56
08:00-09:00	7.55%	20	10.14%	28	48
09:00-10:00	6.79%	18	5.07%	14	32
10:00-11:00	*11.70%*	*31*	*9.42%*	*26*	*57*
11:00-12:00	9.43%	25	10.14%	28	53
12:00-13:00	9.43%	25	6.52%	18	43
13:00-14:00	10.57%	28	9.42%	26	54
14:00-15:00	8.68%	23	9.78%	27	50
15:00-16:00	11.70%	31	7.97%	22	53
16:00-17:00	8.30%	22	9.78%	27	49
17:00-18:00	2.26%	6	7.97%	22	28
18:00-19:00	3.40%	9	3.26%	9	18
08:00-09:00	**7.55%**	**20**	**10.14%**	**28**	**48**
17:00-18:00	**2.26%**	**6**	**7.97%**	**22**	**28**
12hrs	**100.00%**	**265**	**100.00%**	**276**	**541**

2.3.13 Review of the HGV profile data in **Table 2.1** above outlines that most HGV movements are fairly evenly distributed across the daytime period between 07:00 and 19:00. Maximum HGV movements occur between 10:00-11:00, when up to 57 two-way movements are recorded.

2.3.14 Two-way HGV movements during the identified network AM and PM peak hours total 48 and 28 respectively, whilst over the course of the 12-hour daytime period (07:00-19:00) 541 two-way movements are recorded.

2.4 Weighbridge Data Analysis

2.4.1 The facility comprises a weighbridge located at the site entrance where all goods delivery vehicles are required to login / report at, upon entering the site. Kronospan provided comprehensive weighbridge data for the period between 1st April 2021 and 28th March 2022.

2.4.2 Analysis of the weighbridge data identifies peak delivery times of imports and exports, the daily arrivals and departures in total and of each material type and average payloads.

2.4.3 The following table summarises the total traffic generation identified from the weighbridge data analysis. The total traffic generation comprises timber and chemical inbound movements and sawmill and board outbound movements (*on the busiest average day, a Wednesday*):

Table 2.2 – Total Traffic Generation (Weighbridge Data Analysis)

	AM (7:00am to 8:00am)	PM (2:00pm to 3:00pm)	Daily
Arrivals	28	24	355
Departures	28	24	355
2-Way	55	48	710

2.4.4 The peak hours for the operation of the existing Kronospan Facility were identified as 7:00am – 8:00am and 2:00pm – 3:00pm.

2.4.5 The following table presents the average vehicle payload weight associated to vehicles delivering each material type.

Table 2.3 – Average Payload by Material Type (Tonnes)

Material	Average HGV Weight (t)
Inbound	
Timber	21.2
Chemicals	No weight recorded
Outbound	
Sawmill	24.5
Boards	25.1

2.5 Highway Safety

2.5.1 Personal Injury Accident (PIA) data for the highway network adjacent to the site has been obtained from the online CrashMap resource (www.crashmap.co.uk). This provides details of all PIA events attended by the police. The data is approved by the National Statistics Authority and reported on by the Department for Transport (DfT) each year. Data was extracted for the most recently available five-year period which is 2016 to 2020 inclusive. The location and severity of the accidents within the study area which includes the B5070 corridor and the A5 / A483 (Halton Roundabout) are shown on **Plans 2.2** and **2.3** following.

B5070 Holyhead Road

2.5.2 PIA's located along the B5070 Holyhead Road during the study period are indicated on **Plan 2.2** following:

Plan 2.2 – PIA Data (B5070 Holyhead Road)

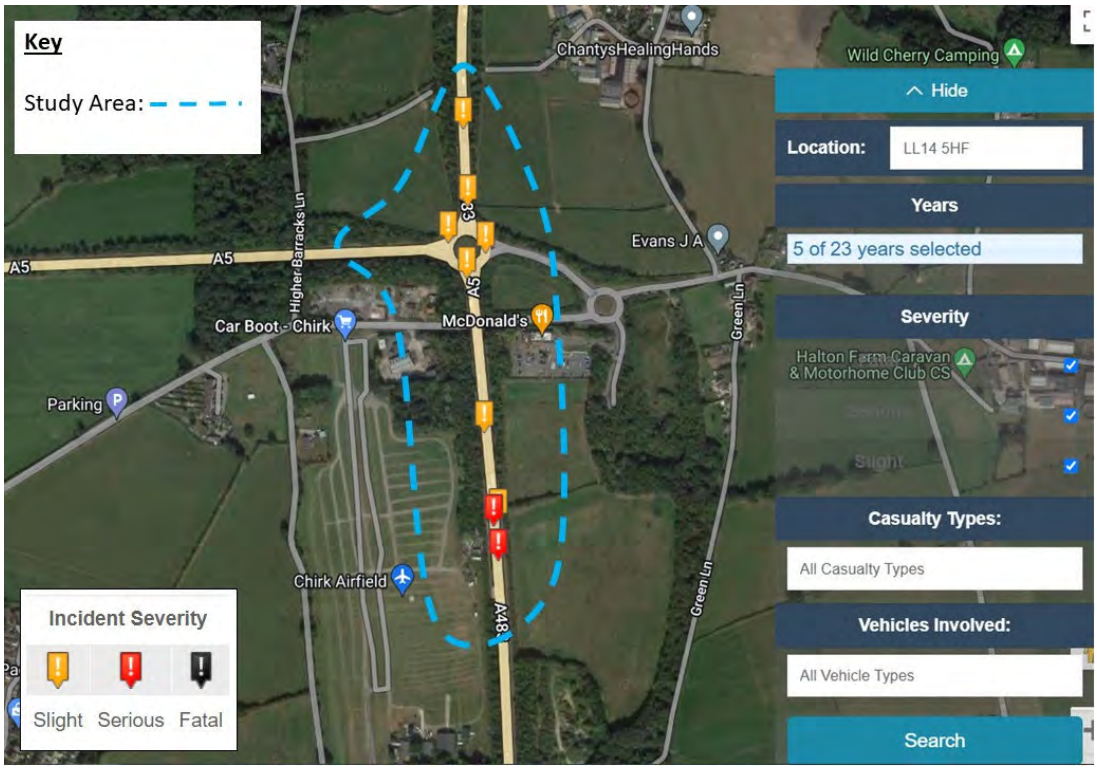
2.5.3 **Plan 2.2** shows that a total of 5 accidents occurred within the study area in the vicinity of the site during the assessed period, 3 of which resulted in 'slight' injury and 2 of which resulted in 'serious' injury.

2.5.4 When considered volumetrically the 5 accidents recorded along the B5070 Holyhead Road equate to 1 accident per year on average. This is not considered to be unusually onerous, especially given that this route carries in the region of 10,000+ daily two-way trips at this location (source: Independent traffic counts).

A5 / A483 Halton Roundabout

2.5.5 PIA's located at the A5 / A483 Halton Roundabout during the study period are indicated on **Plan 2.3** following:

Plan 2.3 – PIA Data (A5 / A483 Halton Roundabout)



2.5.6 **Plan 2.3** shows that a total of 9 accidents occurred within the study area in the vicinity of the site during the assessed period, 7 of which resulted in 'slight' injury and 2 of which resulted in 'serious' injury.

2.5.7 Review of the accident information demonstrates that a total of four of the slight accidents occurred on or close to the Halton Roundabout. The three further accidents (2 slight and 1 serious) occurred to the south of the roundabout.

2.5.8 When considered volumetrically the 7 accidents recorded along the B5070 Holyhead Road equate to just over 1 accident per year on average. This is not considered to be unusually onerous, especially given that this route carries in the region of 19,000+ daily two-way trips at this location (Source: DfT Traffic Count Data).

2.5.9 Given the above review of accident history, which identifies no evidence of accident or road safety issues either relating to operation of the existing Kronospan Facility, or to the use of the local highway network by HGVs, it is concluded that there is no reason to expect that the proposed lorry park and access road would result in a material detrimental effect on local highway safety conditions.

2.5.10 Therefore, it is considered that the existing accident record does not present a material concern in the context of the Proposed Development.

2.6 Accessibility / Sustainable Transport Connections

2.6.1 Most of the trips associated with the Proposed Development are delivery related and are not likely be influenced or changed to other more sustainable modes of travel. Therefore, the accessibility of the site has only been touched on lightly within this section of the TA. Sustainable modes of transport and existing sustainable transport links can be utilised by employees and visitors to travel to / from the facility. The Kronospan Facility represents a well-established employer within the Chirk area and is accessible by sustainable modes for the majority of Chirk residents. This section considers access to the site for pedestrians, cyclists and public transport users in greater detail.

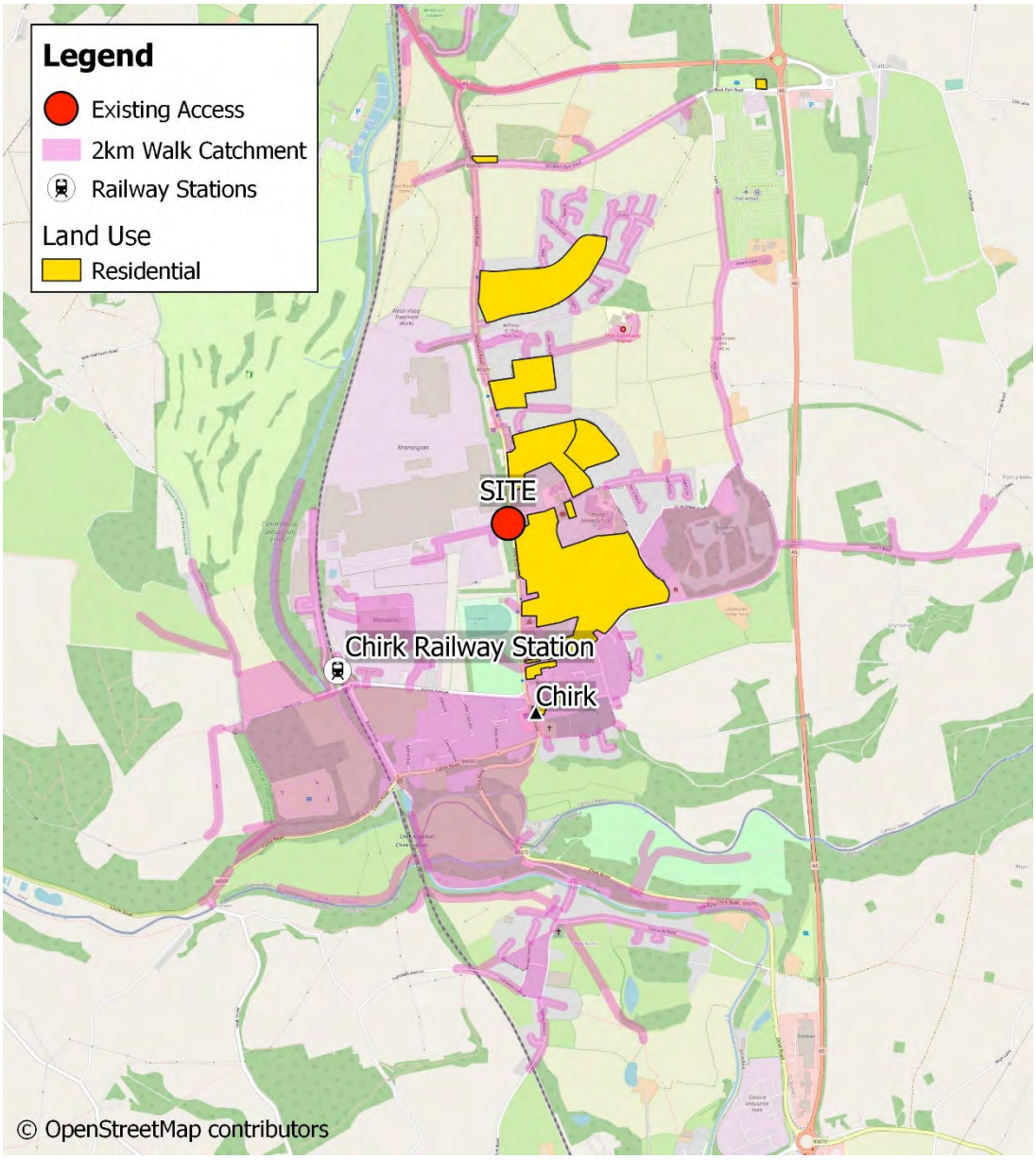
Pedestrian Access

2.6.2 The Chartered Institution of Highways and Transportation (CIHT, formerly the IHT) in their document ‘Providing for Journeys on Foot’ states that “walking accounts for over a quarter of all journeys and four fifths of journeys of less than one mile” (paragraph 1.12, page 11). In other words, around 80% of trips of less than 1 mile are made on foot.

2.6.3 The CIHT document recognises that although acceptable walking distances will vary between individuals and circumstances, for commuting, school and sight-seeing trips, a walk distance of 2km can be considered as the 'preferred maximum'.

2.6.4 **Plan 2.4** shows a 2km walking catchment surrounding the Site, thereby providing an indication of the areas which can be reached within a 24-minute walk, assuming a walk speed of 1.4 m/s.

Plan 2.4 - Walking Catchment



2.6.5 **Plan 2.4** illustrates that the existing Kronospan Facility is located within a 2km walk distance from the built up areas surrounding Chirk and all of the residential areas within it. The existing Kronospan Facility is therefore well located to allow local employees to commute to the site by foot.

2.6.6 The local highway network provides a safe and realistic opportunity to reach the areas contained within the 2km walking catchment via the existing high-quality pedestrian infrastructure in the form of footways, street lighting and pedestrian crossing points equipped with dropped kerbs at the key junctions surrounding the Site.

2.6.7 Footway infrastructure will be accommodated at the proposed roundabout (see **Section 4.2**), including dopped kerb tactile paving crossing points and pedestrian islands which will improve upon the existing pedestrian infrastructure in the area.

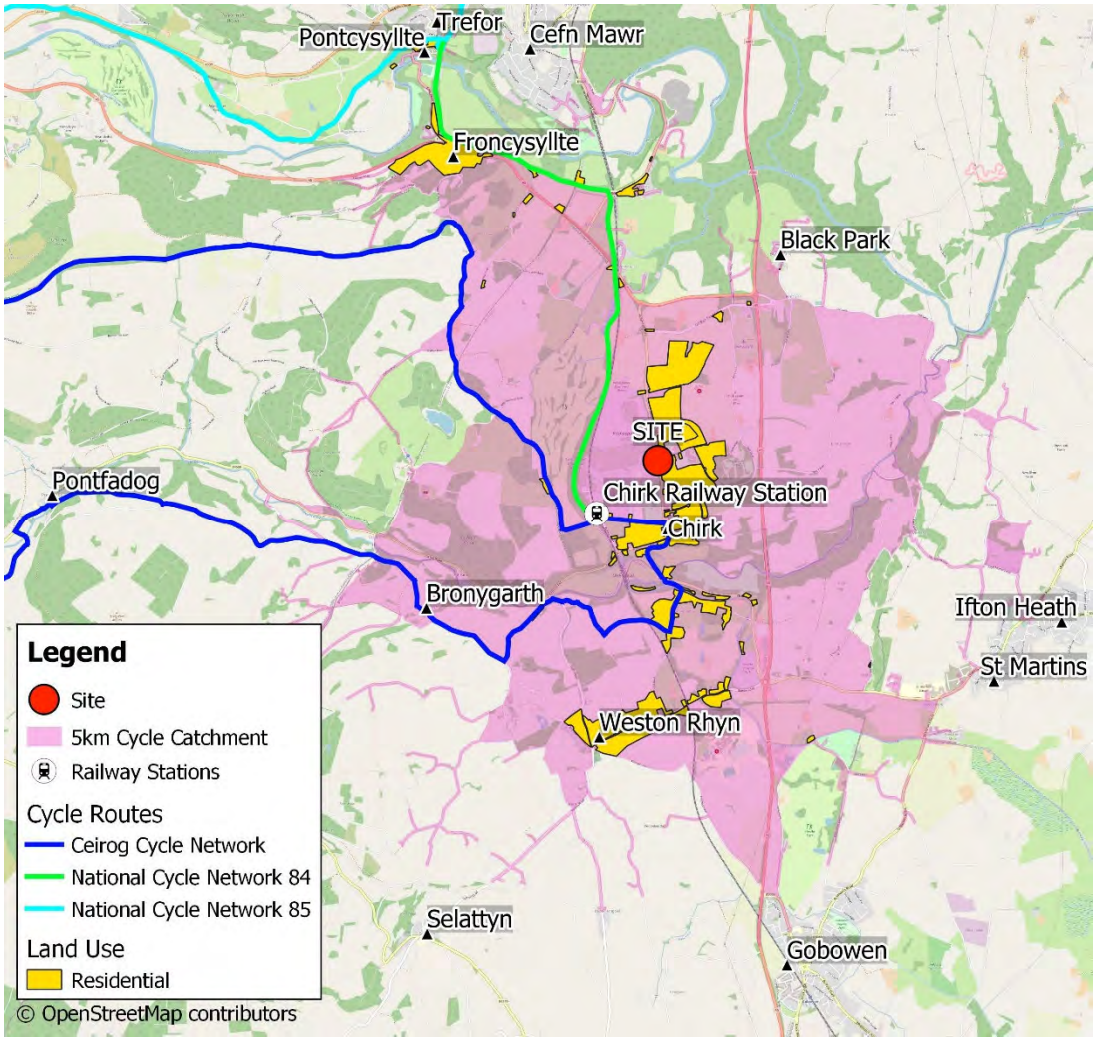
2.6.8 When the existing and proposed pedestrian infrastructure is considered in combination, walking will be a highly viable mode of travel for staff when accessing and travelling to and from the site.

Cycle Access

2.6.9 It is generally accepted that cycling provides a realistic and healthy alternative to the private car for journeys up to 5km as a whole, or as part of a longer journey by public transport.

2.6.10 To assist in summarising the accessibility of the Site by cycle, an indicative 5km cycle catchment plan has been produced, as illustrated on **Plan 2.5**. The isochrone has been produced using the same methodology outlined above.

Plan 2.5 – 5km Cycle Catchment



2.6.11 **Plan 2.5** illustrates that the existing Kronospan Facility is located within 5km cycle distance of a number of settlements including, Froncysyllte, Black Park, Chirk, Bronygarth and Weston Rhyn. There are therefore several residential areas within cycle distance of the site, allowing for local employees to commute to / from work by cycle.

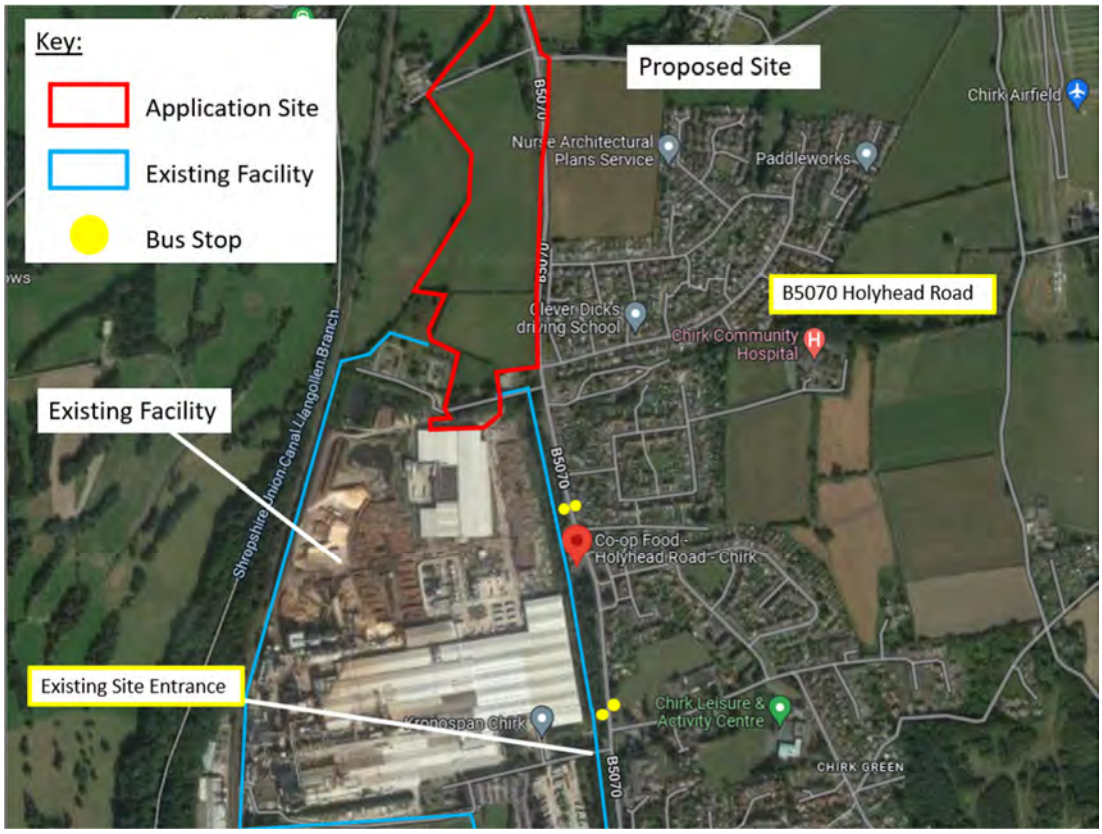
2.6.12 **Plan 2.5** also shows that there are a number of regional cycle routes in the area; the National Cycle Network (NCN) Route 84, NCN Route 85 and the Ceirog Cycle Network. These provide a combination of high quality on and off-street cycle infrastructure. The Kronospan Facility therefore provides for longer journeys by bicycle.

2.6.13 Furthermore, the local highway network features generally flat gradients, wide carriageway widths and street lighting. The local highway network is therefore conducive to on-road cycling.

Public Transport

2.6.14 The Site is located within a short walk of a number of bus stops served by a number of regular bus services. The closest bus stops are illustrated within the following plan:

Plan 2.6 – Local Bus Stops



2.6.15 **Plan 2.6** shows that there are two bus stops (in both the north and south direction) located on Holyhead Road, approximately 25m north of the existing site access. The bus stops in the vicinity of the existing site access includes timetable information and a shelter in each direction. A bus layby is provided for the northbound stop, whereas the southbound stop is accommodated in-carriageway.

2.6.16 Guidance from the Chartered Institution of Highways and Transportation (CIHT) document *'Guidelines for Planning for Public Transport in Development'* recommends that the walk distance from a new development should ideally be 300m, or a maximum of 400m. The bus stops near the site are therefore within the CIHT's ideal 300m walk distance.

2.6.17 The bus services available from the bus stops are summarised in **Table 2.6**.

Table 2.6 – Bus Services

Service Number	Route	Frequency
2	Wrexham – Bryn Offa – Rhostyllen – Rhosllanerchrugog – Johnstown – Ruabon – Acrefair – Cefn-Mawr – Chirk – Gobowen – Park Hall - Oswestry	Hourly
2A	Wrexham – Bryn Offa – Rhostyllen – Rhosllanerchrugog – Johnstown – Ruabon – Acrefair – Cefn-Mawr – Chirk – Weston Rhyn - Oswestry	Hourly
2C	Wrexham – Bryn Offa – Rhostyllen – Rhosllanerchrugog – Johnstown – Ruabon – Plas Madoc – Cefn-Mawr – Chirk – Gledrid - Oswestry	Twice a day
64	Llanarmon – Tregeiriog – Glyn Ceiriog – Dolywern – Pontfadog – Chirk – Halton – Bryn-yr-Eos – Llangollen	Every 2 hours
T12	Machynlleth – Newtown – Welshpool – Oswestry – Chirk – Wrexham	Every 2 hours
	Total	**3 per hour**

2.6.18 **Table 2.6** illustrates that in total the nearby bus stops provide approximately 3 services per hour which equates to roughly one service every 20 minutes on average.

2.6.19 Chirk rail station is located approximately 1.3 km from the site (circa 15 minutes on foot). It is served by a two-hourly service between Holyhead and Birmingham International, as well as a two-hourly service between Holyhead and Cardiff Central. The existing service pattern, summarised below, provides an hourly connection to the major population centres of Wrexham, Chester and Shrewsbury, as well as the local settlements of Ruabon and Gobowen.

Table 2.7 Local Rail Services from Chirk Rail Station

Service	Operator	Route	Daytime Headway
Holyhead – Birmingham International	Arriva Wales	Bangor – Chester – Wrexham – Shrewsbury – Wolverhampton – Birmingham New Street	Two-hourly
Holyhead – Cardiff	Arriva Wales	Bangor – Chester – Wrexham – Shrewsbury – Hereford – Abergavenny	Two-hourly

Sustainable Access Summary

2.6.20 Overall it is concluded that the Proposed Development Site represents a sustainable location for an employment development, being located within an acceptable walk/cycle catchment of local residential areas, as well as being accessible by both bus and rail services to / from key local settlements slightly further afield. These services are anticipated to reduce the need for employees at the site to utilise the car for commuting journeys.

3.0 EXISTING KRONOSPAN SITE OPERATIONS

3.1 Background

3.1.1 The Kronospan plant is well established within the Chirk area, having commenced operations in the early 1970s. It manufactures wood-based panels and other wood products. The primary products manufactured at the site are chipboard and medium density fibreboard (MDF), from this a number of secondary products are produced such as laminate flooring, worktops and melamine faced boards. The site provides direct employment to over 630 staff; however, it is estimated that the facility also provides indirect employment to 6,000 people in industries relating to the manufacturing and supply chains associated with the operations at the site.

3.1.2 The entirety of the Kronospan site covers an area of circa 40ha, with circa 14ha of this developed with industrial buildings and plant. A number of industrial process facilities are located in the west portion of the site, with a number of other process buildings located in the northern half of the site. The site car park, reception building, weighbridge and main site offices are located in the south eastern corner of the site to the south of the MDF / particle board manufacturing buildings.

3.1.3 The western perimeter of the Kronospan site is formed by the Shrewsbury to Chester railway. Improved railway siding facilities have been constructed within the site to enable an increased volume of timber to be imported by rail. As noted in Section 2 of this TA, the site is accessed via a priority controlled T-junction with the B5070 Holyhead Road, which runs in a north south direction to the east of the site.

3.2 Current and Historical Site Operation

3.2.1 Details of both the current and historical operation of the existing Kronospan manufacturing facility site have been established through reference to both operational data, as well as the traffic surveys undertaken at the site access (as discussed in **Section 2.3**).

Current Operational Trends

3.2.2 Section 2 of this TA provides a review of the observed levels of Kronospan related traffic recorded on the day of the July 2017 traffic surveys. This review identifies a total of 276 outbound HGV movements over the course of the 12 hour period (07:00-19:00) and 265 inbound movements, resulting in a total two-way flow of 541 HGV movements.

3.2.3 With regard to total traffic, including car / LGV movements, a total of 1,445 two-way movements were recorded at the site over the 12-hour daytime period (674 arrivals and 771 departures).

3.2.4 Reference to information provided by Kronospan has identified that, during the busiest day of operations in March 2022 the number of HGV loads exiting the site averaged 355 per day, approximately equating to 710 two-way HGV movements. It should be noted that this figure is based on weighbridge data and so is unlikely to include other HGV movements which don't pass over the weighbridge, such as those which are empty. These figures can therefore be considered comparable to those identified in the 2022 survey data for the existing Kronospan site access.

Historical Operational Trends

3.2.5 In 2012 a planning application was submitted to WCBC for the development of a biomass facility and recycled wood fibre offloading and screening facility at the Kronospan site. As part of the 2012 application, a Transport Assessment was produced by Axis, which sought to identify the transport related effects of those development proposals.

3.2.6 To inform that review, traffic surveys were undertaken at the site entrance in January 2011. In summary a total of 1,736 two-way vehicle movements were recorded at the site access over the duration of the survey (553 arrivals and 493 departures), of which 690 were HGVs (320 arrivals and 370 departures).

3.2.7 Comparison of this historical data with that observed for current operations, suggests a broadly similar level of operation at the site, with circa 350 HGV loads per day being recorded.

3.2.8 Further information provided by the operator, has identified that the Kronospan facility has operated at a higher capacity prior to 2010. Reference to weighbridge records from 2006 identifies that circa 460 loads per day were recorded as leaving the manufacturing facility. This level of HGV loads would equate to approximately 920 two-way HGV movements per day.

4.0 PROPOSED DEVELOPMENT

4.1 Overview

4.1.1 As noted in Section 1 of this report, the Proposed Development comprises the construction and operation of a north access road into the Kronospan Facility, lorry park, roundwood storage areas and associated structures, 132kV substation, and ancillary works.

4.1.2 At present the existing access is located within the distinct town area of Chirk. The Proposed Development will allow Kronospan to manage their operations more efficiently and thereby improve the long-term sustainability of the business at the Chirk manufacturing site.

4.1.3 The Proposed Development will avoid the requirement for HGVs to enter the main settlement of Chirk meaning that they can instead enter via the strategic A5 / A483 routes to the north of the site.

4.1.4 The provision of a large purpose-built lorry parking area would facilitate the inclusion of individual facilities for drivers, and will relieve current pressures on hauliers, whereupon the lack of places for drivers to park in Wales has been well documented in recent news media.

4.1.5 Throughout Wales, long-distance lorry drivers have raised concerns not only over the lack of places to park but also the lack of decent showering and washing facilities and also in regard to a lack of safety and security. It is considered that the provision of these news facilities at Kronospan in Chirk will go some way towards providing a better standard for such drivers.

4.1.6 The Proposed Development is part of an ongoing development programme to deliver site improvements and ensure the long-term economic viability of the manufacturing facility.

4.1.7 A plan view of the Proposed Development is provided in **Appendix 1** at the end of this report.

4.2 Roundabout Junction / North Access Road

4.2.1 Access to the application site will be facilitated by a new internal site access road (referred to as the ‘North Access Road’ in this document) which will be located to the north of the site and provide vehicular access to the proposed lorry parking area. The

North Access Road will interface with the B5070 Holyhead Road via a new priority-controlled roundabout which will take the place of the existing Holyhead Road / Old Black Park Road / Afon Bradley Farm access road staggered junction located at the north-east corner of the site.

4.2.2 The existing access to Afon Bradley Farm, would form a further junction from off the proposed North Access Road arm of the proposed roundabout. A copy of the layout of the junction is illustrated on **Drawing No's. 3046-01-D01A and 3046-01-ATR01A** contained within **Appendix 4** at the end of this report.

4.2.3 The proposed roundabout has been designed in accordance with CD116 Design Manual for Roads and Bridges (DMRB) guidance, '*Geometric design of Roundabouts*'. A comprehensive compliance checklist has been compiled in formulating this design, a copy of which is also enclosed within **Appendix 5** at the end of this report.

4.2.4 New footways will be provided all around the roundabout, and un-controlled crossing points will be provided across each arm, facilitated by dropped kerbs and tactile paving.

4.2.5 The proposed roundabout will be sited approximately 13m west of the current junction alignment, the B5070 would be realigned to join the roundabout, and the areas of highway no longer required would be 'stopped up', this will be undertaken via a separate application to the Secretary of State to stop up the highway under Section 247 of the Town and Country Planning Act 1990.

4.2.6 The proposed access road will form a single lane in each direction. From the roundabout intersection with the B5070 Holyhead Road the access will curve around and head in a southerly direction. The lorry park will be accessed via a priority junction with the access road. The internal route will continue to the east providing access to and from a staff parking area.

4.2.7 The new access will allow vehicles travelling to and from the Kronospan facility to enter and exit onto Holyhead Road to the north of Chirk, avoiding the requirement for HGVs to pass through the settlement of Chirk to access it. This will remove a substantial number of raw material HGVs that must currently travel through Chirk to reach the Kronospan plant via the existing site access.

Road Safety Audit

4.2.8 A stage 1 Road Safety Audit (RSA) has been undertaken for the proposed roundabout. The RSA has been commissioned by AXIS to a third party consultant, Highway Associates, a qualified firm who specialise in RSAs and who are entirely separate from the design team.

4.2.9 The full RSA and AXIS's design team response (DTR) are provided within **Appendix 6** at the end of this report.

4.2.10 The RSA raises four problems / recommendations with the proposed roundabout, which are:

- An Inscribed Circle Diameter (ICD) of 30 metres is insufficient for the 50mph speed limit in force, and in particular, a compact roundabouts is not appropriate in this instance per paragraph 2.3.1 of DMRB CD116;
- The over-run area may be used by car type vehicles which could promote higher approach and circulating speeds;
- The swept path analysis appears to show that two-way HGV traffic close to the site entry / exit arm would be constrained; and
- Cycle facilities have not been proposed at the roundabout.

4.2.11 Axis's designers' response concludes that some issues identified from the RSA, such as the appropriate ICD, are not agreed and suitable justification has been given in the DTR for the necessary design decisions. Where appropriate the proposed roundabout layout has been updated to include the RSA assessors' recommendations. This includes:

- Provision of cycle and pedestrian signage, diagram 957 of the Traffic Signs Regulations and General Directions (TSRGD) 2016, highlighting the proposed foot / cycleway; and
- Provision of a raised change in surface on the over-runnable area of the roundabout to make it ensure that vehicles do not drive over it.

4.2.12 The proposed amendments are included on **Drawing No. 3046-01-D01A** and **Drawing No. 3046-01-ATR01A** in **Appendix 4**.

4.3 Lorry Parking Area

4.3.1 The parking area would be approximately 28,800sqm in area and would cater for up to 91 HGVs.

4.3.2 There would be two separate entrances to the lorry park and three exits. The first entrance/exit would be at the northern edge of the lorry park and would lead onto the access road shared with the proposed weighbridge car park (which would run around the eastern edge of the lorry park). This road would join the main proposed access road immediately northwest of the proposed lorry park. The second entrance/exit would be approximately halfway along the western side of the proposed lorry park. This would lead directly to the main new access road. The third exit would be at the southern edge of the proposed lorry park. This would lead directly into an 'in' lane for the proposed weighbridges.

4.3.3 Three new ‘in’ weighbridges and one new ‘out’ weighbridge would be to the south-west of the proposed lorry park. The proposed weighbridge car park would be to the east of the proposed weighbridges, and between the proposed lorry park to the north and the proposed eastern roundwood storage area to the south. It would cover an area of approximately 0.09ha and would include spaces for 32 cars. One space would be reserved for disabled users. Approximately 75% of the spaces (25 no.) would be reserved for staff use, with the remainder (8 no.) available for visitors .

4.3.4 A timber-clad, single storey structure will provide welfare and toilet facilities for drivers. The proposed facilities block would be located immediately north of the proposed weighbridge car park.

4.3.5 A landscaped bund would be constructed between the lorry parking area and the B5070 to provide screening. The height of this has not been precisely determined, but the intention would be for soft landscaping to screen and provide biodiversity enhancements. The height of the bund and landscaping could be determined in combination to ensure that it is no higher than necessary when viewed from the east.

4.3.6 The proposed lorry park layout is illustrated further within the Illustrative Landscape Masterplan also contained within **Appendix 7.**

4.4 132kV Substation

4.4.1 The proposed 132kV substation would be to the south-western part of the Site, to the south-west of the proposed weighbridges and due south of the proposed western roundwood storage area. It will cover an area of approximately 0.36ha. Access

would be via a short road (approximately 30m in length) leading south-west from the main new access road. There will be parking for 5 no. vehicles adjacent to the substation.

4.5 Roundwood Storage Areas

4.5.1 Two proposed roundwood storage areas would be provided.

4.5.2 One storage area would be immediately north of the proposed 132kV substation and west of the proposed weighbridge and would cover an area of approximately 0.47ha. Access would be from the proposed access road leading to the proposed 132kV substation.

4.5.3 The second storage area would be south of the proposed weighbridge car park and south-east of the proposed weighbridges and would cover an area of approximately 0.39ha. Access would be from the new road leading into the wider Kronospan Facility that runs due south from the proposed weighbridges. Both areas would be formed using permeable ground cover and not formally drained.

4.5.4 Both of the proposed roundwood storage areas would provide temporary storage for imported logs, prior to these being moved to other facilities within the wider Kronospan Facility for processing. Internal movements to transport the stored logs elsewhere within the wider Kronospan Facility would be undertaken by crane wagons and would only take place during the normal working day.

4.6 Proposed Site Operations

4.6.1 The access road and lorry park proposals would not result in any changes to existing operations of the Kronospan plant. The facility is still proposed to operate 24 hours a day as per the existing site operations.

4.6.2 The proposed lorry park and access road will not affect employment levels at the facility. There will be no net change in employment at the Kronospan facility as a consequence of the Proposed Development.

4.7 Changes in Traffic Levels

4.7.1 As identified above, it is envisaged that employment levels at the Kronospan facility are unlikely to change because of the Proposed Development.

4.7.2 There are no new employment opportunities proposed as part of the new facility, employees and HGV movements will simply transfer from the existing part of the facility to the area of the Proposed Development. As a result, there is unlikely to be any notable change in the quantum of both light vehicle and HGV traffic.

4.8 Changes in Distribution and Assignment of Kronospan HGV Traffic

4.8.1 The Proposed Development will be supported by a management strategy encouraging drivers to route directly via the north, and the strategic road network A5 / A483, as opposed to through Chirk town centre. This is discussed further within **Chapter 7** of this report. This will ultimately result in a shift in HGV distribution patterns. The change in distribution patterns resulting from the Proposed Development is discussed further within **Chapter 6**.

5.0 CONSTRUCTION TRAFFIC

5.1 Introduction

5.1.1 This section describes the trip generation of the Proposed Development during the construction period as well as the Construction Traffic Management Plan (CTMP) and the Abnormal Loads Procedure.

5.1.2 The exact construction methods, phasing and programme would be determined by the appointed designers and contractors, however, the following information sets out the likely transport implications of the Proposed Development during the construction period.

5.2 Construction Phasing

5.2.1 The timing of construction activity is dependent on the grant of planning permission for the Proposed Development and subsequent contract negotiations. At present, it is anticipated that construction would commence in Quarter 3 2023, and that all works would be complete by Quarter 4 2026.

5.2.2 The Proposed Development would be developed over a single phase, with the lorry park commencing from the northern end, via Afon Bradley access. The initial work would include cut and moulding on the lorry park, followed by construction of the access connection to site and then the roundabout to Holyhead Road.

5.2.3 A construction compound would be formed at Afon Bradley Farm, via a concrete pad, with space for circa 20 vehicles.

5.2.4 The core construction hours are proposed to be 07:30 to 18:00 on Mondays to Fridays and 08:00 to 14:00 on Saturdays. No work is planned on Sundays or Bank Holidays, however there may be occasions when construction would need to be undertaken outside of the core hours, for example, during major concrete pours or the transfer of abnormal loads.

5.2.5 Work would be undertaken during the core construction hours so as to minimise adverse amenity effects on nearby receptors.

5.1 Trip Generation During Construction Phases

5.1.1 During the construction phase it is expected that HGV movements will peak at around 100 one-way movements per day (200 two-way movements).

5.1.2 The maximum number of staff that will be based on the site during the construction period is predicted to be 15 - 20. If all of these staff were to travel to the site by car, then this equates to a maximum of 20 one-way staff trips per day.

5.1.3 The works would be carried out across the working day which would spread staff demands equally across it, therefore helping to reduce staff related traffic impacts during the peak hours.

5.2 Construction Traffic Impact

5.2.1 Construction of the north access road will result in additional staff and HGV movements as described above. These additional movements will be temporary over the construction period (Quarter 3 2023 to quarter 4 2026).

5.2.2 The impact of the proposed construction traffic has been considered at the two northerly junctions:

- B5070 Holyhead Road / A5 roundabout; and
- A5 / A483 roundabout (Halton Roundabout).

5.2.3 The following tables present the predicted changes in traffic flow at each of the above junctions:

Table 5.1 - B5070 Holyhead Road / A5 Roundabout Percentage Link Assessment

2026 AM Scenario						
Link	**Base vehicles**	**Base HGVs**	**Construction Vehicles**	**Construction HGVs**	**% Impact vehicles**	**% Impact HGVs**
1	781	124	31	17	**4.0%**	**13.7%**
2	658	73	5	0	**0.8%**	**0.0%**
3	944	156	26	17	**2.8%**	**10.9%**
2026 PM Scenario						
1	874	70	31	17	**3.5%**	**24.3%**
2	632	27	5	0	**0.8%**	**0.0%**
3	945	80	26	17	**2.8%**	**21.3%**

Link 1 – B5070 Holyhead Road (south of the B5070 Holyhead Road / A5 roundabout);
Link 2 – A5 (west of the B5070 Holyhead Road / A5 roundabout);
Link 3 – A5 (east of the B5070 Holyhead Road / A5 roundabout);

Table 5.2- A5 / A483 Roundabout (Halton Roundabout) Percentage Link Assessment

2026 AM Scenario						
Link	**Base vehicles**	**Base HGVs**	**Construction Vehicles**	**Construction HGVs**	**% Impact vehicles**	**% Impact HGVs**
1	948	153	26	17	**2.7%**	**11.1%**
2	2483	316	23	17	**0.9%**	**5.4%**
3	234	17	1	0	**0.4%**	**0.0%**
4	1965	272	2	0	**0.1%**	**0.0%**
2026 PM Scenario						
1	947	88	26	17	**2.7%**	**19.3%**
2	2501	204	23	17	**0.9%**	**8.3%**
3	210	4	1	0	**0.5%**	**0.0%**
4	2011	223	2	0	**0.1%**	**0.0%**

Link 1 – A5 (west of the Halton Roundabout);
Link 2 – A483 (north of the Halton Roundabout);
Link 3 – Unnamed road (east of the Halton Roundabout);
Link 4 – A483 (south of the Halton Roundabout);

5.2.4 **Table 5.1** and **Table 5.2** show that the proposed construction phase would result in minimal impact on the assessed study area, with increases in construction traffic that are low in absolute terms. It is not expected that the proposed construction phase will result in any impact that could be considered severe.

5.3 Construction Traffic Management Plan

5.3.1 To manage disturbances to the local community during the construction period, a Construction Traffic Management Plan (CTMP) would be prepared to ensure that suitable mitigation measures would be adopted to manage any adverse effects of construction. It is anticipated that the CTMP will include the following:

- restrictions on vehicle delivery hours;
- on-site construction vehicle parking & manoeuvring arrangements;
- an HGV routing strategy;
- staff parking arrangements;
- management and procedures for access by abnormal loads;
- local signage strategy;
- storage of materials;
- construction noise management; and
- construction dust management.

5.3.2 In addition, the CTMP would seek to ensure that all HGV construction-related traffic route to and from the site via the strategic highway network, avoiding residential areas where possible.

5.3.3 Other measures include:

- trimming of foliage to maximise visibility splays; and
- introducing a signage strategy to warn drivers.

5.3.4 The above measures represent an initial suggestion of measures that could be implemented. The exact nature and requirement for the CTMP could be agreed via a suitably worded planning condition.

5.4 Abnormal Load Strategy

5.4.1 During the construction phase, it would be necessary to transfer a few abnormal loads to the site (e.g. Substation Transformers). The transfer of abnormal loads would be suitably managed via the implementation of an Abnormal Load Strategy developed in line with good practice which is separate to the planning process. The strategy would be site specific and could include the following measures:

- cutting back of any over-hanging vegetation along the routes;
- temporary removal of street furniture such as islands / signage;
- liaison with BT / National Power Grid re: planning for any removal / reinstatement of low overhead lines;
- weekend delivery to minimise traffic disruption; and
- police accompaniment of loads to support contra-flow operation / temporary road closures.

5.5 Construction Vehicle Types

5.5.1 The type of vehicles to be used in the construction of the access road, lorry park and 132kV substation would include the following:

- 3 x's excavators;
- 2 x's 30 tonne Moxy (articulated dump truck);
- 1 x low-loader for plant access; and
- HGVs for stone deliveries, tarmac or concrete deliveries.

6.0 HIGHWAYS ANALYSIS

6.1 Introduction

6.1.1 This chapter of the TA forecasts the trip-generating potential of the Proposed Development, as compared to the existing use of the site, to provide the anticipated net traffic changes that will arise.

6.2 Assessment Time Periods

6.2.1 As identified in Section 2 of this report, review of background daily traffic patterns derived from the March 2022 traffic surveys suggests that maximum background traffic levels over the local highway network are experienced during the following time periods:

- Local highway network AM Peak hour: 8:00am-9:00am; and,
- Local highway network PM Peak hour: 5:00pm-6:00pm.

6.2.2 In practice these AM & PM peak periods are also likely to continue to represent the maximum traffic demand periods following the redistribution of trips resulting from the Proposed Development. Accordingly these time periods have been utilised for the network capacity appraisals included in this TA.

6.3 Future Year Traffic Growth Assumptions

6.3.1 It is anticipated that, based upon current market conditions, the Proposed Development could be completed and fully operational by 2026. Accordingly a 2026 opening year date has been utilised for core traffic demand assessments. To account for future network traffic conditions, an additional future design year of 2031 has been considered for all capacity related assessments. This represents 5 years beyond the projected commencement of operations at the Proposed Development.

6.3.2 Guidance published by the DfT identifies that future estimates of traffic should be made through the application of regional growth factors derived from the National Transport Model (NTM). NTM forecasts give traffic growth by region, road type and whether the area is built up or not. These forecasts are then adjusted by local TEMPRO factors to reflect local traffic trends. **Appendix 8** provides the TEMPRO growth factor outputs for the immediate Middle Layer Super Output area of Wrexham 019 for the above future year periods, whilst **Table 6.1** summarises the results.

Table 6.1 – TEMPRO Adjusted NTM Growth Factors

Period	2022-2026	2022-2031
Weekday AM Peak	1.039	1.086
Weekday PM Peak	1.040	1.087

6.3.3 The TEMPRO adjusted NTM growth factors have been applied to the 2022 background traffic flows presented in **Figures 1** and **2** (**Appendix 3**) to produce the 2026 opening year & 2031 future year baseline traffic flows illustrated respectively at **Figures 3** to **6** (**Appendix 9**).

6.4 Committed Development Traffic

6.4.1 Neither WCBC nor WG/NMWTRA has identified any specific committed developments which would need to be taken into account within this assessment. The key committed development of relevance to this assessment is the Oriented Strand Board (OSB) production facility. This proposal received permission on appeal in 2019 (ref: P/2018/0551).

6.4.2 A TA for the 2018 OSB development application was produced by AXIS. A review of the findings of the AXIS TA identifies that the proportional impact of development, even under a busy day of operations, would stand at or less than 1.5% of background traffic levels, or less across the highway network. The AXIS TA also notes that such levels of impact are within the typical variation in flow levels recorded at the junction.

6.4.3 Also of relevance is a small, committed development of 24 dwellings situated off Station Avenue, Chirk (ref: P/2019/0141). This proposal is only forecast to generate a total of 3 two-way trips both in the AM and PM peak periods respectively however it has been included within the analysis for completeness.

6.4.4 TEMPRO growth factors for the assessments of future year development impact are also included as noted above. Given that TEMPRO adjusted National Transport Model (NTM) factors already include for both local housing and employment growth projections (as derived from such sources as Local Plans), the effects of any notable committed development schemes should be inherently accounted for within the application of general network growth. The 'Do Nothing' flows comprise the factored baseline and committed development flows and are included as **Figures 7** to **10** in **Appendix 9.**

6.5 Traffic Generation

HGV Traffic

6.5.1 As discussed previously, the traffic generation of the Kronospan facility will remain unchanged. The HGV traffic flows have therefore been obtained from the weighbridge data for Tuesday 8th March 2022. The peak hour HGV AM and PM arrivals and departures are presented within **Table 6.2** following:

Table 6.2 – Kronospan HGV Weighbridge Flows 2022

	Arrivals	Departures	Two-Way
AM (8:00am-9:00am)	24	24	48
PM (5:00pm-6:00pm)	11	11	22

Staff Flows

6.5.2 The light traffic flows obtained from the Tuesday 8th March 2022 MCC survey at the existing site entrance have been utilised to obtain the proposed staff movements. These are presented within **Table 6.3** following:

Table 6.3 – Kronospan Staff / Light Traffic Flows (March 2022) (All Staff)

	Arrivals	Departures	Two-Way
AM (8:00am-9:00am)	33	2	35
PM (5:00pm-6:00pm)	64	169	233

6.5.3 Of these existing staff movements a total of 10 are expected to migrate from utilising the existing site access to utilising the new north access. The staff in question work an approximate 8 to 10 hour day between 7:00am – 6:00pm. For the purpose of this analysis it has been assumed, for robustness, that all staff would arrive between 8:00am – 9:00pm and would depart between 5:00pm – 6:00pm. The distribution in staff movements north and south have been kept consistent with the observed traffic distribution established with reference to the MCC survey undertaken at the existing site access. This is discussed in further detail below.

Existing Distribution

6.5.4 The existing distribution of vehicles along the B5070 Holyhead Road to and from the existing site access is presented within the table following:

Table 6.3 – North / South existing Percentage split in Arrivals and Departures

Vehicles	AM			
	Arrivals		Departures	
	North	South	North	South
Lights	70%	30%	0%	100%
HGVs	95%	5%	96%	4%
Vehicles	**PM**			
	Arrivals		**Departures**	
	North	South	North	South
Lights	73%	27%	70%	30%
HGVs	100%	0%	91%	9%

6.6 Redistribution / Re-Assignment

6.6.1 The pattern of vehicular distribution will change because of the implementation of the proposed north access road and junction. Being further north, and closer to the A5 / A483 strategic road network will inherently promote that 100% of HGV movements occur to and from the north. This will be enforced by the promotion of supporting measures, including communication with hauliers, driver monitoring and training, and routing strategy, this is discussed further within **Chapter 8**.

6.6.2 HGV traffic levels will not increase because of the Proposed Development. The existing HGV flows outlined above within **Table 6.2** will transfer to the proposed new north access road and junction. These existing trips will also re-assign with 100% arriving / departing from the north both in the AM and PM peak periods.

6.6.3 With regard to staff movements, it has been assumed that the majority of these would remain at the existing junction. A total of 10 members of staff will transfer to the new office / weighbridge facility located via the proposed north access road. This is assumed to equate to 20 two-way trips (10 in & 10 out). Accordingly, these staff trips have been deducted from traffic movements at the existing site access junction and re-assigned to the new north access junction.

6.6.4 The anticipated assignment of both staff and HGV development trips has been added to the projected opening year and future year baseline network traffic movements. The resulting 2026 opening year and 2031 'Do Something' traffic flows used for the assessment of development impact are illustrated in **Figures 11** to **14** in **Appendix 9**.

7.0 ASSESSMENT OF ANTICIPATED DEVELOPMENT TRAFFIC IMPACT

7.1 Introduction

7.1.1 This section of the report considers the operation of both the local and strategic highway network within the study area, and the ability of this network to accommodate the reassignment of traffic flows due to the Proposed Development. Assessment of the impact of the Proposed Development has been carried out through the consideration of both link flow impact as well as junction operational assessment across the study area.

7.1.2 The assessments of link impact have been undertaken for the anticipated opening year of 2026, which should provide the maximum proportional impact of the development proposals. The assessments of junction capacity have been undertaken for both the anticipated 2026 opening year as well as the future design year of 2031. This future year would represent the worst case assessment conditions for the junction when compared to the 2026 opening year conditions.

7.2 Comparison to Historical Operational Demand

7.2.1 When considering the practical operational impact of the Proposed Development, it is important to understand the historical context of the traffic levels from the Kronospan Facility that have previously operated over the local network for many years. As identified in **Chapter 3** this report, the Kronospan Facility has historically generated a similar level of HGVs. Reference to weighbridge records from 2006 identified that circa 460 loads per day were recorded as leaving the manufacturing facility (This would equate to circa 920 two-way HGV movements per day).

7.2.2 Given that such historical peak site HGV traffic demands have been previously judged acceptable as part of the consideration and approval of historical planning submissions, and have been demonstrated to have been successfully accommodated by the local highway network without any known operational capacity or safety issues. Since the Proposed Development only results in a re-distribution of HGV movements away from the existing access, it can be reasonably concluded that it will not result in any material detrimental impact on the operation of the local highway network.

7.3 Link Flow Impact Assessment: Local Road Network

7.3.1 Notwithstanding the above comparison to historical site operation, to ensure the most robust assessment of the traffic related effects of the Proposed Development, any appraisal of network effects needs to reflect current operational conditions at the Kronospan Facility. Accordingly, link and junction operational assessments have been undertaken against the projected baseline traffic flow conditions outlined earlier within this report.

7.3.2 Link flow operational assessments have been carried out for all links within the study area which would form part of the route for HGV movements. These sections of route network would experience the maximum link flow associated with the reassignment associated to the Proposed Development. Should link impact levels on these immediate sections of route prove to lie within appropriate thresholds, it can reasonably be concluded that development traffic at more remote network locations would also be within suitable thresholds.

7.3.3 Reference to Institution of Highways and Transportation (IHT) "Guidelines for Traffic Impact Assessment" suggests that more detailed analysis of highway impact and/or capacity improvements is only likely to be required where either:

- Traffic to/from the development exceeds 10% of existing two-way traffic on the adjoining highway; or,
- Where traffic to/from the development exceeds 5% of the existing two-way traffic flow on the adjoining highways at locations where traffic congestion exists within the assessment period or in other sensitive locations.

7.3.4 March 2007 Welsh Government Guidance TAN18 Annex E (para. E4) provides further advice in respect of likely material increases in traffic levels, specifically occasions under which additional analysis might be required for developments affecting the Welsh Strategic Road Network. In this case TAN18 guidance states:

> *"When assessing whether or not to consult the Assembly…local planning authorities must give full consideration to the effects of a development's traffic would have at a junction, particularly in respect of the additional turning movements created. As a broad guide the Assembly Government would regard an increase in turning movements in the order of 5% as material in most cases, that is, a 5% increase of traffic using any link of the junction. Where the capacity of the junction*

is, or is near to, being exceeded, a smaller percentage increase on a link would normally be material."

7.3.5 It is therefore concluded that a 5% threshold represents a reasonable guidance threshold for the assessment of link impact on the highway network within the study area. It should be recognised, however, that a simple percentage impact test can represent a crude tool, hence its removal from assessment guidance outlined within the 2007 DfT document "Guidance on Transport Assessment", which applied until recently in England. In the context of routes which currently operate with relatively low levels of background flow, a very small level of predicted development traffic can give rise to the calculation of a significant percentage change value, even though the combined background and development traffic would still be substantially below link capacity thresholds.

7.3.6 **Table 7.1** below demonstrates the predicted changes in two-way link flows on the assessed highway network, because of the Proposed Development, during the 2026 opening year.

Table 7.1 Predicted 2026 Opening Year Proportional Link Impact – Peak Hours

2026 AM Scenario						
Link	**Base vehicles**	**Base HGVs**	**Net Change Vehicles**	**Net Change HGVs**	**% impact vehicles**	**% impact HGVs**
1	2438	316	+1	+1	**0.0%**	**0.3%**
2	234	17	0	0	**0.0%**	**0.0%**
3	1965	272	+1	+1	**0.1%**	**0.4%**
4	946	154	+2	+2	**0.2%**	**1.3%**
5	658	73	-4	-4	**-0.6%**	**-5.5%**
6	780	125	-2	-2	**-0.3%**	**-1.6%**
7	35	2	0	0	**0.0%**	**0.0%**
8	805	128	-108	-104	**-13.4%**	**-81.3%**
9	689	24	-3	-3	**-0.4%**	**-12.5%**
2026 PM Scenario						
Link	**Base vehicles**	**Base HGVs**	**Net Change Vehicles**	**Net Change HGVs**	**% impact vehicles**	**% impact HGVs**
1	2501	204	+1	+4	**0.0%**	**2.0%**
2	189	4	0	0	**0.0%**	**0.0%**
3	2011	223	-5	-4	**-0.2%**	**-1.8%**
4	951	80	-4	+1	**-0.4%**	**1.3%**
5	632	27	-2	-2	**-0.3%**	**-7.4%**
6	874	70	-1	-1	**-0.1%**	**-1.4%**
7	52	0	0	0	**0.0%**	**0.0%**
8	914	72	-54	-50	**-5.9%**	**-69.4%**
9	884	22	-1	-1	**-0.1%**	**-4.5%**

Link 1 – A483 (north of the Halton Roundabout);
Link 2 – Unnamed road (east of the Halton Roundabout);
Link 3 – A483 (south of the Halton Roundabout);
Link 4 – A5 (east of the B5070 Holyhead Road / A5 roundabout);
Link 5 – A5 (west of the B5070 Holyhead Road / A5 roundabout);
Link 6 – B5070 Holyhead Road (south of the B5070 Holyhead Road / A5 roundabout);
Link 7 – Old Black Park Road;
Link 8 – B5070 Holyhead Road (south of the proposed site access);
Link 9 - B5070 Holyhead Road (south of the existing site access);

7.3.7 The above exercise demonstrates that changes in peak hour traffic over the immediate local network because of the reassignment of traffic from the Proposed Development are likely to be extremely low, being less than 1.0% of total vehicle traffic volumes during both the AM and PM peak hours.

7.3.8 The maximum link impact is predicted on the A5 east of the B5070 Holyhead Road / A5 roundabout, where the Proposed Development could result in traffic impact demand of 0.2% during the AM peak hour.

7.3.9 There would be a reduction in traffic demand on links 5, 6, 8 and 9 in the AM peak period and links 3, 4, 5, 6, 8 and 9 during the PM peak period. This suggests that for these links, the Proposed Development will result in a net improvement (reduction) in vehicle traffic.

7.3.10 Such results are well below the identified 5% link impact threshold and suggest that the operation of the Proposed Development would not result in any material negative effects on either local or strategic highway network operational performance. Conversely, the Proposed Development is expected to result in a net improvement in traffic on many of the assessed links. On this basis it is considered that the impact of the Proposed Development would be negligible / beneficial in nature.

7.4 Junction Operational Impact

7.4.1 Notwithstanding the results of the above, proportional link flow impact exercise, further consideration has been given to the potential effects of development traffic on the capacity of both the existing and proposed site access junctions. Accordingly, assessments of junction capacity have been undertaken for the AM and PM peak hour periods (8:00am - 9:00am and 5:00pm - 6:00pm) at the below junctions:

- The proposed north access road / B5070 Holyhead Road / Old Black Park Road roundabout; and,
- The existing Kronospan access road / B5070 Holyhead Road junction.

7.4.2 To provide a full appraisal of the specific effects of the Proposed Development, two key future year scenarios have been considered, which are outlined in further detail below:

- “Do Nothing” conditions – baseline future year conditions, with committed developments but without the inclusion of the Proposed Development; and,
- “Do Something” conditions – baseline future year conditions, with committed developments, and with the inclusion of the Proposed Development.

7.4.3 Consideration of the “Do Nothing” conditions should provide a clear benchmark of the likely future operational state of the local highway network around the Kronospan facility and set the changes resulting from the Proposed Development into context.

7.4.4 The proposed new roundabout junction has been assessed using ARCADY module within the TRL software package Junctions 10, whilst the staggered site access T-junction has been modelled using the PICADY module. The TRL software packages split traffic flows into 15-minute time segments within the model inputs. The results generated in the models indicate the peak Ratio of Flow to Capacity (RFC) in any individual peak and also any likely traffic queues. RFC values between 0.00 and 0.85 are generally accepted as representing stable and acceptable operating conditions.

7.4.5 Values between 0.85 and 1.0 represent variable operation but still within theoretical capacity i.e. possible queues building up at the junction during the period under consideration and increases in vehicular delay moving through the junction. RFC values in excess of 1.0 represent overloaded conditions i.e. congested conditions.

7.4.6 The following sections outline the results of the junction capacity assessment, summarising the 2031 future year assessments in particular, as this period would represent the worst-case assessment conditions for the junction when compared to the 2026 opening year conditions. The results of the junction assessments are summarised in turn below, with the full results provided in **Appendix 10**.

North Access Road / B5070 Holyhead Road / Old Black Park Road Roundabout

7.4.7 The results of the Junctions 10 assessments for the north access road / B5070 Holyhead Road / Old Black Park Road roundabout are summarised in **Table 7.2** below:

Table 7.2 - North Access Road / B5070 Holyhead Road / Old Black Park Road 2031 Future Year '*Do Something*' Conditions

Link	AM Peak (8:00am - 9:00am)		PM Peak (5:00pm - 6:00pm)	
	RFC	Queue (PCU)	RFC	Queue (PCU)
B5070 Holyhead Road (N)	0.40	0.7	0.45	0.7
Old Black Park Rd	0.03	0.0	0.03	0.0
B5070 Holyhead Road (S)	0.36	0.5	0.40	0.6
Access Road, Lorry Park & Farm	0.15	0.2	0.08	0.1

7.4.8 The above results again demonstrate that the new access road junction would operate well within capacity. During the assessed "Do Something" conditions, RFCs at the proposed roundabout would be a maximum of 0.45 (for the B5070 (N) link), with very little in the way of queuing predicted.

Existing B5070 Holyhead Road / Kronospan Access Junction

7.4.9 Given that there will be a reduction in flows at the existing Kronospan access, due to all HGVs and some staff transferring to the new north access road, it is not considered that there will be an any negative impact at this junction and the analysis is therefore simply presented for completeness within this assessment.

7.4.10 The results of the Junctions 10 assessments for the existing Kronospan site access junction are summarised in **Tables 7.3** and **Table 7.4** following.

Table 7.3 - B5070 Holyhead Road/Kronospan Access/Chapel Lane 2031 Future Year '*Do Nothing*' Conditions

Link	AM Peak (8:00am - 9:00am)		PM Peak (5:00pm - 6:00pm)	
	RFC	Queue (PCU)	RFC	Queue (PCU)
Right out of the existing site access	0.24	0.32	0.34	0.53
Left out of the existing site access	0.01	0.01	0.17	0.20
Ahead / Right into the existing site access	0.23	0.48	0.23	0.54

Table 7.4 - B5070 Holyhead Road/Kronospan Access/Chapel Lane 2031 Future Year '*Do Something*' Conditions

Link	AM Peak (8:00am - 9:00am)		PM Peak (5:00pm - 6:00pm)	
	RFC	Queue (PCU)	RFC	Queue (PCU)
Right out of the existing site access	0.00	0.00	0.21	0.28
Left out of the existing site access	0.00	0.00	0.14	0.16
Ahead / Right into the existing site access	0.04	0.05	0.12	0.28

7.4.11 The above results demonstrate that, during the assessed "Do Something" conditions, maximum RFCs at the site access junction would reduce to just 0.04 – 0.12, with reduced queuing also predicted. Comparison against the "Do Nothing" results identifies that the inclusion of the north access road would give rise to a beneficial impact upon the junction's capacity – maximum RFC values are expected to reduce from 0.23 to the abovementioned 0.04 – 0.12.

7.4.12 In summary, it is concluded that change in traffic distribution associated to the Proposed Development would give rise to a net benefit in the operation of the existing access junction and the proposed new roundabout would operate well within capacity.

8.0 MITIGATION MEASURES

8.1 Introduction

8.1.1 This chapter provide a summary of measures to discourage HGV drivers from travelling through the village of Chirk and from utilising the existing Kronospan access. Both those measures that currently exist and those that will be further implemented due to the Proposed Development will be discussed. As mentioned previously within this report the key benefit of the north access road is to ensure that HGV vehicles avoid passing through the centre of Chirk. The use of the north access road by HGV drivers therefore needs to be further advocated by the facility.

8.2 Existing Measures

8.2.1 A weight limit of 17.5 tonnes is currently in force to the south of the site between Chirk town centre and Gledrid Roundabout (with the A483), which serves to minimise heavy vehicle movements through the town centre and on less suitable sections of Holyhead Road. The weight limit restriction is signed to vehicles exiting the Kronospan site onto Holyhead Road. It is therefore considered that most HGVs travelling to and from the Kronospan Facility route via the B5070 Holyhead Road, and the A5 and A483, to the north. The delivery of the north access road further emphasises the need to ensure that HGV delivery vehicles continue to comply with this routing pattern.

8.3 Proposed Measures

8.3.1 Additional mitigation measures that will be imposed to enforce the use of the north access road by HGVs include the following:

- Haulier Management: Communication will be had between Kronospan and Hauliers at management level and all drivers will be advised of the new route / access in advance of dispatch;

- Driver Monitoring: Number plates of those HGVs that arrive at the existing (southern) access will be logged, those drivers will be issued with a leaflet (See **Appendix 11**) and re-directed to the north access road;

- Driver Training: Driver induction for all those HGV drivers visiting the site beforehand. The induction will include both a questionnaire and Health & Safety (H&S) information; and,

- Driver Notification: Maps illustrating the location of the new access (See **Appendix 11**), and associated routing strategy, will be provided to all drivers.

9.0 SUMMARY AND CONCLUSIONS

9.1.1 This TA has been prepared on behalf of Kronospan Ltd in relation to a planning application for the construction and operation of a north access road into the Kronospan Facility, lorry park (comprising 91 HGV parking bays), roundwood storage areas and associated structures, 132kV substation, and ancillary works on land immediately north of the existing Kronospan facility, Holyhead Road, Chirk.

9.1.2 The proposed access road to the north of the Site would be facilitated by a priority roundabout from Holyhead Road providing direct access off the A5 / A483 strategic road network, avoiding the need for HGVs to travel through the centre of Chirk.

9.1.3 As an important local business and employer in the area the intention of the future development is to improve efficiency and safeguard jobs. The Proposed Development will replace the existing lorry park facility and provide a better-quality environment for drivers.

9.1.4 WCBC's response to pre-app consultation confirmed the requirement for a detailed TA report accompanying the application which would set out changes in traffic flow both at the existing and proposed access junctions. Details of mitigation measures to be put in place ensuring a reduction in traffic using the main entrance would also need to be provided.

9.1.5 On 9th October 2019 planning permission (P/2018/0551 *APP/H6955/A/19/3227571*) was allowed by WBC for the development of the OSB production facility. This TA has been developed using fresh traffic count data, obtained in March 2022 and the inclusion of the OSB and a committed development.

9.1.6 Recent accident data collected from the CrashMap resource has been analysed. There is no evidence of any existing road safety issues which could be exacerbated by the inclusion of the access road and lorry park proposal. In addition, there were no incidents recorded that involved an HGV.

9.1.7 The accessibility of the site to sustainable transport has been assessed and it has been established that the site is located within an easy walk of the large residential area of Chirk. Several local settlements (including Chirk, Pontcysllte, and Weston Rhyn) are within a reasonable cycle distance of the Site. With conditions that are conductive for staff to cycle to the proposed new facility.

9.1.8 Bus stops close to the site are served by up to 3 services per hour on weekdays and Saturdays which provide connections to Chirk Town Centre, Wrexham and Llangollen. Chirk railway station is located within circa 15mins on foot and offers regular rail services to Birmingham, Holyhead and Cardiff, making multi-modal trips by rail / on foot a real possibility. Based on the above, it is evident that the site is accessible by sustainable travel modes and complies with Planning Policy Wales and local policies.

9.1.9 The historical operation of the Kronospan Facility in terms of traffic generation has been well documented through both operational weighbridge data and recent planning applications. Further information provided by the operator has also identified levels that the Kronospan facility has operated at during 2006, where weighbridge records identified that HGV loads were up to c900 two-way movements per day.

9.1.10 The development of the north access road requires the creation of a new compact roundabout junction from the B5070 further north of the existing facility. The proposed junction has been designed in strict accordance with CD116 Design Manual for Roads and Bridges (DMRB) guidance, '*Geometric design of roundabouts*'. The 91-space lorry park consists of landscaping measures to provide screening and biodiversity enhancements. Two weighbridges are being provided to serve incoming vehicles and a new state of the art welfare facility will provide amenities for drivers. No changes are proposed to site operation, the facility is still proposed to operate 24 hours a day, there will be no net change in employment levels, nor will there be any increase in HGV movements.

9.1.11 A trip re-distribution exercise has considered the forecast net changes in traffic flow that will arise from the Proposed Development. Review of the freshly obtained traffic count data (March 2022) identified that the traffic levels over the local highway network are experienced during the 08:00-09:00 and 17:00-18:00 peak periods. Changes over the 12-hour daytime period of 07:00-19:00 are also recorded.

9.1.12 Given that the traffic generation will remain unchanged, HGV movements have been captured from the weighbridge data and staff / light vehicle movements have been derived from the 2022 traffic flows recorded at the site access. All HGV movements, and a total of 20 two-way staff movements have been deducted from movements at the existing access and transferred to the new north access road roundabout junction. The percentage split in arrivals and departures has been adjusted so that

100% of HGV arrive / depart via the new access to / from the north. The distribution in staff movements north and south have been kept consistent with the observed traffic distribution established with reference to the MCC survey undertaken at the existing site access.

9.1.13 The percentage impact analysis of the construction traffic impact has identified a minimal impact on the assessed study area, with increases in traffic that are low in absolute terms. It is not expected that the proposed construction phase will result in any impact that could be considered severe.

9.1.14 The impact of the Proposed Development has been assessed through the consideration of both link flow impact as well as junction operational assessment across the study area.

9.1.15 The link flow analysis demonstrates that changes in peak hour traffic over the immediate local network, because of the reassignment of traffic from the Proposed Development, are likely to be extremely low. There would be a reduction in demands on most links except for the A5 east of the B5070 Holyhead Road / A5 roundabout where the maximum traffic impact demand would be 0.2% during the AM peak hour.

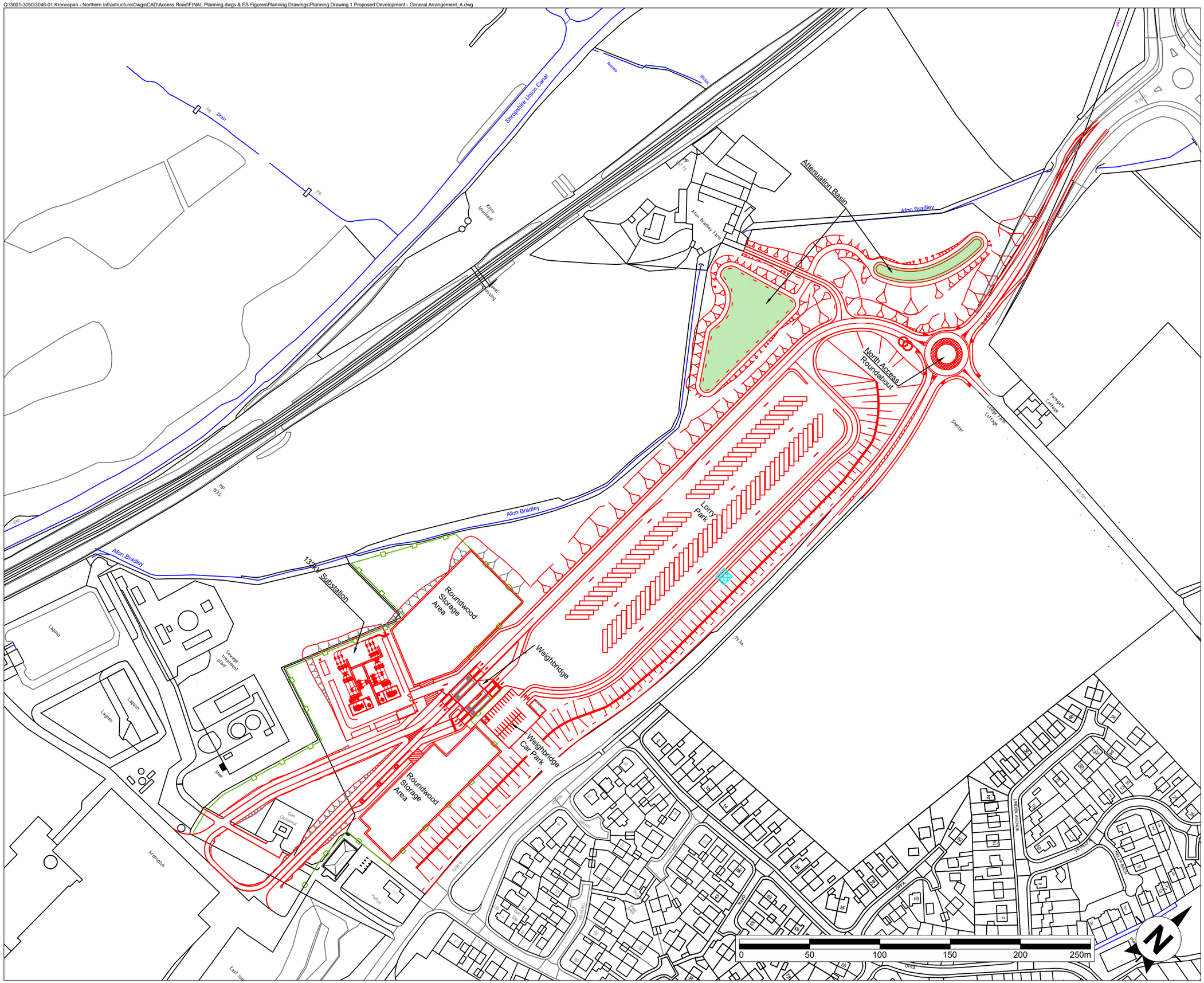
9.1.16 The junction operational analysis demonstrates that the new access road junction would operate well within capacity. The results of the analysis for the existing Kronospan site access junction identified that both RFCs and queues would reduce.

9.1.17 Several mitigation measures have been proposed to enforce HGV drivers to use the new northern access road, these include Haulier Management, Driver Monitoring, Driver Training and Driver Notification. The facility is committed to imposing these measures to ensure that HGV movements are diverted away from the existing access and Chirk town centre.

9.1.18 Based on the review of anticipated future operational highway conditions and reference to appropriate guideline standards, it is concluded that the Proposed Development would have a beneficial impact on operational or highway safety conditions over the local highway network. Accordingly there should be no overriding reasons for refusal of the planning application on highway grounds

APPENDIX 1 – PROPOSED SITE LAYOUT

Q:\3001-3050\3046-01 Kronospan - Northern Infrastructure\Dwgs\CAD\Access Road\FINAL Planning dwgs & ES Figures\Planning Drawings\Planning Drawing 1 Proposed Development - General Arrangement_A.dwg



•	Revision History	• Date
A	Protective measures for limekiln added	29.11.22

Key

- Proposed Development
- Proposed Fence
- Attenuation Basin
- Detailed design to include measures to protect lime kiln from construction damage

Chester Office:
Well House Barns
Bretton
Chester
CH4 0DH

South Manchester Office:
Camellia House
76 Water Lane
Wilmslow
SK9 5BB

0844 8700 007 - www.axisped.co.uk

axis

client: KRONOSPAN

project: KRONOSPAN NORTH ACCESS ROAD

drawing title: PROPOSED DEVELOPMENT - GENERAL ARRANGEMENT

date:	drawn by:	checked:
OCTOBER 2022	SK	BC

drawing number: PLANNING DRAWING 1

status: FOR PLANNING

scale(s): 1:2500@A3

rev: A

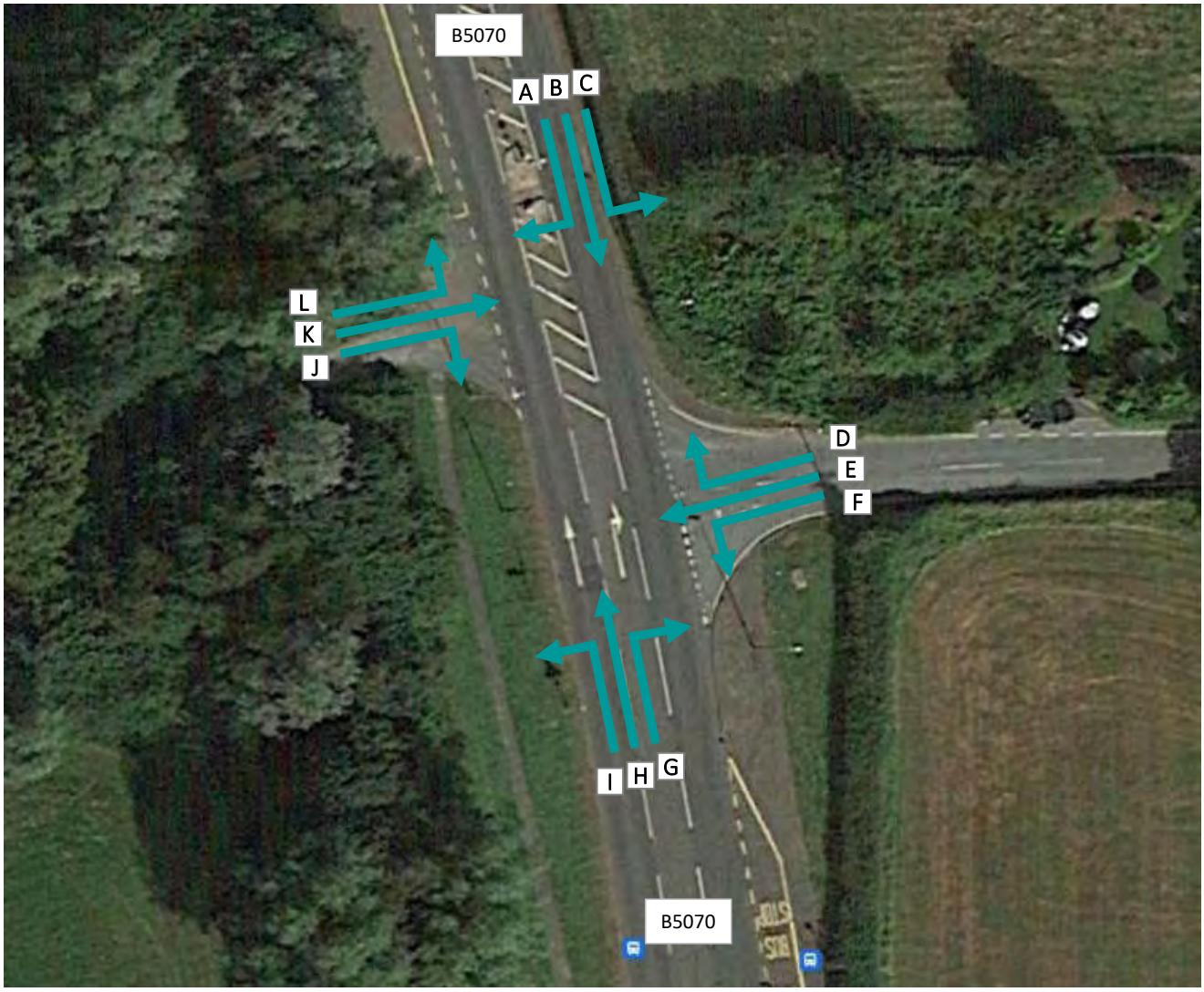
planning environment design

APPENDIX 2 – TRAFFIC SURVEY DATA

CLIENT: AXIS **PROJECT NUMBER:** 220301

PROJECT MANAGER: ADAM CARTER **DATE:** TUES 8TH MAR 2022

SURVEY DESCRIPTION: WREXHAM - MCC - SITE 2 - SITE PLAN



CLIENT: AXIS **PROJECT NUMBER:** 220301

PROJECT MANAGER: ADAM CARTER **DATE:** TUES 8TH MAR 2022

SURVEY DESCRIPTION: WREXHAM - MCC - SITE 2

	MOVEMENT A							MOVEMENT B							MOVEMENT C						
	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE
07:00 - 07:15	0	0	0	0	0	0	0	41	6	0	10	2	0	0	0	0	0	0	0	0	0
07:15 - 07:30	0	0	0	0	0	0	0	46	13	1	8	0	0	0	1	0	0	0	0	0	0
07:30 - 07:45	0	0	0	0	0	0	0	52	13	3	9	1	0	1	0	1	0	0	0	0	0
07:45 - 08:00	0	0	0	0	0	0	0	76	12	1	3	3	2	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	215	44	5	30	6	2	1	1	1	0	0	0	0	0
08:00 - 08:15	1	0	0	0	0	0	0	54	13	6	4	1	0	0	0	0	0	0	0	0	0
08:15 - 08:30	0	0	0	0	0	0	0	63	10	2	10	0	0	0	1	0	0	0	0	0	0
08:30 - 08:45	0	0	0	0	0	0	0	60	9	3	5	0	0	0	1	0	0	0	0	0	0
08:45 - 09:00	0	0	0	0	0	0	0	59	17	3	5	2	0	0	0	0	0	0	0	0	0
TOTAL	1	0	0	0	0	0	0	236	49	14	24	3	0	0	2	0	0	0	0	0	0
09:00 - 09:15	0	0	0	0	0	0	0	51	7	1	5	3	0	0	3	0	0	0	0	0	0
09:15 - 09:30	0	0	0	0	0	0	0	46	12	1	5	1	0	0	0	0	0	0	0	0	0
09:30 - 09:45	0	0	0	0	0	0	0	36	5	4	7	0	0	0	0	0	0	0	0	0	0
09:45 - 10:00	0	0	0	0	0	0	0	33	11	3	4	2	0	0	0	0	1	0	0	0	0
TOTAL	0	0	0	0	0	0	0	166	35	9	21	6	0	0	3	0	1	0	0	0	0
PERIOD TOTAL	1	0	0	0	0	0	0	617	128	28	75	15	2	1	6	1	1	0	0	0	0
16:00 - 16:15	0	0	0	0	0	0	0	61	5	2	8	0	0	0	0	0	0	0	0	0	0
16:15 - 16:30	0	0	0	0	0	0	0	66	12	0	6	2	2	0	1	0	0	0	0	0	0
16:30 - 16:45	0	0	0	0	0	0	0	68	16	0	8	0	1	0	1	1	0	0	0	0	0
16:45 - 17:00	0	0	0	0	0	0	0	92	17	0	2	1	1	0	1	1	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	287	50	2	24	3	4	0	3	2	0	0	0	0	0
17:00 - 17:15	0	0	0	0	0	0	0	100	12	1	4	1	1	0	2	0	0	0	0	0	0
17:15 - 17:30	0	0	0	0	0	0	0	106	4	1	2	3	1	0	0	0	0	0	0	0	0
17:30 - 17:45	0	0	0	0	0	0	0	80	8	0	1	2	0	0	3	0	0	0	0	0	0
17:45 - 18:00	0	0	0	0	0	0	0	69	8	0	1	0	0	0	1	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	355	32	2	8	6	2	0	6	0	0	0	0	0	0
18:00 - 18:15	0	0	0	0	0	0	0	63	7	0	4	2	2	1	1	0	0	0	0	0	0
18:15 - 18:30	0	0	0	0	0	0	0	54	5	1	2	0	0	0	0	0	0	0	0	0	0
18:30 - 18:45	0	0	0	0	0	0	0	42	6	0	1	1	0	0	0	0	0	0	0	0	0
18:45 - 19:00	0	0	0	0	0	0	0	43	5	0	1	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	202	23	1	8	3	2	1	1	0	0	0	0	0	0
PERIOD TOTAL	0	0	0	0	0	0	0	844	105	5	40	12	8	1	10	2	0	0	0	0	0
DAILY TOTAL	1	0	0	0	0	0	0	1461	233	33	115	27	10	2	16	3	1	0	0	0	0
GRAND TOTAL	1							1881							20						

CLIENT: AXIS **PROJECT NUMBER:** 220301

PROJECT MANAGER: ADAM CARTER **DATE:** TUES 8TH MAR 2022

SURVEY DESCRIPTION: WREXHAM - MCC - SITE 2

	MOVEMENT D							MOVEMENT E							MOVEMENT F						
	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE
07:00 - 07:15	2	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	0	0
07:15 - 07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0
07:30 - 07:45	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	3	1	0	0	0	0
07:45 - 08:00	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	1	2	0	0
TOTAL	3	1	0	0	0	0	0	0	0	0	2	0	0	0	8	3	2	1	2	0	0
08:00 - 08:15	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
08:15 - 08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
08:30 - 08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	0	0	0	0	0
08:45 - 09:00	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
TOTAL	3	1	0	0	0	0	0	0	0	0	0	0	0	0	10	2	0	0	1	0	0
09:00 - 09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
09:15 - 09:30	3	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0
09:30 - 09:45	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
09:45 - 10:00	0	0	0	0	0	0	1	0	0	0	0	0	0	0	5	1	0	0	0	0	0
TOTAL	3	1	0	0	0	0	1	0	0	0	1	0	0	0	11	1	0	0	0	0	0
PERIOD TOTAL	9	3	0	0	0	0	1	0	0	0	3	0	0	0	29	6	2	1	3	0	0
16:00 - 16:15	2	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0
16:15 - 16:30	3	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0
16:30 - 16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0
16:45 - 17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0
TOTAL	5	0	0	0	0	0	0	0	0	0	0	0	0	0	16	1	1	0	0	0	0
17:00 - 17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0
17:15 - 17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
17:30 - 17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1	0	0	0	0	0
17:45 - 18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	2	0	0	0	0	0
18:00 - 18:15	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	4	0	0	0	0	0
18:15 - 18:30	2	1	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0
18:30 - 18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0
18:45 - 19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
TOTAL	3	1	0	0	0	0	0	0	0	0	0	0	0	0	15	4	0	0	0	0	0
PERIOD TOTAL	8	1	0	0	0	0	0	0	0	0	0	0	0	0	51	7	1	0	0	0	0
DAILY TOTAL	17	4	0	0	0	0	1	0	0	0	3	0	0	0	80	13	3	1	3	0	0
GRAND TOTAL	22							3							100						

CLIENT: AXIS **PROJECT NUMBER:** 220301

PROJECT MANAGER: ADAM CARTER **DATE:** TUES 8TH MAR 2022

SURVEY DESCRIPTION: WREXHAM - MCC - SITE 2

	MOVEMENT G							MOVEMENT H							MOVEMENT I						
	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE
07:00 - 07:15	0	1	0	0	0	0	0	37	6	1	9	1	0	0	0	0	0	0	0	0	0
07:15 - 07:30	0	0	0	0	0	0	0	56	11	1	4	2	0	0	0	0	0	0	0	0	0
07:30 - 07:45	0	1	1	0	0	0	0	57	14	1	7	0	0	0	0	0	0	0	0	0	0
07:45 - 08:00	4	1	0	0	0	0	0	86	18	3	8	3	0	1	0	0	0	0	0	0	0
TOTAL	4	3	1	0	0	0	0	236	49	6	28	6	0	1	0	0	0	0	0	0	0
08:00 - 08:15	3	1	0	0	0	0	0	92	14	1	8	6	0	0	0	0	0	0	0	0	0
08:15 - 08:30	4	1	1	0	0	0	0	76	5	3	8	3	1	0	0	0	0	0	0	0	0
08:30 - 08:45	2	0	0	0	0	0	0	70	10	2	5	1	0	0	0	0	0	0	0	0	0
08:45 - 09:00	3	0	0	0	0	0	0	64	7	1	8	0	0	0	0	0	0	0	0	0	0
TOTAL	12	2	1	0	0	0	0	302	36	7	29	10	1	0	0	0	0	0	0	0	0
09:00 - 09:15	4	0	0	0	0	0	0	50	7	1	5	1	0	1	0	0	0	0	0	0	0
09:15 - 09:30	2	0	0	0	0	1	0	54	9	1	3	1	0	0	0	0	0	0	0	0	0
09:30 - 09:45	7	1	0	0	1	0	0	38	12	4	6	1	0	0	0	0	0	0	0	0	0
09:45 - 10:00	4	1	0	0	0	0	0	42	13	0	4	1	0	2	0	0	0	0	0	0	0
TOTAL	17	2	0	0	1	1	0	184	41	6	18	4	0	3	0	0	0	0	0	0	0
PERIOD TOTAL	33	7	2	0	1	1	0	722	126	19	75	20	1	4	0	0	0	0	0	0	0
16:00 - 16:15	6	0	0	0	0	0	0	77	18	2	6	4	0	0	0	0	0	0	0	0	0
16:15 - 16:30	5	1	0	0	0	0	0	59	11	3	9	0	0	0	0	0	0	0	0	0	0
16:30 - 16:45	4	1	0	0	0	0	0	88	13	2	7	3	0	0	0	0	0	0	0	0	0
16:45 - 17:00	3	1	0	0	0	0	0	84	9	0	4	0	1	0	0	0	0	0	0	0	0
TOTAL	18	3	0	0	0	0	0	308	51	7	26	7	1	0	0	0	0	0	0	0	0
17:00 - 17:15	6	3	0	0	0	0	0	131	11	1	8	2	1	0	0	0	0	0	0	0	0
17:15 - 17:30	3	1	0	0	0	0	0	80	7	0	1	0	2	0	0	0	0	0	0	0	0
17:30 - 17:45	5	1	0	0	0	0	0	78	12	1	8	1	0	0	0	0	0	0	0	0	0
17:45 - 18:00	2	1	0	0	0	0	0	53	4	0	2	1	2	0	0	0	0	0	0	0	0
TOTAL	16	6	0	0	0	0	0	342	34	2	19	4	5	0	0	0	0	0	0	0	0
18:00 - 18:15	6	0	0	0	0	0	0	79	7	1	2	3	1	1	0	0	0	0	0	0	0
18:15 - 18:30	3	0	0	0	0	0	0	57	6	0	3	0	0	0	0	0	0	0	0	0	0
18:30 - 18:45	4	0	0	0	0	0	0	60	4	0	1	0	1	0	0	0	0	0	0	0	0
18:45 - 19:00	3	0	0	0	0	0	0	41	3	0	2	0	0	0	0	0	0	0	0	0	0
TOTAL	16	0	0	0	0	0	0	237	20	1	8	3	2	1	0	0	0	0	0	0	0
PERIOD TOTAL	50	9	0	0	0	0	0	887	105	10	53	14	8	1	0	0	0	0	0	0	0
DAILY TOTAL	83	16	2	0	1	1	0	1609	231	29	128	34	9	5	0	0	0	0	0	0	0
GRAND TOTAL	103							2045							0						

CLIENT: AXIS **PROJECT NUMBER:** 220301

PROJECT MANAGER: ADAM CARTER **DATE:** TUES 8TH MAR 2022

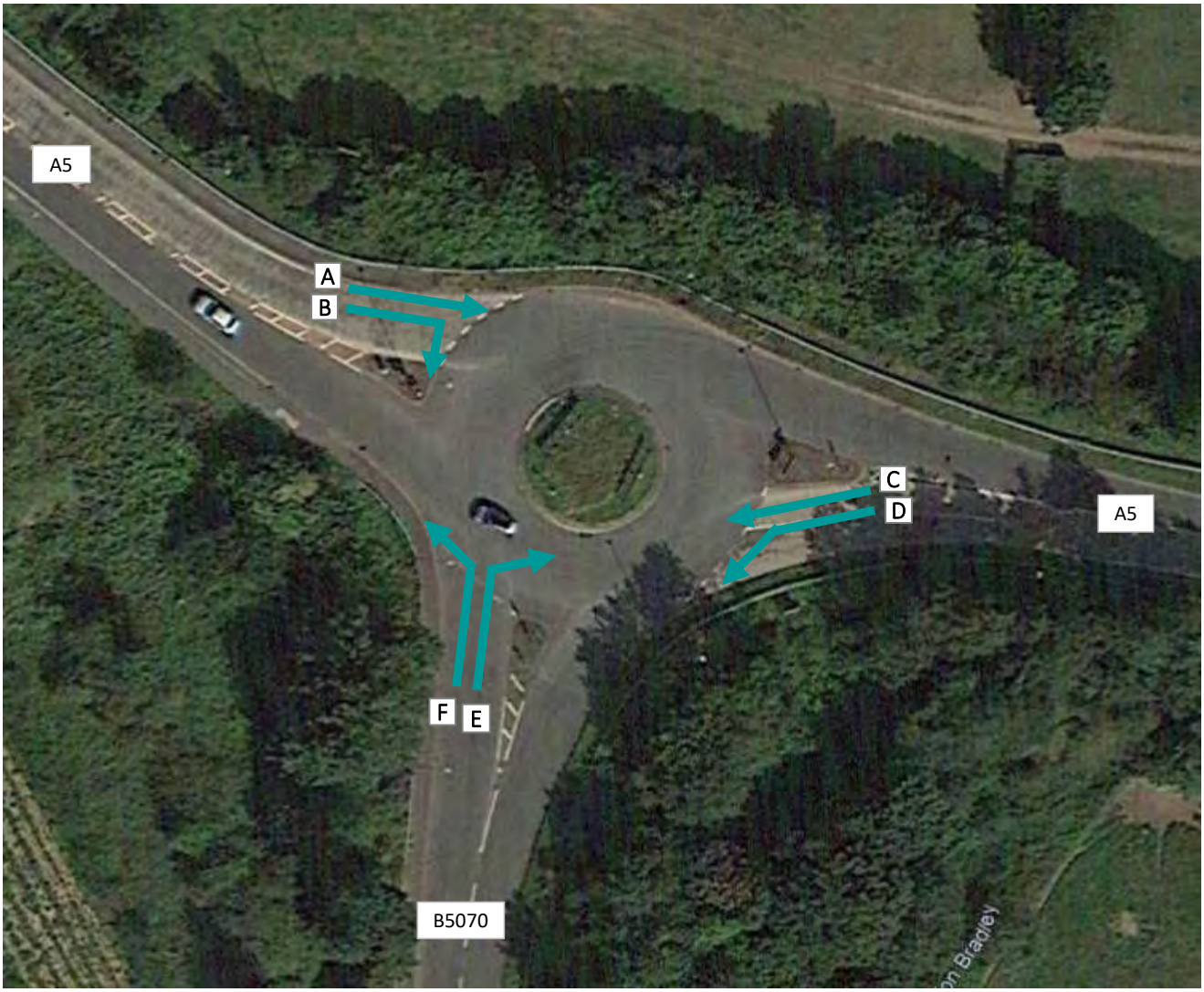
SURVEY DESCRIPTION: WREXHAM - MCC - SITE 2

	MOVEMENT J							MOVEMENT K							MOVEMENT L						
	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE
07:00 - 07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 - 07:30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
07:30 - 07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 - 08:00	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0
08:00 - 08:15	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 - 08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 - 09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:00 - 09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15 - 09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30 - 09:45	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
09:45 - 10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
PERIOD TOTAL	0	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	0	0	0	0
16:00 - 16:15	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	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	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15 - 17:30	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30 - 17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45 - 18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
TOTAL	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
18:00 - 18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15 - 18:30	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:30 - 18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:45 - 19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PERIOD TOTAL	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
DAILY TOTAL	2	0	0	0	0	0	0	0	0	0	3	0	0	0	1	1	0	0	0	0	0
GRAND TOTAL	2							3							2						

CLIENT: AXIS **PROJECT NUMBER:** 220301

PROJECT MANAGER: ADAM CARTER **DATE:** TUES 8TH MAR 2022

SURVEY DESCRIPTION: WREXHAM - MCC - SITE 3 - SITE PLAN



MERCURY TRAFFIC SURVEYS LTD

CLIENT: AXIS **PROJECT NUMBER:** 220301

PROJECT MANAGER: ADAM CARTER **DATE:** TUES 8TH MAR 2022

SURVEY DESCRIPTION: WREXHAM - MCC - SITE 3

	MOVEMENT A							MOVEMENT B						
	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE
07:00 - 07:15	32	9	2	2	0	0	0	8	1	0	0	0	0	0
07:15 - 07:30	22	5	0	1	0	0	0	12	4	0	0	0	0	0
07:30 - 07:45	44	10	1	2	0	1	0	20	3	2	0	0	0	0
07:45 - 08:00	37	11	1	3	1	1	0	27	5	1	0	2	1	0
TOTAL	135	35	4	8	1	2	0	67	13	3	0	2	1	0
08:00 - 08:15	53	6	3	5	0	0	0	22	3	2	0	0	0	0
08:15 - 08:30	55	15	1	1	0	0	0	20	1	2	0	0	0	0
08:30 - 08:45	37	6	4	2	1	0	0	20	2	1	2	0	0	0
08:45 - 09:00	39	7	1	0	1	0	0	21	7	0	0	1	0	0
TOTAL	184	34	9	8	2	0	0	83	13	5	2	1	0	0
09:00 - 09:15	39	7	2	6	0	0	0	24	1	0	0	1	0	0
09:15 - 09:30	23	7	1	4	0	0	0	23	2	0	0	0	0	0
09:30 - 09:45	23	4	1	4	1	0	0	16	0	1	0	0	0	0
09:45 - 10:00	18	7	3	0	0	0	0	17	4	1	0	0	0	0
TOTAL	103	25	7	14	1	0	0	80	7	2	0	1	0	0
PERIOD TOTAL	422	94	20	30	4	2	0	230	33	10	2	4	1	0
16:00 - 16:15	38	6	0	2	0	1	0	27	3	0	1	0	0	0
16:15 - 16:30	39	8	0	1	0	0	0	21	5	0	1	1	1	0
16:30 - 16:45	25	8	1	2	0	0	0	24	10	0	0	0	1	0
16:45 - 17:00	25	7	1	2	0	2	0	27	6	0	0	0	1	0
TOTAL	127	29	2	7	0	3	0	99	24	0	2	1	3	0
17:00 - 17:15	31	7	4	2	0	0	0	36	7	1	0	1	0	0
17:15 - 17:30	43	11	0	2	0	1	0	39	1	1	0	0	1	0
17:30 - 17:45	44	8	0	1	0	0	0	26	1	0	0	1	0	0
17:45 - 18:00	26	3	0	2	0	0	0	23	1	0	0	0	0	0
TOTAL	144	29	4	7	0	1	0	124	10	2	0	2	1	0
18:00 - 18:15	24	5	0	1	0	0	0	27	3	0	0	0	0	0
18:15 - 18:30	25	1	0	2	0	0	0	12	1	0	0	0	0	0
18:30 - 18:45	25	2	0	2	0	0	0	12	2	0	0	0	0	0
18:45 - 19:00	20	2	0	0	0	0	0	15	2	0	0	0	0	0
TOTAL	94	10	0	5	0	0	0	66	8	0	0	0	0	0
PERIOD TOTAL	365	68	6	19	0	4	0	289	42	2	2	3	4	0
DAILY TOTAL	787	162	26	49	4	6	0	519	75	12	4	7	5	0
GRAND TOTAL	1034							622						

MERCURY TRAFFIC SURVEYS LTD

CLIENT: AXIS **PROJECT NUMBER:** 220301

PROJECT MANAGER: ADAM CARTER **DATE:** TUES 8TH MAR 2022

SURVEY DESCRIPTION: WREXHAM - MCC - SITE 3

	MOVEMENT C							MOVEMENT D						
	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE
07:00 - 07:15	11	5	4	3	0	0	0	33	5	0	10	2	0	0
07:15 - 07:30	13	5	3	0	0	0	0	34	9	1	8	0	0	0
07:30 - 07:45	19	9	2	2	0	0	0	32	11	1	9	1	0	0
07:45 - 08:00	31	7	3	2	0	0	0	52	7	0	4	1	1	0
TOTAL	74	26	12	7	0	0	0	151	32	2	31	4	1	0
08:00 - 08:15	16	2	5	6	0	0	0	34	10	4	4	1	0	0
08:15 - 08:30	24	6	4	3	0	0	0	44	9	0	9	0	0	0
08:30 - 08:45	31	11	1	5	2	0	0	41	7	3	3	0	0	0
08:45 - 09:00	28	9	2	2	1	0	0	38	11	2	5	1	0	0
TOTAL	99	28	12	16	3	0	0	157	37	9	21	2	0	0
09:00 - 09:15	26	17	2	3	0	0	0	29	6	1	5	2	0	0
09:15 - 09:30	21	8	3	0	0	0	0	23	10	1	5	1	0	0
09:30 - 09:45	35	9	2	3	0	0	0	21	5	3	7	0	0	0
09:45 - 10:00	32	6	0	3	1	0	0	15	7	3	4	2	0	0
TOTAL	114	40	7	9	1	0	0	88	28	8	21	5	0	0
PERIOD TOTAL	287	94	31	32	4	0	0	396	97	19	73	11	1	0
16:00 - 16:15	28	8	1	2	0	0	0	35	2	2	7	0	0	0
16:15 - 16:30	32	5	1	0	0	0	0	45	7	0	5	1	1	0
16:30 - 16:45	35	4	0	1	0	0	0	44	7	0	8	0	0	0
16:45 - 17:00	33	4	0	0	0	1	0	69	12	0	2	1	1	0
TOTAL	128	21	2	3	0	1	0	193	28	2	22	2	2	0
17:00 - 17:15	35	7	1	1	1	0	0	64	5	0	3	0	0	0
17:15 - 17:30	38	6	0	2	0	0	0	71	3	0	2	3	0	0
17:30 - 17:45	27	7	0	1	0	0	0	57	7	0	1	1	0	0
17:45 - 18:00	22	5	0	0	1	0	0	44	7	0	1	0	0	0
TOTAL	122	25	1	4	2	0	0	236	22	0	7	4	0	0
18:00 - 18:15	23	5	0	3	0	0	0	39	6	0	4	2	2	0
18:15 - 18:30	26	3	0	0	0	0	0	41	3	1	2	0	0	0
18:30 - 18:45	23	3	0	0	0	0	0	29	6	0	1	1	0	0
18:45 - 19:00	23	1	1	0	0	0	0	31	1	0	1	0	0	0
TOTAL	95	12	1	3	0	0	0	140	16	1	8	3	2	0
PERIOD TOTAL	345	58	4	10	2	1	0	569	66	3	37	9	4	0
DAILY TOTAL	632	152	35	42	6	1	0	965	163	22	110	20	5	0
GRAND TOTAL	868							1285						

MERCURY TRAFFIC SURVEYS LTD

CLIENT: AXIS **PROJECT NUMBER:** 220301

PROJECT MANAGER: ADAM CARTER **DATE:** TUES 8TH MAR 2022

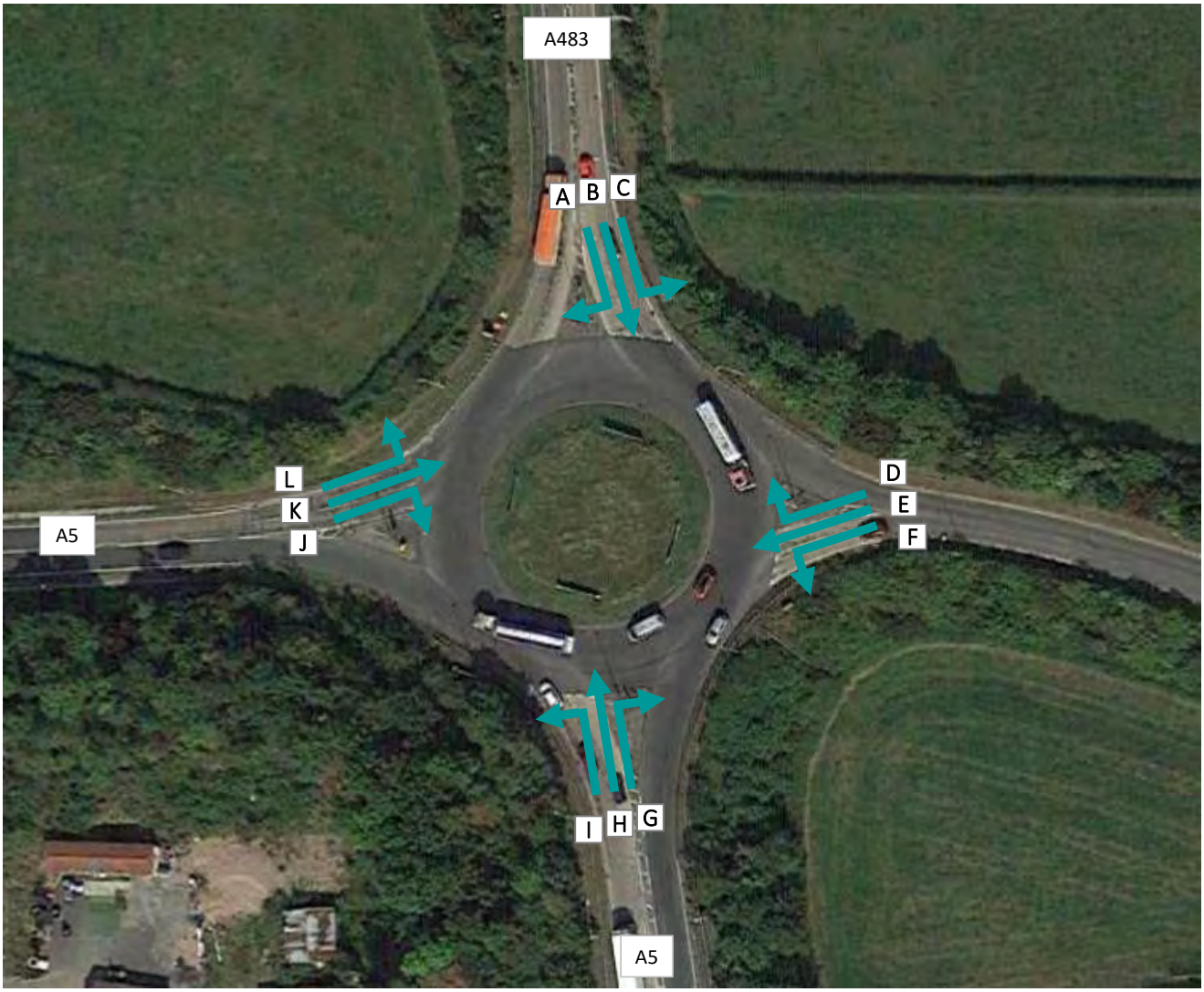
SURVEY DESCRIPTION: WREXHAM - MCC - SITE 3

	MOVEMENT E							MOVEMENT F						
	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE
07:00 - 07:15	36	4	1	9	1	0	0	3	2	0	0	0	0	0
07:15 - 07:30	47	10	1	4	1	0	0	8	1	0	0	1	0	0
07:30 - 07:45	45	11	1	7	0	0	0	13	3	0	0	0	0	0
07:45 - 08:00	63	11	2	8	2	0	0	24	8	1	0	1	0	1
TOTAL	191	36	5	28	4	0	0	48	14	1	0	2	0	1
08:00 - 08:15	64	8	1	7	1	0	0	29	5	0	1	4	0	0
08:15 - 08:30	48	5	2	7	1	0	0	24	0	1	1	3	1	0
08:30 - 08:45	45	7	1	5	1	0	0	29	3	1	0	0	0	0
08:45 - 09:00	38	3	0	8	0	0	0	26	5	1	0	0	0	0
TOTAL	195	23	4	27	3	0	0	108	13	3	2	7	1	0
09:00 - 09:15	31	5	1	3	1	0	0	19	2	0	2	0	0	1
09:15 - 09:30	35	3	1	4	1	0	0	20	6	0	0	0	0	0
09:30 - 09:45	21	7	3	6	1	0	0	19	6	1	0	0	0	0
09:45 - 10:00	23	6	0	4	0	0	0	17	7	0	0	1	0	3
TOTAL	110	21	5	17	3	0	0	75	21	1	2	1	0	4
PERIOD TOTAL	496	80	14	72	10	0	0	231	48	5	4	10	1	5
16:00 - 16:15	60	10	2	6	2	0	0	24	6	0	0	2	0	0
16:15 - 16:30	41	9	3	9	0	0	0	20	4	0	0	0	0	0
16:30 - 16:45	56	9	1	6	3	0	0	32	4	1	1	0	0	0
16:45 - 17:00	51	3	0	4	0	1	0	33	6	0	0	0	0	0
TOTAL	208	31	6	25	5	1	0	109	20	1	1	2	0	0
17:00 - 17:15	94	7	1	6	0	1	0	34	3	0	1	1	0	0
17:15 - 17:30	56	6	0	1	1	1	0	27	2	0	0	0	1	0
17:30 - 17:45	48	4	0	7	1	0	0	26	8	1	1	0	0	0
17:45 - 18:00	35	2	0	2	1	1	0	24	3	0	0	0	1	0
TOTAL	233	19	1	16	3	3	0	111	16	1	2	1	2	0
18:00 - 18:15	62	3	1	2	2	0	0	18	3	0	0	1	1	1
18:15 - 18:30	39	2	0	1	0	0	0	23	3	0	0	0	0	0
18:30 - 18:45	38	5	0	3	0	1	0	22	2	0	0	0	0	0
18:45 - 19:00	33	3	0	2	0	0	0	5	0	0	0	0	0	0
TOTAL	172	13	1	8	2	1	0	68	8	0	0	1	1	1
PERIOD TOTAL	613	63	8	49	10	5	0	288	44	2	3	4	3	1
DAILY TOTAL	1109	143	22	121	20	5	0	519	92	7	7	14	4	6
GRAND TOTAL	1420							649						

CLIENT: AXIS **PROJECT NUMBER:** 220301

PROJECT MANAGER: ADAM CARTER **DATE:** TUES 8TH MAR 2022

SURVEY DESCRIPTION: HALTON ROUNDABOUT - WREXHAM - MCC - SITE 4 - SITE PLAN



CLIENT: AXIS **PROJECT NUMBER:** 220301

PROJECT MANAGER: ADAM CARTER **DATE:** TUES 8TH MAR 2022

SURVEY DESCRIPTION: HALTON ROUNDABOUT - WREXHAM - MCC - SITE 4

	MOVEMENT A							MOVEMENT B							MOVEMENT C						
	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE
07:00 - 07:15	36	7	3	8	2	0	0	81	57	13	11	0	0	0	10	1	1	0	0	0	0
07:15 - 07:30	42	15	2	5	0	0	0	97	48	13	19	0	0	0	3	1	1	0	0	0	0
07:30 - 07:45	34	14	2	4	1	0	0	137	35	9	17	1	0	0	4	2	0	0	0	0	0
07:45 - 08:00	63	12	2	3	1	1	0	156	40	5	9	1	1	0	2	4	0	0	2	0	0
TOTAL	175	48	9	20	4	1	0	471	180	40	56	2	1	0	19	8	2	0	2	0	0
08:00 - 08:15	33	11	6	5	1	0	0	147	47	13	18	0	0	0	12	3	0	0	1	0	0
08:15 - 08:30	54	12	4	9	0	0	0	129	39	6	13	1	0	0	14	5	1	1	1	0	0
08:30 - 08:45	48	13	4	5	0	0	0	125	36	11	18	1	1	0	5	3	0	0	1	0	0
08:45 - 09:00	46	13	3	4	1	0	0	94	39	9	18	0	0	0	6	5	0	0	1	0	0
TOTAL	181	49	17	23	2	0	0	495	161	39	67	2	1	0	37	16	1	1	4	0	0
09:00 - 09:15	35	12	2	4	2	0	0	95	32	9	14	1	0	0	12	3	1	0	0	0	0
09:15 - 09:30	31	17	0	5	1	0	0	88	38	9	16	0	0	0	12	4	2	0	1	0	0
09:30 - 09:45	32	11	3	5	0	0	0	77	39	8	29	0	1	0	13	4	0	0	0	0	0
09:45 - 10:00	32	9	3	3	2	0	0	99	46	12	21	0	1	0	10	2	0	0	0	0	0
TOTAL	130	49	8	17	5	0	0	359	155	38	80	1	2	0	47	13	3	0	1	0	0
PERIOD TOTAL	486	146	34	60	11	1	0	1325	496	117	203	5	4	0	103	37	6	1	7	0	0
16:00 - 16:15	43	6	1	3	0	0	0	143	39	3	10	0	1	0	16	1	0	0	0	0	0
16:15 - 16:30	56	7	1	2	1	1	0	149	35	5	16	1	0	0	11	3	0	0	0	0	0
16:30 - 16:45	55	9	0	5	0	0	0	160	34	6	6	0	0	0	20	1	0	0	0	0	0
16:45 - 17:00	80	13	0	2	1	1	0	147	33	4	13	0	0	0	14	4	0	0	0	0	0
TOTAL	234	35	2	12	2	2	0	599	141	18	45	1	1	0	61	9	0	0	0	0	0
17:00 - 17:15	71	6	1	0	1	0	0	173	30	1	8	0	1	0	9	1	0	0	0	0	0
17:15 - 17:30	88	5	0	2	3	0	0	172	21	5	10	0	2	0	6	0	0	0	0	0	0
17:30 - 17:45	64	7	0	0	1	0	0	156	19	1	18	0	0	0	11	1	0	0	0	0	0
17:45 - 18:00	54	10	0	0	1	0	0	177	16	4	16	1	0	0	17	1	0	0	0	0	0
TOTAL	277	28	1	2	6	0	0	678	86	11	52	1	3	0	43	3	0	0	0	0	0
18:00 - 18:15	45	8	0	2	1	2	0	118	10	1	6	0	0	0	15	3	0	0	0	0	0
18:15 - 18:30	48	4	0	0	0	0	0	120	13	3	8	0	0	0	18	2	0	0	0	0	0
18:30 - 18:45	38	8	1	1	1	0	0	104	11	2	3	0	0	0	19	1	0	0	0	0	0
18:45 - 19:00	33	4	1	1	0	0	0	90	7	2	4	0	0	0	10	2	0	0	0	0	0
TOTAL	164	24	2	4	2	2	0	432	41	8	21	0	0	0	62	8	0	0	0	0	0
PERIOD TOTAL	675	87	5	18	10	4	0	1709	268	37	118	2	4	0	166	20	0	0	0	0	0
DAILY TOTAL	1161	233	39	78	21	5	0	3034	764	154	321	7	8	0	269	57	6	1	7	0	0
GRAND TOTAL	1537							4288							340						

CLIENT: AXIS **PROJECT NUMBER:** 220301

PROJECT MANAGER: ADAM CARTER **DATE:** TUES 8TH MAR 2022

SURVEY DESCRIPTION: HALTON ROUNDABOUT - WREXHAM - MCC - SITE 4

	MOVEMENT D							MOVEMENT E							MOVEMENT F						
	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE
07:00 - 07:15	7	4	0	0	0	0	0	1	3	0	1	0	0	0	6	4	0	0	0	0	0
07:15 - 07:30	7	3	0	0	0	0	0	1	0	0	0	0	0	0	7	0	1	0	0	0	0
07:30 - 07:45	10	2	0	0	0	0	0	4	0	0	0	0	0	0	7	5	0	0	0	0	0
07:45 - 08:00	7	1	0	0	0	0	0	1	0	0	0	0	0	0	4	0	0	0	0	0	0
TOTAL	31	10	0	0	0	0	0	7	3	0	1	0	0	0	24	9	1	0	0	0	0
08:00 - 08:15	7	3	0	0	0	0	0	6	2	0	0	0	0	0	8	3	0	0	0	0	0
08:15 - 08:30	16	0	0	0	0	0	0	3	0	0	0	0	0	0	8	1	0	0	0	0	0
08:30 - 08:45	11	4	0	0	0	0	0	5	2	1	0	2	0	0	2	5	1	0	0	0	0
08:45 - 09:00	13	2	0	1	0	0	0	2	1	0	0	0	0	0	8	3	0	0	0	0	0
TOTAL	47	9	0	1	0	0	0	16	5	1	0	2	0	0	26	12	1	0	0	0	0
09:00 - 09:15	7	1	0	1	1	0	0	3	1	0	0	0	0	0	4	3	0	0	0	0	0
09:15 - 09:30	12	2	0	0	1	0	0	3	0	1	0	0	0	0	6	0	0	1	0	0	0
09:30 - 09:45	6	0	0	0	0	0	0	3	0	0	0	0	0	0	4	6	0	1	0	0	0
09:45 - 10:00	9	2	0	0	0	0	0	0	0	0	0	1	0	0	7	0	1	0	0	0	0
TOTAL	34	5	0	1	2	0	0	9	1	1	0	1	0	0	21	9	1	2	0	0	0
PERIOD TOTAL	112	24	0	2	2	0	0	32	9	2	1	3	0	0	71	30	3	2	0	0	0
16:00 - 16:15	12	3	0	0	0	0	0	0	3	0	0	0	0	0	12	1	0	0	0	0	0
16:15 - 16:30	12	1	0	0	0	0	0	4	0	0	0	0	0	0	5	1	0	0	0	0	0
16:30 - 16:45	12	2	0	0	0	0	0	5	0	0	0	0	0	0	9	0	0	0	0	0	0
16:45 - 17:00	11	2	0	0	0	0	0	5	0	0	0	0	0	0	13	0	0	0	0	0	0
TOTAL	47	8	0	0	0	0	0	14	3	0	0	0	0	0	39	2	0	0	0	0	0
17:00 - 17:15	9	0	0	0	0	0	0	4	1	0	0	0	0	0	8	1	0	0	0	0	0
17:15 - 17:30	15	3	0	0	0	0	0	4	1	0	0	0	0	0	6	0	0	0	0	0	0
17:30 - 17:45	11	2	0	0	0	0	0	1	0	0	0	0	0	0	2	2	0	0	0	0	0
17:45 - 18:00	15	1	0	0	0	0	0	3	1	0	0	0	0	0	10	1	0	0	0	0	0
TOTAL	50	6	0	0	0	0	0	12	3	0	0	0	0	0	26	4	0	0	0	0	0
18:00 - 18:15	14	2	0	0	0	0	0	2	1	0	0	0	0	0	8	0	0	0	0	0	0
18:15 - 18:30	13	4	0	0	0	0	0	8	0	0	0	0	0	0	8	1	0	0	0	0	0
18:30 - 18:45	15	0	1	0	0	0	0	4	0	0	0	0	0	0	2	0	0	0	0	0	0
18:45 - 19:00	14	3	0	0	0	0	0	3	0	0	0	0	0	0	13	2	0	0	0	0	0
TOTAL	56	9	1	0	0	0	0	17	1	0	0	0	0	0	31	3	0	0	0	0	0
PERIOD TOTAL	153	23	1	0	0	0	0	43	7	0	0	0	0	0	96	9	0	0	0	0	0
DAILY TOTAL	265	47	1	2	2	0	0	75	16	2	1	3	0	0	167	39	3	2	0	0	0
GRAND TOTAL	317							97							211						

CLIENT: AXIS **PROJECT NUMBER:** 220301

PROJECT MANAGER: ADAM CARTER **DATE:** TUES 8TH MAR 2022

SURVEY DESCRIPTION: HALTON ROUNDABOUT - WREXHAM - MCC - SITE 4

	MOVEMENT G							MOVEMENT H							MOVEMENT I						
	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE
07:00 - 07:15	5	3	0	0	0	0	0	105	36	7	21	0	0	0	5	0	1	4	0	0	0
07:15 - 07:30	7	3	0	0	0	0	0	151	40	5	22	0	0	0	8	1	2	3	0	0	0
07:30 - 07:45	11	0	0	0	0	0	0	166	33	8	18	1	0	0	12	6	1	8	0	0	0
07:45 - 08:00	6	1	1	0	0	0	0	173	43	4	11	1	0	0	16	1	1	3	0	0	0
TOTAL	29	7	1	0	0	0	0	595	152	24	72	2	0	0	41	8	5	18	0	0	0
08:00 - 08:15	5	0	0	0	0	0	0	160	29	11	13	0	1	0	11	0	2	5	0	0	0
08:15 - 08:30	3	0	1	0	0	0	0	166	39	4	15	0	0	0	13	2	0	3	0	0	0
08:30 - 08:45	10	0	1	0	0	0	0	155	29	8	14	1	1	0	21	5	0	3	0	0	0
08:45 - 09:00	9	4	0	2	0	0	0	115	31	7	24	0	0	0	15	6	1	2	1	0	0
TOTAL	27	4	2	2	0	0	0	596	128	30	66	1	2	0	60	13	3	13	1	0	0
09:00 - 09:15	6	1	0	0	0	0	0	135	29	10	17	1	1	0	14	9	1	4	0	0	0
09:15 - 09:30	5	1	0	0	0	0	0	126	27	11	18	0	0	0	11	2	2	3	0	0	0
09:30 - 09:45	9	1	0	0	0	0	0	113	26	7	21	1	1	0	20	2	2	2	0	0	0
09:45 - 10:00	8	0	0	0	0	0	0	93	22	8	20	1	0	0	15	4	0	4	0	0	0
TOTAL	28	3	0	0	0	0	0	467	104	36	76	3	2	0	60	17	5	13	0	0	0
PERIOD TOTAL	84	14	3	2	0	0	0	1658	384	90	214	6	4	0	161	38	13	44	1	0	0
16:00 - 16:15	12	3	0	0	0	0	0	108	48	4	11	1	0	0	20	3	1	6	0	0	0
16:15 - 16:30	9	2	0	1	0	0	0	141	45	5	13	0	1	0	20	3	0	3	0	0	0
16:30 - 16:45	11	0	0	0	0	0	0	167	40	4	9	0	0	0	16	2	0	4	0	0	0
16:45 - 17:00	7	1	0	0	0	0	0	128	46	4	7	0	0	0	19	3	0	1	0	1	0
TOTAL	39	6	0	1	0	0	0	544	179	17	40	1	1	0	75	11	1	14	0	1	0
17:00 - 17:15	12	0	0	0	0	0	0	178	43	5	7	0	0	0	19	5	0	3	0	0	0
17:15 - 17:30	10	1	0	0	0	0	0	170	38	1	9	1	2	0	17	5	0	3	0	0	0
17:30 - 17:45	10	2	0	0	0	0	0	175	43	10	14	3	0	0	16	4	0	2	0	0	0
17:45 - 18:00	12	2	0	0	0	0	0	160	20	4	5	0	2	0	9	1	0	1	1	0	0
TOTAL	44	5	0	0	0	0	0	683	144	20	35	4	4	0	61	15	0	9	1	0	0
18:00 - 18:15	19	2	0	0	0	0	0	136	14	1	8	1	0	0	12	3	0	4	0	0	0
18:15 - 18:30	9	1	0	1	0	0	0	105	11	5	7	1	0	0	11	2	1	2	0	0	0
18:30 - 18:45	9	1	0	0	0	0	0	123	13	3	6	0	0	0	14	1	0	0	0	0	0
18:45 - 19:00	6	2	0	0	0	0	0	93	16	0	3	0	0	0	13	0	0	0	0	0	0
TOTAL	43	6	0	1	0	0	0	457	54	9	24	2	0	0	50	6	1	6	0	0	0
PERIOD TOTAL	126	17	0	2	0	0	0	1684	377	46	99	7	5	0	186	32	2	29	1	1	0
DAILY TOTAL	210	31	3	4	0	0	0	3342	761	136	313	13	9	0	347	70	15	73	2	1	0
GRAND TOTAL	248							4574							508						

CLIENT: AXIS **PROJECT NUMBER:** 220301

PROJECT MANAGER: ADAM CARTER **DATE:** TUES 8TH MAR 2022

SURVEY DESCRIPTION: HALTON ROUNDABOUT - WREXHAM - MCC - SITE 4

	MOVEMENT J							MOVEMENT K							MOVEMENT L						
	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE	CAR	LGV	OGV 1	OGV 2	PSV	M/C	CYCLE
07:00 - 07:15	19	7	0	3	0	0	0	1	0	0	0	0	0	0	50	7	3	9	1	0	0
07:15 - 07:30	9	4	0	3	0	0	0	1	1	0	0	0	0	0	57	10	1	2	1	0	0
07:30 - 07:45	20	7	1	3	0	1	0	1	0	0	0	0	0	0	69	14	0	4	0	0	0
07:45 - 08:00	18	4	1	6	0	1	0	3	0	0	0	0	0	0	79	18	3	7	2	0	0
TOTAL	66	22	2	15	0	2	0	6	1	0	0	0	0	0	255	49	7	22	4	0	0
08:00 - 08:15	20	1	0	8	0	0	0	1	0	0	0	0	0	0	82	12	3	3	2	0	0
08:15 - 08:30	39	9	0	2	0	0	0	1	0	1	0	0	0	0	80	11	1	7	1	0	0
08:30 - 08:45	18	0	3	3	0	0	0	1	2	0	0	0	0	0	63	12	3	3	1	0	0
08:45 - 09:00	17	3	0	2	0	0	0	5	0	0	0	0	0	0	55	7	0	7	2	0	0
TOTAL	94	13	3	15	0	0	0	8	2	1	0	0	0	0	280	42	7	20	6	0	0
09:00 - 09:15	17	5	0	3	0	0	0	2	0	0	0	0	0	0	50	6	4	5	1	0	0
09:15 - 09:30	17	4	0	1	0	0	0	4	0	0	0	0	0	0	40	7	1	8	1	0	0
09:30 - 09:45	11	0	2	4	0	0	0	0	1	0	0	0	0	0	32	9	3	5	2	0	0
09:45 - 10:00	7	6	1	1	0	0	0	2	0	0	0	0	0	0	30	8	2	4	0	0	0
TOTAL	52	15	3	9	0	0	0	8	1	0	0	0	0	0	152	30	10	22	4	0	0
PERIOD TOTAL	212	50	8	39	0	2	0	22	4	1	0	0	0	0	687	121	24	64	14	0	0
16:00 - 16:15	30	2	0	4	0	1	0	0	0	0	0	0	0	0	72	16	2	5	2	0	0
16:15 - 16:30	12	3	0	5	0	0	0	4	0	0	0	0	0	0	54	15	3	4	0	0	0
16:30 - 16:45	22	1	0	8	0	0	0	4	1	0	0	0	0	0	67	16	1	1	2	0	0
16:45 - 17:00	16	2	0	3	0	0	0	0	1	0	0	0	0	0	56	8	2	2	1	3	0
TOTAL	80	8	0	20	0	1	0	8	2	0	0	0	0	0	249	55	8	12	5	3	0
17:00 - 17:15	19	3	4	7	0	0	0	1	1	0	0	0	0	0	81	10	1	2	0	1	0
17:15 - 17:30	24	2	0	2	0	0	0	6	2	0	0	0	0	0	92	13	0	1	1	2	0
17:30 - 17:45	26	3	0	2	0	0	0	7	0	0	0	0	0	0	61	8	0	3	1	0	0
17:45 - 18:00	17	3	0	4	0	0	0	3	0	0	0	0	0	0	47	2	0	2	1	0	0
TOTAL	86	11	4	15	0	0	0	17	3	0	0	0	0	0	281	33	1	8	3	3	0
18:00 - 18:15	12	1	0	3	0	0	0	4	3	0	0	0	0	0	64	4	1	1	2	1	0
18:15 - 18:30	14	0	0	2	0	0	0	4	0	0	0	0	0	0	46	4	0	1	0	0	0
18:30 - 18:45	17	1	0	4	0	0	0	4	0	0	0	0	0	0	49	5	0	1	0	1	0
18:45 - 19:00	10	0	0	1	0	0	0	3	2	0	0	0	0	0	40	1	0	1	0	0	0
TOTAL	53	2	0	10	0	0	0	15	5	0	0	0	0	0	199	14	1	4	2	2	0
PERIOD TOTAL	219	21	4	45	0	1	0	40	10	0	0	0	0	0	729	102	10	24	10	8	0
DAILY TOTAL	431	71	12	84	0	3	0	62	14	1	0	0	0	0	1416	223	34	88	24	8	0
GRAND TOTAL	601							77							1793						

APPENDIX 3 – BASELINE TRAFFIC FLOW FIGURES

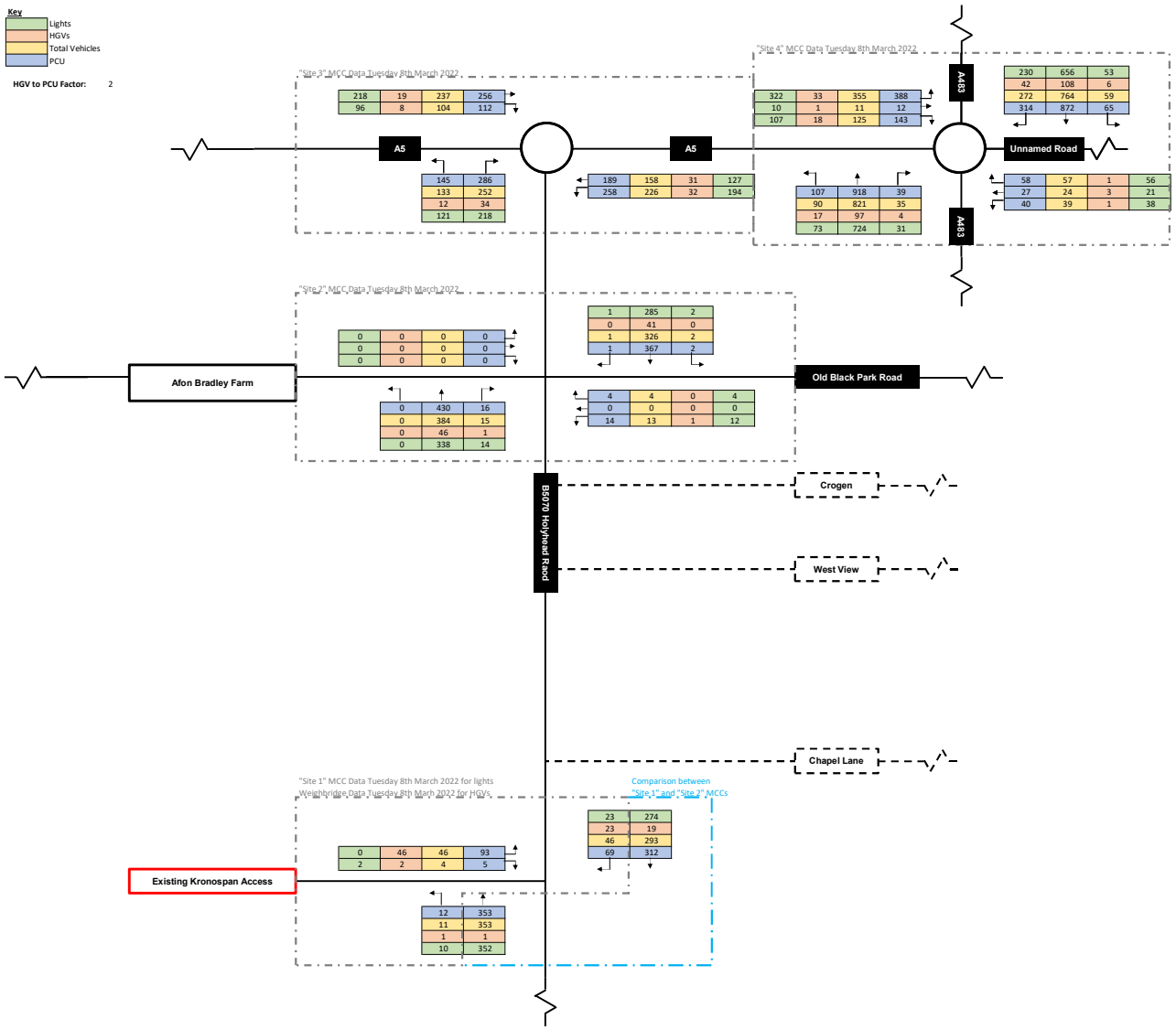


Figure: 1
Project Name: Kronospan Northern Infrastructure
Project Number: 3162-01
Description: Observed Traffic Flows (2022)
Period: AM (8:00am - 9:00am)

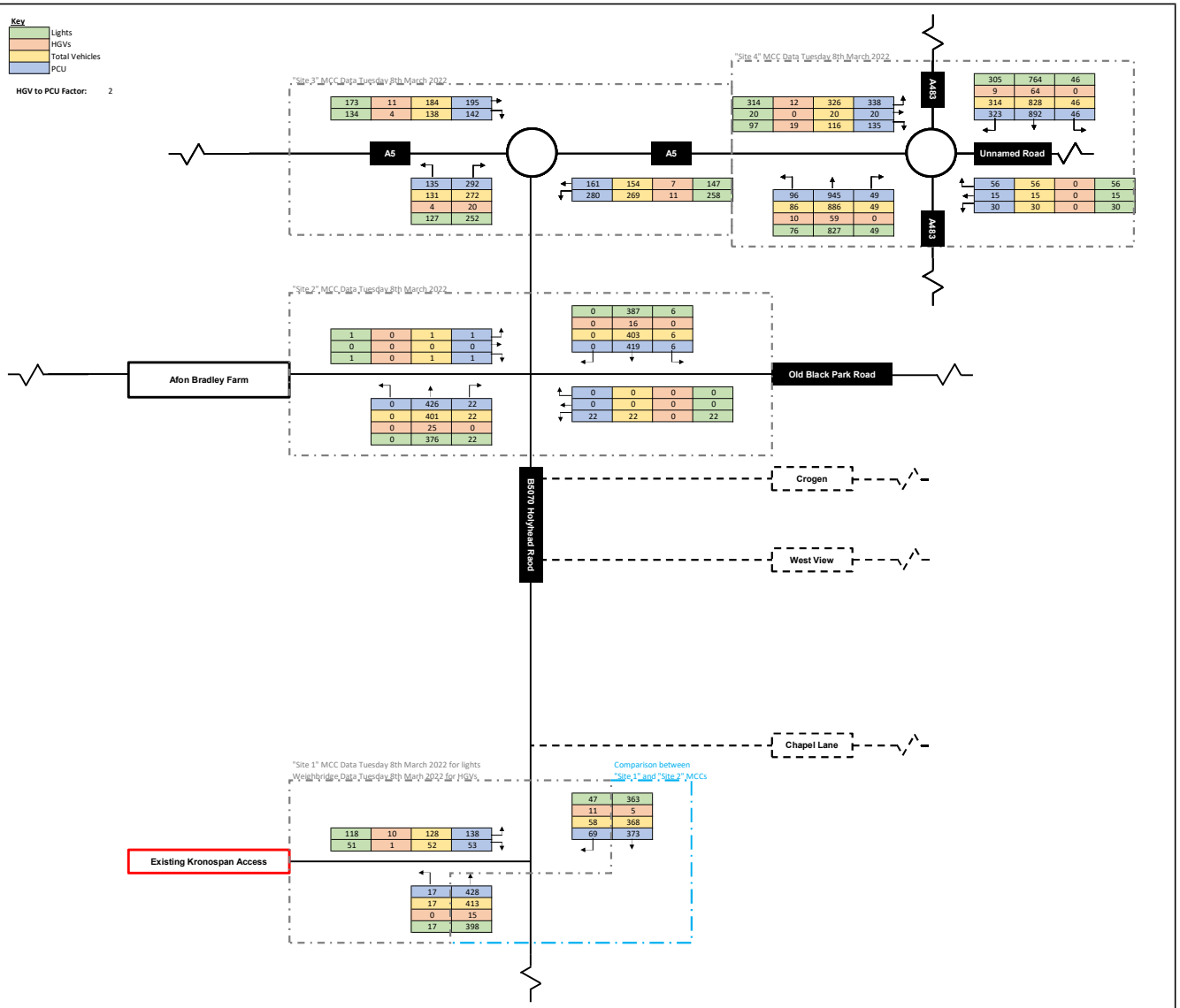


Figure: 2
Project Name: Kronospan Northern Infrastructure
Project Number: 3162-01
Description: Observed Traffic Flows (2022)
Period: PM (5:00pm - 6:00pm)

APPENDIX 4 – DRAWING NO. 3046-01-D01A: PROPOSED ROUNDABOUT LAYOUT AND DRAWING NO. 3046-01-ATR01A: SWEPT PATH ANALYSIS

Q:\3001-3050\3046-01 Kronospan - Northern Infrastructure\Dwgs\CAD\Transport\3046-01-D01-ATR01B Proposed Roundabout V1.4_Arb Overlay.dwg

PROPOSED ROAD LAYOUT OVERVIEW

PROPOSED FOOTWAY TO TIE INTO EXISTING FOOTWAY OFF THE B5070

TACTILE PAVING CROSSING POINTS

OVERUNNABLE AREA

TREES TO BE RETAINED

TACTILE PAVING CROSSING POINTS

PROPOSED FOOTWAY TO TIE INTO EXISTING FOOT / CYCLEWAY OF THE B5070

2.00

Sinks

Parkg
Cotta

Lodge Farm Cottage

Shelter

VISIBILITY SPLAYS

120m APPROACH VISIBILITY

70m APPROACH VISIBILITY

120m APPROACH VISIBILITY

CIRCULATORY CARRIAGEWAY VISIBILITY

2.00

Afon Bradley

Parkgate Cottage

Lodge Farm Cottage

94.5m

Shelter

N

• Revision History		• Date
A	REVISED SITE LAYOUT	11.10.22

KEY:

- PROPOSED LAYOUT
- PROPOSED ROAD MARKINGS
- EXISTING FEATURES

Chester Office
Well House Barns
Bretton
Chester
CH4 0DH

South Manchester Office
Camellia House
76 Water Lane
Wilmslow
SK9 5BB

0844 8700 007 · www.axisped.co.uk

axis

client: KRONOSPAN

project: KRONOSPAN NORTHERN INFRASTRUCTURE

drawing title: PROPOSED ROUNDABOUT LAYOUT AND VISIBILITY SPLAYS

date:	drawn by:	checked:
29.05.22	JW	LK

drawing number: 3046-01-D01

status: PRELIM

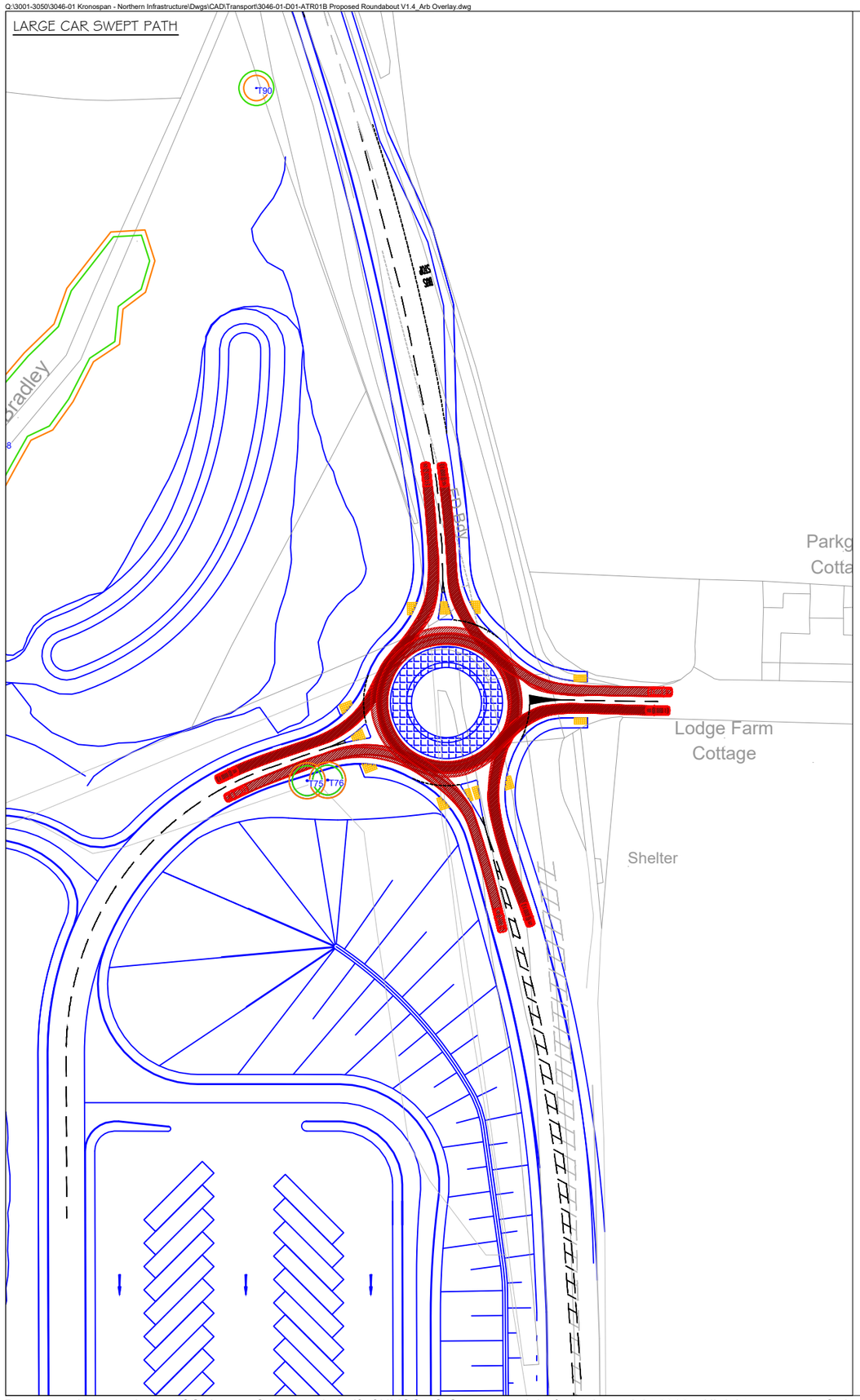
scale(s): 1:1250@A3

rev: A

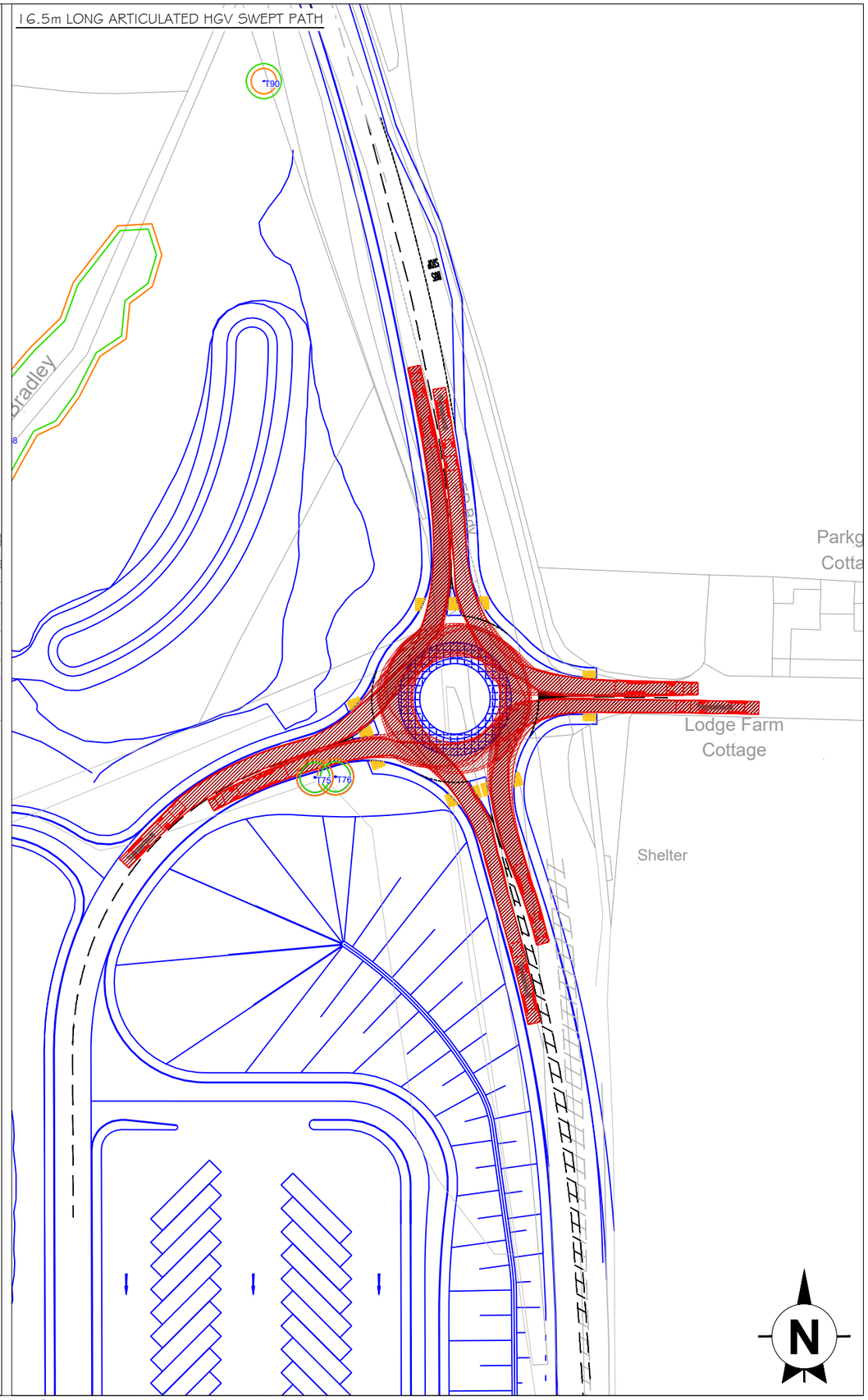
planning environment design

Q:\3001-3050\3046-01 Kronospan - Northern Infrastructure\Dwgs\CAD\Transport\3046-01-D01-ATR01B Proposed Roundabout V1.4_Arb Overlay.dwg

LARGE CAR SWEPT PATH



16.5m LONG ARTICULATED HGV SWEPT PATH

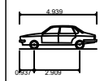


•	Revision History	• Date
A	REVISED SITE LAYOUT	11.10.22

KEY:

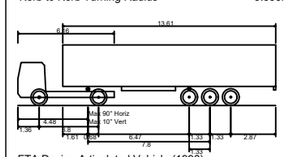
- PROPOSED LAYOUT
- PROPOSED ROAD MARKINGS
- EXISTING FEATURES

VEHICLES USED IN TRACKING:



Jaguar S-Type

Overall Length	4.939m
Overall Width	1.878m
Overall Body Height	1.474m
Min Body Ground Clearance	0.259m
Max Track Width	1.544m
Lock to lock time	4.00s
Kerb to Kerb Turning Radius	6.000m



FTA Design Articulated Vehicle (1998)

Overall Length	16.480m
Overall Width	2.550m
Overall Body Height	3.870m
Min Body Ground Clearance	0.515m
Max Track Width	2.470m
Lock to lock time	3.00s
Kerb to Kerb Turning Radius	6.550m

Chester Office:
Well House Barns
Bretton
Chester
CH4 0DH

South Manchester Office:
Camellia House
76 Water Lane
Wilmslow
SK9 5BB

0844 8700 007 • www.axisped.co.uk

axis

client: KRONOSPAN

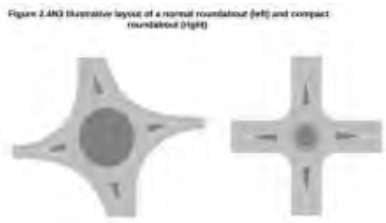
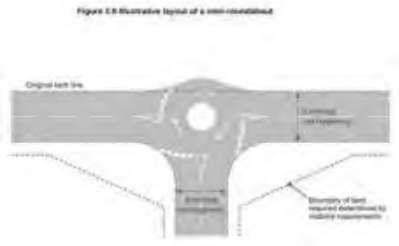
project: KRONOSPAN NORTHERN INFRASTRUCTURE

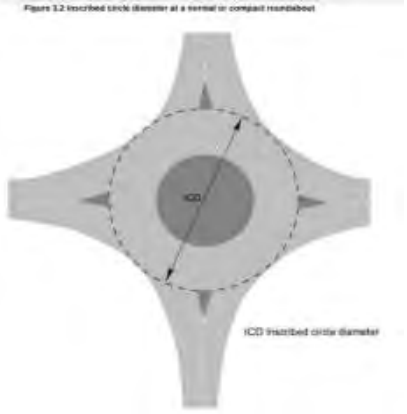
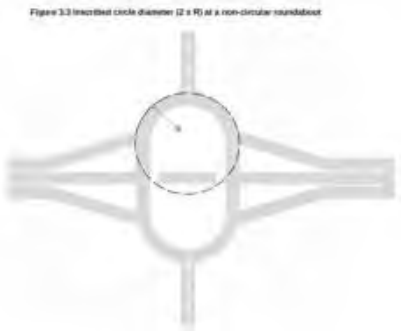
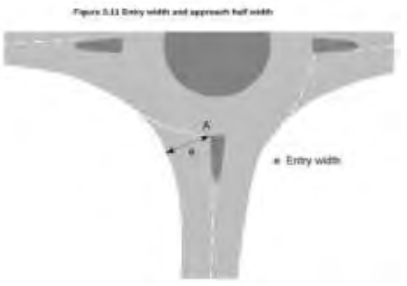
drawing title: PROPOSED ROUNDABOUT SWEPT PATH ANALYSIS

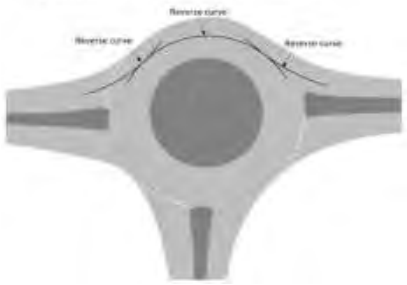
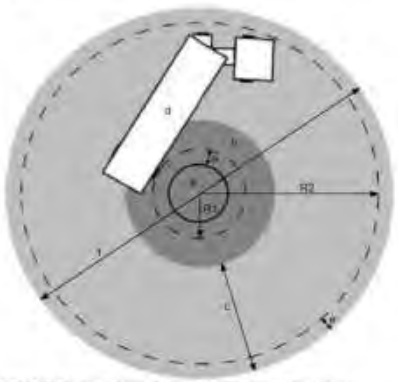
date: 29.05.22	drawn by: JW	checked: LK
drawing number: 3046-01-ATR01	status: PRELIM	
scale(s): 1:1000@A3	rev: A	

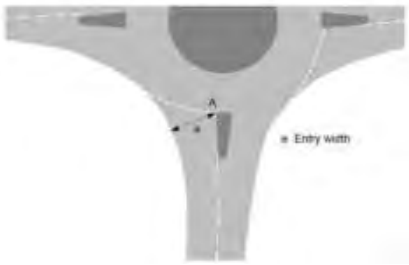
planning environment design

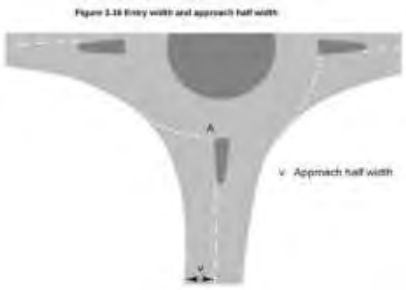
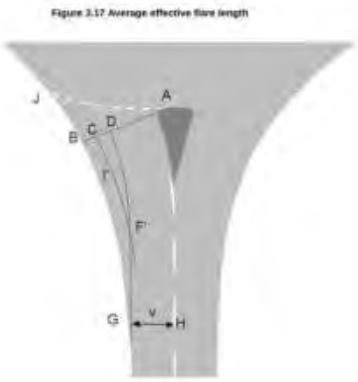
APPENDIX 5 - CD116 (REV 2) PRIORITY CONTROLLED ROUNDABOUT DESIGN COMPLIANCE CHECKLIST

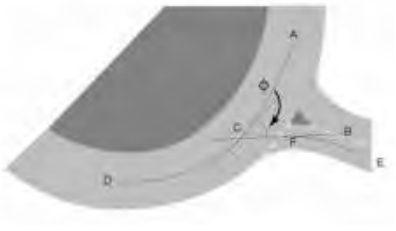
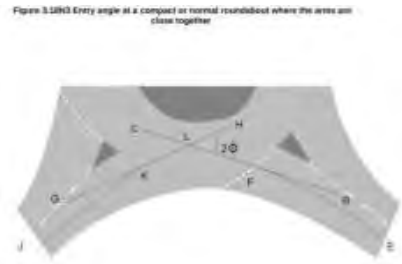
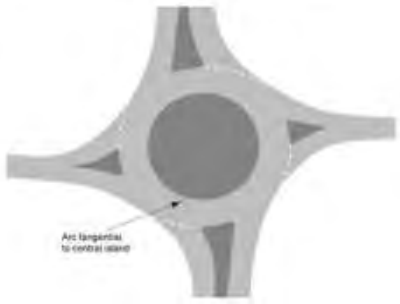
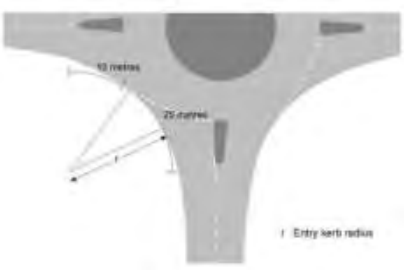
Priority Controlled Roundabout Design Standards (CD116 Revision 2)					
Paragraph	**Description**	**Standard**	**Departure (shall) or Relaxation (should)**	**Achieved**	**Comments**
2.1	Not on motorways	At-grade roundabouts shall not be provided on motorways.	Departure	Yes	
2.1.1	Do not locate roundabouts on:	On all-purpose trunk roads, roundabouts should not be located: 1) on rural three-lane dual carriageway roads, as it is difficult to achieve suitable deflection; 2) where an approach road exceeds a gradient of 2% over the desirable minimum stopping sight distance (SSD) measured from the give way or stop line.	Relaxation	Yes	
2.1.2	3 arms minimum	A roundabout should have 3 or more arms.	Relaxation	Yes	
2.1.4	Conspicuity	Roundabouts should be made conspicuous through the provision of clear signage and road markings.	Relaxation	Yes	Signage details to be provided at detailed design stage
NOTE	Ways to improve conspicuity	The following measures can help improve conspicuity of roundabouts: 1) re-positioning and/or repeating (e.g. nearside and offside) of warning signs; 2) providing additional map type direction signs in advance of the roundabout, possible sign configurations include: a) 3 lane dual-carriageway (50, 60 or 70mph) - 1 mile ADS, 1 /2 mile ADS and final direction sign and warning signs (3 lane dual-carriageway approaches to a roundabout are not preferred); b) 2 lane dual-carriageway (60 or 70mph) - 1 mile ADS (optional - site specific road safety issue / high traffic volume), 1 /2 mile ADS and final direction sign and warning signs; or c) any dual carriageway (lower than 50mph) - final direction sign and, if considered necessary, one pair of warning signs; 3) making the give way line more conspicuous; 4) extending the central island chevron sign further to the left to emphasise the angle of turn; 5) extending the central island chevron sign further to the right or providing additional chevrons on the approach central island where the approach geometry masks the roundabout entry from view; 6) on dual carriageway roads, placing additional chevron signs in the central reserve in line with the offside lane approach.	N/A	N/A	
2.2	Lighting	Road lighting shall be provided on all roundabouts.	Departure	Yes	Lighting details to be provided at detailed design stage
2.3	Normal roundabout selection (volume)	For roads with a speed limit of 50mph or greater and traffic levels of greater than 8,000 two-way AADT on any approach, a normal roundabout shall be used.	Departure	N/A	Speed limit to be reduced to 40mph
2.3.1	Normal roundabout selection (speed)	Where the speed limit is 50mph or greater regardless of traffic flow, normal roundabouts should be provided.	Relaxation	N/A	
2.3.2	Compact roundabout exception (single lane entries and < 8,000 AADT volume)	Where the speed limit is 50mph or greater, and traffic levels are less than 8,000 two-way AADT on any approach and where single lane entries are provided, compact roundabouts may be provided.	N/A	N/A	
2.3.3	Compact roundabout selection (speed)	For roads with a posted speed limit of 40mph or below, either a compact or a normal roundabout may be provided.	N/A	N/A	Compact roundabout selected
NOTE	Higher speed compact roundabout design	On roads with speed limits exceeding 40mph, the design of compact roundabouts is similar to that for normal roundabouts, but single-lane entries and exits are provided.	N/A	N/A	
NOTE	Roundabout selection recommendations	Where the posted speed limit is 40mph or less, compact roundabouts are recommended for traffic levels of less than 8,000 two-way AADT on all approaches and normal roundabouts are recommended for traffic levels of greater than 12,000 two-way AADT on any approach.	N/A	N/A	
NOTE	Alternative roundabout selection	Alternatives to normal or compact roundabout types (i.e., signalised, double, through-about and double-through-about, mini, or provision of an SLTL) can be used where the traffic modelling indicates a benefit.	N/A	N/A	
2.14	Alternative roundabout benefits	Where the design of a normal roundabout could lead to high circulatory speeds then a double roundabout or signalisation can be used to reduce speeds and to regulate traffic flow.	N/A	N/A	
2.3.4	5 arm maximum	Normal roundabouts with five or more arms should not be provided.	Relaxation	N/A	
2.4	No compact roundabouts on dual carriageways	Compact roundabouts shall not be used at any location with a dual carriageway approach, irrespective of speed or AADT	Departure		
NOTE	Compound roundabout pros and cons	A compact roundabout has less capacity than a normal roundabout but can be more suitable where there is a need to accommodate at-grade crossings for pedestrians or cyclists.	N/A	N/A	
NOTE	Compact roundabout pedestrian benefit	Non-flared entries/exits of a compact roundabout give more flexibility for the inclusion of pedestrian crossings in the roundabout design.	N/A	N/A	
NOTE	Normal and compact roundabout illustration	Normal and compact roundabouts are as illustrated in Figure 2.4N3. 	N/A	N/A	
2.8	Mini roundabout selection (speedP	Mini-roundabouts shall only be used on roads with a speed limit of 30mph or less and where the 85th percentile dry weather speed of traffic is less than 35mph within a distance of 70 metres from the proposed give way line on all approaches.	Departure	N/A	
2.9	Mini roundabout exceptions and illustration	Mini-roundabouts (as illustrated in Figure 2.9) shall not be used at: 1) new junctions; 2) accesses serving or intended to serve, one or more properties, and linking directly to the site; or 3) on dual carriageways. 	Departure	N/A	
2.9.1	Mini roundabout exception (traffic flows)	Mini-roundabouts should not be installed where traffic flows or turning proportions differ significantly between arms.	Relaxation	N/A	
2.9.2	Mini roundabout exception (u-turns)	Mini-roundabouts should not be used where there is a risk that vehicles will use them to perform U-turns.	Relaxation	N/A	
2.9.3	Mini roundabout queues	The introduction of a mini-roundabout should be assessed to check that queues created by the mini-roundabout do not adversely impact upon the operation and safety of the junction or adjoining network.	Relaxation	N/A	
2.10	Mini roundabout number of arms	Mini-roundabouts shall only have 3 or 4 arms.	Departure	N/A	
2.11	3-arm mini roundabout exception (volume)	A 3-arm mini-roundabout shall not be used where the predicted two-way annual average daily traffic flow (AADT) on any arm of a junction is below 500 vehicles a day.	Departure	N/A	

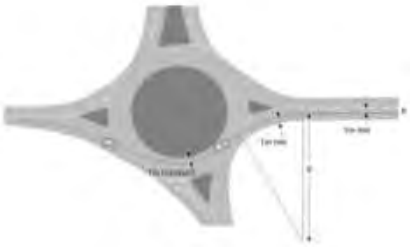
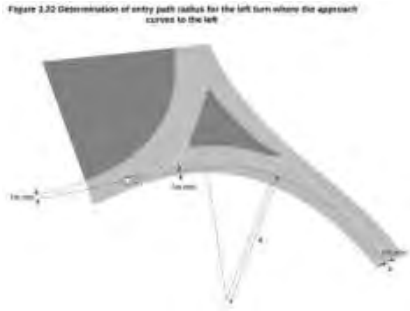
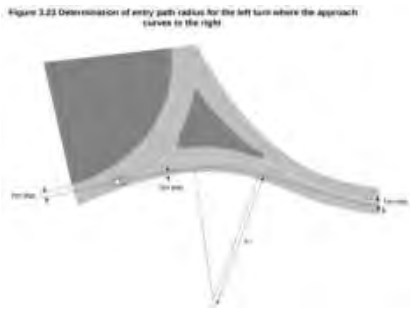
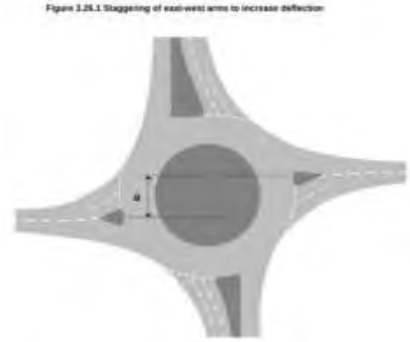
2.12	4-arm mini roundabout exception (volume)	A 4-arm mini-roundabout shall not be used where the predicted two-way annual average daily traffic flow (AADT) on any arm of a junction is below 500 vehicles a day unless the design incorporates features to encourage vehicles to give way on all approaches	Departure	N/A	
2.12.1	4-arm mini roundabout exception (volume)	A 4-arm mini-roundabout should not be used where the sum of the maximum peak hour entry flows for all arms exceeds 500 vehicles per hour.	Relaxation	N/A	
3.1	Inscribed Circle Diamater (ICD)	The inscribed circle diameter (ICD) of a roundabout shall be the diameter of the largest circle that can be inscribed within the junction kerbs. Figure 3.2 Inscribed circle diameter at a normal or compact roundabout  	Departure	Yes	ICD = 33.2m
3.3	ICD of non-circular roundabout	Where the outline of the roundabout is non-circular, two times the radius at the respective entry shall be used to calculate the corresponding ICDs, as shown in Figure 3.3. Figure 3.3 Inscribed circle diameter (2 x R) at a non-circular roundabout 	Departure	N/A	
3.5	Minimum ICD	The minimum value of the ICD for a normal or compact roundabout shall be 28 metres; this is the smallest roundabout that can accommodate the swept path of the design vehicle.	Departure	Yes	ICD = 33.2m
3.5.1	Compact roundabout maximum ICD	The ICD of a compact roundabout should not exceed 36 metres.	Relaxation	Yes	ICD = 33.2m
3.5.2	Normal roundabout maximum ICD	The ICD of a normal roundabout should not exceed 100 metres.	Relaxation	N/A	
NOTE	Excessove ICD	Large ICD can lead to excessive vehicle speeds on the circulatory carriageway	N/A	N/A	
3.6	Circulatory carriageway width	The width of the circulatory carriageway for normal or compact roundabouts shall be between 1.0 and 1.2 times the maximum entry width, excluding any overrun area.	Departure	Yes	Circulatory carriageway width = 5.4m Maximum entry width = 4.5m
NOTE	Entry width illustration	The entry width is shown on Figure 3.11. Figure 3.11 Entry width and approach half width  	N/A	N/A	
3.6.1	Circulatory carriageway shape	The circulatory carriageway of normal or compact roundabouts should be circular and of constant width.	Relaxation	Yes	Circulatory carriageway width = consistent 5.4m
NOTE	Roundabout shape	Roundabouts can be non circular due to staggered road arrangements, land constraints, to allow for dominant mainline flow capacity, and/or to cater for associated structures and slip road layouts for grade separated junctions.	N/A	N/A	
NOTE	Varying carriageway width	Varying widths of circulatory carriageways can be used to optimise safety and capacity at roundabouts where traffic flows differ widely between arms.	N/A	N/A	
3.6.3	Circulatory road markings	Dedicated lane signs and road markings may be used on the circulatory carriageway where appropriate.	N/A	N/A	
3.6.5	Unused carriageway	Where the turning proportions are such that one section of the circulatory carriageway has a relatively low flow, resulting in an unused area of carriageway, the circulatory carriageway should be reduced in width.	Relaxation	N/A	
3.6.6	Maximum carriageway width	At normal roundabouts the width of the circulatory carriageway should not exceed 15 metres.	Relaxation	N/A	
3.6.7	Number of circulatory lanes	The width of the circulatory carriageway on a normal roundabout should accommodate the number of lanes provided on entries and exits.	Relaxation	N/A	
3.6.8	Compact roundabout carriageway width	At compact roundabouts, the width of the circulatory carriageway should not exceed 6 metres, so that it is not possible for two cars to pass one another.	Relaxation	Yes	Circulatory carriageway width = 5.4m

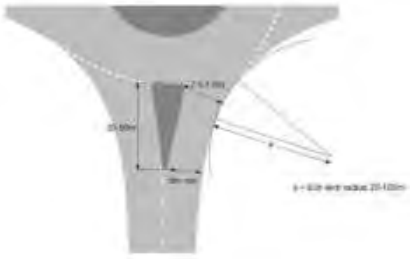
3.6.9	Reverse curve	On the circulatory carriageway, short lengths of reverse curve should be avoided between entry and adjacent exits. Figure 3.6.9N2 Three-arm roundabout illustrating reverse curvature 	Relaxation	Yes	
3.6.10	Circulatory lane markings	The circulatory carriageway lane markings should be designed to 1) create smooth paths around the junction for all movements; 2) maximise the use of the circulatory carriageway width wherever possible; and 3) provide a smooth link between any entry and exit markings to guide drivers safely around the junction.	Relaxation	Yes	
NOTE	HGV overturning	Research has shown that an articulated HGV with a centre of gravity height of 2.5 metres above the ground can overturn on a 20 metre radius bend at speeds as low as 15mph (24kph). See TRL LR788 [Ref 1.I] .	N/A	N/A	
3.6.11	Circulatory markings visibilty	The circulatory markings should be positioned so that the circulating lanes are visible from each entry to offer drivers a clearly defined position on the circulatory carriageway to which to direct their vehicle, thereby reducing potential conflict.	Relaxation	N/A	Circulatory carriageway edge denoted by change in surface / raised overrunnable surface for HGVs
3.6.12	Lane direction arrows on circulatory carriageway	Lane direction arrows may be used on the circulatory carriageway.	N/A	N/A	
3.6.13	Lane direction arrows on circulatory carriageway	Lane direction arrows should be visible to both entering and circulating drivers.	Relaxation	N/A	
3.6.14	Straight ahead and right arrow markings	To facilitate better driver perception on the circulating carriageway, "straight ahead" and "right" arrows may be used to denote lanes that continue to circulate.	N/A	N/A	
NOTE	Use of ahead and right arrow markings	Driver's perception of what is represented by "left", "straight ahead" and "right" arrows is less clear when circulating, further guidance on the use of direction arrows is provided in TSM Chapter 5 [Ref 13.N].	N/A	N/A	
3.6.15	Left turn arrows prior to an exit	Lane direction arrows denoting a left turn immediately prior to an exit may be utilised and prove beneficial to signify that a lane drop around the circulatory carriageway is approaching.	N/A	N/A	
3.6.16	Use of route numbers / destinations	The use of route numbers and/or destinations can also assist drivers' understanding, although their use should not clutter the circulatory carriageway or make the markings unduly confusing, as may happen where destinations are seen to change between circulatory lanes.	N/A	N/A	
3.6.17	Spiral hatch markings	Spiral hatch markings should be provided on larger diameter normal roundabouts where the number of circulating lanes is to be varied to aid general operation.	Relaxation	N/A	
3.6.18	Hatch markings and vehicle paths	Spiral markings and vehicle paths through roundabouts should: 1) follow smooth flowing alignments; 2) have gradually increasing radius; and 3) avoid reducing radius.	Relaxation	N/A	
3.6.19	Spiral marking radii	Spiral marking radii should be gradual to avoid: 1) increasing the likelihood of load shedding by HGV; or 2) causing loss of control accidents (particularly for PTW).	Relaxation	N/A	
3.7	Central island minimum diamater	The central island of normal and compact roundabouts shall be at least 4 metres in diameter.	Departure	Yes	Central island diamater = 14m
3.7.1	Central island shape	The central island of normal and compact roundabouts should be circular.	Relaxation	Yes	
NOTE	Central island shape exception	The central island can be non-circular due to staggered road arrangements, land constraints, to allow for dominant mainline flow capacity, and/or to cater for associated structures and slip road layouts for grade separated junctions.	N/A	N/A	
3.7.2	Central island kerb	The central island of normal and compact roundabouts should be kerbed.	Relaxation	Yes	
3.7.3	Restriction on planting	To achieve circulatory visibility requirements, the use of planting on roundabouts within central islands of 10 metres or less should be avoided.	Relaxation	Yes	Landscaping / planting details to be provided at detailed design stage
NOTE	Restriction on planting exception	As long as visibility is not restricted, planting on central islands less than 1 metre in height can help to mitigate against any see through effect, which can result in failure to give way, particularly on roundabouts with downhill approaches.	N/A	N/A	
3.7.4	Restriction on solid features	Solid features such as statues, trees or rocks should not be placed on the central islands of roundabouts with high speed approaches, or anywhere within the highway boundary adjacent to the roundabout where there is a high risk of collision.	Relaxation	Yes	Landscaping / planting details to be provided at detailed design stage
3.7.5	Allowance for passive infrastructure	Non-passive infrastructure and landscaping may be located on the central island of urban roundabouts where there is sufficient space to do so and there are low speed approaches on all arms.	N/A	N/A	
3.8	Required space	A roundabout shall provide space for the turning movements of the design vehicle in accordance with Table 3.8.1N1. Figure 3.8.1N1 Turning widths required for compact or smaller normal roundabouts  Table 3.8.1N1 Turning widths required for compact or smaller normal roundabouts Central island diameter (metres) | R1 (metres) | R2 (metres) | Minimum ICD (metres) 4.0 | 3.0 | 13.0 | 25.0 6.0 | 4.0 | 13.4 | 23.8 8.0 | 5.0 | 13.9 | 28.4 10.0 | 6.0 | 14.4 | 30.8 12.0 | 7.0 | 15.0 | 32.0 14.0 | 8.0 | 15.6 | 33.1 16.0 | 9.0 | 16.3 | 34.5 18.0 | 10.0 | 17.0 | 36.0	Departure	Yes	Central island diamater = 14m R1 = 8m R2 = 15.6 ICD = 33.2m

3.8.1	Overrun area	An overrun area may be necessary (Figure 3.8.1N1) to provide sufficient entry deflection for vehicles at compact or smaller normal roundabouts while still allowing large vehicles to circulate.	N/A	N/A	
NOTE	Illustration key	An overrun area for a compact or smaller normal roundabout is illustrated in Figure 3.8.1N1, where: 1) a, is the main central island; 2) b, is the central overrun area (where provided); 3) c, is the remaining circulatory carriageway width (1.0 to 1.2 times the maximum entry width); 4) d, is the vehicle; 5) e, is the 1 metre minimum clearance from the edge of kerbing (provided on both the inside and the outside of the circulatory carriageway); 6) f, is the ICD; 7) R1, is the radius from the centre of the roundabout to the outside of the inner 1 metre clearance (e) (values for R1 can be found in Table 3.8.1N1); and 8) R2, is the radius from the centre of the roundabout to the inside of the outer 1 metre clearance (e) (values for R2 can be found in Table 3.8.1N1).	N/A	N/A	
3.8.2	Swept paths in constraints	The swept path for the design vehicle may impinge by up to 0.3 metres into either the inner or outer 1 m clearance allowance ('e', as shown on Figure 3.8.1N1) of the central island where there are constraints.	N/A	N/A	
NOTE	Inner and outer clearance for low frequency design vehicles	Given the anticipated low frequency of the design vehicle, the impingement into the inner and outer clearance is not particularly significant and the dimensions in Figure 3.8.1N1 need not be increased accordingly	N/A	N/A	
3.9	Overrun dimensions	The profile dimensions for an overrun area shall be in accordance with SI 1999/1026 [Ref 7.N]. [Reproduced from SI 1999/1026: *6. Where a rumble device is constructed or maintained in a highway–* *(a) no vertical face of any material forming that device shall exceed 6 millimetres measured vertically from top to bottom of that face; and,* *(b) no part of the device shall be more than 15 millimetres above the surface of the carriageway*]	Departure	Yes	
NOTE	Recommendations on overrun areas	Advice on appropriate use of overrun areas is provided in TAL 12/93 [Ref 9.N].	N/A	N/A	
3.9.1	Overrun attractiveness to a car	The compact and normal roundabout overrun area should be capable of being mounted by the trailers of a HGV, but be unattractive to cars e.g. by having a slope and/or a textured surface.	Relaxation	Yes	
3.9.2	Overrun restriction for peds etc.	Overrun areas should not be used adjacent to walkers, cyclists and horse-riders (WCHR) crossings.	Relaxation	Yes	
3.9.3	Use of overrun near footways	Where an overrun area is used adjacent to a pedestrian crossing, the overrun areas should not resemble foot-ways or refuges in order to discourage pedestrians utilising it to cross the carriageway.	Relaxation	N/A	
3.10	Use of traffic islands	Traffic islands shall be used on each arm of a normal or compact roundabout, located and shaped so as to separate and direct traffic entering and leaving the roundabout.	Departure	Yes	
NOTE	Central reservation as a traffic island	On dual carriageway approaches to roundabouts, the central reserve acts as a traffic island separating opposing traffic flows.	N/A	N/A	
3.10.1	Traffic island kerbs	Traffic islands should be kerbed physical islands.	Relaxation	Yes	Only the eastern arm traffic island does not feature a raised kerb. This is necessary to accommodate the swept path of the worst case design vehicle.
NOTE	Traffic islands as refuge	Kerbed traffic islands can act as WCHR refuges.	N/A	N/A	
3.10.2	Siting of street furniture on islands	Signs and other street furniture which are sited on kerbed islands should be located so as not to interfere with visibility	Relaxation	Yes	Signage details to be provided at detailed design stage
3.10.3	Traffic island kerb exception	Where there is insufficient space to accommodate a kerbed island, traffic islands may consist entirely of markings.	N/A	N/A	
3.11	Entry width	The entry width shall be measured from point A at the right-hand end of the give way line along the normal to the nearside kerb where there are no road markings or hatching alongside the kerbs, as shown in Figure 3.11. Figure 3.11 Entry width and approach half-width  	Departure	Yes	
3.11.1	Entry width with edge lining	Where there is white edge lining or hatching the measurement should be taken between the edges of the markings closest to the running lanes rather than kerb to kerb.	Relaxation	Yes	Entry width measured from the corner of the proposed hatched overunnable area.
3.12	Maximum entry width	On a single carriageway approach to a normal roundabout, the entry width shall not exceed 10.5 metres.	Departure	N/A	
3.12.1	Compact roundabout selection	On a single-carriageway road, where predicted flows are low and increased lane width is not operationally necessary, a compact roundabout with single lane entries should be used.	Relaxation	N/A	
NOTE	TM requirement for single lane entry	The use of single lane entries can result in entry closures during planned maintenance and would be subject to an agreed traffic management plan with the Overseeing Organisation.	N/A	N/A	
3.13	Maximum entry width dual carriageway	On a dual carriageway approach to a normal roundabout, the entry width shall not exceed 15 metres.	Departure	N/A	
3.14	Give way line minimum and maximum width	Lane widths at the give way line for normal and compact roundabouts shall be no less than 3 metres and no greater than 4.5 metres.	Departure	Yes	Lane widths = 4.5m (excluding hatched overunnable area)
3.14.1	Single lane give way line width	At the give way line, a lane width value of 4.5 metres should be used at single lane entries.	Relaxation	Yes	Lane widths = 4.5m (excluding hatched overunnable area)
3.14.2	Multi lane give way line width	At the give way line, lane width values of between 3 metres and 3.5 metres should be used at multi-lane entries.	Relaxation	N/A	
3.14.3	Design vehicle use	Vehicle swept paths should be assessed using the largest design vehicle that is anticipated to use each entry lane.	Relaxation	Yes	Swept path analysis conducted with a 16.5m long HGV
3.13.4	Swept paths of multi lane entries	Vehicle swept paths should be assessed on multi-lane entries to ensure sufficient width is provided for each entry lane.	Relaxation	N/A	
3.14.5	Number of upstream lanes	No more than two lanes should be added to the number of upstream lanes on the entry to a roundabout.	Relaxation	Yes	
3.14.6	Maximum number of entry lanes	No entry should be more than four lanes wide.	Relaxation	Yes	
3.14.7	Entry flare minimum lane width	Where entry flaring is provided, lane markings indicating the tapered lanes should only be provided from a point where both lanes will have a minimum width of 2.5 metres.	Relaxation	N/A	
3.14.8	No short lanes on entry	When developing additional entry lanes, short offside lanes should not be used.	Relaxation	N/A	
3.15	No entry hatching near crossings	Hatching on the entry to reduce the entry width shall not be used in the controlled area of a zebra or signal controlled crossing.	Departure	N/A	
3.15.1	No entry hatching near crossings	Hatching should not be used to reduce the entry width in areas adjacent to pedestrian crossing points.	Relaxation	Yes	

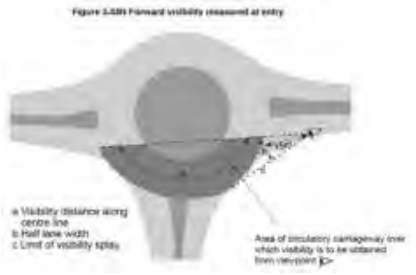
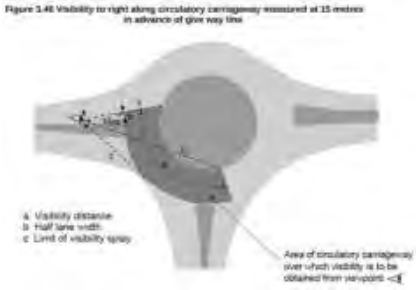
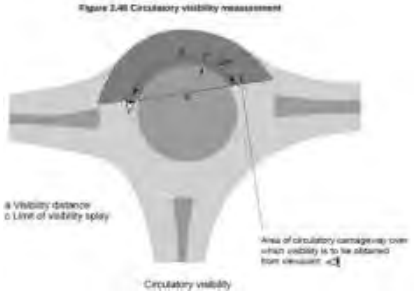
3.16	Approach half width	The approach half width shall be measured as the width of the approach carriageway, excluding any hatching, in advance of any entry flare, as shown in Figure 3.16. Figure 3.16 Entry width and approach half width  	Departure	Yes	
NOTE	Approach half width measure	The approach half width is the shortest distance between the median line, or the edge of the central reserve on dual carriageway roads, and the nearside edge of the road.	N/A	N/A	
3.16.1	Approach half width measure between markings	Where there is white edge lining or hatching, the measurement of approach half width should be taken between markings rather than kerb to kerb.	Relaxation	Yes	
3.17	Entry flare width	Entry flaring shall be measured using the average effective flare length, l' as shown on Figure 3.17. Figure 3.17 Average effective flare length  	Departure	Yes	
NOTE	Average effective flare length	The average effective flare length, l', is the average length over which the entry widens, and is the length of the curve CF'	N/A	N/A	
NOTE	Average effective flare length measure	The average effective flare length, l' (as illustrated in Figure 3.17) is determined following the below methodology: 1) construct lines AB and GH; a) AB is e the entry width; b) and GH illustrates the approach half width, at a point G which is the best estimate of the start of the flare; 2) construct curve GD parallel to the median HA (centre line or edge of central reserve or traffic island), maintaining a distance between the two lines equivalent the approach width, v; 3) where AB is perpendicular to the median HA, the length of AD is to match the approach half width,v (line GH); 4) where AB is not perpendicular to the median HA, the length of AD will vary slightly from the approach half width. D is to be situated at the point where the line (GD) parallel to the median cuts the entry width,e, (line AB); 5) curve BG is formed by the design kerb line; 6) construct curve CF' parallel to curve BG (the nearside kerb) and at a constant distance of ½ BD from BG, with F' being the point where CF' intersects line GD; 7) the length of curve CF' is the average effective flare length, l'.	N/A	N/A	
NOTE	Entry widening measure	The total length of the entry widening (BG) can be about twice the average effective flare length, l'	N/A	N/A	
3.17.1	Minimum effective flare length	A minimum average effective flare length of 5 metres in urban areas and 25 metres in rural areas should be used, but capacity can be the determining factor for the actual length.	Relaxation	No	The effective flare length for the southern, western and northern arms exceeds 5m. The effective flare length of the eastern arm is below 5m. The appropriate flare length could be achieved by artificially narrowing the eastern arm, however it is not considered that this would result in any positive impact on highway safety. Actual vehicle traffic is proportionally low along the eastern arm.
3.17.2	Gradual entry widening	Where the design speed is high, entry widening should be developed gradually with no sudden changes in direction.	Relaxation	N/A	Speed limit to be reduced to 40mph
3.18	Entry angle	The entry angle for roundabouts shall be measured as the conflict angle, ϕ , between: 1) the entering and circulating traffic streams for normal roundabouts, where the arms are well separated, as shown in Figure 3.18N2; or 2) the entering and exiting traffic streams for compact roundabouts and normal roundabouts, where the arms are close together, as shown in Figure 3.18N3.	Departure	Yes	

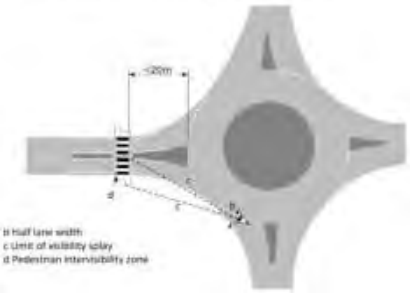
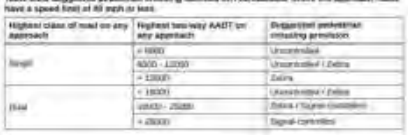
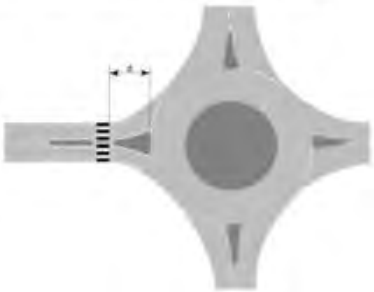
NOTE	Entry lane alignment figure	For a normal roundabout, where the arms are well separated (as illustrated in Figure 3.18N2), the entry angle is determined as the angle between the projected path of an entering vehicle and the path of a circulating vehicle, using the below methodology: 1) construct the curve EF as the locus of the midpoint between the nearside kerb and the median line (or the edge of any traffic island or central reserve); 2) construct BC as the tangent to EF at the give way line; 3) construct the curve AD as the locus of the midpoint of (the used section of) the circulatory carriageway (a proxy for the average direction of travel for traffic circulating past the arm); 4) the entry angle, ϕ , is measured as the acute angle between BC and the tangent to AD. Figure 3.18N2 Entry angle at a normal roundabout where the arms are well separated 	N/A	N/A	
NOTE	Entry lane alignment where arms are close together	For a compact roundabout or normal roundabout, where the arms are close together (as illustrated in Figure 3.18N3), the entry angle is determined as the angle between the projected path of an entering vehicle and the projected path of an exiting vehicle, using the methodology below: 1) construct line BC as in Figure 3.18N3; 2) construct the curve JK in the next exit as the locus of points midway between the nearside kerb and the median line (or the edge of any traffic island or central reserve); 3) construct the line GH as the equivalent of line BC i.e. the tangent to the curve JK at the point where JK intersects the border of the inscribed circle; 4) the lines BC and GH intersect at L; 5) the entry angle, ϕ , is half of angle HLB. (ϕ = [angle HLB]/2 , Note that if angle GLB exceeds 180 degrees, ϕ is defined as zero.) Figure 3.18N3 Entry angle at a compact or normal roundabout where the arms are close together 	N/A	N/A	
3.18.1	Entry lane alignment angle range	The entry angle should be no less than 20 degrees and no greater than 60 degrees for normal and compact roundabouts.	Relaxation	Yes	
3.18.2	Traffic island tangential kerb	Except on compact roundabouts in urban areas, the kerb line of the traffic island (or central reserve in the case of a dual carriageway) should lie on an arc which, when projected forward, meets the central island tangentially (see Figure 3.18.2). Figure 3.18.2 Example showing an arc projected forwards from the traffic island and tangential to the central island 	Relaxation	Yes	
3.19	Entry kerb radius	The entry kerb radius shall be measured as the minimum radius of curvature of the nearside kerb line over the distance from 25 metres upstream of the give way line to 10 metres downstream of it (see Figure 3.19) Figure 3.19 Entry kerb radius 	Departure	Yes	
3.19.1	Minimum entry kerb radius	The entry kerb radius should not be less than 10 metres.	Relaxation	Yes	
3.19.2	Maximum entry kerb	The entry kerb radius should not be greater than 100 metres.	Relaxation	Yes	
3.19.3	Minimum compact roundabout entry kerb for HGVs	At compact roundabouts, if the approach is intended for regular use by HGVs, the entry kerb radii should not be less than 20 metres.	Relaxation	Yes	The eastern arm features a 10m entry radius, however it is note expected that the eastern arm will be used by HGVs regularly.

3.20	Entry path radius	The entry path radius for an ahead movement at a 4-arm roundabout shall be determined as shown on Figure 3.20. Figure 3.20 Determination of entry path radius for ahead movement at a 4-arm roundabout 	Departure	Yes	
NOTE	Entry path radius measurement	The entry path radius (shown as 'a' on Figures 3.20, 3.22 and 3.23) is measured as the smallest best fit circular curve over a distance of 25 metres occurring along the approach entry path in the vicinity of the give way line, but not more than 50 metres in advance of it.	N/A	N/A	
NOTE	Commencement point	The commencement point (shown as 'b' on Figures 3.20, 3.22 and 3.23) is 50 metres in advance of the give way line and at least 1 metre from the nearside kerb or centre line (or edge of central reserve).	N/A	N/A	
3.2.1	Entry path radius for all movements	The entry path radius (or its inverse, entry path curvature) shall be measured for all turning movements at a roundabout.	Departure	Yes	
NOTE	Entry path radius safety	The entry path radius is a measure of the deflection to the left imposed on vehicles entering a roundabout. It is the most important determinant of safety at roundabouts because it governs the speed of vehicles through the junction and whether drivers are likely to give way to circulating vehicles.	N/A	N/A	
3.22	Entry path radius on left curve	The entry path radius for the left-turn movement where the approach to the roundabout curves to the left shall be determined as shown on Figure 3.22. Figure 3.22 Determination of entry path radius for the left turn where the approach curves to the left 	Departure	Yes	
	Entry path radius on right curve	The entry path radius for the left-turn movement where the approach to the roundabout curves to the right shall be determined as shown on Figure 3.23. Figure 3.23 Determination of entry path radius for the left turn where the approach curves to the right 	Departure	Yes	
3.24	Compact roundabout maximum entry path radius <40mph	At compact roundabouts in urban areas, where the speed limit is 40mph or less within 100 metres of the give way line on any approach, the entry path radius shall not exceed 70 metres.	Departure	Yes	
3.25	Compact roundabout maximum entry path radius >50mph	At compact roundabouts where the speed limit is 50mph or greater within 100 metres of the give way line on any approach, the entry path radius shall not exceed 100 metres.	Departure	N/A	Speed limit to be reduced to 40mph
3.26	Maximum entry path radius (normal roundabout)	At normal roundabouts, the entry path radius shall not exceed 100 metres.	Departure	N/A	
3.26.1	Staggered arms for entry path radius	In order to ensure that the entry path radius provides suitable deflection, the arms may be staggered as shown in Figure 3.26.1. Figure 3.26.1 Staggering of east-west arms to increase deflection 	N/A	N/A	
3.26.2	Ways to accommodate sufficient deflection	On normal and compact roundabouts, where sufficient entry deflection cannot be achieved by means of the central island alone, deflection should be generated by enlarging traffic islands or by providing a central overrun area for HGVs.	Relaxation	N/A	

3.26.3	Subsiduary deflection islands	On normal and compact roundabouts, where inadequate entry deflection is leading to operational and safety problems and it is not possible to improve deflection by increasing the size of the central island and/or extending the traffic islands, subsidiary deflection islands (SDI) may be used.	N/A	N/A	
3.26.4	Signalisation for insufficinet entry deflection	On normal and compact roundabouts, where suitable entry deflection cannot be achieved, roundabout signalisation may be used to improve safety and operational effectiveness.	N/A	N/A	
3.26.5	Entry path radius measurement with overrun area	On normal and compact roundabouts, where an overrun area is provided, the entry path radius should be measured relative to the perimeter of this area rather than that of the central island.	Relaxation	Yes	
3.27	No right pointing arrows	Right pointing arrows on lane dedication signs or as markings on the road shall not be used on normal and compact roundabout approaches.	Departure	N/A	
3.27.1	Ahead arrow for right turn	Where a right-hand lane is dedicated to a specific destination, it should be associated with an ahead arrow on the approach.	Relaxation	N/A	
3.27.2	Right turn arrow in circulatory carriageway	A right pointing arrow may be used on the circulatory carriageway.	N/A	N/A	
3.27.3	All lanes road markings	Where any particular lane is dedicated to a specific destination the other lanes should also have arrow markings.	Relaxation	N/A	
3.27.4	Including directional signage	Where any particular lane is dedicated to a specific destination the road markings should be accompanied by direction signing indicating lane dedication.	Relaxation	N/A	
3.27.5	No left turn arrows on circulatory carriageway	Left turn arrows should be avoided on the circulatory carriageway.	Relaxation	N/A	
3.27.6	Entry lane markings should develop from upstread markings	Where lane direction markings have been, or are to be used on the approaches of a particular arm, then the direction markings within the entry lanes should be an extension of those markings in a logical and consistent manner, using the same designation system as those upstream (Figures 3.27.6a and 3.27.6b). **Figure 3.27.6a Example of approach markings** **Figure 3.27.6b Example of entry markings** 	Relaxation	N/A	
3.27.7	Balance queueing	Where no approach markings have been provided, then the entry markings should be designed to give an even balance of any queuing traffic over the entry lanes whilst providing a smooth path onto the roundabout.	Relaxation	N/A	
3.27.8	Position of lane markings	Approach lane markings should be positioned in advance of the give way line in a location where they are not obscured by queuing vehicles, and in a manner which balances the traffic between the approach lanes.	Relaxation	N/A	
3.28	Exit width measurement	On normal and compact roundabouts, the exit width shall be measured as the distance between the nearside kerb and the edge of the traffic island (or central reserve of a dual carriageway) where it intersects with the outer edge of the circulatory carriageway, as shown on Figure 3.28. Figure 3.28 Typical single carriageway exit at a normal roundabout with a long traffic island 	Departure	Yes	
3.28.1	Additional exit lane	The exit width for normal roundabouts should accommodate one more traffic lane than is present on the link downstream.	Relaxation	N/A	
3.28.2	Normal roundabout width for single carriageway	At a normal roundabout, if the downstream link is a single carriageway road, the exit width should be between 7 metres and 7.5 metres and the exit should taper down to a minimum of 6 metres.	Relaxation	N/A	
2.28.3	Exit width taper	Where the downstream link is a single carriageway road, the exit width should reduce at a taper of 1:15 to 1:20, starting at the end of the exit from the roundabout, ensuring 6 metres at end of traffic island, to avoid exiting vehicles encroaching onto the opposing lane at the end of the traffic island.	Relaxation	Yes	
3.28.4	Normal roundabout width for dual carriageway	At a normal roundabout, if the downstream link is an all-purpose two-lane dual carriageway, the exit width should be between 10 metres and 11 metres, with the exit tapering down to two lanes wide.	Relaxation	N/A	
3.28.5	Sufficient exit lane length for merging	Where traffic is required to merge after exiting, sufficient distance should be provided from the exit to allow the merging manoeuvre to take place in a safe and efficient manner.	Relaxation	N/A	
3.28.6	Spiral exit markings	Any exit line markings associated with the concentric-spiral, or spiral type of markings should be designed so as to provide a smooth exit from the circulatory carriageway.	Relaxation	N/A	
3.28.7	Permissable longer exit taper	Where the peak exit volume approaches the capacity of the downstream link, tapers longer than 1:20 may be provided.	N/A	N/A	
3.28.8	Exit width length on up gradient	Where the exit is on an up gradient, the exit width may be maintained for a short distance before tapering in.	N/A	N/A	

3.28.9	Exit width length on up gradient and curve	Where the exit road is on an up gradient combined with an alignment which bends to the left, the exit width may be maintained over a longer distance.	N/A	N/A	
3.28.10	Compact roundabout exit width	At a compact roundabout, the exit width should be similar to the entry width.	Relaxation	Yes	
3.29	Exit kerb radius key	The exit kerb radius shall be measured as shown in Figure 3.28.	Departure	Yes	
3.29.1	Exit kerb radius exceed entry radii	At normal roundabouts the exit kerb radius should exceed the largest entry radius.	Relaxation	N/A	
3.29.2	Normal roundabout exit radius	At normal roundabouts, the exit kerb radius should be 40 metres.	Relaxation	N/A	
3.29.3	Exit kerb radius where 40m not achievable	Where an exit kerb radius of 40 metres cannot be achieved, the exit kerb radius should be no less than 20 metres and no greater than 100 metres	Relaxation	N/A	
3.29.4	Larger exit kerb radius exception	A higher exit kerb radius may be used on normal roundabouts with larger ICDs on high speed roads to suit the overall junction geometry.	N/A	N/A	
3.29.5	Compact roundabout exit kerb radius	At compact roundabouts the exit kerb radius should be equal to the largest entry radius.	Relaxation	Yes	
3.29.6	Compact roundabout exit kerb radius range	At a compact roundabout, the value of the exit kerb radius should be no less than 15 metres and no greater than 20 metres.	Relaxation	Yes	
3.29.7	Larger exit kerb radius not next to ped crossings etc.	Larger values of exit radius, which lead to high exit speeds, should not be located where there are significant numbers of cyclists using the junction or where pedestrian crossing facilities are located immediately downstream.	Relaxation	N/A	
3.29.8	Exit tracking	Exits should be checked to ensure that vehicle paths are smooth and vehicles are not directed towards traffic islands.	Relaxation	Yes	
3.29.9	Traffic island end tangent to centre line	On an exit, traffic islands should end at a tangent (or, at least, parallel) to the centre line and be long enough to prevent an exiting vehicle from crossing the centre line into oncoming traffic.	Relaxation	Yes	
3.36	Visibility measurement (SSD)	Visibility shall be measured in accordance with the envelope of visibility for measurement of stopping sight distance (SSD) in CD 109 [Ref 3.N], with visibility obtainable from a driver's eye height of between 1.05 metres and 2 metres to an object height of between 0.26 metres and 2 metres, except for: 1) visibility to the right at entry; and 2) across the central island.	Departure	Yes	
NOTE	Exception for narrow obstructions	Isolated objects less than 550mm wide such as lighting columns, sign supports or bridge columns are acceptable.	N/A	N/A	
3.37	Forward visibility on approach	On a 7.3 metres wide dual carriageway, SSD shall be measured to the position of an object at the give way line (5.5 metres from the traffic island) as shown on Figure 3.37. Figure 3.37 Measurement of stopping sight distance on a curved approach on a 7.3 metres dual carriageway 	Departure	N/A	
3.38	SSD measure on 10m single carriageway	On a 10 metre wide single carriageway, SSD shall be measured to the position of an object at the give way line (5.5 metres from the edge of the traffic island) as shown on Figure 3.38. Figure 3.38 Measurement of stopping sight distance on a curved approach on a 10 metres single carriageway 	Departure	Yes	
3.39	SSD measure on 7.3m single carriageway	On a 7.3 metre wide single carriageway, SSD shall be measured to the position of an object at the give way line (3.65 metres from the edge of the traffic island) as shown on Figure 3.39. Figure 3.39 Measurement of stopping sight distance on a curved approach on a 7.3 metres single carriageway 	Departure	Yes	
3.40	Visibility length	Visibility on the approach, 'a', to the roundabout shall conform to CD 109 [Ref 3.N].	Departure		
NOTE	Visibiility key	Visibility on the approach, 'a' shown on Figures 3.37, 3.38 and 3.39, is the desirable minimum SSD for the design speed of the road.	N/A	N/A	
NOTE	Approach visibility posiiton	The visibility on the approach is measured from a vehicle position in the centre of the nearside lane, measured from the centre of the lane as shown on Figures 3.37, 3.38 and 3.39.	N/A	N/A	
3.41	Visibility of chevron signs	Where chevron signs are located on the central island, they shall be visible to approaching drivers in all lanes from a distance equal to the desirable minimum SSD measured back along the approach lanes from the give way line.	Departure	N/A	
NOTE	Approach visibility posiiton	The desirable minimum SSD is measured back from the give way line as this is the point at or before which road users need to be able to reduce speed.	N/A	N/A	
3.43	Horizontal visibility requirement	Drivers of all vehicles approaching the roundabout shall be able to see objects of height between 0.26 metres and 2 metres on the full width of the circulatory carriageway, from the centre of the nearside lane at a distance of 15 metres back from the give way line, for the visibility distance as shown in Table 3.43. Table 3.43 Visibility distances required along the centre of the circulatory carriageway ICD (m) | Visibility distance (m) ('a' in Figures) < 40 | White numbers 40 - 60 | 40 > 60 - 100 | 50 > 100 | 70	Departure	Yes	

NOTE	Forward visibility illustration	The visibility distance is given in Table 3.43 is measured along the centre of the circulatory carriageway as shown in Figure 3.43N. Figure 3.43N Forward visibility measured at entry  	N/A	N/A	
3.44	Visibility to the right	For visibility to the right, the envelope of visibility shall be obtainable from a driver's eye height of between 1.05 metres and 2 metres to an object height of between 1.05 metres and 2 metres.	Departure	Yes	
3.45	Visibility to the right illustration	Drivers of all vehicles approaching the roundabout shall be able to see the full width of the circulatory carriageway to their right, from the centre of the offside lane at the give way line, for the visibility distance provided in Table 3.43 and as shown in Figure 3.45. Figure 3.45 Visibility to right along circulatory carriageway measured at entry (from give way line)  	Departure	Yes	
3.45.1	Visibility screening	To reduce excessive approach speeds on dual carriageway approaches, visibility to the right may be limited by screening the vehicle until it is within 15 metres of the give way line.	N/A	N/A	
3.45.2	Screening height	Screening provided to reduce the visibility to the right should be at least 2 metres high in order to block the view of all road users.	Relaxation	N/A	
3.46	Visibility measurement to the right	Visibility to the right shall conform to Table 3.43 and be measured from the centre of the offside lane at a distance of 15 metres back from the give way line, as shown in Figure 3.46. Figure 3.46 Visibility to right along circulatory carriageway measured at 15 metres in advance of give way line  	Departure	Yes	
3.47	Circulatory visibility	For circulatory visibility, the envelope of visibility shall be obtainable from a driver's eye height of between 1.05 metres and 2 metres to an object height of between 1.05 metres and 2 metres.	Departure	Yes	
3.48	Circulatory visibility illustration	This visibility shall be checked at a distance of 2 metres in from the central island, as shown in Figure 3.48. Figure 3.48 Circulatory visibility measurement  	Departure	Yes	
3.49	Visibility full width of circulatory carriageway	Drivers on the circulatory carriageway shall be able to see the full width of the circulatory carriageway ahead of them for the visibility distance given in Table 3.43.	Departure	Yes	
3.49.1	Height of outerh 2m of central island	At least the outer 2 metres of the central island should be hard standing or planted with grass or similar low level vegetation to prevent visibility issues occurring.	Relaxation	Yes	
3.50	Exit visibility requirement	On the circulatory carriageway, the exit visibility shall conform to Table 3.43.	Departure	Yes	
3.51	Visibility to zebra crossing	Drivers approaching a roundabout with a zebra crossing across the entry, shall be able to see the full width of the crossing from a distance at least equal to the desirable minimum SSD for the design speed of the roundabout approach.	Departure	N/A	

3.53	Crossing visibility illustration	At the give way line, drivers shall be able to see the full width of a pedestrian crossing (whether signal-controlled, zebra or informal) across the next exit if it is within 20 metres of the give way line on that arm, as shown on Figure 3.53. Figure 3.53 Visibility measured at entry to pedestrian crossing at next exit  b Half lane width c Limit of visibility splay d Pedestrian intervisibility zone	Departure	Yes	
3.53.1	Crossing position	Crossings should not be sited between 20 metres and 60 metres from the give way line.	Relaxation	Yes	
8.1	Provision for peds etc.	Where there is demand or the desire to encourage pedestrians, cyclists, and / or equestrians at roundabouts, these users shall be provided for.	Departure	Yes	
NOTE	Catering for peds off junction	Demand for pedestrians, cyclists and equestrians can be catered for off network where it is not suitable to provide facilities on or adjacent to the highway / road.	N/A	N/A	
8.1.1	Requirements for signal controlled or grade seperated crossings	Where the speed limit within 100 metres of the give way line is greater than 40 mph on any approach, and the traffic flow on any approach is greater than 8,000 two-way AADT, any pedestrian crossing facilities provided should be either signal-controlled or grade-separated.	Relaxation	N/A	Speed limit to be reduced to 40mph
8.1.2	Allowance for un-controlled crossings	Where the roundabout is situated on a single carriageway with a speed limit greater than 40 mph and the traffic flow on each of the approaches is less than 8,000 two-way AADT, crossing facilities may be uncontrolled crossings.	N/A	N/A	
8.1.3	Crossing facility selection < 40mph	Where the speed limit within 100 metres of the give way line on all approaches is less than or equal to 40 mph, Table 8.1.3 below provides suggestions on what crossing facilities may be provided for pedestrians. Table 8.1.3 Suggested pedestrian crossing facilities on roundabouts where the approach roads have a speed limit of 40 mph or less 	N/A	N/A	
8.1.4	Location of crossings	To keep crossings short, stand-alone pedestrian crossing facilities should be outside the flared section, on normal and compact roundabouts without the provision of SLTLs or SDIs, as shown in Figure 8.1.4. Figure 8.1.4 Measurement of distance from roundabout to pedestrian crossing 	Relaxation	N/A	
NOTE	Entry flare length key	The distance 'd' shown in Figure 8.1.4 is the entry flare length.	N/A	N/A	
8.3	Kerbed island location	Kerbed islands provided to assist pedestrians crossing the roundabout shall be located within 20 metres of the give way line at the nearest point.	Departure	Yes	

APPENDIX 6 – ROAD SAFETY AUDIT (RSA) AND DESIGN TEAM RESPONSE (DRT)

B5070 Chirk -
Proposed Roundabout Works
Stage 1 Road Safety Audit

Prepared by

Distribution List

1. Jamie Whithall - Axis
3. File Copy

REPORT NUMBER 2022/AP/1686

CONTACT

Naresh Madhavan
Highway Associates
International House
Aviation Park
Flint Road
Chester
CH4 0GZ

Tel: 07715109788

Email: Naresh@HighwayAssociates.co.uk
Web: www.HighwayAssociates.co.uk

Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
FINAL	01/09/22	N Madhavan	R Sawczyn	NS Madhavan	For Issue

CONTENTS

1 INTRODUCTION

1.1 This report results from a Stage 1 Road Safety Audit carried out relating to proposals to provide a compact 4 arm roundabout off the B5070, Chirk to serve an industrial development to the west of the roundabout. The audit was carried out during August and September 2022.

1.2 The audit team consisted of:

Team Leader: Naresh Madhavan MCIHT, MSoRSA EU RSA Cert. Comp
Director
Highway Associates

Team Member: Robin Sawczyn BEng MCIHT MSoRSA
Senior Road Safety Engineer
Highway Associates

1.3 The audit took place at the offices of Highway Associates, Chester. The Road Safety Audit was undertaken in accordance with the Road Safety Audit Brief provided by Jamie Whithall of Axis. The Road Safety Audit comprised an examination of the documents provided, and these are listed in Appendix A.

The site was visited at the following times/conditions:

Day/Date	Time	Weather Con	Traffic Flow
Tues 30th August 2022	14:00 – 14:40hrs	Dry/Fine	Ave

1.4 The terms of reference for this audit are as given in GG119, Design Manual for Roads and Bridges. The scheme has been examined and this report compiled only with regard to the safety implications for road users of the scheme as presented. It has not been examined or verified for compliance with any other standards or criteria. However, in order to clearly explain a safety problem or the recommendation to resolve a problem, the Audit Team may on occasion have referred to a design standard for information only. Any audit comments should not be construed as implying that a technical audit has been undertaken in any respect.

1.5 If relevant within this report the generic term “pedestrians” can include walking pedestrians, wheelchair users, dismounted cyclists, the blind, partially sighted, mobility impaired and people

with prams or pushchairs. Highway Maintenance Operatives are also included within this term. Where a problem is specific to one or more of these vulnerable groups then appropriate reference will be made in the report.

1.6 Any recommendations included within this report should not be regarded as being prescriptive design solutions to the problems identified. They are intended only to indicate a proportionate and viable means of eliminating or mitigating the identified problem, in accordance with GG119, and in no way imply that a formal design process has been undertaken. There may be alternative methods of addressing a problem which would be equally acceptable in achieving the desired elimination or mitigation and these should be considered when responding to this report.

1.7 This Road Safety Audit makes allowance for the fact that strategic decisions on matters such as route choice, junction type, standard of provision and approved Departures from Standards already reflect an appropriate balance of a number of factors including road safety.

1.8 The Audit Team have not been made aware of any possible geometric departures or relaxations from standards.

1.9 The reader is reminded that a Road Safety Audit is not limited to the new works alone where there are features that are considered by the Audit Team to affect the general safety in the area. Section 3 of this report lists 'Problems' identified from the drawings and as a result of the site visit relating to the proposed changes to the highway layout that are directly, or indirectly, related to the area (e.g. features/matters within the proposed works or immediate surrounds which the Audit Team feel should be brought to the attention of the Designer or other organisations even though they might not pose an immediate risk associated with the proposed works), and which are considered by the Audit Team to warrant attention under the subject proposals, generally by the maintaining authority. On occasions there are more sensitive issues or issues that fall outside the audit brief but which are of such a nature that Auditors feel should be specifically brought to the attention of the authorities - such issues, if they arise, are usually dealt with in detail in separate correspondence.

2 ITEMS RAISED BY PREVIOUS AUDITS AND REPORTS

2.1 It is understood no previous road safety audits have been undertaken in relation to this scheme.

3 ITEMS RAISED BY THIS AUDIT

3.1 General

3.1.1 PROBLEM

LOCATION: Proposed roundabout

SUMMARY: Roundabout type could cause conflicts

A compact roundabout of ICD of around 30 metres has been specified. Given the 50mph speed limit in force and likely approach speeds, concern is expressed as to the suitability of this type of roundabout in this situation which due to the single lane entries and circulatory carriageway could increase the risk of loss of control type conflicts.

RECOMMENDATION

A review of the roundabout geometry should be undertaken. Para 2.3.1 DMRB CD116 – ***Geometric Design of Roundabouts*** recommends that only normal roundabouts be considered on roads where the speed limit is 50mph or more regardless of traffic flow.

3.1.2 PROBLEM

LOCATION: Proposed roundabout

SUMMARY: Central over-run area could cause loss of control

Notwithstanding problem 3.1.1, concern is expressed that the over-run area may be used for car type vehicles which could promote higher than desired approach and circulating speeds leading to failure to giveway or loss of control conflicts.

RECOMMENDATION

The over-run area should be raised in nature and constructed in a suitable surface that allows it to be over-run by large vehicles but made unattractive to cars.

3.1.3 PROBLEM

LOCATION: Proposed development site arm

SUMMARY: Insufficient manoeuvring space

Swept path analysis appears to show that two-way articulated HGV traffic flow close to the roundabout entry / exit is relatively constrained. Given the high percentage of articulated HGVs likely to use the development site access road, concern is expressed that the constrained alignment could increase the risk of head-on type conflicts or kerb over-running which could lead to loss of control or conflicts with pedestrians established on the adjacent footways.

RECOMMENDATION

The proposed alignments should be adjusted to allow for sufficient manoeuvring space for all likely types of visiting vehicles.

3.2 Non-Motorised Road User Provision

3.2.1 PROBLEM

LOCATION: Proposed roundabout

SUMMARY: Insufficient cycle facilities

Cycle facilities have not been proposed at the roundabout despite an existing segregated facility being present to the north of the proposed roundabout. Roundabouts are inherently dangerous to cyclists and without dedicated facilities could increase the potential for cycle related conflicts at the roundabout.

RECOMMENDATION

Ensure suitable cycle provision is included within the installed scheme.

3.3 Road Signs and Markings

No comments at this stage

3.4 Lighting and Signals

No comments at this stage

3.5 Landscaping

No comments at this stage

3.6 Protective Aids

No comments at this stage

3.7 Surface Characteristics and Drainage

No comments at this stage

4 AUDIT TEAM STATEMENT

We certify that this Audit has been carried out in accordance with the guidelines in GG119.

AUDIT TEAM LEADER

Naresh Madhavan MCIHT MSoRSA EU RSA Cert. Comp
Director
Highway Associates
International House
Aviation Park
Flint Road
Chester
CH4 0GZ

Signed: 

Date: 01/09/22

AUDIT TEAM MEMBER

Robin Sawczyn BEng MCIHT MSoRSA
Senior Road Safety Engineer
Highway Associates
International House
Aviation Park
Flint Road
Chester
CH4 0GZ

Signed: 

Date: 01/09/22

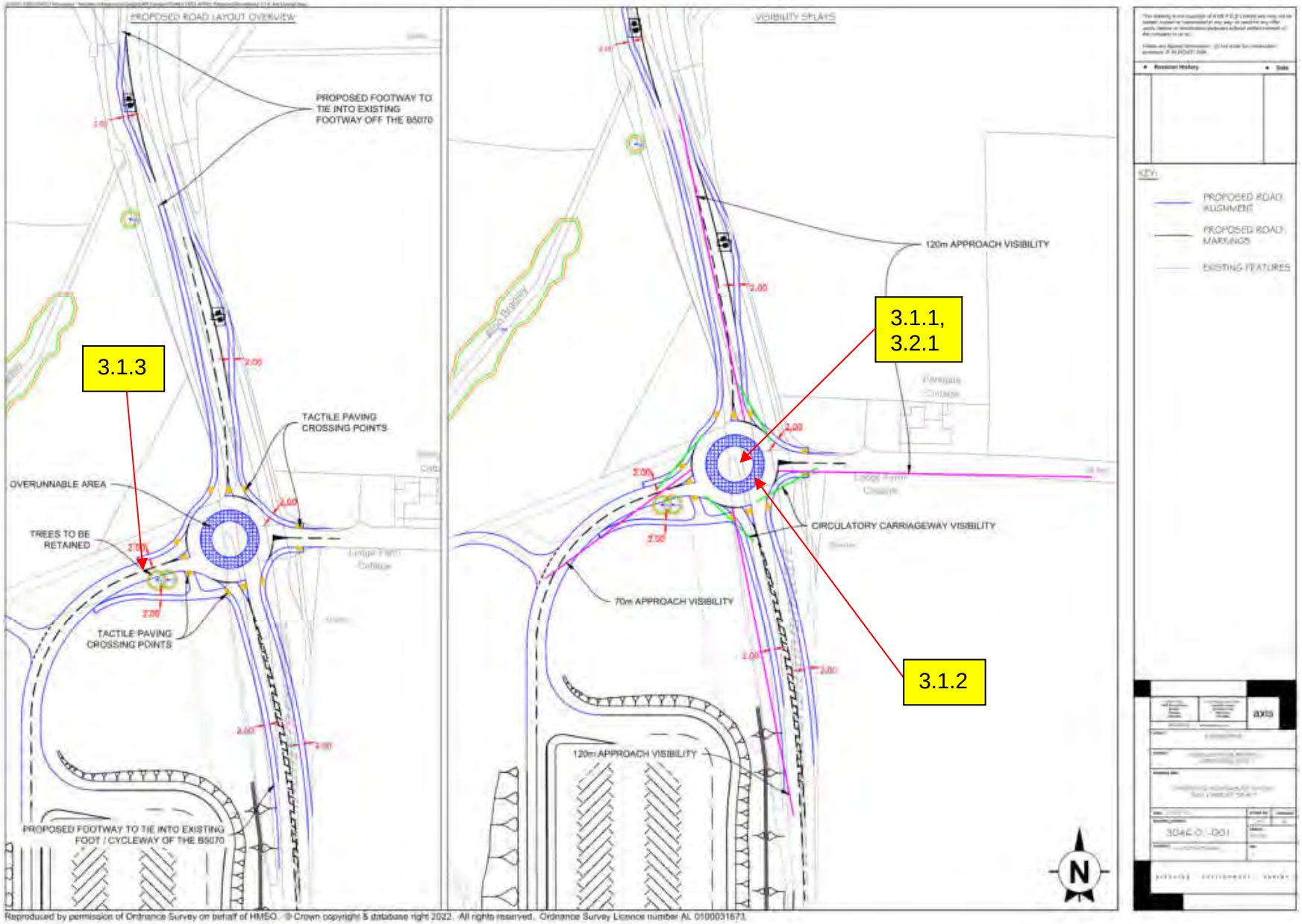
APPENDIX A

DRAWINGS AND DOCUMENTS PROVIDED

DRAWING NUMBER OR REFERENCE	TITLE
-	RSA1 Brief
3046-01-ATR01	Proposed Roundabout – Swept Path Analysis
3046-01-D01	Proposed Roundabout Layout and Visibility Splays

APPENDIX B

PLAN OF ITEMS RAISED BY THIS AUDIT


PROPOSED ROAD LAYOUT OVERVIEW
PROPOSED FOOTWAY TO TIE INTO EXISTING FOOTWAY OFF THE B5070
3.1.3
TACTILE PAVING CROSSING POINTS
OVERUNNABLE AREA
TREES TO BE RETAINED
TACTILE PAVING CROSSING POINTS
PROPOSED FOOTWAY TO TIE INTO EXISTING FOOT / CYCLEWAY OF THE B5070
VISIBILITY SPLAYS
120m APPROACH VISIBILITY
3.1.1, 3.2.1
CIRCULATORY CARRIAGEWAY VISIBILITY
70m APPROACH VISIBILITY
3.1.2
120m APPROACH VISIBILITY
N
KEY:
PROPOSED ROAD ALIGNMENT
PROPOSED ROAD MARKINGS
EXISTING FEATURES
Reproduced by permission of Ordnance Survey on behalf of HMSO. © Crown copyright & database right 2022. All rights reserved. Ordnance Survey Licence number AL 0100031673.