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Truro Northern Access Road

Design Options Review - Main Alignment and Western Junction

Document Ref. & Revision Nº
1665-CSL-HGN-00MZ-RP-CH-0001

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Appendices

Appendix A- West Langarth Options Assessment

1 EXECUTIVE SUMMARY

1.1.1 This report details the current options and development of the Northern Access Road (NAR) main alignment, its associated side roads and the West Langarth Junction.

The Key Objectives of the NAR have been agreed as:

- The selected design speed for the NAR is 30 kph. This will be controlled with a combination of layout and alignment constraint.
- The NAR is to carry greater than 30% of the traffic flows between West Langarth and Treliske roundabout, following development of the Langarth site.
- The NAR is to be direct, so as to be attractive as a commuter route to key destinations such as the hospital, but with slowing features through the housing developments.
- The NAR cross section, is to be 19.6m as confirmed by the client, refer to cross section report 1665-CSL-HML-00MZ-RP-CH-0002.
- The NAR should deliver a good balance of design favouring people and achieve this by providing transport capacity, with flexibility and creating character.
- The NAR should provide an inclusive area usable by all.
- The route should be easy to understand and navigate.
- The finished scheme should be constructed of quality materials.
- The scheme should support Cornwall's Environmental Growth Strategy for a low carbon economy, providing a local access to nature from the A390 corridor.
- The NAR and in particular the West Langarth junction should provide an attractive gateway that signals to the motorist the change to an urban area.
- The scheme should provide at grade crossing facilities and usable cycling and walking infrastructure that is, where possible, separated by landscaping.

1.1.2 The design of the scheme has progressed considerably since August 2019. Some detailed aspects of the design remain in progress and some amendments will inevitably be made; however, the principal of the horizontal and vertical alignment is complete.

1.1.3 Several design options were reviewed in the Technical Appraisal. Option 2 from this appraisal was developed and has been taken as the benchmark alignment. Other iterations of the main alignment have been developed ultimately leading to the **preferred main route Option 14**.

1.1.4 The West Langarth Junction forms the entry to the NAR and the proposed Langarth development site. Sixteen junction options were created for assessment. The first stage of a two-stage assessment was carried out by the project team and initially confirmed that six of the sixteen options should be developed further for detailed assessment. Following a meeting on 16th July 2019 between the design team, the Langarth site master-planners, Cornwall Council and a specialist consultant relating to streetscape design, it was decided that only options 15 and 8 should be taken forward for further detailed assessment. **This detailed assessment concluded that Option 15 is the preferred option for West Langarth Junction.**

1.1.5 Six options have been reviewed for the access road associated with the petrol filling station at Maiden Green in liaison with the proposed developer. **The alignment of Petrol Filling Station Option 6 has been selected as the preferred option**. Further work is required by the developer regarding the proposed junction alignment providing access from the A390 to the development.

1.1.6 Five options have been reviewed associated with the access from Oak Lane, at Treliske Industrial Estate, to the NAR. **Option 5 has been selected as the preferred option for Oak Lane.**

2 INTRODUCTION

2.1 Background

2.1.1 The Engineering Design Group, part of Cormac Solutions Ltd, has been engaged by Cornwall Council to progress the design of the Northern Access Road (NAR) in Truro.

2.1.2 Cornwall Council has submitted a Housing Infrastructure Fund (HIF) business case for £47.5m, in order to deliver the key access road (the NAR) for the development. This road will run parallel to the A390 and link all of the developer sites and connect from the A390 in the west to The Royal Cornwall Hospital and employment in the east.

2.1.3 In this respect it will open up the development and provide much needed highway capacity for the increased traffic generated by the development.

2.1.4 18,000 people commute into Truro each day. The NAR will be approximately 3.5km long, running parallel to the A390 with a projected peak PM flow of 1,700 vehicles per hour in 2038. The aspiration for the NAR route is for it to facilitate development but also to act in relieving some of the pressure on the existing A390.

2.1.5 The implementation of the NAR will help support and facilitate various development opportunities to the north of the A390. The development area, to be served by the NAR, totals approximately 190ha. There is outline planning consent for 2,700 homes with the potential for this to be expanded to around 4,000 homes over time, being jointly provided by a number of different developers.

2.2 Purpose of this Report

2.2.1 Section 1 provides an executive summary of the design position for the NAR and associated side roads.

2.2.2 Section 3 sets out the existing conditions for the surrounding road network of the A390 and Oak Lane link to Treliske Hospital.

2.2.3 Section 4 describes the objectives of the scheme.

2.2.4 Section 5 describes associated schemes connected to this project.

2.2.5 Section 6 describes the NAR Main Alignment Options considered and development of the main alignment to its current arrangement.

2.2.6 Section 7 describes the West Langarth Junction vision, constraints, criteria and Junctions Options considered. It also, at this stage, discusses how each option meets or fails to meet the criteria.

2.2.7 Section 8 outlines the two-stage assessment framework utilised to select the preferred West Langarth junction option and the outcome of the assessment.

2.3 Langarth Site Planning Status

Planning and Developers	Planning Ref	Outcomes
Site 1 West Langarth	Planning Ref PA14/08092	West Langarth outline planning consent granted 11-08-2016
Site 2 Langarth	Planning Ref(s) PA11/06124	Langarth outline planning consent granted 10 July 2013.
	Planning Ref PA15/11489	Revised Reserved Matters registered December 2018 pending consideration.
Site 3 Pollard's Field	Planning Ref PA14/03065	Pollards Field outline planning consent granted 11 August 2016.
Site 4 East Langarth	Planning Ref PA14/10755	East Langarth outline planning consent granted 25 July 2016.

Site 5 Willow Green	Planning Ref PA16/07602	Willow Green outline planning consent granted 25 July 2016.
	PA16/07603	
	PA16/07610	
Site 6 Maiden Green	Planning Ref PA14/00703	Maiden Green outline planning consent granted 11 August 2016.
Site 7 Potential Additional Sites	Planning Ref N/A	Additional Sites - No planning consent granted but logical future extension of development area

Table 2.1 shows a list of planning submissions associated with the Langarth site and their associated status

2.4 Planning Applications Immediately Adjacent to Langarth

Planning and Developers	**Planning Ref**	**Outcomes**
Spanview UK Limited	Planning Ref PA18/06918	Conditional planning approval for a children's play centre
	Planning Ref PA19/05930	Planning application for the Hendra Site to be determined

Table 2.2 shows a list of planning submissions associated to sites immediately adjacent to the Langarth site.

2.4.1 CORMAC Solutions Ltd previously developed the design for the HIF Bid submission EDG1458-CLS-HGN-SW7745-DR-D-0006 General Arrangement, which formed the basis of a number of planning applications, in particular the Phase 1 and 2 Langarth development.

2.5 Study Area

2.5.1 Figure 1

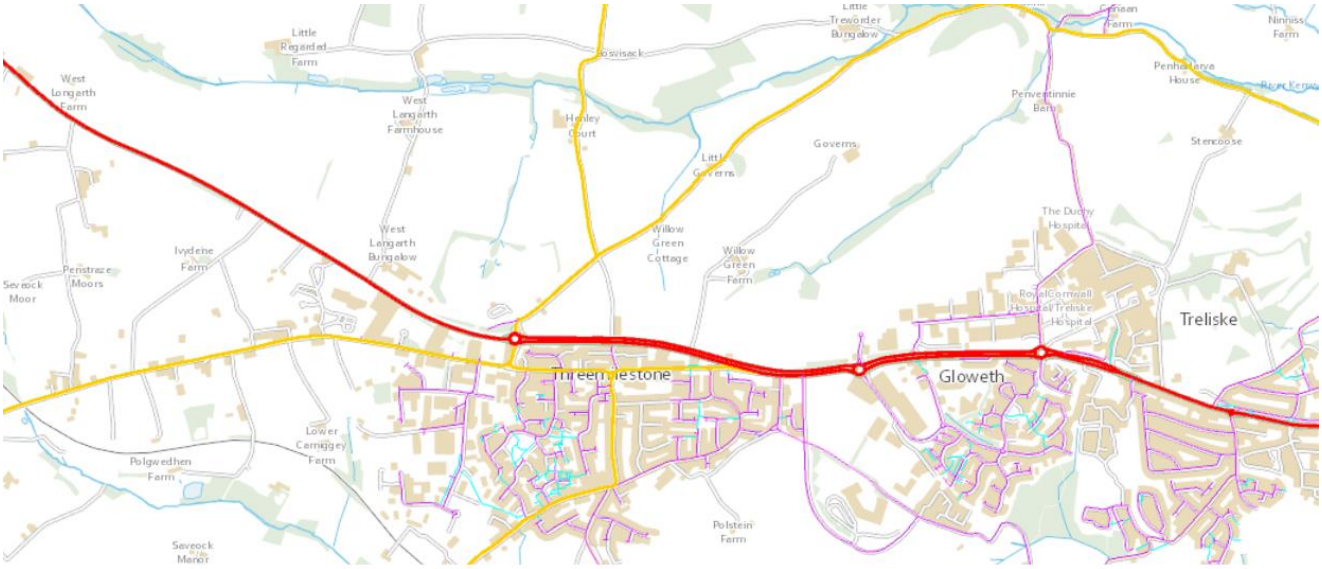

Figure 2.1 Shows A390 between West Langarth in the northwest and Treliske in the east (Kenwyn Parish)

3 EXISTING CONDITIONS

3.1.1 Traffic modelling data was obtained using traffic flows provided by Streetwise Services Limited. From traffic surveys conducted on the A390 between 08/10/2018-14/10/2018.

3.1.2 The existing speed limits for the A390 are shown in table 3.1 and figure 3.1 below.

Road	Section	Speed MPH
A390	Westbound Maiden Green to West Langarth	50
A390	Eastbound West Langarth to Willow Green	50
A390	Eastbound Willow Green to Treliske	40
A390	Westbound Treliske to Maiden Green	40

Table 3.1 Existing A390 speed limits and NAR proposed speed limit

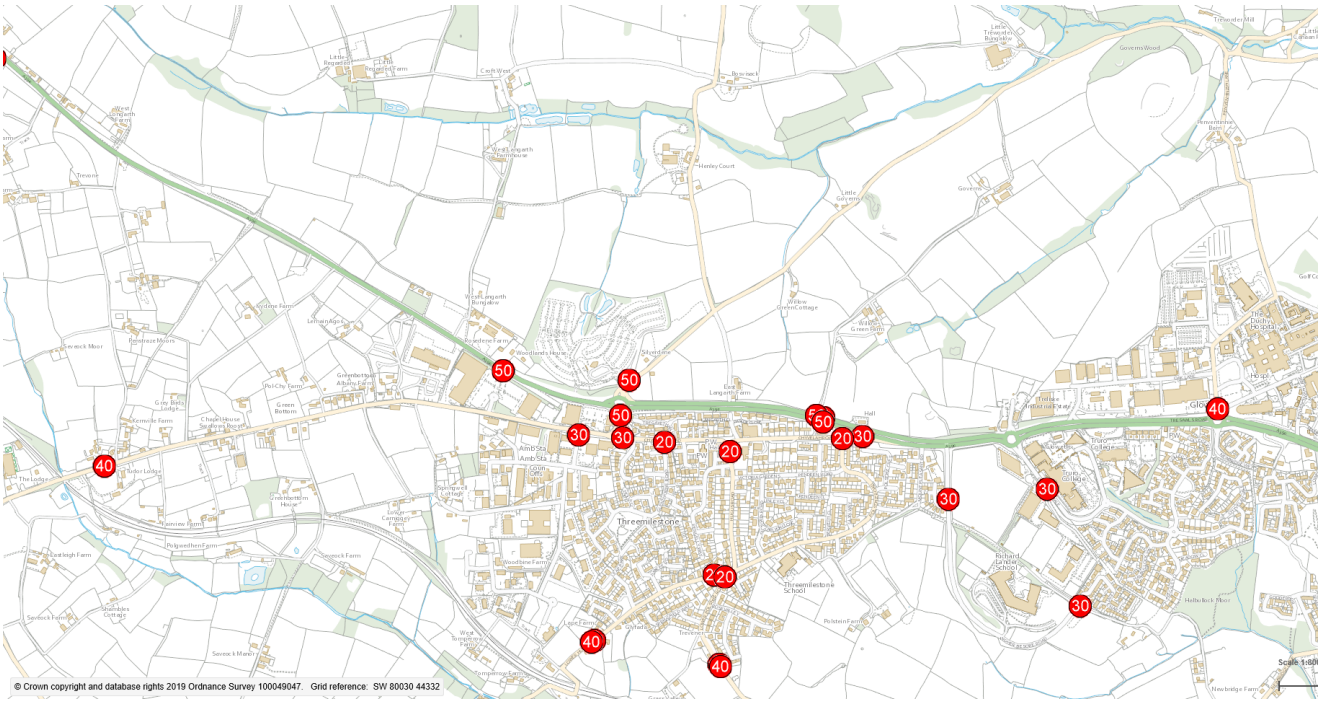

Figure 3.1 shows speed limits along the A390 and surrounding area

3.1.3 Bus services connect Truro with the A30 at Three Burrows Chiverton Cross towards St Agnes and Penzance via Threemilestone and Chacewater. Main bus stops in the area of the NAR are currently at Langarth Park, Truro College and Treliske.

3.1.4 The A390 and the C0723 (Threemilestone to Chacewater) are school bus routes.

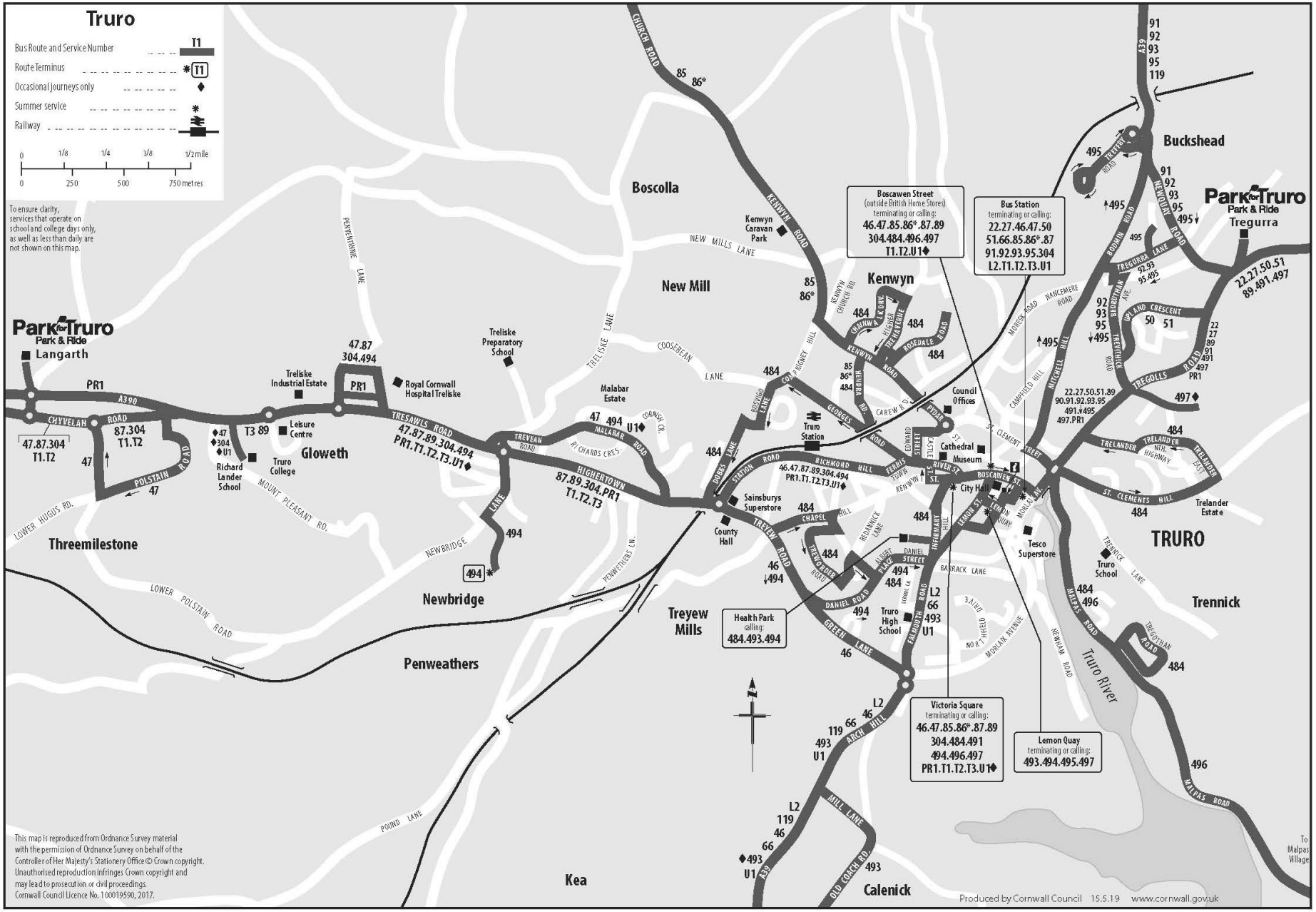

Figure 3.2 Truro bus network town plan

3.2 Traffic Sensitivity

- The A390 is a traffic sensitive route.
- The U6076 link into Treliske Hospital is a commuter route.
- The C0723 from Threemilestone towards Chacewater is commuter and school sensitive.
- The U6071 to Richard Lander School and Threemilestone School from the A390 is a school sensitive link.
- The U6075 to Truro College from the A390 is a school sensitive link.
- The A390 is a strategic freight network route.
- Threemilestone Industrial Estate is a local freight network route.
- Treliske Industrial Estate is a delivery route.

3.3 Highway Infrastructure

3.3.1 Highway network

Road No	AADT	HCV AADT	Maintenance Category
A390	20,000-25,000	500-1,000	Strategic Freight Network. Strategic Maintenance Route 2a
C0723 Greenbottom	5,000-10,000	500-1,000	Main Distributor Maintenance Route 3a
U6067 Oak Lane - Treliske			
A30 to the west onto the A390	20,000 enter/exit Chiverton Roundabout to the A390. A30 AADT 25,000+		Trunk Road

Table 3.2 Highway Network Traffic Flows

- The A390 at West Langarth farm is a modern single carriageway with extensive grass verges and is predominately a level section.

3.3.2 Non-Motorised Users, Public Rights of Way, existing provision on A390.

- Public Right of Way Silver Priority footpath leads from the A390 around Little Regarded Farm.
- Bridleway heads north from the A390 at East Langarth Farm.
- Meadow bridleway to south of A390 by Britannia Lanes

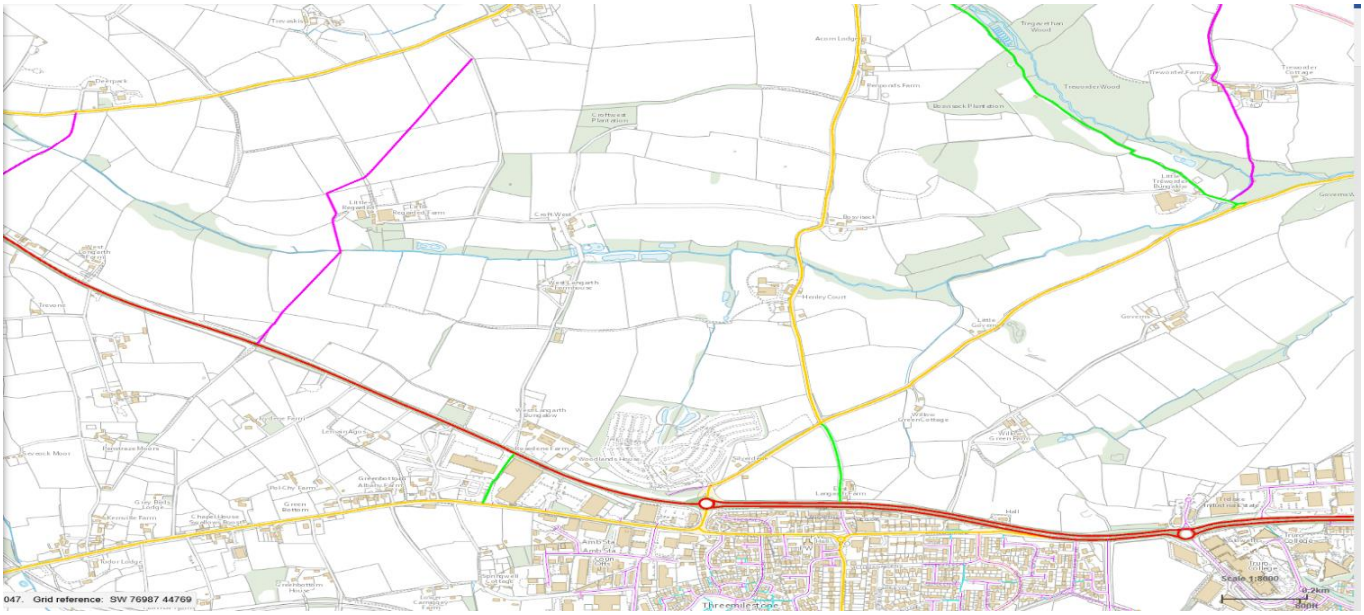

Figure 3.3 shows A390 east from West Langarth Farm, footpath (magenta) from A390 heading north passes Little Regarded Farm and bridleway (green) heading north from the A390 at East Langarth Farm.

3.4 Environmental Baseline

3.4.1 Ecology Biodiversity Action Plan (BAP) Priority Project, Cornwall's Super Green Spine, covers both sides of the A390 at West Langarth Farm.

3.5 Historic Designations:

3.5.1 Listed Buildings

- Grade II Milestone, which is located immediately adjacent to the A390 in the vicinity of the West Langarth junction.

3.5.2 Scheduled Monuments

- Bowl Barrow is situated approximately 425m north-west of Little Regarded Farm, which is located 400m north of the proposed NAR.
- Two bowl barrows situated 250m southeast and 230m north east of Ashgrove Farm which is located approximately 300m south of the proposed NAR.

3.5.3 World Heritage Site

- The Cornwall and West Devon Mining Landscape World Heritage Site, the Gwennap Mining District, is located immediately south of the A390 and extends from Chiverton roundabout to just West of Threemilestone Retail Park.

3.6 Ecological Designations

- The Carrick Heaths SSSI – Located approximately 650m South West of the proposed West Langarth junction.

3.6.1 Air Quality Management Area (AQMA) 6 Truro (Cornwall Council)

- The whole site falls within the AQMA figure 3.4, designated on 01/07/2015, which includes the areas around the development at: Gloweth, Threemilestone and Greenbottom bounded by the main railway line to the southwest, Langarth and land bounded by Road from Garth Lodge to Tregavethan Manor to the west and north-west. The AQMA also includes the main roads of A390, the A39 to the east and the B3284 to the north and Shortlanesend, where they fall within the boundary.

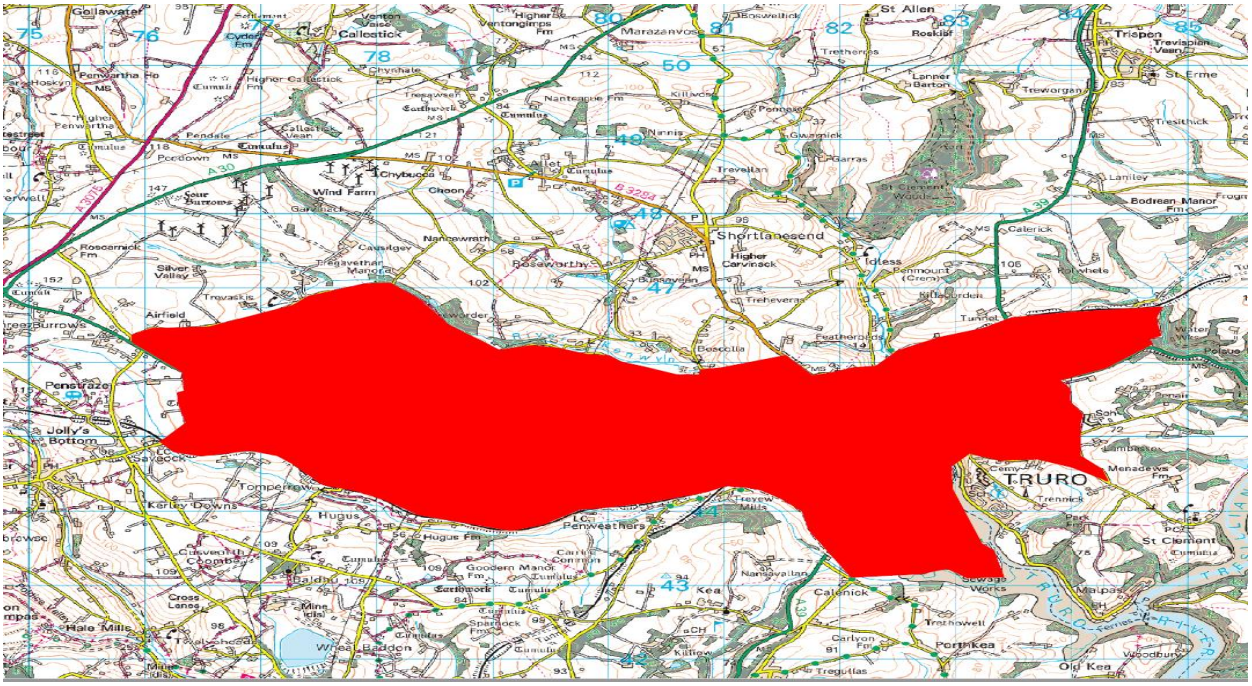

Figure 3.4 shows the Truro Air Quality Management Area

3.7 Landscape and Visual

- West Langarth Farm has Historic Landscape Prehistoric farmland, Prehistoric enclosure, medieval trackway and a Post Medieval milestone.

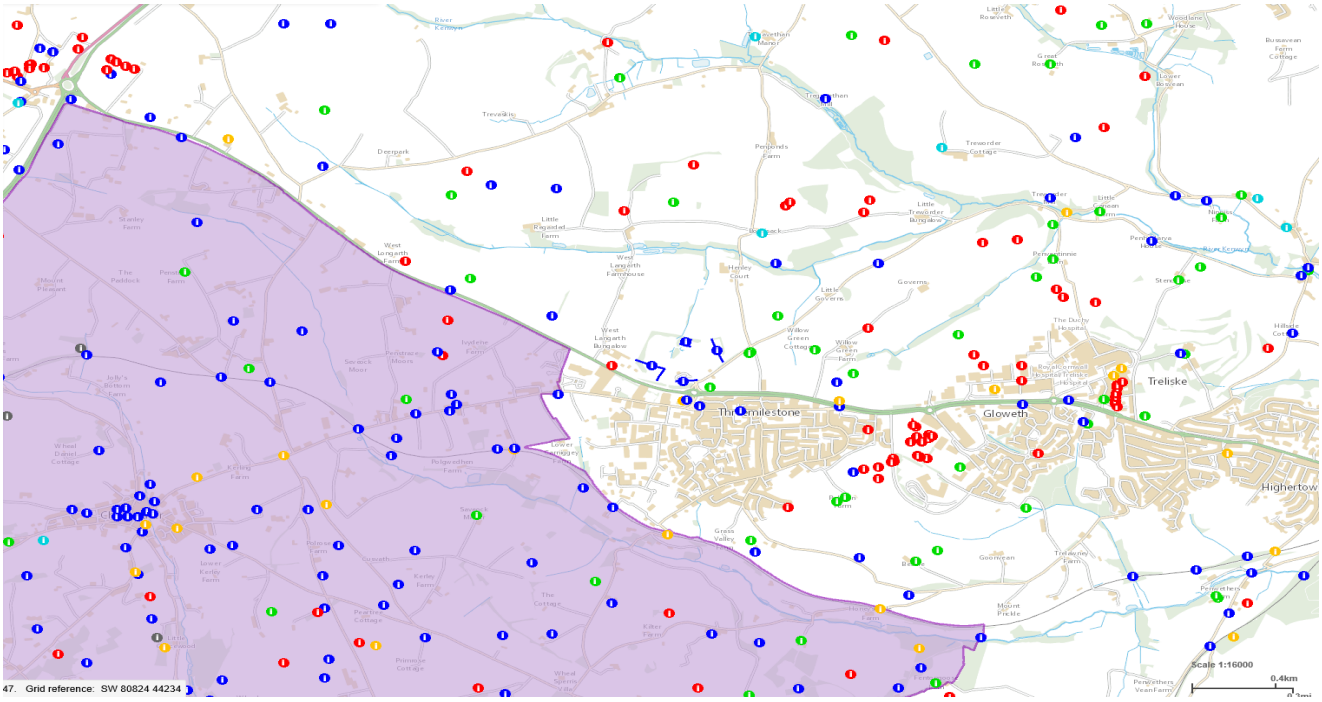

Figure 3.5 shows prehistoric sites, (red spot), medieval (green spot), blue (post medieval), blue line (post medieval recorded line), amber (modern). The lilac shaded area to the south of the A390 is the Gwennap Mining District World Heritage Site.

- Possibly unimproved grassland both sides of West Langarth Farm entrance. There is an ERCCIS 2005 area of scrub on north side of the A390.

- There are areas of Japanese Knotweed surveyed sites within the highway verge close to West Langarth Farm.

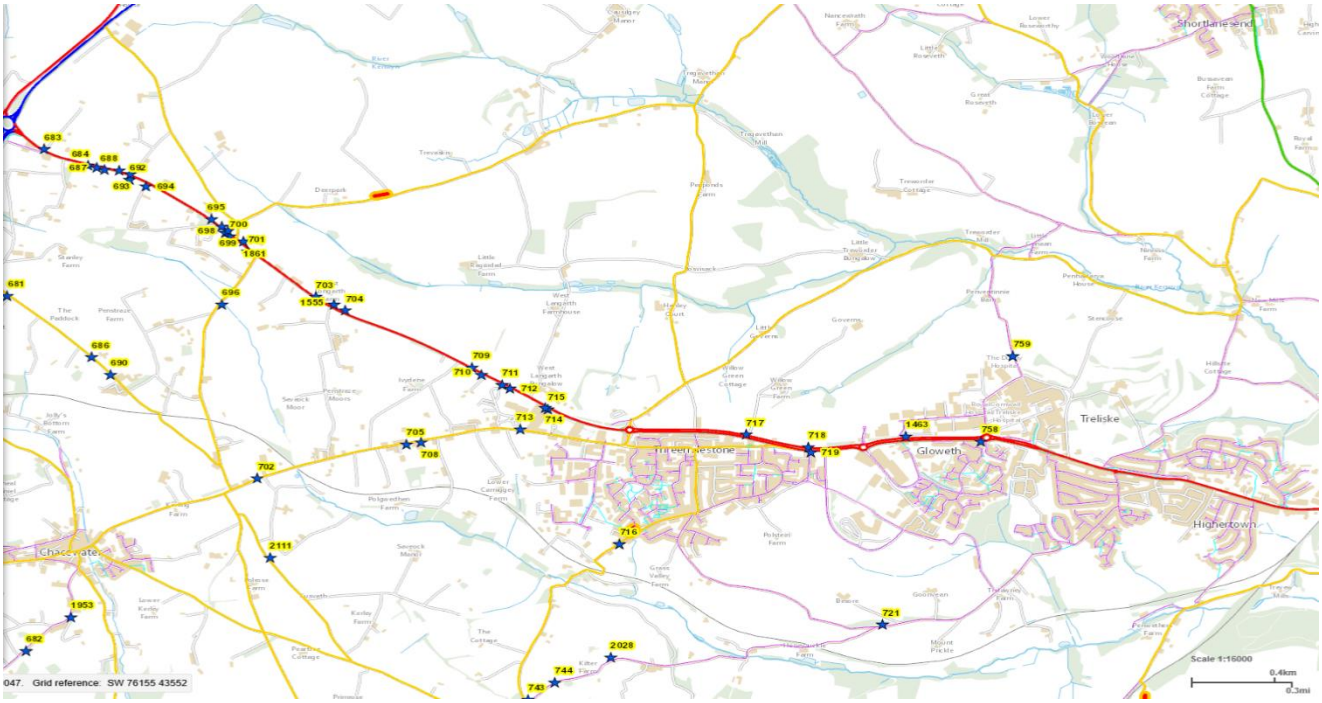

Figure 3.6 Shows areas of Japanese Knotweed along the A390

3.7.1 There are two County Wildlife Sites (CWS) to the north, in the area of Tregavethan Farm and Treworder Wood stretching south-eastwards to Governs Wood and a smaller section to the south of this below the Bosvisack Plantation.

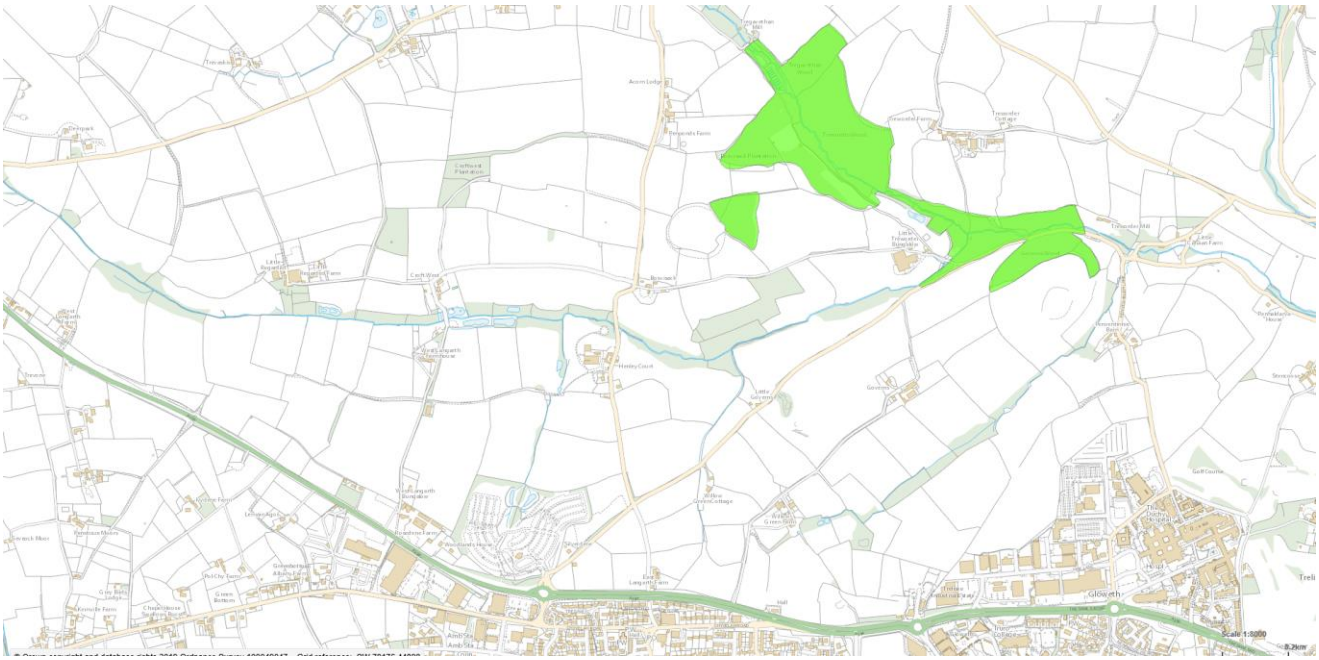

Figure 3.7 County Wildlife Sites

3.7.2 There is a Habitat Action Plan Woodland that stretches in a band from west to east from north of West Langarth Farm through Little Regarded Farm, West Langarth Farmhouse, north of Henley Court and north northeast to Little Treworder Bungalow and covering the County Wildlife site as above at Treworder Woodland/Governs Woodland. See figure 3.8 below.

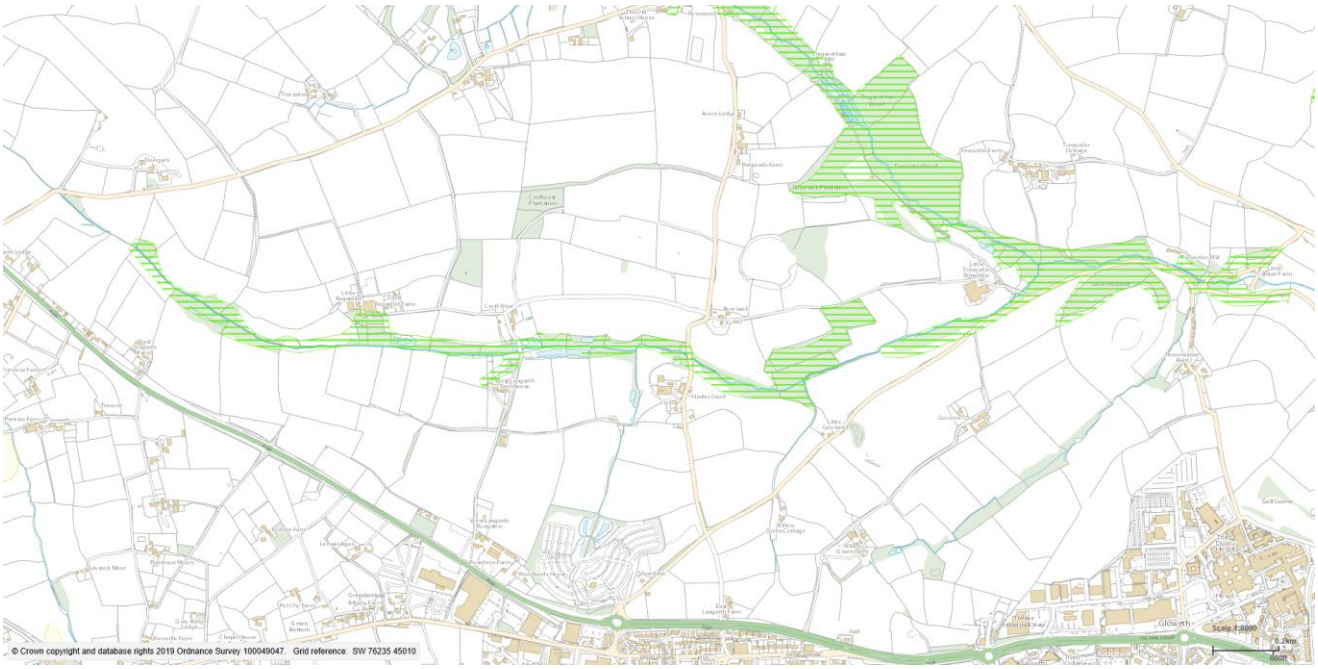

Figure 3.8 Habitat Action Plan Woodland

3.7.3 There are Tree Preservation Order (TPO) Areas, situated to the south of the Langarth Park and Ride Site and in sections of the Treliske Industrial Estate, which includes Oak Lane. See figure 3.9 below.

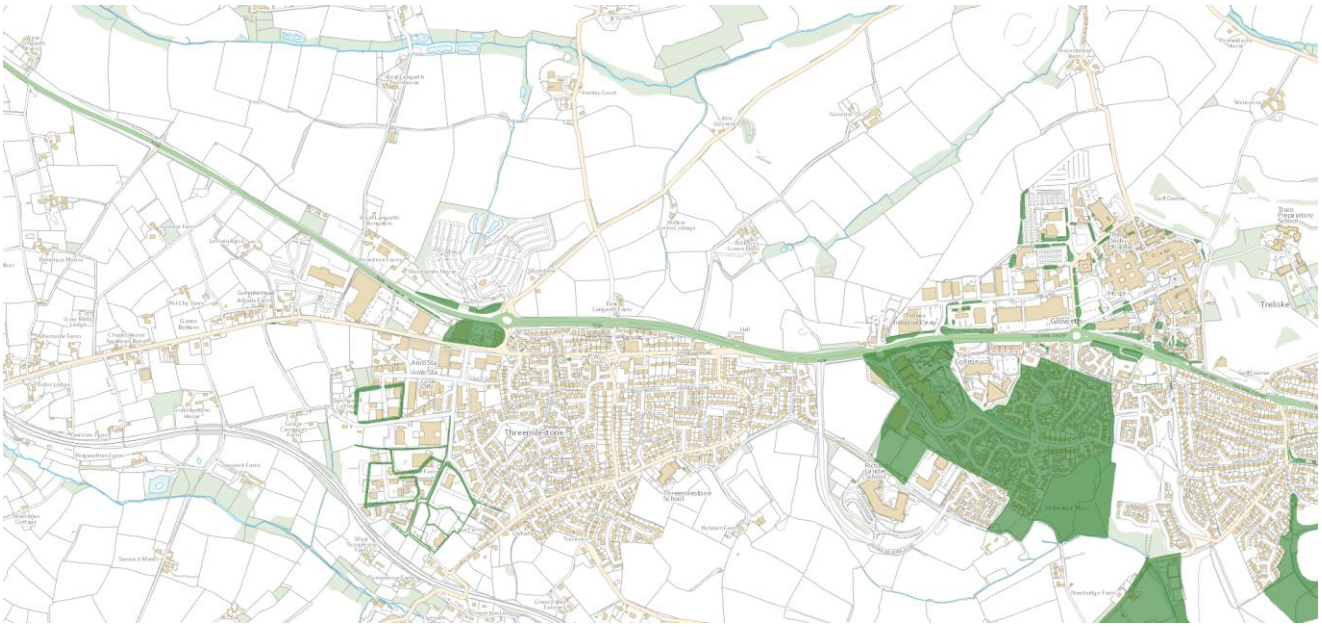

Figure 3.9 Tree Preservation Order Areas

3.7.4 All of the environmental constraints are shown in the environmental constraints drawing 1665-CSL-EGN-XXMZ-DE-CH-0001

4 PROPOSED SCHEME

4.1 Main Alignment Sections

4.1.1 Key outcomes of the NAR highway design will include the encouragement of sustainable transport links to local jobs, education and services. This will be achieved through developing a sense of place with high quality design including footways, cycle ways, bus provision and access to the Langarth Park and Ride.

4.1.2 It will provide environmental enhancement through planting and sustainable urban drainage systems (SuDS) and will also be expected to accommodate 1,700 two-way vehicles in the PM peak hour following the delivery of 4,000 dwellings by 2038.

4.1.3 The NAR and associated highway development will combine to relieve traffic congestion within the Air Quality Management Area (AQMA).

4.2 Key Objectives

- The selected design speed for the NAR is 30 kph. This will be controlled with a combination of layout and alignment constraint.
- The NAR is to carry greater than 30% of the traffic flows between West Langarth and Treliske roundabout, following development of the Langarth site.
- The NAR is to be direct, so as to be attractive as a commuter route to key destinations such as the hospital, but with slowing features through the housing developments.
- The NAR cross section is to be 19.6m as confirmed by the client, refer to cross section report 1665-CSL-HML-00MZ-RP-CH-0002.
- The NAR should deliver a good balance of design favouring people and achieve this by providing transport capacity, with flexibility and creating character.
- The NAR should provide an inclusive area usable by all.
- The route should be easy to understand and navigate.
- The finished scheme should be constructed of quality materials.
- The scheme should support Cornwall's Environmental Growth Strategy for a low carbon economy, providing a local access to nature from the A390 corridor.
- The NAR and in particular the West Langarth junction should provide an attractive gateway that signals to the motorist the change to an urban area.

- The scheme should provide at grade crossing facilities and usable cycling and walking infrastructure that is, where possible, separated by landscaping.

5 ASSOCIATED SCHEMES

5.1 Chiverton Cross to Carland Cross

5.1.1 As part of an investment into Southwest roads, the Highways England scheme is to dual an 8.7 mile section of single carriageway of the A30 between the existing roundabouts of Chiverton Cross and Carland Cross. The preferred route was confirmed in July 2017 and is currently under Planning Inspectorate examination and if approved, construction work is expected to commence in 2020.

5.2 Cycling, Safety and Integration (CSI) now Saints Trails

5.2.1 The proposed dualling of the A30 between Chiverton and Carland Cross opens the opportunity to develop and deliver a range of additional strategic improvements to the transport network. Weaknesses with the current infrastructure can be addressed including the lack of permeability of the existing A30 route, especially for vulnerable and non-motorised road users.

5.2.2 The Department for Transport has allocated £250 million of designated funds for Cycling, Safety and Integration (CSI) within the overall funding for highways for 2015 to 2021. Cornwall Council (CC) and Highways England (HE) have successfully bid for designated funds to improve connectivity for cyclists, pedestrians and equestrians across an area geographically focussed within approximately 8km (five miles) of the A30 Chiverton Cross to Carland Cross road scheme. Enhancements proposed as part of this project are additional to and separate from the A30 scheme. They must be able to be delivered either with or without the A30 scheme in place.

5.2.3 Work Package 5 – St Agnes to Truro is a proposal for the creation of a new cycle route from St Agnes to the A390 corridor at Threemilestone. It is the intention that the route serves primarily as a commuter route and it is to provide a direct and consistent facility along the B3277, A390 or alternatives. The scheme is to incorporate a bridge for pedestrians, cyclists and horses crossing the A30 at Chiverton Cross. The 'Saints Trails' will terminate at Threemilestone roundabout adjacent to the Park and Ride.

5.3 A390 Boulevard

5.3.1 This is currently a concept design for the A390 between West Langarth and Treliske. It will consist of corridor landscaping and green planting to manage traffic flows. It will provide at grade crossing facilities to support accessibility and to provide consistent speed limits to aid improvement in air quality and support liveable neighbourhoods.

5.4 The NAR project associated schemes interface

5.4.1 The NAR project will interface with the above schemes by:

5.4.2 The dualling of the A30 Chiverton Cross to Carland Cross will give improved, more reliable journey times and increased capacity on the A30. The A30 links to the A390 at Chiverton Cross and the off-slip will be close to the West Langarth junction.

5.4.3 Cycling Safety and Integration (CSI) now Saints Trails is a project that will look to make numerous cycling and walking connections across the A30 corridor and beyond. One of these links will connect from the A30, along the south of A390 to the West Langarth junction, into the NAR and along the A390 to connect to the existing cycle infrastructure from Threemilestone.

5.4.4 The Boulevard project will be an integral part of the NAR project, where it will combine in the place making strategy of the Truro A390 corridor. At the West Langarth junction it will combine to present the gateway to the Truro urban environment.

6 MAIN ALIGNMENT

6.1.1 The main alignment for the NAR has been developed using the principles agreed and stated within the Main Alignment Technical Appraisal, reference 1665-CSL-HML-00MZ-RP-CH-0001.

6.1.2 The Main Alignment Technical Appraisal details the proposed methodology and design parameters to be taken forward in the development of the NAR geometry. In summary, design focuses on the following:

- Maintaining longitudinal gradients to a maximum of 6% to encourage walking and cycling- achieved by following existing ground contours
- Maximising lengths of straight sections of road to approximately 100m to discourage higher speed
- Limiting horizontal radii to discourage higher speed
- Restricting forward stopping sight distance in line with the selected design speed

6.1.3 Several design options were reviewed in the Technical Appraisal, detailing the impacts of varying design approaches before concluding the design approach above. Option 2 from the Appraisal was developed using the agreed design parameters and has therefore been taken as a benchmark alignment to record design changes and decisions from. Other options in the main alignment report were as follows:

- Option 1- Original HIF bid alignment
- Option 2- Selected alignment for development (using standards associated with 50kph design speed and Manual for Streets)
- Option 3- Alignment designed to standards associated with 30kph
- Option 4- Alignment designed to control speeds to 30kph solely through horizontal geometry

6.1.4 In development of the NAR main alignment, Option 2 was frozen at the first stage of technical feasibility. Option 5 and Option 6 were iterations of this frozen alignment and Option 5 was initially the selected alignment. This option has been further developed to provide option 8 and ultimately Option 14. This chapter details the alignment constraints and reasoning behind the current design alignment and decisions for Option 14. In order to clarify areas of design, the alignment design development has been separated into sections by chainage as follows:

- Chainage 0-600- Phase 1 and 2 Langarth Development
- Chainage 600-900- Stadium for Cornwall
- Chainage 900-1600- Langarth Park and Ride
- Chainage 1600-1900- Westcountry Land Development
- Chainage 1900-3000- Maiden Green Development
- Chainage 3000-3300- Treliske Hospital

6.2 Main Alignment Chainage 0-600 Phase 1 & 2

6.2.1 Chainage 0-600 of the main alignment relates directly to the planning application for the Phase 1 and 2 Langarth housing development. Figure 6.1 below shows the nature of the horizontal alignment through this section.

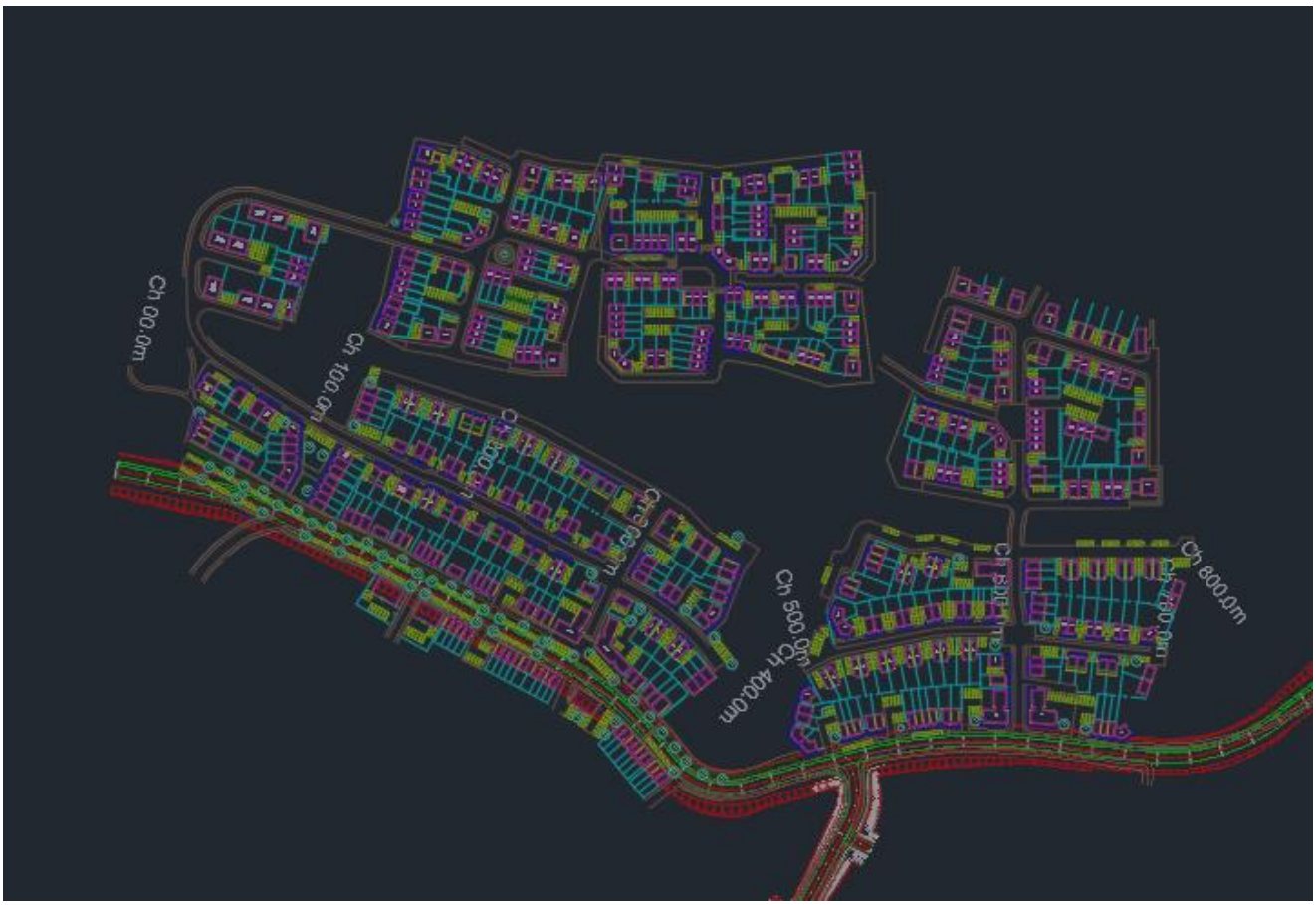

Figure 6.1 Chainage 0-600 Phase 1 and 2 Langarth Site

6.2.2 A planning application for the reserved matters Phase 1 and 2 Langarth development was registered by the Local Planning Authority (LPA) in December 2018 based upon the layout as shown in Figure 6.1. In order to facilitate this area of development the horizontal alignment initially matched that submitted as part of the reserved matters application.

6.2.3 The section of NAR between Ch 0-600 will link to the Interim Link Road, which is subject to a separate design report (produced 30 July 2019) by AECOM on behalf of Cornwall Council. The cross-section width of the NAR alignment through Langarth Phase 1 and 2 reserved matters planning application was 16.4m. The cross-sectional width of the NAR alignment included within the HIF bid was 19.6m. At a meeting with Cornwall Council on 11 June 2019 it was agreed that the cross-section of the main alignment through this section would be widened from 16.4m to 19.6m. It was also agreed that the northern extents of the cross-section of the carriageway would align with the extents of the properties on the northern side of the proposed site. This resulted in moving the centreline alignment of the NAR approximately 1.2m to the south. Further review was carried out to the proposed site layout. This review determined that the proposed levels of the NAR did not easily facilitate the proposed housing layout and side roads. At a meeting on 19 June 2019 with Cornwall Council it was agreed to drop the levels of the NAR from chainage 0-600 to remove the northern embankment and to assist with proposed levels of adjacent properties.

6.2.4 Following initial design review and development, Cornwall Council has taken the decision not to proceed with the reserved matters application for Langarth Phase 1 and 2. Following this decision only minor amendments have been made to this first 600m of the NAR design including increase of the radius at approximate chainage 400 and minor amendments to the vertical profile.

6.3 Radius amended planning application dropped

6.4 Main Alignment Chainage 600-900 Stadium for Cornwall

6.4.1 The main alignment interfaces with the proposed access for the Stadium for Cornwall at chainage 700.

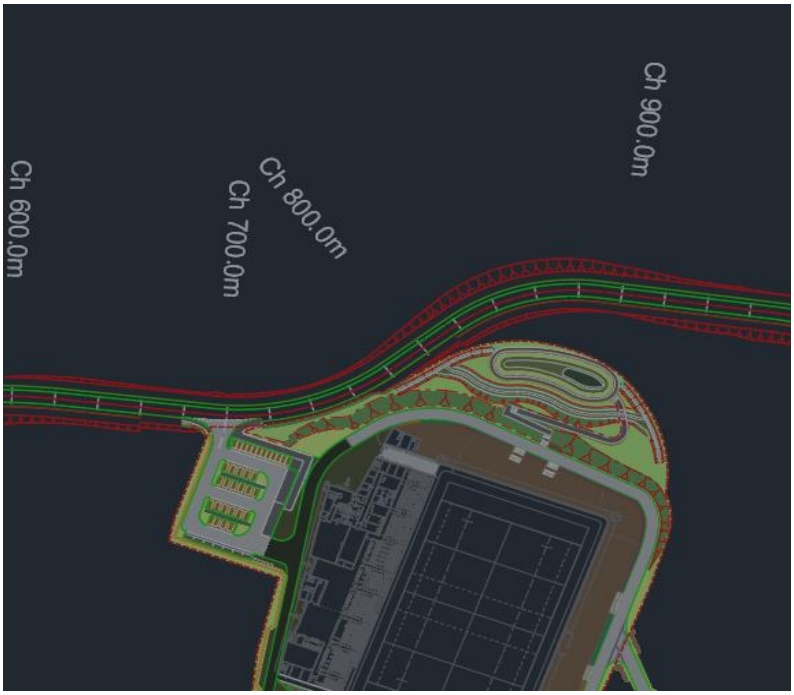

Figure 6.2 Chainage 600-900 Stadium

6.4.2 From chainage 600-900 the alignment is constrained by the existing proposals for the Stadium for Cornwall. The alignment facilitates the current proposals for the stadium and ties into access levels provided by WSP on behalf of Cornish Pirates Ltd on 26 April 2019.

6.4.3 Following a review of the NAR alignment by master planners, dated 6 September 2019, an amendment to the alignment adjacent to the proposed stadium was recommended. The suggested amendment was to relocate the alignment further to the south so that it would run immediately adjacent to the proposed stadium development boundary. This would increase viable development area immediately to the north of the NAR alignment in this area. This alignment is shown in Figure 6.3 below.

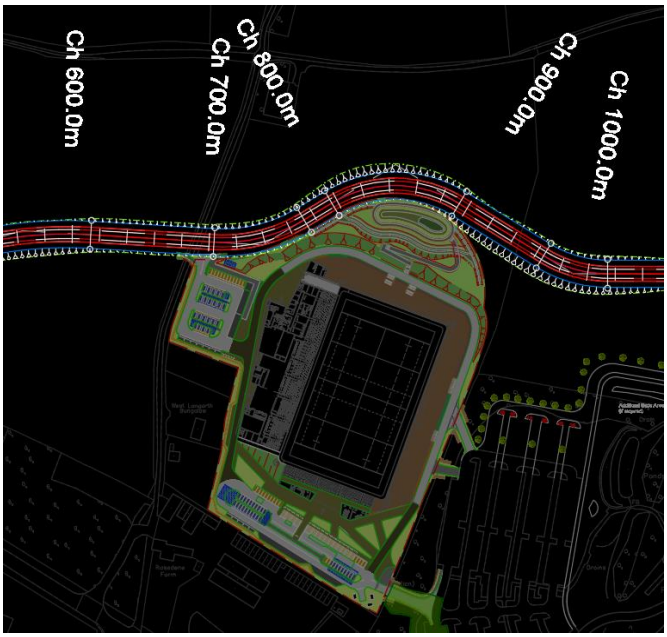

Figure 6.3 Chainage 600-900 Stadium

6.5 Main Alignment Chainage 900-1600 Langarth Park and Ride

6.5.1 From chainage 900 to 1600 the NAR alignment enables a future park and ride extension of 600 spaces, to be implemented as part of overall development of the Langarth site. Figure 6.4 below shows the proposal for a 600 space extension of the current park and ride site and the alignment of the NAR adjacent to that extension. The park and ride extension is subject to further, ongoing development.

Figure 6.4 Chainage 900-1600 Park and Ride

6.5.2 The original alignment, Option 2, located the alignment to the east of the 132kV pylon, shown located between chainage 1900 and 2000 in figure 6.5 below. Following Option 2 the alignment was adjusted to the west of the 132kV pylon to mitigate several issues. Firstly, the longitudinal profile of the access from the proposed park and ride extension site to the NAR from west to east could not be accommodated within the design parameters detailed in the main alignment technical report route. The access would have crossed perpendicular to the existing contours, leading to gradients well in excess of 6%. Locating the main alignment adjacent to the Park and Ride extension mitigates this issue. Secondly, the location of the NAR east of the pylon impacted significantly on the existing rural highway network leading from East Langarth Farm to Henley Court (C0290). The position of the NAR along this existing highway would have resulted in the demolition of approximately 200m of existing mature hedgerows. In order to mitigate this the route proposes to cross at the existing cross-roads (chainage 2100 figure 6.5). In addition to reducing ecological impact, this alignment change offers an opportunity to maintain more of the existing rural highway network as part of the whole Langarth site development.

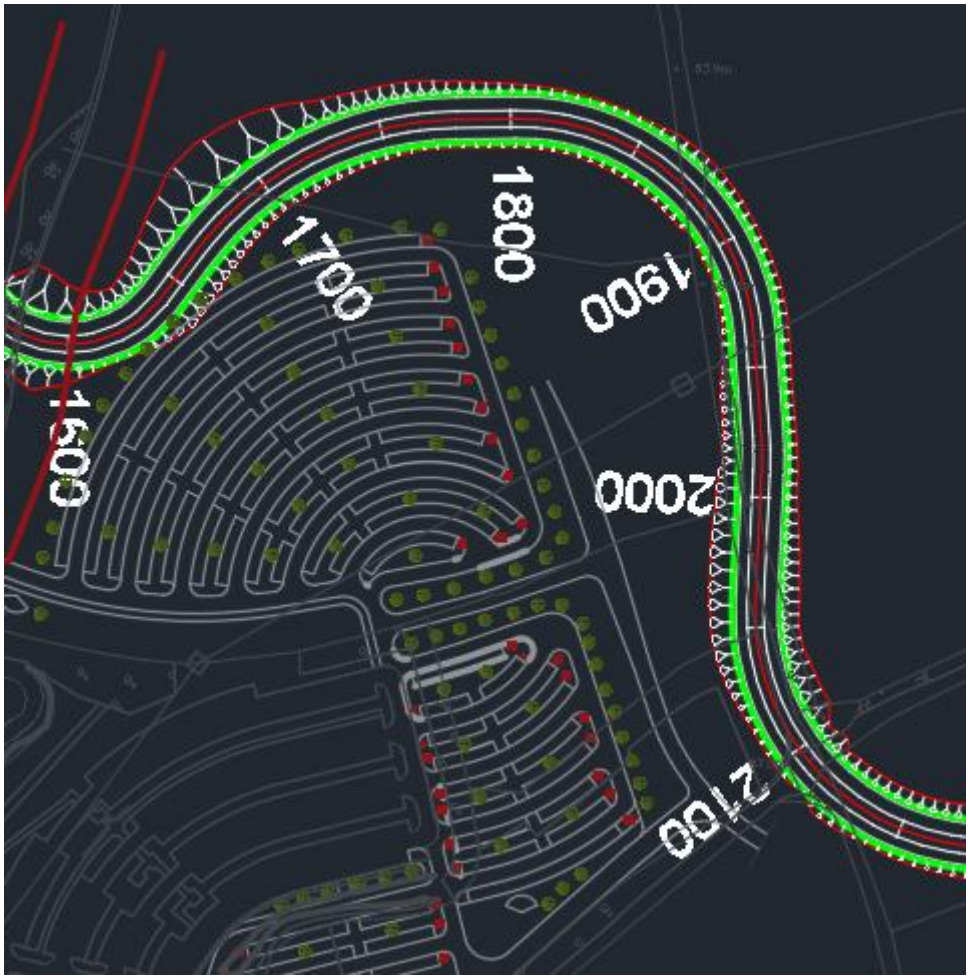

Figure 6.5 Chainage 1600 - 2100

6.6 Main Alignment Ch 1600-1900 Westcountry Land Development

6.6.1 From chainage 1600-1900 the main alignment crosses the proposed Westcountry Land development plot within the Willow Green area of Langarth development.

Figure 6.6 Chainage 1600-1900 Westcountry Land Plot

6.6.2 Figure 6.6 shows the option 5 main alignment in yellow. An earlier main alignment option was reviewed in line with the outline planning application, shown as a red centreline in figure 6.6. The Option 5 alignment, shown in yellow, is direct yet follows existing site contours to enable a maximum 6% gradient.

6.6.3 Although the main alignment design has been developed with horizontal parameters to slow traffic speeds, the NAR must also provide a realistic and attractive commuter opportunity for those travelling to key destinations such as Treliske Hospital, the Innovation Centre and surrounding industrial and commercial properties at Treliske. As a result, the route has been developed to be as direct as possible whilst maintaining the design parameters selected.

6.6.4 As part of opportunity for development areas to the east of the existing park and ride Cornwall Council instructed Cormac to review options to locate the main alignment to the north of the proposed Westcountry Land development. Six independent options were reviewed and a high-level assessment of cost, measured against potential earthworks quantities, was undertaken. The six different options, Options 8 to 13 are detailed below.

6.7 Option 8

6.7.1 Option 8 can be found on drawing 1665_CSL_HML_XXMZ_DR_CH_0031 and figure 6.7 below.

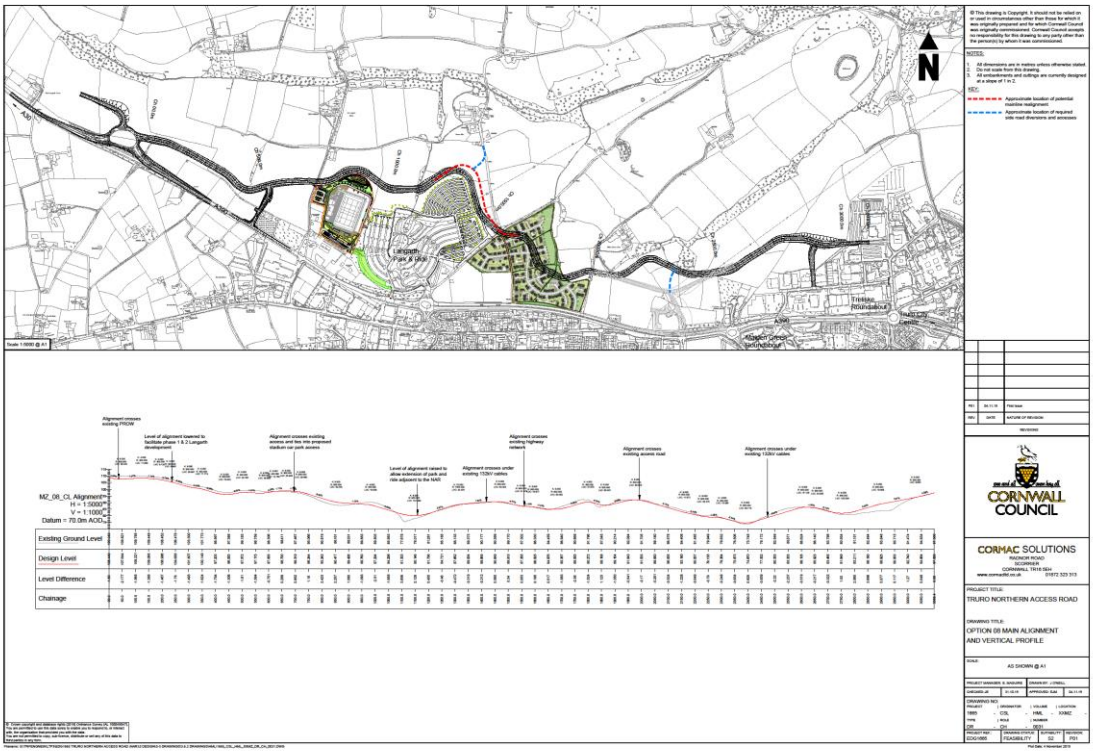

Figure 6.7 Option 8

6.7.2 Option 8 runs immediately adjacent to the eastern side of the park and ride development. This option follows the existing site contours through West Country Land and to the south of Willow Green Farm. Option 8 was reviewed by Cornwall Council's strategic board for the Langarth development. A request was made to locate the alignment further to the east, where it runs adjacent to the park and ride, in order to more easily facilitate the park and ride extension.

6.8 Option 9

6.8.1 Option 9 can be found on drawing 1665_CSL_HML_XXMZ_DR_CH_0032 and figure 6.8 below.

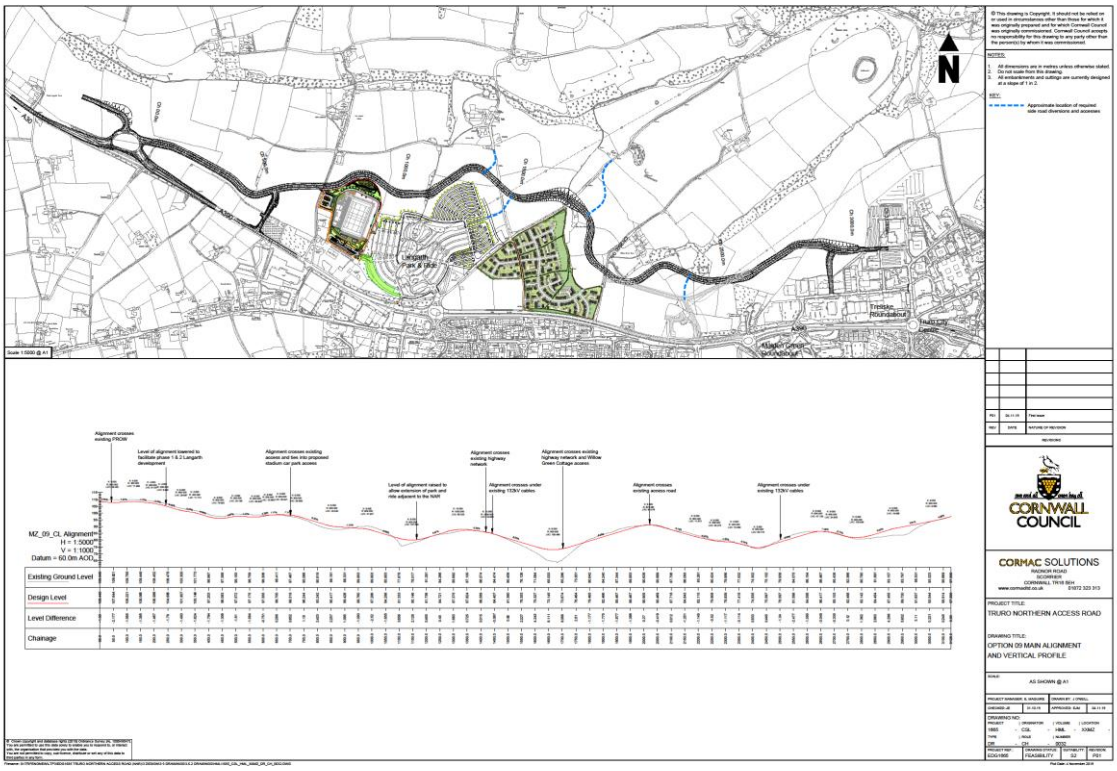

Figure 6.8 Option 9

6.8.2 Option 9 provides an alignment to the north of the proposed West Country Land development and diverts to the south of Willow Green Farm.

6.8.3 This alignment is located to the east of the existing 132kV pylon adjacent to the proposed park and ride development.

6.8.4 This route crosses, rather than follows the contours north of Willow Green Cottage, creating a significant embankment of 8m adjacent to the property and on top of existing highway network. The alignment then follows the contours to the south of Willow Green Farm.

6.9 Option 10

6.9.1 Option 10 can be found on drawing 1665_CSL_HML_XXMZ_DR_CH_0033 and figure 6.9 below.

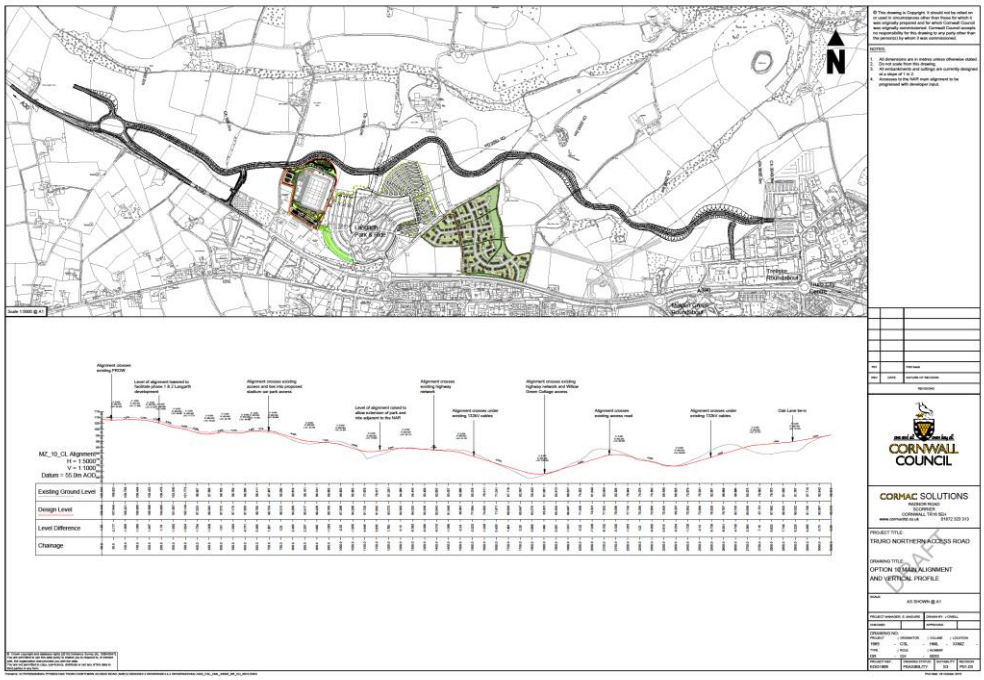

Figure 6.9 Option 10

6.9.2 Option 10, in comparison with Option 9, provides an alignment further to the north of the proposed West Country land development. It follows the contours further to the north, creating less impact on the existing highway network.

6.9.3 This route crosses the contours to the north of Willow Green Farm, creating a cutting of approximately 7m depth. The route crosses the existing wildlife corridor to the east of Willow Green Farm at its narrowest point (based on OS) before crossing existing contours again to the north of Maiden Green.

6.10 Option 11

6.10.1 Option 11 can be found on drawing 1665_CSL_HML_XXMZ_DR_CH_0034 and figure 6.10 below.

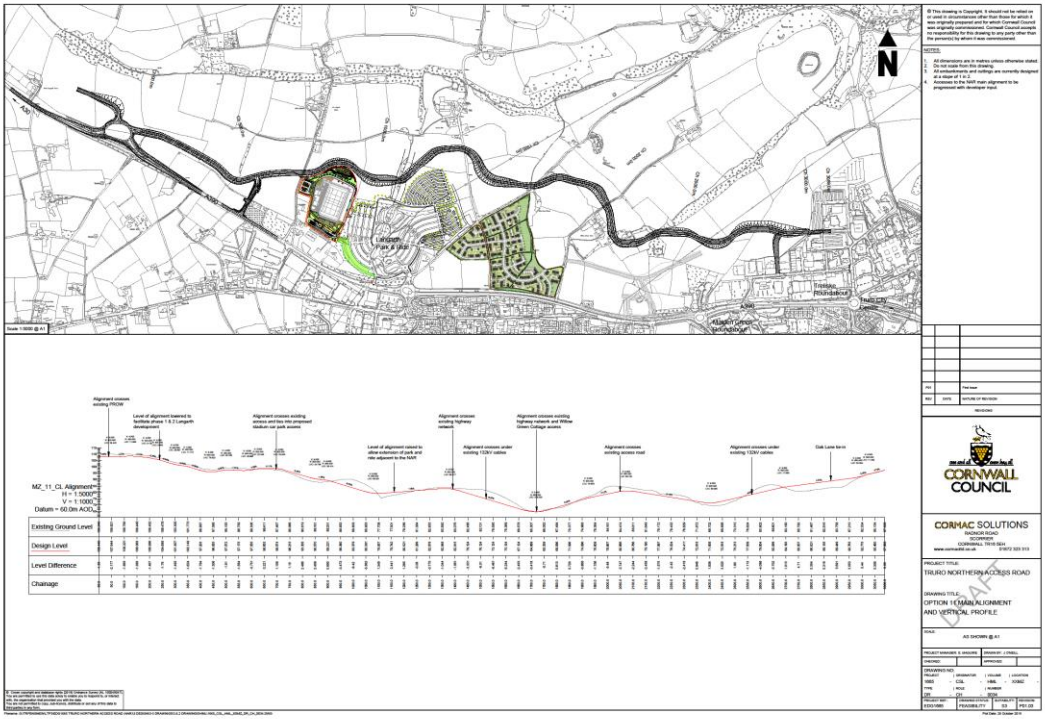

Figure 6.10 Option 11

6.10.2 Option 11 provides an alignment to the north of the proposed West Country land development but located further to the south than Option 10. This route, when compared to Option 10, follows the contours a little more closely and passes immediately to the east of Willow Green Farm.

6.10.3 The route passes through the two wetland areas to the east of Willow Green Farm (as shown on OS) before crossing the contours in an easterly direction to the north of Maiden Green and into the Innovation Centre.

6.11 Option 12

6.11.1 Option 12 can be found on drawing 1665_CSL_HML_XXMZ_DR_CH_0035 and figure 6.11 below.

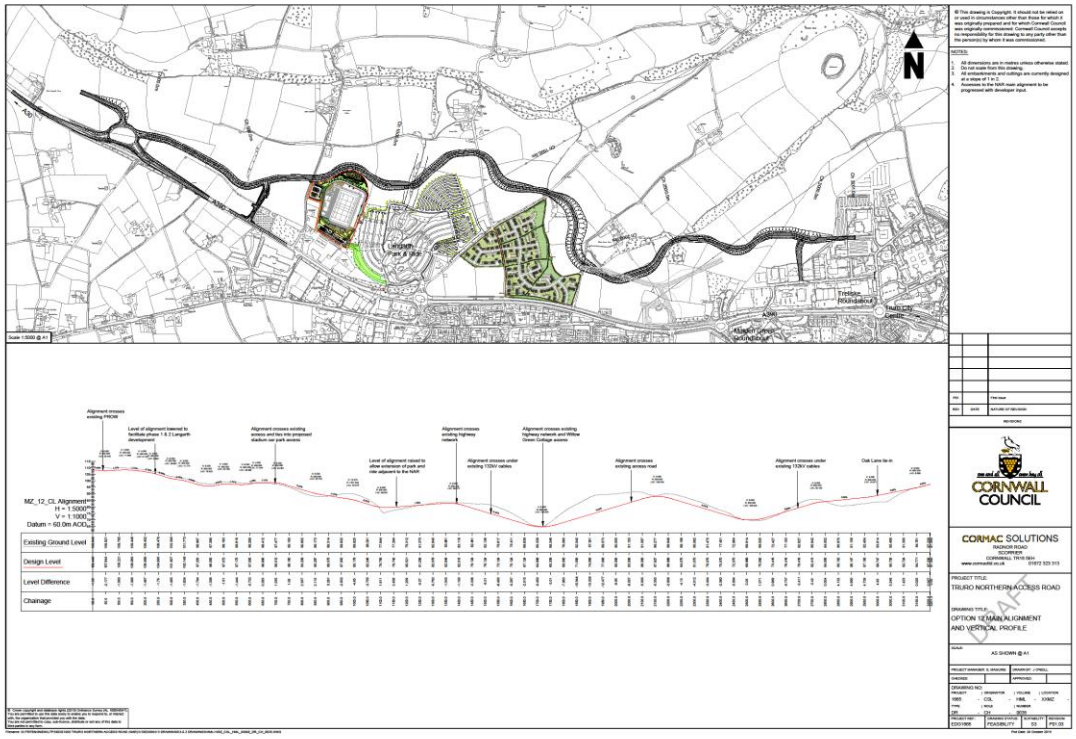

Figure 6.11 Option 12

6.11.2 Option 12 follows the same approximate horizontal and vertical alignment as Option 11 to the most northern point of the proposed West Country Land development.

6.11.3 The route then crosses the existing contours as it runs from north to south between Willow Green Cottage and Willow Green Farm, creating a cutting of approximately 12m in depth.

6.11.4 The route then deviates to the north and between the two wetland areas located to the east of Willow Green Farm (as shown on OS) before crossing the contours in an easterly direction to the north of Maiden Green and into the Innovation Centre.

6.12 Option 13

6.12.1 Option 13 can be found on drawing 1665_CSL_HML_XXMZ_DR_CH_0036 and figure 6.12 below.

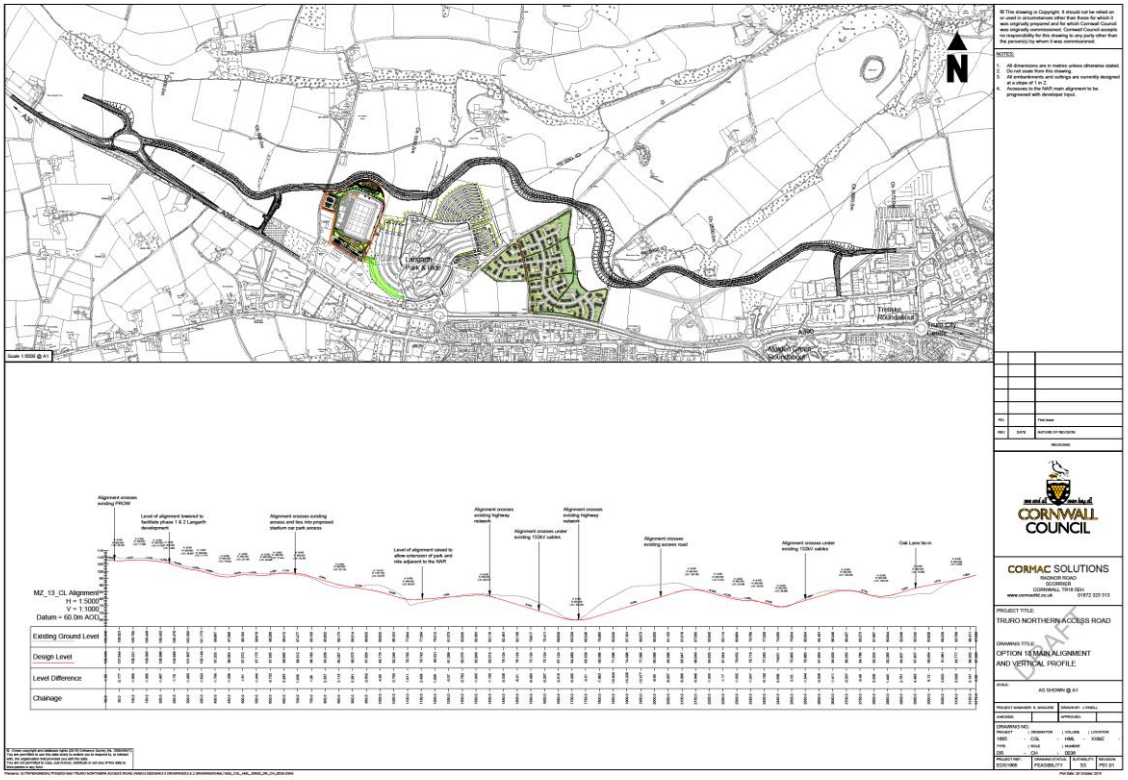

Figure 6.12 Option 13

6.12.2 Option 13 follows the same approximate horizontal and vertical alignment as Option 12 from the park and ride to Willow Green Farm.

6.12.3 The route then deviates to the south of the existing wetland area and follows a similar alignment to Option 8 towards Maiden Green and the Innovation Centre.

6.12.4 The main alignment options and Options 8 to Option 13 were reviewed on 29 October 2019. Options 8 and 9 were discussed at the Strategic Board on 06 November 2019 where Option 8 was selected as the preferred option. In order to further enable the park and ride extension, Option 14 was developed which relocated the alignment eastwards over this section. This arrangement is shown on drawing drawing 1665_CSL_FB_MZ_C3_CH_0050 and figure 6.13 below.

6.12.5 A summary table of options and approximate cost, leading to the selection of alignment Option 8, is included in Appendix B.

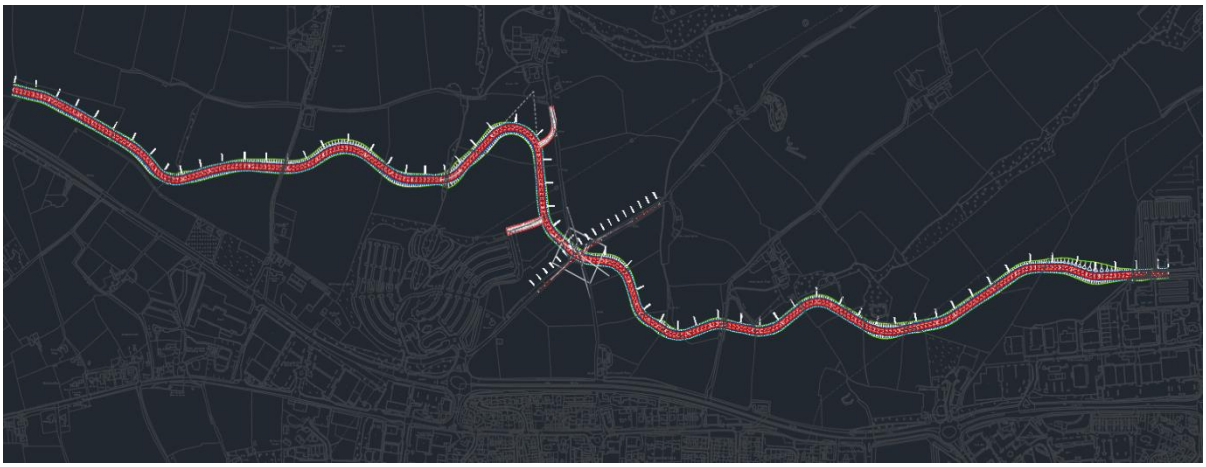

Figure 6.13 Option 14

6.12.6 **Option 14 is now the preferred main alignment option** and is proposed to be used as the option presented for the planning application. The option links to the hospital car park at its eastern end, as in the previous options, also keeping the north/south link to Oak Lane. Further minor design changes are expected and will be tracked as part of a further options report.

6.13 Main Alignment Ch 1900-3000 Maiden Green Development

6.13.1 Between chainage 1900-3000 the main alignment crosses through the proposed Maiden Green development area. The alignment facilitates, as far as practicable, extant planning permissions. The current alignment is shown in figure 6.14 below.

6.13.2 Access from the A390 and the proposed petrol filling station development is discussed in section 6.16 onwards.

6.13.3 Options for access from Oak Lane to the NAR alignment are discussed in section 6.23 onwards.

Figure 6.14 Chainage 1900-3000 Maiden Green Development Area

6.13.4 One significant change has been carried out on this section of the alignment between chainage 2500 and 2700. The original alignment through this section meandered between the existing 132kV pylons as shown in figure 6.15 below. Following review of cleargraph data received from WPD the alignment has been located to the south of the pylons to enable clear statutory distances between finished road level and existing cables and to reduce associated construction risks.

Figure 6.15 Chainage 2500-2700 Alignment through 132kV Pylons

6.13.5 Figure 6.16 shows the alignment of the NAR in relation to the location of the existing pylons following re-alignment to the south. This alignment was then reviewed in order to avoid impacting on a triangular land parcel approved for a children's play centre (PA18/06918).

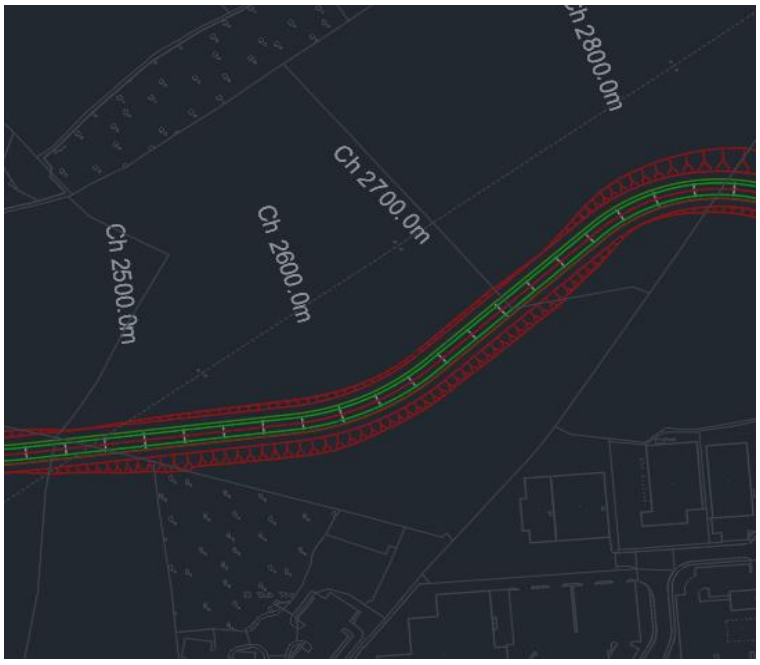

Figure 6.16 Chainage 2500-2700 Alignment to the south of 132kV Pylons

6.13.6 Figure 6.17 shows re-alignment of the NAR to the north to avoid impacting on proposed development PA18/06918.

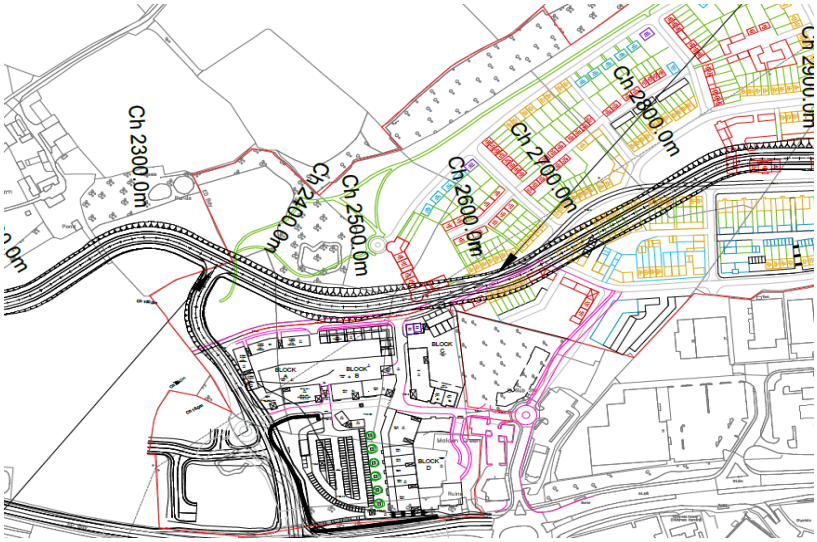

Figure 6.17 Chainage 2500-2700 Alignment to the south of 132kV Pylons

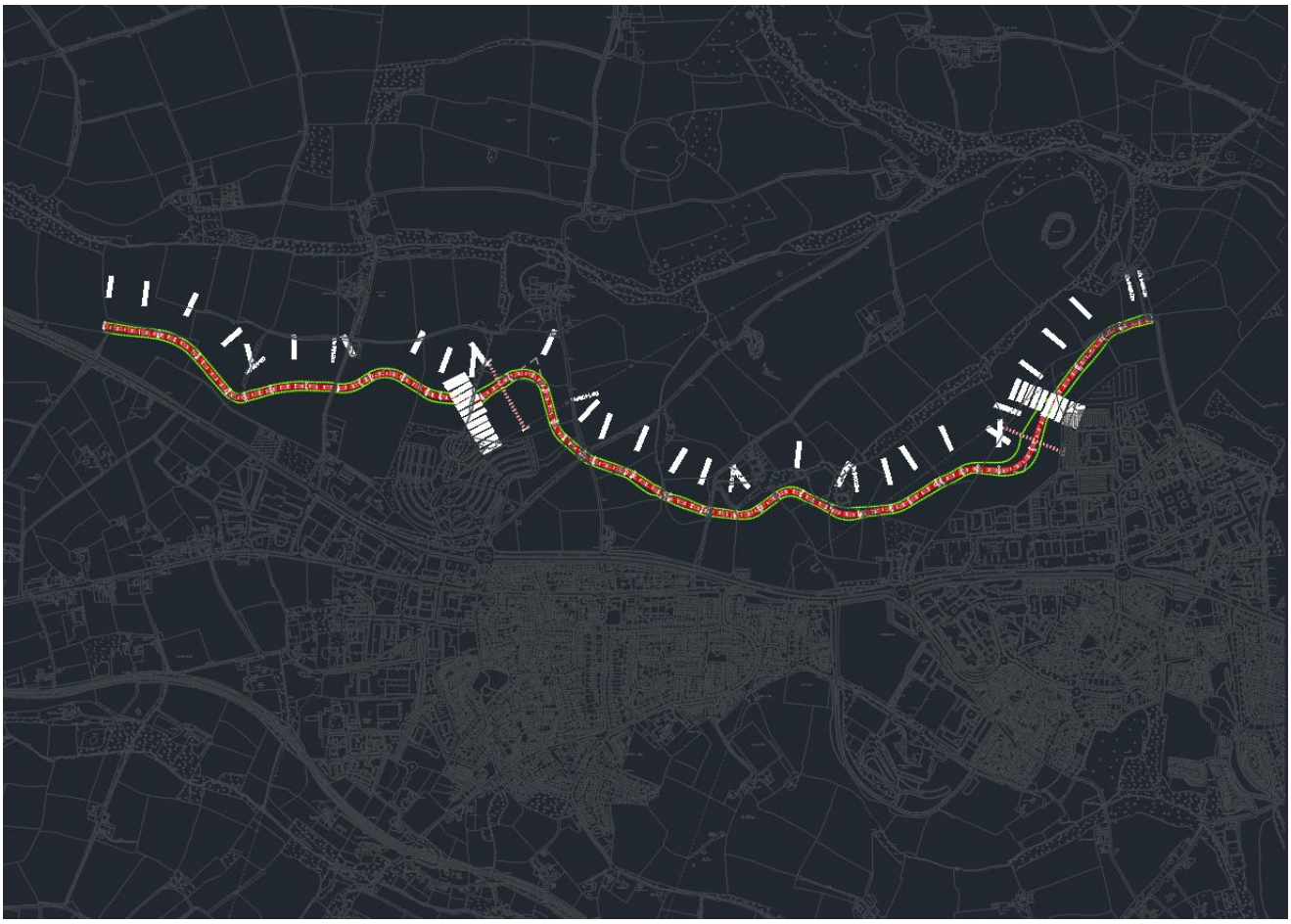

Figure 6.18 Option 7

6.13.7 An option at the eastern extents of the alignment, Option 7, was designed to investigate the opportunity of a direct mainline link into Penventinnie Lane to the north of the Royal Cornwall Hospital. As shown in Figure 6.18, this option was primarily considered as a link, but not pursued, or used, due to unacceptably steep gradients at the tie-in section with Penventinnie Lane to the north of the Duchy Hospital.

6.14 Main Alignment Chainage 3000-3300 Treliske Hospital

6.14.1 The preferred main alignment option, as shown in figure 6.19 below, ties into the existing Health and Wellbeing Innovation Centre at the eastern extents of the NAR. The proposed route through this section is constrained both sides by the Health and Wellbeing Innovation Centre and assets of Treliske Hospital including the helicopter landing pad and existing car park.

6.14.2 The proposed alignment proposes to re-arrange priority at the existing junction between the hospital car park and helicopter landing pad.

6.14.3 The operation of the helipad will cause difficulties for road users as they will be caught up in helicopter downwash. This will require permanent forms of traffic management during landing and launching operations. The helicopters will use two alternative approaches, one from Penventinnie Lane in the east or one from the Innovation Centre and the NAR in the west. These routes avoid passing over developments. Liaison with the Coastguard Search and Rescue and RCHT is ongoing.

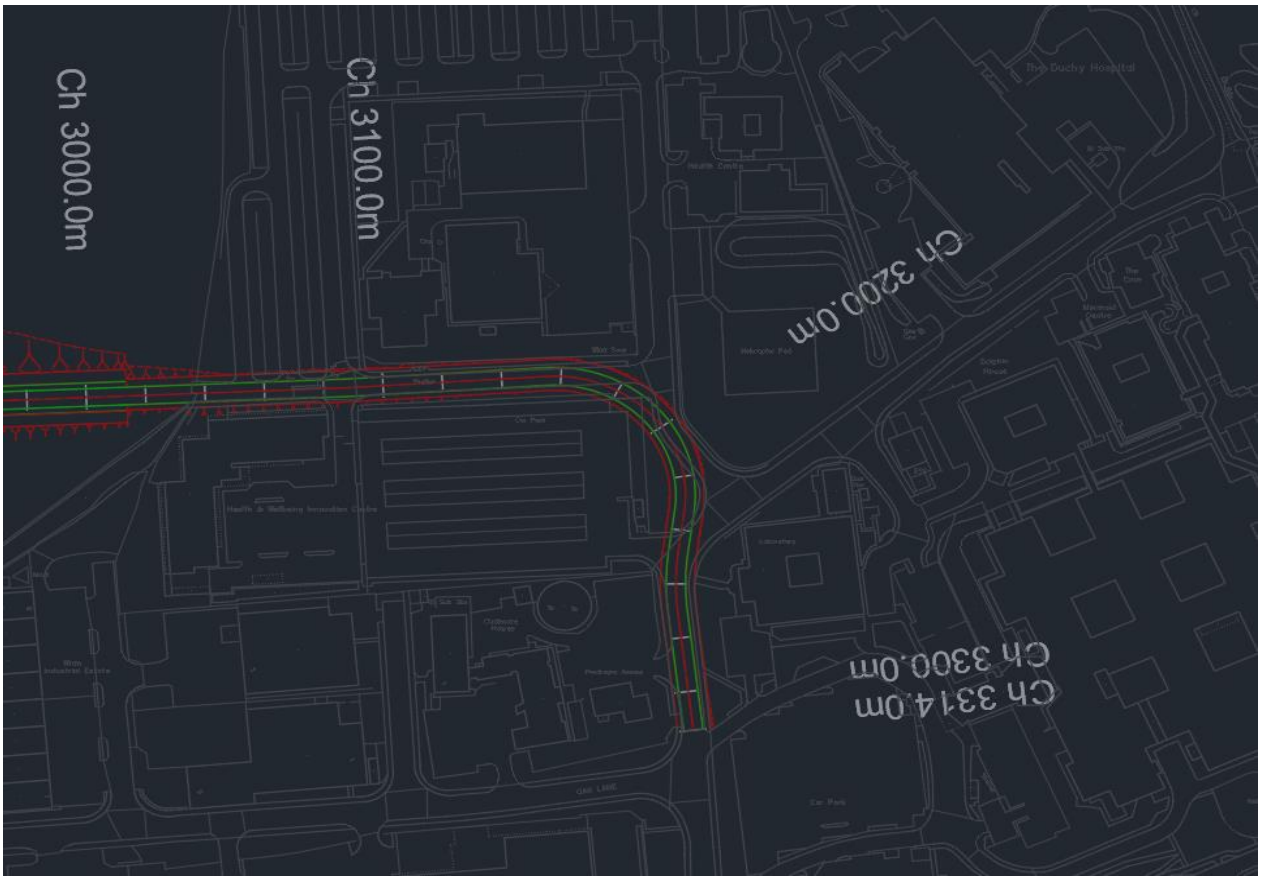

Figure 6.19 Chainage 3000-3300 Alignment from the eastern extent of the NAR to Oak Lane

6.14.4 Options have been investigated to provide alternative priority arrangements at the eastern extents of the scheme at Oak Lane.

6.14.5 An earlier design option investigated the potential of prioritising access from the NAR to Oak Lane, as shown in figure 6.18. This option was discarded as it did not provide the transport modelling benefits provided by two accesses into the Oak Lane area.

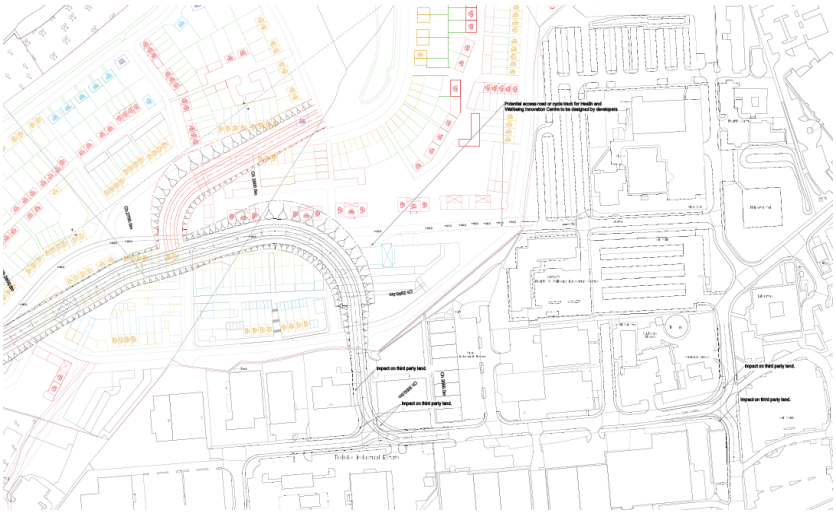

Figure 6.20 Chainage 3000-3300 Alignment with priority to Oak Lane from the NAR

6.14.6 The principle of accessing directly from the NAR to the Innovation and Wellbeing Centre was agreed. Various options were investigated regarding priority arrangements at Oak Lane to improve traffic flows in and around the Hospital and Treliske Hospital Roundabout. Figure 6.19 below details an arrangement whereby entrance and egress to the Hospital main car park is maintained solely via the A390. An initial review of the strategic transport model indicated that no significant benefits would be realised through this option.

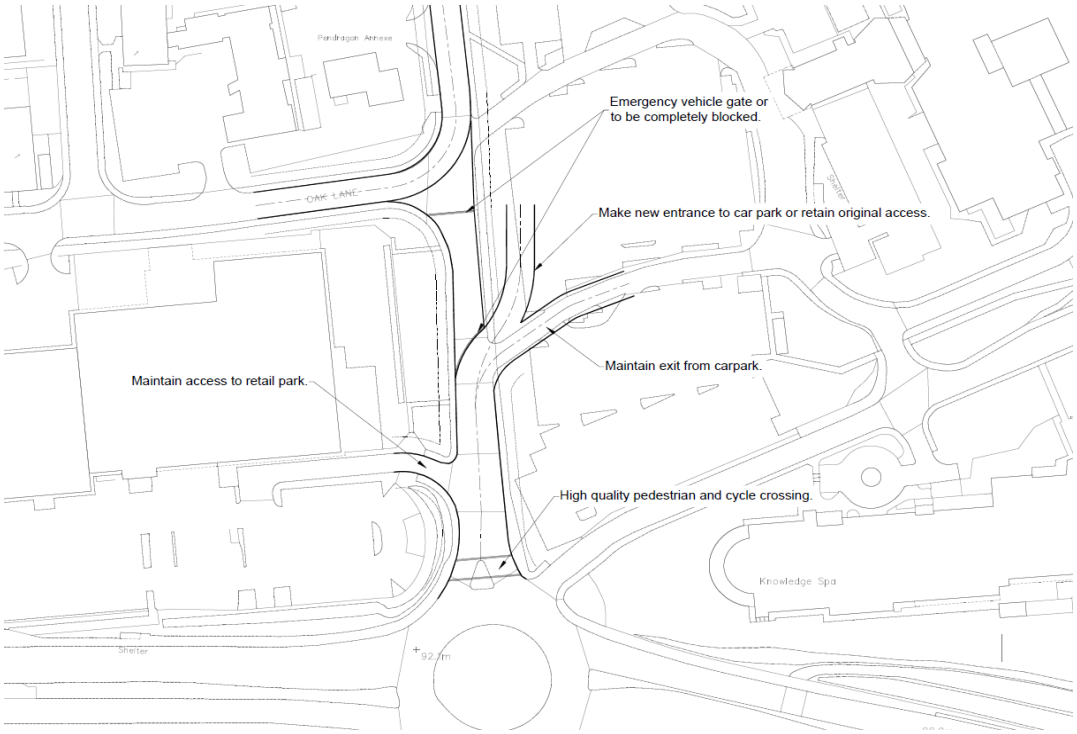

Figure 6.21 Prohibition of vehicular access from Oak Lane to Treliske Roundabout

6.14.7 The current preferred option at the eastern extents of the scheme at Oak Lane is as shown on Figure 6.20. This option forms part of Option 14 and provides access to Oak Lane through the Innovation and Wellbeing Centre and from the north-south linking from the NAR. This current option reconfigures priority at the existing junction located to the southwest of the helicopter pad.

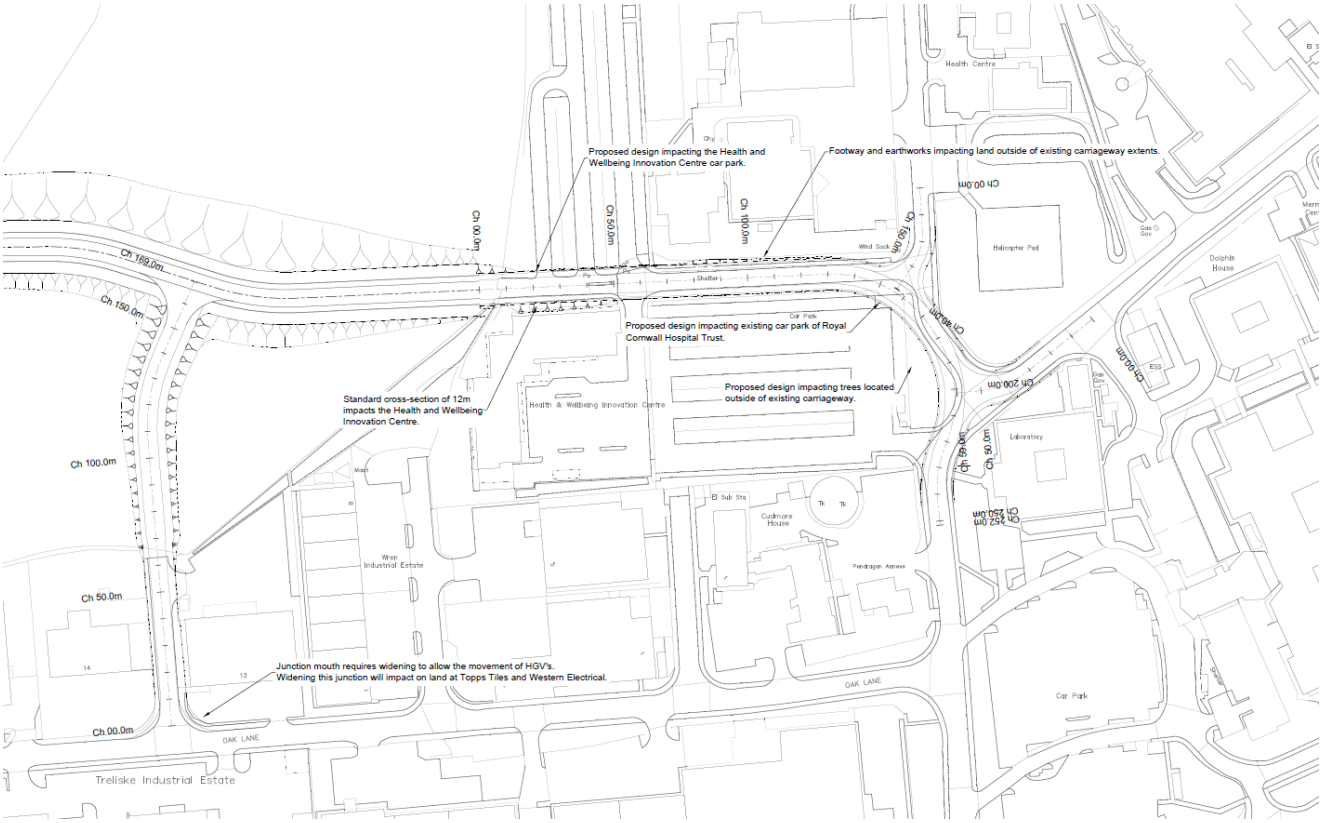

Figure 6.22 Chainage 3000-3300 Alignment with prohibition of vehicular access from Oak Lane to Treliske Roundabout

6.15 Petrol Filling Station Maiden Green Options Evolution

6.15.1 In January 2019, Walker Developments (SW) Ltd submitted a planning application for a new petrol filling station at Maiden Green; PA18/11022. The proposed petrol filling station planning application includes an access road which provides a direct connection from the existing A390 to an assumed location and level of the NAR.

6.15.2 Since the planning application was submitted the NAR main alignment has been developed, superseding the assumed location and level included within the original planning submission. The Engineering Design Group at Cormac have been tasked with designing an access road which connects the northern extents of the proposed petrol filling station access road to the NAR main alignment. To date, six different options for an access road have been assessed. This section of the report details the findings and outcomes of those six options.

6.15.3 The biggest constraint to the petrol filling station noted by the Engineering Design Group design team was a set of 132kV overhead cables that the proposed petrol filling station access crossed underneath. The required statutory minimum clearance from the bottom of the cables to the proposed finished road level is 6.7m, however WPD who own and maintain the cables strongly recommend that this distance is increased to 7.3m. Failure to be able to achieve the required distance could result in having to either raise or divert the cables.

6.15.4 The Engineering Design Group received a 3D AutoCAD drawing of the petrol filling station access road design from WSP on behalf of Walker Developments, as submitted to planning, on the 11 April 2019. All work carried out by the Engineering Design Group has been designed from this 3D AutoCAD drawing. All options, detailed below, have been designed by the Engineering Design Group to tie into the design received at an exact X, Y, and Z co-ordinate along the centreline of either of the western or northern access roads. Different options tie in at various locations on the existing planning design and, as a result, starting gradients and levels may vary from option to option.

6.15.5 The Engineering Design Group undertook a design check on the access road planning design, using cleargraph data of the cables supplied by WPD. Assessment concluded that the planning design did not achieve the required statutory minimum clearance of 6.7m. Walker Developments and Cornwall Council were made aware of this on the 10 June 2019 via email.

6.15.6 This currently means that no options developed by the Engineering Design Group, and as detailed below, cross underneath the 132kV cables with the required 6.7m clearance.

6.15.7 Walker Developments are currently in the process of reviewing and re-designing the petrol filling station access road design submitted as part of planning.

6.15.8 Any proposed alteration to the petrol filling station access road will require assessment and re-design of any of the options selected below for further development.

6.15.9 A description and plan of each of the six options reviewed by Cormac are detailed below.

6.16 Option 1

6.16.1 Option 1 is shown on drawing 1665-CSL-HSR-XXM3-DR-CH-0001 and in Figure 6.23 below.

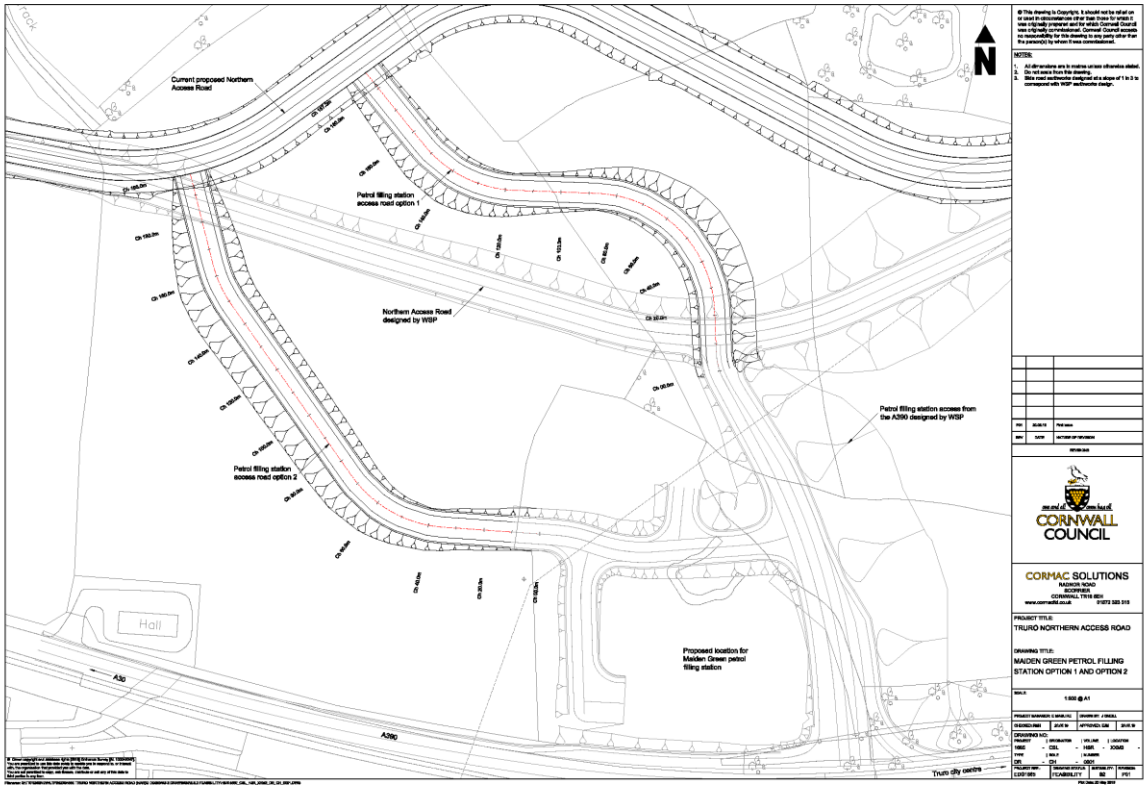

Figure 6.23 Maiden Green Petrol Filling Station Option 1 and 2

6.16.2 Option 1 has been designed from the most northern extents of the main petrol filling station north access road tying into the NAR at chainage 2175.0m at a -2% longitudinal gradient. It utilises the same longitudinal gradients -3.4% as the petrol filling station design end point before steepening to -6% to tie into the NAR. The -6% gradient reduces the amount of required earthworks.

6.16.3 Horizontally the alignment consists of 3 sections of straight carriageway maximum length 39m with two radii of 44m used to restrict speeds to the required 20mph. There is a cross section of 22m at the widest point.

6.17 Option 2

6.17.1 Option 2 is shown on drawing 1665-CSL-HSR-XXM3-DR-CH-0001 and in Figure 6.23 (as above).

6.17.2 Option 2 uses the main alignment option and is designed from the end of the petrol filling station western side road, tying into the NAR at the existing ground level at chainage 2100.0m., with a longitudinal gradient of -2%. It utilises the longitudinal gradients of the petrol filling station design of 2.5% for 10m before steepening to an approximate gradient of -5.8%, to enable tie-in to the NAR.

6.17.3 Horizontally the alignment consists of 3 sections of straight carriageway maximum length 75m with two radii of 44m used to restrict speeds to the required 20mph. There is a cross section of 23m at the widest point.

6.18 Option 3

6.18.1 Option 3 is shown in drawing 1665-CSL-HSR-XXM3-DR-CH-0006 and in figure 6.24 below.

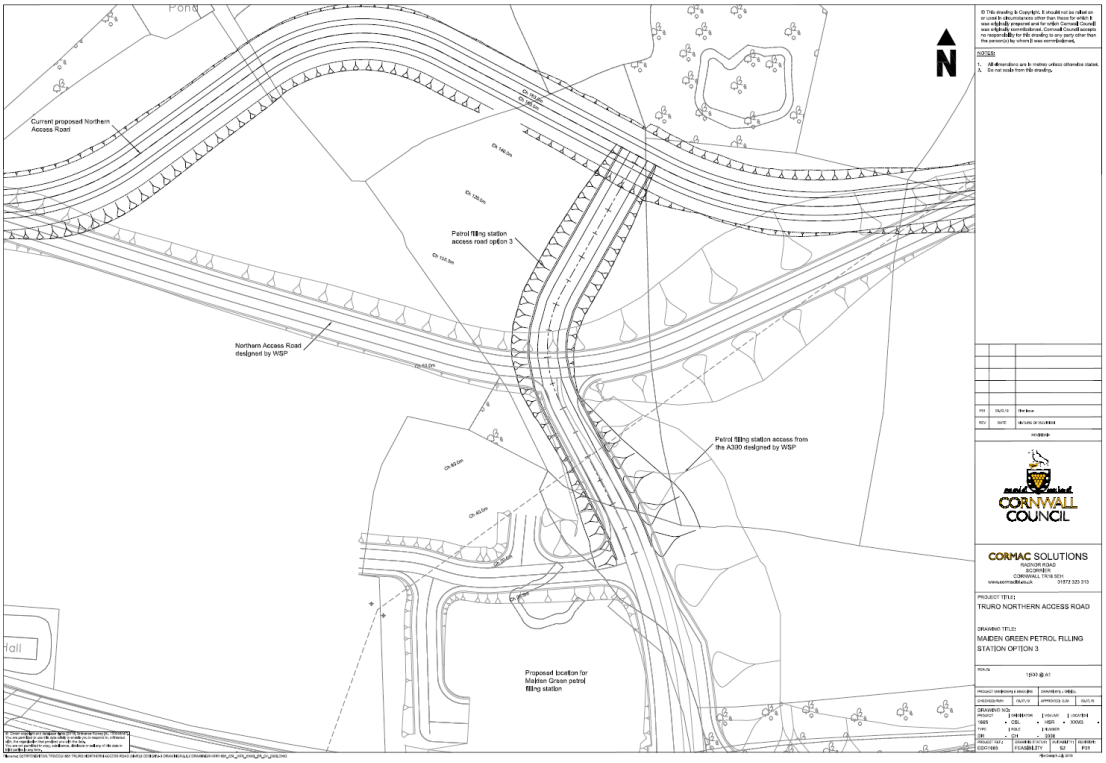

Figure 6.24 Maiden Green Petrol Filling Station Option 3

6.18.2 Option 3 has been designed from the intersection of the northern access and western access junction and ties into the NAR at around existing ground level at approximately chainage 2350.0m. The starting longitudinal gradient of -8% was applied to the start of option 3's vertical design before steepening up to a gradient of over -11% in order to tie into the proposed NAR. The steep gradient is due to the existing topography which falls away to the north east. As a result this proposed access chases a down gradient in order to tie into the NAR.

6.18.3 Option 3 ties into the NAR with a longitudinal gradient of approximately -1.5%. Horizontally the alignment consists of 2 sections of straight carriageway maximum length 57m and 50m and radii of 44m used to restrict speeds to the required 20mph. There is a cross section of 40m at the widest point.

6.18.4 As a result of the 11% gradient, this proposed option does not comply with the geometrical design parameters selected for developing the NAR and associated side roads.

6.19 Option 4

6.19.1 Option 4 is shown in drawing 1665-CSL-HSR-XXM3-DR-CH-0007 and in Figure 6.25 below.

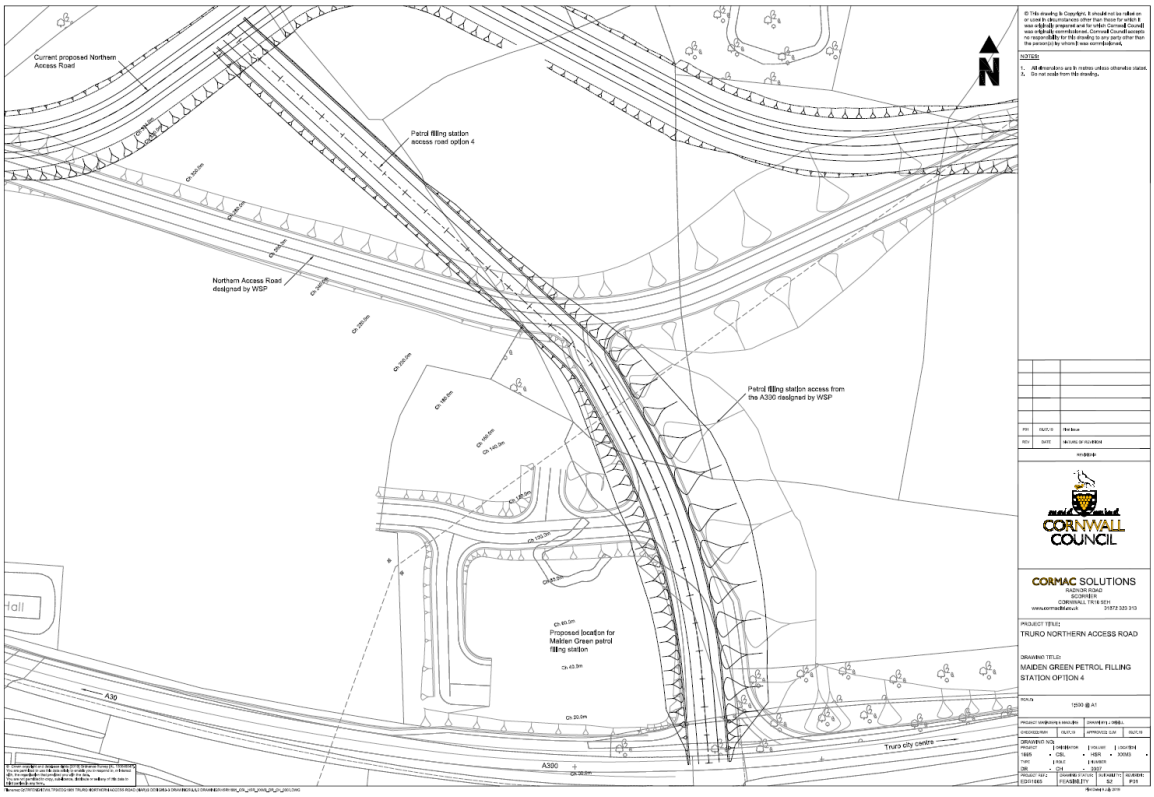

Figure 6.25 Maiden Green Petrol Filling Station Option 4

6.19.2 Option 4 has been designed from the A390 at the same location as the petrol filling station design and ties into the NAR approximately 1.5m below existing ground level at chainage 2180.0m. Option 4 ties into the NAR with a longitudinal gradient of -2.5%. The vertical alignment has been design in accordance with the design parameters within the main alignment technical report.

6.19.3 The horizontal alignment recreates the submitted planning design as far as practicable before continuing on a long straight of 167m before tying into the NAR. This alignment, due to the section of straight carriageway in excess of 100m, does not comply with the design parameters selected for development of the NAR and associated side roads. This, option, however, was assessed on the basis of optimising development areas.

6.20 Option 5

6.20.1 Option 5 is shown on drawing 1665-CSL-HSR-XXM3-DR-CH-0004 and in Figure 6.26 below

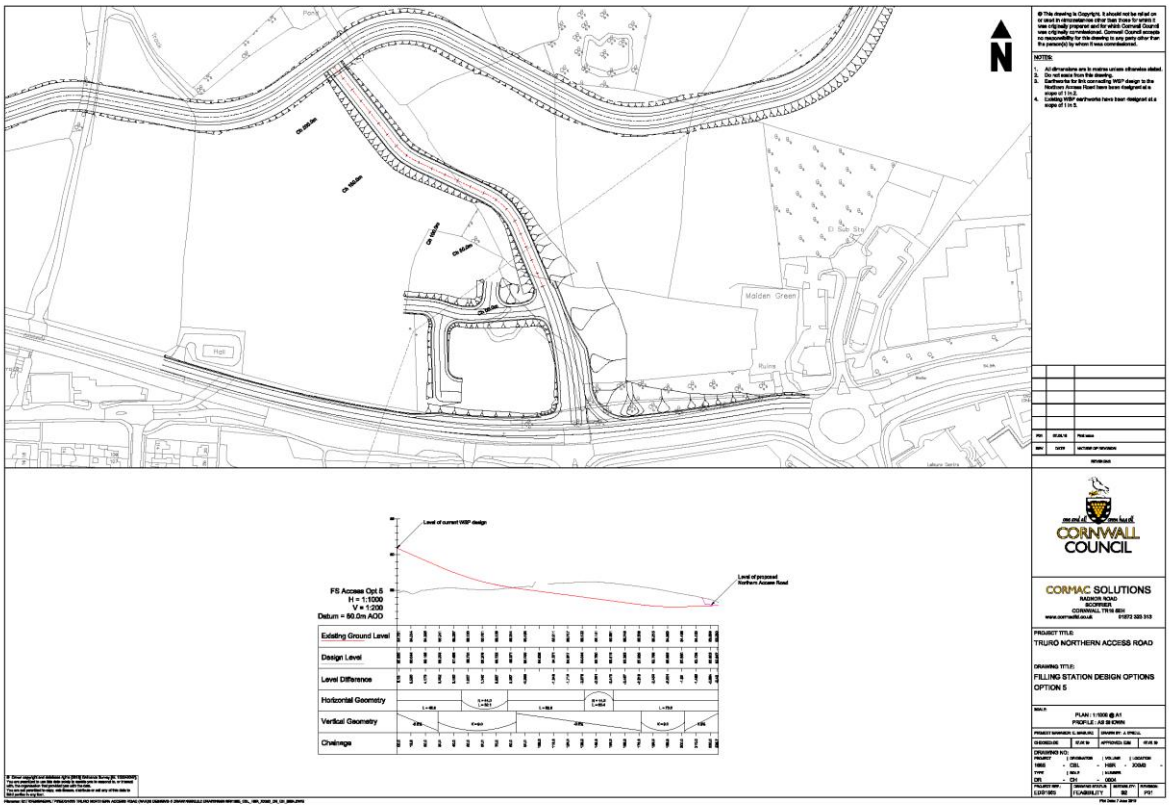

Figure 6.26 Maiden Green Petrol Filling Station Option 5

6.20.2 Option 5 is an adaptation of options 1 and 4, with alterations on the horizontal alignment to reduce curvature and thereby reducing impact upon potential development area. The 44m radii replaces the need for a 167m straight section.

6.20.3 Option 5 has been designed from a point just to the north of the planning design western access road and ties into the NAR approximately half a meter below existing ground level at chainage 2180.0m. The starting longitudinal gradient of -8.7% continues for twenty meters before slackening on the tie-in approach to the NAR.

6.20.4 Horizontally the alignment consists of 3 sections of straight carriageway maximum length 74m with two radii of 44m used to restrict speeds to the required 20mph.

6.20.5 Option 5 does not comply with the geometrical parameters selected for developing the NAR and associated side roads as a result of the longitudinal gradient. At the Langarth Strategic Board Meeting on 5th June 2019, a decision was taken that this would be acceptable, as long as the pedestrian and cycle links would be provided within the overall development site.

6.20.6 This option was discussed with Walker Developments and Cornwall Council on 7 June 2019 and was rejected in favour of Option 6 below.

6.21 Option 6

6.21.1 Option 6 can be found on drawing 1665-CSL-HSR-XXM3-DR-CH-0005 and figure 6.27 below.

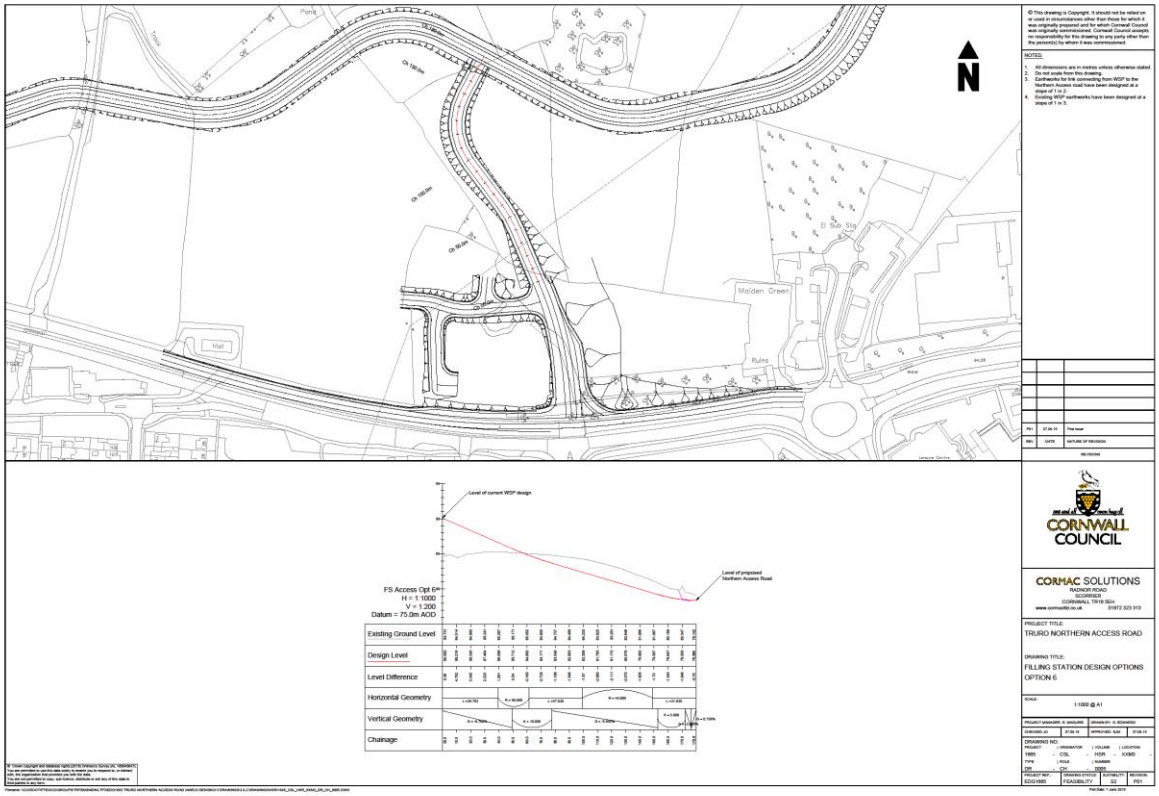

Figure 6.27 Maiden Green Petrol Filling Station Option 6

6.21.2 Option 6 is an evolved design of option 3. The horizontal alignment has been altered so that the tie in point with the NAR is further north to mitigate the issue of steep gradients.

6.21.3 The starting longitudinal gradient of -8.7%, just north of the planning design's western access road, continues for fifty meters before slackening on the tie-in approach to the NAR.

6.21.4 The horizontal alignment consists of 3 sections of straight carriageway maximum length 40m with two radii, one of 90m and one of 44m, used to restrict speeds to the required 20mph.

6.21.5 Option 6 does not comply with the geometrical parameters selected for developing the NAR and associated side roads as a result of the longitudinal gradient. At the Langarth Strategic Board Meeting on 5 June 2019, a decision was taken that this would be acceptable, as long as the pedestrian and cycle links would be provided within the overall development site.

6.21.6 Option 6 provides the most viable design solution and is the preferred option.

6.22 Oak Lane Options Evolution

6.22.1 At the eastern extent of the scheme the NAR ties into the Treliske Industrial estate and existing highway network at the Health and Wellbeing Innovation Centre. Traffic will be directed on to the existing A390 via Treliske roundabout. In order to reduce pressure on this existing roundabout, where options for improving capacity are limited, it is proposed that the eastern extent of Oak Lane is closed to through traffic, as shown in figure 6.23 below. Traffic from Treliske industrial estate will therefore head westbound along the NAR or eastbound on to the A390 via the existing left in, left out junction of the A390 and Oak Lane.

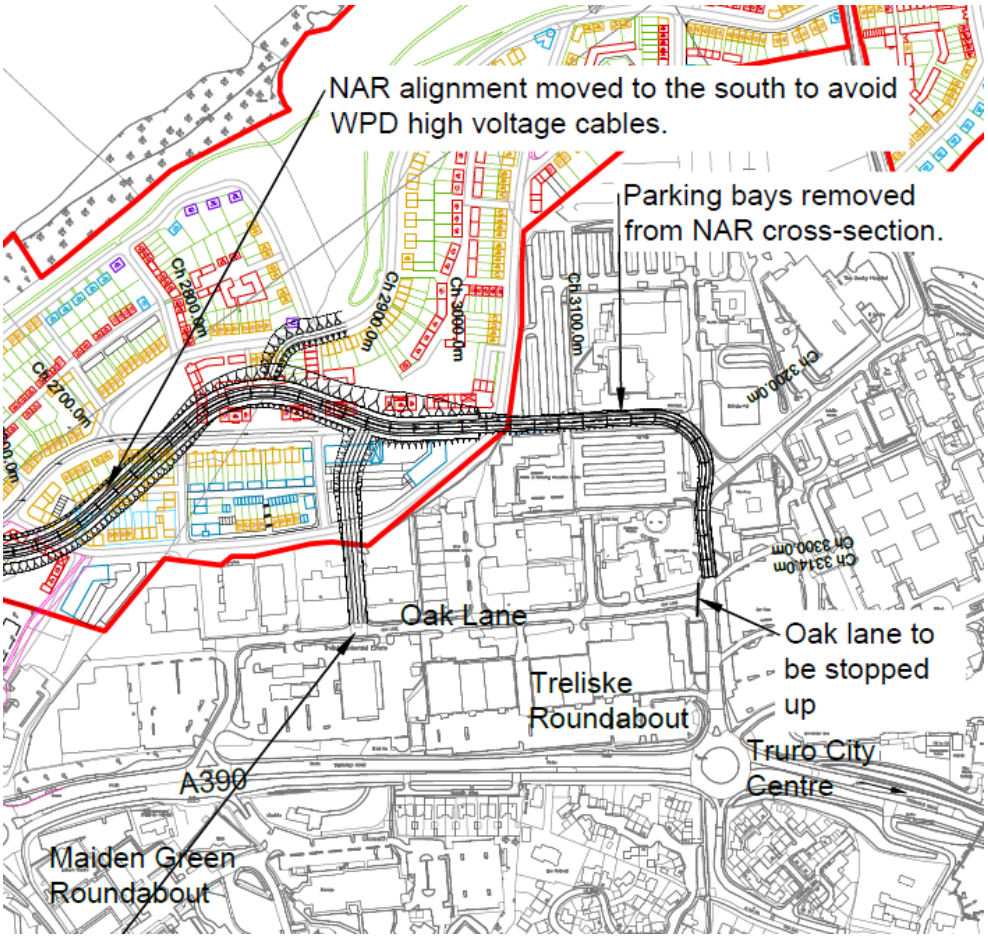

Figure 6.28 Tie-in for Oak Lane including location of stopped up section of highway

6.22.2 Two feasible options for connection from the existing highway at Oak Lane to the NAR have been investigated; one access along the un-adopted highway between the businesses of Topps Tiles and Western Electrical and one access to the east between the businesses of Magnet and Autoglass. The second of the two accesses investigated is restricted at its northern end by third party land. As a result the preferred access from the existing highway to the NAR at Oak Lane is between Topps Tiles and Western Electrical, as shown in figure 6.28.

6.22.3 This section of the report deals with the access options from the northern extents of the existing established street between Topps Tiles and Western Electrical to the NAR.

6.22.4 The assessment of the Oak Lane link involves two variations of the NAR alignment. One main alignment option deviates to the north and between the existing 132kV pylons. The second alignment is located to the south of the existing 132kV pylons.

6.22.5 The existing topography of the Oak Lane link is steep with natural valleys, falling away from the south to the north. The design approach for the Oak Lane link has been in accordance with the main alignment technical report route which details a design speed of 30kph and maximum longitudinal gradient of 6%.

6.22.6 The first four Oak Lane options assessed are shown in figure 6.29 below. Options 1 and 3 tie into a NAR main alignment that is located to the north and traverses between the 132kV pylons. Options 2 and 4 tie into a NAR main alignment that is located to the south of the 132kV pylons. Subsequent review of Western Power Distribution cleargraph data, as detailed in the main alignment options section above, shows that required statutory clearance is problematic when locating the main alignment through the pylons. Although this section details all options reviewed, a decision has been made by the design team that options which involve the alignment located between the 132kV pylons at this location should not be taken further than feasibility.

6.22.7 Options 1-4 are shown on drawing 1665-CSL-HSR-XXM3-DR-CH-0002 and in figure 6.29.

6.22.8 Option 1 shows the NAR main alignment between the 132kV pylons. The main alignment has been raised by up to 4m above existing ground level between chainage 2700 and 2850 to allow the tie in of the Oak Lane access road at a maximum gradient of 6%. The access road has been designed with a tight left hand radius followed immediately by a right hand radius. This enables the length of the access to be increased to assist in maintaining the 6% gradient.

6.22.9 Option 2 is a shorter direct link from south to north. In order to maintain a 6% gradient for this profile, the main alignment of the NAR has been raised by up to 8m above existing ground level between chainage 2700 and 2980.

6.22.10 Option 3 assesses a link in an east-west direction. This option shows the main alignment between the 132kV pylons. The link ties into the NAR alignment at chainage 2550. An east west link better follows the existing contours and as a result this access link has been designed with a longitudinal profile of 4.5%.

6.22.11 Option 4 assesses a link in an east-west direction. This option shows the main alignment to the south of the 132kV pylons. The link ties into the NAR alignment at chainage 2560. A maximum longitudinal gradient of 3.5% has been achieved for this option.

6.22.12 At the Langarth Strategic Board Meeting on 5 June 2019, a decision was taken that side access links, including Oak Lane, could be provided at a steeper gradient, provided that alternative cycle links could be proposed within the overall development site.

Figure 6.29 Oak Lane options 1 – 4

6.22.13 Following this meeting and decision a further option was investigated, Option 5, which provided a direct south to north link from Oak Lane existing highway to the NAR. This alignment was assessed with the main alignment of the NAR located to the south of the existing 132kV pylons.

6.22.14 Option 5 is shown in figure 6.30 below. This alignment has been provided with a gradient of 8% which, in turn, has allowed the embankment of the main alignment to be maintained at a maximum height of approximately 5m above existing ground level between chainage 2700 and 3060.

6.22.15 Option 5 as shown in figure 6.30 below is the preferred option for the Oak Lane access.

6.22.16 A review has been undertaken regarding the southern extents of the Oak Lane junction adjacent to Western Electrical and Topps Tiles. The current junction at this location has been constructed with 10m radii. These radii do not facilitate the turning movements of larger vehicles without significant over-run. A recommendation as part of this report is to approach existing landowners and businesses regarding the requirement to modify the existing junction and possible revision to their frontages onto the new link. As an industrial estate junction the alignment will need to be more open when compared to the NAR where junction radii will be kept tight to reduce speeds.

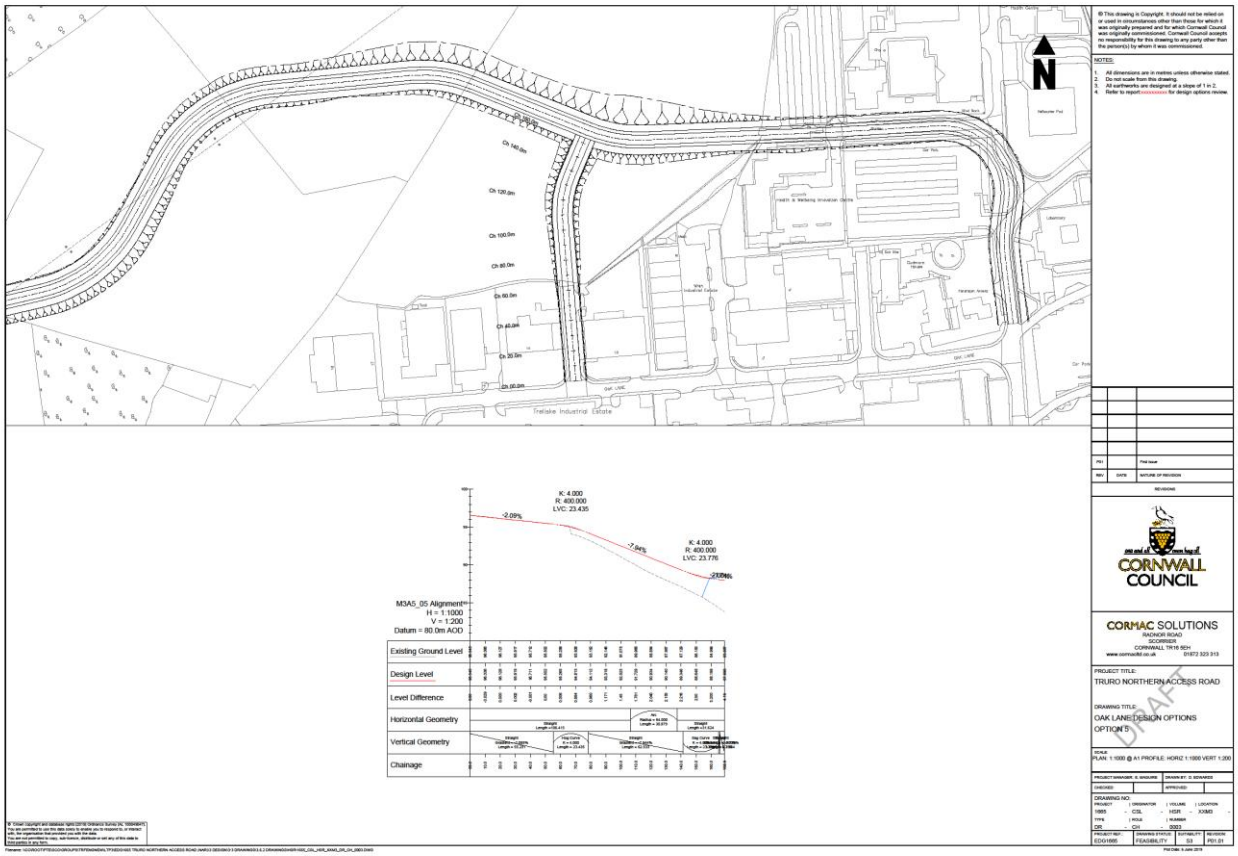

Figure 6.30 Oak Lane option 5

6.22.17 A further option for access from Treliske industrial estate to the NAR has also been reviewed, figure 6.31 below. This access ties into Oak Lane at its western end between the Range and Travis Perkins. The link from the extents of Travis Perkins runs in a westerly then northerly direction directly to the NAR. The access ties into the NAR main alignment at chainage 2600. Between chainage 2400 and 2600, the NAR alignment crosses underneath the existing 132kV cables which dictate its level as a result of required clearance. In order to tie the NAR to the existing level of the Travis Perkins and Range car parks the longitudinal gradient of the access is in excess of 10%. As highlighted previously in paragraph 6.14.5 the footprint crosses the Spanview consented development plot for the children's play centre, (which was previously consented for a hotel). For this reason, no further feasibility analysis of an access at this location has been investigated.

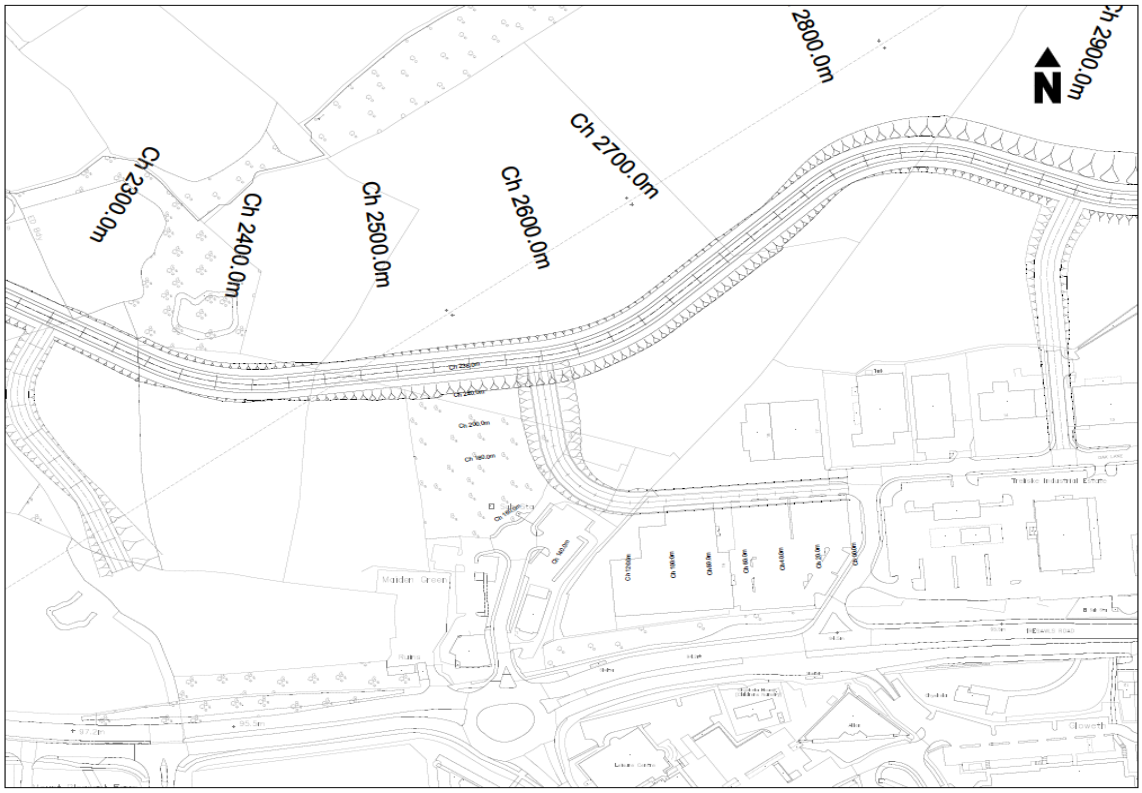

Figure 6.31 Travis Perkins access

7 WEST LANGARTH JUNCTION

7.1 The West Langarth Junction Vision

7.1.1 The West Langarth junction forms the western gateway access from the A390 into the development area of Langarth.

7.1.2 As part of the early development of the HIF bid the vision for the A390 to NAR junction at West Langarth agreed upon was:

- The junction needs to have consideration of potential traffic volumes for capacity and lane requirements, especially through the AM and PM peaks.
- The two lane split for the A390 and NAR needs to be as far away from the junction as possible.
- The junction layout needs to promote the NAR as primary access to the Park & Ride and Treliske Hospital.
- The junction needs to provide a 2/3 (A390) to 1/3 (NAR) split of traffic between the NAR and the A390 following completion of development.
- The junction is to provide a high value streetscape element and a gateway to Truro.
- The junction needs to provide suitable facilities for cyclists.

7.2 Constraints

7.2.1 Principal constraints at West Langarth junction, affecting design development, have been considered as follows:

- Extant planning conditions surrounding the junction area
- Proximity to existing properties including West Langarth Farm
- Adjacent schemes including the Cycling Safety and Integration (CSI) Designated Fund programme
- Existing utilities including a high pressure gas main to the west of the proposed junction
- Transition from national speed limit on the A390 to a low speed environment on the NAR
- The potential impact on the A390 during junction construction

7.2.2 Other design constraints are shown on drawing 1665-CSL-GEN-XXMZ-DE-CH-0029.

7.3 The Junction Options

7.3.1 Sixteen junction options have been developed in two-dimensions for initial assessment. A description of all sixteen options is provided below.

7.4 West Langarth Junction Option 1

7.4.1 Design option 1 is shown on drawing 1665-CSL-GEN-XXJ1-DE-CH-0001.

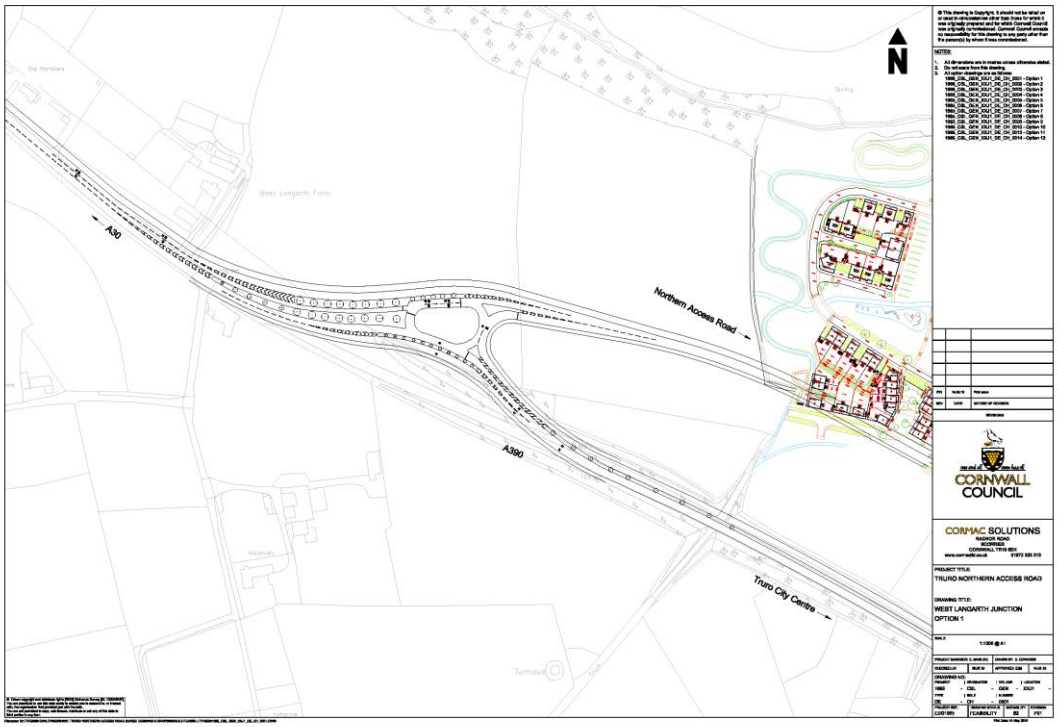

Figure 7.1 West Langarth Junction Option 1

7.4.2 This is the original design concept, submitted as part of the HIF bid and is a large signalised roundabout, incorporating a planted/landscaped gateway boulevard approach to Truro on the A390.

7.4.3 The signalised roundabout option, covers a large surface area and provides an eastern by-pass lane directly into the Langarth development from the A390.

7.4.4 This proposal is situated on top of the high pressure gas main, located immediately to the east of West Langarth Farm.

7.4.5 Westbound traffic along the A390 converge at the signalised roundabout with no by-pass lane.

7.5 West Langarth Junction Option 2

7.5.1 Design option 2 is shown on drawing 1665-CSL-GEN-XXJ1-DE-CH-0002.

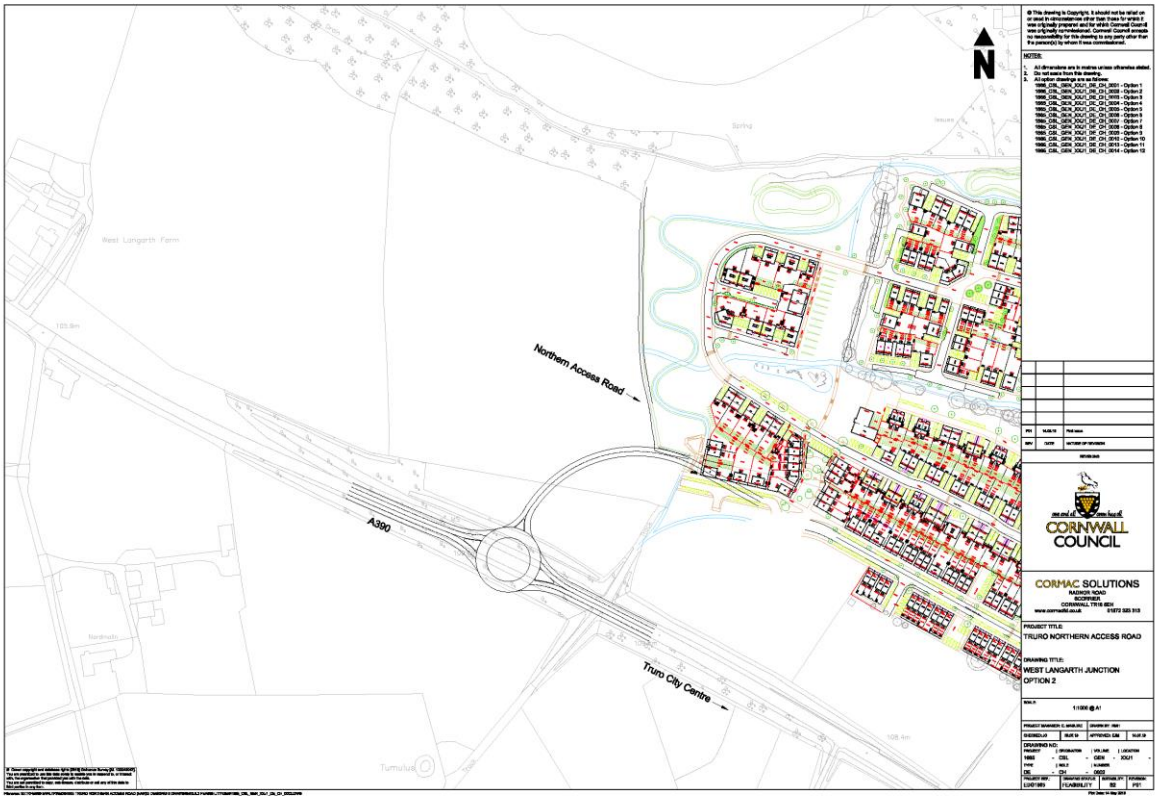

Figure 7.2 West Langarth Junction Option 2

7.5.2 Option 2 is a simple three arm roundabout junction. The junction is situated on-line and provides a northern arm access to the Langarth development. Existing A390 east-west traffic is not diverted.

7.5.3 Option 2 is located within the existing cutting area on the A390.

7.6 West Langarth Junction Option 3

7.6.1 Design option 3 is shown on drawing 1665-CSL-GEN-XXJ1-DE-CH-0003.

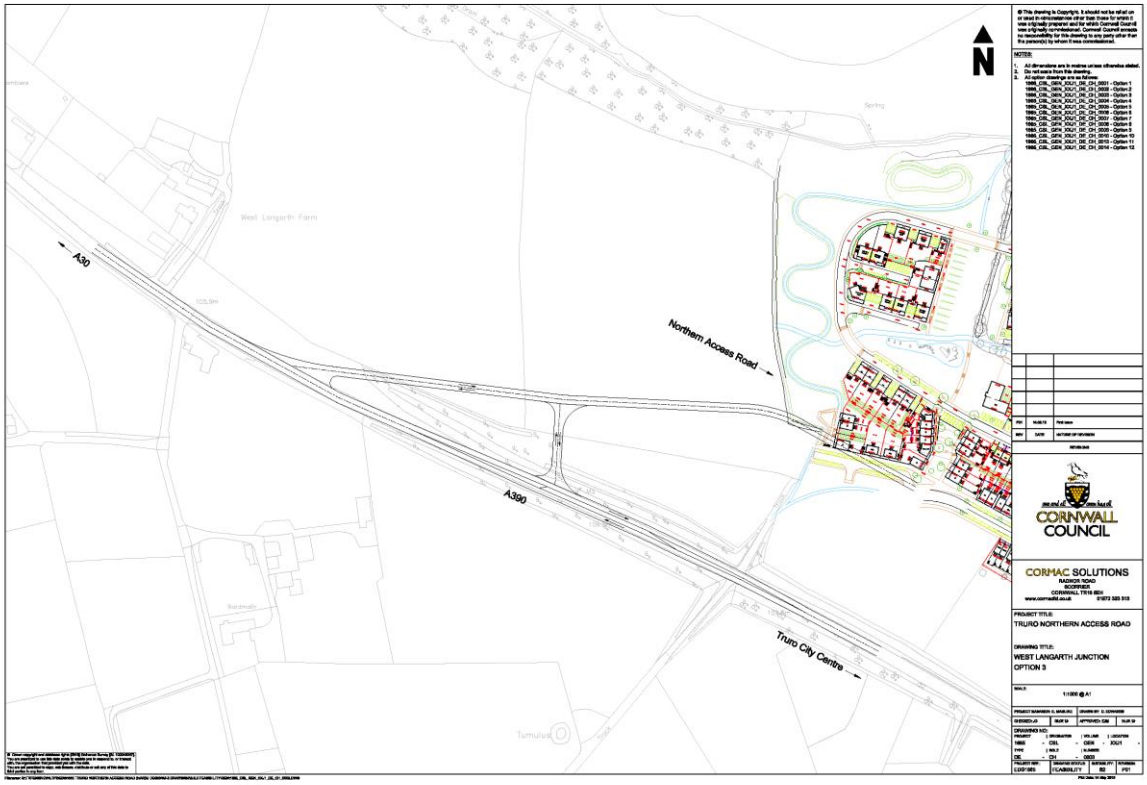

Figure 7.3 West Langarth Junction Option 3

7.6.2 Option 3 consists of two priority junctions with provision of ghost islands or single lane dualling.

7.6.3 A390 traffic is unimpeded with NAR traffic giving way.

7.7 West Langarth Junction Option 4

7.7.1 Design option 4 is shown on drawing 1665-CSL-GEN-XXJ1-DE-CH-0004.

Figure 7.4 West Langarth Junction Option 4

7.7.2 Option 4 is a similar concept to Option 3, but with a left-turn eastbound traffic off-slip lane from the A390 allowing one way access onto the NAR. This lane has increased impact on third party land compared to Option 3.

7.8 West Langarth Junction Option 5

7.8.1 Design option 5 is shown on drawing 1665-CSL-GEN-XXJ1-DE-CH-0005.

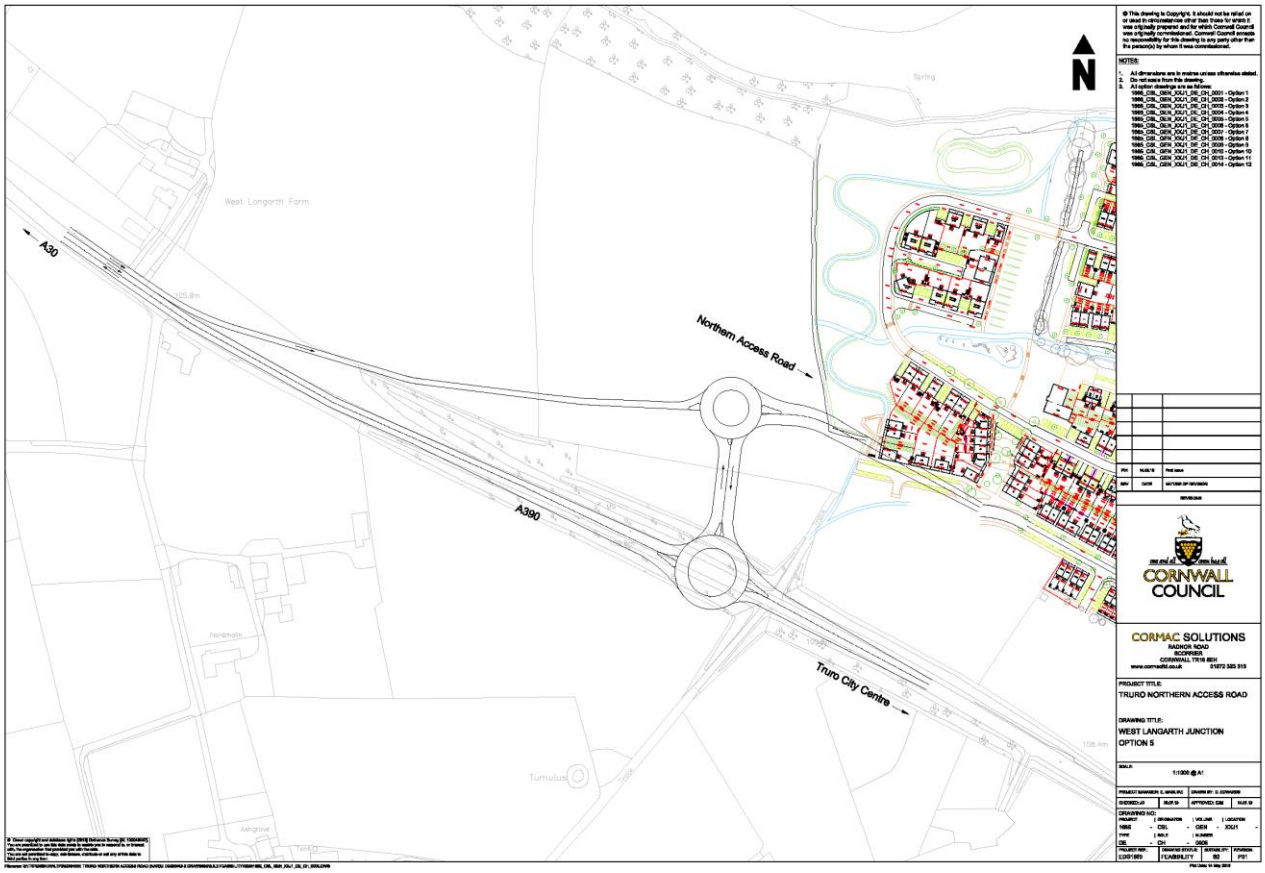

Figure 7.5 West Langarth Junction Option 5

7.8.2 Option 5 is a dumbbell roundabout solution with a slip-lane heading eastbound to the NAR from the A390.

7.8.3 A390 traffic would give way to traffic heading westbound from the NAR.

7.9 West Langarth Junction Option 6

7.9.1 Option 6 is shown on drawing 1665-CSL-GEN-XXJ1-DE-CH-0006.

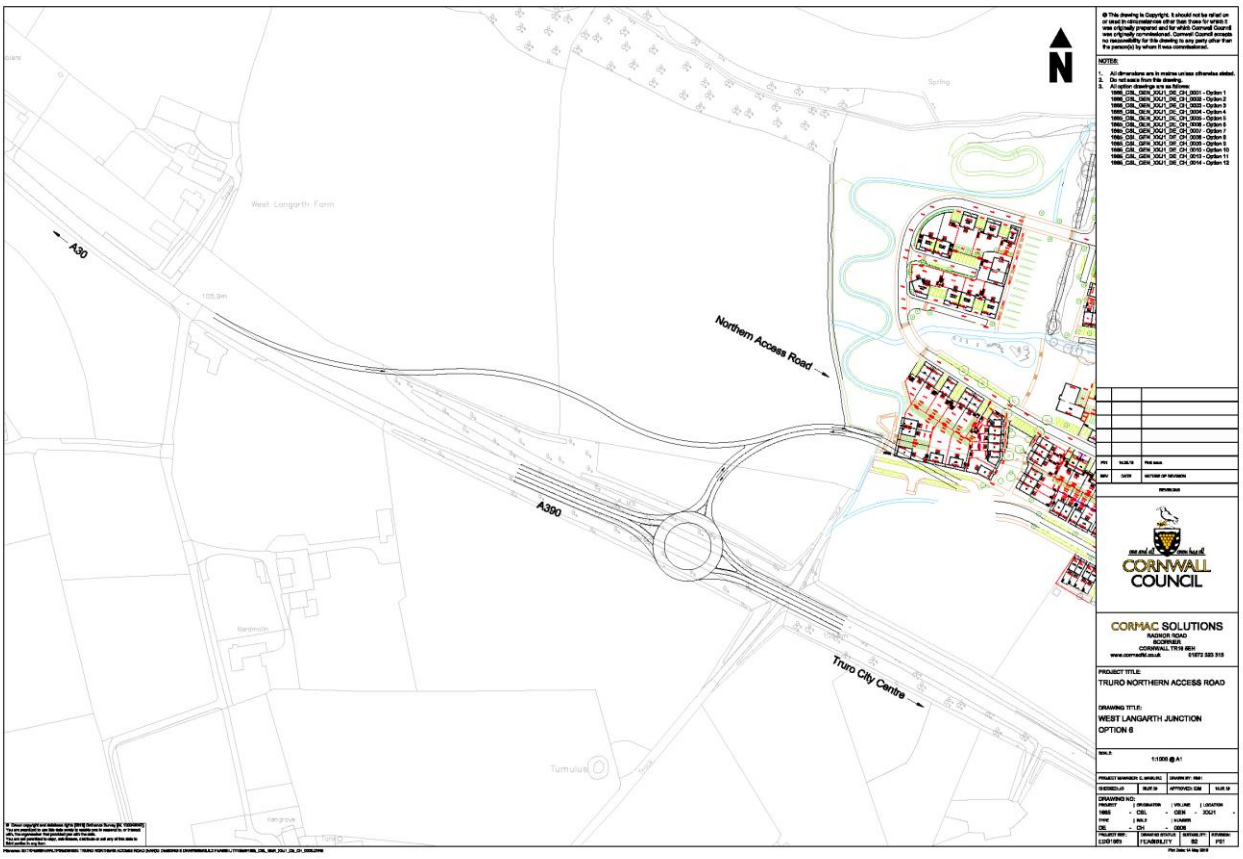

Figure 7.6 West Langarth Junction Option 6

7.9.2 Option 6 is a single roundabout solution with a dedicated eastbound slip-lane for vehicles heading east from the A390 to the NAR. The dedicated slip-lane has increasingly tight horizontal geometry introduced heading towards the Langarth site, designed to slow approaching traffic.

7.9.3 As with Option 2, the proposed roundabout is situated within the existing cutting on the A390.

7.10 West Langarth Junction Option 7

7.10.1 Option 7 is shown on drawing 1665-CSL-GEN-XXJ1-DE-CH-0007.

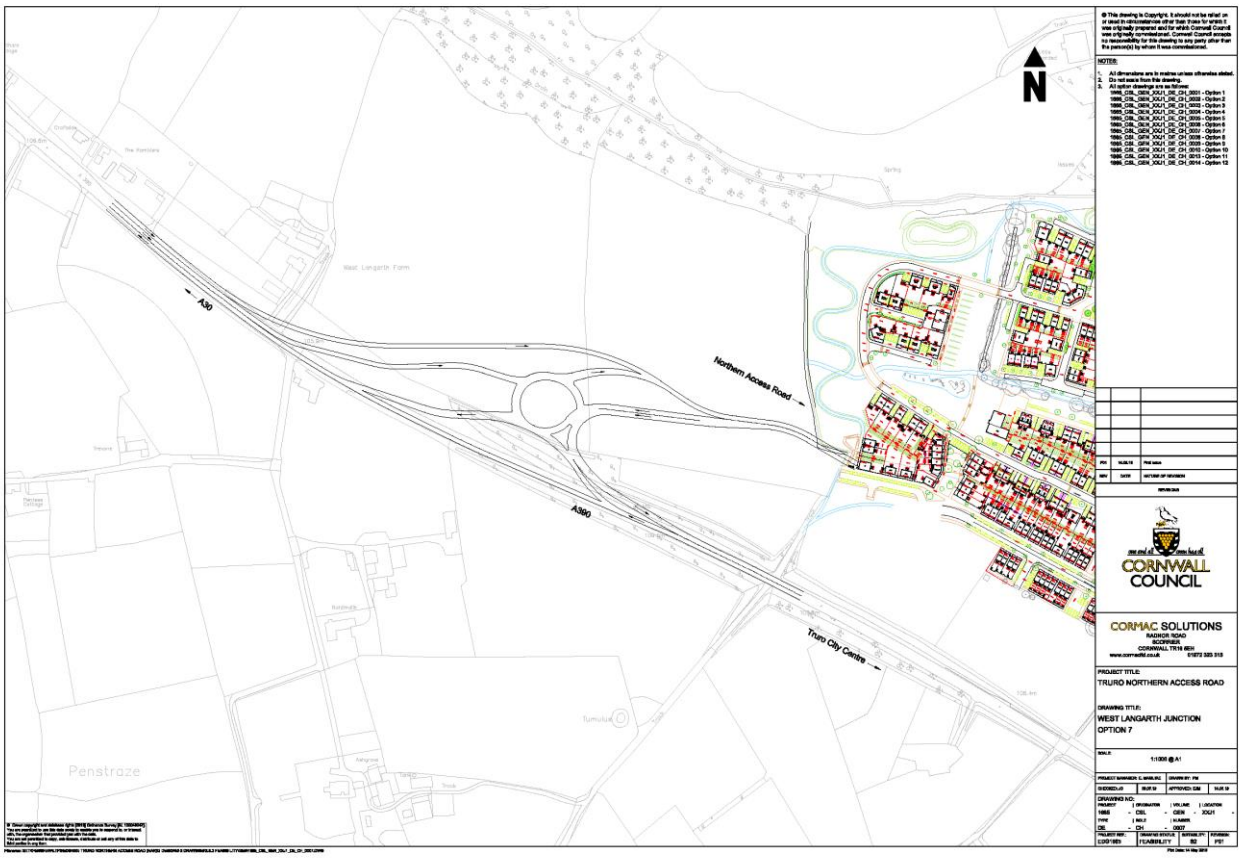

Figure 7.7 West Langarth Junction Option 7

7.10.2 The concept of this option is of a gyratory system with a roundabout positioned midway between West Langarth Farm and the new development.

7.10.3 There is a single lane priority exit from the eastbound A390 heading east towards the NAR Development. Traffic heading east on the A390 would use the roundabout therefore reducing speeds and encouraging traffic to use the NAR.

7.10.4 Traffic heading west from Truro on the A390 have a dedicated west bound by-pass lane.

7.10.5 This option takes more land from West Langarth Farm frontage and adjoining properties, although this could be adjusted southwards.

7.10.6 The option covers a large footprint of the land between West Langarth Farm and the NAR Development.

7.11 West Langarth Junction Option 8

7.11.1 Option 8 is shown on drawing 1665-CSL-GEN-XXJ1-DE-CH-0008.

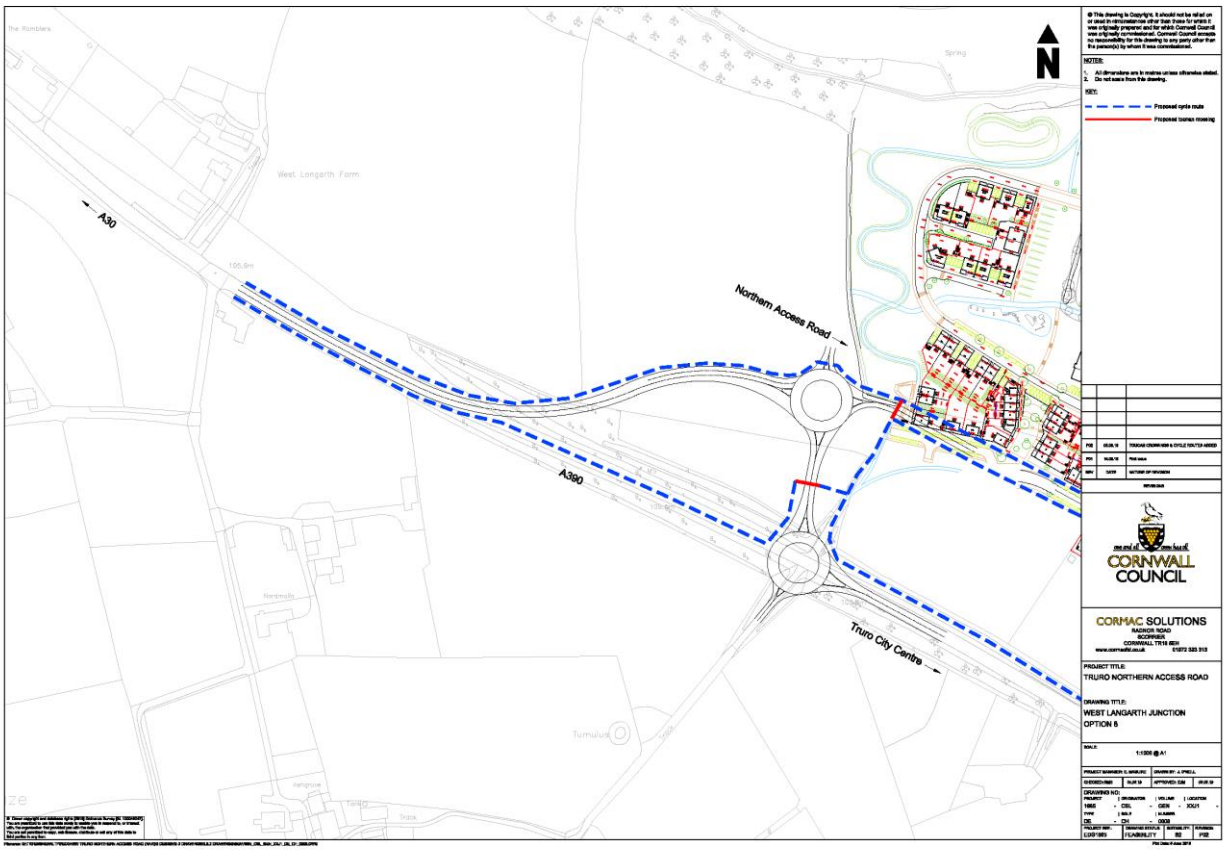

Figure 7.8 West Langarth Junction Option 8

7.11.2 This junction arrangement is similar to Option 5 with a dumb-bell roundabout solution.

7.11.3 The main difference to Option 5 is that this proposal forces eastbound and westbound A390 traffic via the proposed roundabouts and entrance to the Langarth development.

7.12 West Langarth Junction Option 9

7.12.1 Option 9 is shown on drawing 1665-CSL-GEN-XXJ1-DE-CH-0009.

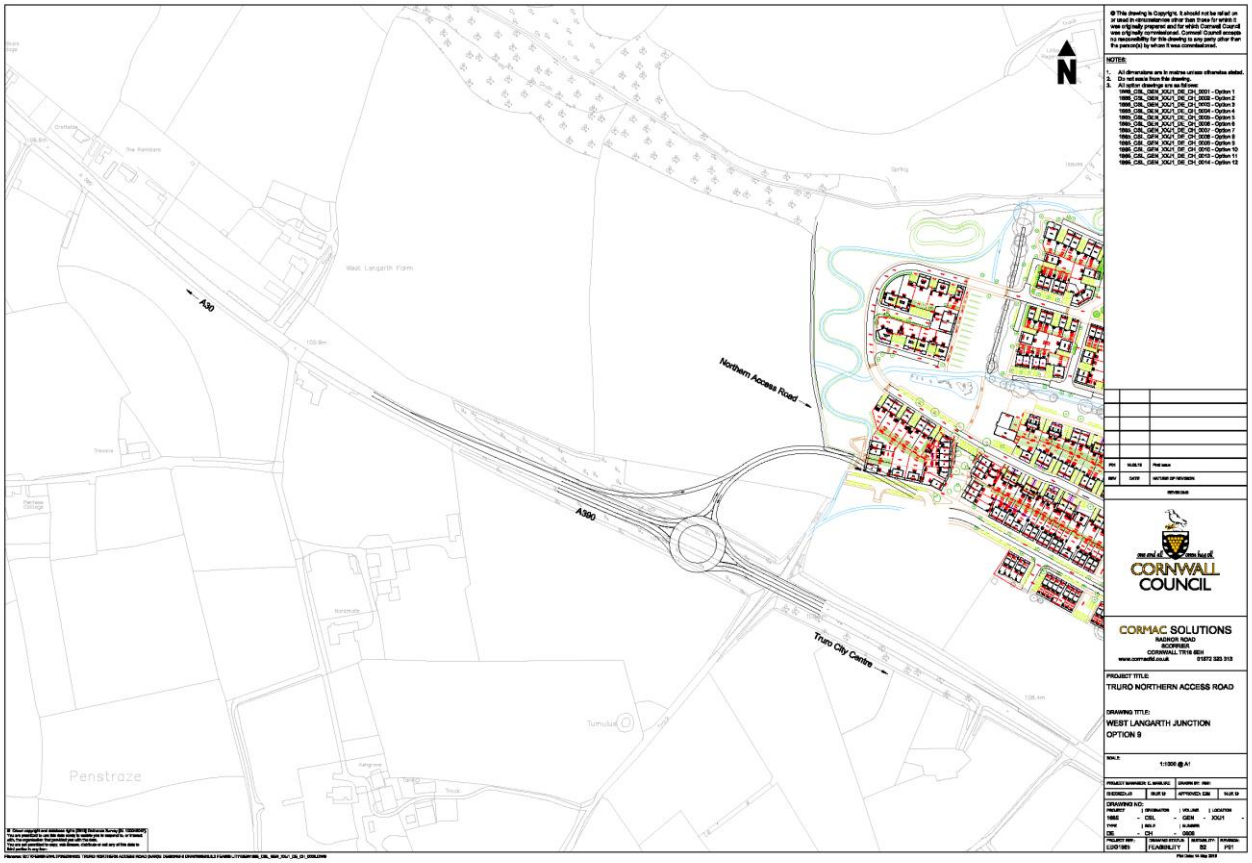

Figure 7.9 West Langarth Junction Option 9

7.12.2 The concept of this option is for a similar layout as Option 6, with a single roundabout situated on the A390 close to the NAR Development, but with two lane entry and exit on the A390 arms, to enhance traffic flows.

7.12.3 The eastbound off-slip from the A390 is much shorter than previous options and is in close proximity to the roundabout, therefore reducing the footprint.

7.12.4 The off-slip link has priority over traffic from the roundabout heading north to the NAR Development.

7.12.5 The single roundabout is positioned within the existing A390 cutting and tighter to the development with a slower entry curve towards the development.

7.12.6 The roundabout gives priority to the NAR traffic re-joining the A390 westbound.

7.13 West Langarth Junction Option 10

7.13.1 Option 10 is shown on drawing 1665-CSL-GEN-XXJ1-DE-CH-0010.

Figure 7.10 West Langarth Junction Option 10

7.13.2 Option 10 is similar to Option 8 with a dumb-bell roundabout solution but maintains eastbound and westbound traffic on the A390. Access to the NAR is via an eastbound off-slip leading to the northern roundabout and entrance to Langarth.

7.13.3 As part of this Option, the southern roundabout provides a westbound by-pass lane for A390 traffic.

7.14 West Langarth Junction Option 11

7.14.1 Option 11 is shown on drawing 1665-CSL-GEN-XXJ1-DE-CH-0013.

Figure 7.11 West Langarth Junction Option 11

7.14.2 Option 11 shows a major/minor priority junction arrangement on the A390 and at the access to the Langarth development.

7.14.3 This junction arrangement was submitted in November 2018 as part of the reserved matters planning application for the Phase 1 and 2 Langarth site, reference PA18/10902. The planning application is currently under determination.

7.15 West Langarth Junction Option 12

7.15.1 Option 12 is shown on drawing 1665-CSL-GEN-XXJ1-DE-CH-0014.

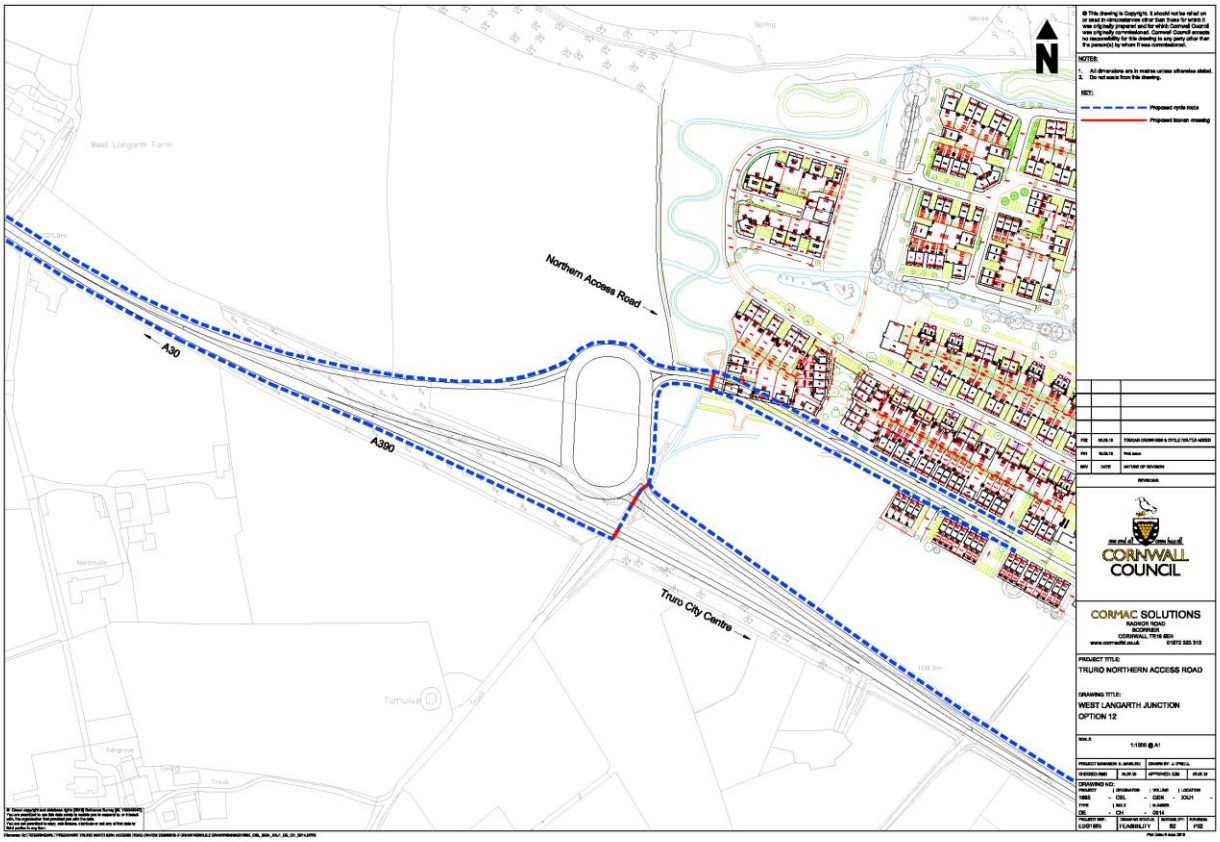

Figure 7.12 West Langarth Junction Option 12

7.15.2 The concept of this option is for a gyratory located in close proximity to the entry to the Langarth development.

7.15.3 This option forces eastbound A390 traffic to negotiate the junction but provides a westbound by-pass lane.

7.15.4 Option 12 requires more land-take compared with traditional roundabout solutions.

7.16 West Langarth Junction Option 13

7.16.1 Option 13 is shown on drawing 1665-CSL-GEN-XXJ1-DE-CH-0022.

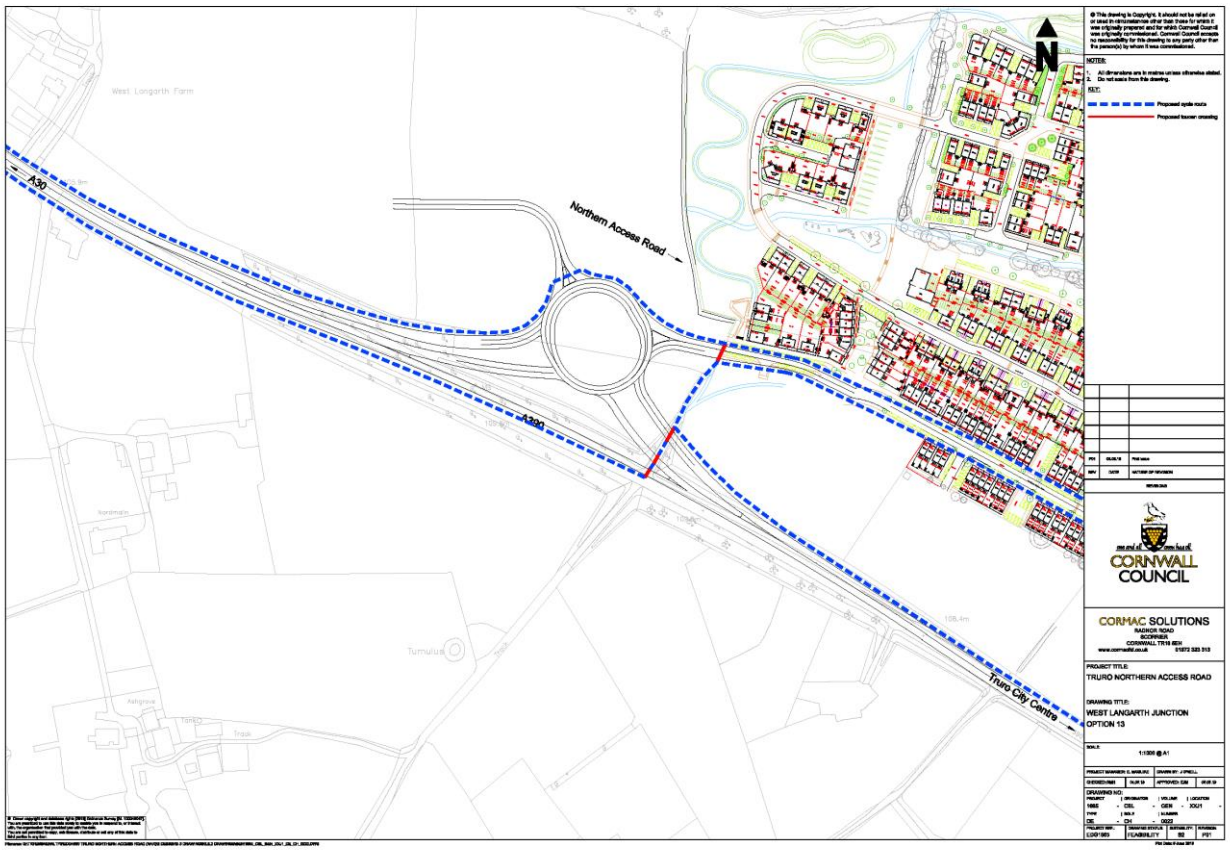

Figure 7.13 West Langarth Junction Option 13

7.16.2 Option 13 is similar to Option 12 but provides a more compact circulatory layout.

7.16.3 Eastbound traffic on the A390 is forced to negotiate the circulatory, with a by-pass lane provided for westbound traffic.

7.17 West Langarth Junction Option 14

7.17.1 Option 14 is shown on drawing 1665-CSL-GEN-XXJ1-DE-CH-0023.

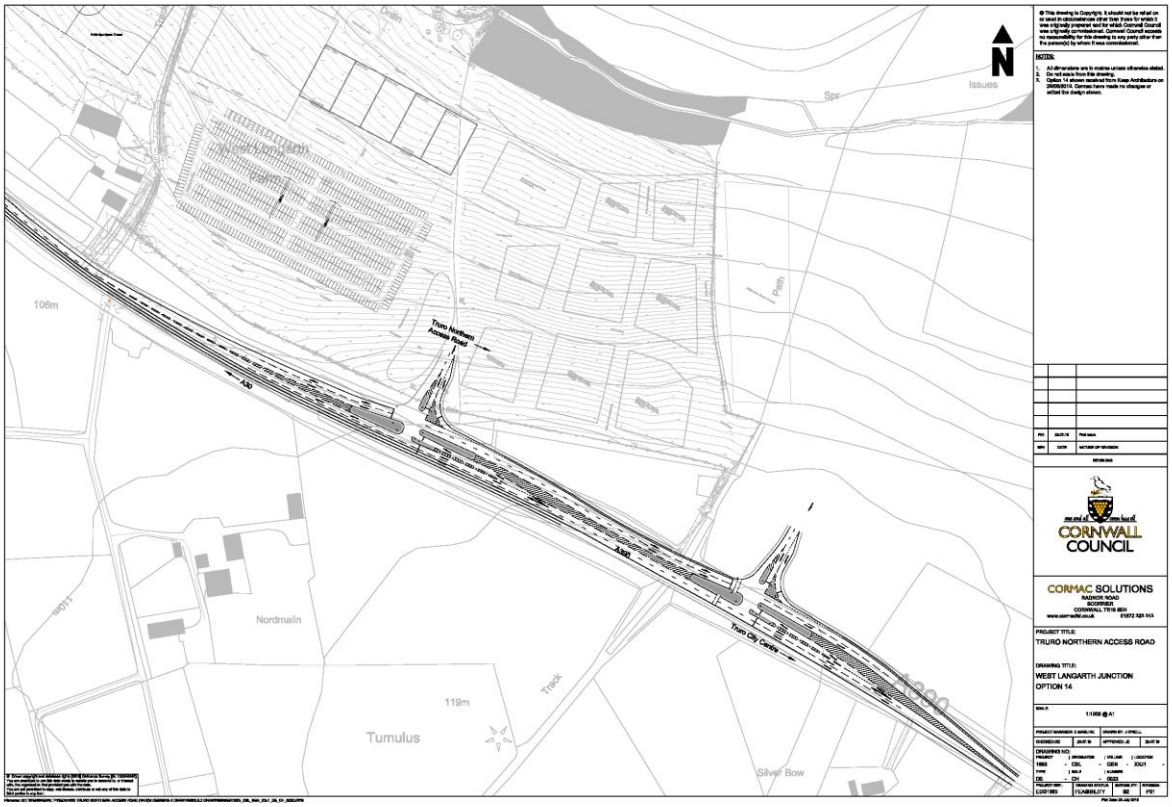

Figure 7.14 West Langarth Junction Option 14

7.17.2 Option 14 shows a priority major/minor junction on the A390 at the location of the proposed West Langarth development. Option 14 shows Option 11 located on the A390 to the southeast.

7.17.3 Outline planning consent was granted for the West Langarth development in 2016, planning reference PA14/08092.

7.18 West Langarth Junction Option 15

7.18.1 Option 15 is shown on drawing 1665-CSL-GEN-XXJ1-DE-CH-0024.

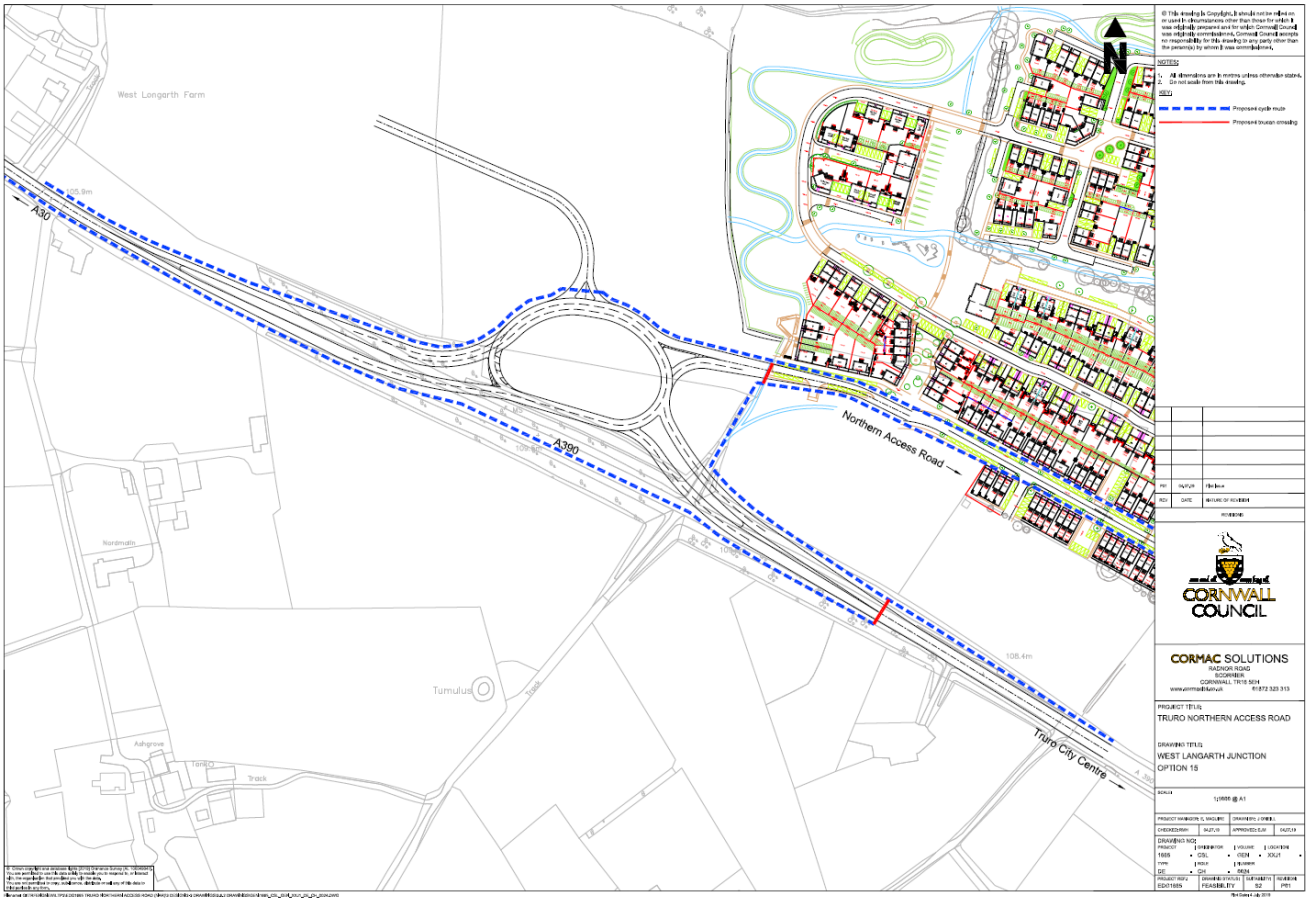

Figure 7.15 West Langarth Junction Option 15

7.18.2 The concept of this option is similar to option 13 but with a more elongated profile and re-orientated as per option 1.

7.18.3 Option 15 forces all eastbound and westbound A390 traffic to negotiate the circulatory.

7.19 West Langarth Junction Option 16

7.19.1 Option 16 is shown on drawing 1665-CSL-GEN-XXJ1-DE-CH-0025.

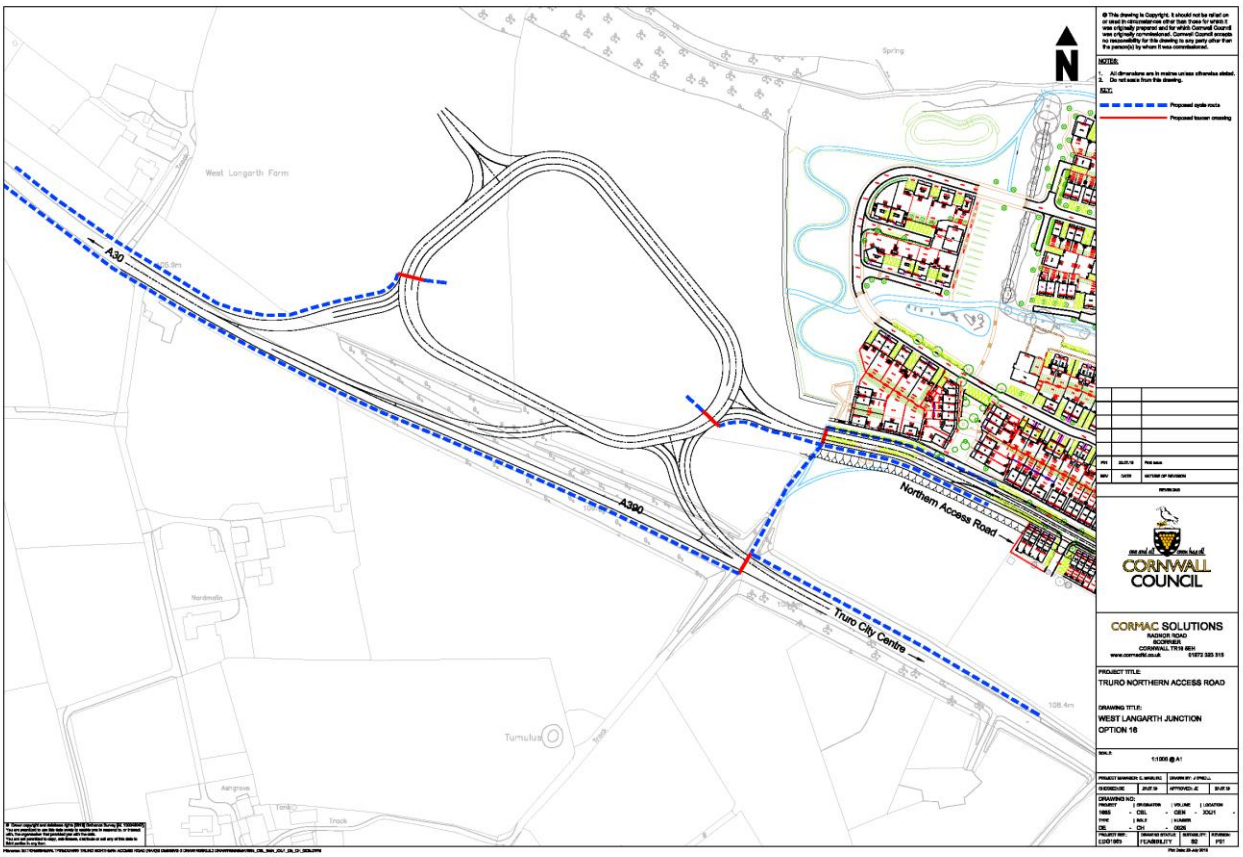

Figure 7.16 West Langarth Junction Option 16

7.19.2 The concept of this option is to provide a large gyratory, the centre of which could be utilised for development.

7.19.3 This option forces eastbound A390 traffic to negotiate the gyratory and provides a by-pass lane for westbound A390 traffic.

7.19.4 This option requires more space than any of the other options.

8 WEST LANGARTH OPTIONS ASSESSMENT

8.1 Assessment Framework.

8.1.1 A two-stage appraisal approach for assessing the preferred West Langarth junction has been agreed. The assessment team is made up of key members of the overall project team. These members represent the following areas:

- Cornwall Council asset maintenance
- Cornwall Council client
- Design team (Cormac)
- Construction team (Cormac)
- Environment (AECOM)

8.1.2 The first stage of the option assessment was undertaken at a workshop on 30 May 2019 where junction options 1-14 were presented and judged against the following criteria:

- Is the option appropriate for the proposed traffic flows? (E.g. based on Fig 2/2 of TD 42/95)
- Does the option appear to be feasible in construction terms?
- Does the option appear to be deliverable for a comparable cost (or less) than the particular junction arrangement submitted as part of the Business Case?
- Does the junction appear to be acceptable in environmental terms?
- Is the junction considered suitable on safety grounds given the context of the design flow and speed?
- Does the junction allow delivery of adjacent schemes? (CSI, Boulevard, Private Development, Development south of A390)
- Does it meet the design brief/principle aims of the project?

8.1.3 Each junction was marked against each of the seven questions above based on a basic scoring process of; Yes, Maybe or No.

8.1.4 Any junction option not scoring a Yes or Maybe for any of the criteria did not proceed further than first stage assessment.

8.1.5 Those selected proceed to the next stage of assessment; stage 2. Stage 2 assessment will be carried out based upon the following four criteria:

8.1.6 Environment

- Landscape and visual impact

- Ecology
- Historic environment
- Noise, air quality and greenhouse gases

8.1.7 Impact on Society

- Non-Motorised Users
- Connectivity
- Journey Quality
- Severance

8.1.8 Engineering/Technical

- Capacity/Impact on journey time

8.1.9 Buildability

- Judgement of disruption during construction
- Bulk earthworks, quantities for total cut + total fill
- Need for special structures
- Statutory undertaker's equipment diversions required
- Use of existing geometry or road corridor for side road diversions
- Inclusion of departures from standard for selected design speed
- Land take

8.2 Stage One Outcome(s)

8.2.1 Results of the assessment are shown in appendix A and summarised below in table 8.1.

Junction Option	Stage One Assessment	Comments
1	Pass	Proceed to stage 2 assessment
2	Fail	Junction option does not provide a gateway feature into Truro
3	Fail	Junction option not suitable in terms of engineering and traffic capacity in line with standards
4	Fail	Junction option not suitable in terms of engineering and traffic capacity in line with standards
5	Fail	Junction option does not provide a gateway feature into Truro
6	Fail	Junction option does not provide a gateway feature into Truro
7	Fail	Option provides a significantly higher cost solution than the option submitted as part of the HIF bid
8	Pass	Proceed to stage 2 assessment
9	Fail	Junction option does not provide a gateway feature into Truro
10	Fail	Junction option does not provide a gateway feature into Truro
11	Fail	Junction option does not provide a gateway feature into Truro

12	Pass	Proceed to stage 2 assessment
13	Pass	Proceed to stage 2 assessment
14	Fail	Junction option does not provide a gateway feature into Truro
15	N/A	Option developed after stage 1 assessment- to be assessed as part of stage 2
16	N/A	Option developed after stage 1 assessment- to be assessed as part of stage 2

` Table 8.1 Stage One Assessment

8.2.2 Options 1, 8, 12, 13, 15 and 16 were initially proposed to be taken forward for further assessment.

8.2.3 Following a meeting held with Cornwall Council, Cormac, AHR, the master-planners for the Langarth site and Andy Cameron a streetscape consultant, on 16 July 2019 general discussion took place on the merits of the options in para 8.2.2.

8.2.4 Discussion featured on an 'Organic' v 'Formal' design of the roundabout - an example of an organic, rural fringe roundabout, being the A591 Kendal (Cumbria) roundabout seen in figure 8.1 below.

Figure 8.1 A591 Kendal roundabout

8.2.5 An example of a formal design roundabout, being the A35 Poundbury (Dorset) roundabout seen in figure 8.2 below.

Figure 8.2 A35 Poundbury roundabout

8.2.6 At this meeting Cornwall Council confirmed not to proceed with Stage 2 assessments of junction options 1, 12, 13 and 16 leaving Options 8 and 15 remaining.

8.2.7 In respect of Option 8, the north-south orientation was amended to NW/SE to provide a clearer route for strategic A390 traffic.

8.2.8 The link between the roundabouts was widened to provide mini dual carriageway with a wide centre reserve to ease pedestrian/cycle crossing at this location.

8.2.9 In respect of Option 15 it was recommended that the roundabout be reviewed with the aspiration to:

- Reduce speed to 40mph west of the roundabout.
- Minimise street furniture (e.g. chevrons) to reduce sign clutter.
- Consider views from the roundabout to the NAR, especially from give-way lines, the circulatory of the roundabout and roundabout exit points.
- Consider the addition of planting to limit views along abandoned A390 section (utilities permitting).

8.2.10 **Option 15 is the preferred option.**

APPENDICES

Appendix A Options Appraisal Results from the first stage of the Options assessment undertaken at a workshop on 30 May 2019 where junction options 1-14 were presented and judged.

Stage 1 - Initial Sift

10 Options contain at least one 'No' answer and will NOT be carried forward to Stage 2 Assessment.

Sift Criteria	Option 1 Link to Plan 7/7 answered	Option 2 Link to Plan 7/7 answered	Option 3 Link to Plan 1/7 answered	Option 4 Link to Plan 1/7 answered	Option 5 Link to Plan 7/7 answered	Option 6 Link to Plan 7/7 answered	Option 7 Link to Plan 3/7 answered	Option 8 Link to Plan 7/7 answered	Option 9 Link to Plan 7/7 answered	Option 10 Link to Plan 7/7 answered	Option 11 Link to Plan 7/7 answered	Option 12 Link to Plan 7/7 answered	Option 13 Link to Plan 7/7 answered	Option 14 Link to Plan 7/7 answered	Comments
Is the option appropriate for the proposed traffic flows? (e.g. based on Fig 2/2 of TD 42/95)	Maybe	Maybe	No	No	Maybe	Maybe	Maybe	Maybe	Maybe	Maybe	Maybe	Maybe	Maybe	Maybe	
Does the option appear to be feasible in construction terms?	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Does the option appear to be deliverable for a comparable cost (or less) than the particular junction arrangement submitted as part of the Business Case.	Yes	Yes			Maybe	Maybe	No	Maybe	Yes	Maybe	Yes	Maybe	Maybe	Yes	
Does the junction appear to be acceptable in environmental terms	Yes	Yes			Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Is the junction considered suitable on safety grounds given the context of the design flow and speed?	Maybe	Yes			Yes	Maybe		Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Does the junction allow delivery of adjacent schemes? (CSI, Boulevard, Private Development, Development sounth of A390)	Maybe	Yes			Yes	Maybe		Yes	Yes	Maybe	Maybe	Maybe	Maybe	Maybe	
Does it meet the design brief/principle aims of the project?	Yes	No			No	No		Yes	No	No	No	Yes	Maybe	No	

Appendix B Comparison table of main alignment Options 8-13 used to select a preferred alignment to the immediate east of the Park and Ride

NAR - Routes North of West Country Land - Comparison Table

29-Oct-19

Main Alignment Design Option	Drawing Reference	Description	Approximate Earthworks Cost	CC Comments
8	1665_CSL_HML_XXMZ_DR_CH_0031	Option 8 is the current preferred alignment. It runs immediately adjacent to the eastern side of the park and ride development. This option follows the existing site contours through West Country Land and to the south of Willow Green Farm.	£4m- based on approximately 60,000m³ cut and 30,000m³ fill	Base comparison, through WCL
9	1665_CSL_HML_XXMZ_DR_CH_0032	Option 9 provides an alignment to the north of the proposed West Country Land development and diverts to the south of Willow Green Farm. This alignment is located to the east of the exisiting 132kV pylon adjacent to the proposed park and ride development. This route crosses, rather than follows the contours north of Willow Green Cottage, creating a significant embankment of 8m adjacent to the property and on top of existing highway network. The alignment then follows the contours to the south of Willow Green Farm.	£6m- based on 60,000m³ cut and 90,000m³ fill	+£2m earthworks Requires side road diversion due to highway severance. Passes south of WG Farm
10	1665_CSL_HML_XXMZ_DR_CH_0033	Option 10 provides an alignment further to the north of the proposed West Country land development compared with Option 9. It follows the contours further to the north, creating less impact on the existing highway network. This route crosses the contours to the north of Willow Green Farm, creating a cutting of approximately 7m depth. The route crosses the existing wildlife corridor to the east of Willow Green Farm at its narrowest point (based on OS) before crossing existing contours again to the north of Maiden Green.	£10m- based on 110,000m³ cut and 150,000m³ fill	+£6m earthworks Requires side road treatment Passes north of WG Farm
11	1665_CSL_HML_XXMZ_DR_CH_0034	Option 11 provides an alignment to the north of the proposed West Country land development but located further to the south than Option 10. This route follows the contours a little more closely (compared with Option 10) and passes immediately to the east of Willow Green Farm. The route passes through the two wetland areas to the east of Willow Green Farm (as shown on OS) before crossing the contours in an easterly direction to the north of Maiden Green and into the Innovation Centre.	£8.5m- based on 130,000m³ cut and 60,000m³ fill	+£4.5m earthworks Side and access roads to address Passes north of WG Farm
12	1665_CSL_HML_XXMZ_DR_CH_0035	Option 12 follows the same approximate horizontal and vertical alignment as Option 11 to the most northern point of the proposed West Country Land development. The route then crosses the existing contours as it runs from north to south between Willow Green Cottage and Willow Green Farm, creating a cutting of approximately 12m in depth. The route then deviates to the north and between the two wetland areas located to the east of Willow Green Farm (as shown on OS) before crossing the contours in an easterly direction to the north of Maiden Green and into the Innovation Centre.	£15m- based on 260,000m³ cut and 60,000m³ fill	+£11m earthworks, 200,000m³ surplus Major cuttings, sterilises dev land Passes south of WG Farm Avoids side road diversion