



**PERSIMMON HOMES THAMES VALLEY
NORTH LITTLEHAMPTON
LYMINSTER BYPASS (SOUTHERN
SECTION)
LITTLEHAMPTON, WEST SUSSEX**

**STAGE 1 - ROAD SAFETY AUDIT
ADDENDUM**

JULY 2017



**PERSIMMON HOMES THAMES VALLEY
NORTH LITTLEHAMPTON
LYMINSTER BYPASS (SOUTHERN
SECTION)
LITTLEHAMPTON, WEST SUSSEX**

**STAGE 1 - ROAD SAFETY AUDIT
ADDENDUM**

JULY 2017

Project Code:	S/PHLYM.1.1AD.6a
Prepared by:	Martyn Parr
Approved by:	John Reid
Issue Date:	July 2017
Status:	FINAL



**Persimmon Homes Thames Valley
North Littlehampton
Lyminster Bypass (Southern Section)
Littlehampton, West Sussex
Stage 1 - Road Safety Audit Addendum**

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1 Introduction

- 1.1 A Stage 1 Road Safety Audit undertaken dated September 2011 was undertaken on the overall development highway improvements.
- 1.2 A Stage 1 Road Safety Audit undertaken October 2014 for the A259 Worthing Road and Northern Roundabout junctions, changing the northern junction from a traffic signal junction to a 4-arm roundabout and the A259 roundabout amended to include 3 lane entries.
- 1.3 A Stage 1 Road Safety Audit undertaken October 2015 for the Northern Roundabout junction curtailing the proposed right turn lane at the north end of the Internal Distributor Road (IDR).
- 1.4 The Audit Team has been provided with a detailed Audit Brief explaining the reason for the alterations in layout.
- 1.5 This Addendum report results from a Stage 1 Road Safety Audit carried out on the amended Lyminster Bypass (southern section) proposals following discussions with West Sussex County Council, at the request of WSCC the Highways Authority Project Sponsor. The Road Safety Audit Addendum was carried out in July 2017.
- 1.6 The Road Safety Audit Team membership was as follows:
- | | |
|-------------|--|
| Martyn Parr | MSoRSA, RegRSA (IHE), MCIHT, HECoc
Road Safety Manager – Mayer Brown Limited
(Certificate of Competency in Road Safety Audit gained in February 2015) |
| John Reid | MSc, DipHTE, MCIHT, FSoRSA, MITAI, HECoc
Technical Director (Safety) – Mayer Brown Limited
(Certificate of Competency in Road Safety Audit gained in April 2012) |
- 1.7 The Road Safety Audit was undertaken in accordance with the Road Safety Audit Brief provided by Mr Adrian Barnley, included as Appendix C.

- 1.8 The Design Organization have been advised that a site inspection is not required on the bypass alignment and the location of the northern roundabout because this is currently a green field site and does not contain any existing roads.
- 1.1 A site visit was conducted by both Road Safety Audit Team Members on 10th July 2017 from 13:00 hrs onwards, during which the weather was fine and the existing road surface was dry. Traffic conditions on Worthing Road were moderate to high and free flowing, Highdown Road they were low and free flowing.
- 1.2 The Audit Team are aware of departures from standard as set out in the Audit Brief provided.
- 1.3 The terms of reference of the Road Safety Audit are as described in HD 19/15, although in this case the members of the Audit Team have not carried out a site inspection. The Road Safety Audit Team has examined and reported only on the road safety implications of the scheme as presented and has not examined or verified the compliance of the designs to any other criteria.
- 1.4 The audit is concerned only with the new works and their interface with the surrounding highway network.
- 1.5 In outline, the proposals under consideration are to construct a number of major new highway links which will serve to relieve congestion on parts of the existing network and will also provide access to a major residential and commercial development of some 1,800 dwellings a hotel and various business premises on land currently used for commercial horticulture production.
- 1.6 A comprehensive description of the proposed development and highways improvements has been provided by means of an Audit Brief. The Audit Brief also contained details of forecast traffic flow data, accident record data and track plots together with a schedule of departures from standards.
- 1.7 The works which form the subject of this audit report are as shown on Mayer Brown Drawings;

A/PHLYM.1/GA-1 Southern Bypass Roundabout – General Arrangement Drawing

A/PHLYM.1/GA-2 A259 Worthing Road Roundabout – General Arrangement Drawing

A/PHLYM.1/VIS-1 Southern Bypass Roundabout – Visibility Splays

A/PHLYM.1/VIS-2 A259 Worthing Road Roundabout – Visibility Splays

A/PHLYM.1/TK-1 Anticipated Vehicle Swept Paths

Persimmon Homes Thames Valley
North Littlehampton, Lyminster Bypass (Southern Section)
Littlehampton, West Sussex
Stage 1 - Road Safety Audit Addendum

A/PHLYM.1/ST-1 Southern Bypass Roundabout – Surface Treatments Drawing

A/PHLYM.1/ST-2 A259 Worthing Road Roundabout – Surface Treatments Drawing

A/PHLYM.1/TR-1 Southern Bypass Roundabout – Tree Removal Drawing

A/PHLYM.1/TR-2 A259 Worthing Road Roundabout – Tree Removal Drawing

35944/2001/001 Lyminster Bypass – Proposed Road Alignment and Contours

35944/2001/002 Lyminster Bypass – Proposed Finishes and Kerbing

35944/3501/004 Lyminster Bypass – General Arrangement

A100789_501 Bypass Drainage

- 1.8 For ease of reference, reduced scale copies of the previously mentioned drawings are given as Appendix B to this report.
- 1.9 Whilst recommendations have been made within this report, there may be equally satisfactory alternatives. The Audit Team will be pleased to consider alternatives if required.

2 Items Raised at the Stage 1 Road Safety Audit

Matters Arising From This Audit

Departures from Standards

- 2.1 The Audit Brief provided to the Auditors identifies two relaxations and three departures from standards. The auditors have considered these together with the Designer's supporting comments. The Auditors are satisfied that no material increase in risk to road users will arise as a result of the proposed Relaxations and Departures.

General

2.2 Problem

Location: General.

Summary: Proposed signage

It will be important that the new highway network is clearly signed throughout.

Recommendation

- i) Provide signing on each approach to new and modified junctions.
- ii) Map-type signs will be required at roundabout junctions.
- iii) Ensure adequate forward visibility to signs, and ensure adequate clearance between sign face and carriageway.
- iv) Where appropriate ensure adequate clearance for pedestrians and cyclists beneath sign face.
- v) Provide maximum speed limit signs at all changes of speed restriction

2.3 Problem

Location: General.

Summary: Dropped kerbs and tactile paving provision

This problem may be addressed at the detail design stage. It will be necessary to provide dropped kerbs and tactile paving in relation to all pedestrian and off-road cycle routes.

Recommendation

Provide dropped kerbs and tactile paving as required throughout. This should include the provision of corduroy paving where proposed shared pedestrian / cycle facilities tie in with existing pedestrian only footways.

2.4 Problem

Location: General.

Summary: Reflective bollards / signage on traffic islands

Numerous solid refuge islands throughout the proposals will require the provision of reflective or internally illuminated bollards. Direction signing may also be required.

Recommendation

Ensure that islands are of sufficient size to accommodate such signing as may be required at a specific location.

A259 Worthing Roundabout

2.5 Problem

Location: Highdown Drive (Northern end).

Summary: Highway arrangement 'see through'

For northbound traffic the alignment of Highdown Drive will result in headlights shining towards southbound vehicles on the Lyminster bypass and vice-versa. This could lead to confusion in relation to the road alignment particularly during periods of reduced visibility. The Audit Team note that 'possible bund or planting' is indicated on drawing 'A/PLYM.1/GA-2'.

Recommendation

Provide bund or some other form of screening at the northern end of Highdown Drive.

2.6 Problem

Location: Fitzalan Link / Worthing Road Roundabout.

Summary: Confusion / conflict on the circulatory carriageway

Three-lane approaches on all entry arms (apart from the southbound approach which consists of two lanes) and two-lanes on all exit arms of this roundabout could lead to potential conflict within the circulatory carriageway. This could result in sharp braking or side swipe collisions.

Recommendation

Provide lane destination guidance on all approaches.

2.7 Problem

Location: Fitzalan Link / Highdown Drive (Northern end)

Summary: Proposed right turn facility lane into Highdown Drive (Northern end)

There is concern that the length of the right turn lane should have sufficient capacity for the volume of traffic that Highdown Drive and its adjoining roads will generate. Waiting traffic could tail back from right turn lane and obstruct the southbound through lane and potentially the proposed roundabout junction to the north with consequence risk of tail end collisions.

Recommendation

Ensure that the right turn lane provides sufficient capacity for anticipated right turning vehicles into Highdown Drive (Northern end).

2.8 Problem

Location: Central Island

Summary: Junction 'see through'

Details of chevron signing on the roundabout central island have not been submitted at this stage. It will be important that a "see through" effect is not created which could result in drivers overshooting the circulatory carriageway and central island.

Recommendation

Ensure "see through" is prevented by suitable provision and location of chevron signs and / or other features.

Northern Roundabout

2.9 Problem

Location: Central Island

Summary: Confusion / conflict on the circulatory carriageway

Two-lane approaches on all entry arms (apart from the east approach which consists of one lane) and two-lanes on all exit arms of this roundabout could lead to potential conflict within the circulatory carriageway. This could result in sharp braking or side swipe collisions.

Recommendation

Provide lane destination guidance on all approaches.

2.10 Problem

Location: Central Island

Summary: Junction 'see through'

Details of chevron signing on the roundabout central island have not been submitted at this stage. It will be important that a "see through" effect is not created which could result in drivers overshooting the circulatory carriageway and central island.

Recommendation

Ensure "see through" is prevented by suitable provision and location of chevron signs and / or other features.

2.11 Problem

Location: Northern arm and all approaches to the roundabout

Summary: Northern arm (stub) closed to general traffic

The proposed northern arm of the roundabout junction will not be operational when the highway arrangement subject to this Audit is commissioned. It will therefore be important that drivers approaching the roundabout are either aware that the northern arm will be closed to general traffic, or that general traffic are not directed to on to the northern arm.

Recommendation

Until the northern arm linking the roundabout with the Lyminster Road is commissioned and open to general traffic:

- i. Ensure that advanced signing and lining do not direct vehicles on to the temporary northern stub arm
- ii. Ensure that advanced signing indicates the positioning of northern stub arm in relation to the eastern, western and southern arms
- iii. Provide appropriate reflective barriers to prevent both vehicles and pedestrians from using the temporary northern stub arm

Bypass

2.12 Problem

Location: Elevated bypass

Summary: Restraint barriers - embankment

The proposals as shown include a bridge over an existing road and railway. Additionally there is also a swale at the bottom of the western embankment.

Recommendation

- i) Provide vehicle restraint barriers and pedestrian fencing as required.
- ii) Ensure that adequate embankment width is provided as required for the provision of barriers or fencing.

3 Audit Team Statement

3.0 AUDIT TEAM STATEMENT

We certify that this Road Safety Audit has been carried out as described in HD 19/15, with the exception that no site visit was carried out on the bypass alignment and the location of the northern roundabout because this currently consists of greenfield and does not contain any existing roads.

ROAD SAFETY AUDIT TEAM LEADER

Martyn Parr – MSoRSA, RegRSA (IHE), MCIHT, HECOC
Road Safety Manager
Mayer Brown Limited
Lion House
Oriental Road
Woking
Surrey
GU22 8AR

Signed

Date 11/07/17

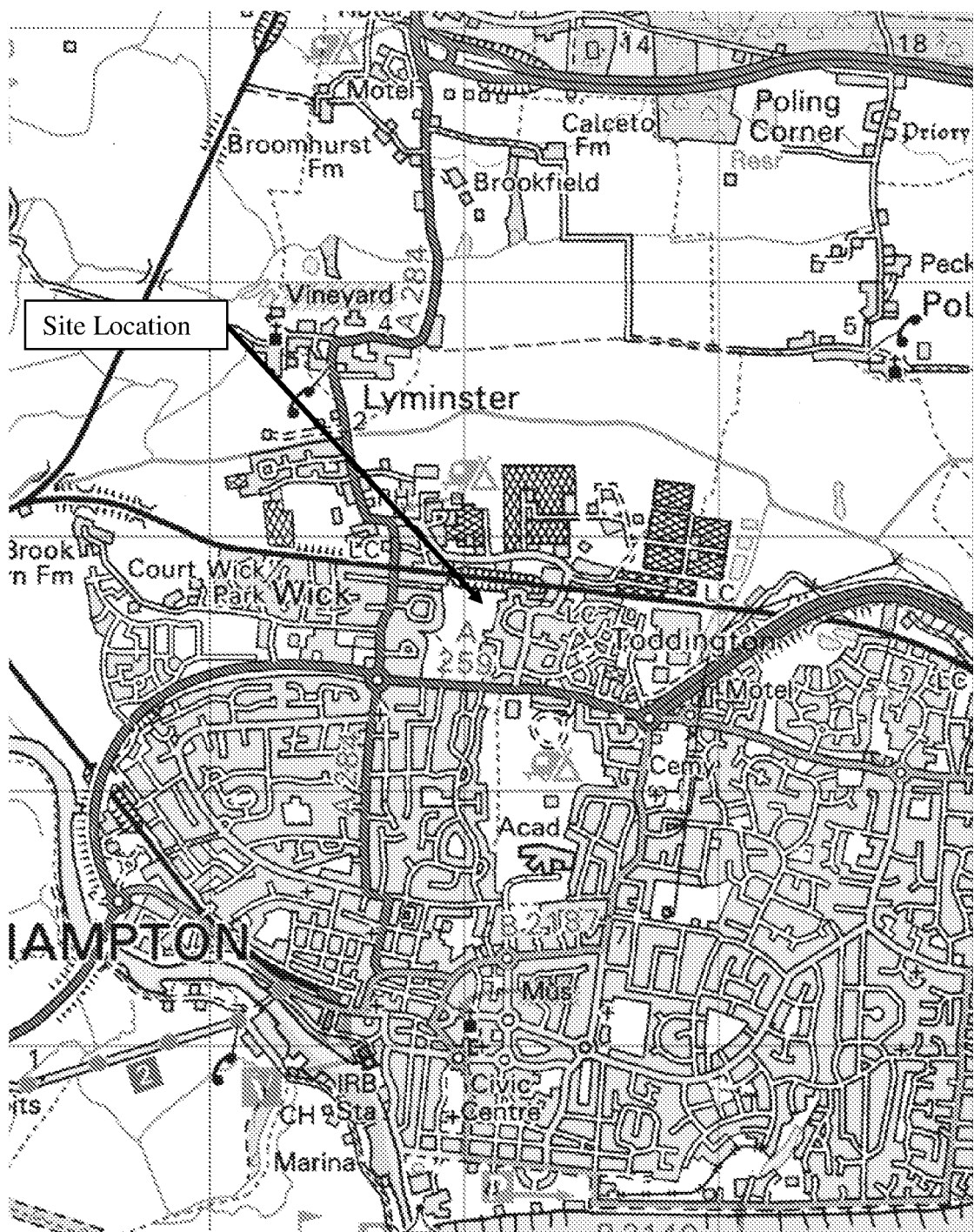
ROAD SAFETY AUDIT TEAM MEMBER

John Reid - MSc, DipHTE, MCIHT, FSoRSA, MITAI, HECOC
Technical Director (Safety)
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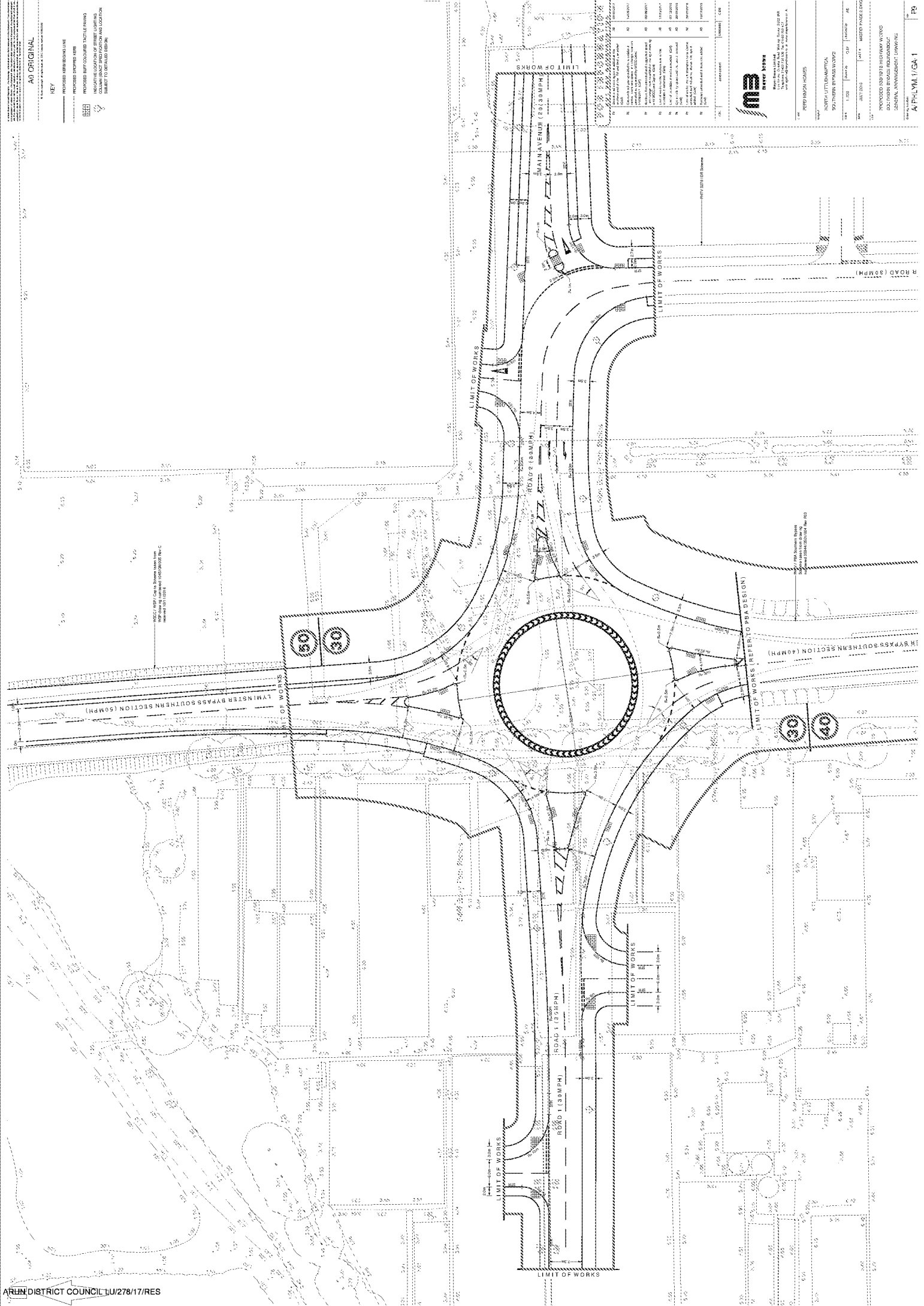
Signed

Date 11/07/17

APPENDIX A: Site Location Plan



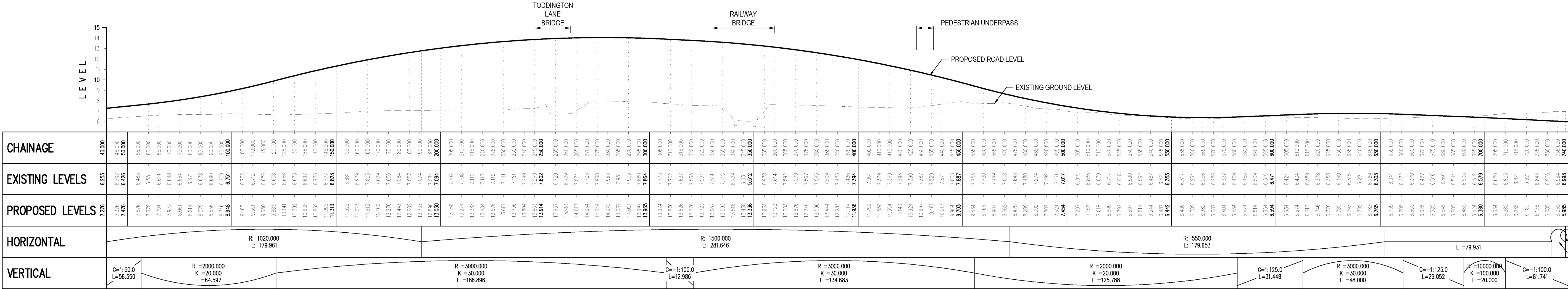
APPENDIX B: Reference Plans



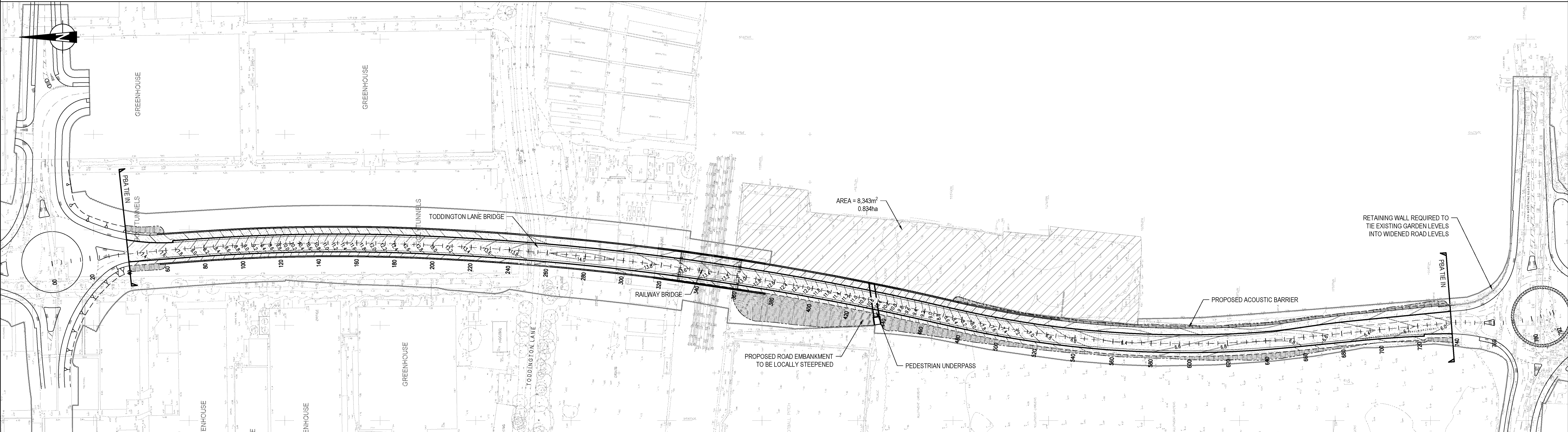








PROPOSED BYPASS CENTERLINE
SCALE: H 1:1000, V 1:200. DATUM: 5.000



NOTES:

- DO NOT SCALE THIS DRAWING. IF IN DOUBT PLEASE REQUEST FURTHER INFORMATION.
- ALL DIMENSIONS ARE IN METRES UNLESS STATED OTHERWISE.
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT CONTRACT DRAWINGS, CONSTRUCTION DETAILS AND SPECIFICATIONS.
- PROPOSED LAYOUT AND LEVEL AND GRADIENT OF BYPASS AT EXTENT OF PBA DESIGN BASED ON MAYER BROWN DRAWING A/PH/LITTLE.2/SBP/LSECT-02 A, A/PH/LITTLE 2/GA-1 P4 AND A/PH/LYM.1/GA-2 P2.

KEY:

- PROPOSED MAJOR CONTOUR - 200mm INTERVALS
- PROPOSED MINOR CONTOUR - 50mm INTERVALS
- RED LINE BOUNDARY

C	Vertical profile and contours over rail bridge amended	20.12.16	MJP	CMB	DTH
B	Persimmon land ownership outside of red line added	06.09.16	MJP	CMB	DTH
A	Horizontal & vertical alignments amended. Red line added	02.09.16	MJP	CMB	
Mark	Revision	Date	Drawn	Chkd	Appd

SCALING NOTE: Do not scale from this drawing. If in doubt, ask.
UTILITIES NOTE: The position of any existing public or private sewers, utility services, plant or apparatus shown on this drawing is believed to be correct, but no warranty to this is expressed or implied. Other such plant or apparatus may also be present but not shown. The Contractor is therefore advised to undertake his own investigation where the presence of any existing sewers, services, plant or apparatus may affect his operations.

Drawing Issue Status

FOR INFORMATION

LYMINSTER BYPASS - SOUTH
NORTH LITTLEHAMPTON
PROPOSED ROAD ALIGNMENT AND
CONTOURS

Client

PERSIMMON

persimmon

Offices throughout
the UK and Europe

www.peterbrett.com

© Peter Brett Associates LLP

READING
Tel: 0118 950 0761

File Location: J:\35944-north littlehampton\cd4 - carfax bridge\road\CD4_2011_01.dwg

I	Red Line Boundary updated	07.07.17	CRD	CMB	DTH
H	Red Line Boundary updated	05.07.17	CRD	CMB	DTH
G	Red Line Boundary updated	29.06.17	CRD	CMB	DTH
F	Pedestrian underpass abutments amended	23.06.17	MJP	DTH	DTH
E	Pedestrian underpass and Toddington Lane bridge abutments amended	10.05.17	MJP	DTH	DTH
D	Pedestrian underpass added	23.12.16	MJP	CMB	DTH
Mark	Revision	Date	Drawn	Chkd	Appd



APPENDIX C: Audit Brief



**PERSIMMON HOMES THAMES VALLEY
NORTH LITTLEHAMPTON
LYMINSTER BYPASS (SOUTHERN
SECTION)
LITTLEHAMPTON, WEST SUSSEX**

**STAGE 1 ROAD SAFETY AUDIT
ADDENDUM BRIEF**

JULY 2017



**PERSIMMON HOMES THAMES VALLEY
NORTH LITTLEHAMPTON
LYMINSTER BYPASS (SOUTHERN
SECTION)
LITTLEHAMPTON, WEST SUSSEX**

**STAGE 1 ROAD SAFETY AUDIT
ADDENDUM BRIEF**

JULY 2017

Project Code:	A/PHLYM.1
Prepared by:	OJN
Approved by:	AB
Issue Date:	July 2017
Status:	DRAFT

**Persimmon Homes Thames Valley
North Littlehampton
Lyminster Bypass (Southern Section)
Littlehampton, West Sussex
Stage 1 Road Safety Audit Addendum Brief**

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APPENDIX C: Personal Injury Collision Accident Data
APPENDIX D: Previous Road Safety Audit Designer's Responses

Authorisation Sheet

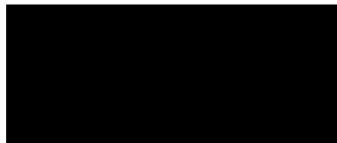
Project: North Littlehampton, Southern Bypass Works

Report Title: Stage 1 Road Safety Audit Brief

Prepared By:

Name: Oliver Nevett

Signed:



Organisation: Mayer Brown Ltd

Date: 28/06/2017

Introduction

- 1.0.1 Mayer Brown Limited has been appointed by Persimmon Homes Thames Valley in respect of the design of the Southern Bypass works associated with Planning Application Ref LU/47/11 and LU/63/11.
- 1.0.2 The site is known as “North Littlehampton” and lies to the north of Toddington Lane in Littlehampton, West Sussex. The site is currently largely glasshouses and open grassland and would be developed to create an urban extension
- 1.0.3 Figure 1.1 below shows the site in relation to the local network

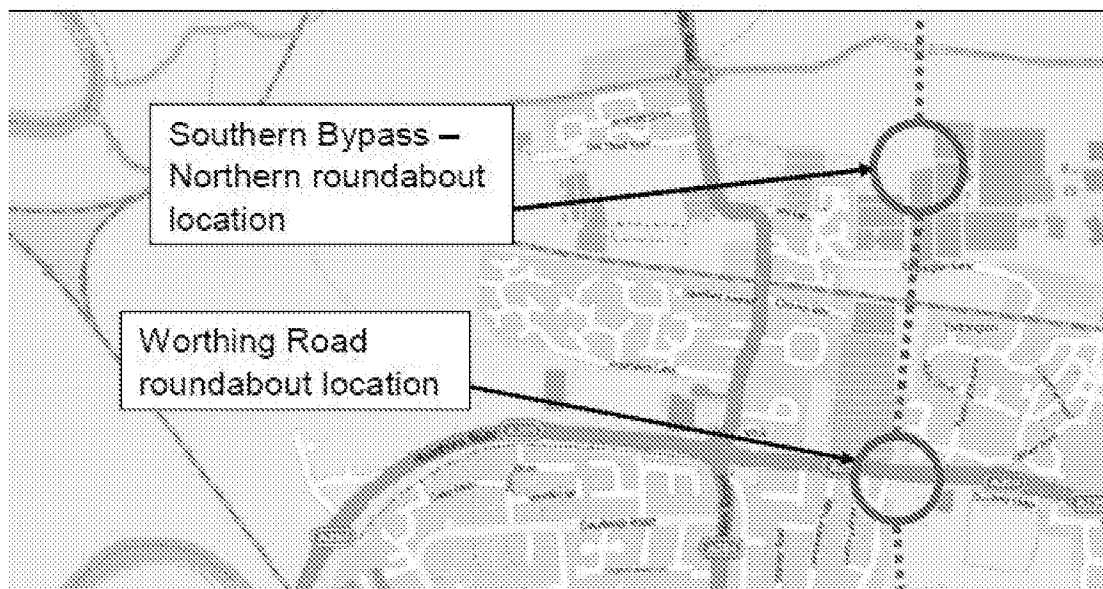


Figure 1.1: Site Location Plan

- 1.0.4 The proposals comprise the demolition of existing buildings and structures, and redevelopment to provide residential, business, neighbourhood centre and community uses, green infrastructure, new highway infrastructure and improvements to existing local highway network.

1.0.5 Application LU/47/11 includes the following:

Outline application with some matters reserved for mixed use development comprising: demolition of existing buildings and structures, up to 1,260 residential dwellings (out of a potential 1,460 dwelling masterplan), up to 13,000 sqm of B1 employment floorspace (including 3,000 sqm Enterprise Centre), up to 3,500 sqm of Class A local facilities, a 100 bed hotel, 60 bed care home, a new 2 Form Entry primary school, community centre, youth and leisure facilities, combined heat & power plant, extension to existing household recycling centre, landscaping, replacement and additional allotments, multi-functional green infrastructure including sports pitches (& associated changing facilities), informal open space, children's play areas, primary vehicular access from a new access from the A259 bridging over the railway line with additional access from Mill Lane & Toddington Lane. This application is the subject of an Environmental Impact Assessment & a departure from the development plan. This application affects a public right of way.

1.0.6 Application LU/63/11 includes the following:

Outline Application for the construction of the 'Fitzalan Link Road' between the A259 Worthing Road & the East Street/Fitzalan Road Roundabout.

1.0.7 This Report follows a:

- » Stage 1 Road Safety Audit undertaken dated September 2011 undertaken on the overall development highway improvements.
- » Stage 1 RSA undertaken October 2014 for the A259 Worthing Road and Northern Roundabout junctions, changing the northern junction from a traffic signal junction to a 4-arm roundabout and the A259 roundabout amended to include 3 lane entries.
- » Stage 1 RSA undertaken October 2015 for the Northern Roundabout junction curtailing the proposed right turn lane at the north end of the Internal Distributor Road (IDR).

1.0.8 The Designer's Responses to these Road Safety Audits are included at **Appendix B**.

- 1.0.9 This Stage 1 Road Safety Audit Addendum brief relates specifically to the alterations to both roundabouts and the addition of the Southern Bypass as listed below:

Northern Roundabout

- ✦ Alignment of northern arm amended to tie in with West Sussex County Council northern bypass scheme.
- ✦ Alignment of western arm amended and extended into the development site to include two priority junctions to serve future site uses.

A259 Roundabout

- ✦ Alignment of eastern arm amended to tie in with West Sussex County Council A259 road widening/duelling works including the widening of the splitter island, curtailment of the footway on the northern side of the carriageway and provision of a temporary crossing point.
- ✦ Alignment of the northern arm amended following changes to the alignment of the southern bypass.
- ✦ Widening of the splitter island on the northern arm and removal of one traffic lane.
- ✦ Alignment of the western arm amended to improve deflection.
- ✦ Alignment of southern arm amended to improve deflection and provide shorter crossing widths for pedestrians and.
- ✦ Footway / cycleway alignments amended.
- ✦ Right turn lane into Highdown Drive curtailed to accommodate a more southerly crossing point north of the junction, as requested by WSCC.
- ✦ The proposed speed limit on the Fitzalan Link has been increased in speed from 30mph to 40mph at the request of WSCC.

Southern Bypass

- ✦ The southern bypass consists of a 7.3m wide single carriageway road with 1m hard strips, a 3.5m wide footway / cycleway on the eastern side and crash barriers on both sides.
- ✦ The southern bypass has two bridge structures as it passes over the existing Toddington Lane and railway line.
- ✦ The scheme has been subject to minor horizontal and vertical realignment since the previous Stage 1 RSA as a result of design development and liaison with Network Rail and WSCC.
- ✦ Through design development the proposed earthworks solution for the approaches to the railway and Toddington Lane bridges has evolved from traditional 1 in 3

earthwork slopes to reinforced earth walls on three sides of the approaches with the southwestern approach remaining as an earthwork embankment.

- » The change to the earthworks on the south-eastern approach was necessitated by the requirement to achieve the agreed area quantity required for new allotments, to compensate for the allotment area being lost due to the construction of the proposed bypass, whilst not expanding the earthwork embankment into the recreation area to the west. The bridge approaches to the north of Toddington Lane and between the Toddington Lane and Railway Bridges were revised to reinforced earthwork embankments to minimise the land take of the bridge approaches and optimise the developable area adjacent to the bypass.

1.0.10 As described above, the general layout of the road network has been subjected to multiple Stage 1 Road Safety Audits. This Road Safety Audit history is further elaborated in Section 6 of this report.

This is illustrated in **Figure 1.2** below.

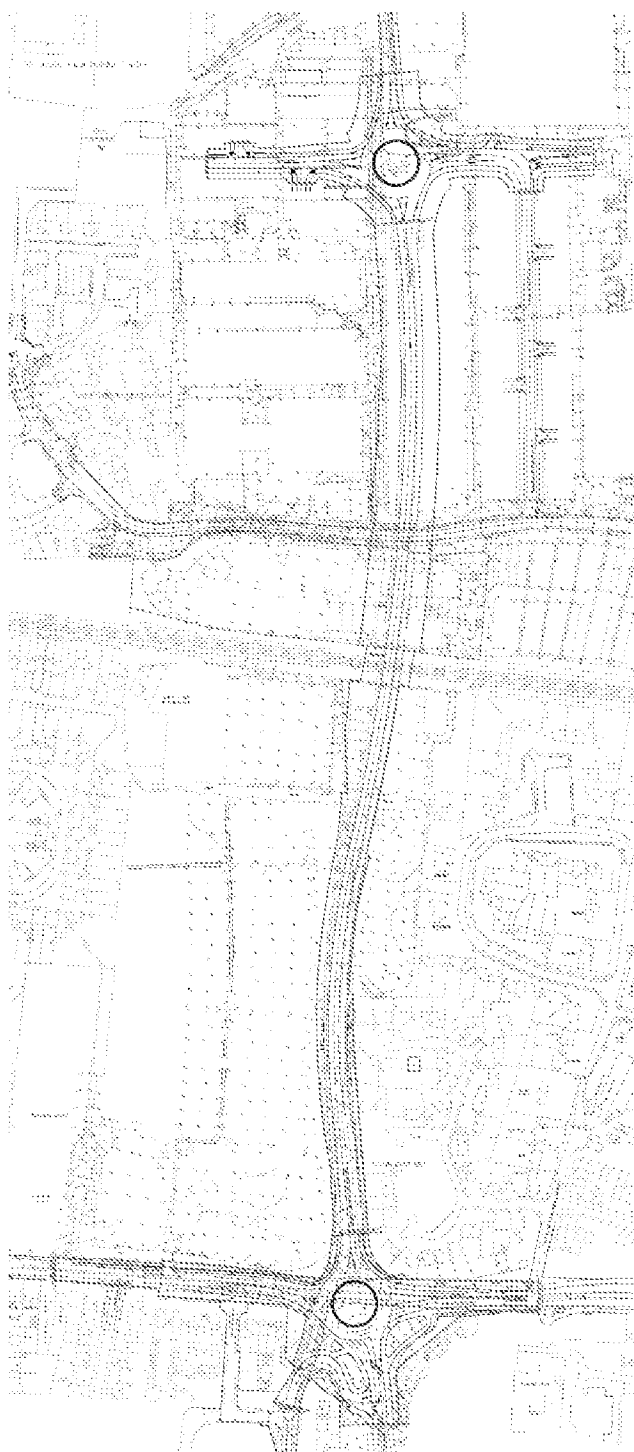


Figure 1.2: Audit area edged red

- 1.0.11 The Stage 1 Road Safety Audit Addendum Report shall be undertaken in accordance with HD19/15 and provided direct to **Adrian Barnley** at **Mayer Brown Limited**.

1 General Details

1.1 Highway Improvement Scheme Name and Road Number

Phase 2 – Southern Bypass

1.2 Type of Scheme

New road and junction scheme

1.3 Road Safety Audit Stage (tick as appropriate)

1	2	1&2	3	Interim	4 (12 months)	4 (36 months)
✓						

1.4 Highway Authority

West Sussex County Council
 Ground Floor Northleigh
 County Hall
 Chichester
 PO19 1RH

T: [REDACTED]

E: [REDACTED]

[REDACTED]

1.5 Design Organisation Details

Mayer Brown Ltd
 Lion House
 Oriental Road
 Woking
 Surrey
 GU22 8AR

T: [REDACTED]

[REDACTED]

1.6 Police Contact Details (Required for Stage 3 only)

N/A

1.7 Maintaining Agent (where applicable)

TBC

1.8 Road Safety Audit Team will comprise a minimum of two of the following auditors

Ken Fry

Qualifications –

- I Eng FIHE, RegRSA (IHE),
- Highways England Certificate of Competency

Company Name –

Mayer Brown Road Safety Team

John Reid

Qualifications –

- Fellow of the Society of Road Safety Auditors
- Member of the Institute of Traffic Accident Investigators
- Highways England Certificate of Competency

Company Name –

Mayer Brown Road Safety Team

Martyn Parr

Qualifications –

- MCIHT Member of the Chartered Institution of Highways and Transportation
- MSoRSA Member of the Society of Road Safety Auditors
- RoSPA Road Safety Engineering Accreditation
- HECOC Highways England Certificate of Competence
- RegRSA (IHE) Registered Road Safety Auditor

1.8.1 The Audit Team are requested to invite the following to the Audit:

N/A

1.8.2 Any changes in the Audit Team personnel shall be referred to the Designer for approval in advance of undertaking the Audit.

1.9 Terms of Reference

1.9.1 This Safety Audit is to be undertaken fully in accordance with the DMRB Standard HD 19/15, as well as the contents of this Road Safety Audit Brief and provided direct to the Designer. Contact details as follows:

Adrian Barnley

Director

Mayer Brown Limited

Lion House

Oriental Road

Woking

Surrey

GU22 8AR

Tel: [REDACTED]

[REDACTED]

2 Scheme Description/Objective

2.1 *General*

- 2.1.1 The works are required to accommodate North Littlehampton Development Residential Development. The works are shown on the drawings included at **Appendix A**.

2.2 *Design Standards Applied to the Scheme Design*

- 2.2.1 The North Littlehampton Phase 2 Section 38/278 proposals have been designed with reference to the Design Manual for Roads and Bridges (DMRB), and any relevant Overseeing Organisation Interim Advice Notes (IAN) and Manual for Streets.

2.3 *Design Speeds*

- 2.3.1 The Design Speeds for this scheme are 60kph (30mph), 70kph (40mph) & 85kph (50mph)

2.4 *Speed Limits (Mandatory)*

- Lyminster Bypass Southern Section 40mph
- Northern Roundabout and Eastern and Western arms 30mph
- Northern Roundabout – Northern arm approach 50mph
- A259 Worthing Road 40mph
- Fitzalan Link 40mph
- Highdown Drive 30mph

2.5 *Existing Traffic Flows/Queues*

- 2.5.1 The Lyminster Southern Bypass will be a new road.

2.6 *Forecast Traffic Flows*

- 2.5.2 The anticipated traffic flows taken from the WSCC Forecast indicate an approximate 2-way AADT (24hr) traffic flow of 26,000.

2.7 *Non-Motorised User (NMU) Desire Lines*

A footways and shared footway / cycleway shall be provided as indicated on the drawings.

It should be noted that the footway/cycleway on the northern side of the eastern arm of the A259 Roundabout has been curtailed because WSCC's future A259 dualling scheme will include the implementation of an extension to this footway/cycleway on this arm to link with the signal crossing.

3 Description of Locality

3.1 General Description

- 3.2 The Lyminster Bypass (Southern Section) is required to Link the North Littlehampton Development to the adjacent highway network.

Road alignment

- 3.3 As part of the design process the southern section of the proposed Lyminster Bypass has been subject to minor horizontal and vertical realignment to tie into the amended roundabout layouts of the A259 Worthing Road proposed roundabout to the south and proposed roundabout at the intersection of the proposed site roads and the northern and southern sections of the Lyminster Bypass to the north.

- 3.4 The realignment of both ends of the bypass had a minor impact on the position of the bridges over Toddington Lane and the railway. Whilst realigning the approach to the A259 Worthing Road roundabout the alignment was optimised to ensure that the carriageway, foot / cycleway, verges and earthworks are contained within the redline boundary.

Earthworks

- 3.5 Through design development the proposed earthworks solution for the approaches to the railway and Toddington Lane bridges has evolved from traditional 1 in 3 earthwork slopes to reinforced earth walls on three sides of the approaches with the southwestern approach remaining as an earthwork embankment.
- 3.6 The change to the earthworks on the south-eastern approach was necessitated by the requirement to achieve the agreed area quantity required for new allotments, to compensate for the allotment area being lost due to the construction of the proposed bypass, whilst not expanding the earthwork embankment into the recreation area to the west. The bridge approaches to the north of Toddington Lane and between the Toddington Lane and Railway Bridges were revised to reinforced earthwork embankments to minimise the land take of the bridge approaches and optimise the developable area adjacent to the bypass.

Toddington Lane Bridge

- 3.7 The proposed road bridge will carry the southern section of the Lyminster Bypass over Toddington Lane road.
- 3.8 The proposed structure has been positioned to provide a minimum clearance of approx. 2800mm at the east corner of the north abutment to the rising main being installed. The width of northern footway under the proposed structure will therefore vary between approx. 3200mm, at the northeast end, and approx. 4500mm, at the northwest end. The width of the southern verge under the proposed structure will vary between approx. 2900mm at the southwest end and approx. 4000mm at the southeast end.
- 3.9 The structure is proposed to be a semi-integral bridge with a single clear square span of 17.0m. The bridge superstructure will comprise of precast prestressed concrete U-beams with an in-situ reinforced concrete deck slab. The substructure will comprise of reinforced concrete abutments.
- 3.10 A 1.4m high N2 (normal containment) galvanised steel parapets with mesh infill panels will be provided on the east side of the structure, over the bridge deck and wing walls. A 1.25m high N2 (normal containment) galvanised steel parapet with mesh infill panels will be provided on the west side of the proposed structure, over the bridge deck and wing walls.
- 3.11 An elevation of the proposed structure has been included on drawing no. 35944/3501/004.

Road over rail bridge

- 3.12 The proposed rail overbridge will carry the southern section of the Lyminster Bypass over the Brighton to Littlehampton Line (ELR: BL11).
- 3.13 The structure is proposed to be a semi-integral bridge with a single clear span of 29.8m. The bridge superstructure will comprise of precast prestressed concrete U-beams with an in-situ reinforced concrete deck slab. The substructure will comprise of reinforced concrete abutments.
- 3.14 A minimum 2m wide corridor will be provided between the abutments and the Network Rail boundary fence, allowing a scaffolding tower to be erected at the ends of the structure for inspection and maintenance.
- 3.15 1.8m high H4a (Very high containment) galvanised steel parapets with solid infill panels and steep copings will be provided on both sides of the structure, over the bridge deck and wing walls.

- 3.16 An elevation of the proposed structure has been included on drawing no. 35944/3501/004.

Allotment culvert

- 3.17 The proposed structure will carry the southern section of the Lyminster Bypass and will provide pedestrian access to the new allotments at the east of the bypass.
- 3.18 The structure will comprise an 18m long buried precast reinforced concrete box culvert with precast reinforced concrete headwalls and tapered wing walls at the west end. The proposed structure will have a clear width of 2.3m and a clear height of 2.3m to allow pedestrian access only.
- 3.19 Lockable access gates will be provided at both ends of the structure.
- 3.20 Lighting will be provided along the length of the culvert. Timed push button switches shall be provided at both ends preventing light pollution.
- 3.21 A 1.4m high N2 (normal containment) galvanised steel parapets with mesh infill panels will be provided along the east side of the structure. The western verge will have a VRS with a 1.15m high steel post and rail fence to provide a pedestrian edge restraint. A 1.15m high galvanised steel post and rail fence will also be mounted along the top of the headwalls and wing walls, on the west side of the structure.
- 3.22 An elevation of the proposed structure has been included on drawing no. 35944/3501/004.

3.23 *Relevant Factors which may Affect Road Safety*

- 3.2.1 The proposed speed limit of Fitzalan Link has been increased from 30mph to 40 mph, at the request of WSCC.
- 3.2.2 WSCC currently has proposals to undertake improvement works on the eastern arm of the proposed A259 Roundabout. The design presented has been developed in close liaison with WSCC to ensure that the proposed A259 Roundabout meets WSCC's capacity criteria whilst accommodating the currently proposed eastern arm improvements.
- 3.2.3 It should be noted that the footway/cycleway on the northern side of the eastern arm of the A259 Roundabout has been curtailed because WSCC's future A259 dualling scheme will include the implementation of an extension to this footway/cycleway on this arm to link with the signal crossing to the east.

3.2.4 WSCC currently has proposals to extend the bypass northwards beyond the northern roundabout. The design of the northern section is currently underway. The design presented has been developed in close liaison with WSCC to ensure that the proposed northern extension ties into the northern roundabout design.

3.24 *Adjacent Land Uses*

3.3.1 Below is an indication of the currently intended land uses. (Plots A1, B3 and B5 are Residential)



Figure 3.1: Land Uses (Northern Roundabout)

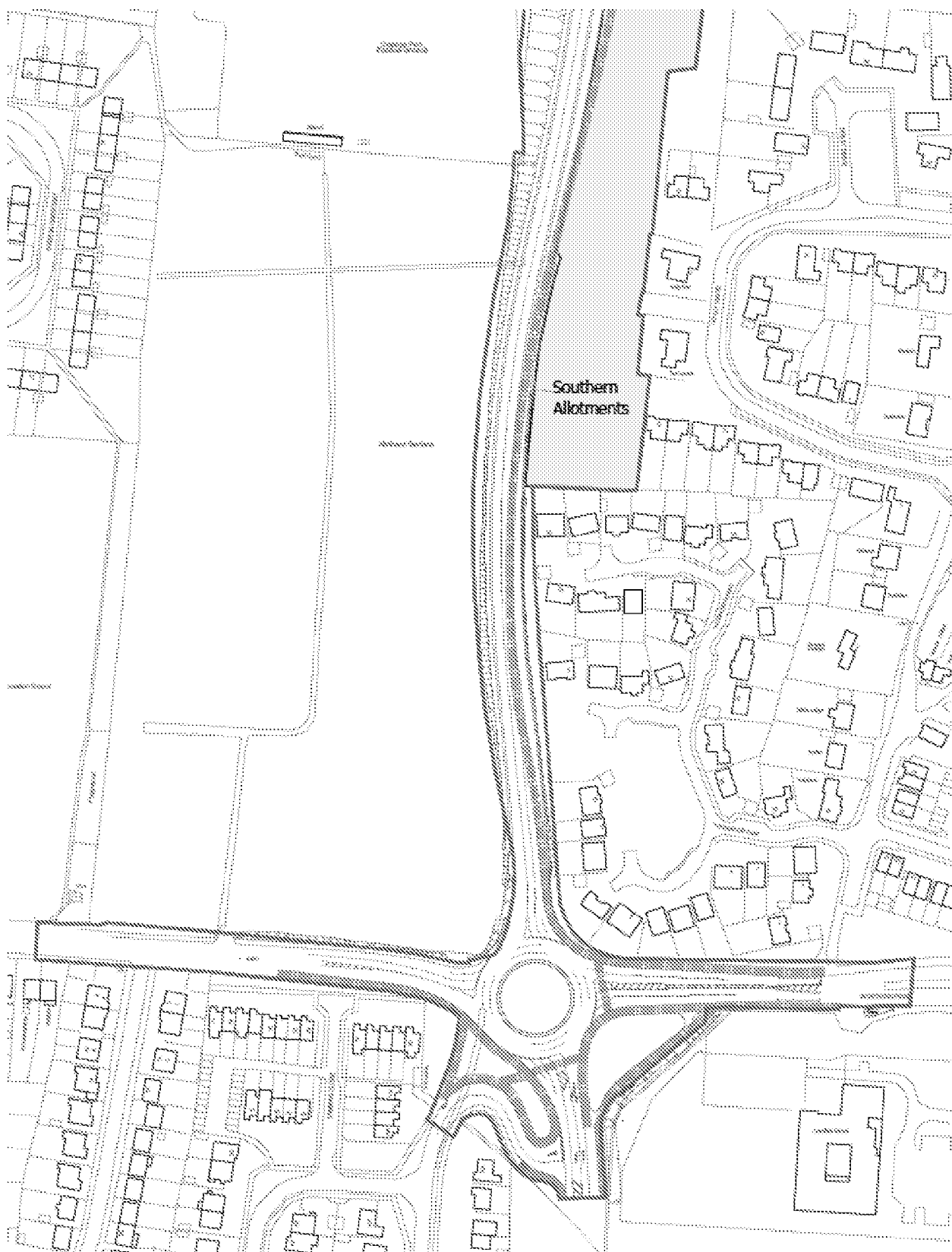


Figure 3.2: Land Uses (Southern Roundabout)

4 Personal Injury Collision Analysis

- 4.1 Accident data has been reviewed on Crashmap.co.uk which indicates that 3 slight accidents have been recorded within the vicinity of the Highdown Drive / A259 Junction and 1 slight accident at the Lansdowne Road / A259 junction within the last 3 recorded years indicted (2013 to 2016).
- 4.2 Accident data in the form of a Crashmap.co.uk screen print is provided below.

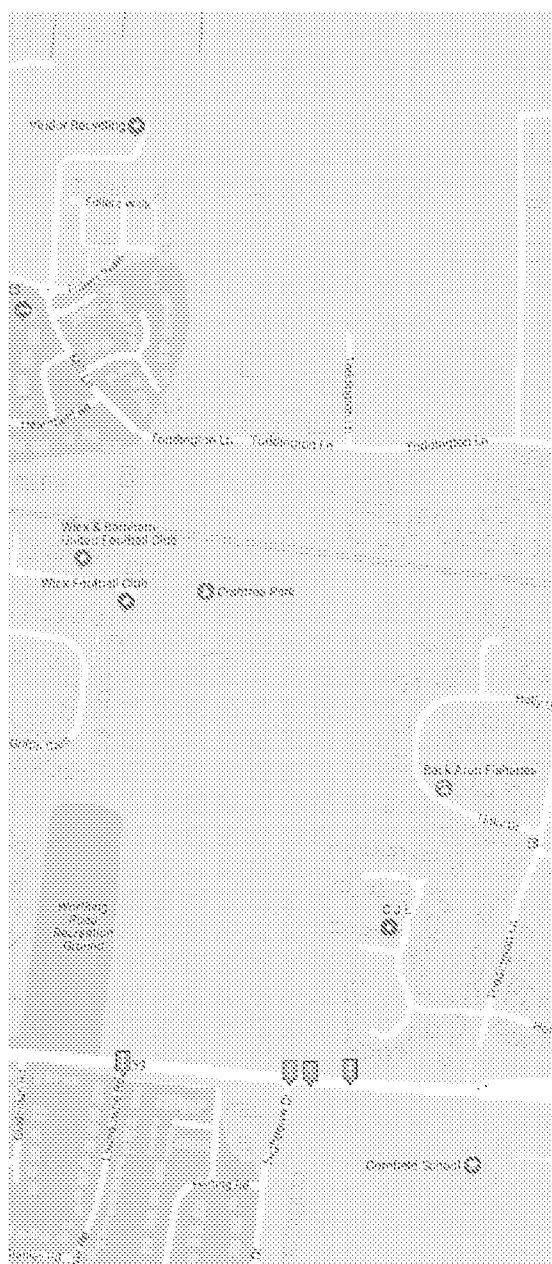


Figure 4.1: Crashmap Accident Data

5 Departures and Relaxations from Standards

Northern Roundabout Junction

- 5.1 No Departures from Standard have been identified.

Southern Bypass (Link Road) between the roundabout

- 5.2 No Departures from Standard have been identified.

Southern A259 Roundabout Junction

- 5.3 A Departure from Standard for the northern approach arm was previously agreed with WSCC. However, in the amend scheme, the entry path curvature has been adjusted and now accords with the DMRB.

Highdown Drive / Fitzalan Link Priority Junction -- [TD 42/95]

- 5.4 Relaxations and Departures from Standards were advised as part of the original Stage 1 Road Safety Audit (Sept 2011) and subsequently accepted by the Highway Authority.
- 5.5 The following sets out the previously highlighted departures and relaxations that are still present within the scheme proposals. The reference numbers are based on those used in the MB Relaxations and Departures from Standard Report dated January 2012.
- 5.6 The applicable section of the DMRB is TD 42/95. The following tables set out the required departures and relaxations.

Relaxation	
Reference no.	A
Location	Southbound major arm approach (from roundabout)
Description	120m visibility not achievable contrary to paragraph 7.5 (Approx 45m is achievable)
Why Required	Horizontal alignment of Highdown Drive is highly constrained and junction cannot be moved any further south.
Hazards and Risks	Potential for vehicles not to see the junction in time and hence overshoot
Benefits	Disbenefits
Maintains all movements access to Highdown Drive and provision of a 4-arm roundabout.	Potential for vehicles to overshoot junction

- 5.7 **Designers' Comment:** The space available for the A259 roundabout is very limited. It is therefore not possible to incorporate Highdown Drive into the roundabout. Highdown Drive has therefore been realigned in order to form a priority junction with the Fitzalan Link. This has been placed as far as possible to the south of the roundabout without creating an unacceptable alignment of Highdown Drive. Due to the proximity of the roundabout, speeds on the southbound approach will be low. In addition, this is an urban situation. MfS stopping site distances therefore considered appropriate, and are fully achievable.

Relaxation	
Reference no.	B
Location	Highdown Drive minor arm approach
Description	90m visibility not achievable contrary to paragraph 7.6a (70m is achievable – one step below desirable minimum)
Why Required	Horizontal alignment of Highdown Drive is highly constrained and junction cannot be moved any further south.
Hazards and Risks	Potential for vehicles not to see the junction in time and hence overshoot
Benefits	Disbenefits
Allows a 4-arm roundabout to be created within the limited space available.	Potential for vehicles to overshoot junction

- 5.8 **Designers' Comment:** The space available for the A259 roundabout is very limited. It is therefore not possible to incorporate Highdown Drive into the roundabout. Highdown drive has therefore been realigned in order to form a priority junction with the Fitzalan Link. This has been placed as far as possible to the south of the roundabout without creating an unacceptable alignment of Highdown Drive. Due to this alignment, speeds on the approach will be low. In addition, this is an urban situation. MfS stopping site distances therefore considered appropriate, and are fully achievable.

Departure	
Reference no.	C
Location	Right turn lane into Highdown Drive
Description	Deceleration length of right turn lane shall be 40m in accordance with paragraph 7.40. The actual length (excluding 10m turning length) is 16m
Why Required	The right turn length has been reduced to accommodate an uncontrolled pedestrian crossing south of the roundabout, as requested by WSCC and to accommodate all movements at the junction.
Hazards and Risks	Potential for rear end shunts
Benefits	Disbenefits
Accommodates all movements junction and pedestrian crossing in narrower carriageway width south of roundabout junction.	Potential for rear end shunts

- 5.9 Designers' Comment: The space available for the A259 roundabout is very limited. It is therefore not possible to incorporate Highdown Drive into the roundabout. Highdown drive has therefore been realigned in order to form a priority junction with the Fitzalan Link. This has been placed as far as possible to the south of the roundabout without creating an unacceptable alignment of Highdown Drive. The restriction in deceleration length is shorter than required and was reduced further by the request to move the pedestrian crossing (on the southern arm) further south to a narrower section of carriageway, by WSCC.

Departure	
Reference no.	D
Location	Overall Layout
Description	Sharp radius on Highdown Drive approach to junction contrary to paragraph 8.2.
Why Required	Horizontal alignment of Highdown Drive is highly constrained and junction cannot be moved any further south. Junction required as insufficient land available to form a 5-arm roundabout.
Hazards and Risks	Potential for rear end shunts
Benefits	Disbenefits
Accommodates all movements junction and provision of A259 roundabout.	Potential for rear end shunts

- 5.10 Designers' Comment: The space available for the A259 roundabout is very limited. It is therefore not possible to incorporate Highdown Drive into the roundabout. Highdown drive has therefore been realigned in order to form a priority junction with the Fitzalan Link. This has been placed as far as possible to the south of the roundabout without creating an unacceptable alignment of Highdown Drive. The bend can accommodate all necessary swept paths and will encourage low speeds on this residential road. Rat running will also be discouraged.

Departure	
Reference no.	E
Location	Highdown Drive Ghost Island Right Turn Facility
Description	Direct taper length of 15m is required. 5m is provided (paragraph 7.34)
Why Required	Horizontal alignment of Highdown Drive is highly constrained and junction cannot be moved any further south. Junction required as insufficient land available to form a 5-arm roundabout.
Hazards and Risks	Potential for rear end shunts
Benefits	Disbenefits
Accommodates all movements junction and pedestrian crossing in narrower carriageway width south of roundabout junction.	Potential for rear end shunts

- 5.11 Designers' Comment: The space available for the A259 roundabout is very limited. It is therefore not possible to incorporate Highdown Drive into the roundabout. Highdown drive has therefore been realigned in order to form a priority junction with the Fitzalan Link. This has been placed as far as possible to the south of the roundabout without creating an unacceptable alignment of Highdown Drive. The restriction in deceleration length is shorter than required and was reduced further by the request to move the pedestrian crossing (on the southern arm) further south to a narrower section of carriageway by WSCC. Speeds off the roundabout should be low and it should be considered that a direct taper of 5m corresponds to a speed limit of 30mph.
- 5.12 As set out in the Relaxations and Departures from Standard Report dated January 2012, following discussions with WSCC regarding the departures at Highdown Drive, it was agreed that the proposed layout and departures in this location were acceptable. However, it was agreed that the use and operation of the junction and right turn would be monitored over time (3 years is suggested). If an accident history emerges, the junction would revert to a left in / left out arrangement.

6 Previous Road Safety Audit Reports, Designer's Responses and Exception Reports

6.0.1 This report follows a;

- Stage 1 Road Safety Audit undertaken dated September 2011 undertaken on the overall development highway improvements.
- Stage 1 RSA undertaken October 2014 for the A259 Worthing Road and Northern Roundabout junctions, changing the northern junction from a traffic signal junction to a 4-arm roundabout and the A259 roundabout amended to include 3 lane entries.
- Stage 1 RSA undertaken October 2015 for the Northern Roundabout junction curtailing the proposed right turn lane at the north end of the Internal Distributor Road (IDR).

6.0.2 The Designer's Responses to these Road Safety Audits are included at **Appendix B**.

7 Strategic Decisions – Items Outside the Scope of this Road Safety Audit

7.1 General

- 7.1.1 The principle of the roundabout designs have been developed since granting of outline planning permission over many months liaison with WSCC.
- 7.1.2 The southern roundabout has been designed to accommodate the future implementation of the WSCC A259 dualling scheme.
- 7.1.3 The northern roundabout has been designed to accommodate the future implementation of the bypass northern section being developed by WSCC.

8 List of Included Documents and Drawings

8.1 Drawings (Provided at Appendix A)

<u>Drawing Number</u>	<u>Title</u>
519-GR.L_002	Illustrative Master Plan
A/PHLYM.1/GA-1 Rev P9	General Arrangement Drawing (1 of 2)
A/PHLYM.1/GA-2 Rev P8	General Arrangement Drawing (2 of 2)
A/PHLYM.1/ST-1 Rev P5	Surface Treatment Drawings (1 of 2)
A/PHLYM.1/ST-2 Rev P6	Surface Treatment Drawings (2 of 2)
A/PHLYM.1/VIS-1 Rev P5	Visibility Splay Drawings (1 of 2)
A/PHLYM.1/VIS-2 Rev P7	Visibility Splay Drawings (2 of 2)
A/PHLYM.1/TR-1 Rev P3	Tree Removal Drawings (1 of 2)
A/PHLYM.1/TR-2 Rev P3	Tree Removal Drawings (2 of 2)
A/PHLYM.1/TK-1 Rev P4	Anticipated Swept Paths Drawing
35944/2001/001 Rev I	Proposed Road Alignment & Contours Drawing
35944/2001/002 Rev C	Proposed Finishes and Kerbing Drawing
35944/2001/004 Rev P05	Reco Walls General Arrangement Drawing
A100789_501 Rev E	Bypass Drainage

8.2 Documents (Provided at Appendix B)

<u>Reference</u>	<u>Title</u>	<u>Date</u>
-	Stage 1 RSA Designer's Response to RSA1 dated Sept 2011	Oct 2011
-	Designer's Response to Stage 1 RSA dated Oct 2014 (Rev A)	Oct 2014
-	Designer's Response to Stage 1 RSA dated Oct 2015	Nov 2015

9 Checklist

9.1 Documents

RSA Brief	✓	Site Location Plan	✓
Scale Layout Plans	✓	Construction/Typical Details	N/A
Previous RSA Reports	✓	Previous RSA Designer's Response Reports	✓
Road Safety Audit Exception Reports	✓	Departures and Relaxations from Standards	✓
Traffic Signal Staging Refer to drawing ??	N/A	Personal Injury Collision Data	✓
Personal Injury Collision Drawing	✓	Traffic Counts	N/A
Speed Surveys	N/A	NMU Desire Lines and Volumes	✓
NMU Context and Audit Report	✓	Items Outside the Scope of the RSA/Strategic Decisions	✓
Other Factors that may Impact on Road Safety	✓	Design Speeds/Speed Limits	✓
Design Standards Used	✓	Adjacent Land Uses	✓

Grey = Not Mandatory for Stage 1 RSA

APPENDIX A: Drawings

APPENDIX B: Previous Road Safety Audit Designer's Responses

