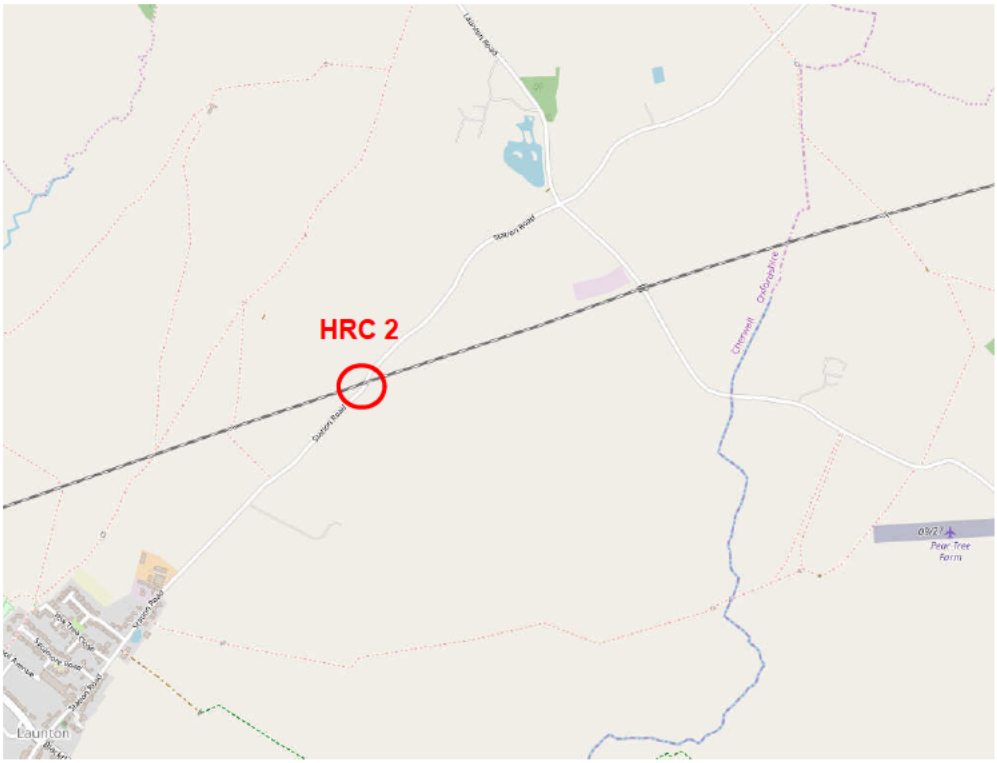
Departure Reference:	N013	**Departure Type:**	Specific
Document File Name:	133735_RW-EWR-XX-XX-RP-CH-000143	**Local Highway Authority:**	Oxfordshire County Council

Departure Title:	Reduced visibility distance to primary signal at junctions on accesses to Haul Road Crossing 2.
Departure Location:	 HRC 2 - Station Road
Supporting Information:	**General Arrangement Drawing Number** HRC 2 - 133735_2A-EWR-OXD-HRC_2-DR-CH-010001 **Signal Head Visibility Drawings Numbers** HRC 2 - 133735_2A-EWR-OXD-HRC_2-DR-CH-010009 HRC 2 - 133735_2A-EWR-OXD-HRC_2-DR-CH-010010
Consultations:	Oxfordshire County Council

DEPARTURE DETAILS

Relevant Standards:	DMRB, Volume 6, Section 2, Part 6, TD 9/93 DMRB, Volume 6, Section 2, Part 3, TD 50/04
Clause/Paragraphs:	TD 50/04, Paragraphs 2.6 - 2.7

Visibility on the Approach to Junctions

2.6 The stopping sight distance on the immediate approach to the junction **[See paragraph 1.26, TD 9 (DMRB 6.1.1)]** shall be in accordance with the standards contained in **TD 9 (DMRB 6.1.1)** and Relaxations below Desirable Minimum Stopping Sight Distance **(DMSSD)** shall not be permitted on the immediate approaches to the junction.

2.7 Each traffic lane shall have clear vision of at least one primary signal associated with its particular movement, from a distance equivalent to the DMSSD. The visibility envelope **[See Figure 3, TD 9 (DMRB 6.1.1)]** shall be increased to include the height of the signal head as indicated in **Figure 2/1**.

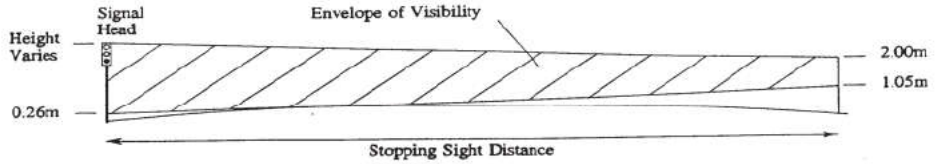


Figure 2/1: Visibility Requirements on Approach to Junction

TD 9/93, Paragraphs 2.1 - 2.2 & Table 3

Stopping Sight Distance

2.1 Table 3 shows the stopping sight distance (SSD) appropriate for each Design Speed.

2.2 Stopping sight distance shall be measured from a minimum driver's eye height of between 1.05m and 2.00m, to an object height of between 0.26m and 2.00m both above the road surface, as shown in Figure 3. It shall be checked in both the horizontal and vertical plane, between any two points in the centre of the lane on the inside of the curve (for each carriageway in the case of dual carriageways).

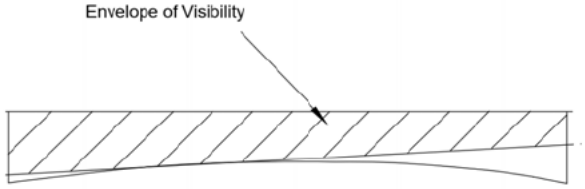


Figure 3 Measurement of Stopping Sight Distance

DESIGN SPEED kph	120	100	85	70	60	50	V^2/R
STOPPING SIGHT DISTANCE m							
Desirable Minimum	295	215	160	120	90	70	
One Step below Desirable Minimum	215	160	120	90	70	50	
HORIZONTAL CURVATURE m.							
Minimum R* without elimination of Adverse Camber and Transitions	2880	2040	1440	1020	720	520	5
Minimum R* with Superelevation of 2.5%	2040	1440	1020	720	510	360	7.07
Minimum R* with Superelevation of 3.5%	1440	1020	720	510	360	255	10
Desirable Minimum R with Superelevation of 5%	1020	720	510	360	255	180	14.14
One Step below Desirable Minimum R with Superelevation of 7%	720	510	360	255	180	127	20
Two Steps below Desirable Minimum Radius with Superelevation of 7%	510	360	255	180	127	90	28.28
VERTICAL CURVATURE							
Desirable Minimum* Crest K Value	182	100	55	30	17	10	
One Step below Desirable Min Crest K Value	100	55	30	17	10	6.5	
Absolute Minimum Sag K Value	37	26	20	20	13	9	
OVERTAKING SIGHT DISTANCES							
Full Overtaking Sight Distance FOSD m.	*	580	490	410	345	290	
FOSD Overtaking Crest K Value	*	400	285	200	142	100	

Table 3

Departure Description:	Visibility to signal heads from traffic approaching the junction.
Associated Departures:	None
Reason for Departure:	Reduced visibility to signal heads for traffic approaching junctions at Haul Road Crossing 2.

DESIGN DETAILS

Design Year Traffic Flow (AADT):	Unknown
Design Speed:	TD 50/04 Paragraphs 2.2 and 2.3 provide advice on determining design speeds on approaches to the junction. The approach suggested in paragraph 2.3 relies on measured traffic flows. Presently this information is not available for the junctions being considered the methods described in paragraph 2.2 will be adopted. **Design Speed** 2.2 Some design standards are dependent on the approach speed of vehicles and reference should be made to **TD 9 (DMRB 6.1.1)** to determine appropriate design speeds for each entry arm. Where these design speed related standards cannot be achieved then traffic management measures should be introduced to reduce the approach speed to an appropriate value, for the available Stopping Sight Distance (**SSD**). 2.3 **TA 22 (DMRB 5.1.4)** provides guidance for determining speed limits, and design speeds based upon the 85th percentile approach speed of traffic. The design speed of the major road can be calculated using advise in TD 9/93, Paragraph 1.7.

Extracts from TD 9/93

1.7 Existing Rural Road Improvements: (including short diversions or bypasses up to about 2 km in length) Design Speed shall be derived in a similar manner to Paragraph 1.6 above, with Ac measured over a minimum length of 2 km incorporating the improvement, provided there are no discontinuities such as roundabouts. The strategy for the contiguous sections of road, however, must be considered when determining Ac and the cross-sectional design. It might be unnecessary to provide a full Standard cross-section for a minor re-alignment within a low Standard route, unless it represented a stage of a realistic improvement strategy.

Selection of Design Speed

1.6 New Rural Roads: Design Speed shall be derived from Figure 1, which shows the variation in speeds for a given Lc against Ac. The Design Speeds are arranged in bands, ie. 120, 100, 85, etc., within which suffixes A and B indicate the higher and lower categories of each band. An initial alignment to a trial Design Speed should be drawn

up, and Ac measured for each section of the route demonstrating significant changes thereof, over a minimum length of 2 km. The Design Speed calculated from the ensuing Ac and Lc should be checked against the initial choice to identify locations where elements of the initial trial alignment may be relaxed to achieve cost or environmental savings, or conversely where design should be upgraded, according to the calculated Design Speed. If any changes to road geometry result, then the Design Speed should be recalculated to check that it has not changed.

Paragraph 1.3 identifies how Alignment Constraint, Ac is calculated for a single carriageway;

Ac = 12 – VISI/60 + 2B/45

Where

B = Bendiness in degrees/km

And VISI is established from Annex A, paragraph 3;

3. For existing roads, an empirical relationship has been derived which provides estimates of VISI given in bendiness and verge width (applicable up to VISI = 720m) i.e.

$$\text{Log}_{10}\,\text{VISI} = 2.46 + \text{VW}/25 - \text{B}/400$$

where:

VW = Average verge width (averaged for both sides of the road)

B = Bendiness (Degree per km - minimum Length of about 2 km)

This relationship is valid for existing roads, but on long straight roads, or where sight distance is available outside the highway boundary, significant underestimates of VISI will result.

Paragraph 1.4 identifies how the Layout Constraint (Lc) is established

1.4 Layout Constraint Lc: This measures the degree of constraint imparted by the road cross section, verge width, and frequency of junctions and accesses. Table 1 shows the values of Lc relative to cross section features and density of access, expressed as the total number of junctions,laybys and commercial accesses per km, summed for both sides of the road, where:

L = Low Access numbering 2 to 5 per km

M = Medium Access numbering 6 to 8 per km

H = High Access numbering 9 to 12 per km

Road Type	S2				WS2		D2AP		D3AP	D2M	D3M
Carriageway Width (Ex. Metre Strips)	6m		7.3m		10m		Dual 7.3m		Dual 11m	Dual 7.3m & Hard Shoulder	Dual 11m & Hard Shoulder
Degree of Access and Junctions	H	M	M	L	M	L	M	L	L	L	L
Standard Verge Width	29	26	23	21	19	17	10	9	6	4	0
1.5m Verge	31	28	25	23							
0.5m Verge	33	30									

There is no research data available for 4 lane Single Carriageway roads between 12 and 14.6m width (S4). In the limited circumstances for their use descibed in this document, Design Speed should be estimated asuming a normal D2AP with a Layout Constraint of 15 - 13 kph

Table 1 Layout Constraint Lc kph

Design speed is then established using Figure 1

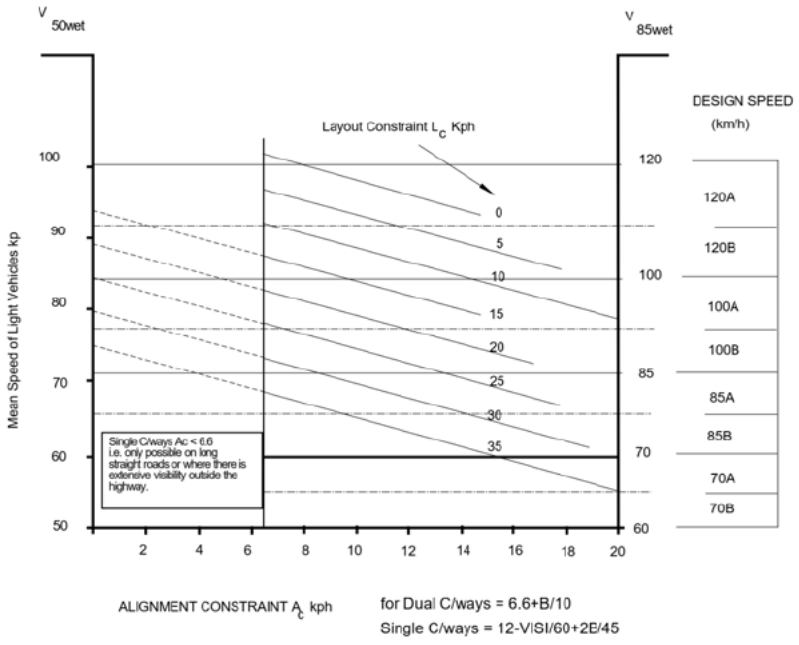


Figure 1 Selection of Design Speed (Rural Roads)

The design road speed is calculated as follows;

Location	VW	B	Log10 VISI	VISI	Ac	Lc	Design speed kph
HRC 2	0.5	124	2.17	150	15	30	85

JUSTIFICATION

Safety:

The SSD for design and relevant posted speed at this location is;

Location	Design Speed (kph)	Posted Speed (mph/kph)	Design Speed SSD (m)
HRC 2	85	60/96	160

The specified and achievable SSD from Table 3 for the haul road crossing based on its design speed is;

Location	Specified SSD (m)	Achieved SSD (m)	
		Southern Approach	Northern Approach
HRC 2	160	28	50

The specified SSD is not achieved for HRC 2 in either direction. Signalising the haul road crossing has been proposed with the aim of improving safety for road users. HRC 2 proposed layout is similar to the existing level crossing; whereby, advanced signage is used to relay the hazard to vehicle users and pedestrians.

Congestion/Delay:

There will be some delay to road users, due to the nature of traffic signals. However, this will be minimised with the revertive stage being on the main roads at the haul road crossing. As a result, the signals will only change on demand, to allow site haulage vehicles to cross, reverting back to green on the main arms. There are also no all-red stages catering for pedestrians, which will help minimise delay to vehicles using the junctions.

Environment/ Sustainability:

It is not proposed to provide the full SSD on approach to HRC 2, as this would involve heavy vegetation clearance, including several mature trees. As the crossing is only temporary for the duration of the EWR works, it is an unreasonable approach to take and would be a long-term detriment to the area.

Accessibility:

EWR Alliance have no control over the land required to provide the SSD for HRC 2, although as mentioned above this would not be a favourable approach to take, due to the environmental impact.

Maintenance:

Any vegetation trimming required to provide the SSD, will be maintained during the course of the works, with this carried out at the appropriate time of year.

Economic (whole life cost):

n/a

MITIGATION

Risk Assessment Classification:	n/a
Other Options Considered:	n/a
Mitigation:	Advanced warning signs will be provided on the approach to the haul road crossing. Vegetation clearance will be undertaken to help achieve the improved SSD limits detailed above. This will be done under guidance from the environmental team on the project.

CONCLUDING COMMENTS

It was felt that providing a signalised junction would provide the greatest level of safety for road users in the vicinity of the haul road crossing. The SSD approaching the signals has been maximised as far as reasonably practicable, given the extent of vegetation and tree clearance or road realignment which would be required to provide the full SSD, and that the signals are not planned to be permanent.

Also the duration of usage by private vehicles will be short due to the closure of this section of Station Road to allow the construction of the proposed realignment and associated overbridge.

ALLIANCE ASSURANCE

	Name	Signed	Date
Originator	**Andrew Kirk**	[redacted]	**03/04/2020**
Reviewer	**Lisa Taylor**		**03/04/2020**
Authorised	**Gareth Johnston**		**03/04/2020**

LOCAL HIGHWAY AUTHORITY RESPONSE

For completion by Local Highway Authority Representative

Category		Tick
1	Approved	
2	Approved with comments*	
3	Rejected with comments*	

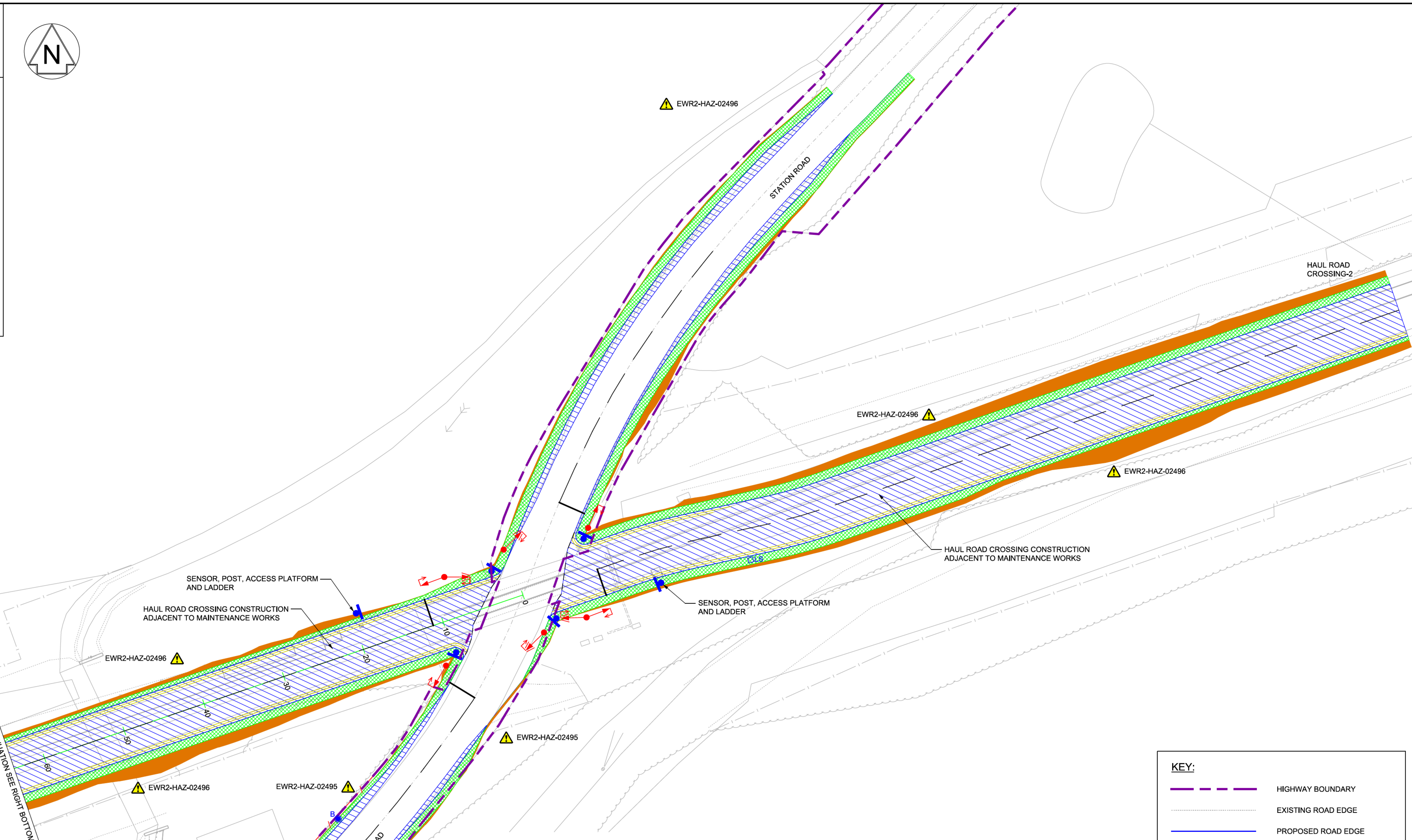
Name	Position	Signed	Date

*comments are to be provided on the form provided. Responses will be provided back to the LHA on these forms and close out monitored. Link to template: 133735_RW-EWR-XX-XX-CM-CH-000002

Note: Where comments impact upon a design decision or have multidiscipline impacts, they will be entered into BIMCollab the projects online issues management system.

Revision & Version
B01.03

Drawing Number
133735_2A-EWR-OXD-HRC_2-DR-CH-010001



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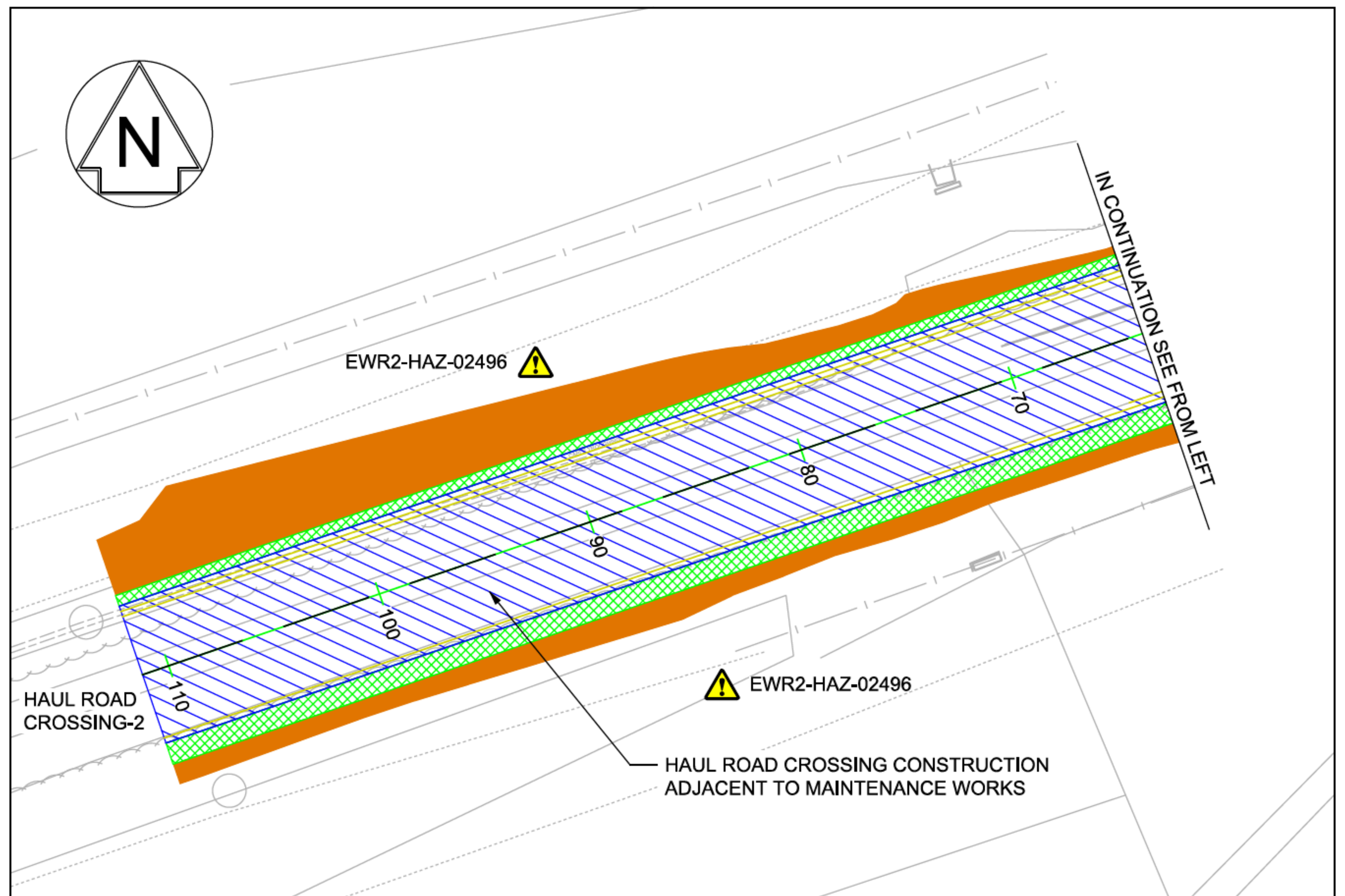

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NETWORK RAIL (EAST WEST
RAIL WESTERN SECTION PHASE 2)

NOTES:

1. THIS DRAWING IS NOT TO BE SCALED.
2. ALL DIMENSIONS ARE IN METRES (m) UNLESS SHOWN OTHERWISE.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE HIGHWAY DESIGN PACKAGE OF DRAWINGS AND DOCUMENTS.
4. WHEREVER REQUIRED, ROAD MARKINGS ARE TO BE LAID IN ACCORDANCE WITH 'THE TRAFFIC SIGN REGULATIONS AND GENERAL DIRECTIONS 2016' & `TRAFFIC SIGNS MANUAL CHAPTER 5 (2003)'.
5. FOR DETAILS OF ROAD MARKINGS, REFER TO STANDARD CONSTRUCTION DETAIL TW5 ROAD MARKINGS FOR COMPOUND ACCESS DRAWING No. 133735_RW-EWR-XX-XX-DR-CH-000122.

KEY:

- HIGHWAY BOUNDARY
- EXISTING ROAD EDGE
- PROPOSED ROAD EDGE
- PROPOSED WHITE ROAD MARKER
- PROPOSED YELLOW ROAD MARKING
- NEW PAVEMENT
- GRASS VERGE
- PROPOSED EARTHWORKS
- RELOCATED TRAFFIC SIGN
- LS RELOCATED LANDSCAPE POST
- B RELOCATED BOLLARD
- PROPOSED POST & WIRE FENCE
- PROPOSED TRAFFIC SIGNALS

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

THE WORKS ARE TO BE UNDERTAKEN BY A COMPETENT DELIVERY TEAM, AND THEREFORE ONLY EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW. FOR FURTHER DETAILS AND PROPOSED SAFETY MEASURES REFER "EWR PHASE 2 HAZARD LOG WORKING COPY" EB DOC. REF: 133735-NWR-RSA-SSD-000001.

ID	HAZARD DESCRIPTION
EWR2-HAZ-02495	OVERHEAD HIGH AND LOW VOLTAGE CABLES
EWR2-HAZ-02496	PRESENCE OF BURIED SERVICES/ UTILITIES

INDICATES PROJECT RISKS (EWR2-DRIS- .....)
INDICATES H&S RISKS (EWR2-HAZ- .....)

Rev	Date	Description of Revisions	Dsnd	Chkd	Appr
B01	18/03/20	FOR INFORMATION	N.T.	L.T.	G.J.

Status: SHARED - for Information
Suitability: S2

EWR Alliance
Connecting People

Project:
East West Rail
(Western Section)
Phase 2

Drawing Title:
HAUL ROAD CROSSING HRC_2 GENERAL ARRANGEMENT

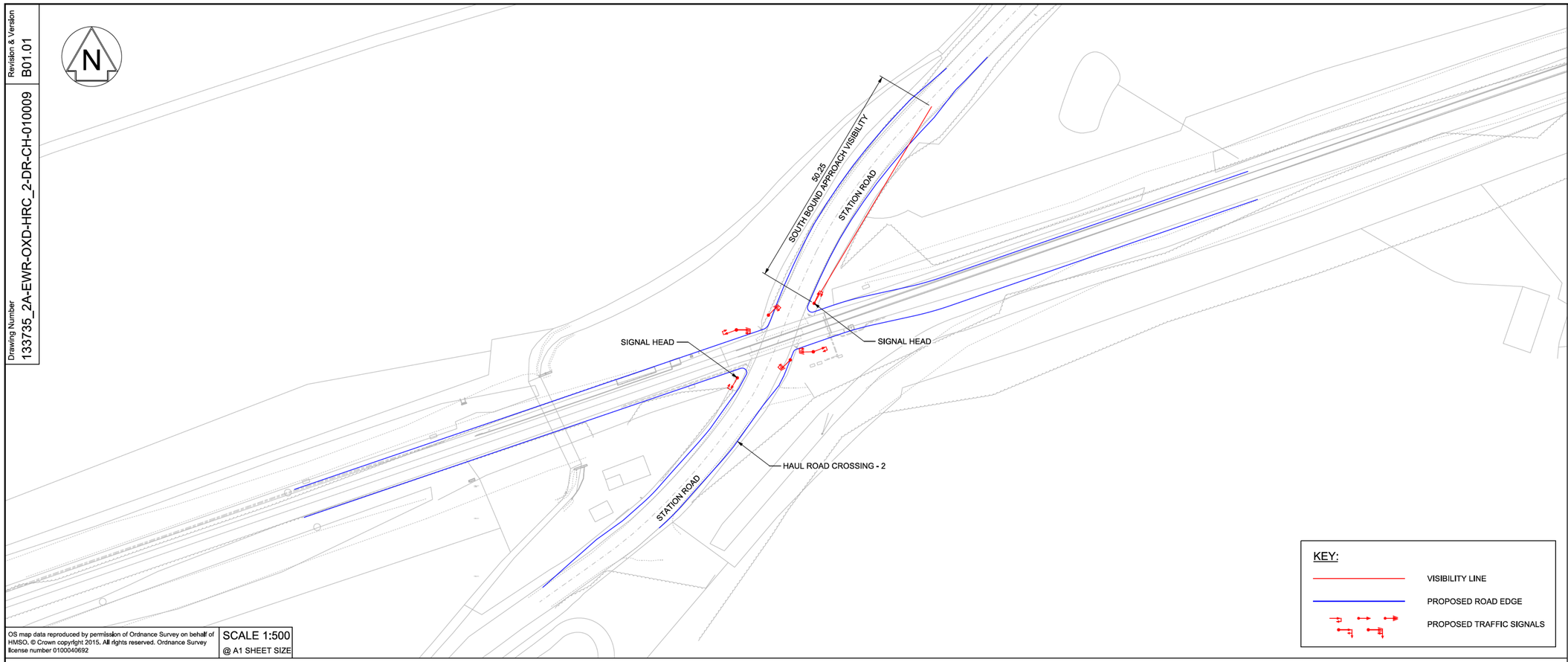
	Name	Signed	Date
Designed	Nagoth Thomas Ravi Kumar	N. T. R. Kumar	11/03/20
Drawn	Ravikumar KN	R. KN	10/06/19
Checked	Lisa Taylor	L. Taylor	11/03/20
Approved	Gareth Johnston	G. Johnston	12/03/20

Scale(s): 1:250
ELR - Project Chainage (Miles Yards): OXD -
Design Package Risk Classification: Normal
Sheet: 1 of 1
Alternative Reference:
Revision: B01
Drawing Number: 133735_2A-EWR-OXD-HRC_2-DR-CH-010001

Sheet Size A1 594 x 841

Revision & Version B01.01

Drawing Number 133735_2A-EWR-OXD-HRC_2-DR-CH-010009



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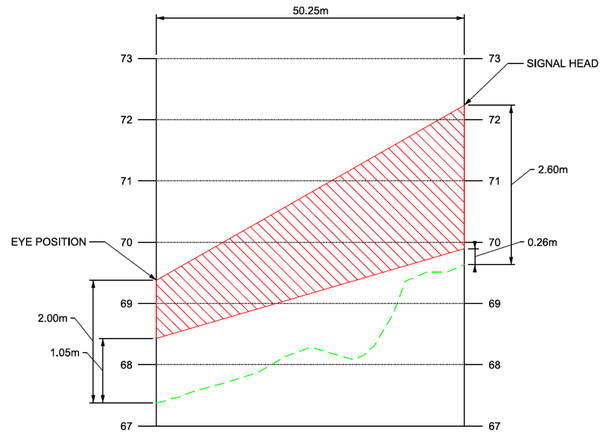

VISIBILITY ENVELOPE ON SOUTH BOUND APPROACH TO SIGNAL HEAD 50.25m

KEY:
VISIBILITY ENVELOPE
EXISTING GROUND PROFILE

SCALE H - 1:100
V - 1:10
@ A1 SHEET SIZE

NETWORK RAIL (EAST WEST RAIL WESTERN SECTION PHASE 2)

NOTES:

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4. THE VISIBILITY ENVELOPE DEVELOPED IS AS PER DMRB TD50.

Rev	Date	Description of Revisions	Dsnd	Chkd	Appr
B01	18/03/20	FOR INFORMATION	N.T.	L.T.	G.J.

Status: SHARED - for Information
Suitability: S2

EWR Alliance
Connecting People

Project: East West Rail (Western Section) Phase 2

Drawing Title: HAUL ROAD CROSSING HRC_2 SIGNAL HEADS VISIBILITY

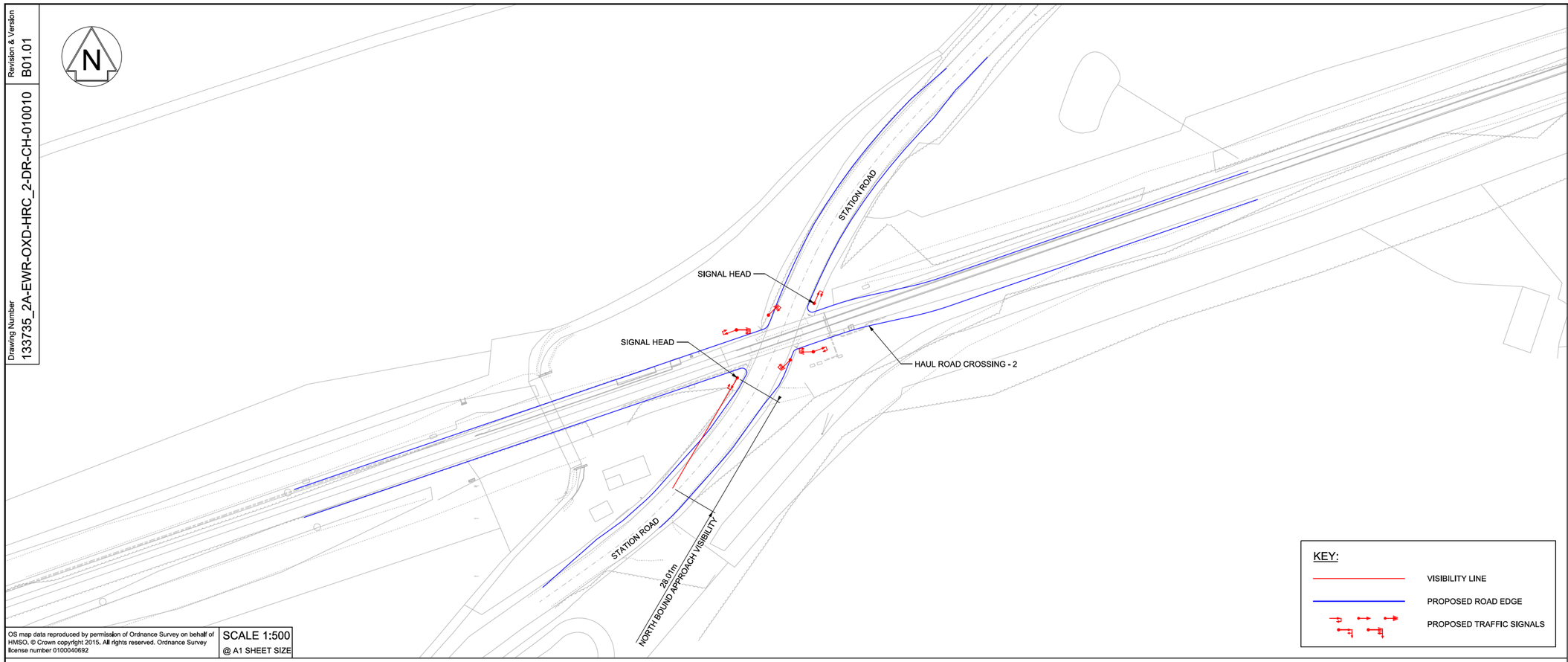
Designed	Nagoth Thomas Ravi Kumar	Signed	N. T. R. Kumar	Date	11/03/20
Drawn	Ravikumar KN	Signed	R. KN	Date	11/11/19
Checked	Lisa Taylor	Signed	L. Taylor	Date	11/03/20
Approved	Gareth Johnston	Signed	G. Johnston	Date	12/03/20

Scale(s): AS SHOWN
ELR - Project Chainage (Miles Yards): OXD -
Design Package Risk Classification: Normal
Sheet: 1 of 2
Alternative Reference:
Revision: B01
Drawing Number: 133735_2A-EWR-OXD-HRC_2-DR-CH-010009

Sheet Size A1 594 x 841

Revision & Version
B01.01

Drawing Number
133735_2A-EWR-OXD-HRC_2-DR-CH-010010



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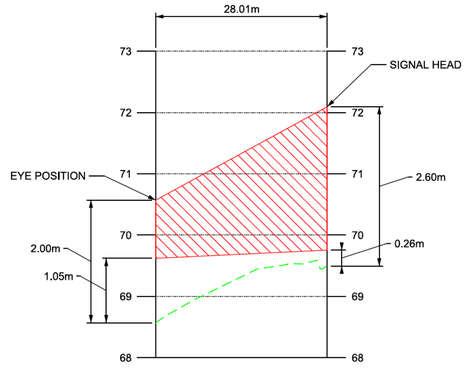

VISIBILITY ENVELOPE ON NORTH BOUND APPROACH TO SIGNAL HEAD 28.01m

KEY:
VISIBILITY ENVELOPE
EXISTING GROUND PROFILE

SCALE H - 1:100
V - 1:10
@ A1 SHEET SIZE

NETWORK RAIL (EAST WEST RAIL WESTERN SECTION PHASE 2)

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Rev	Date	Description of Revisions	Dsnd	Chkd	Appr
B01	18/03/20	FOR INFORMATION	N.T.	L.T.	G.J.

Status: SHARED - for Information
Suitability: S2

EWR Alliance
Connecting People

Project
East West Rail
(Western Section)
Phase 2

Drawing Title
HAUL ROAD CROSSING HRC_2
SIGNAL HEADS VISIBILITY

Designed	Nagoth Thomas Ravi Kumar	Signed	N. T. R. Kumar	Date 11/03/20
Drawn	Ravikumar KN	Signed	R. KN	Date 11/11/19
Checked	Lisa Taylor	Signed	L. Taylor	Date 11/03/20
Approved	Gareth Johnston	Signed	G. Johnston	Date 12/03/20

Scale(s): AS SHOWN
ELR - Project Chainage (Miles Yards): OXD -
Design Package Risk Classification: Normal
Sheet: 2 of 2
Alternative Reference:
Revision: B01
Drawing Number: 133735_2A-EWR-OXD-HRC_2-DR-CH-010010

Sheet Size A1 594 x 841