highways england

European Union
European Regional Development Fund

A30 Chiverton to Carland Cross Improvement Scheme

Scheme Assessment Report

Contents

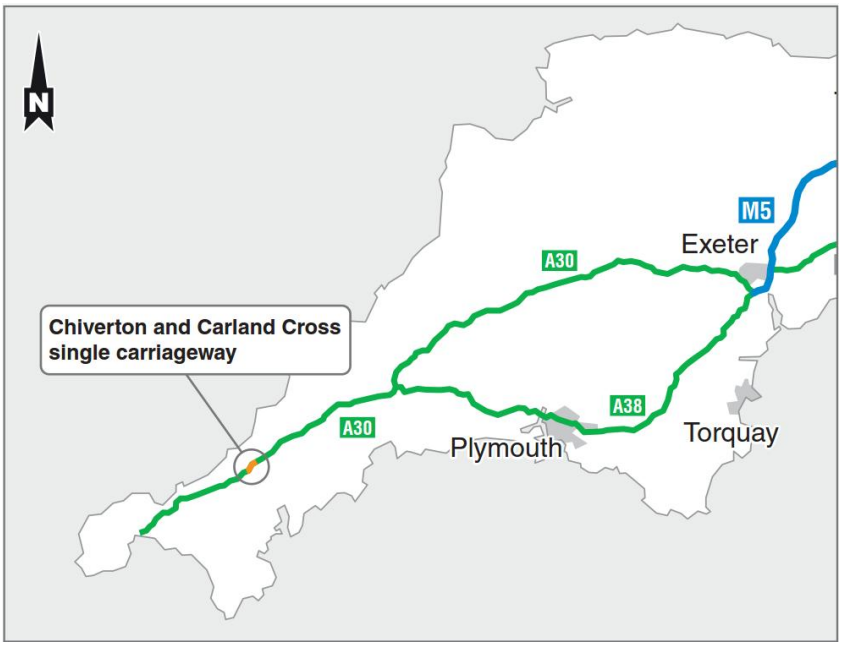
1 Introduction

1.1 Purpose of the Stage 2 study

The section of the A30 in Cornwall between Chiverton Cross and Carland Cross, north of Truro, is currently a single carriageway route. Once the single carriageway section of the A30 between Temple and Higher Carblake near Bodmin is completed in 2017, the A30 Chiverton to Carland Cross will remain as the only single carriageway section of the A30 route between the M5 at Exeter and Camborne.

Due to the low standard of the route, this section of the A30 experiences congestion and delays throughout the year, with poor journey time reliability. These problems are exacerbated in summer months, when traffic flows increase due to tourist traffic. The route is in need of improvement to meet Highways England's objectives of maintaining the smooth flow of traffic, making the network safer and supporting economic growth. The desire for improvements to this route is strongly supported by local and regional strategies from Cornwall Council, the Cornwall and Isles of Scilly Local Enterprise Partnership, businesses and local stakeholders. The scheme location is shown in Figure 1-1 below."

Figure 1-1: Scheme location



1.2 Purpose of this report

This Scheme Assessment Report summarises the development and assessment of the options, the public consultation and the recommendation of a preferred route. It is intended to support the preferred route announcement.

The structure of this report is:

- Section 2 describes the current situation in terms of:
  - existing policies for transport;
  - present and future travel demand; and
  - planning and other constraints within the study area.

It identifies the problems with the existing A30 and describes the objectives for the improvement scheme.
- Section 3 describes the scheme taken to public consultation and its engineering and transport assessment.
- Section 4 summarises the assessment of operation and maintenance of the scheme taken to public consultation.
- Section 5 summarises the environmental assessment and environmental design of the scheme taken to public consultation.
- Section 6 summarises the public consultation.
- Section 7 describes the design refinements and the assessment of alternatives following public consultation.
- Section 8 makes conclusions and recommendations for the preferred route.
- Section 9 contains the Appraisal Summary Table for the preferred route.

1.3 Scheme history

1.3.1 Background

Cornwall Council and Highways England conducted extensive studies for the improvement of the A30 between Chiverton Cross and Carland Cross in the past, as summarised in Table 1-1 below.

Table 1-1: Scheme history

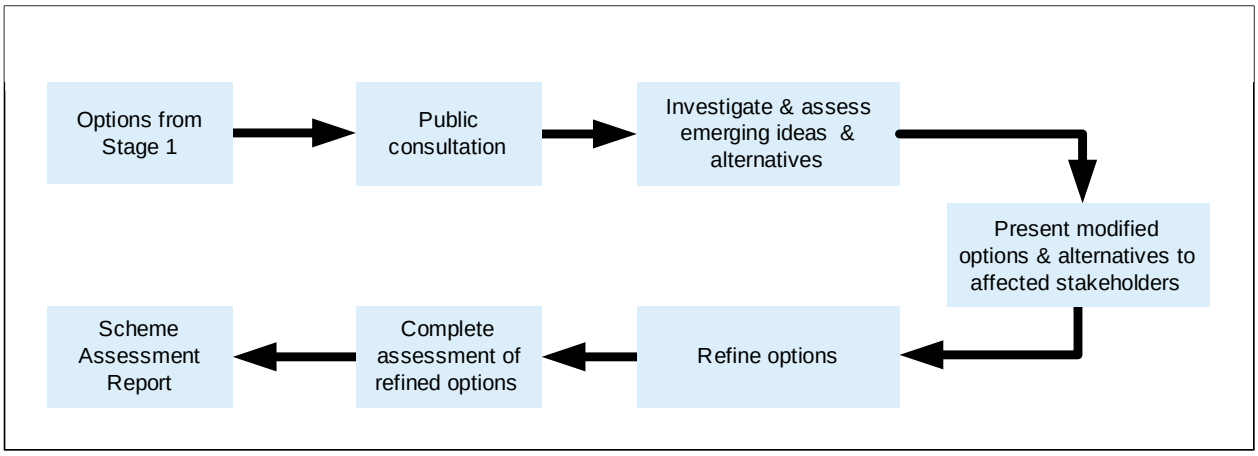
1980-1990s	Cornwall County Council (now Cornwall Council) considered improvements between Carland Cross and Chiverton Cross in two separate sections: · Carland Cross to Zelah was included in the Government's white paper Roads for Prosperity in 1989, but not implemented · Zelah to Chiverton Cross roundabout The Zelah bypass was constructed in 1991 to alleviate the narrow roads through the village of Zelah from the increasing volumes of traffic along the A30.
2002-2009	In 2002 the Highways Agency (now Highways England) reviewed options. A single option was presented to a public consultation in May 2004, following which the Secretary of State for Transport made a preferred route announcement in March 2005. However, the South West Regional Assembly (SWRA) recommended that the scheme should be delivered in the longer-term. In July 2006 the Secretary of State for Transport accepted SWRA's advice and indicated that funding was unlikely before 2016 at the earliest.
2006-2008	Following SWRA's assessment that improving the full length to dual carriageway standard was not a priority, the Highways Agency commissioned a safety improvement scheme in December 2006, which could be delivered within the ten year plan. An initial Scheme Assessment Report was produced which: · described the options considered · described the impact of those options in terms of traffic, safety, economic and environmental impact · recommended a strategy for improving this section of A30 prior to 2016
2013-2014	Highways England developed a route strategy for the A30, which led to the scheme being included in DfT's Road Investment Strategy (RIS) for 2015-2020, published in December 2014.
2015-2017	Subsequent to the RIS publication, Highways England has undertaken: · Project Control Framework (PCF) Stage 1, to identify feasible options · PCF Stage 2 to further investigate those options and carry out a public consultation

1.3.2 Stage 2

During Stage 2, the project team undertook the following activities:

- Traffic modelling and economic appraisal for options
- Engineering design for options
- Environmental surveys
- Environmental assessment and mitigation design for options
- Stakeholder engagement
- Public consultation
- Design and assessment of alternatives emerging from public consultation
- Supplementary consultation on alternatives
- Option refinement
- Assessment and reporting

Figure 1-2: Stage 2 key activities



1.4 Technical reports

This Scheme Assessment Report is based on the various multidisciplinary studies and reports undertaken by the project team during Project Control Framework Stages 1 and 2 between 2015 and 2017.

2 The Current Situation

2.1 Identified problems

2.1.1 Local economic growth and social / community regeneration

Current congestion on the existing A30 between Chiverton and Carland Cross forms a bottleneck on the trunk road network in Cornwall, preventing reliable east – west journeys and stifling growth in Cornwall. If not improved, the existing infrastructure will continue to contribute to growing congestion, poor reliability and efficiency, and poor journey times – all of which fail to meet highways England's business strategy and the government's strategic vision outlined in the Road Investment Strategy.

2.1.2 Route performance

Key issues

The issues identified on the current A30 between Chiverton and Carland Cross are:

- sections of narrow carriageways
- unsuitable bends and gradients for high speed traffic
- locations with poor forward visibility
- slow moving agricultural vehicles
- limited opportunities for overtaking
- increasing traffic levels outgrowing the capacity of the existing road
- multiple minor roads and junctions where traffic enters, exits or crosses the A30
- numerous properties have direct access to the A30

The consequences of these issues are:

- congestion and longer journey times, particularly during peak times
- unreliable journey times
- queuing at the junctions, due to the interaction between local and strategic traffic, particularly at peak times
- queuing when incidents occur with knock on effects to surrounding local routes.

A30 traffic flows

Throughout the year, congestion and delay commonly occur at junctions on the A30 between Chiverton and Carland Cross during peak periods. Moreover, peak period traffic flows are close to exceeding capacity for a single carriageway during neutral months. This leads to poor journey time reliability and congestion. The higher levels of traffic during the summer increases the severity and frequency of these problems.

Moreover, the A30 is a key component in many local journeys, including those travelling between the north and south parts of Cornwall. At Chiverton Cross and Carland Cross, there are major junctions serving the city of Truro to the south as well the north coast towns of Newquay, St. Agnes and Perranporth. There are three significant junctions at Chybucca, Zelah and Boxheater along the existing route as well as 10 minor junctions linking to communities each side of the A30 via a network of local roads and lanes.

Table 2-1 outlines the existing traffic conditions on the A30.

Table 2-1 A30 Average annual daily traffic flows, peak hours and 12 hour flows

Site	Average annual daily traffic (one-way), vehicles	Hourly Capacity, vehicles	Morning peak (08:00 – 09:00), vehicles	Evening peak (17:00 – 18:00), vehicles	12 hour (07:00 – 19:00), vehicles
	East / Westbound	Per Direction	East / Westbound	East / Westbound	East / Westbound
East of Carland Cross (dual carriageway)	16,184 / 16,212	1838	1,317 / 1,657	1,697 / 1,375	14,794 / 14,854
Zelah Hill	10,867 / 10,917	1238	963 / 1,098	1,114 / 1,002	10,030 / 10,046
East of Chybucca	9,445 / 9,369	1238	836 / 909	933 / 844	8,864 / 8,749
Chiverton to Chybucca	10,330 / 9,379	1238	1,196 / 857	1,143 / 1,029	10,029 / 9,106
West of Chiverton (dual carriageway)	16,377 / 17,373	1838	1,585 / 1,536	1,397 / 1,826	15,279 / 15,940

Sources: Hatris, accessed March 2015. Chiverton to Chybucca flows from manual classified counts (March 2014)

Road capacity is the theoretical limit on the average number of vehicles per hour that can travel along a road. For high flows (between capacity and 85% of capacity), the interaction between vehicles becomes significant, leading to a fall in average journey times and greater journey time variability. The capacity of the single carriageway section of the A30 between Chiverton and Carland Cross was calculated as approximately 1,238 vehicles per hour per direction using the methodology set out in the Department for Transport's transport analysis guidance (WebTAG) M3.1 Appendix D[1]; 85% of this capacity is approximately 1,050 vehicles per hour per direction.

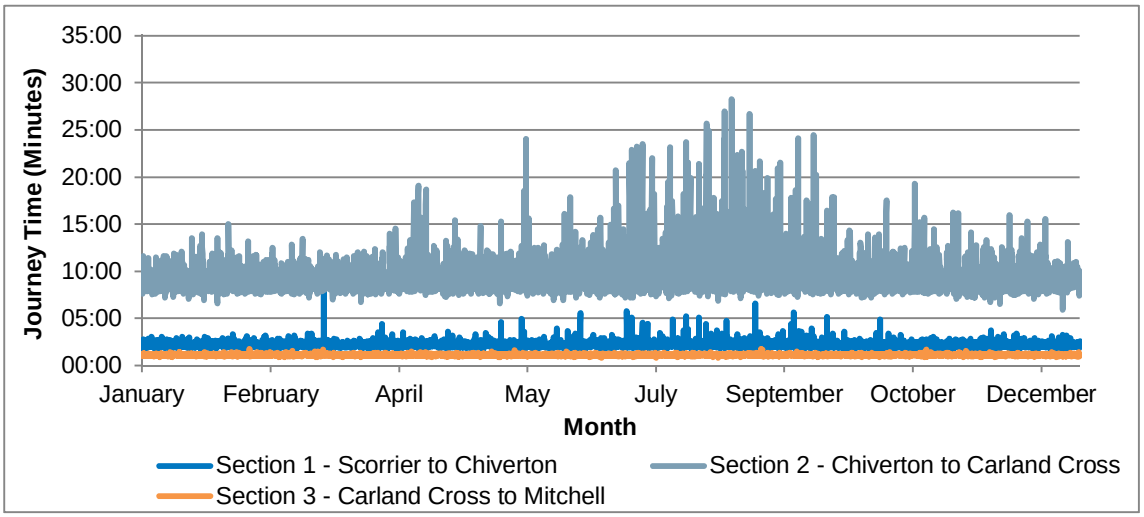
The neutral month peak period flows shown above indicate that current traffic flows exceed 85% of capacity for the single carriageway link around Zelah Hill and between Chiverton Cross and Chybucca during neutral months. This leads to poor journey time reliability and congestion. During the summer, traffic generally increases on the A30 and it is likely that the whole route between Chiverton Cross and Carland Cross would exceed 85% of capacity in this period.

Eastbound journeys

[1] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427124/webtag-tag-unit-m3-1-highway-assignment-modelling.pdf

There is a significant variation of journey times between Chiverton and Carland Cross, particularly over the summer months (July to September), where journey times on the section fluctuate from 11 minutes to 28 minutes. This variation does not occur on the adjacent dual carriageway sections, which experience relatively similar journey times year-round. This is illustrated by Figure 2-1 below.

Figure 2-1 East-bound journey times - Scorrier to Mitchell



Westbound journeys

Figure 2-2 shows journey times fluctuating between 7 and 25 minutes to travel between Chiverton and Carland Cross over the year. Again, there is a peak over the summer months, with the section experiencing longer journey times on average than the rest of the year. Like the eastbound traffic, Sections 1 and 3 experience little variation in their journey times over the year.

Figure 2-2: West-bound journey times - Mitchell to Scorrier

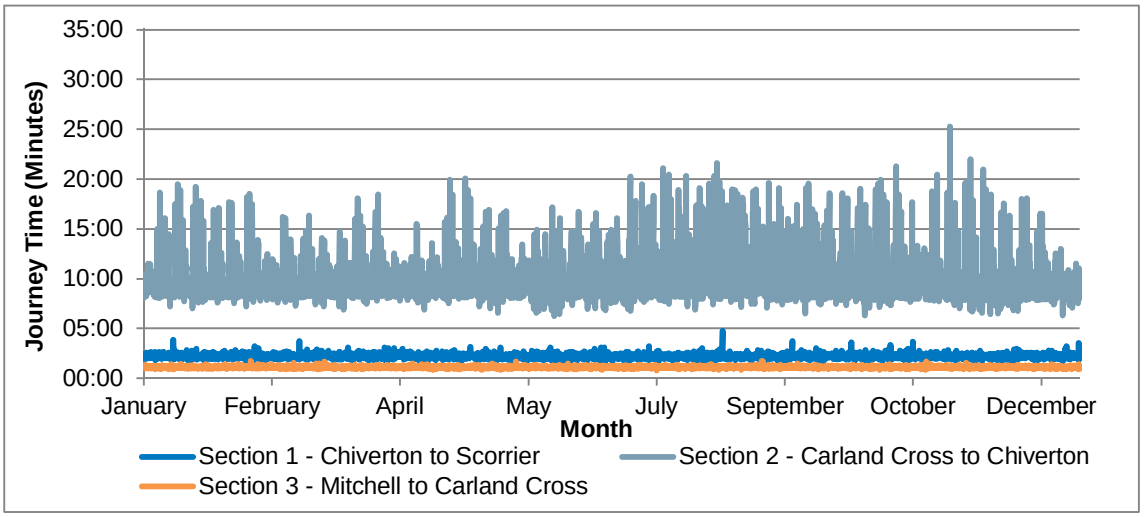


Figure 2-1 and Figure 2-2 clearly show that journey times for the single carriageway section from Chiverton Cross to Carland Cross (Section 2) are significantly more variable and therefore less reliable compared to journey times on the dual carriageway sections (Sections 1 and 3) – regardless of whether the traffic is moving in an easterly or westerly direction.

Significant variation in journey times are observed in Section 2 – between Chiverton Cross and Carland Cross – particularly eastbound during the summer months (July and August). The dual carriageway sections of the A30 have a significantly better level of performance, with journey times generally consistent throughout the year.

The poor reliability along the single carriageway is due to a combination of delays created by the junctions in this section of the road preventing a through flow of vehicles, the alignment of the A30 causing reduced vehicle speeds, and its use by slow moving agricultural vehicles.

SATURN transport modelling software was used to create a representative traffic network to assess the impact of the scheme. The models were calibrated and validated against existing traffic data for the 2015 base year to WebTAG standards. TEMPRO and planning data were used to create future year forecasts for the scheme opening year (2022) and the scheme design year (2037).

Link flows from the traffic modelling for the base year and the forecast year Do Minimum (DM) scenario are presented in Tables 2-2 to 2-4 below. These show that traffic on the A30 will increase and flows are predicted to exceed capacity in the 2037 PM peak period with the 2037 AM and Interpeak periods approaching capacity. These increased flows will worsen the current issues experienced by road users.

Table 2-2: AM Average Peak Period Hour A30 Link Flows in the Vicinity of the Scheme

Site Location	Dir	Link Capacity (Single Carriageway)	2015 BASE	2022 without scheme	2037 without scheme
EB, A30, Between Zelah and Carland Cross Rbt	EB	*1238*	718	950	1024
WB, A30, Between Zelah and Carland Cross Rbt	WB		991	1053	1125
EB, A30, Between Chybucca and Marazanvose	EB		750	919	958
WB, A30, Between Chybucca and Marazanvose	WB		973	1033	1103
EB, A30, Between Chiverton Cross and Chybucca	EB		915	1018	1046
WB, A30, Between Chiverton Cross and Chybucca	WB		839	1071	1200

Table 2-3 – Inter Peak Average Peak Period Hour A30 Link Flows in the Vicinity of the Scheme

Site Location	Dir	Link Capacity (Single Carriageway)	2015 BASE	2022 without scheme	2037 without scheme
EB, A30, Between Zelah and Carland Cross Rbt	EB	*1238*	703	886	1066
WB, A30, Between Zelah and Carland Cross Rbt	WB		681	732	897
EB, A30, Between Chybucca and Marazanvose	EB		697	843	1020
WB, A30, Between Chybucca and Marazanvose	WB		639	712	876
EB, A30, Between Chiverton Cross and Chybucca	EB		710	1039	1209
WB, A30, Between Chiverton Cross and Chybucca	WB		731	936	1156

Table 2-4 : PM Average Peak Period Hour A30 Link Flows in the Vicinity of the Scheme

Site Location	Dir	Link Capacity (Single Carriageway)	2015 BASE	2022 without scheme	2037 without scheme
EB, A30, Between Zelah and Carland Cross Rbt	EB	*1238*	893	1075	1197
WB, A30, Between Zelah and Carland Cross Rbt	WB		761	839	961
EB, A30, Between Chybucca and Marazanvose	EB		855	1018	1140
WB, A30, Between Chybucca and Marazanvose	WB		707	783	900
EB, A30, Between Chiverton Cross and Chybucca	EB		811	1206	1397
WB, A30, Between Chiverton Cross and Chybucca	WB		850	1027	1158

Forecast Journey Times

Table 2-5 shows predicted increases in journey times between Carland and Chiverton Cross without improvement, illustrating that in the future the journey times on the existing A30 will increase by over one minute 35 seconds (eastbound PM peak period) in 2022 and by over three minutes 15 seconds (eastbound AM peak period) by 2037.

Table 2-5 – Journey Times between Carland and Chiverton Cross

Direction	Average Peak Period Hour	Journey Times (mm:ss)		
		2015 BASE	2022 without scheme	2037 without scheme
Westbound	**AM**	12:40	13:25	15:41
	IP	10:55	11:19	12:36
	PM	11:29	12:02	13:07
Eastbound	**AM**	11:33	13:04	14:48
	IP	10:53	12:06	13:36
	PM	11:47	13:22	14:47

Junction Operation

Table 2-6 provides an overview of the operational assessment of the key junctions. This shows that by 2022 these existing junctions would operate over capacity. Without intervention, delays at these junctions will increase.

Table 2-6 Existing Junction Layout Operation

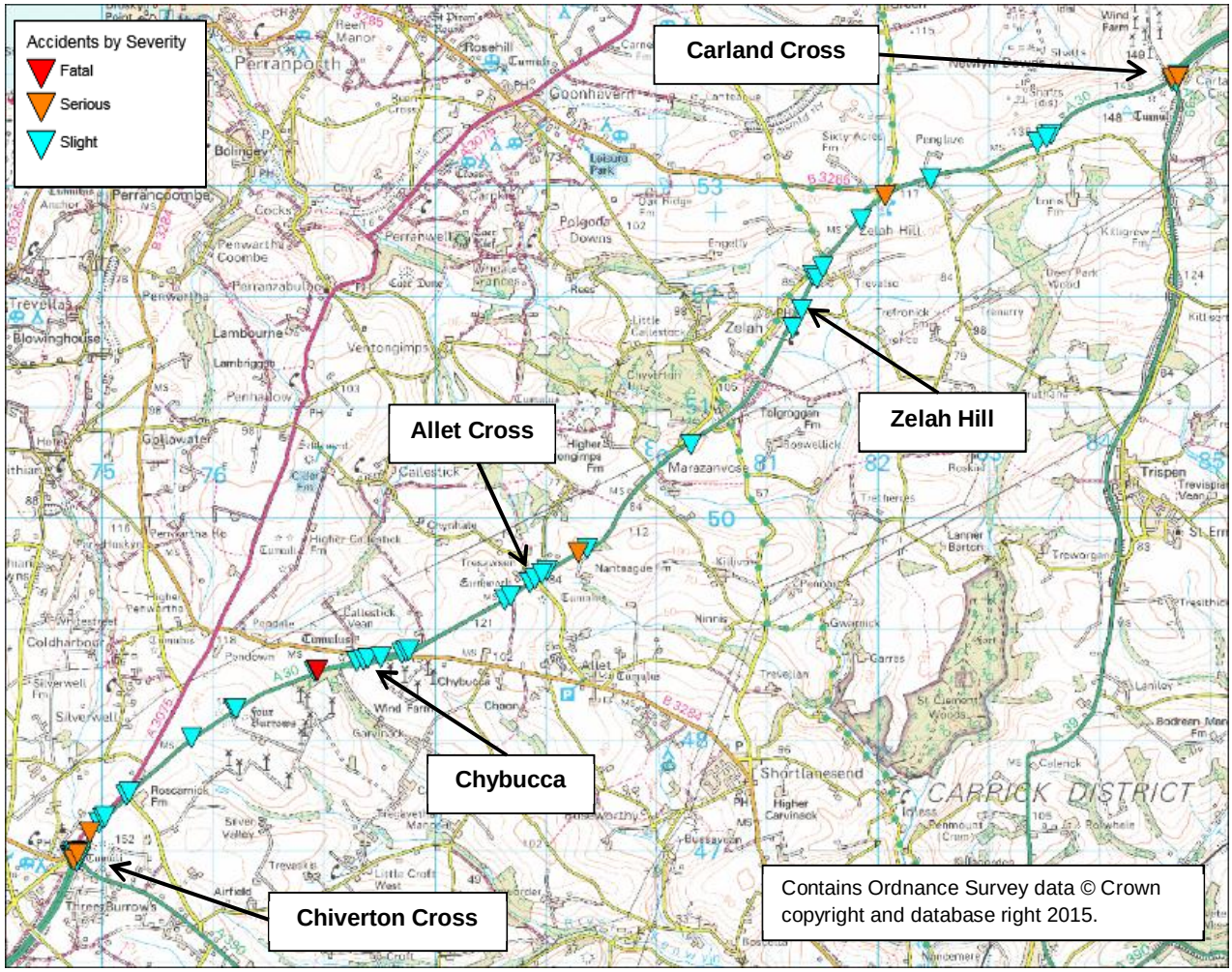
Junction	Type	2022 Results		2037 Results	
		AM	PM	AM	PM
Carland Cross	*Roundabout*	Over Capacity >100% Capacity	Over Capacity >100% Capacity	Over Capacity >100% Capacity	Over Capacity >100% Capacity
Chybucca	*Priority*	Over Capacity >100% Capacity	Over Capacity >100% Capacity	Over Capacity >100% Capacity	Over Capacity >100% Capacity
Chiverton Cross	*Roundabout*	Over Capacity >100% Capacity	Approaching Capacity 85%-100% Capacity	Over Capacity >100% Capacity	Over Capacity >100% Capacity

2.1.3 Safety

Road safety is also a concern. The current poor alignment, limited overtaking opportunities, side road junctions and private accesses have caused numerous accidents on this section of the A30. According to a summary of traffic personal injury accidents between 1 April 2010 and 31 March 2015 there was 1 fatality, 9 serious collisions and 86 slight collisions between Chiverton Cross and Carland Cross.

Accidents were more frequent in the vicinity of Chiverton Cross, Carland Cross, Zelah Hill, Chybucca and Callestick / Allet Cross Junction, shown in Figure 2-3 below.

Figure 2-3: Accident sites on the A30 between Chiverton and Carland Cross



2.1.4 Resilience

The A30 is the most important route serving the County of Cornwall for both long-distance and local road users. It runs from Exeter along the middle of the peninsula to Penzance and is approximately 104 miles in length. Of this, 78 miles is dual carriageway.

The single carriageway A30 between Chiverton and Carland Cross is sensitive to incidents. When they impede or block flow there is no alternative direct route, forcing traffic to queue on the main road or divert to minor roads which are not capable of sustaining substantial traffic flows or movements. This situation is worsened by the at grade junctions, including many minor junctions and direct agricultural and residential accesses; all of which increase the likelihood of incidents.

2.2 Existing conditions

2.2.1 A30 and local road network

Description of the locality

The proposed scheme is located between Chiverton Cross and Carland Cross junctions on the A30 in Cornwall, south-west England. Nearby settlements include Marazanvose, Zelah, St Allen, Allet, Shortlanesend, and Callestick. Zelah was bypassed by re-routing the A30 in 1992.

The area surrounding the existing carriageway is rural agricultural land with renewable energy installations and some disused quarries. The scheme is in the proximity of the Cornwall West Devon Mining Landscape World Heritage Site, Newlyn Down Special Area of Conservation and Site of Special Scientific Interest, Chyverton Park registered park and garden in addition to numerous scheduled and listed heritage features. The closest element of the Cornwall Area of Outstanding Natural Beauty (AONB) is St Agnes, extending along the north Cornish coast from Porthtowan in the west to Perranporth in the east.

Existing highway network

The existing A30 trunk road between the M5 motorway at Exeter and Penzance is predominantly dual carriageway. It serves the towns of Okehampton, Launceston, Bodmin, Camborne, St Austell, Truro and Redruth. The stretch of single carriageway between Temple and Higher Carblake is currently undergoing improvement to two lane all-purpose dual carriageway (D2AP) standard, compatible with Expressway standards.

This section of the existing A30 comprises approximately 7.9 miles of single carriageway linking the existing Chiverton Cross junction at the south-western extent and the existing Carland Cross junction at its north-eastern extent.

At the western extent of the scheme, Chiverton Cross connects the existing A30 trunk road to the A390 from Truro, the A3075 from Newquay and the B3277 from St Agnes. At the eastern extent of the scheme, Carland Cross connects the A39 from Truro to the existing A30 trunk road in addition to the local minor road network. The notable junctions along the scheme are:-

- Chybucca, which connects the B3284 from Truro to the south-east and the B3284 from Perranporth to the west on the north coast.
- Zelah, where the existing A30 connects to the unclassified road between Goonhavern and Shortlanesend by means of a grade separated connector.
- Boxheater, which connects:
    - the A30 to the B3285 from Perranporth and Goonhavern to the west
    - the unclassified road which connects towards St Newlyn East, Cubert and Newquay to the north
    - the unclassified road southward to St. Allen, Trispen and Truro

In addition to the above roads, 10 minor roads connect to the A30 at junctions between Chiverton and Carland Cross. These serve communities each side of the A30 and link into the local road network, providing access to villages and towns to the north and south of the A30. These are predominantly single lane width carriageways with high-sided hedges. There are also numerous individual properties served by direct access to the A30.

Notable structures on the existing A30, which were constructed in the early 1990s as part of the A30 Zelah Bypass scheme, are:

- The Tolgroggan overbridge carries an agricultural access road over the existing A30 trunk road to the south of Zelah village at Tolgroggan Farm. The structure spans a total of 42.5 metres above the rock cutting.
- The Twobarrows underbridge carries the A30 over the class 3 Zelah to Shortlanesend road to the south of Zelah village. The bridge has a clear span of 9.43 metres.
- Two existing culverts below the existing A30 carrying local watercourses to the east of Zelah village.

2.2.2 Environmental status

Air Quality

Current air quality in the vicinity of the scheme is generally good, with the exception of Highertown in the Truro Air Quality Management Area (AQMA) where a maximum concentration of 43.0µg/m3 was modelled in the baseline year. Elsewhere, concentrations are well within the UK Objective values. Some isolated properties experience elevated concentrations (for example 33.1µg/m3 in Zelah) because of their proximity to the roadside, though there are no exceedances outside the Truro AQMA.

Noise

The A30 does not pass through any built up areas although there are several properties fronting onto the carriageway which are affected by noise issues as demonstrated by the designation of a number of Noise Important Areas by Defra.

Cultural Heritage

There are 144 heritage assets within the 1km study area, including;

- 1 World Heritage Site – Gwennap Mining District within the Cornish Mining World Heritage Site;
- 14 Scheduled Monuments;
- 2 Grade II* Listed Buildings;
- 39 Grade II Listed Buildings;
- 1 Registered Park and Garden – Chyverton Park; and
- 87 non-designated assets.

Landscape

Open Access land, designated under the Countryside and Rights of Way Act 2000, lies close to the northern edge of the road between Newlyn Downs and Carland Cross. The area also includes a number

of historic environment designations described above. The landscapes and features protected by statute have a high sensitivity to change.

Nature conservation

There is one European Designated Site under the Habitat Directive within 2km of the existing A30 (Newlyn Downs Special Area of Conservation). There are four nationally designated Sites of Special Scientific Interest (SSSIs) within 2km. There are 15 non-statutory locally- designated Country Wildlife Sites within 2km and four Cornwall Roadside Verge Inventory site.

The Habitat Verification Survey identified signs of, or potential for, the presences of protected and notable species within the study area. Detailed surveys have been undertaken throughout Project Control Framework Stage 2 to inform the assessment and are on-going into Stage 3.

2.3 Planning Factors

Improving the section of the A30 between Carland and Chiverton Cross falls within the criteria set out in the Infrastructure Planning (Highway and Rail) Order 2013. It is therefore considered by government to be of more than just local significance and so is classified as a Nationally Significant Infrastructure Project (NSIP).

The National Policy Statement for National Networks (NPSNN) sets out the government's vision and strategic objective for national networks, including the Strategic Road Network (SRN). It provides planning guidance for promoters of NSIPs on the road network, ensuring that the road schemes delivered under the policy are well designed, and comprise sustainable development; appropriately balancing economic, social and environmental impacts.

The NPSNN is the main basis on which the Secretary of State makes decisions on whether specific schemes should be consented. It also provides guidance on mediating appropriately between national need and local impact when designing the scheme, as well as any other strategic government priorities with which the scheme may spatially conflict. Since the scheme is of national significance, appropriate weight is given by the NPSNN to the public benefits of delivering the scheme, and it recognises that in some cases adverse local impacts may remain (Paragraph 3.4).

The strategic aims of the National Planning Policy Framework (NPPF) and the NPSNN are consistent, but the NPPF does not contain specific policies for NSIPs. These are provided by the NPSNN. The NPPF is however an important and relevant consideration in decisions on NSIPs, but only to the extent relevant to that project (Paragraph 1.18). Both documents seek to achieve sustainable development.

The NPPF provides the framework upon which local authorities prepare Local Plans to bring forward developments. Where a NSIP conflicts with a proposal in a Development Plan, the Secretary of State should take account of the stage of preparation the Development Plan document has reached in deciding what weight to give to the plan for the purposes of determining the planning significance of what is replaced, prevented or precluded. The closer the Development Plan document is to being adopted, the greater the weight which can be attached to the impact of the proposal.

In determining the application, the Secretary of State will balance the impacts and benefits of the scheme, taking into account compliance with national and local policies, and the recommendation of the Examining Authority.

Due to the characteristics of the scheme, being located in the open countryside on a visible ridgeline, along a route in which there are scheduled monuments (tumuli), and near to ecologically sensitive areas, the primary environmental impacts informing the development of the final alignment and design are ecology, the historic environment and landscape. How these impacts are considered in relation to the overall planning balance of delivering the broader public interests of the scheme is set out in Section 5 of the NPSNN, and this formed a framework to inform the design workshops throughout Project Control Framework Stage 2.

The above considerations are not exhaustive and a detailed assessment of the extent to which the scheme has been developed to be in accordance with policy is within the Planning Statement.

2.4 Scheme objectives

The Client Scheme Requirements, contain Transport Objectives, which were developed from consideration of the national objectives of Department for Transport (DfT) and Highways England, Cornwall Council's transport objectives and the constraints on the A30 summarised in sections 2.1 and 2.2 above. The transport objectives are:

- to contribute to regeneration and sustainable economic growth
    - to support employment & residential development opportunities
- to improve the safety, operation & efficiency of the transport network
- to improve network reliability and reduce journey times
    - to deliver capacity enhancements to the Strategic Road Network
- to support the use of sustainable modes of transport
- to deliver better environmental outcomes
- to improve local and strategic connectivity

The Client Scheme Requirements also include organisational objectives that serve the purpose of ensuring that customers and communities are fully considered throughout the design and delivery stages of the scheme. Specifically, this should include:

- considering traffic delay and the effect on the customer impact Key Performance Indicator (KPI) during construction
- ensuring safe future maintenance through dialogue with Operations during the design phase
- ensuring a minimum 5 year maintenance free period after construction by dealing with existing maintenance problems during construction
- the handover of all asset data within a reasonable timescale following to maintenance

3 The alternative schemes

3.1 The options

3.1.1 Project Control Framework Stage 1 options

Background

In Stage 1, the project team identified two options. The first option, option 1M , is known as the on-line option because it is aligned close to the existing road corridor and re-used the corridor occupied by the existing Zelah Bypass. However, for most of its length, it is actually off-line to achieve the geometric standard of a 70mph dual carriageway. The second option (6A) was developed to minimise impact on the existing A30 to maintain this as a continuous local route.

Option 1M was based on the 2005 preferred route and with modifications to reflect current issues and address concerns raised in the previous public engagement. The key changes considered were:

- Local development changes since 2005 – such as new wind and solar farms which were constructed along the A30 and add physical constraints.
- The construction difficulties associated with the previously proposed location of the Chiverton grade separated junction. In its 2005 location, on the site of the existing roundabout, construction would have been difficult whilst managing interfaces with existing traffic flows. The new junction would also have adversely affected properties and businesses close to the new junction. Relocating to the north-east of the existing roundabout avoids the constraints and allows for provision of a junction that can accommodate future traffic flows.
- Difficulties incorporating Zelah bypass into the new dual carriageway. The use of the existing bypass would have required extensive traffic management measures to convert the single carriageway to dual carriageway (as was experienced at A30 Temple to Higher Carblake). In addition, departures from standard, where the proposed design does not comply with design standards, such as a reduced width of structure free space under the accommodation bridge, would be required to make use of the existing Tolgroggan Accommodation Bridge. These departures may prove to be unacceptable for an Expressway and therefore, as an alternative, the bridge would be demolished and replaced.
- The removal of intermediate junctions in accordance with emerging Expressway standards. Option 1M had incorporated the Zelah bypass into the new dual carriageway. The consequences of removing the intermediate junctions would be an increase in local traffic flow through Zelah. This was not considered acceptable and would remove the opportunity to provide a continuous alternative local route.

Option 1M was further refined into option 1N as follows:

- Retain Zelah bypass as a local route, protecting the traffic calmed route through Zelah, with the proposed dual-carriageway running parallel and to the south.
- Incorporate west-facing slip-roads at Chybucca to facilitate the peak flow movements between West Cornwall and Truro. Without the west-facing slip-roads, traffic flows would potentially overload the proposed junction at Chiverton Cross in the future.

Option 6A was developed as a wholly off-line solution (i.e. it did not affect the existing A30) thus allowing it to be used as a continuous route for local traffic separate from the new dual carriageway. A wholly off-line dual-carriageway route has potential advantages:

- Less disruption during construction - by retaining the existing A30 as a local route the majority of the new dual carriageway can be built away from the existing road.

- Potentially safer, quicker and cheaper to construct than converting sections of the existing road into a dual carriageway.
- Avoids need to create new lengths of side road to maintain local road connectivity and access to properties.

Option 6A was further refined into option 6B to realign the proposed dual carriageway closer to the boundary of the Zelah bypass, narrowing the road corridor and reducing severance, whilst retaining the Zelah bypass as a local route. This option also included the addition of west-facing slip-roads at Chybucca.

3.1.2 Option selection for Public Consultation

It was concluded that the off-line option 6B was preferable to options 1M, 1N and 6A for the following reasons:

- reduced air quality and noise impacts to properties alongside the existing road;
- better opportunities for re-use of the existing road for local connectivity, including non-motorised use, as well as part of the Land's End to John O'Groats cycling route;
- less disruption during construction; and
- potentially quicker and cheaper to construct.

A single option 6B was presented to public consultation in October 2016. It included two variants at Chybucca, which were:

- Option A: an alignment passing between a tumuli and the property Callestick Vean; and
- Option B: an alignment passing to the north of the tumuli and the property Callestick Vean.

Drawings of Option 6B with these variants are included in Appendix A.

3.2 Traffic and economics

3.2.1 Consultation Scheme Assessment (Option 6B)

Traffic Forecasting

Traffic modelling of the route showed that journey time savings would be made following construction of the scheme. By comparison, doing nothing would lead to increased congestion and journey times, contributing to poor reliability in future years. Journey time savings result from reduced delays at existing junctions as well as from increased speeds on the route.

Economic Assessment

The economic assessment at Stage 1 shows that the scheme would provide benefits to transport users, resulting from the significant improvement in the performance of the A30. The assessment showed that the scheme would provide 'Very High' value-for-money.

4 Operational assessment, technology and maintenance assessment

4.1 Outline Operational Approach

4.1.1 General

The section below sets out the key principles and identifies the further work necessary as the scheme progresses.

For the proposed scheme the overall operational approach would be that which is normal for a rural, dual two lane road. Assessment of the proposed scheme has not identified any extraordinary issues or non-standard items requiring specific assessment.

Consultation with stakeholders has commenced and their input was incorporated within the scheme assessment. A meeting was held with operations staff from Highways England Area 1, Area 1 Term Maintenance Contractor staff and Devon & Cornwall Police. Further consultation would be undertaken to contribute to the development of the scheme design in subsequent Project Control Framework stages.

Maintenance operations would be routine activities which need to be performed on a cyclical or frequent basis and non-routine activities which require much less frequent access to the highway.

4.1.2 Technology

The proposed scheme can operate safely without technology or communications equipment. It is not proposed that any technology or communications infrastructure would be constructed as part of the scheme. Thus at opening, there would not be any variable message signs or operational cameras. SOS telephones will be provided at laybys.

Currently this approach is consistent with the rest of the A30 route in Cornwall and in Devon to the west of Exeter.

The design of the scheme allows for future implementation of technology and communications equipment where appropriate and/or if the scheme is developed as an Expressway. This would be accommodated within the proposed verge widths. The Road Investment Strategy states that this section of the route will be improved to Expressway standard.

4.1.3 Resilience

The existing A30 carriageway would be retained as a complete single carriageway local route between Chiverton Cross and Carland Cross. Where necessary, new sections of carriageway would be constructed to complete the local route. The use of this local route for planned and unplanned events would give additional operational resilience to the A30 route.

Where incidents occur on the A30 the Police would be able to use the existing single carriageway as part of their incident management. Two emergency access points would be provided where the proposed dual carriageway is adjacent to the existing A30 and a safe layout can be accommodated. Future consultation with Highways England Operations teams and local emergency services would be used to identify strategies for unplanned events.

For off peak planned maintenance and repair activities that require carriageway closure, the local route could be used as a diversion route during overnight A30 carriageway closures. This would avoid the need for contraflow traffic management.

4.2 Maintenance and Repair Assessment

4.2.1 Routine Maintenance Activities

Highway Inspection

The proposed scheme design would include safe places to stop using hardstandings constructed at regular intervals and at junctions. The proposed verge widths allow for the location of such facilities. Where possible, access from the existing A30 carriageway where it is adjacent to the proposed A30 boundary would be included. Other side roads with lower traffic speeds will also be used for inspection access, for example, at structures and attenuation ponds.

Verge Maintenance

Grassed areas on the verge would be positioned to allow cutting by machine to be maximised and minimise the use of hand held tools. That is, the distance between the grassed area and the carriageway would be sufficient to give the required safety zone where possible. Landscape planting areas would similarly be located at sufficient distance from the carriageway.

Embankment slopes are proposed to be at a gradient of 1:2. Cutting slopes are proposed to have a combination of slope angles as summarised in Table 4-1 below.

Table 4-1 : Cutting slopes

Slope height	Gradient
0 – 1m	1 : 2.5
1 – 3m	1 : 2
3 – 5m	1 : 1.5
> 5m	1 : 1

Where slopes of greater depth than 5m occur the steepest part of the cut will be through bedrock. This is in the area near to Hill House to the south of Zelah for approximately 400m. It is anticipated that this would require regular inspection but not cyclic maintenance. Fall protection may be required for inspections and where appropriate the detailed design will include provision.

Where the slopes are between 1 and 5m in height and have gradients of 1:2 and 1:2.5 options would be considered for minimising maintenance requirements and/or providing fall protection.

Fencing in addition to highway boundary fencing would be considered where required to provide fall protection.

Verge side road restraint systems would be required at embankments and at features including structures and advanced direction signs.

Drainage Maintenance

Drainage design would provide conventional drainage systems using surface water channels and drains in accordance with the relevant DMRB standards. Ponds would provide attenuation and pollution control would be an integral part of the design. Drainage assets would be detailed to optimise safe access for routine inspection and cleaning whilst minimising the visits required to assets.

All of the proposed attenuation ponds are located to allow vehicle access from adjacent minor roads. The layouts allow complete circular access around the pond giving sufficient space for machinery to operate safely. Detailed design would allow for the sites to be fully fenced.

Central Reserve Maintenance

A rigid (concrete) vehicle restraint system is proposed for the central reserve. This requires less maintenance in comparison to a deforming barrier which requires replacement work each time it is struck by errant vehicles.

Options to be considered for the design of the central reserve to minimise the need for access would include:

- Hardening of the whole of the central reserve width to avoid the need for grass cutting. This would not preclude the need for maintenance since hardened central reserves still need maintenance, however, it would reduce the number of visits required.
- Hardening local to the vehicle restraint system to avoid the need for grass cutting using hand tools.
- The use of socketed posts where appropriate for any deforming barrier sections.

Structures

Structures would be designed with access arrangements for inspection. This would include inspection galleries for bearings with access steps as necessary. Safe access routes for culverts would also be identified - each of the proposed culvert locations allow for this.

Lighting

Lighting is assumed for the junctions and underbridges, subject to further assessment at Stage 3. However, lighting is not proposed for the A30 carriageway. At junctions and underbridges the lighting would be provided on the verge allowing nearside access from the carriageway.

4.2.2 Traffic Management for Routine Maintenance

Proposed Main Line

Maintenance activities for the main line would be undertaken using off peak lane closures. Temporary traffic management would need to be implemented for each planned activity.

Inspections and some short duration verge side maintenance activities would be able to be undertaken without traffic management where safety zones can be achieved. The proposed scheme offers safe stopping points and access arrangements to be detailed to facilitate this wherever possible. The option also allows for the development of safe pull off areas to be used for mobile lane closure vehicles.

The location of the temporary traffic management would be determined by the maintenance activity being undertaken. However, suitable positions for the entry taper positions would be determined in advance and recorded for operational purposes. These would be determined by alignment constraints and junction positions, given the need for adequate forward visibility to the taper and avoidance of conflict with traffic joining at a junction.

Although the scheme junction alternatives have different arrangements, the positions of the merges and diverges are not significantly different from an operational perspective. The main line alignment would not offer any extraordinary constraints which would restrict the development of safe taper positions and the operational practices.

The proposed scheme as a two lane dual carriageway would be able to use the current permissible relaxations to omit the offside signing for temporary lane closures, meaning personnel would not have to cross the live carriageway to erect traffic management signing.

Junctions

For the junction options at Chiverton Cross, Chybucca and Carland Cross, traffic management systems would be developed to enable access for routine activities on the slip roads and junction links. The west-facing slip roads at Chiverton Cross could be closed with those at Chybucca available to use for diversion routes along with the existing A30 carriageway. Similarly, the slip roads at Chybucca could be closed and advanced signing used to divert traffic at Chiverton Cross.

4.2.3 Non-routine Maintenance and Repair

The proposed scheme offers normal operational approaches to non-routine activities. Non-routine activities could include structures repair work and longer term maintenance such as parapet repair, bearings replacement and deck waterproofing replacement. Work to the carriageways would include replacement of surfacing, lining and studs. These activities would be carried out as and when necessary, but it would be anticipated that the time periods between these activities would be greater than that for the cyclic maintenance activities.
These activities require access to full carriageway widths or partial widths that would make running live traffic adjacent to the works undesirable. The local road could be used as a diversion route during overnight closures as set out above.

4.2.4 Traffic Management for Non-routine Maintenance and Repair

Proposed Main Line

Where these activities can be undertaken during off peak hours, principally overnight, carriageway closures could be implemented using the existing A30 as a diversion route.

Where the works require longer time periods of carriageway possession this would require contraflow operation. Crossover points will be identified for permanent construction. The retention of the existing A30 route allows some resilience for the use of contraflow operations but the use of these arrangements would need to be minimised.

Junctions

As with routine maintenance, the west facing slip roads at Chiverton Cross and Chybucca along with the existing A30 carriageway will be used to provide diversion routes for slip road closures.

4.3 Summary

The proposed scheme would require operation and maintenance which would be normally appropriate for a rural two lane dual carriageway. The proposed scheme does not require any non-standard operations or maintenance measures.

Technology or communications equipment is not required for normal operation and is not in the current proposal, however the scheme is designed to enable the future inclusion of technology as the Expressway concept is refined.

The existing A30 could be used as a diversion route for planned work and used by the emergency services during incident management.

5 Environmental assessment and environmental design

5.1 Introduction

One of the key objectives of the scheme (as identified in the Client Scheme Requirements) is to 'deliver a better environmental outcome'.

Whilst some adverse effects on the environment may result from introducing significant additional road infrastructure into an area, it is often possible to mitigate these effects. Environmental enhancements are also possible.

Throughout, the correct balance of environmental, social and economic impacts and effects were considered with reference to the wider scheme objectives, and the policy framework provided by the NPSNN and any relevant environmental legislation. Adverse environmental effects can sometimes be justified, under this policy and legal framework, by the social and economic benefits to Cornwall as a result of upgrading the road in this location. The environmental objectives for the scheme are therefore considered to have been met at the end of PCF Stage 2, if the preferred route does not prevent, by reason of being unable to adequately account for its environmental effects, a consentable and legally compliant scheme to be designed in detail during PCF Stage 3.

The following sections provide brief summaries of the environmental assessment, environmental mitigation, and potential for environmental enhancement for various environmental topics for the route that was presented at public consultation - Option 6B (a single alignment with two options (A and B) at Chybucca). For each environmental topic, a conclusion is then drawn on the extent to which the recommended preferred route (Option 7A), which was developed following public consultation and engagement with stakeholders (the evolution of which is described in greater detail later in the report), performs better or worse than Option 6B.

An overall conclusion is then made as to the extent to which the recommended preferred route improves upon the ability of the consultation option (Option 6B) to 'deliver a better environmental outcome'.

5.2 Level of environment assessment

In most cases this has involved undertaking a 'Simple' level assessment, on the likely environmental effects resulting from Option 6B (including the Chybucca variation Option A and B).

Following public consultation on Option 6B, the route was refined into Option 6C, which included the discarding of Options A and B at Chybucca in favour of a suggested alternative alignment. To take account of public and stakeholder feedback alternatives were developed for a number of other locations along the scheme route, such as Marazanvose, Chiverton and Carland Cross Junctions.

The level of environmental design and assessment undertaken has reflected the need to provide sufficient understanding about the likely environmental effects to meet the main aims of PCF Stage 2, which are to arrive at a preferred route, a cost estimate for the scheme, and an area of land to be protected from development.

In order to sift the post-consultation options to arrive at the recommended preferred route, targeted appropriate environmental assessment was required.

Sometimes a more detailed assessment, which followed a recognised methodology, was critical for making a decision on the alignment or the extent of land to be protected for mitigation and included in the cost estimate. For example, in order to better understand noise impacts in the Marazanvose area.

Likely impacts for these alternatives were captured (along with non-environmental impacts), in the 'Post Consultation Alternative Options Assessment Table'. (Appendix B of this Scheme Assessment Report).

5.3 Environmental summaries

5.3.1 Air Quality

Air quality modelling, which took account of data from the local authority and Defra, confirmed that air quality around the scheme is generally good. Highertown, in the Truro Air Quality Management Area (AQMA), is distant from the scheme area and would not be affected. Some isolated properties close to the existing road are subject to elevated concentrations (for example at Zelah), though no UK objectives are exceeded.

Changes in pollutant concentration predicted as a result of Option 6B relate mainly to the realignment of traffic along the new route, with insignificant slight increases and decreases predicted at various dwellings., although not significant. The air quality effects associated with Option 6B would be unlikely to: interfere with or prevent actions by Cornwall Council to improve air quality; exceed a UK air quality objective; cause a new AQMA to be declared; significantly increase emissions, degrade air quality, or increase in exposure to pollutants.

Overall impacts as a result of Option 6B were therefore assessed as negligible to neutral during construction and negligible to slightly beneficial during operation.

As a result, mitigation would not likely be required and air quality impacts on human receptors as a result of Option 6B would be unlikely to cause a conflict with any of the stipulations contained in Paragraphs 5.3 to 5.15 of the NPSNN. Overall, Option 6B would deliver a slightly better environmental outcome in respect of air quality than the existing situation.

No specific feedback was received from the public or stakeholders regarding air quality. Consequently, the alignment did not need to be adjusted to take account of air quality impacts following this consultation.

The recommended preferred route (Option 7A) would have a different alignment to Option 6B and would therefore cause slightly different levels of pollutant concentrations at various human receptors (in particular dwellings) than would Option 6B. This does not, however, affect the conclusion of the assessment of negligible to slightly beneficial, and so the recommended preferred route would deliver similar environmental outcomes to Option 6B in respect of air quality. Therefore, it would also deliver a slightly better environmental outcome than the existing situation.

5.3.2 Cultural Heritage

It is difficult to come to an overall conclusion on the effects on cultural heritage for the scheme, as impacts on individual heritage assets can vary dramatically. This is reflected in the range of impacts, which range from major adverse to moderate beneficial.

The assessment concluded that Option 6B would cause significant adverse impacts of varying magnitude on the setting of several listed buildings, including the group located at the Church of St Peter near Chiverton Cross, which are all Grade II listed. Historic England raised concerns about these impacts during the consultation. Whilst the recommended preferred route does not specifically address these concerns by taking the alignment further from the assets, it does not prevent the impacts being mitigated though careful design of the junction, and in particular by minimising the overall height of the infrastructure and providing screening.

One Grade II listed milestones would be affected. However, this can be adequately mitigated by moving it to an appropriate location. Both Option 6B and the recommended preferred route will require its relocation. Considering how its significance is derived this can only be partially mitigated by moving the stone to an alternative site.

The only other Grade II listed building assessed as likely to be significantly adversely impacted by Option 6B would be Nancarrow Farmhouse and wall, which is set within a small river valley. The asset and its surroundings are in use as both a working farm and a wedding venue, and remain tranquil despite existing noise from the A30. Option 6B would impact on both the surrounding agricultural landscape that forms the immediate setting and tranquillity by introducing additional noise. Following feedback as a result of public consultation, the recommended preferred alignment is now further from this asset, reducing the impact.

Since the proposed scheme will introduce significantly more built infrastructure, tumuli have been assessed as being significantly adversely affected by the scheme. Offsetting harm in the historic environment is not specifically mentioned as a form of mitigation in the NPSNN in the same way that it is for biodiversity (see NPSNN Paragraph 5.25). During consultation Historic England has stated that the harm present across the scheme, especially to tumuli and the historic landscape, can be partially offset with improvements to an important group of tumuli at Carland Cross. In particular, improvements to the setting of Warren's Barrow, a tumulus currently isolated from the rest of the group by the existing A30. Whilst the recommended preferred route does not adjust the alignment of the main carriageway, an alternative junction design has been developed to enable Warren's Barrow to again form part of a coherent group of tumuli. An undesignated barrow to the east of Carland Cross, which would also be directly affected by Option 6B, was identified whilst developing the post consultation alternatives, and the alignment marginally adjusted so that the recommended preferred route (Option 7A) now runs alongside it.

Due to the characteristics of the scheme and the area, Option 6B would therefore not deliver a better environmental outcome than the existing situation in respect of cultural heritage. Consultation with Historic England informed changes to Option 6B and whilst this does not change the alignment has resulted in a recommended preferred route that now provides an opportunity to deliver a better environmental outcome than Option 6B. Overall these localised improvements may offset some of the wider harm to cultural heritage.

Whilst the overall impacts on cultural heritage may remain adverse, these adverse impacts are likely to be able to be justified by the social and economic benefits that would arise as a result of delivering other

scheme objectives. The recommended preferred route (Option 7A), taken together with proposed mitigation measures, is therefore more likely than Option 6B to deliver a better environmental outcome for cultural heritage, in respect of specific locations along the route.

5.3.3 Landscape

The preferred route does not pass through or near a designated landscape. Cornwall's local landscape character assessment has been used to inform the simple assessment at PCF Stage 2 of landscape and visual effects. The study area lies wholly within the Cornwall and Isles of Scilly Landscape Character Study landscape character area No.CA14 Newlyn Downs.

Introducing prominent infrastructure into the landscape would detract from the over-riding rural character of the area with a noticeable change to the pattern and grain of the landscape. This is due to the removal of hedges and disruption to characteristic field patterns, particularly between Chiverton Cross and Marazanvose, and between Trevalso and Carland Cross. There is also no plan to reduce the impact of the existing road as part of the de-trunking strategy. Therefore, the combined effect of the old road and a new dual carriageway would together comprise a significant amount of road infrastructure within a landscape which, whilst undesignated, has been assessed as being of high quality and highly sensitive to change.

Overall, the effect on the landscape was assessed for Option 6B as likely to be moderate adverse overall. In occasional places across the scheme this may reduce to slight adverse within 15 years.

Following comments from Cornwall Council's Landscape Officer (as documented in the Public Consultation Report) indicative landscape mitigation has been designed during PCF Stage 2, such as Cornish Hedgerow, to inform the recommended preferred route boundary and to provide a more robust scheme cost estimate. In certain locations, such as around Nancarrow Farm, the alignment has been brought closer to the existing alignment in order to minimise disruption to characteristic field patterns.

Mitigation provided by screening will mainly address visual impact and provide screening to dwellings, from public viewpoints, and towards and from heritage assets. The impact of the scheme on landscape is largely derived from the alignment, which disrupts field patterns and so is less easily mitigated with such measures.

This mitigation has been designed at PCF Stage 2 following a simple assessment only. There is a small risk that the land required to provide reasonable landscape mitigation has not been sufficiently protected from development at the end of PCF Stage 2. However, considering the rural context, there would be no significant development pressure on the surrounding land, except perhaps from renewable energy schemes. The development of these has become less prevalent in recent years, which reduces the risk.

Whilst the recommended preferred route alignment improves the Option 6B alignment at some locations, such as around Marzanvose, where the impact on landscape is reduced, the overall assessment of moderate adverse overall remains unchanged for the recommended preferred route. There may be occasional places across the scheme where this would reduce to slight adverse within 15 years. Whilst the overall impacts on landscape may remain adverse, these adverse impacts are likely to be able to be justified by the social and economic benefits that would arise as a result of delivering other scheme objectives. The recommended preferred route, together with proposed mitigation measures, is therefore less likely than Option 6B to deliver a better environmental outcome for landscape especially in respect of specific locations along the route, such as at Marzanvose.

Overall, neither the recommended preferred scheme nor Option 6B would deliver a better environmental outcome in terms of landscape, which remains at moderate adverse. The recommended preferred route, improves on Option 6B by minimising the impact in localised areas, so there would be more places within the scheme where this might reduce to slight adverse within 15 years.

5.3.4 Biodiversity and Ecological Conservation

Habitats

Newlyn Downs SAC and SSSI is located north of the scheme area and is the largest area of Dorset heath in Cornwall. Being close to the proposed alignment it could potentially be impacted by nitrogen deposition as a result of the scheme. Carrick Heaths is designated as a SSSI under the Wildlife and Countryside Act and comprises several fragments located along the length of the scheme corridor.

There will be no direct loss of habitat at the SAC as a result of either Option 6B or the recommended preferred alignment. Option 6B is also not different to the recommended preferred route alignment in places that are likely to cause indirect impacts (from nitrogen deposition) on the SAC. A court judgment handed down in April 2017 will have implications on how the significance of impacts from nitrogen deposition on the SAC has been derived. There remains a low risk that only a change of alignment might be able to mitigate any significant adverse impacts that may be identified as a result of changing the methodology for assessing cumulative effects. This could apply to both Option 6B and the recommended preferred route equally. Generally, neither option is likely to lead to a better environmental outcome for the SAC, though neither Option 6B nor the recommended preferred route would lead to any significant adverse effects to the SAC (notwithstanding the potential implications of the high court judgement discussed above).

There is a currently undesignated heathland fragment south of the existing A30 and the SAC, within a broader area of the habitat, predominantly comprising an area of scrub and a disused quarry, including a pond. Both Option 6B and the recommended preferred scheme would bisect this habitat to the south of the pond, directly impacting a fragment of priority heathland habitat and a small area of Dorset heath.

Natural England was consulted on the issue and has informally agreed in a meeting (held on 3 March 2017) that: the undesignated heathland fragment be assigned as ‘national to regional’ value; the lost habitat be re-created in an area as close to the lost existing lost habitat as possible; and be designed and managed for the habitat to be of at least equal size and quality to that being lost.

In this case, all fragments of Carrick Heaths are located similar distances from both Option 6B and the recommended preferred route and so any impacts have the potential to be appropriately mitigated for both. To account for uncertainties surrounding habitat creation and to ensure that the above is achieved, an area of land representing a ratio of 4:1 of the lost habitat has been identified near Carland Cross as direct compensation for loss of this habitat. Whilst this has not influenced the alignments, the appropriate area can be provided in the route protection plans provided to Cornwall Council.

For Option 6B, fragmentation and habitat loss has been assessed as being likely to be significant due to cutting through fields and hedgerows, widening the distance between functionally linked habitats (for example woodland blocks or aquatic habitat occurring on either side of the road). Overall, without compensation, residual impacts are predicted to be moderate to large adverse. It is notable that both Option 6B and the recommended preferred route would deliver ‘no net loss’ for biodiversity, although

scheme design does deliver net gain for acid grassland and heathland, and woodland habitats of principal importance. Hedgerows will be compensated for at a ratio of slightly more than 1:1. Nevertheless, the length of hedgerow currently indicated as likely to be provided as compensation would not be likely to lead to no net loss. Both options would therefore not achieve a better environmental outcome for habitats and both have the potential to deliver worse environmental outcome for habitats than the existing situation. There is potential to address this at PCF Stage 3 through detailed mitigation design.

If the scheme aims to deliver better environmental outcomes for habitats then it must aim for net gain to biodiversity. If the scheme aims to avoid delivering a worse environmental outcome for habitats then it must aim for no net loss. Therefore, further compensation is needed in order to avoid achieving a worse environmental outcome for habitats than the existing situation. The recommended preferred route, whilst including some protected areas of land that could be used for habitat compensation, does not currently substantively improve on Option 6B in respect of the environmental outcome for habitats, but neither does it have a greater adverse effect.

Protected species

Bats

A full survey has not been completed at PCF Stage 2, but from the information available it is known that multiple bat species forage, commute and roost in and around the scheme area. In particular, bat roosts and crossings have been recorded at Nancarrow Farm, and in and around Trevalso.

Both the Option B and the recommended preferred route would directly disturb bat roosts at Nancarrow Farm. Both routes would also sever key commuting routes, especially around Nancarrow and Trevalso. To mitigate this, mitigation measures have been identified to provide for bat crossing features at Nancarrow and potentially at Trevalso.

A better environmental outcome is not likely to be achieved for bats. However, provided the design undertaken during PCF Stage 3 mitigates for bats appropriately, then it is not expected that there would be a worse environmental outcome as a result of Option B or the recommended preferred route.

Other species

No dormice have been found during surveys to date, but a small amount of habitat that would be suitable for dormice is present within the scheme footprint. It is considered likely that they would be patchily distributed.

Otters are likely to use watercourses crossing and close to the scheme to disperse between the River Allen and the north coast of Cornwall, in particular around Zelah Hill. They are also associated with a number of County Wildlife Sites near to the scheme. Following consultation, the Environment Agency provided information on known otter casualties on the existing A30.

Surveys undertaken for previous iterations of the scheme indicate that badgers are present in the area including: a main sett near to Marazanvose; two substantial active setts near Carland Cross; and nine active or partially used setts elsewhere.

Breeding bird surveys have indicated that the scheme contains discrete areas of particular note for breeding and wintering birds, and barn owls.

There is suitable habitat for common reptile and amphibian species, and notable fish in and around the preferred route.

A number of notable invertebrates have been recorded close by, including the silver studded blue butterfly. Other protected and notable invertebrate species are likely to be associated with other habitats including woodland, heathland and aquatic habitats located along the scheme corridor, as well as in designated and priority habitats located in the wider area.

Overall, neither Option 6B nor the recommended preferred route would lead to better environmental outcomes in respect of other species. However, provided mitigation is designed into the scheme during PCF Stage 3, then a worse environmental outcome compared with the current situation could be avoided. In the case of the protected species, this would be a legal requirement and if not provided could prevent the scheme from being consented.

5.3.5 Noise

It is difficult to come to an overall conclusion on the effects of noise for the entire scheme, as impacts on individual receptors can vary dramatically. This is reflected in the range of impacts shown on the summary of assessment (Chapter 15 of the PCF Stage 2 Environmental Study Report) for Option 6B (both variants), which range from moderate to major adverse, to moderate to major beneficial.

Being close to the existing A30, many of the dwellings located near to the proposed scheme are already exposed to high noise levels. In particular, the dwellings at Marazanvose and Nancarrow have been identified as being within a Noise Important Area (NIA).

The Noise Policy Statement for England (NPSE) recognises that it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations. For the purposes of PCF Stage 2, and to inform options selection and the design process, appropriate limits were set based on European guidance, previous experience and professional judgement. The limits comprise each category as follows: Unacceptable Observed Effect Level (UOEL): 76 dB; Significant Observed Adverse Effect Level (SOAEL): 68 dB (day); 55 dB(night); Lowest Observed Adverse Effect Level (LOAEL): 50 - 55dB (day), 40dB (night).

Initial noise modelling in advance of noise surveys of Option 6B and the recommended preferred route indicate that there would be no dwellings in which the occupants would be exposed to an UOEL of noise as a result of the scheme. This assessment assumes no low noise surfacing, and was modelled with no detailed design information that can affect noise levels, such as the depth of cuttings.

Several dwellings have the potential to be exposed to SOEAL of noise as a result of both Option 6B and the recommended preferred route, in particular around the Marzanvose area, including those within the NIA. Option 6C also has the potential to increase noise from existing levels at the dwellings in Marazanvose. The recommended preferred route would take the alignment marginally closer than Option 6C to these dwellings, though further from the dwellings within Nancarrow Farm, all within the NIA, which may offset the overall impact on the NIA. There is though no significant difference in effect between Option 6B and the recommended preferred route, with both leading to a similar environmental outcome for

noise in this area, which is marginally worse than the existing situation. This would need to be precisely established with a detailed assessment.

Option 6B would likely have led to a better environmental outcome in respect of noise for Hill House, a dwelling just east of Chyverton Park, south of the existing alignment. The recommended preferred route would lead to a worse outcome for Hill House both in respect of the existing situation and when compared to Option 6B. However, it would not lead to a SOEAL, nor be significantly worse than Option 6B. Since there are better environmental outcomes in other areas for the recommended preferred route when compared to Option 6B (for example for landscape and businesses around Marazanvose), then this slightly worse environmental outcome in respect of noise was considered to be balanced by better outcomes in other areas. The policy framework provided by Planning Practice Guidance, NPSNN, and the NPSE all state that noise is not expected to be considered in isolation, separately from the economic, social and other environmental dimensions of a proposed development.

Other dwellings across the entire scheme area have the potential to be affected differently by Option 6B as a result of the recommended preferred route, some positively and some negatively. It is also possible that the noise level at some of these dwellings might be maintained at less than significant levels with the help of insulation as a result of meeting the threshold for it being provided in the Noise Insulation Regulations. Other mitigating methods, such as low noise surfacing and bunds, might also reduce these noise levels to less than significant, if they were to occur. There remains a small risk that significant noise impacts can only be avoided by adjusting the alignment.

Based on current information, and without more detailed survey and assessment, it cannot be concluded that the recommended preferred alignment would lead to a better environmental outcome for noise than with Option 6B, or the existing situation. However, the risk is low that, should future detailed analysis indicate adverse noise effects then such effects could not be balanced by other economic, social and other environmental factors such that the scheme could not be consented.

5.3.6 People and Communities

Effects on peoples and communities can be wide ranging, including effects on views from roads and driver stress. In most areas there are no notable differences in outcomes for Option 6B or the recommended preferred route.

For the people of Cornwall, the local economy and health would experience a slight beneficial effect, with no adverse effect on vulnerable groups. In providing a safer and more efficient route, communities would be able to access some services more easily. There would be similar outcomes in these areas for Option 6B and the recommended preferred route.

Following consultation on Option 6B, the public and parish council raised the issue of historic north-south severance of the community around Zelah. Mitigation within the recommended preferred route is possible either by providing a crossing near Zelah or Trevalso, and this has been allowed for in the scheme area and the cost estimate. Whilst it is not as a result of changes to the main alignment, it can be said that there is slightly more potential with the recommended preferred route for a better environmental outcome in respect of people and communities than for Option 6B. However, continuing with Option 6B would not have prevented north-south severance potentially being addressed in this area.

Overall there would be a slightly better environmental outcome in respect of people and communities as a result of the recommended preferred route when compared to the existing situation. This outcome would also have been possible as a result of Option 6B.

5.3.7 Other

For other aspects of the environment including geology and soils, materials, and road drainage and the water environment, environmental outcomes as a result of the recommended preferred route would not significantly differ from Option 6B and were not raised as significant issues by the public following consultation. They were therefore not significant factors when developing alternatives following consultation on Option 6B and similar environmental outcomes would be achieved as a result of both Option 6B and the recommended preferred route. These outcomes are not likely to be better than the existing situation.

5.4 Conclusion

One of the key objectives of the scheme (as identified in the Client Scheme Requirements) is to 'deliver a better environmental outcome'. Environmental outcomes might be different for different aspects of the environment and for specific parts of the scheme.

In most cases the recommended preferred route would deliver a similar environmental outcome to Option 6B. In particular, for air quality, biodiversity, geology and soils, materials, road drainage and the water environment.

For cultural heritage and landscape, improvements in environmental outcome would be achieved in some localised parts of the scheme as a result of the recommended preferred route, when compared with Option 6B. For landscape, these improvements are not significant and do not represent an improved environmental outcome for the entire scheme. In the case of cultural heritage, there would be a significant improvement in the outcome at Carland Cross as result of the recommended preferred route, both when compare both to Option 6B and to the existing situation. The significance is local to Carland Cross.

Overall, the recommended preferred route responds to feedback from the public and to stakeholders on Option 6B and in doing so has achieved some better environmental outcomes for specific aspects of the environment, in specific locations across the scheme.

6 Public consultation

6.1 Introduction

Public consultation took place in October and November 2017. The purpose of the consultation was to:

- inform the public of the proposed improvements; and
- identify any opportunities to improve the proposals.

The plans were discussed with councillors, key stakeholders and affected land owners and occupiers before being presented to the public at four staffed events in October and November. Feedback was collected in a questionnaire which was available at the staffed events, four deposit points and could be completed online.

The public exhibition events contained information boards and plans of the proposed route. Members of the project team were in attendance to explain the proposals, answer any questions and listen to what people thought. The events were held at the following locations:

- St. Erme Community Centre – Saturday 15 October 2016;
- Shortlanesend Village Hall – Wednesday 19 October 2016;
- Blackwater Community Primary School – Thursday 20 October 2016; and
- Perranzabuloe Parish Rooms – Thursday 24 November 2016.

6.2 Views and Comments from stakeholders & the public

The exhibitions were well attended with visitor numbers spread quite evenly across the four exhibitions. Information gathered demonstrated a good geographical distribution of attendees. Below is a summary of key numbers:

- 835 visitors across the four exhibitions (evenly spread);
- Good geographic spread of attendees;
- 1,400 questionnaires taken;
- 698 responses received; and
- 52 direct communications (letter/email) received.

Analysis of responses shows there was a strong support for the need to improve the A30 between Chiverton and Carland Cross. There was considerable backing for a dual carriageway with grade separated terminal junctions and the retention of existing A30 as a local route. Below is a list of key figures that support these statements:

- 95% of respondents supported the need for the scheme;
- 92% support for dual carriageway with grade separated terminal junctions; and
- 86% support for retention of existing A30 as a local route.

The main concerns expressed by attendees and respondents were:

- Chiverton Cross Junction – concerns over capacity and length of detour (St Agnes to Truro);
- Severance of useful farming land throughout the length of the scheme;
- Alignment at Chybucca – separation of the two properties at Callestick Vean Farm;
- Lack of east facing slips at Chybucca;
- Negative impact on certain farms and businesses;
- Poor connectivity between Zelah and the parish of St. Allen; and
- Impact on Warrens Barrow at Carland Cross.

6.3 Scheme alternatives

Several alternative routes and side road arrangements were also proposed by those responding to the consultation and taken forward for further consideration. These are described further in Table 6-1 together with the outcome from an initial assessment process that identified:

- Whether the alternatives were opportunities that would add value but were not necessarily an essential part of the scheme
- Whether further assessment was necessary, indicated by 'Yes'
- Whether the alternatives should be discarded, indicated by 'No'

Table 6-1: Consultee proposals

Location	Alternative	Initial Assessment	Further Assessment Required
Chiverton Cross	Grade separated at existing location	Insufficient space and unbuildable without major disruption	No
	Improvements to existing at grade junction	Capacity concerns and difficult to build without major disruption Reduced land take	No
	Through-about at existing junction	Capacity concerns and difficult to build without major disruption (see Table 6.2) Reduced land take	No
	Dumbbell close to existing junction	Concerns of prominence in landscape and time consuming to build without significant disruption (see Table 6.2) Reduced detour from existing junction	No
	Gyratory between consultation dumbbell and existing roundabout	Offered no comparable benefit over dumbbell at consultation location	No
	5 arm single gyratory close to existing junction	Concerns of prominence in landscape and time consuming to build without significant disruption (see Table 6.2) Reduced detour from existing junction and increased capacity	Yes
	6 arm single gyratory close to existing junction	Location likely to be near consultation location and difficult to build without major disruption Increased capacity	No
	6 arm single gyratory replacing dumbbell at consultation location	Increase cost of second bridge and detour from existing junction location Increased capacity and minimal disruption during construction	Yes
	NMU Crossing	Increase in cost of structure under or over the dual carriageway. Landscape impact from overbridge Increased connectivity for NMUs	Opportunity

Location	Alternative	Initial Assessment	Further Assessment Required
Chybucca	More online, making better use of existing carriageway	Possible increase in disruption during construction Reduced land take and severance	Yes
	East facing slip-roads	Predicted traffic flows do not justify provision	No
Tresawsen	Remove underbridge to avoid risk of forming rat run	Reduce connectivity of local routes Reduce structure requirements	No
Marazanvose	South of Boswellick Farm	Increased land take, difficult topography and rural location (see Table 6.2) Increased separation from existing route	No
	South	Close proximity to Nancarrow Farm and no reduction in impact to Marazan Barn Reduction in severance of farmland, reduced land take and reduced structure requirements	Yes
	North Option 1 with side road connections east and west to maintain local route on existing A30	Increased land take, increased side road requirements and additional stakeholders affected Reduced impact to Nancarrow Farm and no impact on Marazan Barn	Yes
	North Option 2 with extended side road connection east and west to maintain local route on existing A30. Existing A30 at Marazanvose severed	Increased land take, large increased side road requirements and additional stakeholders affected Reduced impact to Nancarrow Farm, no impact on Marazan Barn and improvements to setting of Marazanvose	Yes
Zelah	Reusing Zelah bypass	Increased side road requirements and increased impact on Zelah village Improved connection to properties southeast of Zelah (see Table 6.2)	No
	Church Lane underpass	Increased cost and limited current use or demand Increase connectivity and support sustainable travel / leisure pursuits	Opportunity
	Intermediate junction at Twobarrows and Boxheater	Increased land take, increased “hop on hop off” mentality and increase in construction cost (see Table 6.2) Further reduction in traffic through Zelah	No
	Trevalso Underbridge	Increased cost, time-consuming to construct and limited use Increase connectivity reduce impact on Trevalso Farm	Opportunity

Location	Alternative	Initial Assessment	Further Assessment Required
Carland Cross	Split junction with Boxheater	Poor junction performance and increase in traffic on local route Addresses seasonal journeys between A30 and north coast.	No
	Remove proposed bridge. Convert the loop to a dumbbell with new local A30 route to the north. Existing A30 used as westbound on slip	Increase land take and increase side road requirements Reduction in structure requirements and improved setting of tumuli	No
	Remove existing A30 and proposed bridge. Convert the loop to a dumbbell with new local A30 route to the north	Increased land take and increased side road requirements Reduction in structure requirements and greatly improved setting of tumuli	Yes

6.4 Opportunities to add value

The following aspects were identified as opportunities that would add value but were not necessarily an essential part of the scheme:

- Non-motorised user crossing point at the existing Chiverton Cross junction
- Non-motorised user underpass at Church Lane, Zelah
- Vehicular underpass at Trevalso.

6.5 Development of alternatives

The following alternative alignments and junction layouts were further assessed against a refined consultation layout. This assessment took account of concerns raised at consultation and further data that informed mitigation measures:

- Chiverton Cross:
  - Gyratory close to existing junction
  - Gyratory replacing dumbbell at consultation location
- Chybucca: more online making better use of existing road and reducing farm severance
- Marazanvose to Zelah (all tying into Twobarrows Bridge on Zelah bypass):
  - Southern Route
  - Northern Route Option 1
  - Northern Route Option 2 (with new northern local route)
- Carland Cross

The results of the further assessment are discussed in Chapter 7.

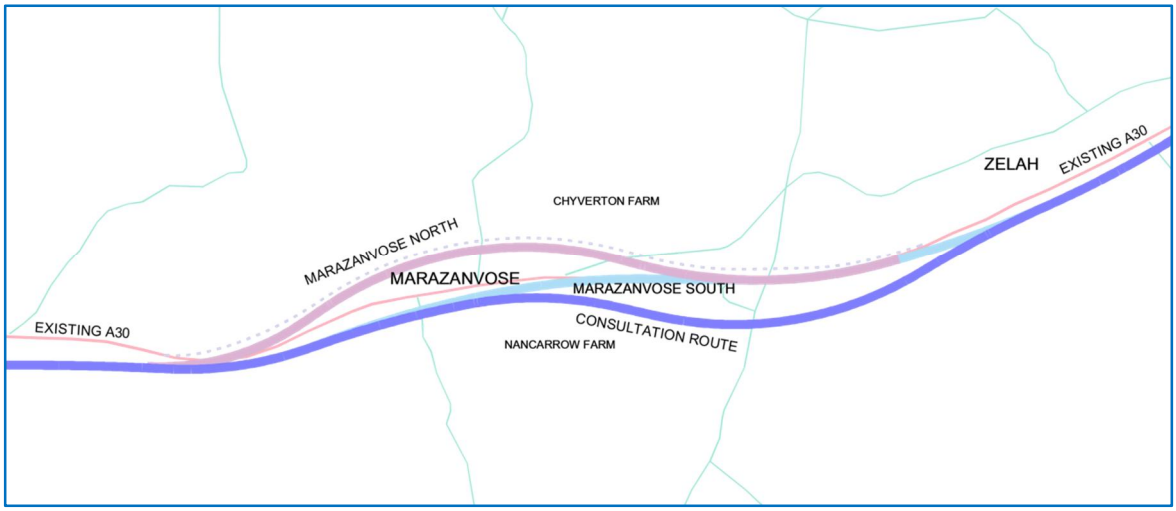
The initial assessment was used to inform a Value Management (VM2B) workshop on 27 January 2017, attended by key stakeholders, which concluded that the options at Marazanvose were not so clear cut. These alternatives could have significant impact on those potentially affected by the proposals. Therefore, Highways England undertook further consultation by means of:

- private meetings with affected landowners;

- an information-gathering event at Shortlanesend Village Hall on Wednesday 08 February.

The event presented three alternatives in addition to the refined consultation route. These are shown in Figure 6-1 below.

Figure 6-1 : Information-gathering event alternatives



86 people attended the event and 30 responded using the form available at the event. There were 5 direct communications received in the form of letters or emails and a petition.

The alternatives do have distinctly different effects on local businesses. Routes to the south have an effect on Marazan Farm campsite and Nancarrow Farm, routes to the north affect Chyverton Park and their equestrian facilities.

Those living alongside the existing A30, particularly at Marazanvose, were concerned about the difficulty in managing the speed of vehicles using the local route, others were concerned about the need to maintain the local route as an uninterrupted side road from Chybucca to Carland Cross. Since the alternatives tie into the Twobarrows Bridge on the existing Zelah bypass, there was a concern that disruption during the construction period would be higher, potentially leading to more vehicles rat running through Zelah village. Feedback showed that, collectively, local residents were happy with the consultation route and did not see the need to consider alternatives. This was highlighted with a petition containing 45 signatures which read:

"We the undersigned think that the original 2016 proposal to dual the Chiverton to Carland A30 provides the most elegant solution which provides a free flowing local road and the best solution to reduce Zelah rat run."

6.6 Rejected alternatives

Following the initial assessment, a number of alternatives emerging from the consultation were considered and rejected as shown in Table 6-1. Further details are provided in Table 6-2 below.

Table 6-2: Reasons for discarding alternatives

Options	Reason discarded
Chiverton	
At Grade Throughabout (Hamburger)	Not grade separated and thus not compliant with RIS. Would reach capacity before design year and would lead to extensive queuing on all approaches. Unacceptable to Cornwall Council.
At Grade Gyratory	Not grade separated and thus not compliant with RIS. Would reach capacity before design year and would lead to extensive queuing on all approaches. Unacceptable to Cornwall Council.
Dumbbell closer to existing roundabout	A gyratory layout at this location was considered a more efficient use of the constrained space available.
Marazanvose, Ch 6,500 to 9,000	
Reuse of Zelah Bypass	The need to fully reconstruct the existing Zelah bypass (carriageway and drainage) to D2AP standard and the need to provide a vehicular crossing at the eastern end of the Zelah bypass. This option also aligned the proposed dual carriageway closer to Zelah Village.
New junctions either side of Zelah	The provision of intermediate junctions is contrary to the scheme objectives, as it would result in local traffic using the proposed dual carriageway.
Alignment south of Boswellick Farm	This alignment significantly widened the route corridor, increased severance to agricultural land and would require the crossing of several steep sided wooded valleys over the River Allen and its tributaries.

6.7 Conclusions

The majority of the public responding to the information event favoured the consultation alignment at Marazanvose.

Residents in Marazanvose directly affected by the proposals had mixed views on the choice of alternatives suggested in the area, but the consensus was that the Marazanvose South alternative minimises impact on most of those directly affected.

The key issues that emerged from consultation that have been addressed are:

- Chiverton Cross Junction – concerns over capacity. Junction capacity improved in refined layout
- Severance of useful farming land throughout the length of the scheme; addressed by consideration of alternatives
- Alignment at Chybucca – separation of the two properties at Callestick Vean Farm; addressed by consideration of alternatives
- Impact on Warrens Barrow at Carland Cross: addressed by consideration of alternatives
- Chiverton Cross Junction – length of detour (St Agnes to Truro): addressed by possible non-motorised user crossing at Chiverton.
- Poor connectivity between Zelah and the parish of St. Allen: addressed by non-motorised user crossing at Trevalso Farm, combined with a multi-species crossing.

The key issue which remained to be resolved following the consultation was the negative impact on certain farms and businesses: this is addressed in further assessment discussed in Chapter 7.

The alternatives at Chiverton, Chybucca, Marazanvose and Carland Cross were developed in more detail and subjected to further assessment, as set out in Chapter 7.

7 Option refinement process

7.1 Introduction

Following the conclusion of the information event, alternatives at Chiverton, Chybucca, Marazanvose and Carland Cross were developed and assessed to determine the optimum combination to take forward as the preferred route. The alignment and junction designs were revisited in a series of multi-disciplinary workshops involving environmental specialists, highways engineers, town planners and transport planners in which compliance with the policy tests contained within the National Policy Statement for National Networks (NPSNN) were considered. This led to the identification of a preferred route and a provisional site area encompassing all land currently considered necessary for the scheme, and allows the route to be protected from development.

Throughout the assessment process it was recognised that policy and legal tests, such as the NPSNN, must carry exceptional weight as opposed to equal balance with other options sifting criteria.

7.2 The scheme alternatives

7.2.1 Alternatives taken forward for refinement

Table 7-1 below lists the alternatives which were developed for further assessment.

Table 7-1: List of alternatives

Location	Options
Chiverton	Gyratory at consultation location (instead of dumbbell layout)
	Gyratory adjacent to existing Chiverton roundabout
Chybucca	More southerly realignment to reduce separation and land severance between the existing A30 and the proposed dual carriageway, with an online section through Chybucca
Marazanvose: Ch 6,500 to 9,000	South - Closer alignment to existing A30 with online sections at Twobarrows to reduce land severance through Nancarrow Farm
	North option 1 - Alignment moved north of Marazanvose
	North option 2 - Alignment and side road moved north of Marazanvose
Carland Cross	Northern link to allow existing barrows group to be re-connected and remove proposed bridge on Newlyn Downs

These alternatives are shown in Figures 7-1 to 7-8 below, developed from the initial layouts following public consultation. Section 7.3 describes these design developments.

Figure 7-1: Chiverton junction - consultation layout

Figure 7-2: Chiverton junction - alternative large gyratory layout

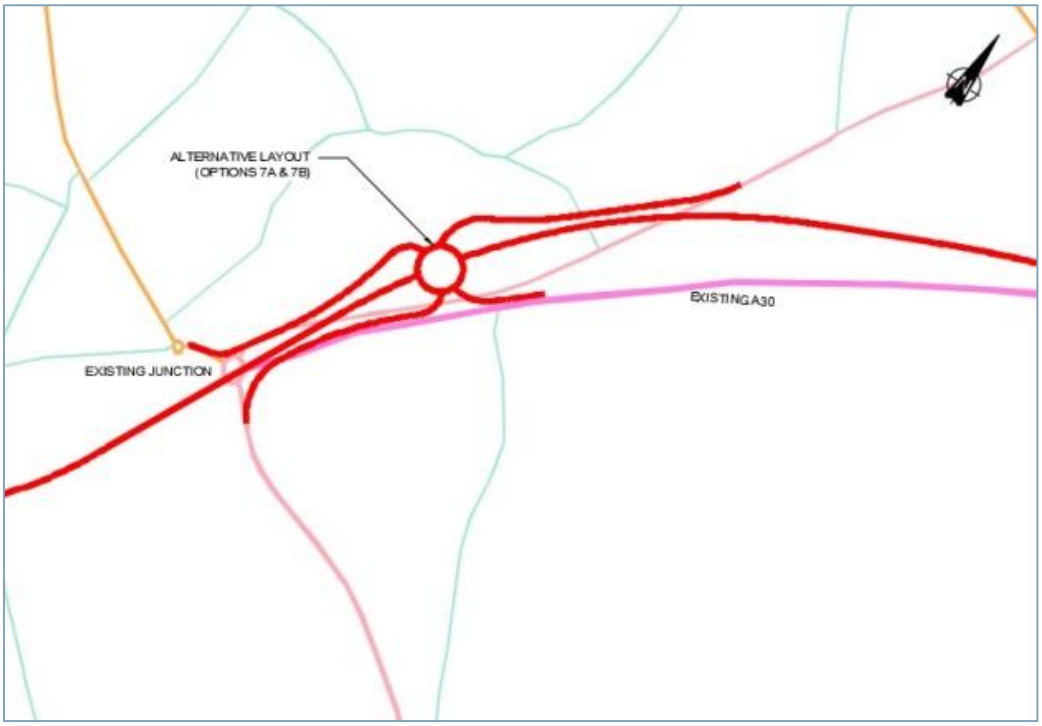


Figure 7-3: Chiverton junction - large gyratory close to existing junction

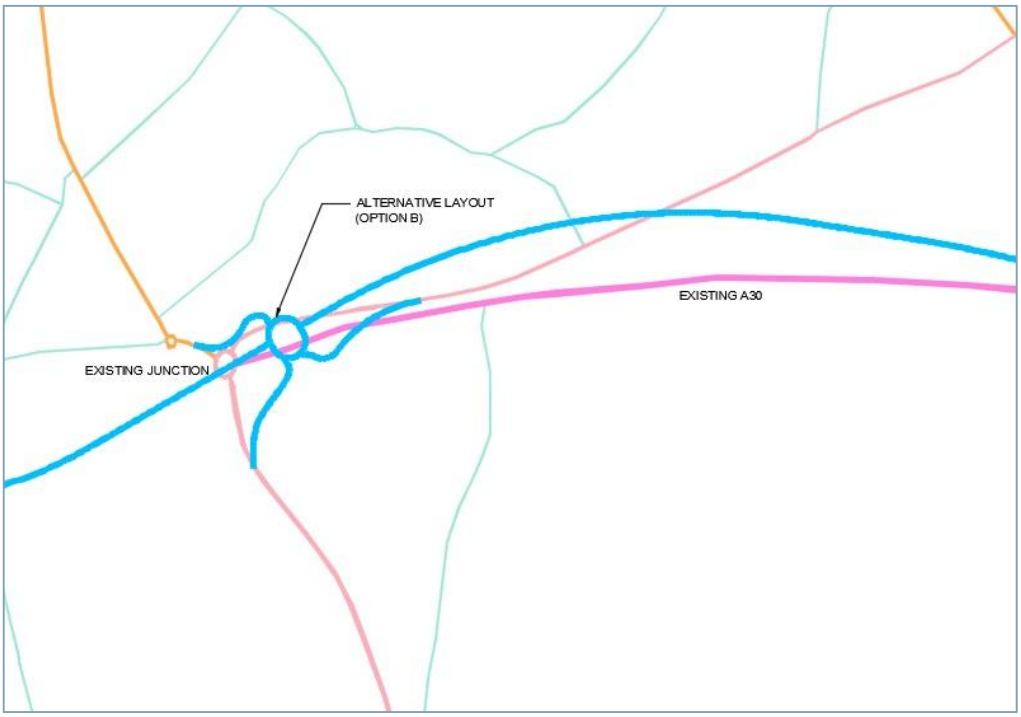


Figure 7-4: Chybucca - public consultation layout

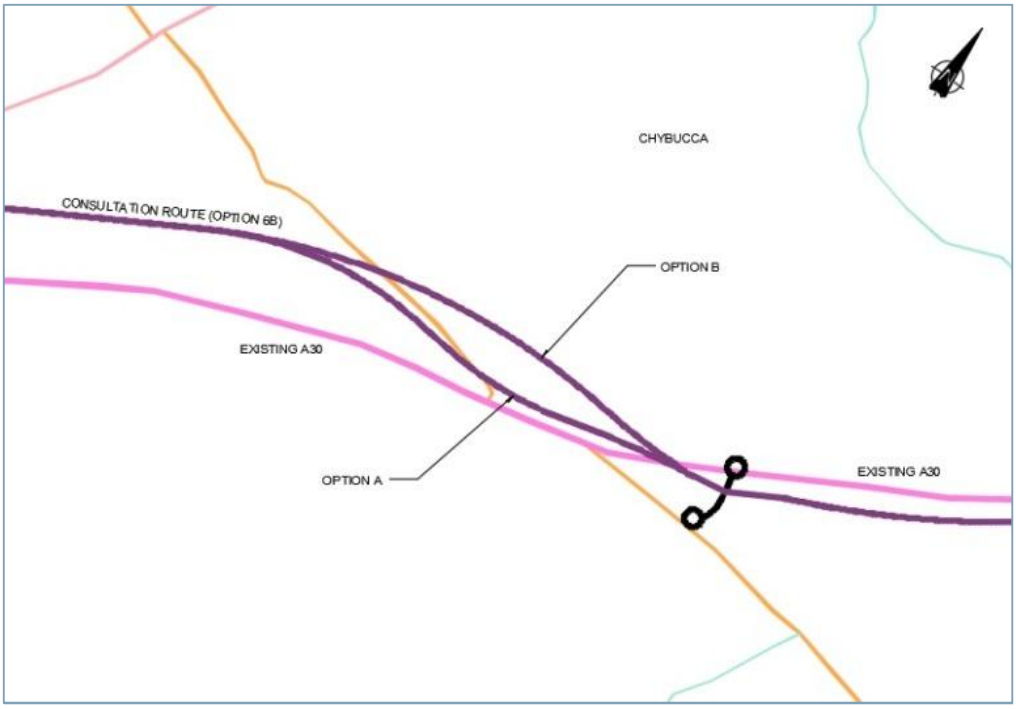


Figure 7-5: Chybucca - alternative layout

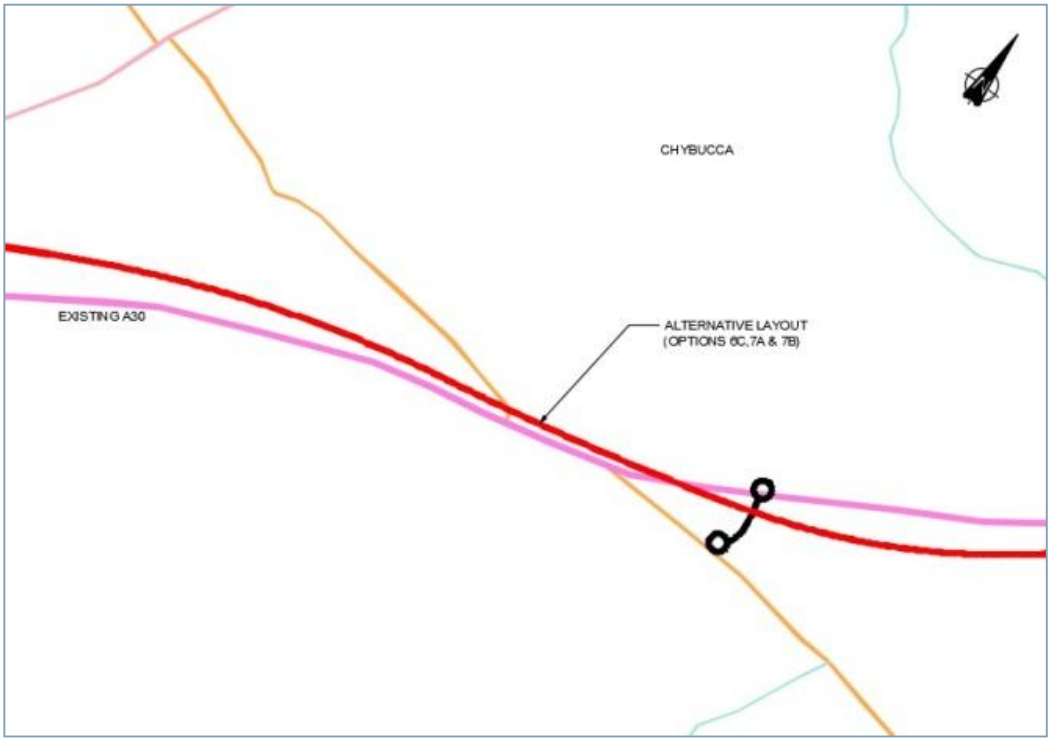


Figure 7-6: Marazanvose - public consultation layout and alternative layouts

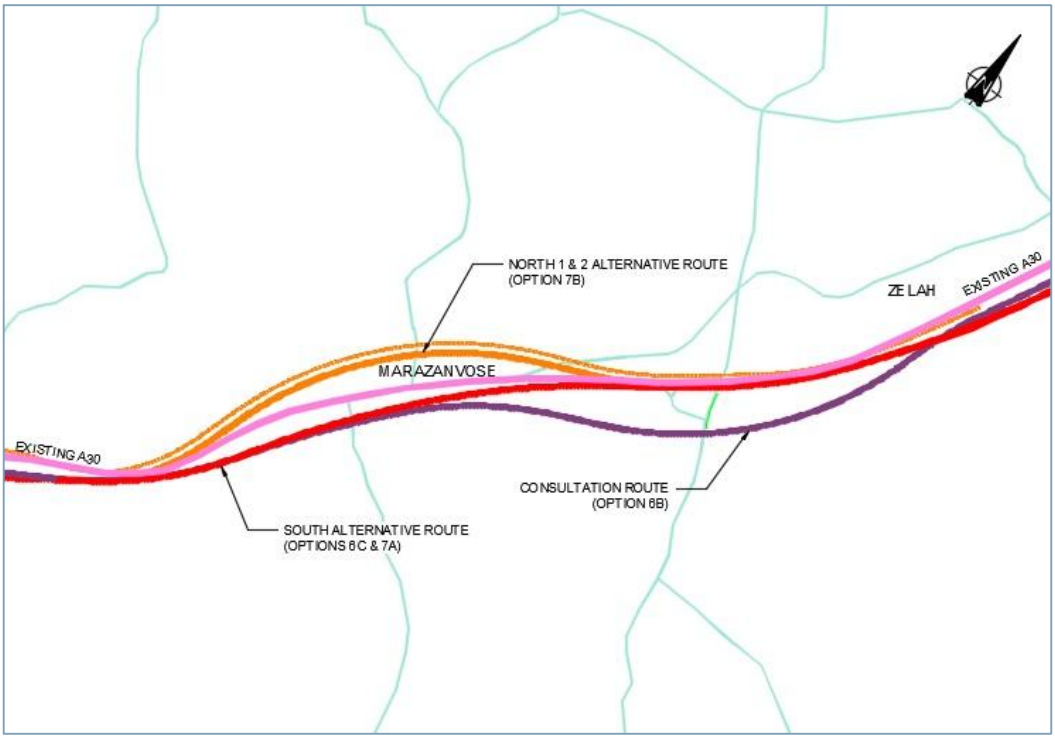
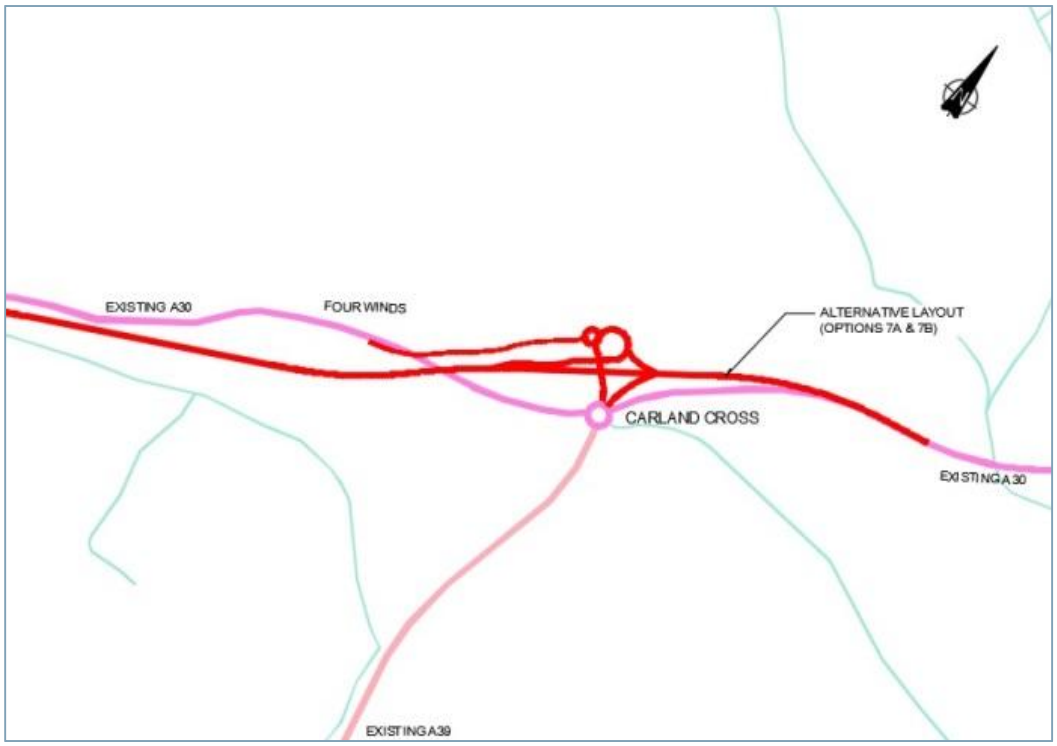


Figure 7-7: Carland Cross junction - public consultation layout

Figure 7-8: Carland Cross junction - alternative layout



7.2.2 The refinement and selection process

The refinement and selection process used is shown in Figure 1-2 in Chapter 1. The alternatives were reviewed at the design review workshops, using pair-wise comparison informed by an assessment framework.

The workshops considered all issues associated with a choice of alternative for each location against a refined public consultation option. Issues that were deemed to be 'significant' in the selection of the preferred option were discussed. The understanding of those issues deemed to be significant, and the weighting given to each issue, was informed by reference to the content of the National Policy Statement for National Networks. The Comparison Table listing all alternatives and impacts, used for selection of significant issues, is included in Appendix B.

7.2.3 Operational assessment of alternative junctions

As part of the refinement and alternative development and assessment process, an operational assessment of the principal junctions was undertaken for:

- the consultation layout; and
- alternative layouts at Chiverton Cross and Carland Cross which emerged from the public consultation.

The junction options assessed were:

- Chiverton Cross:
  - Consultation – Dumbbell roundabouts
  - Alternative Option A – Gyratory as close as possible to Chiverton Cross
  - Alternative Option B – Gyratory at consultation dumbbell location
- Chybucca:
  - Consultation – Dumbbell roundabouts
- Carland Cross:
  - Consultation – Single roundabout
  - Carland Cross Alternative– Dumbbell roundabouts

The results of the assessment show that in the forecast years all options would operate below capacity in all peak hours.

7.2.4 Economic assessment of alternative junctions

Economic assessments were carried out on the three options below:

- Chiverton Alternatives:
  - Alternative Option A – as close as possible to Chiverton Cross
  - Alternative Option B – at consultation dumbbell location
- Carland Cross alternative junction arrangement (new side road link to the north)

The economic assessment for these options only includes Transport Economic Efficiency Benefits (TEE) for the AM, interpeak and PM peak periods and excludes off-peak, weekend and bank holidays TEE benefits. Table 7-2 below outlines the relative changes to the Present Value of Benefits (PVB) with each alternative in place:

Table 7-2: Relative changes to Present Value of Benefits for scheme junction alternatives

Option	PVB (£000s)	Difference From Consultation	
		£000s	%
Consultation (AM, IP and PM only)	443,578		
Chiverton Cross Alternative - Gyratory (Option A)	452,950	9,372	+2%
Chiverton Cross Alternative - Gyratory (Option B)	447,155	3,577	+1%
Carland Cross Alternative – Dumbbells	447,355	3,777	+1%

Each alternative shows an increase in PVB over the consultation alignment. The alternatives increase the benefits by between 1% and 2% over the consultation PVB for the same time periods.

7.2.5 Environmental assessment

All environmental impacts were assessed during the scheme development, and compared during the route selection process. The impact of the scheme alternatives on the environmental receptors along the corridor is similar - the potentially significant impacts are on landscape, cultural heritage assets and biodiversity receptors. Of these, only the cultural heritage impacts vary with the route option.

7.3 Assessment of alternatives

The assessment process is formed of the following stages:

Prior to option selection workshop:

1. Each alternative for each element of the schemes was developed so that there is like-for-like comparison in terms of scale, quantum, purpose, etc.
2. Each project discipline reviewed each element and summarised the assessed impacts in the Comparison Table (see Appendix B), such that the likely impacts/effects of each element are understood.
3. From analysis of each discipline's summary assessment of each option, key risk areas were identified for sharing with the workshop group.
4. At the option selection workshop, the workshop participants reviewed drawings of each assessed alternative and the Comparison Table. The summarised significant impacts for each alternative were described by relevant specialists to ensure a common understanding of all salient issues.
5. When all salient issues were listed for each alternative, a pairwise comparison was undertaken during the workshop i.e. two alternatives were compared; advantages and disadvantages were listed; and conclusions reached on which alternative to take forward for comparison with any further option. This pairwise comparison process was repeated until a preferred option emerged.

7.3.1 Chiverton Cross junction (Figures 7-1 to 7-3)

The junction layout of Option 6B, presented at Public Consultation, was refined to address concerns about traffic capacity and resilience by widening the connection between the 'dumbbell' roundabouts.

Two alternative gyratory layouts were developed for comparison with the dumbbell layout. These alternatives were at different locations:

- Option A - a single large roundabout at the location of the consultation dumbbell and
- Option B - a single large roundabout adjacent to the existing Chiverton roundabout.

Option A was preferred and taken forward for further assessment. Although more expensive, due to the cost of an additional underbridge, a gyratory layout is heavily supported by Cornwall Council as it would provide greater resilience to future traffic growth beyond design year. The length of detour for pedestrians and cyclists traveling between the B3277 and the A390 could be addressed by a non-motorised user crossing at Chiverton, but this is subject to further design development.

It was concluded that the alternative layout should be incorporated in an alternative scheme for comparison with the refined consultation, whilst recognising that further work on the junction proposals would be necessary at Stage 3.

7.3.2 Chybucca (Figures 7-4 and 7-5)

The alignment of Option 6B, presented at Public Consultation, is offset by approximately 200m to the north of the existing A30 between Ch 2,500 and Ch 4,000 to minimise conflict between the construction works and the existing traffic.

Alternatives emerged during public consultation that sought to minimise agricultural land severance and make better use of the existing highway land. An optimised partially 'on-line' alternative was developed from the ideas that emerged during public consultation. Those ideas sought to minimise agricultural land severance, make better use of the existing highway land and reduce impact on adjacent dwellings. This on-line alternative aligns the main carriageway closer to the existing road both to the west and east of the junction at Chybucca and was aligned to minimise impacts on a Scheduled Monument to the north of the A30 and a woodland subject to a Tree Preservation Order to the south of the A30.

The alternative was preferred because it significantly reduces agricultural land severance, although it would cost more due to increased traffic management and more extensive statutory undertaker diversions.

It was concluded that the alternative layout should be incorporated in an alternative scheme to be compared with the refined consultation scheme.

7.3.3 Carland Cross (Figures 7-7 and 7-8)

Option 6B, presented at Public Consultation, was refined to improve capacity. The alternative was developed to enhance the historic environment by removing a section of the existing A30 west of the junction and reconnecting the barrow group. This is achieved by connecting the existing A30 to the junction with a new side road link along the north side of the proposed dual carriageway.

The alternative was preferred because it has environmental benefits and eliminates the need for a bridge at Newlyn Downs to connect the existing A30 to the junction. Initial concerns that the southern roundabout of the junction may be less clear for road users than Option 6B were addressed. A safety review was undertaken, which identified no significant safety issues. It noted that care will be needed when detailing the signing and lining strategy so that it is made clear to drivers which lanes they should be in as they approach the Carland Cross roundabout.

It was concluded that the alternative layout should be incorporated in an alternative scheme for comparison with the refined consultation scheme, whilst recognising that further work on the junction proposals would be necessary at Stage 3.

7.3.4 Marazanvose (Figure 7-6)

The alignment of Option 6B, presented at Public Consultation, curves east past Nancarrow Farm staying south of Hill House before curving north to follow a line just east of the existing A30 boundary. Three alternatives were developed as summarised below:

- A southern alternative which sought to reduce agricultural severance by aligning the route to the north of Hill House and using the existing Twobarrows Bridge for the dual carriageway.
- Two alternatives to the north of the existing A30 to decrease agricultural land severance at Nancarrow Farm:
    - the first uses existing roads to form a local route (North Option 1);
    - the second provides a new road north of the proposed dual carriageway to provide local access (North Option 2).

Additionally, the consultation option was refined by moving the alignment south-eastwards parallel to Zelah bypass to reduce its impact on Zelah village by maintaining the mature landscaping along the existing bypass slopes.

Further refinement of the consultation option and the alternatives was undertaken to:

- address comments received during consultation regarding the need for improved local and farm access;
- reduce farm severance;
- minimise impact on property; and
- provide essential bat mitigation following ecological surveys and assessment.

The southern options were compared, then the two northern options, then the better performing of each compared. The process was formed of two stages:

- an initial stage to ascertain whether there were any clear preferences
- a final stage that was informed by independent cost estimates of the combined alternatives.

The initial stage concluded that North Option 1 should be discarded because it provided a poor alignment for the local route.

7.3.5 Selection between alternatives

The refinement and assessments described above resulted in three remaining alternatives to be taken forward for further assessment combined with options at Chiverton, Chybucca and Carland Cross as indicated in Table 7-3. These consisted of the different combinations of link alignments, junction layouts and/or additional structures.

Table 7-3: Option selection

Option	Options
6C	Option 6B with refinements noted in section 7.2
7A	Option 6C with revised junction layouts at Chiverton and Carland Cross and southern alignment at Marazanvose.
7B	Similar to Option 6C with revised junction layouts at Chiverton and Carland Cross and northern alignment at Marazanvose (North Option 2)

Table 7-4 records the elements included in each option.

Table 7-4: Elements included within the Route Options

Scheme Element	Scheme option		
	6C	7A	7B
Chiverton Cross Junction			
Public Consultation (Dumbbell refined)	Y		
Option B (Gyratory – at consultation location)		Y	Y
Chybucca: Ch 2,500 to 6,500			
Online	Y	Y	Y
Marazanvose: Ch 6,500 to 9,000			
Public Consultation (refined)	Y		
Southern Alternative		Y	
North Option 2			Y
Carland Cross Junction			
Public Consultation (refined - underbridge & capacity)	Y		
Alternative		Y	Y

Options cost estimates were prepared for the three options, and these costs were used to inform the route selection process. The selection of the proposed preferred route was completed at an option review workshop (as indicated in Figure 7-8) attended by the Project Manager, Assistant Project Manager, Design Director, Design Manager, Environmental Coordinator and Stakeholder Manager.

Generally, all three options would similarly enable the objectives of the scheme and so more specific and localised environmental, social and economic impacts were critical in the decision on the alignment in the Marazanvose section.

From the Comparison Table B3 for Marazanvose (see Appendix B), the key differentiators were identified and the alternatives were compared in accordance with the methodology set out in sections 7.3 as follows:

- Option 6C – the refined public consultation option was compared with option 7A, the southern alternative because both followed a route south of the existing A30.
- Next, the selected Option 7A southern alternative was compared with Option 7B the northern alternative (North Option 2) to test the choice between a northern or southern alternative.

7.3.6 Option 6C compared with Option 7A at Marazanvose

Option 6C, the refined public consultation route was compared with Option 7A, the alternative southern alignment for the link through Marazanvose. The following elements were considered pertinent to this comparison:

Table 7-5: Comparison of option 6C and option 7A at Marazanvose

	Option 6C	Option 7A	Best-performing alternative
Land area acquired (non-highway)	10 ha	8 ha	7A
Risk of delay/cost due to utility works	Less online construction, lower risk	More on-line construction, higher risk	6C
Business impacts	Increased adverse impact on Nancarrow Farm, fields severed, farmyard requires relocating	Reduced adverse impact on Nancarrow Farm, possible reduced efficiency of farmyard location	7A
Landscape	Greater adverse impact, route remote from existing alignment	Reduced adverse impact, close to existing alignment	7A
Visual impact	Greater disruption of field pattern & boundary vegetation	Reduced adverse impact, close to existing alignment	7A
Noise	Significant adverse impact on Hill House, slight impact at Nancarrow Farm slight reduction at Marazanvose	Neutral impact (similar to existing) at Hill House, other impacts similar to 6C	7A
Residential demolition	None	Marazan Barn and Grooms Cottage at Nancarrow Farm	6C
Most likely cost	£294.5m	£291.4m	7A

Option 7A was taken forward for comparison with Option 7B because it reduced the area of agricultural land required and therefore had a lesser effect on a local business despite the loss of some private properties. It also had a lesser environmental impact than Option 6C. In particular, the landscape and noise impacts of Option 7A were lower. The NPSNN requires schemes to be designed carefully to minimise landscape harm. Option 7A is closer to the existing A30 at Marazanvose and therefore addresses this issue.

Although the majority of the public responding to the information event favoured the consultation alignment (Option 6C) at Marazanvose as this route was further away from the properties at the southern end of Zelah, the benefits of Option 7A as set out above were considered to outweigh these concerns. The new dual carriageway will occupy the existing road cutting at this point and where necessary additional mitigation will be considered.

7.3.7 Option 7A compared with Option 7B at Marazanvose

Option 7A, the alternative southern alignment was compared with Option 7B, the alternative northern alignment for the link through Marazanvose. The following elements were considered pertinent to this comparison:

Table 7-6: Comparison of option 7A and option 7B at Marazanvose

Impact compared	Option 7A	Option 7B	Best-performing alternative
Land area acquired (non-highway)	8 ha	10 ha	7A
Risk of delay/cost due to utility works	Route crosses higher section of Western Power Distribution (WPD) transmission line with higher headroom, 2 pylons may require support	Route crosses higher section of WPD transmission line with lower headroom, 2 pylons may require support	7A
Business impacts	Loss of 1 field and reduces size of 6 fields. Adverse impact on Nancarrow, possible reduced efficiency of farmyard location due to lost field. Possible impact on wedding business during construction if not screened.	Severs 8 fields and reduces size of 1 field. Adverse impact on Chyverton Park eventing area.	7A
Cultural heritage	Adverse impact on listed Nancarrow Farmhouse	Adverse impact on Chyverton Registered Park & Garden	7A
Visual impact	Reduced impact, close to existing alignment	Greater disruption of field pattern & boundary vegetation	7A
Living conditions	Adverse impact on 2 residential properties at Nancarrow	Adverse impact at Marazanvose, roads both sides of 5 residential properties	7A
Noise	Adverse impact on 2 residential properties at Nancarrow, can be mitigated	Adverse impact on 5 residential properties at Marazanvose, can be mitigated	7A
Residential demolition	Marazanvose Barn & Grooms Cottage, Nancarrow	Marazanvose Barn	7B
Most likely cost	£291.4m	£301.8m	7A

Preferred option

Option 7A was taken forward for inclusion in the recommended preferred route because, for almost all pertinent issues, it emerged as the best performing option. In particular, it has a lower environmental

impact especially on landscape, despite the loss of some private properties. It is also the favoured option when examining cultural heritage impacts against NPSNN criteria. These are further explained below. In addition, Option 7A reduces the area of agricultural land required, and is significantly cheaper, whilst still meeting the objectives of the scheme.

Landscape

Option 7B would be more disruptive to the field pattern than Option 7A. There would also be a loss of woodland in the immediate setting of Chyverton House and grounds Registered Park and Garden and the dwellings at Marazanvose would become an island between old and new A30.

Option 7A would be relatively closer to the existing alignment and would therefore cause less severance of fields than Option 7B. By minimising harm to the landscape it is considered to accord better than Option 7B with the aims of NPSNN Paragraphs 4.28-4.35, and 5.143 to 5.161, which deal with good design and landscape.

Cultural Heritage

Option 7B would lead to a direct loss of woodland that is functionally part of Chyverton House and Grounds Registered Park and Garden. Option 7A through this area is as close to the existing alignment as possible to minimise effects.

Option 7B would harm the setting of a Registered Park and Garden, including a number of Listed Buildings within Chyverton Park. Whilst Option 7B is outside the official boundary for the designation, the area through which the route would pass is functionally and aesthetically part of the park and, as such, a direct impact on the park would therefore cause harm. Option 7B would therefore be more difficult to justify using the provisions of NPSNN, Paragraph 5.132, and the stipulations of Paragraph 5.133. By being further from the existing alignment and severing the field patterns Option 7B would also be more harmful to the fabric and character of the farming landscape than Option 7A.

Option 7A would impose on the setting of Nancarrow farmhouse and wall, which is set within a small river valley. The asset and its surroundings are in use as both a working farm and a wedding venue, and remain tranquil despite existing noise from the A30. The road would impact on both the surrounding agricultural landscape that forms the immediate setting and tranquillity by introducing additional noise.

It is considered that any harm to this asset can be justified by balancing the public benefits that would arise from the scheme (NPSNN, Paragraph 5.132). This takes into account necessity for the route to pass through the Nancarrow and Marazanvose area, and lack of viable alternatives.

Option 7A is therefore most likely to comply with the policy and legal framework provided by the NPSNN and relevant legislation, including an appropriate balance of social, environmental and economic outcomes. This resulting scheme could therefore be consented by the Secretary of State, following detailed design at PCF Stage 3.

7.4 Proposed Scheme (Option 7A)

7.4.1 Forecast Traffic Flows

The forecast traffic flows within the study area indicate that there is an increase in traffic on the A30 with the scheme in place. This is caused by traffic rerouting from local routes such as the A3075 and accessing the A30 at Chiverton Cross and Carland Cross. These forecasts were based upon the Project Control Framework Stage 2 appraisal work and further details are in the Stage 2 Traffic Forecasting Report.

7.4.2 Journey Times

Traffic modelling of the route showed that journey time savings would be made. Specifically, the modelling shows the scheme would reduce journey times by between 4 minutes 45 seconds and 8 minutes 6 seconds when compared to the respective do-minimum scenario. Further details are in the Stage 2 Traffic Forecasting Report.

7.4.3 Economic Assessment

The economic assessment, which is discussed in further detail in the Stage 2 Economic Assessment Report, shows that the scheme would provide benefits to transport users, resulting from the significant improvement in the performance of the A30. The scheme adjusted benefit cost ratio (BCR) is 2.9, which represents 'High' value-for-money. This adjusted BCR also includes the monetised impacts of journey time reliability, wider economic impacts and landscape impacts.

7.4.4 Environmental Assessment

The environmental assessment, which is discussed in further detail in the Stage 2 Environmental Study Report, concludes that the scheme has the potential to result in beneficial effects on human and ecological receptors by reducing noise and improving air quality. There is also the potential to improve the setting of some cultural heritage assets. However, it is also possible that the scheme has the potential to result in some significant environmental effects on cultural heritage assets, landscape character and visual receptors, and on people and communities, depending on the nature of the mitigation that would be identified at PCF Stage 3.

7.5 Operations and maintenance assessment

The other options considered following public consultation, as discussed above, in operational terms offer limited differences in comparison to the proposed option.

Where the main line alignment of the alternatives are more sinuous at Marazanvose, there is potential for more difficulty with temporary traffic management and the establishment of safe taper positions. The alternatives have similar horizontal and vertical alignments.

With respect to the junctions, a dumbbell arrangement (option 6C) would present more traffic management issues in comparison to the single larger gyratory roundabout (option 7). The latter gives more carriageway width to move live traffic lanes across the carriageway. The proposed dumbbell would give too short a length between smaller roundabouts for normal Traffic Signs Manual Chapter 8 signing. There would also

be too short a length for contraflow to operate and so it would be more difficult to access the carriageway for pavement replacement and bridge deck works.

7.6 Technical Feasibility of Alternatives

The proposed solution is technically feasible taking into account the constraints identified. The estimated cost of the scheme reflects the difficulties and problems likely to be encountered.

8 Conclusion and recommendations

8.1 Conclusions

8.1.1 Client Scheme Requirements

The work undertaken in Project Control Framework Stages 1 and 2 confirmed that the Client Scheme Requirements for improving the A30 between Chiverton and Carland Cross to dual carriageway standard is feasible in engineering and environmental terms and that it is economically viable.

8.1.2 Off-line scheme

Project Control Framework Stage 1 concluded that an off-line scheme was preferable in comparison with partial on-line options for the following reasons:

- reduced air quality and noise impacts on properties alongside the existing road;
- better opportunities for re-use of the existing road for local connectivity, including non-motorised use, as well as part of the Land's End to John O'Groats cycling route;
- less delay and disruption to road users during construction;
- quicker and cheaper to construct; and
- provides an alternative route in the event of an incident on the A30, improving resilience.

The junction and side road strategy for the scheme was to provide grade separated junctions at Chiverton and Carland Cross and to restrict any other connections to the local road network. Local connectivity would be provided by utilising the existing A30. An additional partial grade separated junction with west-facing slip roads was added at Chybucca to improve the operation of the Chiverton junction.

8.1.3 Public consultation

The main concerns expressed by stakeholders during the public consultation were:
Chiverton Cross Junction – concerns over capacity and length of detour (St Agnes to Truro);

- Severance of useful farming land throughout the length of the scheme;
- retaining existing north-south routes, including NMU routes;
- Alignment at Chybucca – separation of the two properties at Callestick Vean Farm;
- Lack of east facing slips at Chybucca;
- Negative impact on certain farms and businesses;
- Poor connectivity between Zelah and the parish of St. Allen;
- impacts and enhancement of heritage monuments and their landscape setting, including Warrens Barrow at Carland Cross; and
- provisions for cyclists;

8.1.4 Option refinement and assessment

As a result of the comments made during the public consultation in October and November 2017, a number of alternatives and refinements were designed and investigated. Key stakeholders were re-consulted on the alternatives and refinements at a Value Management workshop and at a public information event.

The alternatives and refinements were assessed at a series of workshops. This led to a final choice between three options:

- 6C (public consultation route refined),
- 7A (southern alternative at Marazanvose)
- 7B (northern alternative at Marazanvose).

The selection of the proposed preferred route was completed at an option review workshop, where these remaining options were compared. The conclusion of the option review was that option 7A should be taken forward as the proposed preferred route, subject to confirmation by Highways England, whilst recognising that further work on the junction proposals at Chiverton and Carland Cross would be necessary at Stage 3.

Option 7A

The estimated scheme cost is £291.4 million. In the forecast year, all proposed junctions and their alternatives would operate below capacity in all peak hours.

The economic assessment shows that the scheme would provide benefits to transport users, resulting from the significant improvement in the performance of the A30. The scheme's adjusted benefit cost ratio (BCR) is 2.9, which represents 'High' value-for-money. This adjusted BCR also includes the monetised impacts of journey time reliability, wider economic impacts and landscape impacts.

The Transport Planning Group (formerly TAME) has confirmed their agreement that the economic assessments have been correctly carried out with current data and that the basis for the traffic forecasting is also agreed.

8.2 Recommendation

It is recommended that scheme development proceeds with Option 7A, as shown in Appendix C. The proposed solution is technically feasible taking into account the constraints identified. Option 7A performs best in comparison with the other options as follows:

- in compliance with the National Policy Statement for National Networks, particularly in respect of landscape, cultural heritage and biodiversity assets;
- is easier to build, reducing adverse effects on travellers during construction; and
- is estimated to cost less than alternatives

Opportunities for scheme enhancements include those identified during Stages 1 and 2, as listed in Table 8-1 below.

Table 8-1: Potential scheme enhancements

Location	Enhancement Opportunity	Issues
Historic heritage	Enhance setting of Carland barrow group by acquiring the area they occupy	Additional land acquisition costs
Biodiversity net gain	Acquire land to re-create lost habitat (could be combined with above to enhance setting of Carland barrows)	Additional land acquisition and planting costs
Cyclist route on existing A30	Provide facilities required to meet IAN195	Significant additional infrastructure and land acquisition costs
Non-motorised user crossing points	St Agnes to Treliske cycle link at Chiverton	Additional infrastructure costs
	Cycle link Carland to Mitchell	Additional infrastructure and land acquisition costs
	Provide underpass at Church Lane to maintain link between Zelah and parish church	Additional infrastructure costs

9 Appraisal Summary Table

Appraisal Summary Table

Date produced:	13	6	2017

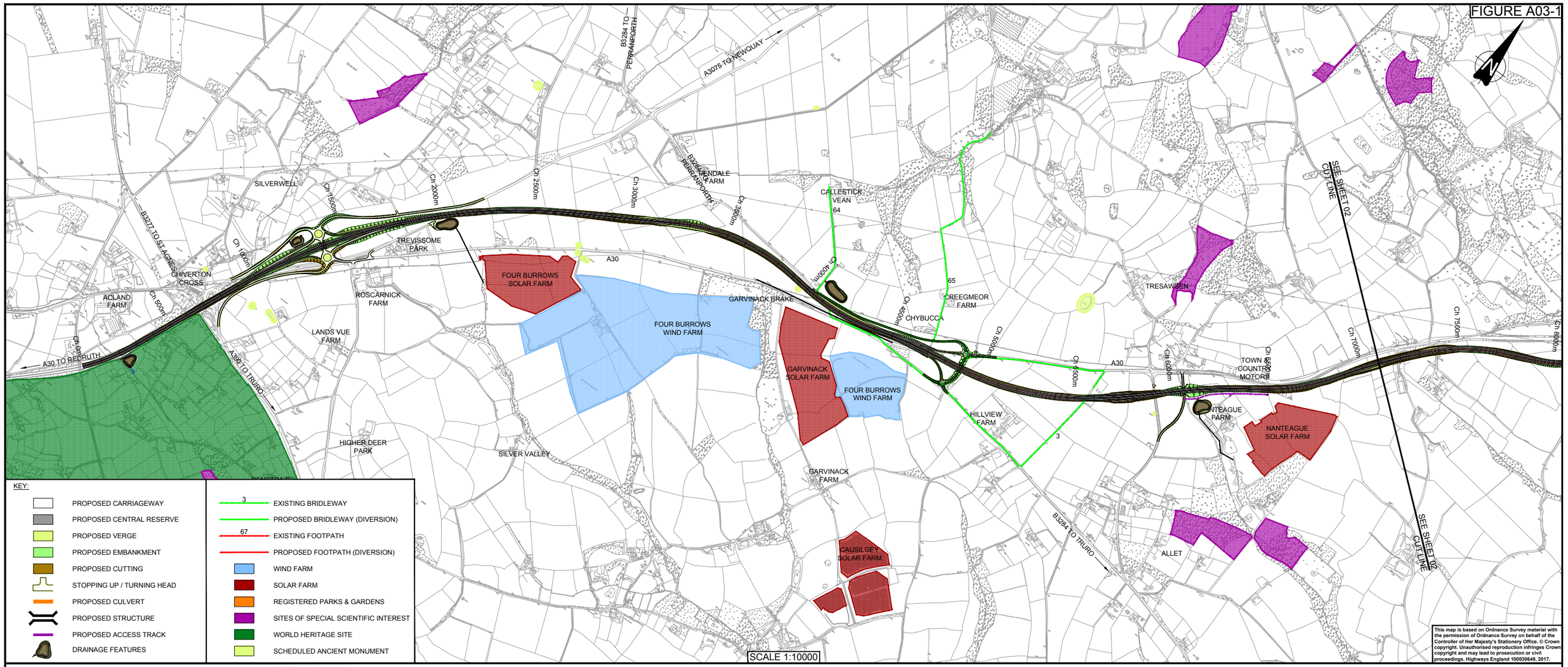
Contact:	
Name	Josh Hodder
Organisation	Highways England
Role	Promoter/Official

Name of scheme:	A30 Chiverton to Carland Cross
Description of scheme:	Upgrade 12.5 km of single carriageway to dual carriagway on the A30 between Chiverton and Carland Cross (Option 7A), with grade separated junctions at Chiverton Cross and Carland Cross, as well as an intermediate junction at Chybucca north of Callestick Vean.

Impacts		Summary of key impacts	Assessment			
			Quantitative	Qualitative	Monetary £(NPV)	Distributional 7-pt scale/ vulnerable grp
Economy	Business users & transport providers	The significant reduction in congestion and delays as a result of the scheme would improve travel time for business users, both for traffic using the A30 trunk road and for traffic accessing Truro.	Value of journey time changes(£): 237,557,000 Net journey time changes (£) 0 to 2min: 33,717,000; 2 to 5min: 63,913,000; > 5min: 139,927,000		£204,955,000	
	Reliability impact on Business users	The increased capacity as a result of the scheme would lead to more predictable journey times, reduce the impact of incidents, reduce driver stress and create a more reliable route for business users.	Stress on the A30 without scheme = 108% Stress on the A30 with scheme = 29%	Slight Beneficial	£11,878,000	
	Regeneration	The decrease in journey times, better reliability and improved connectivity to the wider UK would make west Cornwall towns more attractive to business who rely on the strategic road network and wish to relocate or expand. This would both increase jobs and make existing jobs more accessible. The improvements to the local economy would help the area to regenerate.	The scheme has the potential to support 420 net additional jobs and £102 million net additional discounted GVA cumulative over 30 years.	Beneficial		
	Wider Impacts	There is a positive 'output change in imperfectly competitive markets' impact; the reduction in transport costs as a result of the scheme will allow businesses to profitably increase output of goods or services that require use of transport in their production. This increased output of goods and service is valued more highly by consumers than the cost of producing this output.			£ 20,496,000	
Environmental	Noise	The WebTAG noise assessment procedure indicates an overall worsening of road traffic noise within the study area. More properties are predicted to experience an increase in noise levels compared to the number predicted to experience a decrease. 73 properties are predicted to experience a moderate or major adverse change in noise level in the opening year, 37 properties are predicted to experience this magnitude of change in the design year (DMRB lond-term). 22 properties would experience this magntitude of beneficial change in the opening year, 12 in the design year (DMRB long-term). Based on the transformation method between day and night time noise levels, the NPV of impact on sleep disturbance is -£116,829. There is predicted to be an increase of 22 properties who would experience a noise level greater than 55dB Lnight Three NIAs would experience a decrease in noise level and four would experience no change/negligible change in noise level. It should be noted that the assessment has not considered the effectiveness of any potential noise mitigation measures such as the use of low noise surfacing or noise barriers / bunds.	161 households will experience an increase in daytime noise levels and 33 properties will experience a decrease in daytime noise levels in the opening year. 156 households will experience an increase in daytime noise levels and 37 properties will experience a decrease in daytime noise levels in the forecast (design) year.		-£272,039	Income Quintile 1 - Neutral Income Quintile 2 - Moderate Adverse Income Quintile 3 - Moderate Adverse Income Quintile 4 - Neutral Income Quintile 5 - Neutral
	Air Quality	Due to the route realignment increasing the distance between sensitive receptors and emission sources, slight decreases in pollutant concentration are expected at Fourburrow Farm House, as well as very slight decreases in concentration at properties in Marazanvose and Zelah. The relocation and reduction of congestion at Chiverton Cross is expected to cause a very slight decrease at nearby properties. No exceedences of the UK objectives are expected in future years with the scheme in place.		Neutral	Present Value of Change in Nox emissions: -£36,344, Present Value of Change in PM10 concentrations: -£12,831 Total value of change in air quality: -£49,175	Income Quintile 1 - Neutral Income Quintile 2 - Slight Beneficial Income Quintile 3 - Slight Beneficial Income Quintile 4 - Neutral Income Quintile 5 - Neutral
	Greenhouse gases	There would be an increase in emissions over the 60 year appraisal period as vehicles are able to drive faster and therefore use more fuel.	Change in non-traded carbon over 60y (CO2e): 759,848 Change in traded carbon over 60y (CO2e): 0		-£34,670,451	
	Landscape	Adverse impacts on the established pattern and grain of the landscape would arise from the Scheme due to the fragmentation of the field pattern. Existing vegetation and Cornish hedges would be lost. There would be views from some residential properties and from Newlyn Downs and some public rights of way which would be adversely affected. There would be an adverse impact on the landscape setting of statutorily designated features due to the introduction of the additional road infrastructure. The proposals would introduce additional and prominent infrastructure into the landscape that would detract from the over-riding rural character of the area.		Moderate adverse		
	Townscape	There will be no direct impacts on the townscape and the character is unlikely to be affected by the proposals. Views towards the scheme will be largely screened by intervening vegetation and built form.		Neutral		
	Historic Environment	The scheme will have up to a moderate adverse impact on the setting of 19 designated assets; one world heritage site, eight scheduled monuments, two Grade II* Listed Buildings, seven Grade II listed buildings and one Registered Park and Garden. There is expected to be a direct physical impact on three designated assets, which could have up to moderate adverse effects. The scheme is expected to have a slight benefical impact upon the setting of 6 designated assets; one scheduled monument and five Grade II listed buildings. There is a potential moderate adverse effect on two regionally important heritage assets through their destruction, loss or partial loss. Further to this, an adverse impact is predicted on a further 15 regionally or locally significant heritage assets. There is a high potential for buried archaeology, potentially of prehistoric to modern period and remains could be of national significance. There will be cumulative impacts from the scheme on both the former mining landscape and the prehistoric landscape, which have only a finite capacity for absorbing harm. The remaining cohesive agricultural landscape, that creates the setting of a number of assets both designated and non-designated, will be bisected and adversely harmed by the scheme through impacts which include removal of historic hedgerows and impacts on associated buried archaeology.		Moderate Adverse		
	Biodiversity	The majority of impacts on Newlyn Downs SAC/SSSI, four SSSIs, 13 CWSs, Roadside Inventory Habitats and protected species are considered to result in neutral or minor adverse effects as a result of input into the design and incorporation of environmental control measures to avoid/minimise indirect impacts. However, adverse effects are identified in the medium term as a result of the loss of mature habitats with higher intrinsic ecological value and those of importance to bats. Fragmentation effects are likely to be significant due to cutting through fields/hedgerows as oppose to edge habitats. This may result in the widening the distance between functionally linked habitats.		Large Adverse		
	Water Environment	Construction or alteration of the three current watercourse crossings may have a moderate adverse impact on local biodiversity, although the ecological value of the watercourses is unknown at this stage of the project. The construction of new crossings over the watercourses may have a minor adverse impact on their aesthetics. It is assumed that the capacity of existing watercourse crossings will be maintained and that any new watercourse crossings will be designed to manage the 1 in 100 year flow with an appropriate climate change .	N/A	Slight Adverse		
Social	Commuting and Other users	Significant reduction in congestion and delays would improve travel time for commuting and other users, both for traffic using the A30 trunk road and for traffic accessing Truro.	Value of journey time changes(£): 365,782,000 Net journey time changes (£) 0 to 2min: 70,312,000; 2 to 5min: 105,985,000; > 5min: 189,485,000		£292,026,000	Income Quintile 1 - Moderate Beneficial; Income Quintile 2 - Moderate Beneficial; Income Quintile 3 - Moderate Beneficial; Income Quintile 4 - Large Beneficial; Income Quintile 5 - Moderate Beneficial.
	Reliability impact on Commuting and Other users	The increased capacity would lead to more predictable journey times, reduce the impact of incidents, reduce driver stress and create a more reliable route for commuting and other users.	Stress on the A30 without scheme = 108% Stress on the A30 with scheme = 29%		£18,289,000	
	Physical activity	Due to the very low number of pedestrians and cyclists using the existing route it is unlikely that the introduction of the new scheme will lead to an increase in the number of cyclists or an improvement in journey times as limited new facilities are to be provided for these users. Based on this it has been determined that the scheme will not alter physical activity and thus this impact has not been assessed.		Neutral		
	Journey quality	While many factors will remain unchanged, journey quality for bus users is likely to improve, as traffic moves from the existing route to the new scheme. Travellers will benefit from improved views and also from reduced stress, caused by the new route being built to modern standards, reducing frustration and fear of potential accidents. These benefits will be experienced by the large numbers that would use the new route on a daily basis.		Moderate Beneficial		
	Accidents	The study area will experience a reduction in accidents as a result of the implementation of the scheme. The dual carriageway and associated grade separated junctions reduce the number of accidents on the A30. The majority of routes in the study area will see a reduction in the number of accidents due to rerouting effects.	Casualty Saving by Severity Fatal = 21 Serious = 117 Slight = 748 Total Accident Saving = 552		£41,552,000	All Identified Vulnerable Network Users (Children, Elderly, Pedestrians, Cyclists, Motorcyclists, and Young Male Drivers) - Moderate Beneficial
	Security	Personal security is likely to be improved for travellers on the new route with the provision of new laybys providing safe waiting areas with emergency call facilities. Personal security will also be improved for cyclists and public transport users due to the removal of traffic from the existing route. This will improve the quality of public transport waiting areas for passengers when waiting, boarding and alighting.		Slight Beneficial		
	Access to services	The scheme does not inherently provide for any change in Public Transport Accessibility.		Neutral		
	Affordability	Affordability is likely to decrease as the scheme increases speed along the mainline A30 leading to an increase in vehicle operating costs along this route. This route is heavily trafficked and therefore has an adverse impact on the overall level of vehicle operating costs. Because these additional costs relate to changes in vehicle speed, they are, in effect optional as vehicles will not have to travel at 70mph and incur the additional cost.		Moderate Adverse		Income Quintile 1 - Moderate Adverse; Income Quintile 2 - Slight Adverse; Income Quintile 3 - Moderate Adverse; Income Quintile 4 - Large Adverse; Income Quintile 5 - Moderate Adverse.
	Severance	The existing A30 is not well served with formal pedestrian or cycle crossings and as a result can cause severance by acting as a barrier to pedestrian and cycle movements. The scheme will introduce a new high speed route which will experience a large volume of traffic. Pedestrian surveys identified that at an existing point on the A30 to the south of Zelah on average less than one pedestrian cross the existing A30, based on this it is likely that the numbers are too low to produce a meaningful assessment. The proposed scheme will see pedestrians having to walk an extended route when crossing at Chiverton Cross however based on the numbers of pedestrians crossing the A30 this is unlikely to have a significant impact. The scheme is also going to see the Church Lane crossing at Zelah closed, with the introduction of a underpass at Trevalso (300 metres east) providing a new safer crossing point for pedestrians.		Slight Adverse		
	Option and non-use values	The proposal does not include improvements directly linked to public transport, meaning option values remain unaffected.		Neutral		
Public Accou	Cost to Broad Transport Budget	Out-turn Scheme Cost in 2016 prices = £291,387,172	PVC = £184,613,000		£184,613,000	
	Indirect Tax Revenues	Indirect Tax Revenues have been calculated using TUBA in line with WebTAG			-£61,020,000	

Appendix A. Route option 6B: presented at public consultation

FIGURE A03-1



KEY:

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- PROPOSED CENTRAL RESERVE
- PROPOSED VERGE
- PROPOSED EMBANKMENT
- PROPOSED CUTTING
- STOPPING UP / TURNING HEAD
- PROPOSED CULVERT
- PROPOSED STRUCTURE
- PROPOSED ACCESS TRACK
- DRAINAGE FEATURES
- 3 EXISTING BRIDLEWAY
- PROPOSED BRIDLEWAY (DIVERSION)
- 67 EXISTING FOOTPATH
- PROPOSED FOOTPATH (DIVERSION)
- WIND FARM
- SOLAR FARM
- REGISTERED PARKS & GARDENS
- SITES OF SPECIAL SCIENTIFIC INTEREST
- WORLD HERITAGE SITE
- SCHEDULED ANCIENT MONUMENT

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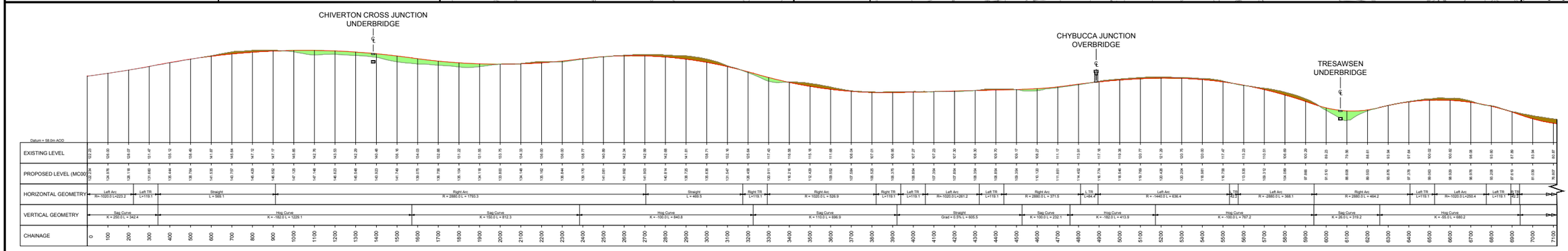

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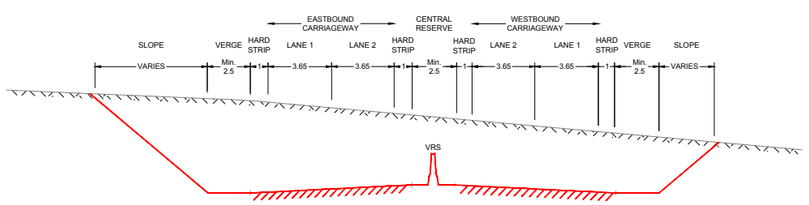
3. All levels are in metres above ordnance datum unless otherwise stated.



TYPICAL CUT SECTION (NTS)

Rev.	Date	Description	By	Chk'd	App'd
P01	22/06/2017	FOR SCHEME ASSESSMENT REPORT	AW	CB/MH	TH
P01.1	19/09/2016	INITIAL	AS	CB	---

Drawing Status: SUITABLE FOR STAGE APPROVAL
Suitability: S4

WSP
PARSONS BRINCKERHOFF
The Forum
Barnfield Road
Exeter
Devon
EX1 1QR
Tel: +44 (0)1392 229 700
www.wsp-pb.co.uk

Client: Working on behalf of highways england

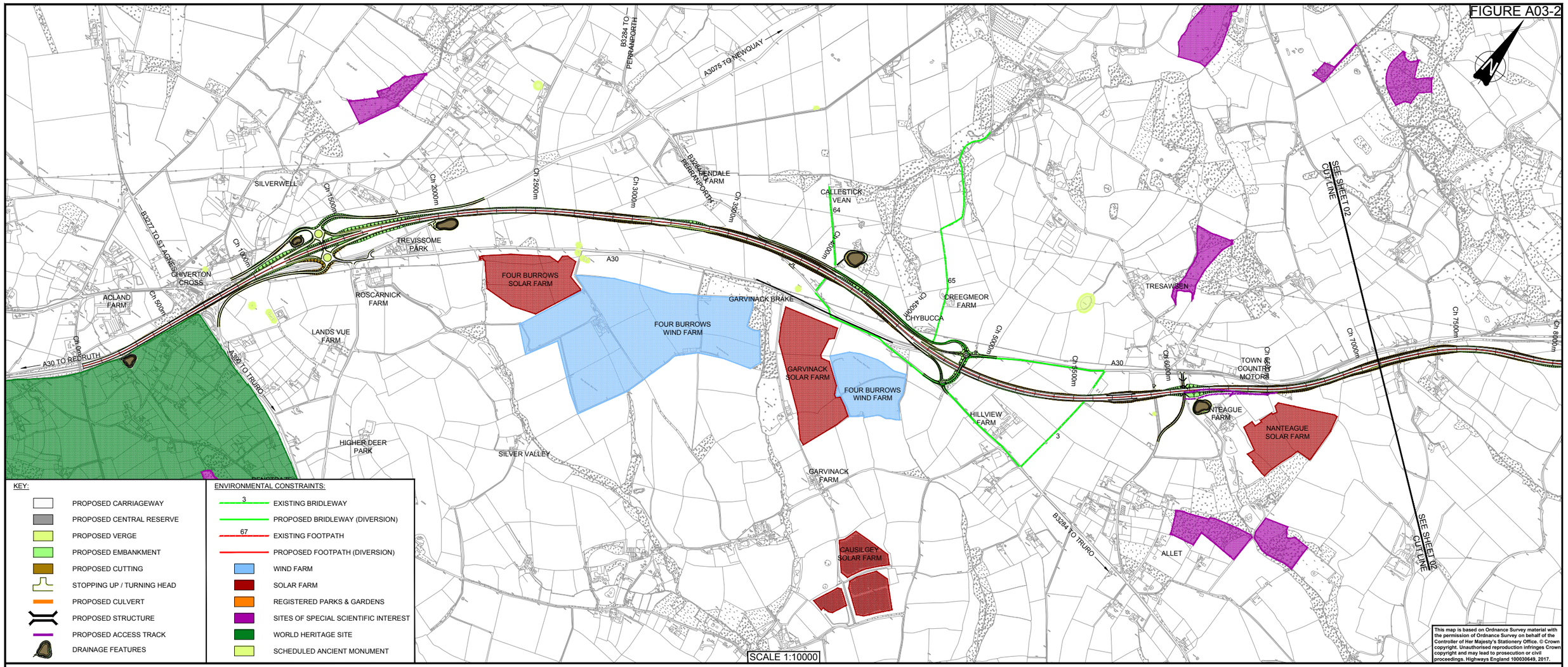
Project Title: A30 CHIVERTON TO CARLAND CROSS

Drawing Title: GENERAL ARRANGEMENT OPTION A SHEET 1 OF 2

Scale	Drawn	Checked	Approved	Authorised
AS SHOWN	AW	CB/MH	TH	---
Original Size	Date	Date	Date	Date
A1	22/06/2017	23/09/16	22/06/2017	---

Drawing Number: Project HA551502 | Originator WSP | Volume HGN | Location 0000 | Type DR | Role D | Number 00026
Project Ref. No.:
Revision: P01

FIGURE A03-2



KEY:

- PROPOSED CARRIAGEWAY
- PROPOSED CENTRAL RESERVE
- PROPOSED VERGE
- PROPOSED EMBANKMENT
- PROPOSED CUTTING
- STOPPING UP / TURNING HEAD
- PROPOSED CULVERT
- PROPOSED STRUCTURE
- PROPOSED ACCESS TRACK
- DRAINAGE FEATURES

ENVIRONMENTAL CONSTRAINTS:

- 3 — EXISTING BRIDLEWAY
- PROPOSED BRIDLEWAY (DIVERSION)
- 67 — EXISTING FOOTPATH
- PROPOSED FOOTPATH (DIVERSION)
- WIND FARM
- SOLAR FARM
- REGISTERED PARKS & GARDENS
- SITES OF SPECIAL SCIENTIFIC INTEREST
- WORLD HERITAGE SITE
- SCHEDULED ANCIENT MONUMENT

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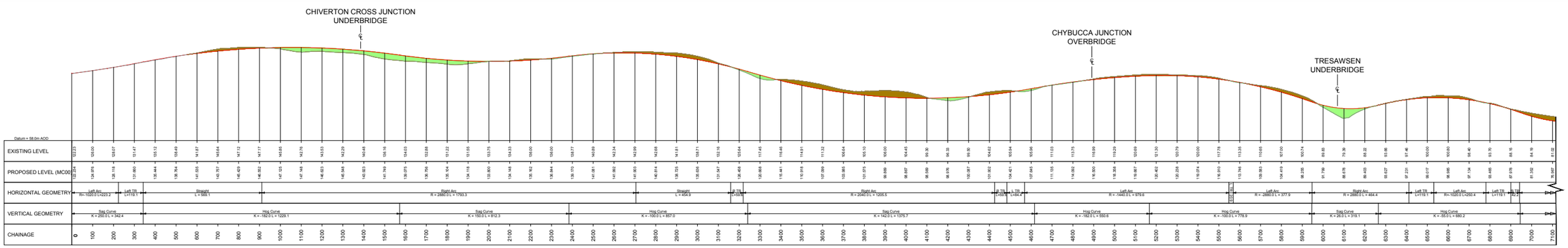

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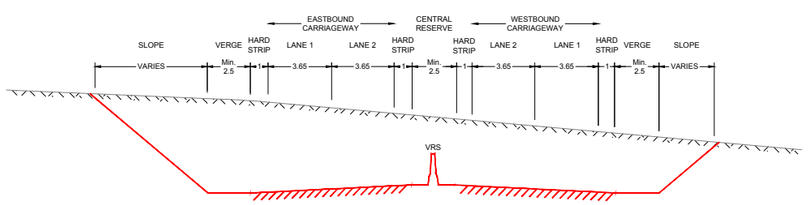

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Rev.	Date	Description	By	Chk'd	App'd
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P01.1	19/09/2016	INITIAL	AS	CB	---

Drawing Status: SUITABLE FOR STAGE APPROVAL

Suitability: S4

WSP
PARSONS BRINCKERHOFF
The Forum
Barnfield Road
Exeter
Devon
EX1 1QR
Tel: +44 (0)1392 229 700
www.wsp-pb.co.uk

Client: Working on behalf of highways england

Project Title: A30 CHIVERTON TO CARLAND CROSS

Drawing Title: GENERAL ARRANGEMENT OPTION B SHEET 1 OF 2

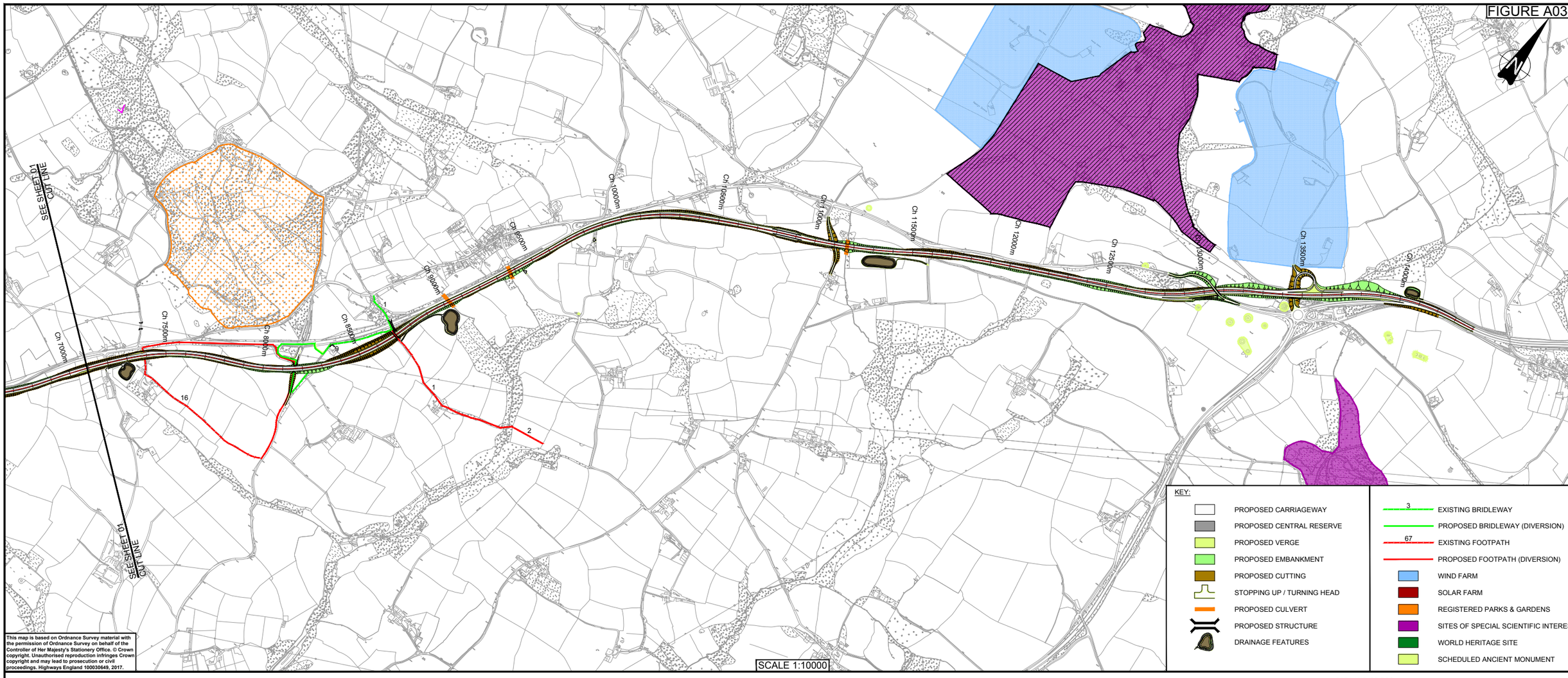
Scale	Drawn	Checked	Approved	Authorised
AS SHOWN	AW	CB	TH	---
Original Size	Date	Date	Date	Date
A1	22/06/2017	22/06/2017	22/06/2017	---

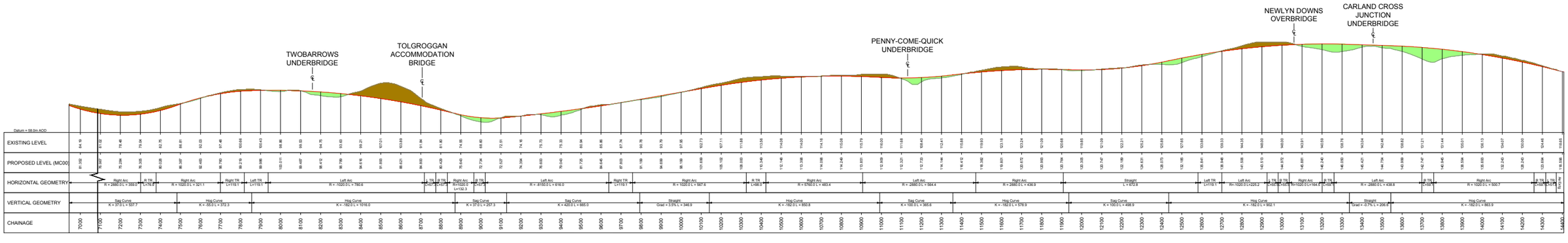
Drawing Number: Project HA551502 | Originator WSP | Volume HGN | Location 0000 | Type DR | Role D | Number 00027

Project Ref. No.

Revision: P01

FIGURE A03-3





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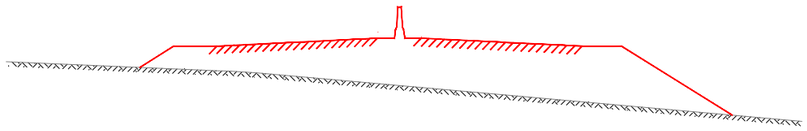
2. All dimensions are metres unless otherwise stated.
3. All levels are in metres above ordnance datum unless otherwise stated.



TYPICAL EMBANKMENT SECTION (NTS)

Rev.	Date	Description	By	Chk'd	App'd
P01	22/06/2017	FOR SCHEME ASSESSMENT	AW	CB	TH
P01.2	30/09/2016	INITIAL	AS	CB	---

Drawing Status: SUITABLE FOR STAGE APPROVAL
Suitability: S4

WSP | Parsons Brinckerhoff
The Forum
Barnfield Road
Exeter
Devon
EX1 1QR
Tel: +44 (0)1392 229 700

 www.wsp-pb.co.uk

Client: Working on behalf of highways england

Project Title: A30 CHIVERTON TO CARLAND CROSS

Drawing Title: GENERAL ARRANGEMENT OPTION A & B (COMMON) SHEET 2 OF 2

Scale	Drawn	Checked	Approved	Authorised
AS SHOWN	AW	CB	TH	---
Original Size	Date	Date	Date	Date
A1	22/06/2017	22/06/2017	22/06/2017	---

Drawing Number: Project HA551502 | Originator WSP | Volume HGN | Location 0000 | Type DR | Role D | Number 00028
Project Ref. No.:
Revision: P01

Appendix B. Assessment of alternatives framework table

Basic data for Alternatives	Chiverton Public Consultation Layout (October 2016)	Chiverton Cross Gyratory (Option A - closest to existing Chiverton Roundabout) Note: There are two sub-options: The mainline on underbridges over the gyratory and the gyratory on overbridges with the mainline passing below.	Chiverton Cross Gyratory (Option B - furthest from existing Chiverton Roundabout) Note: There are two sub-options: The mainline on underbridges over the gyratory and the gyratory on overbridges with the mainline passing below.
Strategy for comparison	Compare each of the sub-options for Options A and B, then compare the better performing sub-option of Option A with the better performing sub-option of Option B, then compare the better performing alternative with the Consultation Layouts		
Reason for alternative	Not applicable	Reduce detour	Additional capacity
Key Risk Areas for Consideration:	Landscape and visual impacts. Impact on tumuli and setting of St Peters Church. Capacity and longevity of the junction. The acceptability of departures. Buildability NMU provision.	Landscape and visual impacts. Impact on tumuli and setting of St Peters Church. Capacity and longevity of the junction. The acceptability of departures. Buildability NMU provision.	Landscape and visual impacts. Impact on tumuli and setting of St Peters Church. Capacity and longevity of the junction. The acceptability of departures. Buildability NMU provision.
Date dropped / accepted	02.03.2017	02.03.2017	02.03.2017
Assessment Data			
Drawing Reference *(sub option drawings shown in red italics)*		Drg HA551502-WSP-HGN-0000-DR-D-00041, *(HA551502-WSP-HGN-0000-DR-D-00059), (HA551502-WSP-HGN-0000-DR-D-00060), (HA551502-WSP-HGN-0000-DR-D-00061)*	Drg HA551502-WSP-HGN-0000-DR-D-00042, *(HA551502-WSP-HGN-0000-DR-D-00062), (HA551502-WSP-HGN-0000-DR-D-00063)*
Sub-options (where relevant)	None	Note: There are two sub-options: The mainline on underbridges over the gyratory and the gyratory on overbridges with the mainline passing below.	Note: There are two sub-options: The mainline on underbridges over the gyratory and the gyratory on overbridges with the mainline passing below.
Chainage	0-3000	0 -3000	0 -3000
Workshop Assessment Topics			
Amount of Best and Most Versatile (BMV) land affected.	Not possible to establish without site surveys. High level review using available data on iGIS shows that all land has the potential to be either Grade 3a or 3b. Grade 3a would be BMV land. There is no potential for Grade 2 BMV land to be affected by this option.	Ditto.	Ditto.
Agricultural land, access and farm severance	Impacts 16 fields from seven farms and a Highways England land holding. Significant loss of land from the 25 acre small holding at Silver Springs Farm. Significant land take from the large (open) fields forming part of Acland Farm. Impact on the operation of Hill View Farm. Large areas of isolated land created where access can be maintained but with impact on operations. Isolated parcels of, land may not be of use to Acland Farm given the scale of dairy operation at this farm.	Affects 19 fields from seven farms, Highways England holding and a private land holding. Access can be maintained to all parcels of land. Severed pieces of land are useable, particularly for Acland Farm. Severed sections of land forming part of Hill View Farm are also useable.	Ditto Consultation Layout but beyond A3075 up to Ch 3000 reduced impact on the operation of Hill View Farm.
Approximate land area required within link chainages	25ha (incl. highway land) 19ha (exc. highway land)	18ha (incl. highway land) 13ha (exc. highway land)	22ha (incl. highway land) 16ha (exc. highway land)
Air Quality	Slight reduction in pollutant concentrations at dwellings nearest Chiverton Cross due to increased distance between the dwellings at the junction from the existing alignment. Slight decrease in pollutant exposure at Roscarnick Farm and Trevissome Park as a result of increased distance to significant pollutant sources compared to the existing A30.	Dwellings south west of the junction would experience slight decreases in pollutant concentration due to the relocation of the junction and more smoothly flowing traffic in proximity to the properties.	Dwellings south west of the junction would experience slight decreases in pollutant concentration due to the relocation of the junction and more smoothly flowing traffic in proximity to the properties. Potentially a very slight increase at Roscarnick Farm due to increased proximity to the junction, though likely to be a negligible effect.
Ecology	Loss of connective hedgerow within proximity to the Chiverton Cross residential houses, resulting in potential fragmentation impacts on bats. The provision of the underbridge has potential to be holistically designed to facilitate the crossing of bats north and south of the A30.This option would bring the A30 traffic closer to the known common pipistrelle maternity roosts at Silversprings farm. This option would result the loss of intensively managed farmland considered to provide limited foraging habitat for bats.	Loss of arable and pastoral farmland and a number of hedgerows. There would be a loss of breeding bird habitat and foraging bat habitat. Loss of larger areas of connective hedgerow suitable for commuting bats within proximity to the Chiverton Cross residential houses. This option would bring the A30 traffic closer to the known common pipistrelle maternity roosts at Silversprings farm, and further residential properties that are considered suitable to support roosting bats within Chiverton Cross and along the A390 to Truro. This may result in disturbance impacts on bat roosts.	The option would result in the loss of arable and pastoral farmland and a number of hedgerows. There would be a loss of breeding bird habitat. The location of the gyratory itself is within farmland of negligible ecological value. Loss of connective hedgerow within proximity to the Chiverton Cross residential houses, resulting in potential fragmentation impacts on bats. This option would bring the A30 traffic closer to the known common pipistrelle maternity roosts at Silversprings farm. This option would result the loss of intensively managed farmland considered to provide limited foraging habitat for bats. The option impacts upon a small area of roadside verge notable for orchids and known to support reptiles
Trees	Tree loss within field boundaries and existing highway soft estate would be significant but can be mitigated within new highway corridor.	Ditto..	Ditto.

Basic data for Alternatives	Chiverton Public Consultation Layout (October 2016)	Chiverton Cross Gyratory (Option A - closest to existing Chiverton Roundabout) Note: There are two sub-options: The mainline on underbridges over the gyratory and the gyratory on overbridges with the mainline passing below.	Chiverton Cross Gyratory (Option B - furthest from existing Chiverton Roundabout) Note: There are two sub-options: The mainline on underbridges over the gyratory and the gyratory on overbridges with the mainline passing below.
Historic Environment	There would be impacts to the setting of the Listed St Peter's Church and the associated assets due to increases in noise and light, as well as altering the permeability of the landscape.	Underbridge: There would be impacts to the setting of the Listed St Peter's Church and the associated assets due to increases in noise and light, as well as altering the permeability of the landscape. However, most of the new junction should be screened by existing vegetation. The large gyratory junction would be present in some views from Listed St Peter's Church and the associated assets. The new sections of carriageway would be visible in the view to the south at Three Burrows, as the road would be adjacent to the northernmost tumulus and wwould reduce the parcel of land on which the tumuli are situated. Overbridge: not considered as stated to be inferior option by Stakeholders	Underbridge: The large gyratory junction would be present in some views from Listed St Peter's Church and the associated assets. There would be some impact on the land containing Three Burrows, although this would not result in a great degree of change. Overbridge: not considered as stated to be inferior option by Stakeholders
Landscape, visual impact, and lighting	Major disruption of field pattern. Loss of mature hedgerows. Loss of highway trees, shrubs and scrub. The northbound approach road and embankment in close proximity to Silversprings. Visual impacts on residential receptors and travellers on local roads. Impacts from lighting on approach roads in visually open landscape.	Major disruption of field pattern. Loss of mature hedgerows. Loss of highway trees, shrubs and scrub. Visual impacts on residential receptors and travellers on local roads. Junction in close proximity to Chiverton with impacts from new infrastructure, including lighting, on setting of cluster of listed buildings (St Peter's Church, school room and The Old Vicarage). Overbridge arrangement: the junction would be a prominent feature in the landscape. The gyratory and embankments in close proximity to Silversprings. Underbridge arrangement: This option would result in less impact on landscape and visual amenity than overbridge.	Major disruption of field pattern. Loss of mature hedgerows. Loss of highway trees, shrubs and scrub. The northbound on-slip and embankment in close proximity to Silversprings. Visual impacts on residential receptors and travellers on local roads. Impacts from lighting on approach roads in visually open landscape. Overbridge arrangement: The junction would be a very prominent feature in visually open landscape approximately 0.5km east of Chiverton. Underbridge arrangement: This option would result in less impact on landscape and visual amenity than overbridge.
Noise and vibration	Properties to the north likely to experience increase in noise due to elevated junction, proximity of roundabout and increased traffic speeds. A likely reduction in noise levels at properties in Chiverton Cross as the junction is moved to the east away from these properties.	Properties to the north likely to experience increase in noise due to elevated junction, proximity of roundabout and increased traffic speeds.	Properties to the south (e.g. Roscarnick Farm) may experience a decrease in noise levels due to increased distance from the A30 and landscaping which may provide some screening effects.
Impacts on transport network	Roundabouts close to capacity in design year in neutral months, giving little scope for traffic growth beyond this.	Roundabout within capacity with scope for traffic growth beyond design year.	Roundabout within capacity with scope for traffic growth beyond design year.
Cost of construction: Option adjustment based on baseline cost of construction of £114.8m at a Q1/2014 price base.)	0	£5.98m	£3.0m
Value for Money	Very High	Very High - additional benefits of £9.4m (2%) compared to Consultation Layout	Very High - additional benefits of £3.6m (1%) compared to Consultation Layout
Potential <u>mainline</u> Departures from Standards (Nr)	None	Yes - Departure in Standards identified under TD 9/93 Para 1.26 (vertical crest curve of K=100 will not provide sufficient forward visibility to junction slip roads).	No with underbridges / yes with overbridges - Departure in Standards identified under TD 9/93 Para 1.26 (vertical crest curve of K=100 will not provide sufficient forward visibility to junction slip roads).
Mainline & side roads pavement area (m2)	91,,400	80,800	86,900
Mainline earthworks volume (m3)	Cut = 43700 Fill = 143300	Cut = 54,300 Fill = 25,300	Cut = 54,300 Fill = 25,300
Impact on services (STATS Diversions) Impact -5 to +5 relative to Consultation Layout	0 Baseline Openreach: Lowering; Level 3: Diversion; WPD: L, PL & 11kV diversions; Vodafone: Diversion; Verizon: Diversion; SWW: Trunk main and distribution main diversion	0 No significant change in cost WPD: Minor diversion amendments SWW: Longer diversion of trunk main only but includes interception of affected distribution main.	0 No change
Buildability Rating from buildability workshop, relative to Consultation Layout	1x buildable Ranking easiest to build. Phasing of the works required but similar to the Single Gyratory (Option B) as the proposed under bridge is located off line. Plant crossing of the A3075 at Ch 2000m approximately would be beneficial as it would allow the underbridge to be constructed in parallel with the A3075 diversion route (diversion route uses permanent works north of the new junction). A temporary restriction (closure) of the traffic movement A30 eastbound (from Redruth) to A390 Truro maybe required during the completion of the new dual carriageway across the existing Chiverton junction (Ch 750m). Further details can be found in the Skanska Buildability Review dated December 2016.	4 to 5 x less buildable Option shown on Drg 00041 and 00059. Ranking third and most difficult to build. Conclusion A3075 plant crossing definitely required (shorter term A30 plant crossing would assist construction) - More difficult to construct than either public consultation option or Gyratory Option B. If seriously considered as an option further buildability checks required. Extensive phasing of works required as the two proposed overbridges are located on the line of the existing A30 and A3075. The phasing developed so far would require a plant crossing of the diverted A3075. A closure of the A30 Eastbound (from Redruth) off slip road for a period of time is likely to be required (this would impact eastbound traffic for B3177 (North), A3075 and A390 Truro (required during the works to complete the dual carriageway across the existing junction Ch 750m). A plant crossing of the temporary diversion of the A30 would also assist the construction of A390 (or across the existing A30 to assist the construction of A30 diversion route (permanent works) and the A390. In addition probable excavation in hard material also likely, further compounding buildability issues associated with limited working space, working adjacent to live traffic and traffic management restrictions. Options shown on Drg 00060 and 00061. These two options do not reduce the buildaboility issues identified above and	2 less buildable Ranking second easiest to build. Conclusion more important to have an A3075 plant crossing with this option as more bridge works. Phasing of the works required but similar to the Public Consultation layout as the proposed bridge structures are located off line. Plant crossing of the A3075 at Ch 2000m approximately would be beneficial as it would allow the bridge structures to be constructed in parallel with the A3075 diversion route (diversion route uses permanent works north of the new junction). A temporary restriction of the traffic movement A30 eastbound (from Redruth) to A390 Truro maybe required during the completion of the new dual carriageway across the existing Chiverton junction (Ch 750m). The above comments are applicable to both the overbridges and underbridges sub options. The details of the phases will be similar to those shown in the Skanska Buildability Review dated December 2016

Basic data for Alternatives	Chiverton Public Consultation Layout (October 2016)	Chiverton Cross Gyratory (Option A - closest to existing Chiverton Roundabout) Note: There are two sub-options: The mainline on underbridges over the gyratory and the gyratory on overbridges with the mainline passing below.	Chiverton Cross Gyratory (Option B - furthest from existing Chiverton Roundabout) Note: There are two sub-options: The mainline on underbridges over the gyratory and the gyratory on overbridges with the mainline passing below.
		infact increase probable excavation in hard materials.	
New Bridges & Structures (No)	1 x under bridge	3 x over bridges or (2 x underbridges + 1 x overbridge)	2 x overbridges or underbridges
Land take (excl. environmental mitigation and drainage measures) (m2)	250,900 (incl. highway land) 185,000 (exc. highway land)	186,700 (incl. highway land) 126,700 (exc. highway land)	219,900 (incl. highway land) 158,200 (exc. highway land)
Non-Motorised Users	There are non-designated footpaths on either side of the B3277 and between the A30 westbound and the A390, but no pedestrian crossings at these locations. It is assumed that NMUs cross the roads at this point to access roadside properties and shop amenities, which may no longer be possible under this option. (Note: Opportunityfor NMU crossing (underpass or overbridge), which would reduce NMU journey lengths.)	There are non-designated footpaths on either side of the B3277 and between the A30 westbound and the A390, but no pedestrian crossings at these locations. It is assumed that NMUs cross the roads at this point to access roadside properties and shop amenities, which may no longer be possible under this option.	There are non-designated foot paths on either side of the B3277 and between the A30 westbound and the A390, but no pedestrian crossings at these locations. It is assumed that NMUs cross the roads at this point to access roadside properties and shop amenities, which may no longer be possible under this option. (Note 'opportunity' for NMU crossing (underpass or overbridge), which would reduce NMU journey lengths.)
Public Rights of Way & Open Access Land	No public rights of way or areas of open access land are impacted by the junction options.	Ditto.	Ditto.
Land use	Predominantly affects agricultural land. Does not affect any local plan allocations or amenity space.	Ditto.	Ditto.
Stakeholder engagement. Landowners/residents/tenants directly affected.	3	7	3
Stakeholder engagement. Landscape.	Limited consultation although recent meeting held with Cornwall Council's Landscape Architect. Preferred option is for side roads to be below mainline, which is to be as low as possible but closest to Chiverton, ie preference is for underbridge options with mainline above junction. Second preferred is at grade circulatory with approach roads at grade and road above with structure and embankments up to 8m. Do not like overbridges generally. .		
Stakeholder engagement. Heritage	Some consultation including through the value management workshops and meetings. Limited opinions until recently on Chiverton. Visual impact should be reduced as much as possible by lowering the junction to the ground although no preference for road above junction or vice versa, so long as it is in cutting. Very concerned about the setting of St Peters Church, especially from views from the north. Currently prefer the location furthest from the existing roundabout so long as th emainline isas low as possible and a B road is made into the new A390 to Truro; and the existing A390 is declassified. Are concerned that the current designs have sufficient capacity and longevity to ensure that further upgrades, which would cause additional harm to the historic environment, would not be necessary in the near future. Part of a barrows significance lies in what it can tell us about the past and this can be recovered. Would therefore even consider a case for the loss of a Barrow if this was to mean that a more robust junction could be designed, which also had better impacts on the setting of St Peters church. Have an open mind on this but need to be convinced. Possible PR issues and the junction is called three burrows and would then be two burrrows. Re the sub-options, underbridge options preferred. Overall height should be as low as possible.		
Stakeholder engagement. Ecology	Limited consultation with Natural England or County Ecologists so far except through value management workshops. Meeting set up for 3 March.		

Basic Data for Alternatives	Chybucca Public Consultation Layout – Option A (October 2016)	Chybucca Online
Strategy for comparison	Option A selected over option B following representations from owners of Callestick Vean. Compare Consultation Layout Option A with Alternative On-line option	
Reason for alternative	N/A	Reduce impact on Callestick Vean dwellings.
Key Risk Areas for Consideration:	Noise impact on Callestick Vean (south) Access to Callestick Vean (north). Impact on tumuli, landscape, impact on TPO. Severed PROW.	Noise impact on Callestick Vean south. Impact on tumuli, landscape, impact on TPO. Severed PROW.
Date dropped/ accepted	02.03.2017	02.03.2017
Assessment Data		
Drawing Reference *(sub option drawings shown in red italics)*	Shown in black on drg HA551502-WSP-HGN-0000-DR-D-00046	Drg HA551502-WSP-HGN-0000-DR-D-00046
Sub-options (where relevant)	N/A	N/A
Chainage	3000 – 6000	3000 – 6000
Workshop Assessment Topics		
Amount of Best and Most Versatile (BMV) land affected.	Not possible to establish without site surveys. High level review using available data on iGIS shows that all land has the potential to be either Grade 3a or 3b. Grade 3a would be BMV land. There is no potential for Grade 2 BMV land to be affected by this option.	Ditto.
Agricultural land, access and farm severance	16 fields from 6 farms. Most significant impact on Hill View Farm, with the main line running through the centre of the farm. Small areas of land become isolated that could be resolved by private arrangements. Access to all fields and new parcels is maintained but would have a significant negative impact on the operation of Hill View Farm.	Approximately 17 fields from five farms and a woodland holding would be affected. Similar impact on access but severed parcels of land are much smaller, in comparison with the Consultation Layout, leaving larger fields.
Approximate land area to be acquired within link chainages	20ha (incl. highway land) 17ha (exc. highway land)	20ha (incl. highway land) 17ha (exc. highway land)
Air Quality	Due to the lack of nearby receptors, the impact is negligible. Potential for very slight increase in pollutant levels at Creegmeor Farm, though highly likely to be a negligible change.	Ditto.
Ecology	The route would result in the loss of arable and pastoral farmland and would bisect numerous hedgerows. This option would avoid the bat flyway located to the north of the junction. This option directly bisects a known greater horseshoe and lesser horseshoe bat flyway located at Nanteague farm. The provision of an underbridge at Nanteague Farm may provide suitable mitigation for the bat fragmentation impacts (if sited correctly). Otter Road Traffic Casualties are recorded in this location. It will be necessary to provide structures/fencing and landscaping to facilitate safe otter crossings in this location.	The route would result in the loss of arable and pastoral farmland and would bisect numerous hedgerows. There would be a loss of breeding bird habitat and some wintering bird foraging areas. This option would avoid the bat flyway located to the north of the junction. The option may have an impact on the Garvinack Brake woodland which contains a known bat roost (south of the existing A30).This option directly bisects a known greater horseshoe and lesser horseshoe bat flyway located at Nanteague farm. The provision of an underbridge at this location may provide suitable mitigation for the fragmentation impacts (if sited correctly). Otter Road Traffic Casualties are recorded in this location. It will be necessary to provide structures/fencing and landscaping to facilitate safe otter crossings in this location.
Trees	Potential conflict with historic TPO at Ch3550. Not considered a show stopper but a material constraint.	Ditto.
Historic Environment	The option brings the road adjacent to a Scheduled barrow, and potentially to within the scheduled area of the monument. The setting would also be affected by the construction of a new section of road that would create further divisions within the landscape affecting the permeability of the setting,	The road alignment comes very close to the tumulus to the north of the road, but it should not impact on the Scheduled Monument or the setting of the asset. There would be a degree of harm to the setting. Would also require moving a Grade II listed milestone (LB1140923).
Landscape, visual impact, and lighting	Disruption of field pattern.	Loss of belt of trees and shrubs. Substitutable.
Noise and vibration	Negligible change. Likely to be beneficial as keeps traffic on A30 for longer rather than slip roads or links roads which are closer to properties (Chybucca and Creegmeor Farm) There is likely to be a negligible change to noise levels at Callestick Vean.	Negligible change. Likely to be beneficial as keeps traffic on A30 for longer rather than slip roads or links roads which are closer to properties (Chybucca and Creegmeor Farm) There is likely to be a beneficial effect at Callestick Vean as the A30 traffic would be further from the receptor.
Impacts on transport network	Roundabouts on northern and southern side within capacity.	Ditto.
Cost of construction: Option adjustment based on baseline cost of construction of £114.8m at a Q1/2014 price base	£0	£1.3m
Value for Money	Very High	Very High
Potential <u>mainline</u> Departures from Standards	None – if proposed layby near Tresawsen is relocated	Ditto.
Mainline & side roads pavement area (m2)	73300	76800

Basic Data for Alternatives	Chybucca Public Consultation Layout – Option A (October 2016)	Chybucca Online
Mainline earthworks volume (m3)	Cut = 83,300 Fill = 36,700	Cut = 76,101 Fill = 49,501
Impact on services (STATS Diversions) **Impact -5 to +5 relative to Consultation Layout**	0 Baseline Level 3: Diversion; Openreach: Diversion; WPD: 11kV private cable probably linking windfarms & 33kV diversions connecting to wind farm substation; Vodafone: Diversion; Wales & West: possibly 2 short diversions or one long diversion, price to be provided for both.	+3 High cost increase Level 3: longer diversion; WPD: additional 33kV connecting to wind farm substation; Vodafone: longer diversion; Wales & West: affects 1.1km length Wind farm: additional diversion of 11kV private cable probably linking windfarm arrays
Buildability Rating from buildability workshop, relative to Consultation Layout	1 x buildable Construct side roads and Chybucca overbridge at Ch 4750m to divert A30 and local traffic to construct mainline. This is illustrated (similar road layout) in the Skanska Buildability Review December 2016. Option alignment at the existing Chybucca junction could be refined to improve buildability. The diversion route for the existing A30 at the Chybucca overbridge would have a low geometric alignment and this should be considered further as the scheme progresses.	2 x buildable Construct side roads and Chybucca overbridge at Ch 4750m to divert A30 and local traffic to construct mainline. This is illustrated in the Skanska Buildability Review December 2016. Option alignment at the existing Chybucca junction could be refined to improve buildability. However this alignment also impacts on a greater length of High Pressure (HP) Gas main east of Chybucca. This alignment therefore requires a longer HP Gas main diversion. The cost of the longer diversion is similar to that required on the Public consultation option but the diversion is likely to have programme implications (either for the (1.3km) and a shorter programme duration to complete the main works). This issue adds to buildability issues already present and associated with working space and live traffic at Chybucca junction. As with the public consultation option the diversion route for the existing A30 at the Chybucca overbridge would have a low geometric alignment and this should be considered further as the scheme progresses.
New Bridges & Structures (No)	1 x overbridge	1 x overbridge
Land take (excl. environmental mitigation and drainage measures) (m2)	196,900 (incl. highway land) 174,500 (exc. highway land)	213,000 (incl. highway land) 173,100 (exc. highway land)
Non-Motorised Users	(see below)	Ditto.
Public Rights of Way & Open Access Land	The route will sever Bridleway 309/3/1. There is no open access land affected. The route will sever Bridleway 309/3/1 and will require diversion via the proposed underbridge at Tresawsen in order to maintain connectivity (as agreed at the NMU Consultation Briefing last November - see dwg HA551502-WSP-HGN-0000-DR-D-00026). There is no open access land affected.	Ditto.
Land use	Predominantly affects agricultural land. Does not affect any local plan allocations or amenity space.	Ditto.
Stakeholder engagement. Landowners/residents/tenants directly affected.	6	6
Stakeholder engagement. Landscape.	No significant issues for landscape stakeholders.	Ditto.
Stakeholder engagement. Heritage	Historic England have previously indicated that the barrow in this location is not in good condition.	Ditto.
Stakeholder engagement. Ecology	Limited consultation with Natural England or County Ecologists so far, except through value management workshops.	Ditto.

Basic Data for Alternatives	Marazanvose Public Consultation Layout. (October 2016)	Marazanvose North – Option 1	Marazanvose North – Option 2 (existing A30 cul-de-sac, new local route to north)	Marazanvose South
Strategy for comparison:	Compare both northern options, then both southern options, then compare the better performing northern and southern options.			
Reason for alternative	N/A	Remove impact on Nancarrow wedding business and organic farm	Remove impact on Nancarrow wedding business and organic farm	Reduce impact on Nancarrow wedding business and organic farm
Key Risk Areas for Consideration:	Landscape and visual impact. Impact on listed buildings at Nancarrow. Impact on NIA and noise at Nancarrow and Marazanvose, as well as Hill House. Impact on wedding business and campsite. Access to Chynoweth Farm.	Landscape and visual impact. Impact on listed buildings at Nancarrow, and setting of Chyverton Park. Impact on NIA and noise at Nancarrow and Marazanvose, as well as Hill House. Impact on wedding business and campsite. Impact on businesses to the north.	Landscape and visual impact. Impact on listed buildings at Nancarrow, and setting of Chyverton Park. Impact on NIA and noise at Nancarrow and Marazanvose, as well as Hill House. Impact on wedding business and campsite. Impact on businesses to the north.	Landscape and visual impact. Impact on listed buildings at Nancarrow. Impact on NIA and noise at Nancarrow and Marazanvose, as well as Hill House. Impact on wedding business and campsite, as well as businesses to the north. Impacts on PROW.
Date dropped/ accepted	10.04.2017	02.03.2017	02.03.2017	10.04.2017
Assessment Data				
Drawing Reference	Shown in black on drg HA551502-WSP-HGN-0000-DR-D-00047, 00048 & 00052	Drg HA551502-WSP-HGN-0000-DR-D-00047	Drg HA551502-WSP-HGN-0000-DR-D-00052	Drg HA551502-WSP-HGN-0000-DR-D-00048
Sub-options (where relevant)	N/A	N/A	N/A	N/A
Chainage	6000 - 9000	6000 - 9000	6000 - 9000	6000 - 9000
Workshop Assessment Topics				
Amount of Best and Most Versatile (BMV) land affected.	Not possible to establish without site surveys. High level review using available data on iGIS shows that all land has the potential to be either Grade 3a or 3b. Grade 3a would be BMV land. There is no potential for Grade 2 BMV land to be affected by this option.	Ditto.	Ditto.	Ditto.
Agricultural land, access and farm severance	Impacts 14 fields through Nanteague and Nancarrow Farms. Divides Nancarrow Farm into three sections with significant loss of farmland (approx. 15% from a 100 acre farm). Severe impact on access to remaining parcels of land. Creates five small fields. Significant impact on the operation of the farm. Access to Nancarrow Farm would be exclusively from the southeast, via a track off Shortlanesend Rd which currently serves as access to its wedding venue, feast night and eventing business. It is unknown whether this track would be suitable for use by agricultural vehicles as well. Should access be required into Nancarrow farm from the northwest, say from the existing A30, then a new overbridge at Marazanvose and a new access track through the old Marazanvose campsite would need to be provided costing approximately £1M. Additionally, if a new overbridge at Marazanvose was not provided, then in order to maintain access for agricultural vehicles and deliveries to Chynoweth Farm, localised improvements to the CC highway network (such as the provision of regularly spaced parking places and carriageway /bellmouth widening) would be necessary. The estimated works cost for this is estimated to be around £32K (excluding any land purchase costs).	Approximately 18 fields (from 5 land holdings) would be impacted by this option, mostly north of the existing A30 through Marazanvose. Creates isolated parcels of land, remote from their original farms, although access can be maintained to these severed pieces of fields. Private arrangements could resolve issues of remote fields. Impact on Chyverton cross country equestrian venue. Major impact on Ranger Barn, small holding and a privately held pasture field.	Similar impacts to Option 1 but increased land take north the A30.	Approximately 13 fields (from Nanteague and Nancarrow Farms) would be impacted. But most would be marginally impacted as route closely follows the existing A30 alignment. Creates one severed field on land already remote from Nancarrow Farm. Access issues to Nancarrow & Chynoweth Farms are as per the consultation layout.
Approximate land area required within link chainages	11ha (incl. highway land) 10ha (exc. highway land)	11ha(incl. highway land) 10ha (exc. highway land)	13ha (incl. highway land) 11ha (exc. highway land)	10ha (incl. highway land) 8ha (exc. highway land)
Air Quality	Slight decrease in pollutant exposure at Tresawsen and Marazanvose dwellings due to increased distance to the roadside. Very slight increase in pollutant concentrations at Nancarrow Farm as a result of realignment.	Realignment causes an increase in exposure at Hill House.	Slight decrease in pollutant exposure at Tresawsen and Marazanvose dwellings due to increased distance to the roadside. Slight decrease in pollutant concentrations at Nancarrow Farm as a result of realignment.	Potentially a very slight increase at Nancarrow Bungalow.

Basic Data for Alternatives	Marazanvose Public Consultation Layout. (October 2016)	Marazanvose North – Option 1	Marazanvose North – Option 2 (existing A30 cul-de-sac, new local route to north)	Marazanvose South
Ecology	The route would result in the loss of organic farmland, and hedgerows. There would be a loss of breeding bird habitat and there would be significant impacts including the loss of a maternity roost to bats. Current data suggests the option crosses a significant flyway. Mitigation to include installation of measures to facilitate the continued passage of bats across the road north-south and provision of compensatory habitat. Otter Road Traffic Casualties are recorded in this location. It will be necessary to provide structures/fencing and landscaping to facilitate safe otter crossings in this location.	The route would result in the loss of pastoral and arable farmland, hedgerows and woodland. Also a loss of breeding bird habitat. The option would remove woodland, which may contain a number of bat roosts and also likely crosses a significant flyway. Mitigation to include installation of measures to facilitate the continued passage of bats across the road north-south and compensatory habitat. Otter Road Traffic Casualties are recorded in this location. It will be necessary to provide structures/fencing and landscaping to facilitate safe otter crossings in this location. Further survey is needed at this stage to establish impacts/effects on protected/notable species.	Ditto Option 1.	Ditto Consultation Layout.
Trees	Direct loss of existing woodland on north side at Ch7550.	Conflict with existing woodland on north side at Ch7550 as mentioned previously	Ditto Option 1.	Large locally important trees at ch9550 on east side, mature trees atop Cornish hedge bank.
Historic Environment	The option is closer to Nancarrow Farmhouse than the existing A30 creating adverse impacts to the setting, through increases in noise leading to loss of tranquillity. The proposed route impacts on an outlying building that may be within the curtilage of the listed farmhouse. Whilst the road would move away from Chyverton Registered Park, suggesting beneficial impacts, the change in permeability may alter the experience of the asset.	The option moves the road further to the north of Nancarrow Farmhouse potentially increasing the sense of tranquillity and creating slight beneficial impacts. However, the option would be immediately adjacent to Chyverton Registered Park and Garden creating adverse impacts on the setting of the garden and the listed lodge buildings, both through loss of tranquillity and alterations to the permeability of the landscape.	Ditto Option 1.	The option is closer to Nancarrow Farmhouse than the northern option creating adverse impacts to the setting, through increases in noise leading to loss of tranquillity. There is also the potential for impacts to the setting of Chyverton Registered Park and Garden particularly during the construction phase, as the change in permeability of the landscape may alter the experience of the asset.
Landscape, visual impact, and lighting	Disruption of field pattern.	Some loss of highway trees and shrubs in vicinity of Zelah. Disruption of field pattern. Loss of woodland. Impact on setting of Chyverton House and Grounds Registered Park and Garden. Loss of field trees. Loss of mature hedgerows. Hamlet would become an island between old and new A30.	Ditto Option 1.	Loss of belt of highway trees east of existing A30 in vicinity of Nancarrow. Substitutable.
Noise and vibration	Likely decrease in noise level at Hill House due to increased separation distance between the new route and receptor.. Likely to increase noise levels receptors at Marazanvose already subject to high road traffic noise levels. Passes close to NIA on existing A30 at Marazanvose, but there is the potential to mitigate this with a noise barrier.	Expected increase in noise level at Hill House due to decrease in horizontal separation between road and receptor. The scheme design with the road in cutting at this location will increase noise reduction potential of any proposed barrier. At Marazanvose decrease in noise level would be expected and beneficial impact on NIA. (This takes into account all the noise receptors in this area (including at Nancarrow farm)). Potential for noise barriers to further reduce noise at Marazanvose.	At Marazanvose an overall decrease in noise level would be expected and therefore beneficial impact on NIA. Potential for noise barriers to further reduce noise at Marazanvose. This takes into account all the noise receptors in this area (including at Nancarrow farm).	Broadly follows existing A30 alignment. Likely to increase noise levels at receptors already subject to high road traffic noise levels. Passes close to NIA on existing A30 at Marazanvose.
Impacts on transport network	Within capacity	Within capacity	Within capacity	Within capacity
Cost of construction: Option adjustment based on baseline cost of construction of £114.8m at a Q1/2014 price base.	£0	£3.1m	£1.0m (excludes any effect of optimised earthworks quantities)	£2.7m
Value for Money	Very High	Very High	Very High	Very High
Potential <u>mainline</u> Departures from Standards	None	Potential – Isolated relaxations to vertical geometry may be required, which if in combination with isolated relaxations to horizontal geometry, could lead to departures.	Ditto Option 1.	None
Mainline & side roads pavement area (m2)	40,000	46,000	51,300	33,800
Mainline earthworks volume (m3)	Cut = 90,750 Fill = 54,500	Cut = 136,700 Fill =104,800	Cut = 136,700 Fill =104,800	Cut = 249,000 Fill = 63,500
Impact on services (STATS Diversions) Impact -5 to +5 relative to Consultation Layout	0 Baseline Openreach: OH diversions; Level 3: Slew; WPD: 11kV diversions; Vodafone: Slew; SWW: Trunk main diversion	+4 Very high cost increase Openreach: alternative diversion arrangements, no net change; Level 3: 2 x additional diversions; WPD: alternative diversion arrangements, no net change; Vodafone: 2 x additional diversion; SWW: extended diversion and additional diversion	Ditto Option 1 and additional diversion	+3 High cost increase Level 3: additional diversion; WPD: 132kV pylon protection/ relocation Vodafone: additional diversion;

Basic Data for Alternatives	Marazanvose Public Consultation Layout. (October 2016)	Marazanvose North – Option 1	Marazanvose North – Option 2 (existing A30 cul-de-sac, new local route to north)	Marazanvose South
Buildability Rating from buildability w/shop, relative to Consultation Layout	1 x buildable Ranking easiest to build. The traffic can remain on the existing A30 whilst the dual carriageway is built off-line. Temporary diversion and plant crossing of Shortlanesend Road or closure of Shortlanesend Road required to construct the Two Barrows Underbridge.	4 x less buildable Ranking the fourth and most difficult to build (if seriously considered buildability should be considered again - a second plant crossing could be required Zelah eastbound off slip or road closure). An A30 plant crossing would be required and a sub-standard temporary diversion of A30 traffic under the existing Two Barrows Underbridge would be required. Also there is an underpass located below overhead high voltage electricity cables. Alternatively a temporary diversion route similar to North Option 2 (cul- de-sac) to the Zelah eastbound off slip could be provided). This would be abortive work. Plant crossing Ch 6500m existing A30 required. It is assumed that the new route of the old A30 is built at Two Barrows Underbridge and the A30 traffic diverted on to it (Shortlanesend Road would be closed to north and southbound local traffic - the Two barrows junction would also be closed). A plant crossing of the eastbound off slip road to Zelah would be required.	3 x less buildable Ranking third easiest to build. No plant crossing of A30 required. It is assumed that the new route of the old A30 (side road) is built between Town and country Motors Ch 6500m and Tolgroggan Ch 9000m and the A30 traffic diverted (access Marazanvose to Zelah would be restricted as Two Barrows Underbridge would be closed. This would mean that no plant crossings of the A30 would be required. A plant crossing of the eastbound off slip road to Zelah would be required during the construction of the side road only. There is a considerable length of side road to be built (2.5km) that may impact the construction programme and therefore overall buildability within the overall scheme programme. Separate Mainline/Side Road highway drainage systems over this length will also add to the volume of construction work.	2 x less buildable Ranking second easiest to build. No plant crossings required but A30 traffic needs to divert onto proposed side roads. This option has the longest length of on-line construction either side of the existing Two Barrows Underbridge but once the A30 traffic is diverted temporarily onto the side roads the mainline buildability issues would diminished.
New Bridges & Structures (No)	2 x under bridges & 1 x accommodation bridge at Tolgroggan	1 x under bridge & 1 x accommodation bridge at Tolgroggan	1 x under bridge & 1 x accommodation bridge at Tolgroggan	1 x under bridge, 2 x retaining feature & 1 x accommodation bridge at Tolgroggan (possible 1 x accommodation over bridge at Marazanvose)
Land take (excl. environmental mitigation and drainage measures) (m2)	110,500 (incl. highway land) 108,800 (exc. highway land)	112,800 (incl. highway land) 96,600 (exc. highway land)	128,900 (incl. highway land) 105,800 (exc. highway land)	97,800 (incl. highway land) 75,300 (exc. highway land)
Non-Motorised Users	Provided the bridge under the A30 at Shortlanesend Rd is maintained, access for NMU across the A30 would remain in this location. However, it is likely that access for equestrian users of Bridleway 319/9/1 would be hindered to the west. Access to bus stop on existing A30 from Nancarrow Farm and surrounding properties would be severed.	Ditto Consultation Layout.	Providing the bridge under the A30 at Shortlanesend Rd is maintained, access for NMU across the A30 will remain in this location. However, it is likely that access for equestrian users of Bridleway 319/9/1 will be hindered to the west.	Ditto Consultation Layout.
Public Rights of Way & Open Access Land	The western end of Footpath 319/16/1 would be severed where it joins with the A30 and would require diversion via Shortlanesend Rd (on field side of hedge) in order to maintain connectivity (as agreed at the NMU Consultation Briefing last November - see dwg HA551502-WSP-HGN-0000-DR-D-00028). Bridleway 319/9/1 would also be severed and would require diversion via Shortlanesend Rd in order to maintain connectivity (as agreed at the NMU Consultation Briefing last November - see dwg HA551502-WSP-HGN-0000-DR-D-00028). There is no open access land which would be affected.	Footpath 314/67/1 would be severed by this option (however this was observed to be overgrown and likely to be very low use during survey). Bridleway 319/9/1 would also be impacted upon. There is no open access land which will be affected.	Severs Footpath 314/67/1 (however this was observed to be overgrown and likely to be very low use during survey). There is no open access land which will be affected.	The western end of Footpath 319/16/1 would be impacted where it joins with the A30. Bridleway 319/9/1 would also be impacted upon. There is no open access land which will be affected.
Land use	Predominantly affects agricultural land. Does not affect any local plan allocations or amenity space.	Predominantly affects agricultural land. Does not affect any local plan allocations or amenity space.	Predominantly affects agricultural land. Does not affect any local plan allocations or amenity space.	Predominantly affects agricultural land. Does not affect any local plan allocations or amenity space.
Stakeholder engagement: Landowners/residents/tenants directly affected.	6	8	10	5
Stakeholder engagement. Landscape.	Southern options are preferred by Cornwall Council, although the alternative southern option over this one.	Cornwall Council consider both northern options to have worse landscape and visual impacts.	Ditto Option 1	This is Cornwall Council's preferred option.
Stakeholder engagement. Heritage	Keen to see further assessment. Historic England have not yet offered an opinion in this area.			

Basic Data for Alternatives	Marazanvose Public Consultation Layout. (October 2016)	Marazanvose North – Option 1	Marazanvose North – Option 2 (existing A30 cul-de-sac, new local route to north)	Marazanvose South
Stakeholder engagement. Ecology	Limited consultation with Natural England or County Ecologists so far except through value management workshops.			

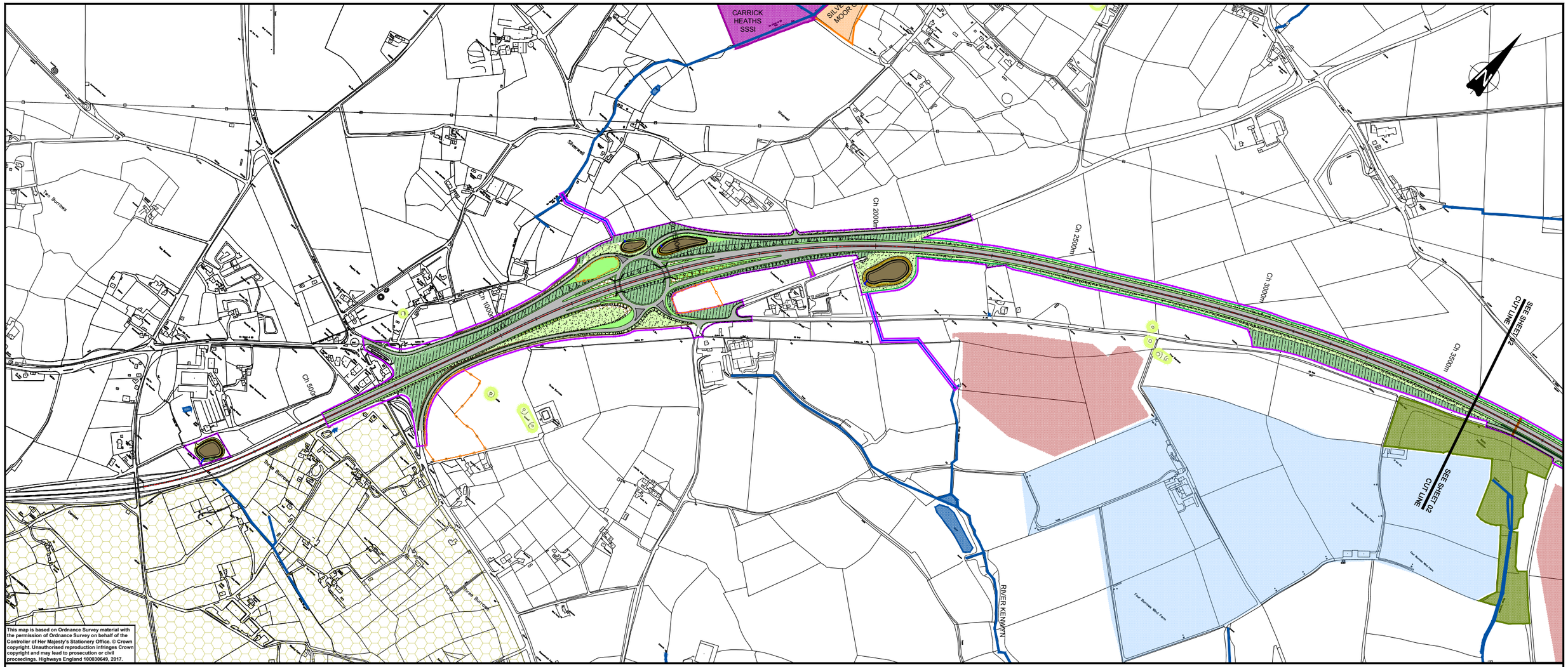
Topic	Trevalso Public Consultation layout (October 2016)	Trevalso additional crossing point
Date dropped		
Reason dropped	See Option Selection report	See Option Selection report
Drawing Reference *(sub option drawings shown in red italics)*	Shown in black on drg HA551502-WSP-HGN-0000-DR-D-00050	Drg HA551502-WSP-HGN-0000-DR-D-00050
Drawing Hyperlinks	HA551502-WSP-HGN-0000-DR-D-00050	HA551502-WSP-HGN-0000-DR-D-00050
Chainage	9,850	9,850
Strategy for comparison	N/A	N/A
Most relevant issues/disciplines to weigh up.	See additional crossing point option.	Benefits to agricultural businesses and possible bat mitigation not included in public consultation layout.
Reason for alternative	N/A	Improve access to farms at Trevalso, and Trerice, and connect Zelah with St Allen Parish Church. Provide bat crossing structure.
Amount of BMV land affected.	Not possible to establish without site surveys. High level review using available data on iGIS shows that all land has the potential to be either Grade 3a or 3b. Grade 3a would be BMV land. There is no potential for Grade 2 BMV land to be affected by this option.	Not possible to establish without site surveys. High level review using available data on iGIS shows that all land has the potential to be either Grade 3a or 3b. Grade 3a would be BMV land. There is no potential for Grade 2 BMV land to be affected by this option.
Agricultural land, access and farm severance	Consultation scheme (with no crossing) has severe impact on access to Trevalso Farm creating long detour (3 miles) for lorries and agricultural vehicles accessing the A30 and fields to the north of the A30. At present, large vehicles (18T rigid and articulated) would be unable to negotiate such a detour and so localised improvements to the CC highway network (such as the provision of regularly spaced parking places and carriageway /bellmouth widening) would be necessary. The estimated works cost for this is estimated to be around £145K (excluding any land purchase costs).	The crossing will require small amount of land from the pasture field to the north of Trevalso Cottage. No agricultural land requirement to the north of the A30. Provides direct access from Trevalso Farm to the existing A30 (for large vehicles and agricultural vehicles and equipment) and fields to the north.
Approximate land area to be acquired within link chainages	N/A	0.75ha (incl. highway land) 0.3ha (exc. highway land)
Air Quality	Sight decrease in pollutant exposure at Henver Cottage and Henver Lane House due to increased distance to the roadside.	Sight decrease in pollutant exposure at Henver Cottage and Henver Lane House due to increased distance to the roadside.
Ecology	Significant bat roosts have been recorded at Trevalso Farm and Trevalso Cottage, together with foraging and commuting activity. The dual carriageway in this location may result in the loss of foraging habitat and disturbance to roosting bats. It is unlikely that there will be sufficient room to allow for the safe and guided passage of bats across the road in this location. Additional landscaping will be necessary to attempt to 'deflect' bats from crossing in this location / enhance foraging to reduce any residual impacts and to reduce the potential for disturbance effects on bats using the roosts to the south.	Significant bat roosts have been recorded at Trevalso Farm and Trevalso Cottage, together with foraging and commuting activity. The dual carriageway in this location may result in the loss of foraging habitat and disturbance to roosting bats. Mitigation (landscaping) to reduce the potential for disturbance effects on bats will be necessary in this location. The addition of an underpass which lies near to bat maternity roosts is likely to be of benefit at this location; a large number of lesser and greater horseshoe bats have been recorded in this area. The crossing point may provide additional mitigation in this area.
Trees	Notwithstanding the points raised by ecology and landscape there are no significant tree issues in this area.	Notwithstanding the points raised by ecology and landscape there are no significant tree issues in this area.
Historic Environment	With the information provided this option creates no adverse harm to designated assets.	With the information provided this option creates no adverse harm to designated assets.
Landscape, visual impact, and lighting		Loss of lane hedges and mature trees with canopy connectivity. Loss of highway trees. Bridge and side road cutting in close proximity to Trevalso Cottage.
Noise and vibration	Alignment broadly follows existing A30 alignment therefore noise increases would be expected at properties close to the road. Existing NIA would potentially be subject to increase in noise levels. Some reduction in noise level possible for properties in Zelah due to increased separation distance.	Alignment broadly follows existing A30 alignment therefore noise increases would be expected at properties close to the road. Existing NIA would potentially be subject to increase in noise levels. Some reduction in noise level possible for properties in Zelah due to increased separation distance. New access in cutting so will screen noise. Unlikely to have significant change due to low traffic flows and dominance of A30.
Impacts on transport network	Within capacity	Within capacity
Cost of construction, option adjustment (Baseline cost of construction £114.8m at a Q1/2014 price base)	£0	£1.8m
Value for Money	Very High	Very High
Potential mainline c/way Departures from Standards (Nr)	N/A	No
Mainline c/way & side roads pavement area (m2)	N/A	2,200
Mainline c/way earthworks volume (m3)		Cut = 17,500 Fill = 100

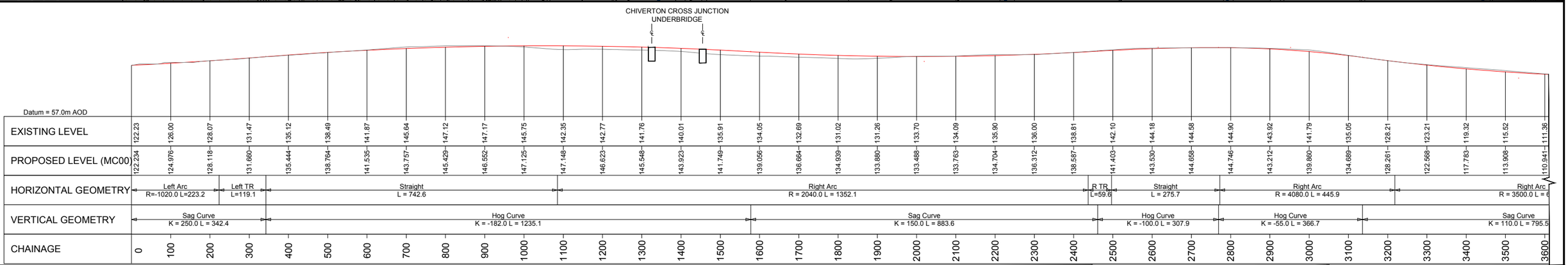
Topic	Trevalso Public Consultation layout (October 2016)	Trevalso additional crossing point
Impact on services (STATS Diversions) **Impact -5 to +5**	0 Baseline SWW: Trunk main diversion	+3 High cost increase Openreach: additional diversion Level 3: Slew Vodafone: Slew SWW: additional distribution main diversion
Buildability Rating from buildability w/shop	No issues	Underbridge would need to be built 'half and half' with a traffic switch.
New Bridges & Structures (No)	None	1 x under bridge, 1x retaining wall
Land take (excl. environmental mitigation and drainage measures) (m2)	N/A	7,500 (incl. highway land) 2,900 (exc. highway land)
Non-Motorised Users	NMU crossing or use of the A30 is thought to be minimal in this location. Undesignated path and crossing point accessed from Church Lane, mainly used recreationally, is likely to be severed. (Potential for culvert approx. 100m away to be enlarged for NMU access to mitigate this)	Although the crossing will provide an additional crossing point over the A30, it is not likely to be pedestrianized (or provide access to any community facilities, just residences) and therefore NMUs are not likely to benefit from this significantly. Possible bus stop affected?
Public Rights of Way & Open Access Land	No PRoWs or access land will be affected	No PRoWs or access land will be affected by the crossing.
Land use	Predominantly affects agricultural land. Does not affect any local plan allocations or amenity space.	Predominantly affects agricultural land. Does not affect any local plan allocations or amenity space.
Stakeholder engagement. Landowners/residents/tenants directly affected.	1	1
Stakeholder engagement. Landowners/residents/tenants indirectly affected.	0	0
Stakeholder engagement. Landscape.	No specific issues for landscape to consider.	No specific issues for landscape to consider.
Stakeholder engagement. Heritage	Not likely to be issues that would concern Historic England.	Not likely to be issues that would concern Historic England.
Stakeholder engagement. Ecology	Limited consultation with Natural England or County Ecologists so far except through value management workshops. Meeting set up with NE for 3 March.	Limited consultation with Natural England or County Ecologists so far except through value management workshops. Meeting set up with NE for 3 March.
Sub-options (where relevant)		

Topic	Carland Cross Public Consultation Layout. (October 2016)	Alternative Carland Cross Layout
Strategy for comparison	Compare Consultation Layout with Alternative Carland Cross Layout	
Reason for alternative	N/A	To reunite Warren's Barrow with the rest of the adjacent barrow group
Key Areas for Consideration:	Impact on Dorset Heath of potentially SSSI value NMU provision Impacts on tumuli, (especially Warren's Barrow). Landscape and visual impact. Wind farm buffer.	Impact on Dorset Heath of potentially SSSI value NMU provision Impacts on tumuli, (especially Warren's Barrow). Landscape and visual impact. Wind farm buffer.
Date dropped / accepted	02.03.2016	
Assessment Data		
Drawing Reference *(sub option drawings shown in red italics)*	Shown in black on drg HA551502-WSP-HGN-0000-DR-D-00051	Drg HA551502-WSP-HGN-0000-DR-D-00051
Sub-options (where relevant)	Alternative northern alignment Following Design Team discussion about potential impacts on the remnant section of notable heath to the south of the current A30, from the Consultation Layout, an alternative alignment to the north of the heath was explored and rejected. Four Winds and Racland House are likely to experience a significant (i.e. moderate or major increase in noise) as the road is also elevated at this location. Noise barriers and low noise surfacing would be required. In the consultation alignment, reductions in noise were predicted at Four Winds and Racland House and the change at Journeys End was negligible. Impacts on SAC is likely to be adverse..	Alternative use of existing (disused) A30 for Statutory Undertaker Corridor This alternative arose at the Value Management Workshop as an idea to save Statutory Undertaker costs. However, it has been rejected because on further examination, the cost savings wer not material, the statutory undertakers require plant to be located in highway; and th e potential benefits of this option that could be realised for Warren's Barrow would be reduced.
Chainage	10500 - 14000	10500 - 14000
Workshop Assessment Topics		
Amount of Best and Most Versatile (BMV) land affected.	Not possible to establish without site surveys. High level review using available data on iGIS shows that all land has the potential to be either Grade 3a or 3b. Grade 3a would be BMV land. There is no potential for Grade 2 BMV land to be affected by this option.	Ditto.
Agricultural land, access and farm severance	Impacts two pasture fields and one arable field. Creates one new small field which could be used for grazing. Access to all fields (including new severed parcel of land) maintained.	Ditto.
Approximate land area required within link chainages	27ha (incl. highway land) 22ha (exc. highway land)	23ha (incl. highway land) 20ha (exc. highway land)
Air Quality	Emission sources are moved further from sensitive receptors, leading to a slight decrease in pollutant exposure at each dwelling east of Carland Cross along with a slight decrease at Newlyn Downs SAC/SSSI	Ditto.
Ecology	The route lies 180 m south of the Newlyn Downs SSSI/SAC, which improves the baseline with regard to nitrogen deposition. The route would bisect a remnant section of notable heath to the south of the current A30 resulting in loss and fragmentation. Compensation will be necessary to result in an end point of habitat replacement > 1:1. The junction arrangement would result in the loss of arable and pastoral farmland, along with thick hedgerows, particularly in line with the main carriageway. Current survey results indicate a loss of habitat for breeding and wintering birds, however further analysis is needed at this stage relating to bats. These losses are mitigatable through habitat recreation.	Ditto.
Trees	There are no significant tree issues in this area	Ditto.
Historic Environment	The new section of road creates an artificial island on which Warren's Barrow would be located, physically separating it from other contemporary assets, i.e. those associated barrows. The proposed new scheme is likely to impact on the remains of a contemporary non-designated asset (MCO2332). The height of the road would diminish the relative scale of Warren's Barrow which was intended to be prominent in the landscape, having been used as a beacon by travellers. The setting of the prehistoric assets in this location have been subject to previous harm and have little capacity to absorb more harm.	This option reroutes the side road to the north of the group of assets, and returns the current A30 alignment to the south to the landscape. This would reconnect Warren's Barrow with those associated barrows further to the south, with potential beneficial impacts. It remains unclear from the drawing whether Warren's Barrow would be the prominent feature in the landscape (in terms of height) or whether the new dual carriageway would be.
Landscape, visual impact, and lighting	This option bisects the remnant section of heath to the south of the current A30. New road embankments intrude into visually open landscape of Newlyn Downs.	This option bisects the remnant section of heath to the south of the current A30. New road embankments intrude into visually open landscape of Newlyn Downs. This option allows reconnection of an ancient barrow landscape at Warrens Barrow, currently severed by the existing A30.
Noise and vibration	Junction is moving A30 away from some properties to the south.	Ditto.
Impacts on transport network	Adequate capacity.	Both roundabouts have capacity. Design requires road markings to maintain lane discipline.
Cost of construction: Option adjustment based on baseline cost of construction of £114.8m at a Q1/2014 price base.	£0	£0.0m (but there would be an increase if a plant crossing of the existing A30 is not permitted (use of road lorries for earthworks operations - more expensive and less productivity)

Topic	Carland Cross Public Consultation Layout. (October 2016)	Alternative Carland Cross Layout
Value for Money	Very High	Very High
Potential <u>mainline</u> Departures from Standards	None	None
Mainline & side roads pavement area (m2)	83,600	84,700
Mainline earthworks volume (m3)	Cut = 135,700 Fill = 330,700	Cut = 97,800 Fill = 310,700
Impact on services (STATS Diversions) **Impact -5 to +5 relative to Consultation Layout**	0 Baseline Openreach: 4 x Diversions; Level 3: Diversion; WPD: 2 x 11kV OH & 1 x 33kV OH diversions; Vodafone: Diversion; Wales & West: Diversion; SWW: Trunk main diversion ScottishPower Renewables: Slew cables	+3 High cost increase (very high if existing A30 removed in barrow field) Scottish Power: Diversion of cable to individual turbine and cable connecting entire western array (Barrow field would require diversions to Level 3, Vodafone and Openreach)
Buildability Rating from buildability workshop, relative to Consultation Layout	1x buildable Easiest to Build. Phasing of the works required, see (similar) Skanska Buildability Review December 2016. The overbridge for the existing A30 traffic could be built early to allow earthworks to be moved west to east to build the Carland embankment. Note in any option High Pressure Gas main diversion required. In any option earthworks to the new westbound off slip road should avoid the existing dual carriageway on the east side of the existing Carland Cross Roundabout.	2x buildable A30 plant crossing required (as no overbridge) phases than similar to Skanska Buildability Review December 2016. Alternatively the scheme could be built moving earthworks materials by road lorries or a temporary bridge for plant movements could be installed. The Carland Cross underbridge is smaller than the underbridge in the Public Consultation but there are extensive retaining walls. Note in any option High Pressure Gas main diversion required. In any option earthworks to the new westbound off slip road should avoid the existing dual carriageway on the east side of the existing Carland Cross Roundabout. The alternative northern alignment west of Carland Cross was dismissed at an early stage, so buildability issues of the alternative were not considered.
New Bridges & Structures (No)	2 x under bridges, 1 x over bridge	2 x under bridges
Land take (excl. environmental mitigation and drainage measures) (m2)	266,300 (incl. highway land) 226,200 (exc. highway land)	232,700 (incl. highway land) 202,600 (exc. highway land)
Non-Motorised Users	Potential for cycle link between Carland Cross and Mitchell would improve journey times and NMU access. Non-designated cycle links on southern side of existing roundabout not impacted upon. NMU access to north of the existing roundabout is thought to be minimal and therefore not impacted by this option.	Ditto.
Public Rights of Way & Open Access Land	No public rights of way or areas of open access land are impacted.	Ditto.
Land use	Predominantly affects agricultural land. Does not affect any local plan allocations or amenity space.	Ditto.
Stakeholder engagement. Landowners/residents/tenants directly affected.	3	3
Stakeholder engagement. Landscape.	The option showing the reconnection of ancient barrow landscape was shown and approved of by Cornwall Council. Preferred to the consultation layout.	
Stakeholder engagement. Heritage	Historic England is clear that they strongly recommend measures to reunite the barrows. Alternative treatment of the existing road has been suggested but the no opinion on this has yet been received. Also require opinion of the barrow affected by alignment through the Dorset Heath.	
Stakeholder engagement. Ecology	Limited consultations with Natural England or County Ecologists so far accept through value management workshops. Meeting set up for 3 March.	Ditto.

Appendix C. Option 7A: The recommended route





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KEY:
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Rev.	Date	Description	By	Chk'd	App'd
P01	22/06/2017	FOR SCHEME ASSESSMENT REPORT	AW	CB/MH	TH
P01.3	26/05/2017	MINOR AMENDMENTS	AW	CB/MH	TH
P01.2	12/05/2017	PROPOSED ROUTE BOUNDARY ADDED	AW/MD	CB/MH	TH

Drawing Status: SUITABLE FOR STAGE APPROVAL
Suitability: S4

WSP PARSONS BRINCKERHOFF
The Forum
Barnfield Road
Exeter
Devon
EX1 1QR
Tel: +44 (0)1392 229 700

 www.wsp-pb.co.uk

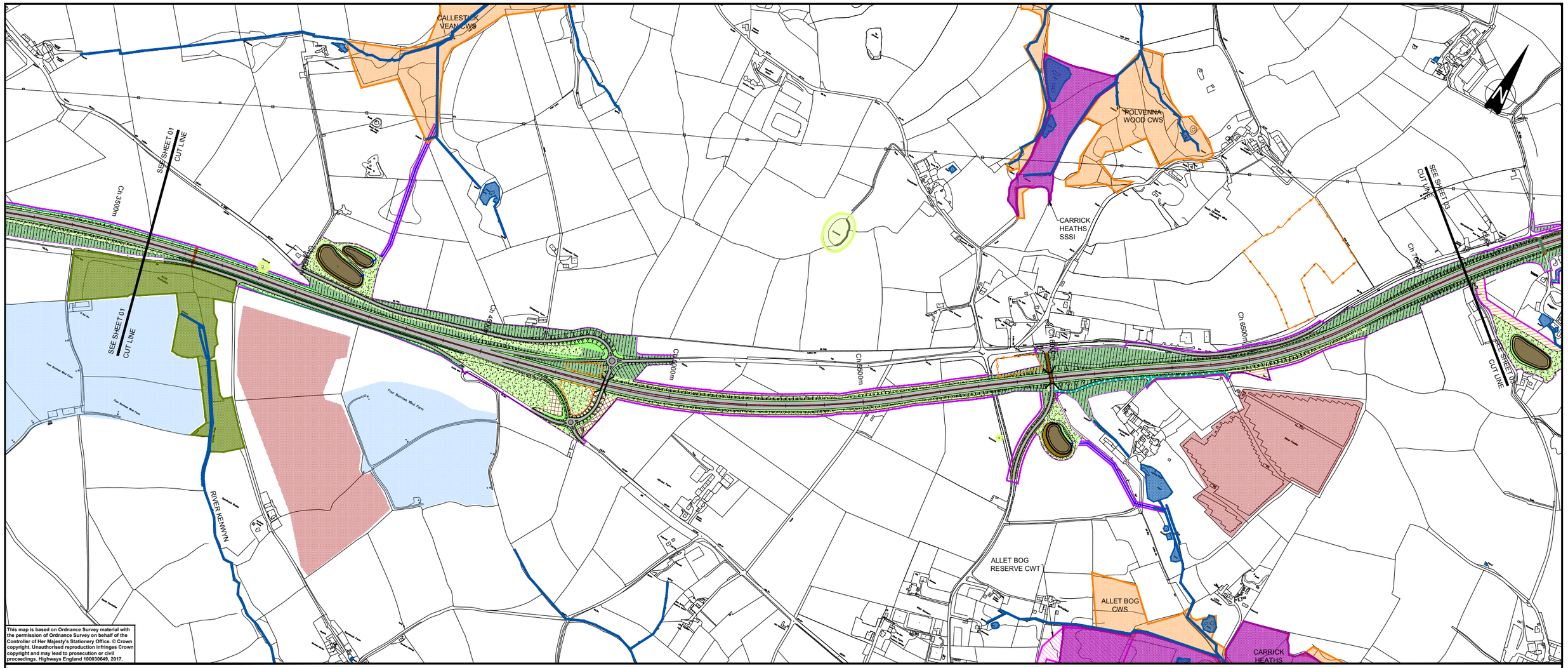
Client: Working on behalf of highways england

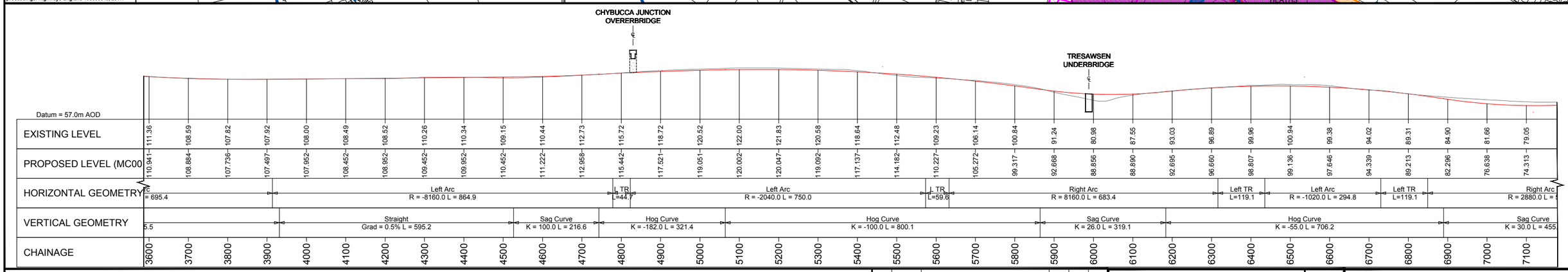
Project Title: A30 CHIVERTON TO CARLAND CROSS

Drawing Title: PROPOSED ROUTE OPTION 7A SHEET 1 OF 4

Scale	Drawn	Checked	Approved	Authorised
HS: 1:5000 VS: 1:2000	AW/MD	CB/MH	TH	---
Original Size	Date	Date	Date	Date
A1	22/06/17	22/06/17	22/06/17	---

Drawing Number: Project HA551502 | Originator WSP | Volume GEN | Location 0000 | Type DR | Role Z | Number 00124
Project Ref. No.
Revision: P01





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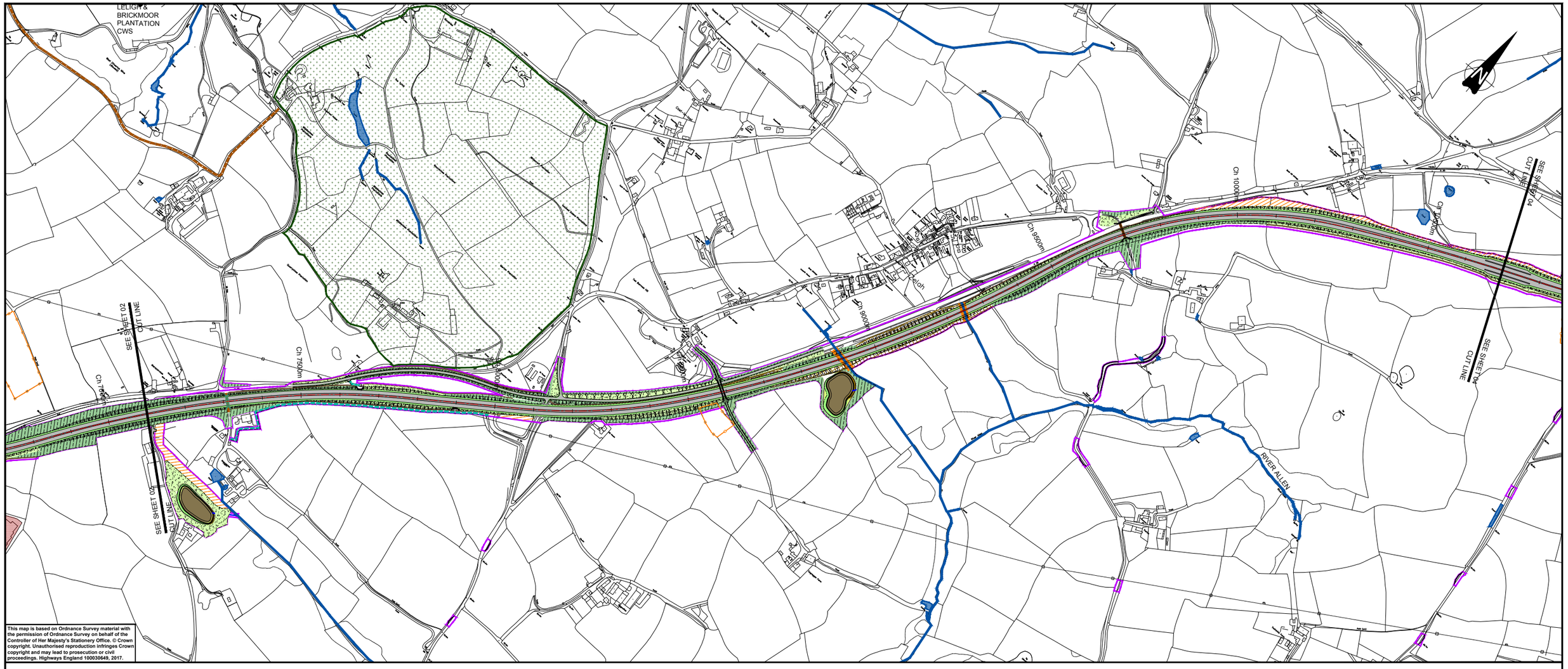
Project Title: A30 CHIVERTON TO CARLAND CROSS

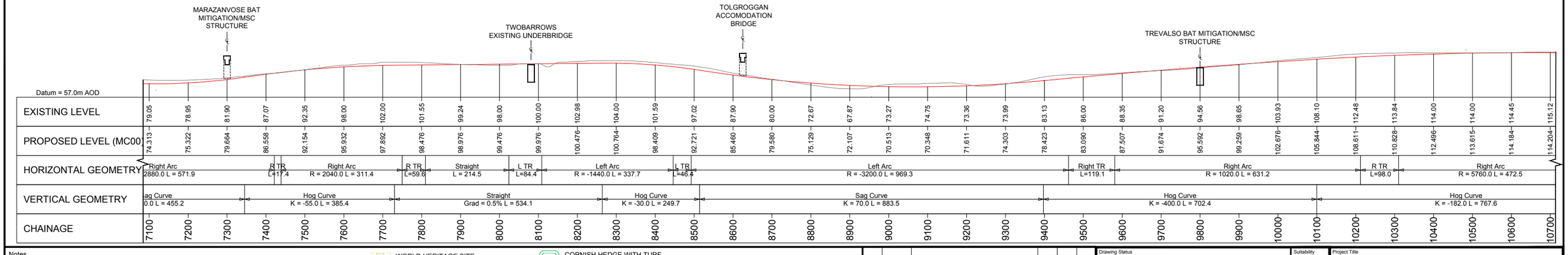
Drawing Title: PROPOSED ROUTE OPTION 7A SHEET 2 OF 4

Scale	Drawn	Checked	Approved	Authorised
HS: 1:5000 VS: 1:2000	AW/MD	CB/MH	TH	---
Original Size	Date	Date	Date	Date
A1	22/06/17	22/06/17	22/06/17	---

Drawing Number Project	Originator	Volume	Project Ref. No.
HA551502	WSP	GEN	
0000 Location	DR Type	Z Role	00125 Number

Revision: P01





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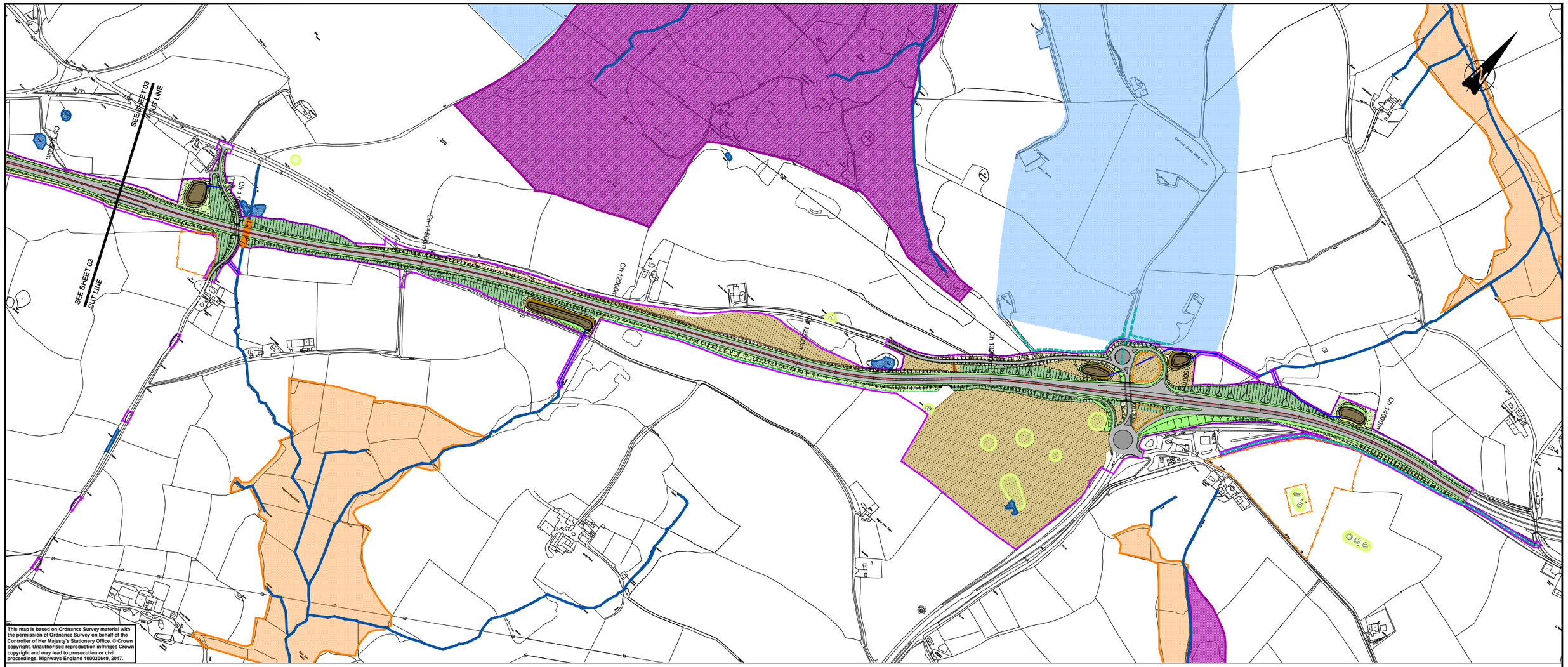
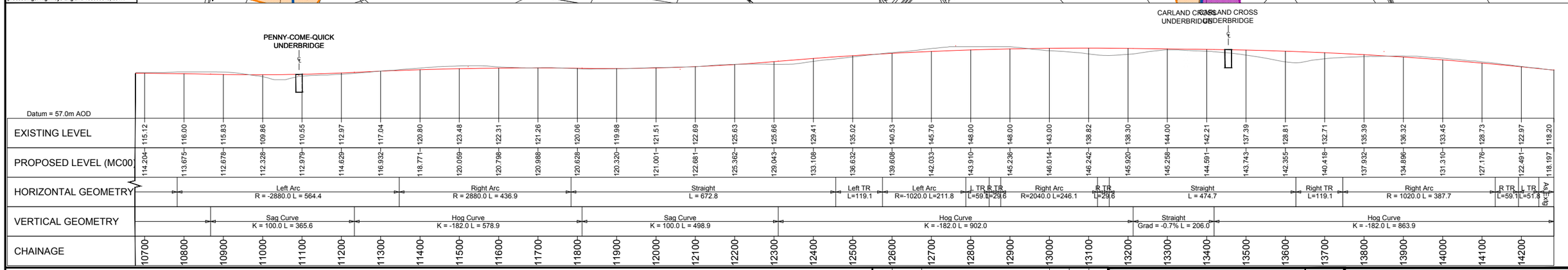
Drawing Title: PROPOSED ROUTE OPTION 7A SHEET 3 OF 4

Scale	Drawn	Checked	Approved	Authorised
HS: 1:5000 VS: 1:2000	AW/MD	CB/MH	TH	---
Original Size	Date	Date	Date	Date
A1	22/06/17	22/06/17	22/06/17	---

Drawing Number: Project HA551502 | Originator WSP | Volume GEN | Location 0000 | Type DR | Role Z | Number 00126
Project Ref. No.:
Revision: P01





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Scale: HS: 1:5000 VS: 1:2000	Drawn: AW/MD	Checked: CB/MH	Approved: TH	Authorised: ---
Original Size: A1	Date: 22/06/17	Date: 22/06/17	Date: 22/06/17	Date: ---

Drawing Number: Project HA551502 | Originator WSP | Volume GEN | Location 0000 | Type DR | Role Z | Number 00127
Project Ref. No.:
Revision: P01

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