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A30 Chiverton to Carland Cross TR010026

7.5 TRANSPORT REPORT

Planning Act 2008

APFP Regulation 5(2)(q)
Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

A30 Chiverton to Carland Cross
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7.5 TRANSPORT REPORT

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Executive Summary

The section of the A30 in Cornwall from Chiverton to Carland Cross, experiences congestion and delays throughout the year, with poor journey time reliability. 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 scope of the scheme is to upgrade 12.5km of single carriageway to dual carriageway on the A30 between Chiverton and Carland Cross.

The specific 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;
- improve network reliability and reduce journey times;
  - to deliver capacity enhancements to the SRN;
- supporting the use of sustainable modes of transport;
- delivering better environmental outcomes, and;
- to improve local and strategic connectivity.

This report summarises the development of the traffic model that has been used in the appraisal of the scheme in terms of impact on the highway network and the economic benefits of the scheme for Highways England Project Control Framework (PCF) Stage 3 in support of the Development Consent Order.

In addition to summarising the development of the traffic model, this report also presents the policy context for the scheme on a local, regional and national level. The policy context addresses the requirement for the highway scheme as well as the needs of Walkers, Cyclists and Horse Riders.

1 Introduction

1.1 Background

1.1.1 Following the completion of the dualling scheme to upgrade the A30 between Temple and Higher Carblake near Bodmin in 2017, the section of the A30 from Chiverton to Carland Cross is the only remaining single carriageway section of the A30 between the M5 at Exeter and Camborne in west Cornwall.

1.1.2 The Chiverton to Carland Cross 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.

1.1.3 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.

1.1.4 In 2014, it was announced as part of the Department for Transport's (DfT) Road Investment Strategy (RIS) that a scheme to upgrade this final single carriageway section from Chiverton to Carland Cross to expressway standard would receive funding. Additionally, the scheme has received support from the European Union's European Regional Development Fund, with a subsidy of £20 million available to assist in the development and construction stages.

1.2 Scheme Description

1.2.1 The key elements of the scheme consist of:

- The construction of a new A30 dual carriageway road approximately 14 kilometres between Chiverton and Carland Cross;
- The re-alignment of the existing A30;
- The construction of a new grade separated junction at Chiverton;
- The construction of a new grade separated dumbbell junction at Chybucca;
- The construction of a new grade separated junction at Carland Cross;
- Works to Allet Road for access across the new A30 at Tresawsen;
- The demolition and replacement of the existing bridge at Tolgroggan Farm;
- The construction of an underpass under the main carriageway of the new A30 and the existing A30 at Trevalso;
- The construction of an underpass at Pennycomequick;
- The closure and stopping up of public highways and the existing A30; and
- The diversion of utilities including telecoms equipment, water pipelines, power cables and gas pipelines.

1.2.2 These features were identified as meeting the current and future needs of road users, as well as achieving the high-level Government, Highways England and local objectives for the Strategic Road Network (SRN).

1.2.3 Construction activities for the scheme would commence in March 2020, as identified in the Road Investment Strategy. The dual carriageway element of the scheme would be "open for traffic" in December 2022, however, the scheme construction would not finish until 2023.

1.2.4 The scheme area can be seen in Figure 1-1.

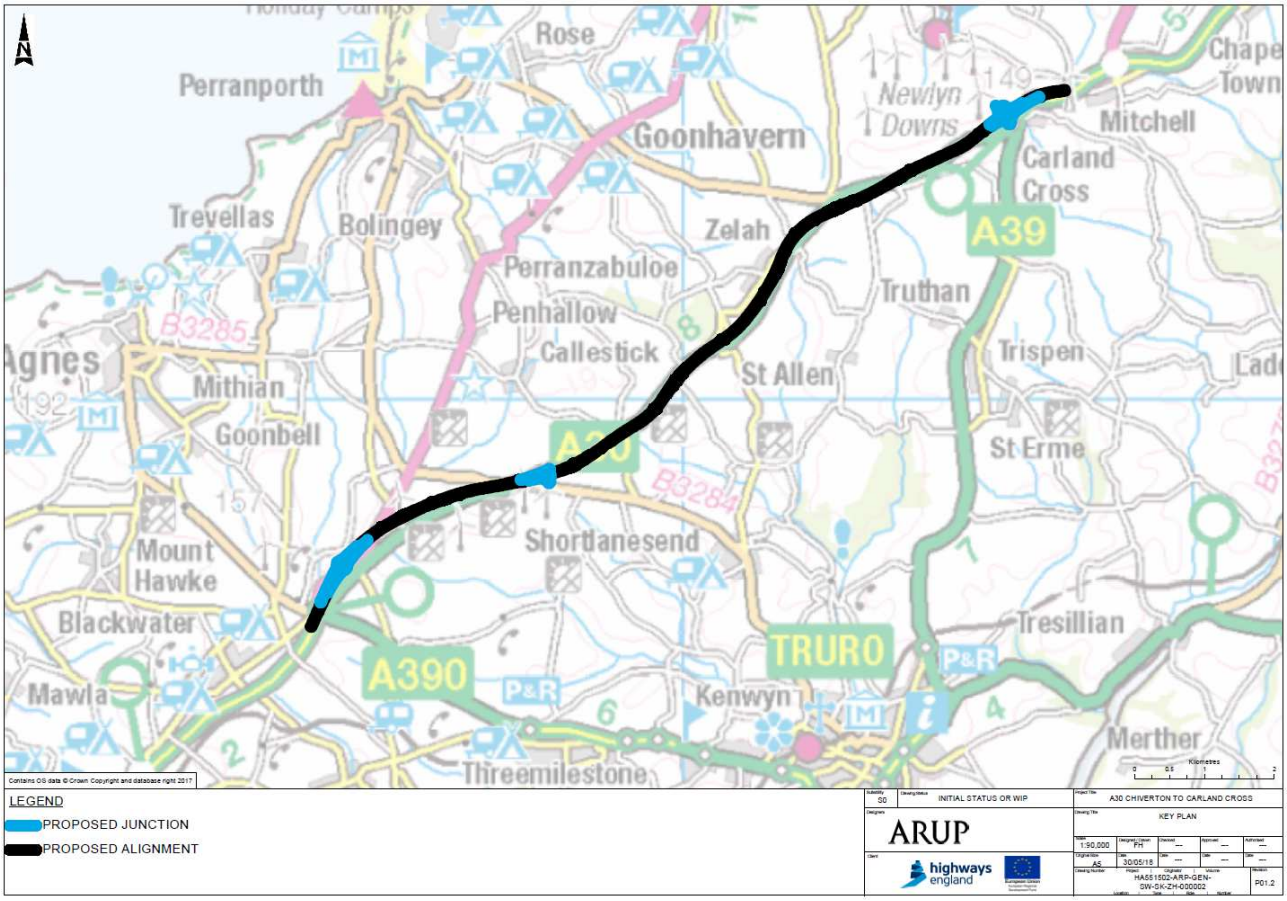

Figure 1-1: Scheme Area

1.3 Scheme Objectives

1.3.1 The scheme would:

- Contribute to economic growth by supporting employment and residential development opportunities;
- Contribute to regeneration by enhancing the opportunities for previous, existing and future regeneration projects to realise their full potential; and
- Minimise the environmental impact of operating, maintaining and improving the network and seek to protect and enhance the quality of its surrounding environment while conforming to the principles of sustainable transport.

1.3.2 The objectives for the scheme are to:

- Improve the safety, operation & efficiency of the transport network;
- Contribute to regeneration and sustainable economic growth;
- Support employment & residential development opportunities;
- Improve network reliability and reduce journey times;
- Deliver capacity enhancements to the SRN;
- Support the use of sustainable modes of transport;
- Deliver better environmental outcomes; and
- To improve local and strategic connectivity.

1.4 Purpose of the Transport Report

1.4.1 As a Nationally Significant Infrastructure Project (NSIP), the scheme requires an application for a Development Consent Order to be submitted to the Planning Inspectorate, acting on behalf of the Secretary of State. This report forms part of Volume 7 of the application for a Development Consent Order (DCO) authorising Highways England to construct the scheme.

1.4.2 The purpose of this report is to provide a non-technical summary of the transport planning works that have been completed to support the DCO submission for the scheme. These include traffic modelling and economic appraisal works, in addition to the Walking, Cycling and Horse-Riding (WCH) assessment and review. The purpose of these works has been to:

- Quantify the impacts of the scheme on the highway network, in terms of expected levels of congestion with and without the scheme in place;
- Provide traffic flow inputs to design of the new road and its junctions;
- Provide traffic flow inputs to the Environmental Impact Assessment (EIA) of the proposed scheme;
- Provide inputs to the value for money assessment for the scheme, in terms of the costs and benefits arising from the scheme for road users; and
- Assess the existing provision of WCH facilities in order to identify potential opportunities for improvement and integration with the local and national network(s) throughout the design process.

1.4.3 The traffic model is a strategic highway model, with a detailed study area that covers from Indian Queens in the east, to Truro in the south, Redruth in the west and Newquay to the north. The wider study area includes the major routes to the west of Redruth, the A390 to the south of Truro towards Falmouth and the major strategic routes within Cornwall and Devon such as the A39, A38 and A30.

1.4.4 Deliverables have been produced at each stage of Highways England's Project Control Framework (PCF) related to the traffic and economics workstream. The PCF products that primarily underpin this document include the following:

- PCF Stage 3 Traffic Data Collection Report (TDCR) (HA551502-WSP-GEN-0000-RE-TR-0012-P02);
- PCF Stage 3 Local Model Validation Report (LMVR) (HA551502-WSP-GEN-0000-RE-TR-0013-P04);
- PCF Stage 3 Appraisal Specification Report (HA551502-WSP-GEN-0000-RE-TR-0009-P03);
- PCF Stage 3 Traffic Forecasting Report (HA551502-WSP-GEN-0000-RE-TR-0018-P03);
- PCF Stage 3 Combined Modelling and Appraisal Report (ComMA) (HA551502-ARP-GEN-SW_WCH-RP-TR-000001);
- PCF Stage 3 Distributional Impacts Report (HA551502-ARP-GEN-SW-RP-TR-000001-P04) and
- Operational Assessment Technical Note (HA5515020-ARP-HGN-SW-FN-TR-000009-P01).

1.4.5 Additionally, whilst not PCF products, the Walking, Cycling and Horse-Riding Assessment and Review Reports have also been utilised to inform the relevant sections of this report:

- Walking, Cycling and Horse-Riding Assessment Report (HA551502-ARP-ENM-SW-RP-LE-000001); and
- Walking Cycling and Horse-Riding Review Report (HA551502-ARP-ENM-SW-RP-LE-000019).

2 Policy Context

2.1 Overview

2.1.1 To support the preparation of the traffic model and economic appraisal, it is necessary to review National and Local Planning Policy and how this has informed the overall approach. An assessment of the scheme's compliance with relevant policies is provided in the **Planning Statement** (Volume 7, Document Ref 7.1).

2.1.2 The Planning Act 2008 (the Act) establishes the development consent regime for Nationally Significant Infrastructure Projects. The Scheme is identified as a highways NSIP under section 22 of the Act (as amended and described in full above). The Planning Inspectorate has responsibility for administering the DCO process and supporting the appointed examining authority, which is responsible for examining applications and making a recommendation to the Secretary of State as to whether to grant development consent.

2.1.3 The National Policy Statements (NPS) are of primary importance to the decision-making process when DCO applications are being examined. Section 104 of the Act states that:

> *(2) In deciding the application the Secretary of State must have regard to –*
>
> *(a) any national policy statement which has effect in relation to development of the description to which the application relates (a "relevant national policy statement") …*
>
> *(3) The Secretary of State must decide the application in accordance with any relevant national policy statement, except to the extent that one or more of subsections (4) to (8) applies."*

2.1.4 The National Policy Statement for National Networks (NN NPS) is relevant to the proposed A30 Chiverton to Carland Cross. This NPS forms the basis against which the scheme will be examined.

2.1.5 In addition, the National Planning Policy Framework (NPPF) published in July 2018 sets out the Government's planning policies for England. The NPPF is likely to be an "important and relevant"[1] matter to be considered in decision making for NSIPs. The NPPF is supplemented by the Planning Practice Guidance (PPG)[2] web-based resource launched in February 2014. The PPG is updated by the Department for Communities and Local Government as necessary.

2.1.6 It is important to note that applications under the Act are not subject to s38(6) of the Planning and Compulsory Purchase Act 2004, which states that determination of a planning application must be made in accordance with the local development plan, unless other material considerations indicate otherwise. Local planning policy may be an important and relevant matter during the consideration of applications for development consent, but such applications do not have to be in accordance with the development plan.

2.1.7 Development plan policies may be relevant considerations where they inform the assessment of potential effects – for example, by identifying land allocations and

[1] National Planning Policy Framework paragraph 3
[2] Department for Communities and Local Government: Planning Practice Guidance: February 2014

environmentally sensitive areas. If there is a conflict between the NPS and local policies, however, the NPS takes precedence.

2.2 National Policy Statement for National Networks (December 2014)

2.2.1 The NN NPS sets the Government's policy against which the Secretary of State for Transport will make decisions on applications for development consent for nationally significant infrastructure projects on road, rail and strategic rail freight interchange developments[3]. Specifically, Paragraph 1.1 states that the purpose of the NN NPS is to establish:

> *"the need for, and Government's policies to deliver, development of nationally significant infrastructure projects (NSIPs) on the national road and rail networks in England. It provides planning guidance for promoters of nationally significant infrastructure projects on the road and rail networks, and the basis for the examination by the Examining Authority and decisions by the Secretary of State."*

Drivers of Need for Development on the National Road Network

2.2.2 The NN NPS sets out the 'vision and strategic objectives for the national networks'. This recognises that there is a critical need to provide safe, expeditious and resilient networks that better support social and economic activity, and to provide a transport network that is capable of supporting economic growth and rebalancing the economy.

> "Government's vision and strategic objectives for the national networks The Government will deliver national networks that meet the country's long-term needs; supporting a prosperous and competitive economy and improving overall quality of life, as part of a wider transport system. This means:
>
> - *Networks with the capacity and connectivity and resilience to support national and local economic activity and facilitate growth and create jobs.*
> - *Networks which support and improve journey quality, reliability and safety.*
> - *Networks which support the delivery of environmental goals and the move to a low carbon economy.*
> - *Networks which join up our communities and link effectively to each other.[4]"*

2.2.3 Whilst the NN NPS is not scheme specific, it provides a decision-making framework for applications on the strategic highway network. It does however state that in some cases, it will not be sufficient to simply expand capacity on the existing network, through factors such as junction improvements or new slips roads, implementing 'smart motorways' or improving trunk roads. In these circumstances "*new road alignments and corresponding links… may be needed to support increased capacity and connectivity*"[5].

[3] National Networks National Policy Statement (Paragraph 1.1)
[4] National Networks National Policy Statement (Vision)
[5] National Networks National Policy Statement (Paragraph 2.27)

Assessment Principles

2.2.4 Unlike other types of infrastructure covered by the Act, the NN NPS deals predominantly with linear infrastructure projects that are designed to link together separate points. Development will usually be determined by economic activity and population, as well as the location of existing transport networks[6].

2.2.5 Paragraph 4.2 of the NN NPS sets out that subject to the detailed policies and protections in this NPS, and the legal constraints set out in the Act, there is a presumption in favour of granting development consent for national networks NSIPs that fall within the need for infrastructure established in this NPS. In considering proposed development, and weighing adverse impacts against benefits, the Secretary of State should take into account:

- *Its potential benefits, including the facilitation of economic development, including job creation, housing and environmental improvement, and any long-term or wider benefits;*
- *Its potential adverse impacts, including any longer-term and cumulative adverse impacts, as well as any measures to avoid, reduce or compensate for any adverse impacts[7].*

2.2.6 With regard to alternatives, Paragraphs 4.26 and 4.27 of the NN NPS set out that applicants should comply with all legal requirements and any policy requirements for the assessment of alternatives. Specifically, this will include: reference to the EIA Directive, which requires projects with significant environmental effects to include an outline of the main alternatives studied by the applicant; other legal requirements for the consideration of alternatives, including under the Habitats and Water Framework Directives; or a policy requirement of the assessment of state that "*all projects should be subject to an options appraisal*".

2.2.7 Section 5 of the NN NPS sets out the assessment criteria for the generic impacts associated with a nationally significant road or rail scheme.

2.3 National Planning Policy Framework

Role of the NPPF and NPS

2.3.1 The overall strategic aims of the NPPF and the NPS are consistent, however, as set out above, the two documents have two differing roles to play. Paragraph 5 of the NPPF makes it clear that it does not contain specific policies for NSIPs for which particular considerations apply. It goes on to state, however, that it may be an 'important and relevant' matter to be considered in decision making for NSIPs. The role of the NPS will be to assume the function of providing specific policies and provide transport policy which will guide individual development brought under it[8].

2.3.2 Further details are provided in the **Planning Statement** (Volume 7, Document Ref 7.1).

[6] National Networks National Policy Statement (Paragraph 4.13)
[7] National Networks National Policy Statement (Paragraph 4.3)
[8] National Networks National Policy Statement (Paragraph 1.19)

2.4 Local Development Plan

2.4.1 Although a DCO application is not subject to Section 38(6) of the Planning and Compulsory Purchase Act 2004, development plans may be considered an important and relevant matter.

2.4.2 The proposal falls entirely within the Cornwall Council Local Authority area. Although there are a number of 'saved policies' within the Local Plan, the development plan for the scheme area comprises:

- The **Cornwall Local Plan Strategic Policies (2010-2030)** which was formally adopted on 22 November 2016, which represents the overarching planning policy framework for the whole of Cornwall in the period up to 2030.
- The **Cornwall Local Plan Strategic Policies (2010-2030) Community Network Area Sections** which act as a local focus for debate and engagement and provide the basis for the place-based element of Cornwall's policy framework. The scheme is within both PP6 Truro and Roseland and PP7 St Agnes and Perranporth Community Network Areas.
- The scheme falls partially within the north eastern section of the **Truro and Kenwyn Neighbourhood Development Plan**, which sets out a number of relevant development management policies in the Truro and Kenwyn Neighbourhood Plan Area

2.4.3 There are also a number of guiding documents and supplementary planning documents, set out below, which will also feature as material considerations.

Cornwall Local Plan Strategic Policies (2010-2030)

2.4.4 The A30 Chiverton to Carland Cross is identified on the Key Diagram within the Cornwall Local Plan Strategy (2010-2030) as a Key Infrastructure Improvement. Relevant policies for the project, which are set out in further detail within each topic chapter of the **Environmental Statement** (Volume 6, Document Ref 6.2), are as follows:

- **Policy 1** *Presumption in favour of sustainable development*, sets out Cornwall Council's response to the NPPF which states that Council's will take a positive approach that reflects the presumption in favour of sustainable development.
- **Policy 12** *Design* which sets out the Council's ambitions to achieving high quality, safe, sustainable and inclusive design in all development. Development must ensure Cornwall's enduring distinctiveness and maintain and enhance its distinctive natural and historic character.
- **Policy 23** *Natural Environment* states that development proposals will need to sustain local distinctiveness and character and protect and where possible enhance Cornwall's natural environment and assets according to their international, national and local significance. The policy sets out required interventions and mitigation measures for each type of habitat, which will be referenced within Chapter 8 Nature Conservation.
- **Policy 24** *Historic Environment* states that development proposals will be permitted where they would sustain the cultural distinctiveness and significance of Cornwall's historic rural, urban and environment by protecting, conserving and where appropriate, enhancing the significant of designated and non-designated assets. It further states that development within, or within the setting, of the Cornwall and West Devon Mining Landscape World Heritage Site (WHS) should accord with the WHS Management Plan.

- **Policy 27** *Transport and Accessibility* states that all developments should provide safe and suitable access to the site for all people and not cause a significant adverse impact on the local or strategic road network that cannot be managed or mitigated.
- **Policy 28** *Infrastructure* sets out that the requirements for developer contributions and when these will be sought.

Local Plan Community Network Area Sections

2.4.5 The proposed scheme falls within two of the Community Network Area Sections. These form the basis for the place-based element of Cornwall's policy framework:

- Policies within the **Truro and Roseland Community Network Area (PP6)** focus on ensuring the housing needs of the community are met (Objective 1) and balancing the provision of employment and housing to reduce commuting (Objective 2). Specifically, in relation to the proposed scheme, Objective 4 is relevant and seeks to enable the use of more sustainable transport modes and reduce congestion through the provision of additional transport infrastructure. Objective 7 also seeks to ensure that the development is adaptable, sustainable and of a high quality design and layout.
- In addition, the proposed scheme also falls within the **St Agnes and Perranporth Community Network Area (PP7)**. This Community Network Area document focuses on "co-ordinating a strategic approach to the provision of services and public transport to encourage self-containment and sustainable transport" (Objective 4). In addition, Objective 8 seeks to "maintain and enhance the area's heritage and environmental assets for the benefit of the local community and to enhance the area's tourism offer".

Truro and Kenwyn Neighbourhood Development Plan

2.4.6 The proposed scheme falls within the north eastern edge of the Truro and Kenwyn Neighbourhood Development Plan. Alongside promoting sustainable development (Policy E1), sustainable drainage (Policy E2) and green infrastructure (Policy E4), the Neighbourhood Development Plan seeks to promote employment growth at existing and new employment sites. In relation to the proposed scheme, the NDP includes:

- Policy E7 Character of the Highways and Byways which seeks to retain and enhance the character and materials of highways and associated structures;
- Policy T1 Truro Transport Strategy which sets a requirement for contributions to the delivery of the Truro Transport Strategy.
- Policy T3 Sustainable Transport, which requires development to provide for sustainable transport modes, reduce the need to travel and identifies key routes for walking and cycling.

3 Existing Conditions

3.1 Overview of Existing Highway Network

3.1.1 The A30 is 284 miles in length and runs from west London to Land's End, forming the primary connection to west Cornwall. As such, it retains trunk road status under the management of Highways England from Honiton, east of Exeter, to Longrock, east of Penzance.

3.1.2 Specific to the scheme, the section of the A30 from Chiverton to Carland Cross is approximately 8 miles in length, consisting primarily of winding single carriageway with a speed limit of 60mph. Short sections have been widened to two lanes to facilitate the overtaking of slow-moving vehicles on the hilly terrain.

3.1.3 As the only main route to west Cornwall, the A30 is crucial to the resilience and performance of transport infrastructure in the region, and the connectivity of west Cornwall to the rest of the South West and wider UK. When incidents occur that impede or block flow on the A30, 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.

3.1.4 The A30 also serves some north-south routes between two of Cornwall's largest settlements – Newquay and Truro – in addition to significant local movements between numerous farms and small settlements along its route.

3.1.5 During neutral month peak hours[9], the single carriageway A30 between Chiverton and Carland Cross operates close to capacity, and is forecast to operate over capacity by 2022 As such, this section experiences heavy congestion, which in turn impacts on the local economy. Journey times show that the A30 currently operates over capacity in the summer period due to the significantly increased traffic flows during these periods.

Key Junctions between Chiverton to Carland Cross

3.1.6 There are three key junctions between Chiverton and Carland Cross, in addition to the two roundabouts that bound this section of the A30.

3.1.7 At the western extent of the scheme, Chiverton Cross roundabout connects the existing A30 trunk road to the A390 from Truro, the A3075 from Newquay and the B3277 from St Agnes.

3.1.8 At the eastern extent of the scheme, Carland Cross roundabout connects the A39 from Truro to the existing A30 trunk road in addition to the local minor road network. A gated access to the Carland Cross Windfarm forms the final arm of the roundabout.

3.1.9 The three 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.

[9] Department for Transport (2014) TAG Unit M1.2 – Data Sources and Surveys, Paragraph 3.3.6 [Online]. Available at: (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427124/webtag-tag-unit-m3-1-highway-assignment- modelling.pdf)

- 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; and
  - the unclassified road southward to St. Allen, Trispen and Truro.

3.1.10 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.

3.1.11 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.

3.2 Observed Traffic Flows

3.2.1 Traffic flows on the existing A30 and other local roads within the vicinity of the scheme were identified through a number of different methods, including:

- Manual Classified Count (MCC) data collected by Cornwall Council in October 2012 at all the junctions on the A30 section from Chiverton to Carland Cross, as well as at other key junctions in the area. The locations of these counts can be found in Section 5 the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).
- Automatic Traffic Count (ATC) data available for key routes on the local highways network from a series of ATC sites managed by Cornwall Council.
- Highways England's TRADS traffic count database provided further traffic count data on the A30.

3.2.2 The full details of the traffic data collection completed for the purposes of the traffic modelling and economic appraisal can be found in the PCF Stage 3 Traffic Data Collection Report (HA551505-WSP-GEN-0000-RE-TR-0012-P02).

3.2.3 Existing traffic conditions have been analysed on the A30 between Chiverton and Carland Cross using the TRADS ATC counter between Zelah and Carland Cross roundabout, which can be seen in Figure 3-1 and Figure 3-2.

3.2.4 Peaks in both graphs occur during the AM and PM peak periods - from this it can be assumed that traffic is using the route in both directions as part of a commute.

3.2.5 Figure 3-2 shows that the eastbound flow on the A30 experiences its largest level of traffic during the PM peak. This trend could suggest that in the AM peak, these vehicles could be using alternative routes such as the A3075 or A39.

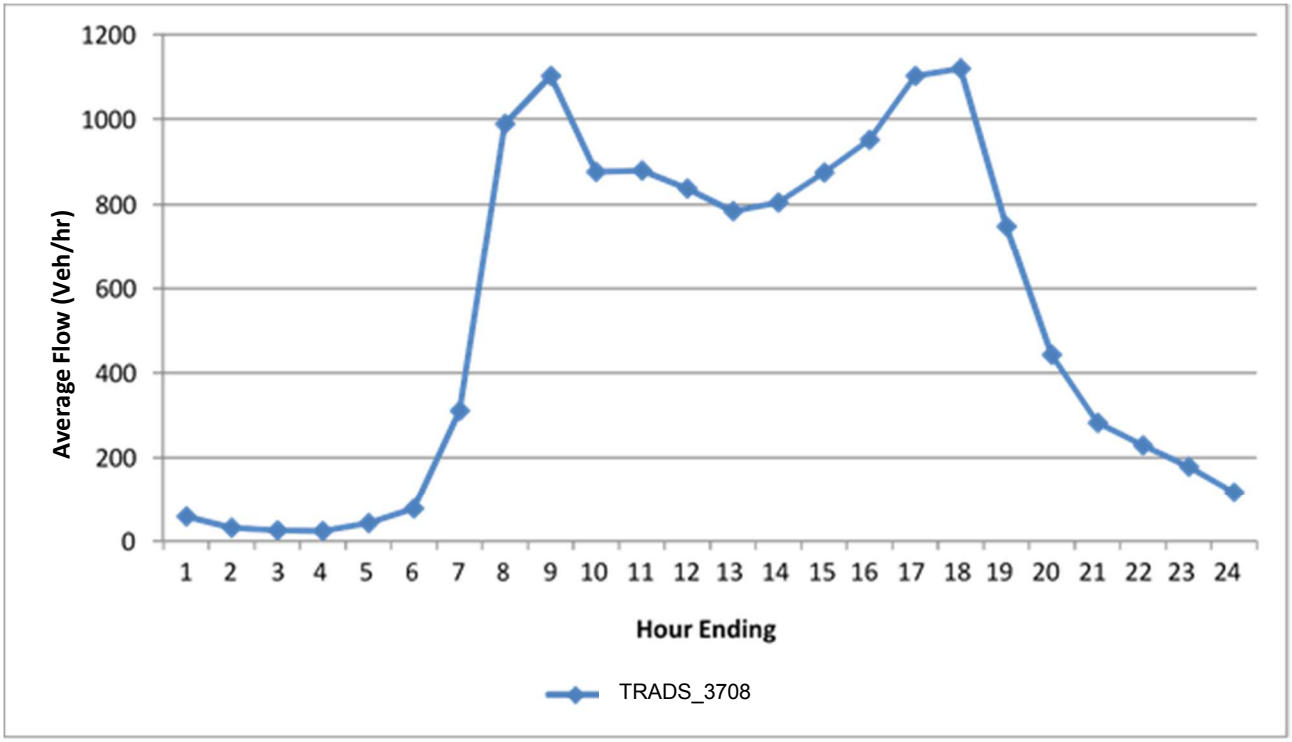

Figure 3-1: Average Hourly 2015 Westbound Traffic Flows between Zelah and Carland Cross

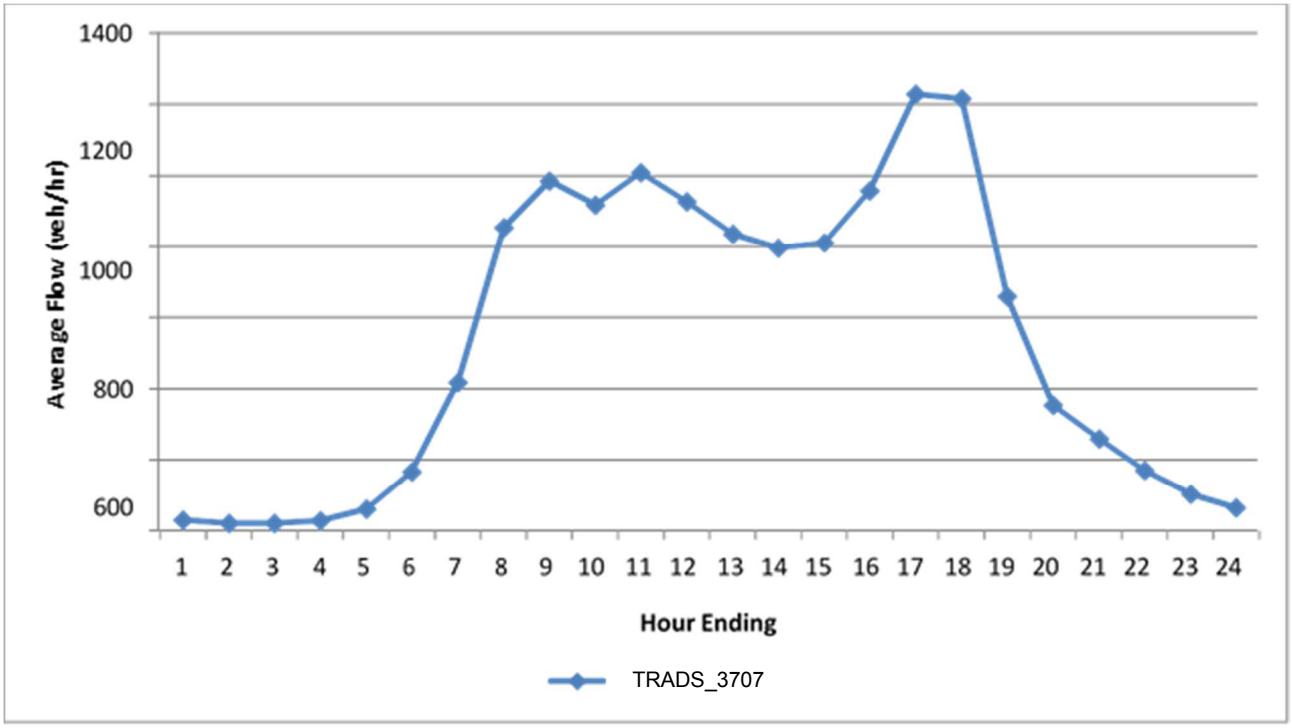

Figure 3-2: Average Hourly 2015 Eastbound Traffic Flows between Zelah and Carland Cross

3.2.6 Observed traffic flows on other local roads, in addition to the junction turning counts along the A30 from Chiverton to Carland Cross can be found in the PCF Stage 3 TDCR (HA551505-WSP-GEN-0000-RE-TR-0012-P02).

3.3 Seasonality

3.3.1 Figure 3-3 and Figure 3-4 show the average hourly traffic flows for each month of the year between Zelah and Carland Cross on the A30.

3.3.2 Figure 3-3 shows the westbound monthly traffic flows for the A30. The graph shows a peak in traffic levels during July and August with the trend indicating that the route experiences its highest levels of traffic during the summer. This trend can also be seen in Figure 3-4, where the traffic levels gradually increase throughout the year from January to the peak summer months of July and August. These two months are expected to be when traffic is busiest as Cornwall experiences a high volume of tourist traffic over the summer period, especially during the school summer break.

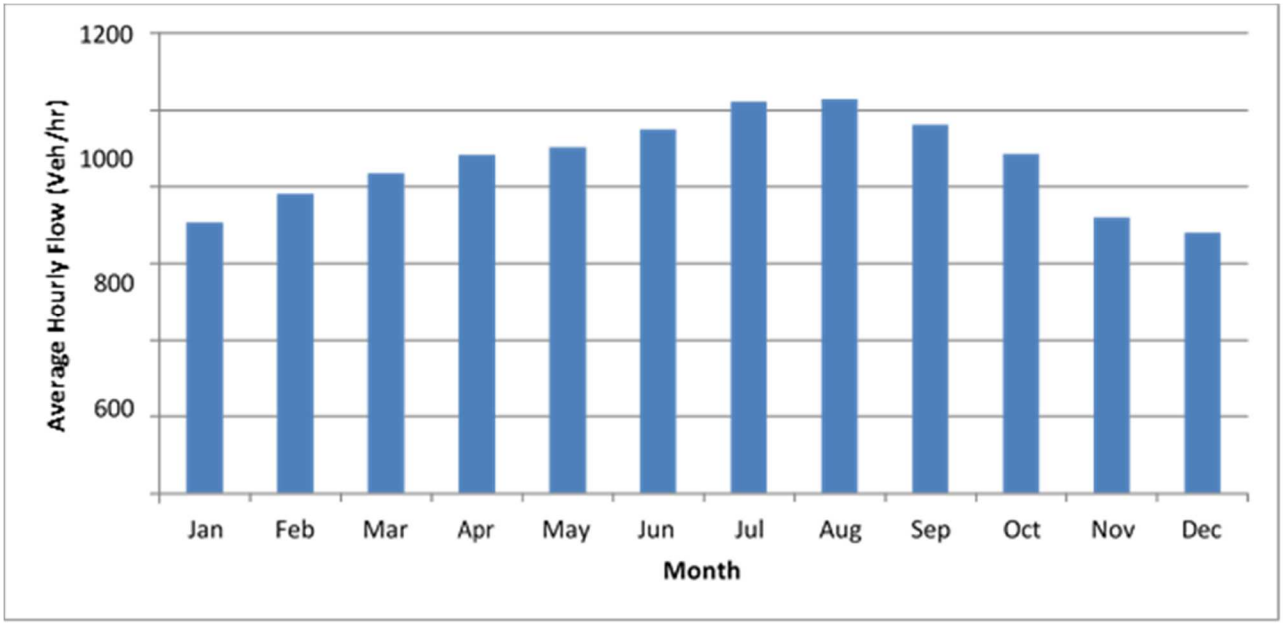

Figure 3-3: Monthly 2015 Westbound Traffic Flows between Zelah and Carland Cross (TRADS 3708)

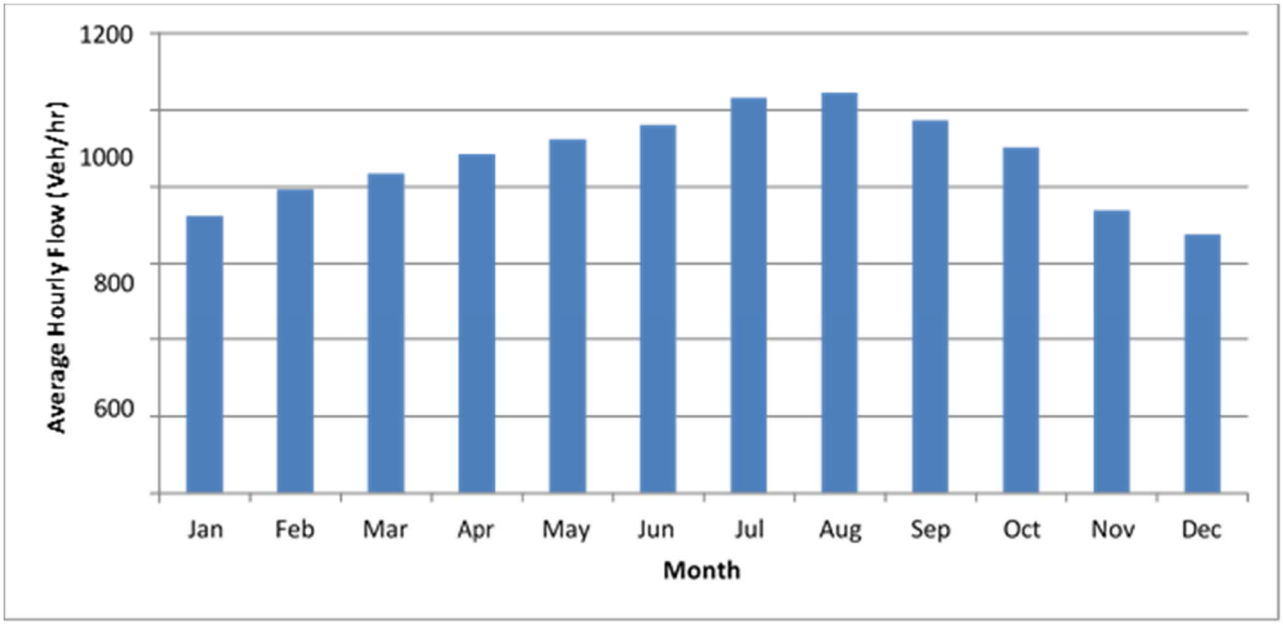

Figure 3-4: Monthly 2015 Eastbound Traffic Flows between Zelah and Carland Cross (TRADS 3707)

3.3.3 The most important descriptor of annual traffic flow patterns is the seasonality index, which is defined as the ratio of the average August weekday flow to the average weekday flow (Monday to Friday) in the neutral months of April, May, June, September and October (excluding periods affected by bank holidays).

3.3.4 Using the annual report for the 2014 flows for the sites in the figures above, the A30 in these locations is shown to be subject to the following seasonality indexes.

Table 3-1: Seasonality Indices for the A30 Between Zelah and Carland Cross

Site	Seasonality Index
TRADS_3707	1.1841
TRADS_3708	1.1691
Non Built-up Trunk Road Typical Value (COBA Manual)	***1.1000***

3.3.5 The A30 between Zelah and Carland Cross is within the range of seasonality index encountered (1.00 - 1.50) for a non-built-up trunk road as stated in the COBA manual[10]. It is above the typical value of the seasonality index for a non-built-up trunk road.

3.4 Observed Journey Times

3.4.1 Journey time data for vehicles travelling on the A30 was collected from Highways England's HATRIS journey time database. HATRIS is a national dataset of average vehicle journey times between fixed points on the trunk road network. The dataset contains average speeds of all vehicles passing between two points. The list below details the location of the surveys on the A30:

[10] Non-built-up trunk roads are defined as those roads owned and operated by the Secretary of State for Transport (through Highways England), with speed limits above 40mph: Department for Transport (2017) COBA 2017 User Manual, Part 4 – Traffic Input to COBA, Paragraph 6.1 [Online]. Available at: (http://www.tamesoftware.co.uk/manuals/COBA_MANUAL/COBA2017%20Part%204%20(July%202017).pdf

- A3074 Hayle and Penzance (westbound only);
- A3074 Nut Lane, Lelant and Tolvaddon Interchange;
- Tolvaddon Interchange and Scorrier Interchange;
- Scorrier Interchange and Chiverton Cross roundabout;
- Chiverton Cross roundabout and Carland Cross roundabout;
- Carland Cross roundabout and Mitchell Interchange;
- Mitchell Interchange and Chapel Town;
- Chapel Town and St Enoder;
- St Enoder and Indian Queens;
- Indian Queens and junction with A389/A391;
- Junction with A389/ A391 and Carminnow Cross;
- Carminnow Cross and Launceston Rd, Bodmin; and
- A30 Entry Slip and A395, Tregadillett (eastbound only).

3.4.2 These routes cover the A30 in detail between Lelant, near Hayle and Bodmin.

3.4.3 For none trunk road links journey time data has been supplied by Cornwall Council from the Traffic Master database[11], which covers the following routes:

- A390 between Chiverton Cross and County Hall, Truro;
- A39 between Carland Cross and Union Hill junction, Truro;
- A3075 between Chiverton Cross and Newquay;
- B3284 between Chybucca and Truro via Shortlanesend;
- A39 between Arch Hill, Truro and Carnon Gate, Devoran;
- B3285 between the A30 and the A3075;
- B3277 between Chiverton Cross and St. Agnes; and,
- A30 between Chiverton Cross and Carland Cross.

3.4.4 The Traffic Master data supplements the HATRIS data to provide a wider coverage and the combined dataset is considered to have a sufficiently wide coverage of the study area.

3.4.5 The locations of the journey time routes can be seen in Figure 3-5.

3.4.6 Section 7 of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001) summarises the analysis of the journey time data in terms of quality, reliability and difference between the HATRIS data and Cornwall Council's data.

3.4.7 In the development of the A30 Chiverton to Carland Cross traffic model a combination of HATRIS data from Highways England (for the A30 west and east of the scheme) and the Traffic Master data from Cornwall Council for the A30 scheme and non-trunk roads was used for journey time validation. The Traffic Master data for the scheme is summarised in Table 3-2.

[11] Traffic Master data is GPS data sourced and centrally purchased by the Department for Transport. It is used to provide detailed analysis of congestion using GPS records to calculate the speed of traffic on different days and times.

Table 3-2: Observed Traffic Master Journey Times (seconds) between Chiverton and Carland Cross

Direction	Data Source	AM	IP	PM
Eastbound	Cornwall Council (Traffic Master)	684	642	702
Westbound	Cornwall Council (Traffic Master)	804	673	748

3.4.8 Journey times for the remaining routes can be found in Annex C of the PCF Stage 3 TDCR (HA551505-WSP-GEN-0000-RE-TR-0012-P02).

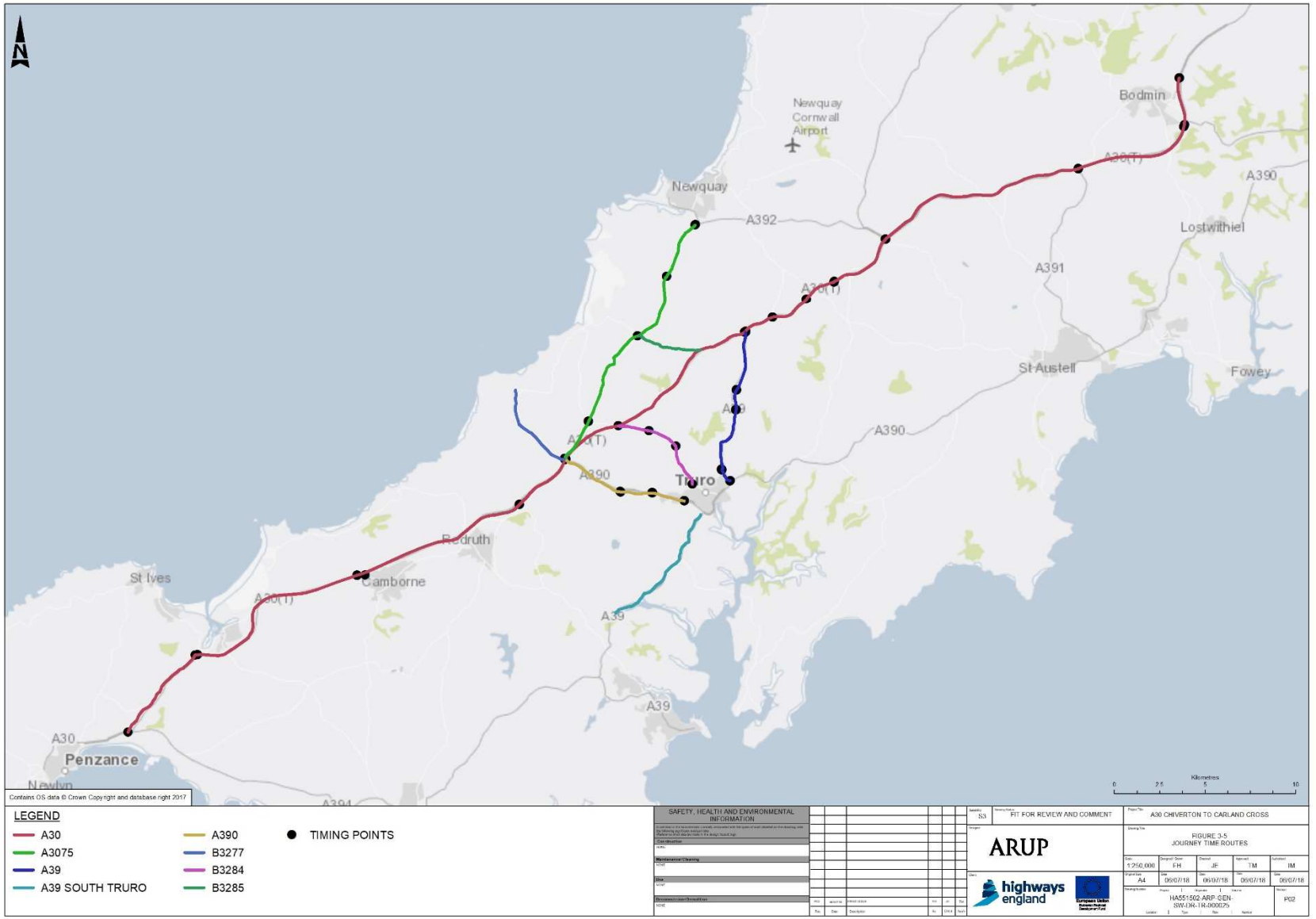

Figure 3-5: Journey Time Routes

3.5 Road Safety

3.5.1 A summary of traffic Personal Injury Accidents (PIA) was provided by Cornwall Council for the A30 between Chiverton and Carland Cross between 01/01/2012 and 31/12/2016. During this period there was a total of 1 fatal, 17 serious and 93 slight accidents.

3.5.2 Figure 3-6 shows the location of the accidents within the study area. Accidents were more frequent in the vicinity of Chiverton Cross, Carland Cross, Zelah Hill, Chybucca and Callestick / Allet Cross junction.

3.5.3 Regarding severity, the map does not show a clear distributional pattern of the killed or seriously injured (KSI) collisions. Out of 17 serious collisions, four occurred at Chiverton Cross, two at Carland Cross with the remaining four spread along the route. The only registered fatal collision occurred near Chybucca junction.

3.5.4 Table 3-3 shows the breakdown of the accidents by year and severity.

Table 3-3: Breakdown of Accidents by Severity and Year

Year	Fatal	Serious	Slight	Total
2012	0	2	17	19
2013	1	2	13	16
2014	0	4	25	29
2015	0	3	20	23
2016	0	6	18	24
Total	1	17	93	111

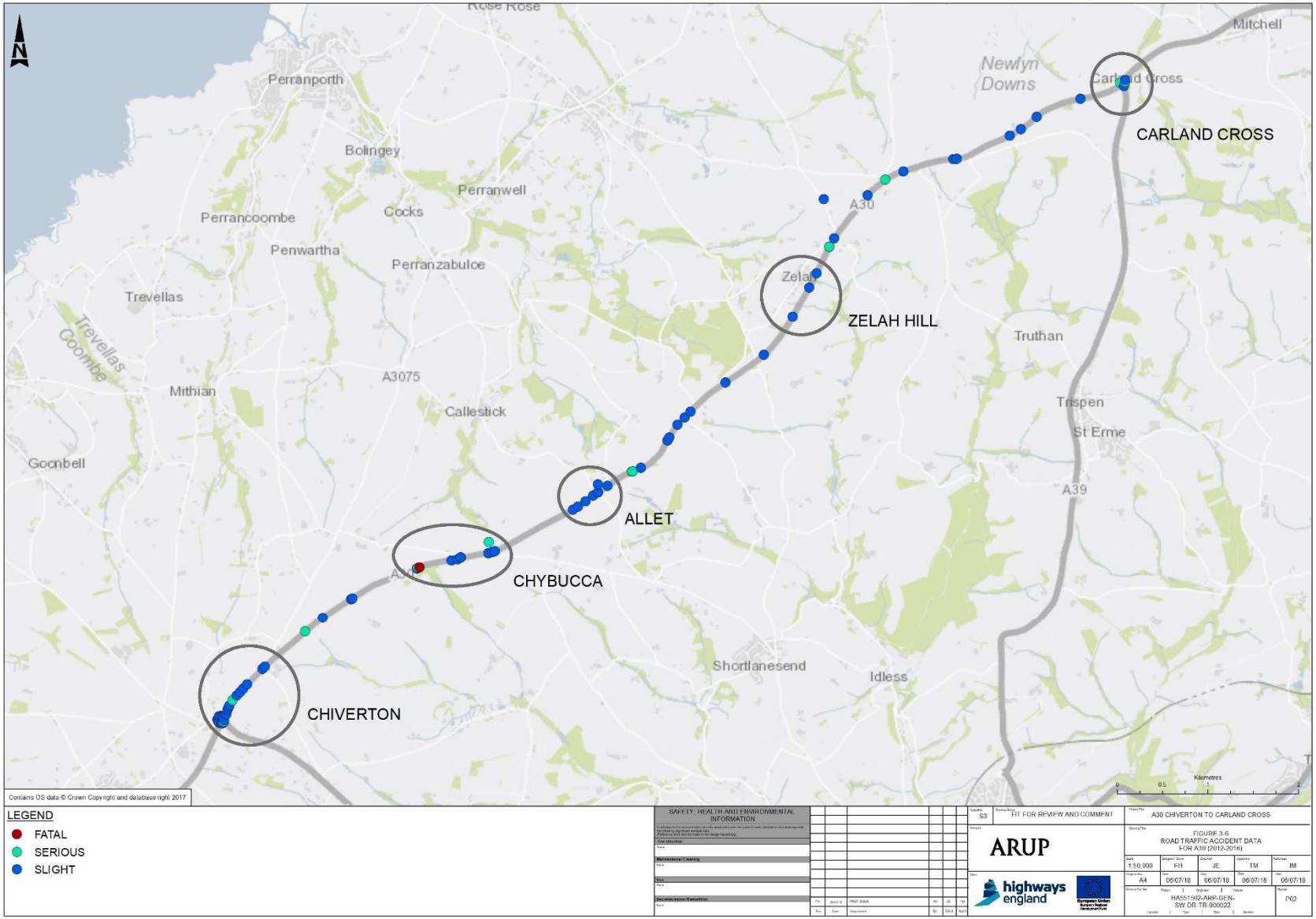

Figure 3-6: Accident Map (January 2012 to December 2016)

3.6 Sustainable Transport

Bus

3.6.1 Two bus routes utilise the A30 within the study area:

a. **Route 85**: Operated by First Kernow from Newquay to Truro via Crantock, St. Newlyn East and Shortlanesend. The 85 operates hourly Monday-Friday, only utilising a section of the A30 between Boxheater and Allet Common.
b. **Route 460**: Operated by Summercourt Travel on behalf of Travel Cornwall from Truro to Bude, via Wadebridge and Wainhouse Corner. The 460 is a very low frequency bus service, with only Monday AM and Friday PM services operating solely on schooldays.

3.6.2 The routes for these services can be seen in Figure 3-7.

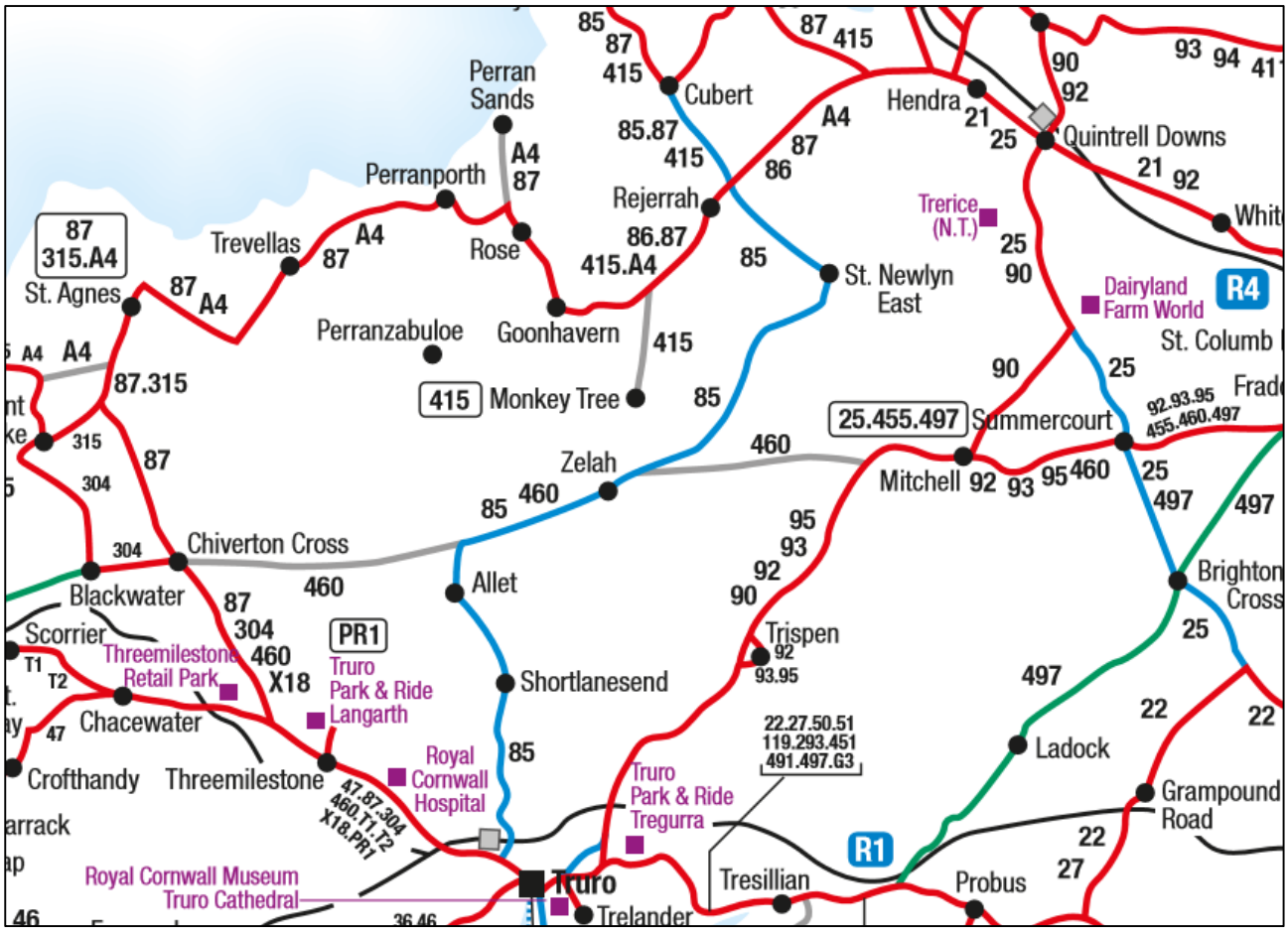

Figure 3-7: Extract from Cornwall Council's Full County Bus Map[12]

[12] Cornwall Council. Full County Bus Map. 18 May 2017. Available from: https://www.cornwall.gov.uk/media/28933622/countymap.pdf (Accessed 4 June 2018)

Rail

3.6.3 There are no railway lines or stations within the immediate vicinity of the A30 from Chiverton to Carland Cross. The nearest station is in Truro to the south of the study area, which forms part of the Cornish Main Line to Penzance. To the north, there is a branch off the Cornish Main Line – the Atlantic Coast Line – which connects to Newquay from Par.

3.6.4 Services are operated on these lines primarily by Great Western Railway, with some long distance services operated by Cross Country. Service frequencies are increased, in addition to supplementary routes, during the summer months by both providers.

Walking, Cycling and Horse-Riding

3.6.5 The A30 is a heavily trafficked road and does not generally cater for pedestrians, cyclists and horse-riders. It does however sever communities and walking, cycling and horse-riding activity is more common on the side roads than along the A30 itself.

3.6.6 Pedestrian/cyclist facilities are provided on some, but not all, of the arms at the Chiverton and Carland Cross junctions. Bus stops are located on the A30 at Marazanvose and Zelah and a narrow footway runs along one side of the A30 between Zelah and Mount Pleasant. This is the only infrastructure along the A30 itself that caters for WCH.

3.6.7 From Chiverton Cross to Carland Cross, there are currently twelve locations where people can cross the line of the proposed A30, including the two terminal junctions. These crossings are a mix of ‘A’, ‘B’ and unclassified roads and public rights of way. All are rural in character and a number are signed as ‘quiet lanes’ for shared use by pedestrians, cyclists and horse-riders.

3.6.8 Marazanvose is the busiest section of the A30 in terms of both pedestrians and cyclists and the B3284 at Chybucca is popular with cyclists.

3.6.9 Improving the A30 corridor will not only relieve traffic congestion but also provide an opportunity to improve facilities for WCH. The aim is to mitigate any potential adverse impacts and enhance any short-comings with the existing infrastructure. A key element of the strategy is to grade separate all the existing side road crossings including quiet lanes with either an overbridge or underpass.

4 Base Year Model Development

4.1 Overview of Traffic Model

4.1.1 The PCF Stage 3 A30 Chiverton to Carland Cross traffic model is a variable demand highway model developed in SATURN (version 11.3.12U).

4.1.2 The basis of the assessment, for all PCF stages, is the 2009 Truro SATURN Model that was designed to assess the impact of developments and highway improvement schemes in the vicinity of the City of Truro, Cornwall. This model was enhanced and refined through each of the PCF stages to more accurately represent the highway network relevant to the assessment of the scheme.

4.1.3 It should be noted that a public transport model has not been developed through any of the PCF stages, as the impact of the scheme on public transport routes and usage is not considered to be significant.

4.2 Model Time Periods

4.2.1 The following time periods have been modelled:

- 07:00 – 10:00 average hour – AM peak period;
- 10:00 – 16:00 average hour – Interpeak period;
- 16:00 – 19:00 average hour – PM peak period.

4.2.2 The base year model is representative of an October 2015 neutral weekday (Monday – Thursday).

4.3 Model User Classes

4.3.1 The model has three vehicle classifications: Cars, Light Goods Vehicles (LGV) and Heavy Goods Vehicles (HGV). The car vehicle class has been further split into three to represent three separate trip purposes, resulting in a total of five user classes. Each vehicle class is represented in the trip matrices in terms of Passenger Car Units (PCUs), where 1 PCU is equivalent to 5.75m. The user classes, vehicle classes and PCU factors are summarised in Table 4-1.

Table 4-1: Summary of User and Vehicle Classes

User Class	Trip Purpose	Vehicle Class	Vehicle Type	PCU Factor
1	Employers Business	1	Car	1.0
2	Commute			
3	Other			
4	All	2	LGV	2.0
5	All	3	HGV	2.0

4.4 Network Development

4.4.1 The network development process is described in Section 10.1 of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

4.4.2 The model network is split into two types: simulation network and buffer network. Figure 4-1 shows the extents of the simulation and buffer network within Cornwall and Devon.

4.4.3 The simulation network represents the highway network modelled in the greatest level of detail, which covers from Indian Queens in the east, to Truro in the south, Redruth in the west and Newquay to the north. The simulation network also includes the major routes to the west of Redruth, the A39 to the south of Truro towards Falmouth and the major strategic routes within Cornwall and Devon such as the A390, A38 and A30. The simulation network has therefore been developed to accurately represent the key routes to the main population centres near to the scheme.

4.4.4 During the PCF Stage 3 model development, the network has been further enhanced along the A30 corridor by the inclusion of all junctions with smaller unclassified roads between the Chiverton Cross and Carland Cross roundabouts. These updates to the network can be seen in Figure 4-2. Where necessary, new zones have been created for these accesses to reflect the localised demand generated by adjacent farms and hamlets. Cornwall Council has been consulted to assist in the identification of the additional network links and nodes required.

4.4.5 The simulation network is now formed of the following sections and areas:

- A30 between Indian Queens and Redruth;
- A3075 between Chiverton Cross Roundabout and Newquay;
- The city of Truro;
- The key routes around the western side of Redruth;
- Minor routes to smaller population centres have been added including routes to Perranporth and St Agnes located north of the A30.

4.4.6 The buffer network extends beyond that shown in Figure 4-1 to cover the rest of the UK, which is modelled using the major SRN routes used to access major population centres such as the M5 and M4. This allows realistic modelling of long range trips. Fixed speeds were coded on these links because there is only partial trip representation in this area.

4.4.7 Each link in the simulation network was surveyed to determine the link speed, layout and standard of that particular section of road, with detailed junction coding applied. Information was input to the model in relation to capacities, lane allocations and priorities at individual junctions. Fixed traffic signal timings were obtained from Cornwall Council. The saturation flows of the key junctions were based on those specified in Highways England's Regional Transport Model (RTM) Network Coding Manual (Version 08), as was used in the development of the South-West Regional Transport Model (SWRTM).

4.4.8 Speed-flow curves were added to a number of routes through the network in order to limit link capacity and provide a better representation of traffic speed at times of high traffic flow. This was particularly important to accurately model the difference in capacities between dual and single carriageway sections of the A30. Speed-flow curves have been added to routes in rural areas. In these areas link capacity, rather than junction capacity, is the key constraint on flow. The speed-flow curves have been obtained from the RTM Network Coding Manual (Version 08).

4.4.9 Local highways improvement schemes that had been completed prior to the base year of 2015 were also identified and included within the model. These schemes were:

- Trafalgar Roundabout, Truro;

- Union Hill Junction, Truro; and
- Chiverton Cross Roundabout widening.

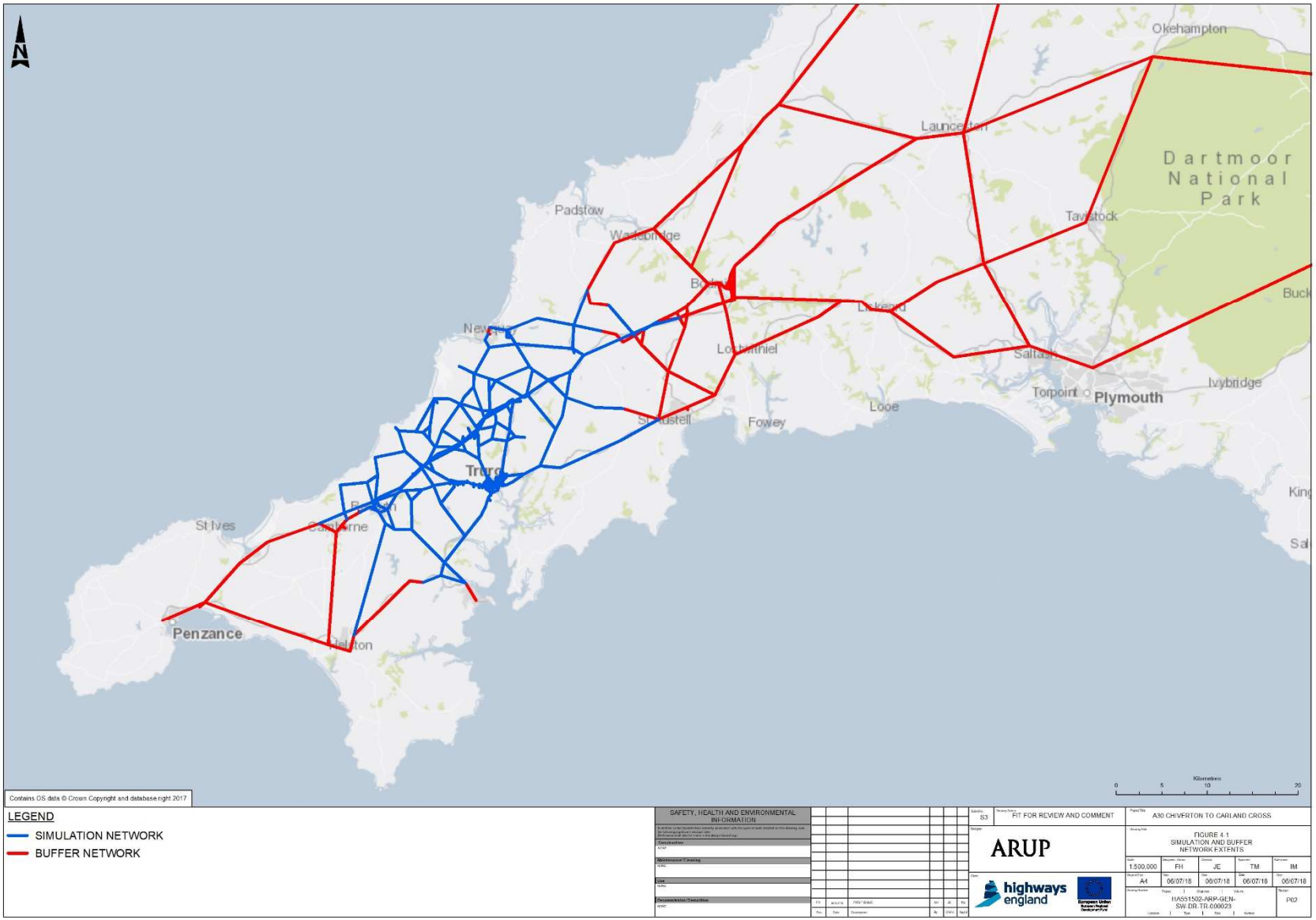

Figure 4-1: Simulation and Buffer Network Extents within Cornwall and Devon

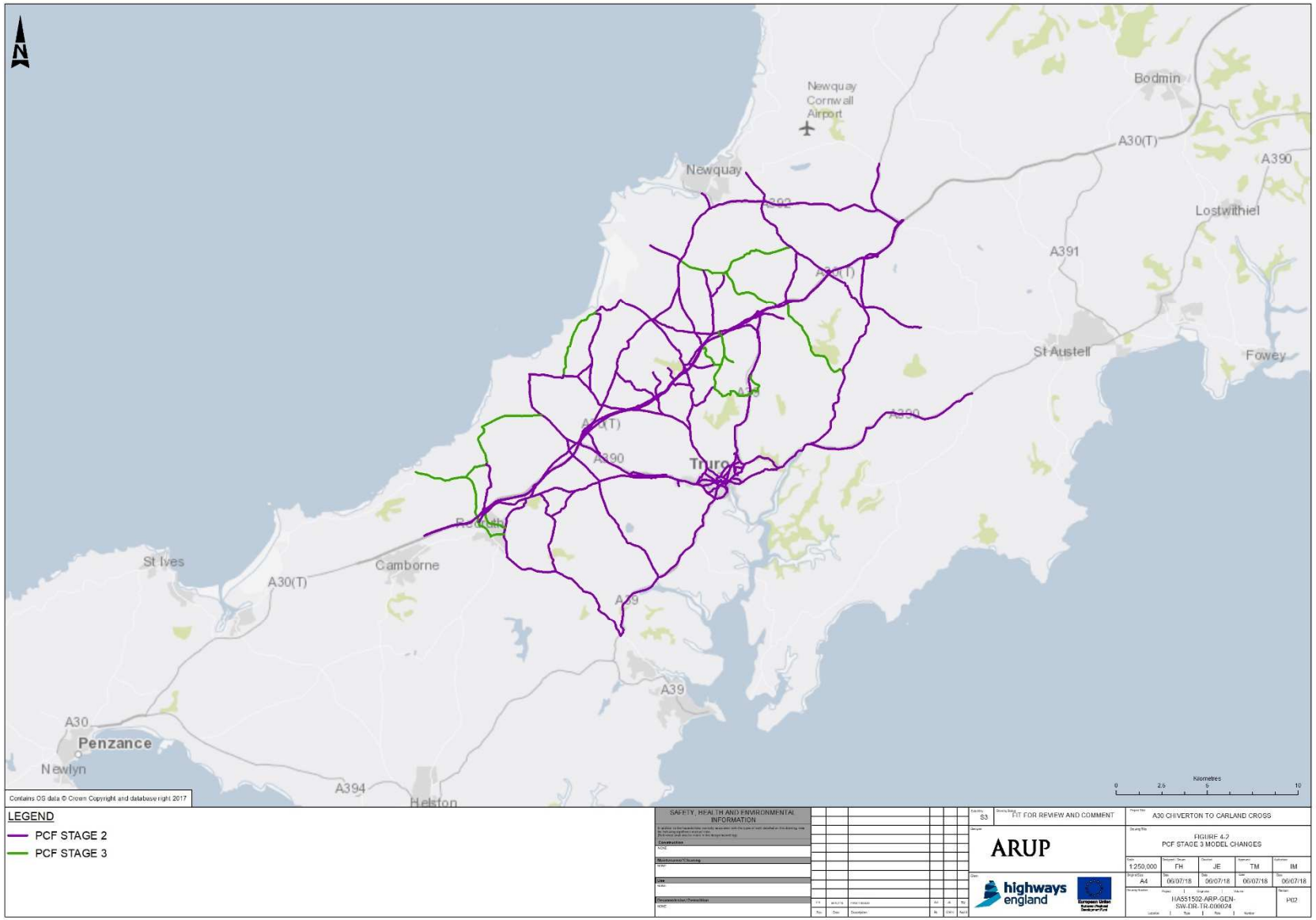

Figure 4-2: Network Coverage in the Vicinity of the Scheme Area

4.5 Matrix Development

4.5.1 The matrix development process is described in Section 10.2 of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

4.5.2 Matrices were developed to determine the demand between each of the 907 zones within the model for each user class and for each time period.

Zoning System

4.5.3 Zones are specified within a strategic traffic model to represent the geographical areas where demand on the highway network will originate from or arrive to.

4.5.4 The original zone system utilised within the 2009 Truro model was plotted in GIS (Geographical Information Systems) software to understand the zone coverage. Upon review, further detail was required for the zoning system in the vicinity of the study area with multiple larger population centres disaggregated into smaller zones as detailed later in this section.

4.5.5 Figure 4-3 shows that the zone structure is very detailed within Truro itself but the surrounding areas have been grouped into larger zones, with the exception of Camborne, Redruth, Penryn and Falmouth which are large population centres near to Truro. The other zones contained several settlements of varying sizes.

4.5.6 New zones were created, centred around population centres, which are likely to use similar loading points on the network. The boundaries of these new zones are based upon combined boundaries of the 2011 Census Output Areas. The updated Cornwall zone structure can be seen in Figure 4-4.

4.5.7 To disaggregate the trips from the larger original zones, the original trip volumes were assigned in proportion to the population of the new smaller zones. A table showing the populations can be found in the PCF Stage 3 Local Model Validation Report (HA11505-WSP-GEN-0000-RE-TR-0013-P04).

4.5.8 The original coverage of the 2009 Truro model included a single zone which encompassed most of Devon, Exeter and the rest of the UK.

4.5.9 The Devon zone has been disaggregated around larger settlements and their surrounding hinterland. These zones will load onto the network at the location of the main population centre they contain e.g. Tavistock, Plymouth or Exeter. The updated Devon zone structure can be seen in Figure 4-5.

4.5.10 The rest of the UK zones have been assigned based upon a regional structure with the South West showing a further disaggregation given its proximity to the study area (relative to the remainder of the UK). The zone structure for the remainder of the UK can be seen in Figure 4-6.

4.5.11 During PCF Stage 3, new zones have been defined in order to increase the level of detail in key areas of the network. Zones 900-907 represent different small accesses, farms and hamlets that interact with the A30 through the whole length of the scheme.

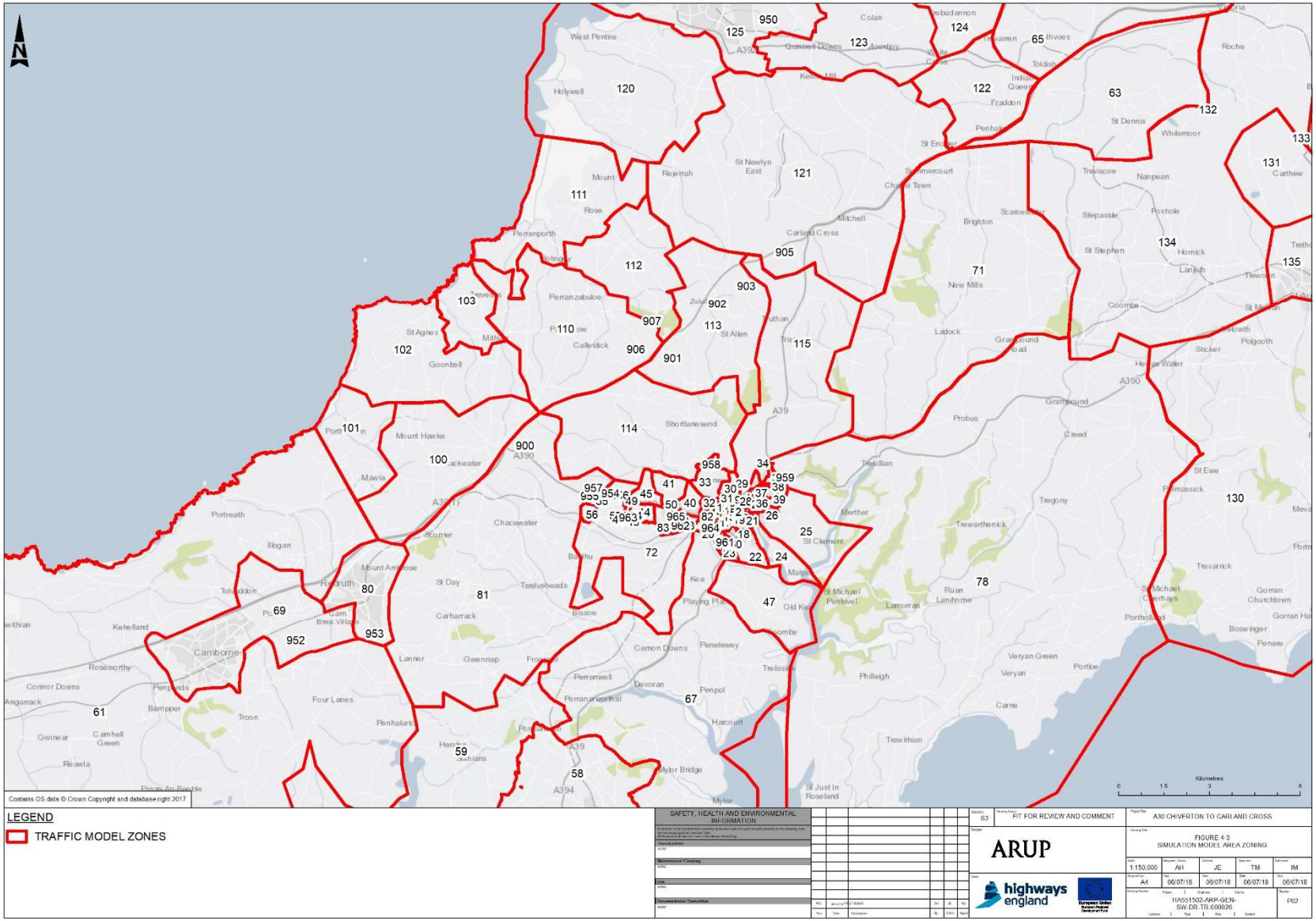

Figure 4-3: Model Simulation Area Zone Structure

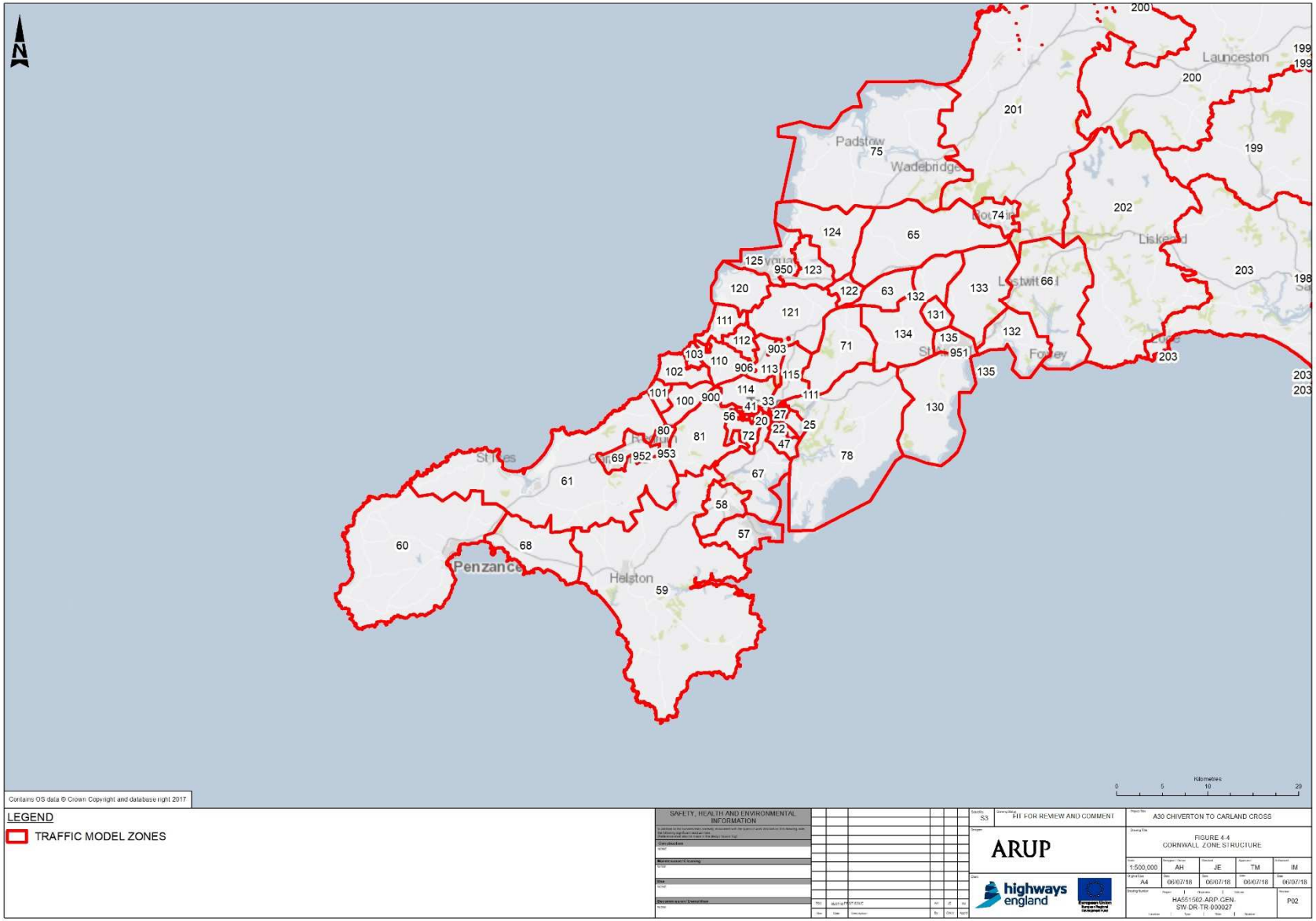

Figure 4-4: Updated Cornwall Zone Structure

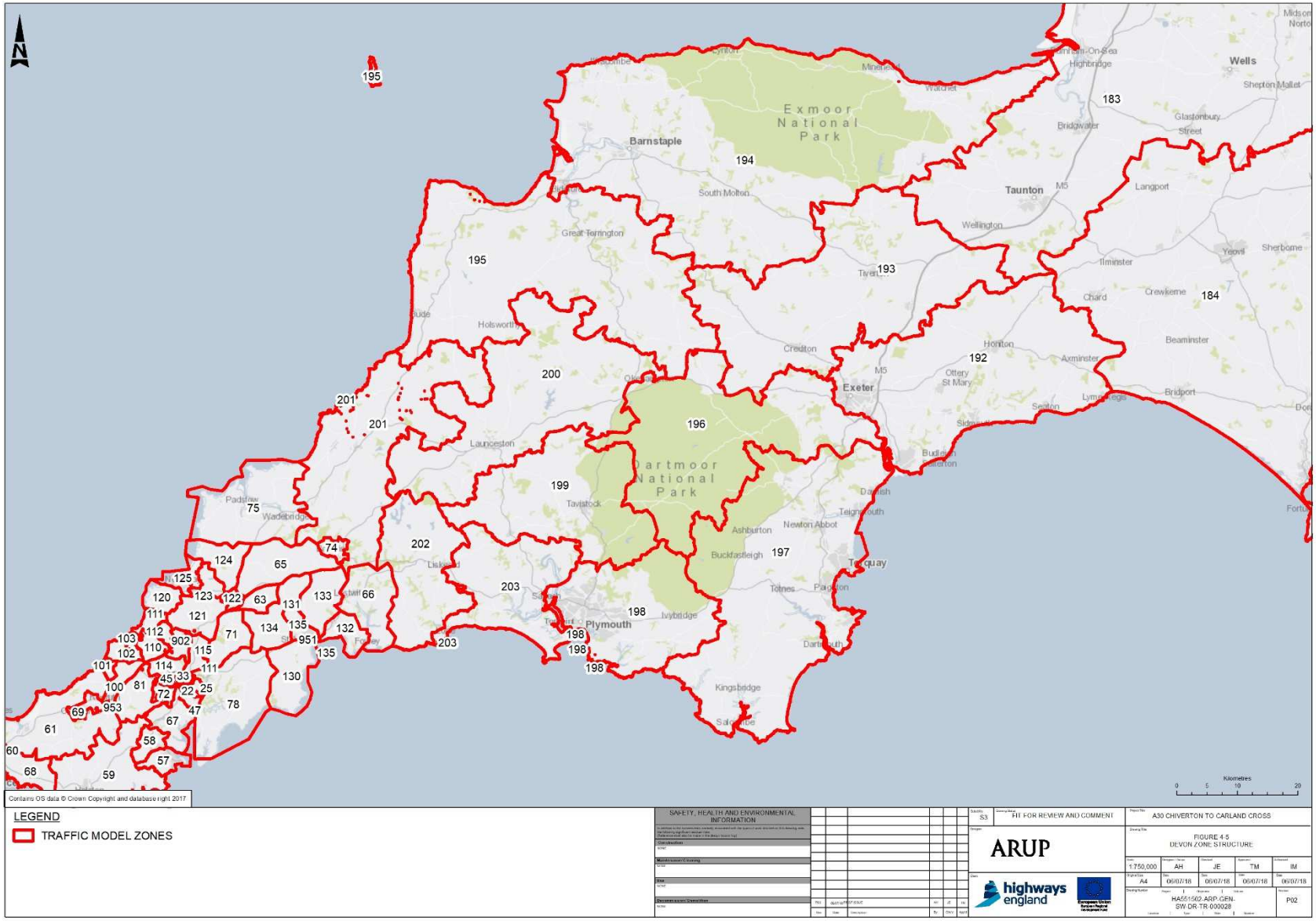

Figure 4-5: Devon Zone Structure

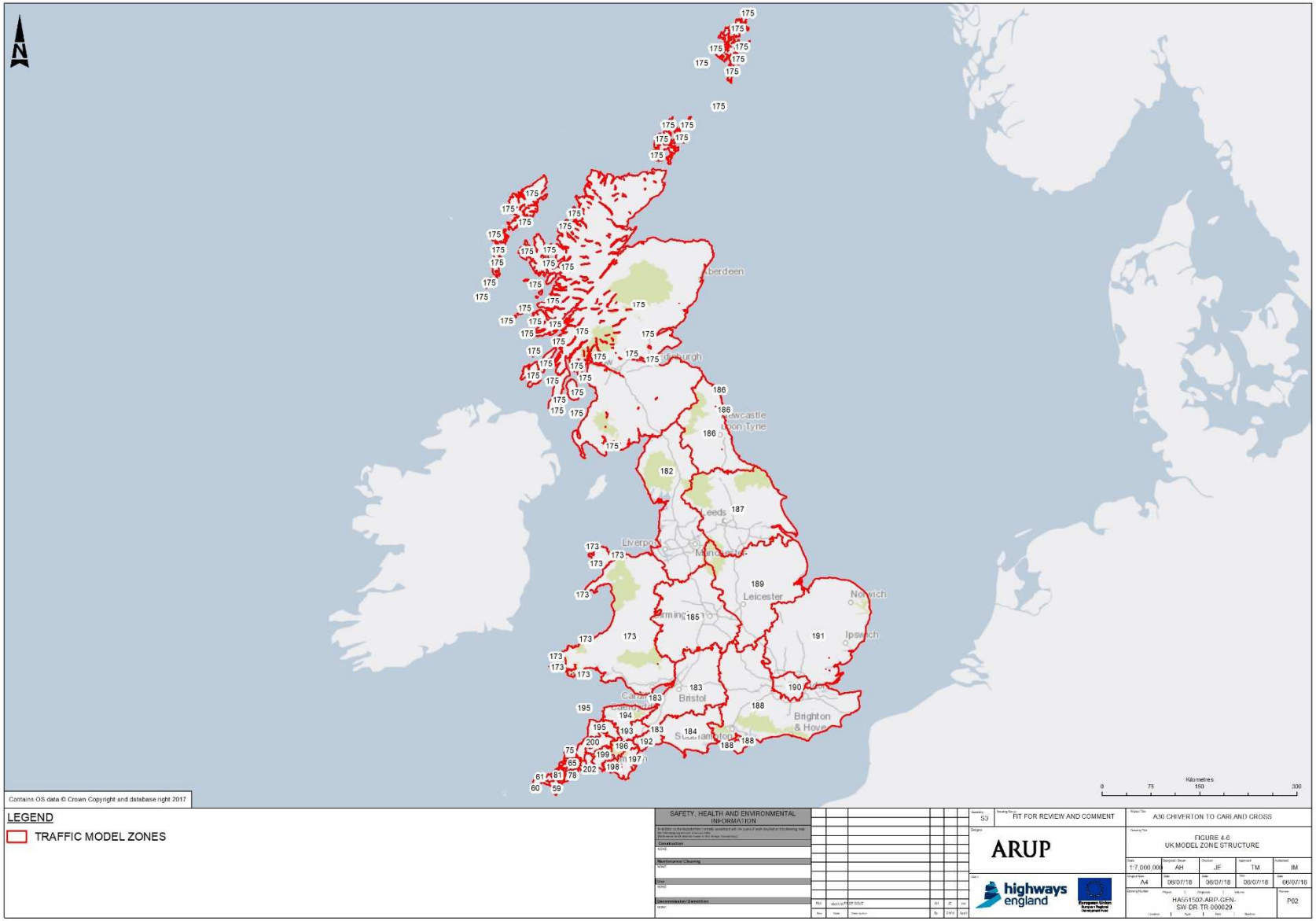

Figure 4-6: Zone Structure of the Remainder of the UK

Matrix Building

4.5.12 The basis for the trip matrices was a range of Roadside Interview (RSI) data. This type of data provides trip origins and destinations, in addition to journey purpose, which can then be reconciled with the zoning system and model user classes to create the required trip matrices for each time period and user class.

4.5.13 The basis of the A30 traffic model matrices was the 2009 Truro model matrices, which were developed using RSI data obtained from six sites on the key routes into Truro in 2009. This was then supplemented with additional data from a single RSI to the east of Bodmin from 2011. This data was factored to 2015 levels in-line with National Trip End Model (NTEM) data using TEMPro (Trip End Model Presentation Program) growth factors.

4.5.14 To update these matrices further, surveys were commissioned specifically as part of the scheme, which comprised of RSIs at 3 locations and postcard surveys at 2 locations, all within the vicinity of the scheme. These surveys were undertaken on 20th and 21st October 2015. These dates represent neutral weekdays during a neutral month outside of school holidays (including half term), in order to obtain a dataset representative of typical conditions and to align with the time periods being modelled.

4.5.15 Full details on the results of the surveys, including processing and analysis of the data to create the original matrices can be found in Section 4 of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

4.5.16 Matrix estimation was used to calibrate the matrices, using guidance set out in the DfT's Web-based Transport Analysis Guidance (WebTAG). Matrix estimation is a modelling technique that has become a standard feature in many traffic models. Essentially, its purpose is to produce a 'most likely' trip matrix estimated directly from traffic count data. It is based on the theoretical procedure properly entitled 'Matrix Estimation from Maximum Entropy' and is generally referred to as ME2.

4.5.17 The totals and respective proportions of each of the five user classes, as outlined in Table 4-1, for each post ME2 average peak hour matrix are shown in Table 4-2. These have been compared to the proportions quoted in TAG Data Book March 2017.

Table 4-2: Post ME2 Average Peak Hour Matrix User Class Totals

UC	Vehicle Type	AM			Interpeak			PM		
		Total Trips	Proportion	TAG Proportion	Total Trips	Proportion	TAG Proportion	Total Trips	Proportion	TAG Proportion
1	Car	4,688	25%	16.5%	3,906	22%	16.5%	3,661	18%	11.8%
2		5,990	32%	44.1%	4,273	24%	11.8%	5,908	29%	41.3%
3		8,022	43%	39.5%	9,406	53%	71.7%	10,491	52%	46.9%
4	LGV	2,524	100%	100%	2,390	100%	100%	2,694	100%	100%
5	HGV	1,474	100%	100%	1,272	100%	100%	1,226	100%	100%

4.6 Model Calibration

Network

4.6.1 As part of the model calibration process, checks were made on the modelled network to ensure it accurately represents the highway network. These checks included reviews of:

- Network structure;
- Link length checks;
- One-way links;
- HGV restrictions;
- Speed flow curves; and
- Junction saturation flows.

4.6.2 Full details of these checks can be found in Section 11.1 of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001). Minor changes were made to the network as required, but no major issues were identified.

Matrices

4.6.3 Similarly, checks were made on the changes to the trip matrices during the matrix estimation process in line with DfT's WebTAG criteria.

4.6.4 Full details of these checks can be found in the PCF Stage 3 LMVR (HA551502-WSP-GEN-0000-RE-TR-00013). The results of these checks found that matrix estimation statistics were mostly good and generally comply with WebTAG. Where the statistics do not fully meet WebTAG criteria, the differences are minimal as has been reported in the LMVR.

Link Flows and Screenlines

4.6.5 Screenline calibration criteria relating to flow difference between observed and modelled flows is set out in Table 1 of TAG unit M3.1[13]. Link and turning flow calibration parameters relating to flow difference and the GEH statistical test are set out in Table 2 of TAG unit M3.1. These criteria are detailed in Section 11.2 of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

4.6.6 The model has been calibrated to a number of counts and screenlines. The post ME2 modelled flows were compared to the observed flows at the calibration link and screenline locations. Table 4-3 provides an overview of the number of links and screenlines that pass the WebTAG criteria.

[13] Department for Transport (2014) TAG Unit M3.1 – Highway Assignment Modelling [Online]. Available at: (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427124/webtag-tag-unit-m3-1-highway-assignment- modelling.pdf)

Table 4-3: Number of Calibration Links and Screenlines that Pass TAG Criteria

Count	AM		IP		PM	
	GEH Pass	Flow Pass	GEH Pass	Flow Pass	GEH Pass	Flow Pass
Link Flows	87%	95%	87%	94%	75%	94%
Screenlines		3 of 4		3 of 4		3 of 4

4.6.7 The results above show that the AM and Interpeak models calibrate well against the observed data with over 90% of the links passing both GEH and Flow criteria. The PM model shows 75% of links passing the GEH criteria with 94% passing the flow criteria.

4.6.8 Screenlines are only assessed regarding flow levels, which must be within 5% of observed flows. In each of the three modelled periods, 3 out of 4 pass the criteria.

4.6.9 A full breakdown of the results of the link flow and screenline analyses by vehicle type can be found in Appendix A of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

Junction Turning Flows

4.6.10 It is important that the model accurately replicates the turning movements at the key junctions within the study area. The following seven junctions were included in the calibration process:

- Chybucca (undertaken as two three arm T-junction counts);
- Henver Ln/B3285 Junction;
- Fiddler's Green Junction;
- Boxheater;
- Chiverton Cross Roundabout;
- Threemilestone Roundabout; and
- Carland Cross Roundabout.

4.6.11 Table 4-4 shows the proportion of turns that pass the WebTAG flow criteria.

Table 4-4: Proportion of Turns at Key Junctions that pass TAG Criteria

Junctions	AM PASS	IP PASS	PM PASS
Chybucca (East)	89%	100%	100%
Chybucca (West)	100%	100%	100%
Henver Ln/B3285 Junction	100%	100%	100%
Fiddlers Green Junction	100%	100%	100%
Boxheater	100%	89%	89%
Chiverton Cross Roundabout	96%	88%	84%
Threemilestone Roundabout	94%	88%	88%
Carland Cross Roundabout	100%	94%	88%

4.6.12 Based on the data shown in Table 4-4 the model is considered to provide a good representation of the key junctions within the study area.

4.6.13 A full breakdown of the results of the Junction Turning Flow analysis can be found in Appendix B of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

4.6.14 The results presented above demonstrate the model calibrates in accordance with WebTAG and therefore that the model calibration is acceptable.

4.7 Model Validation

4.7.1 The datasets used for validation purposes have been kept independent of the calibration data and were not included in the matrix estimation process. The locations of the counts used for validation can be found in Section 3.3 of the PCF Stage 3 Local Model Validation Report (HE551502-WSP-GEN-0000-RE-TR-0013-P04).

4.7.2 The base year model was validated in five key areas: the network, matrices, convergence of the assignments, journey times, link flows and screenlines.

Network

4.7.3 Further checks were made on the network during the model validation process, including:

- Analysis of journey paths to ensure sensible routeing;
- Application of speed flow curves; and
- Junction coding.

4.7.4 Full details of these checks can be found in Section 12.1 of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

Matrices

4.7.5 A comparison of the matrix demand against the SWRTM data was completed as part of the production of the PCF Stage 3 Local Model Validation Report (HE551502-WSP-GEN-0000-RE-TR-0013-P04).

Convergence

4.7.6 The convergence of the SATURN assignments for each modelled time period must meet the criteria set out in Table 4 of TAG unit M3.1.[14] Table 4-5 provides a summary of the convergence parameters used in the SATURN model, based on the final four iterations of each assignment.

Table 4-5: Summary of Model Convergence

Measure of Convergence	Acceptability Criteria	AM	Interpeak	PM
'Delta' and %GAP	Less than 0.1% or at least stable with convergence fully documented and all other criteria met.	**Pass**	**Pass**	**Pass**
Percentage of links with flow change < 1%	Four consecutive iterations greater than 98%.	**Pass**	**Pass**	**Pass**
Percentage change in total user costs	Four consecutive iterations less than 0.1%.	**Pass**	**Pass**	**Pass**

[14] Department for Transport (2014) TAG Unit M3.1 – Highway Assignment Modelling [Online]. Available at: (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427124/webtag-tag-unit-m3-1-highway-assignment- modelling.pdf)

4.7.7 The convergence results show stability with the final four iterations seeing more than 98% of links achieving a change in traffic flows of less than one percent in all peak periods. The Delta value is stable and less than 0.1 all peaks which is considered acceptable.

4.7.8 Further details of the convergence of each modelled time period can be found in Section 12.2 of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

Journey Times

4.7.9 It is important that journey times are accurately modelled for the purposes of the economic analysis and so the modelled journey times must meet the criteria set out in Table 3 of TAG unit M3.1.[15] Section 12.2 of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001) outlines the criteria.

4.7.10 The model has been validated against the journey time routes shown in Figure 3-5. The post ME2 modelled journey times were compared to the observed data. Table 4-6 shows the proportion of routes that pass the WebTAG journey time criteria.

Table 4-6: Number of Validation Journey Times that pass TAG Criteria

Type	AM PASS	IP PASS	PM PASS
Journey Times	95% (19 out of 20)	95% (19 out of 20)	85% (17 out of 20)

4.7.11 The results show that over 85% of the journey time routes pass the validation criteria in all peaks. The model is deemed to therefore reasonably model journey times on key routes.

4.7.12 The individual results for each journey time route are found in Appendix D of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

Link Flow and Screenline

4.7.13 A number of counts were retained to validate the model against along the key A30 corridor and to the north of the A30 where the majority of the zonal changes have occurred. These points must meet the same criteria for calibration link flows and screenlines. Table 4-7 shows the proportions of the links and screenlines that pass the WebTAG criteria.

Table 4-7: Number of Validation Link Flows that pass TAG Criteria

Count	AM		IP		PM	
	GEH Pass	Flow Pass	GEH Pass	Flow Pass	GEH Pass	Flow Pass
Link Flows	90%	90%	90%	90%	70%	80%
Screenlines		2 of 2		2 of 2		2 of 2

4.7.14 The results show that at least 80% of the PM peak links meet the criteria. In the AM and Inter Peaks, 90% of the links pass the Flow and GEH criteria.

[15] Department for Transport (2014) TAG Unit M3.1 – Highway Assignment Modelling [Online]. Available at: (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427124/webtag-tag-unit-m3-1-highway-assignment- modelling.pdf)

4.7.15 The validation screenline is only assessed regarding flow levels and all the differences between modelled and observed values are below the 5% recommended by WebTAG.

4.7.16 The full results for the validation link flow and screenline analysis by vehicle type are found in Appendix E of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

4.7.17 The results demonstrate that the model validates in accordance with WebTAG criteria in all modelled time periods.

5 Forecast Year Do Minimum Scenario Summary

5.1 Approach

Overview of Demand Forecasting Approach

5.1.1 This section details the approach used to produce future year demand matrices to be used in the PCF Stage 3 modelling work.

5.1.2 For this scheme two forecast years are modelled, 2023 (opening year) and 2038 (design year).

5.1.3 The demand forecasting procedure involved the interrogation of local planning documents to identify developments to be point loaded to specific zones in the model. Large developments in the proximity of the scheme that are considered likely to have a direct impact on future demand on the A30 were explicitly modelled. These included developments in large settlements such as Newquay, Redruth and St Austell, trips from which were expected to use either the A30 between Chiverton and Carland Cross or pass through one of the junctions in the scheme area. The developments are detailed in Section 5.2.

5.1.4 Once all developments were identified and point loaded, the forecast growth was compared to National Trip End Model projections at settlement level for these locations using TEMPro (v7.2). Any shortfall or surplus in growth across the settlement and the wider county was corrected by application of a factor to adjust to overall county growth levels to ensure that forecast growth across the county is constrained to TEMPro growth projections. This was only applied to new trip ends resulting from adjusted background growth and specific developments to ensure no zones exhibited negative growth.

5.1.5 The following steps were undertaken to produce the demand forecasts:

1. Car trip development totals were calculated for each new zone by year, time period and user class. In the towns of Newquay, St Austell and CPIR (Camborne, Pool, Illogan and Redruth), correction factors derived from census journey to work data were applied to account for local trips, internal to the zone, which will not impinge on the modelled road network. Further details on the calculation of the development totals are in Section 5.2. To distribute the trips from the new developments, the average distributions from existing zones with similar characteristics were applied using the trip ends from these zones.

2. Alternative planning assumption factors from TEMPro were applied to the trip ends. This was applied at settlement level for four key towns with specifically modelled development with growth for zones outside of these applied at a Cornwall and GB level.

3. These trip ends were then constrained to TEMPro growth at county level.

4. LGV and HGV growth forecasts have been calculated using National Transport Model (NTM) and the NRTF (National Road Traffic Forecasts).

5.1.6 The DfT's DIADEM software programme (version 5) will be used to specify and operate the demand model processes.

National Transport Model and National Trip End Model

5.1.7 The NTM is a tool that compares the national consequences of alternative transport policies or widely applied transport policies. These policies are then compared against a range of background scenarios which account for major factors affecting future patterns of travel. Road Traffic Forecasts are produced every two years, with the most recent, from March 2015, being used for the A30 Chiverton to Carland Cross PCF Stage 3 assessment.

5.1.8 The NTEM provides predictions for the growth of car ownership and traffic. This is influenced by planning data projections. The predictions are a forecast of vehicle movements not of personal travel. The most recent dataset released was in 2013 and this dataset was used in the A30 Chiverton to Carland Cross forecasting.

5.2 Development Assumptions Included in Forecasts

Developments

5.2.1 Local planning data was obtained for the key settlements in the vicinity of the scheme. These settlements are Truro, Newquay, St Austell and Camborne, Pool, Illogan and Redruth.

5.2.2 Outside of these areas, local planning data is of less significance to the scheme as growth will be constrained to TEMPro at a County Level. Therefore, the distribution of development is of limited significance to growth on the A30 between Chiverton and Carland Cross, and hence modelling specific development locations was not considered to be necessary.

5.2.3 Developments were identified using planning data provided by Cornwall Council. This includes size of development, type of development and development phasing. In addition, the development certainty has been identified for each development, in consultation with Cornwall Council. The likelihood of each development coming forward has been considered and assigned a probability in line with Table 5-1.

Table 5-1: Classification of Future Developments

Probability of the Input	Status
Near certain: The outcome will happen or there is a high probability that it will happen.	- Intent announced by proponent to regulatory agencies. - Approved development proposals. Projects under construction.
More than likely: The outcome is likely to happen but there is some uncertainty.	- Submission of planning or consent application imminent. Development application within the consent process.
Reasonably foreseeable: The outcome may happen, but there is significant uncertainty.	- Identified within a development plan. - Not directly associated with the transport strategy/ scheme, but may occur if the strategy/scheme is implemented. - Development conditional upon the transport strategy/scheme proceeding. Or, a committed policy goal, subject to tests (e.g. of deliverability) whose outcomes are subject to significant uncertainty.
Hypothetical: There is considerable uncertainty whether the outcome will ever happen.	- Conjecture based upon currently available information. - Discussed on a conceptual basis. - One of a number of possible inputs in an initial consultation process. Or, a policy aspiration.

Source: TAG Unit M4 Table A2 Classification of Future Inputs

5.2.4 Table 5-2 shows the total developments by town or strategic development, which are considered to be 'Near Certain' or 'More than Likely'. Detailed locations of the developments can be found in the Traffic Forecasting Report (HA551502-WSP-GEN-0000-RE-TR-0018-P03).

Table 5-2: Total 'Near Certain' and 'More Than Likely' Developments (2038 Build Out Levels)

Name	Housing	Retail				Employment							Education	
		Local Shops	Food superstore	Retail Park no food	Retail park with food	B1(a)	B1(mixed)	B2	B8	A3	A3/A4	C2 Care Home	D1 Primary School	D1 Nursery
	Dwell	m2	m2	m2	m2	m2	m2	m2	m2	m2	m2	bed	pupil	pupil
Newquay	4936	0	0	0	23234	0	34037	0	0	0	0	0	0	0
St Austell	2422	0	0	0	5285	0	9600	0	0	0	0	0	0	0
Camborne	992	1359	0	0	0	0	5686	0	0	0	0	0	0	0
Redruth	1141	1804	0	0	0	11000	0	17000	0	0	0	0	0	0
Langarth	1500	0	1120	0	7339	4505	9010	0	0	929	929	60	360	500
Pollards Field	78	0	0	0	0	0	0	0	0	0	0		0	0
Willow Green	515	0	0	9643	0	3513	0	0	0	640	460	0	0	0
Maiden Green	435	0	0	8200	0	0	0	0	0	861	0	0	211	0
Hendra	0	0	6828	0	0	116	0	0	0	0	929	0	0	465
Pencoose	173	0	0	0	0	0	0	0	0	0	0	80	0	0
Union Corner	96	0	0	2000	0	0	0	0	0	70	0	0	0	0
Higher Newham	150	0	0	0	0	0	0		0	0	0	0	0	0
Tolgarrick	520	0	0	0	0	0	0	0	0	0	0	0	0	0
Dudman Farm	275	0	0	0	0	0	0	0	0	0	0	0	0	0
Higher Besore	175	0	0	0	0	0	0	0	0	0	0	0	0	0
Treyew Road Football Ground	0	0	0	0	12545	0	0	0	0	464	0	0	0	0
Penn an Dre	118	0	0	0	0	0	0	0	0	0	0	0	0	0

Trip Generation

5.2.5 TRICS v7.2.4 has been used to extract trip rates for each of the development types identified for inclusion within the forecast models. These rates were based upon similar developments to ensure they are representative of the development to which they are being applied for the purposes of trip generation.

5.2.6 Table 5-3 shows the car only average trip rates that were used for each time period by development type.

Table 5-3: Trip Rates

Development Type	Trip Rate Divisor	AM Peak		Interpeak		PM Peak	
		Origin	Dest	Origin	Dest	Origin	Dest
Housing	per dwelling	0.314	0.140	0.093	0.174	0.209	0.407
Local Shops	per 100 m2	3.805	4.224	4.800	4.800	5.208	4.609
Food superstore	per 100 m2	2.170	2.744	6.300	6.300	7.346	7.061
Retail Park no food	per 100 m2	0.262	0.480	1.500	1.500	1.177	1.090
Retail park with food	per 100 m2	2.599	1.968	4.500	4.500	4.150	4.433
B1(a)	per 100 m2	0.246	1.796	0.450	0.450	1.265	0.206
B1(mixed)	per 100 m2	0.127	1.529	0.400	0.400	1.338	0.510
B2	per 100 m2	0.549	0.353	0.430	0.430	0.500	0.140
B8	per 100 m2	0.330	0.200	0.140	0.150	0.040	0.252
C1	per 100 m2	0.588	0.232	0.140	0.169	0.116	0.312
A3	per 100 m2	0.000	0.000	0.000	0.000	2.247	2.809
A3/A4	per 100 m2	0.000	0.000	1.061	1.515	2.424	3.182
C2 Care home	Per Room	0.089	0.089	0.101	0.098	0.013	0.070
D1 Primary school	Per Pupil	0.107	0.133	0.015	0.021	0.027	0.012
D1 Nursery	per 100 m2	3.509	4.575	0.533	0.577	4.375	3.575

5.2.7 The trip rates for the neutral month weekday periods were taken directly from TRICS for the modelled time periods. The trip generation process assumes the new developments would only generate trips in user classes 1 to 3, as LGV and HGV growth has been modelled using NTM and the NRTF.

5.2.8 Table 5-4 shows the trip totals by town or strategic development for each modelled year and time period.

Table 5-4: Development Trips

Name	2023						2038					
	AM		IP		PM		AM		IP		PM	
	Origin	Dest	Origin	Dest	Origin	Dest	Origin	Dest	Origin	Dest	Origin	Dest
Newquay	682	580	598	707	850	1030	2197	1669	1641	2041	2451	3213
St Austell	623	307	192	352	439	814	910	590	501	698	854	1269
Camborne	323	234	126	205	293	438	370	283	180	261	354	495
Redruth	280	170	149	204	234	357	547	494	315	408	557	594
Langarth	349	292	401	431	473	533	775	682	612	736	932	1126
Pollards Field	24	11	7	14	16	32	24	11	7	14	16	32
Willow Green	100	91	105	126	138	168	199	183	209	251	277	337
Maiden Green	56	39	50	61	58	81	186	130	168	205	194	272
Hendra	165	211	433	433	544	525	165	211	433	433	544	525
Pencoose	31	16	12	19	19	38	61	31	24	38	37	76
Union Corner	36	23	39	47	44	61	36	23	39	47	44	61
Higher Newham	47	21	14	26	31	61	47	21	14	26	31	61
Tolgarrick	70	31	21	39	47	91	163	73	48	90	109	212
Dudman Farm	43	19	13	24	29	56	86	39	26	48	57	112
Higher Besore	55	25	16	30	37	71	55	25	16	30	37	71
Treyew Road Football	329	248	565	565	521	558	329	248	565	565	521	558
Penn an Dre	37	16	11	20	25	48	37	16	11	20	25	48

Trip Distribution

5.2.9 It was necessary to create a distribution for the trips generated by the new developments. In Truro, this was done by using an average distribution from similar existing zones and applying this distribution to the new development zones. In the remaining towns, which are generally modelled as a single zone, the trips created by specifically modelled developments were distributed based on the existing trip distribution in that zone. Checks were undertaken to ensure the development distributions appeared sensible.

5.2.10 2011 Census Journey to Work data was used to adjust the development trips to and from Newquay, St Austell and CPIR to account for the expected intrazonal movements within these zones. This represents movements where people live and work in a similar area (i.e. within the same zone in the model). Given strategic nature of the model, several zones do not model a full set of trips for the town. The Redruth and Camborne zones for example, only model the trips through the A30 between Chiverton and Carland Cross and to and from Truro.

5.2.11 A factor was applied to the total volume of trips to correct the overall volume to remove these intrazonal trips. Table 5-5 shows these factors.

Table 5-5: Intrazonal Trip Correlation Factors

Town	Origin Factor	Destination Factor
Newquay	0.50	0.52
St Austell	0.50	0.66
Camborne, Pool & Illogan*	0.38	0.32
Redruth*	0.54	0.51
* Intrazonal factor also removes trips to and from western Cornwall		

5.2.12 In order to account for traffic growth outside of the study area DfT's TEMPro v7.2 has been used to derive growth factors for Car user classes.

5.2.13 For more details on the TEMPro calculations please see Sections 13.4 and 13.5 of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

Demand Forecasting using NRTF

5.2.14 LGV and HGV growth within the model were forecast using the 2015 National Road Traffic Forecast from NTM. The NRTF incorporate economic and demographic data and evidence on travel behaviour. Five scenarios are available to account for various levels of uncertainty and use difference income and fuel adjustments.

Table 5-6: NRTF Growth Factors used for LGV and HGV Classes

Year	LGV	OGV
2023	1.21	1.05
2038	1.62	1.17

Reference Case Matrices

5.2.15 Table 5-7 shows the constrained forecast matrix totals by year and time period, 2015 base year matrix totals have been provided for reference.

Table 5-7: Reference Case Forecast Matrix Totals

Scenario	UC1	UC2	UC3	UC4	UC5	TOTAL	Total % Increase from 2015
2015							
AM	4,689	5,991	8,022	2,524	1,474	22,700	
IP	3,906	4,274	9,407	2,390	1,272	21,249	
PM	3,662	5,909	10,491	2,695	1,226	23,982	
2023							
AM	4,684	6,554	8,554	3,055	1,548	24,394	7%
IP	3,907	4,382	10,452	2,882	1,336	22,959	8%
PM	3,618	6,307	11,231	3,260	1,287	25,704	7%
2038							
AM	4,818	7,494	9,484	4,101	1,726	27,624	22%
IP	4,082	4,765	11,970	3,869	1,490	26,176	23%
PM	3,708	7,108	12,453	4,377	1,436	29,083	21%

High and Low Growth Scenarios

5.2.16 As part of the assessment, High and Low Growth scenarios have to be undertaken to assess the impact of more, or less, growth occurring than is predicted based on the available information. The calculation of the percentage increase/decrease for each forecast year is calculated using the formula from WebTAG Unit M4 (November 2014).

$\pm 2.5\% \times \sqrt{n}$

where n = years ahead of the base year

5.2.17 The following adjustment factors were applied to the 2023 and 2038 reference matrices to develop the high and low growth matrices:

- 2023 High 7.07%;
- 2038 High 11.99%;
- 2023 Low -7.07%; and
- 2038 Low -11.99%.

Variable Demand Modelling

5.2.18 Variable Demand Modelling (VDM) has been carried out at this stage of the scheme assessment as agreed in the PCF Stage 3 Appraisal Specification Report (HA551502-WSP-GEN-0000-RE-TR-00009-P03).

5.2.19 The demand model is an incremental type of model (also known as a “pivot-point” model) as recommended in WebTAG. The demand response in the model is therefore, a function of relative changes in cost between a forecast and comparator scenario. In order to produce the Do Minimum year models, the Do Minimum pivoted off the base model (i.e. demand model used base year costs as a comparator).

5.2.20 The Department for Transport's DIADEM software programme (Version 5) has been used to specify and operate the demand model processes.

5.2.21 For more details on VDM please see Section 15 of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

5.2.22 The impact of VDM on the forecast matrices can be seen in Table 5-8.

Table 5-8: Comparison of Matrix Totals

Year	Growth Scenario	Scenario	Average Peak Period Hour	Ref Case matrix total (pcu)	Post Diadem matrix total (pcu)	Difference (pcu)	Percentage Difference
2023	CORE	DM	AM	24,394	24,474	80	0%
			IP	22,959	23,008	49	0%
			PM	25,704	25,728	24	0%
	HIGH	DM	AM	26,119	26,160	41	0%
			IP	24,582	24,615	33	0%
			PM	27,521	27,481	-40	0%
	LOW	DM	AM	22,670	22,776	106	0%
			IP	21,336	21,396	60	0%
			PM	23,887	23,961	74	0%
2038	CORE	DM	AM	27,624	27,769	145	1%
			IP	26,176	26,281	105	0%
			PM	29,083	29,092	9	0%
	HIGH	DM	AM	30,936	30,979	43	0%
			IP	29,315	29,366	51	0%
			PM	32,570	32,413	-157	0%
	LOW	DM	AM	24,312	24,521	209	1%
			IP	23,038	23,171	133	1%
			PM	25,596	25,730	134	1%

5.2.23 The table shows that the VDM process results in only minor matrix total changes with a maximum change of ±1% of the Reference Case matrix total for the relevant peak.

Do Minimum Infrastructure Improvements

5.2.24 Table 5-9 outlines the infrastructure improvement schemes which have been included in the forecast scenarios.

5.2.25 New zones have been coded for all the 'Near Certain' and 'More than Likely' developments outlined in Table 5-2, including access junctions for those located within the simulation network. These were coded as priority junctions unless plans have been provided by Cornwall Council indicating otherwise. Junction layouts from planning applications were available for a number of developments including Willow Green, Maiden Green and Langarth in Truro. These were coded into the model as signalised junctions as per the planning applications.

Table 5-9: Infrastructure Improvement Schemes for Inclusion in the Do Minimum Forecast Modelling

Scheme	Status	DM	
		2023	2038
A30 Temple	Committed	Y	Y
Newquay Strategic Route	Growth Deal Funding Allocated	Y	Y
Truro - Northern Access Road	Committed	Y	Y
Truro - Threemilestone Roundabout	Under Construction	Y	Y
Truro - Treliske Roundabout	Growth Deal Funding Allocated	Y	Y
Truro - Arch Hill	Growth Deal Funding	Y	Y
St. Erth	N/A - Junction Schemes in buffer network		
Loggans Moor	N/A - Junction Schemes in buffer network		
A38 Island Shop	N/A - Junction Schemes in buffer network		
A38 Carkeel Signalised scheme	N/A - Junction Schemes in buffer network		
Callywith Gate, Bodmin	N/A - Junction Schemes in buffer network		
A38 Carminnow Cross, Bodmin	N/A - Junction Schemes in buffer network		
A39 Treluswell, Falmouth	N/A - Junction Schemes in buffer network		

5.2.26 For more details in relation to the Do Minimum network and parameters please see Section 13.6 of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

5.3 Summary of DM

Assignment Convergence

5.3.1 Convergence is required in order to provide stable, consistent and robust model results and to differentiate between real changes and those associated with differing degrees of convergence.

5.3.2 Table 5-10 and Table 5-11 show the convergence results for each of the Core scenarios.

Table 5-10: 2023 DM Convergence Results

Year	Time Period	% of Links with Flow Change (P) < 1%	Acceptability (Final 4 Consecutive Iterations > 98%)	Delta (δ)	Acceptability (< 0.1%)
2023 DM	AM Peak	98.4	PASS	0.003	PASS
		98.5			
		98.7			
		98.9			
	Interpeak	99.1	PASS	0.001	PASS
		98.3			
		98.4			
		98.2			
	PM Peak	98.5	PASS	0.001	PASS
		98.5			
		98.5			
		98.5			

Table 5-11: 2038 DM Convergence Results

Year	Time Period	% of Links with Flow Change (P) < 1%	Acceptability (Final 4 Consecutive Iterations > 98%)	Delta (δ)	Acceptability (< 0.1%)
2038 DM	AM Peak	99.2	PASS	0.006	PASS
		99.0			
		98.7			
		98.7			
	Interpeak	98.5	PASS	0.006	PASS
		98.6			
		98.4			
		98.2			
	PM Peak	98.8	PASS	0.016	PASS
		98.2			
		98.2			
		98.6			

5.3.3 The convergence results show stability with the final four iterations seeing more than 98% of links achieving a change in traffic flows of less than one percent in all peak periods. The Delta value is stable and less than 0.1 all peaks which is considered acceptable.

Journey Times

Table 5-12: Journey Times Between Chiverton and Carland Cross

Direction	Peak	Journey Times (mm:ss)		
		2015	2023 DM	2038 DM
Westbound	AM	11:43	13:10	15:59
	IP	11:13	12:28	13:50
	PM	11:42	12:56	14:46
Eastbound	AM	11:15	13:04	16:36
	IP	10:34	11:41	15:04
	PM	11:10	13:01	18:32

5.3.4 Table 5-12 shows that in 2023 and 2038 journey times on the A30 between Chiverton and Carland Cross have increase between 2015 and 2023 and 2038 as traffic grows.

Traffic Flows

5.3.5 The key links within the model have been analysed to understand the changes in traffic volume at various locations within the model. The full link flow analysis and link saturation including the A390, A39, A3075 and other parts of the A30 is found in Appendix D of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

5.3.6 The A30 on either side and within the study area has been analysed to understand the growth in traffic on the A30. Table 5-13 to Table 5-15 shows the results of this analysis.

Table 5-13: AM Peak A30 Link Flows in the Vicinity of the Scheme

Site Location	Dir	2015 BASE	2023 DM	2038 DM
EB, A30, Between Carland Cross Rbt and Mitchell	EB	1,302	1,472	1,662
WB, A30, Between Carland Cross Rbt and Mitchell	WB	1,652	1,831	2,013
EB, A30, Between Zelah and Carland Cross Rbt	EB	792	898	1,083
WB, A30, Between Zelah and Carland Cross Rbt	WB	933	1,024	1,113
EB, A30, Between Redruth and Scorrier	EB	1,527	1,804	2,040
WB, A30, Between Redruth and Scorrier	WB	1,321	1,470	1,695
WB, A30, Between Scorrier and Chiverton Cross Rbt	WB	1,490	1,797	1,967
EB, A30, Between Scorrier and Chiverton Cross Rbt	EB	1,434	1,550	1,818
EB, A30, Between Chybucca and Marazanvose	EB	837	931	1,117
WB, A30, Between Chybucca and Marazanvose	WB	900	988	1,097

Table 5-14: IP Peak A30 Link Flows in the Vicinity of the Scheme

Site Location	Dir	2015 BASE	2023 DM	2038 DM
EB, A30, Between Carland Cross Rbt and Mitchell	EB	1,317	1,503	1,723
WB, A30, Between Carland Cross Rbt and Mitchell	WB	1,349	1,523	1,809
EB, A30, Between Zelah and Carland Cross Rbt	EB	752	858	1,178
WB, A30, Between Zelah and Carland Cross Rbt	WB	836	920	1,042
EB, A30, Between Redruth and Scorrier	EB	1,269	1,479	1,782
WB, A30, Between Redruth and Scorrier	WB	1,411	1,612	1,885
WB, A30, Between Scorrier and Chiverton Cross Rbt	WB	1,354	1,501	1,809
EB, A30, Between Scorrier and Chiverton Cross Rbt	EB	1,572	1,725	2,050
EB, A30, Between Chybucca and Marazanvose	EB	745	846	1,177
WB, A30, Between Chybucca and Marazanvose	WB	819	909	1,068

Table 5-15: PM Peak A30 Link Flows in the Vicinity of the Scheme

Site Location	Dir	2015 BASE	2023 DM	2038 DM
EB, A30, Between Carland Cross Rbt and Mitchell	EB	1,553	1,669	1,761
WB, A30, Between Carland Cross Rbt and Mitchell	WB	1,460	1,642	1,918
EB, A30, Between Zelah and Carland Cross Rbt	EB	841	1,046	1,267
WB, A30, Between Zelah and Carland Cross Rbt	WB	874	955	1,109
EB, A30, Between Redruth and Scorrier	EB	1,237	1,424	1,602
WB, A30, Between Redruth and Scorrier	WB	1,671	1,774	1,863
WB, A30, Between Scorrier and Chiverton Cross Rbt	WB	1,451	1,634	1,775
EB, A30, Between Scorrier and Chiverton Cross Rbt	EB	1,966	2,030	2,129
EB, A30, Between Chybucca and Marazanvose	EB	846	1,053	1,244
WB, A30, Between Chybucca and Marazanvose	WB	887	973	1,180

5.3.7 The tables show that there is an increase in traffic on the A30 between 2015, 2023 and 2038. There is also an increase in traffic to the immediate west and to east of the scheme in all time periods. The traffic flows in the do minimum scenario are constrained by the capacity of the current single carriageway A30 which accounts for the large increase in flow with the scheme in place.

Table 5-16: AM Peak Key Route Link Flows in the Vicinity of the Scheme

Site Location	Dir	2015 BASE	2023 DM	2038 DM
A3075 Between Chiverton and B3284	NB	368	439	589
A3075 Between Chiverton and B3284	SB	440	492	598
A39, Between Truro and Carland Cross Rbt	NB	470	511	496
A39, Between Truro and Carland Cross Rbt	SB	605	697	693
A39, Between Truro and Carnon Downs	NB	915	979	1,117
A39, Between Truro and Carnon Downs	SB	744	807	858
A390, Between Chiverton Cross and Threemilestone	EB	839	1,102	1,096
A390, Between Chiverton Cross and Threemilestone	WB	635	652	856
A390, Between Treliske Hospital and Truro	EB	1,001	1,119	1,214
A390, Between Treliske Hospital and Truro	WB	1,134	1,171	1,235
A390, Between Truro and Probus	EB	478	557	688
A390, Between Truro and Probus	WB	826	865	886
B3284, Between Shortlanesend and Truro	NB	229	281	323
B3284, Between Shortlanesend and Truro	SB	552	528	530
Chacewater Hill between Threemilestone and Chacewater	EB	582	651	867
Chacewater Hill between Threemilestone and Chacewater	WB	129	188	233

Table 5-17: IP Peak Key Route Link Flows in the Vicinity of the Scheme

Site Location	Dir	2015 BASE	2023 DM	2038 DM
A3075 Between Chiverton and B3284	NB	426	486	632
A3075 Between Chiverton and B3284	SB	410	449	563
A39, Between Truro and Carland Cross Rbt	NB	581	655	496
A39, Between Truro and Carland Cross Rbt	SB	504	557	608
A39, Between Truro and Carnon Downs	NB	845	924	952
A39, Between Truro and Carnon Downs	SB	772	828	877
A390, Between Chiverton Cross and Threemilestone	EB	727	687	796
A390, Between Chiverton Cross and Threemilestone	WB	872	917	1,170
A390, Between Treliske Hospital and Truro	EB	1,120	1,118	1,190
A390, Between Treliske Hospital and Truro	WB	1,077	1,113	1,233
A390, Between Truro and Probus	EB	635	692	832
A390, Between Truro and Probus	WB	583	607	646
B3284, Between Shortlanesend and Truro	NB	363	449	536
B3284, Between Shortlanesend and Truro	SB	328	434	435
Chacewater Hill between Threemilestone and Chacewater	EB	303	366	498
Chacewater Hill between Threemilestone and Chacewater	WB	284	313	394

Table 5-18: PM Peak Key Route Link Flows in the Vicinity of the Scheme

Site Location	Dir	2015 BASE	2023 DM	2038 DM
A3075 Between Chiverton and B3284	NB	628	687	767
A3075 Between Chiverton and B3284	SB	427	486	636
A39, Between Truro and Carland Cross Rbt	NB	656	565	444
A39, Between Truro and Carland Cross Rbt	SB	453	518	568
A39, Between Truro and Carnon Downs	NB	882	873	868
A39, Between Truro and Carnon Downs	SB	921	995	1,075
A390, Between Chiverton Cross and Threemilestone	EB	538	623	649
A390, Between Chiverton Cross and Threemilestone	WB	1,255	1,298	1,294
A390, Between Treliske Hospital and Truro	EB	1,077	1,156	1,245
A390, Between Treliske Hospital and Truro	WB	1,123	1,159	1,236
A390, Between Truro and Probus	EB	952	939	943
A390, Between Truro and Probus	WB	554	599	586
B3284, Between Shortlanesend and Truro	NB	557	632	711
B3284, Between Shortlanesend and Truro	SB	464	402	444
Chacewater Hill between Threemilestone and Chacewater	EB	178	240	354
Chacewater Hill between Threemilestone and Chacewater	WB	615	616	801

5.3.8 The tables above show an increase in traffic on all the roads between 2015, 2023 and 2038 as traffic increases. As traffic increases, congestion and journey times on these routes increase as a result.

5.3.9 For more information relating to the model statistics see Section 16.6 of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

5.3.10 For the High and Low growth scenario traffic flows see section 16.7 of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

5.3.11 As can be seen from the various tables in this section, the number of trips in the model has increased as a result of developments in the area and background growth in traffic. This results in an increase in traffic on the A30 which results in increased congestion and journey times. Traffic increases on the other roads in the vicinity as a result of development and due to traffic re-routing to avoid congestion on the A30.

6 Proposed Scheme

6.1 Overview

6.1.1 The A30 Chiverton to Carland Cross scheme comprises the construction of 14km (8.7 miles) of new A30 dual carriageway between the existing Chiverton Cross roundabout in the west and Carland Cross roundabout in the east. At the western end, the improvement connects to the existing A30 Blackwater Bypass immediately west of the existing Chiverton Cross roundabout, leading on to the Scorrier Junction further west, and at the eastern end, the scheme connects to the existing Mitchell Bypass approximately 500m east of the existing Carland Cross roundabout.

6.1.2 The existing Chiverton Cross and Carland Cross roundabouts are to be replaced with new grade separated junctions to provide connections to the local major side road network whilst maintaining uninterrupted traffic flow on the mainline A30. Additionally, a grade separated junction with west facing slip roads only is to be included at Chybucca.

6.1.3 The General Arrangement for the proposed scheme can be found in the **Environmental Statement – Figures** (Volume 6, Document Ref 6.3, Figure 2.1). The description of the mainline and associated side roads and junctions is outlined below, with the scheme developed in accordance with the Design Manual for Roads and Bridges (DMRB) design standards and best practice.

6.1.4 To accommodate the new dual carriageway, the existing A30 will be retained to provide a local route. It will connect to a number of minor side roads leading to and from Truro to the south of the A30, and to and from Perranporth and Newquay to the north.

6.2 Construction of New Dual Carriageway

6.2.1 The scheme comprises the following main features associated with the construction of the new dual carriageway:

- The construction of a new A30 rural all-purpose dual carriageway approximately 14km (8.7 miles) to current trunk road design standards; in length and predominantly off-line from the existing single carriageway route;
- The construction of a new grade separated all-movement gyratory junction at Chiverton, with realigned connections to the B3277, A3075, A390 and the existing A30 side roads and the removal of the existing Chiverton Roundabout;
- The construction of a new grade separated restricted movement dumbbell junction at Chybucca, with west facing slips only and connections to the existing A30 and the B3284 side roads;
- The construction of a new grade separated all-movement dumbbell junction at Carland Cross, with connection to the A39 side road and replacing the existing Carland Cross Roundabout;
- The construction of 9 new public lay-bys along the scheme, a rest area on the realigned B3277 and a number of maintenance lay-bys and emergency access points;
- The construction of 20 new drainage attenuation ponds for the new A30 and realigned side roads; and

- The construction of 5 major drainage culverts and 14 multi-species culverts under the new A30 and side roads.
- The diversion of a gas high pressure pipeline, water mains, power cables and telecommunications cables and mast, as well as the removal of sections of an abandoned oil pipeline;
- The construction of a reinforced slope at the existing historic Round Barrow near to Ennis Farm; and
- The construction of a reinforced slope at the existing Western Power Distribution overhead pylon east of Marazanvose.

6.3 Changes to Existing Local Roads

6.3.1 Significant changes to the existing A30 and other local roads will be made alongside the construction of the proposed new dual carriageway as part of the scheme. These include:

- Realignment of the existing A30 at Chiverton, Chybucca, Zelah and Carland Cross to maintain as a parallel local route;
- Construction of a new side road underbridge at Tresawsen providing grade separated access across the new A30;
- Demolition of the existing bridge at Tolgroggan Farm and construction of a new accommodation overbridge across the new and realigned A30;
- Retention of and improvement of the existing Two Barrows underbridge, with a new staggered junction for the Shortlanesend Road with the realigned existing A30, retaining grade separated access across the new A30;
- The construction of a number of new private laneways along the scheme, providing new and retained access from the existing side road network;
- The construction of a new side road underbridge at Trevalso Lane, providing grade separated access across the new and existing A30 and linking with the realigned Henver Lane;
- The construction of a new side road underbridge at Pennycomequick;
- The stopping up of the Kilavose side road at Marazanvose; and
- The stopping up and realignment of the Ennis Lane side road.

6.3.2 The existing A30 trunk road would be downgraded to county road status (de-trunked) between Chiverton and Carland Cross. Approximately 12.7km (7.9 miles) of the existing A30 route would be downgraded to county road status, with maintenance liability transferred to Cornwall Council. The existing road will connect with a number of realigned sections, at Chybucca, Zelah and Carland Cross. Providing a local road connection between Chiverton, Chybucca and Carland Cross would maintain connections for the local communities and side roads.

6.3.3 Further details of de-trunking can be found in the **Cornwall Council Statement of Common Ground** (Volume 7, Document Ref 7.4).

6.4 Construction of New Walking, Cycling and Horse-Riding Routes

6.4.1 The scheme offers the opportunity to improve the provision for pedestrians, cyclists and horse-riders by ensuring north-south permeability across the existing and proposed A30.

6.4.2 Four dedicated WCH crossings are proposed along the route of the new A30:

- Construction of a new WCH underpass just west of the new Chiverton junction, providing grade separated WCH access across the new A30 and between the side roads.
- Construction of a new WCH underpass at Church Lane, with grade separated WCH access across the new A30 and retained access to Zelah.
- Construction of a greenbridge for ecology at Marazanvose with an associated WCH route linking between the adjacent side roads. The proposed overbridge spans both the existing and proposed A30.
- Construction of a new WCH underpass at Newlyn Downs, with grade separated WCH access across the new A30 and between the A39 and realigned existing A30.

6.4.3 The ecology team advises that the proposed underpass at Chiverton will not have any ecological constraints and lighting will therefore be provided on a 24-hour basis. At Church Lane and Newlyn Downs, for ecology reasons the proposed lighting will be low lux and demand sensitive. It will be turned off half an hour before sunset during April-October to facilitate the use of the underpasses by local ecology. There will be no street lighting at the proposed greenbridge.

6.4.4 The existing A30 will be noticeably quieter when the new dual carriageway is operational, and will provide a safer and more pleasant route for walking, cycling and horse-riding. Pedestrians, cyclists and horse-riders will be prohibited from using the new A30 dual carriageway mainline and directed to use the existing A30 instead.

6.5 Changes to Existing Walking, Cycling and Horse-Riding Routes

6.5.1 Eight crossings of the new A30 will be affected by the proposed new dual carriageway:

- A footway will be provided through the proposed junction at Chybucca. Cyclists and horse-riders will remain on the carriageway.
- Pedestrians, cyclists and horse-riders will continue to use the carriageway at the new Tresawsen underbridge.
- At Marazanvose, the existing quiet lane will be stopped up and a new bridleway provided that crosses over the greenbridge and connects to the lane towards Perranporth and Goonhavern. The existing footpath through Nancarrow Farm will also connect to the greenbridge.
- National Cycle Network (NCN) Route 32 will be maintained at Two Barrows with a new staggered junction.
- Pedestrians, cyclists and horse-riders will continue to use the carriageway at the new Tolgroggan overbridge. A new bridleway will replace the existing, which is being stopped up, and connect to NCN 32.
- The quiet lane at Trevalso will be realigned with a new underbridge and pedestrians, cyclists and horse-riders will continue to use the carriageway. Low lux lighting will be provided.
- At Pennycomequick, the quiet lane, which is also a signed cycle route, will be maintained through a new underbridge. Pedestrians, cyclists and horse-riders will continue to use the carriageway.

6.6 Construction Phasing

6.6.1 The construction activities for the scheme would be typical of a major road scheme and consist of the following:

- Advance/preparatory works to be undertaken prior to construction including advanced ecology mitigation (moving of badger setts and vegetation clearance etc.) and archaeological investigation;
- Site establishment and any further vegetation clearance;
- Main construction works involved in the scheme drainage and bulk earthworks and where needed statutory utility diversions;
- Junction bridge structure construction at Chiverton, Chybucca and Carland Cross;
- Road works and other associated side road, WCH and ecology structures; and
- Final tie-ins and soft landscape works.

6.6.2 Further details regarding the construction phasing, in addition to operational and long-term management details can be found in the **Environmental Statement Chapter 2 The Project** (Volume 6, Document Ref 6.2, Section 2.7).

7 Forecast Year Do Something Scenario Summary

7.1 Approach

7.1.1 For the Do Something forecast year the approach for developing the demand matrices is the same as for the Do Minimum, as the initial matrices used in the VDM process are the same for both the Do Minimum and Do Something scenarios. Sections 5.1 and 5.2 outline the process undertaken for developing the forecast reference case matrices.

7.2 Development Assumptions

Reference Case Matrices

7.2.1 The approach for the VDM is the same as that for the Do Minimum scenario with the same matrices used as the starting point. This ensures that any changes to traffic assignment are due to the scheme alone and not an external parameter impacting on the assignment of traffic. This means that the same level of growth is used for both the DM and DS scenarios.

7.2.2 Table 7-1 shows the constrained forecast matrix totals by year and time period. 2015 base year matrix totals have been provided for reference.

Table 7-1: Reference Case Forecast Matrix Totals

Scenario	UC1	UC2	UC3	UC4	UC5	TOTAL	Total % Increase from 2015
2015							
AM	4,689	5,991	8,022	2,524	1,474	22,700	
IP	3,906	4,274	9,407	2,390	1,272	21,249	
PM	3,662	5,909	10,491	2,695	1,226	23,982	
2023							
AM	4,684	6,554	8,554	3,055	1,548	24,394	7%
IP	3,907	4,382	10,452	2,882	1,336	22,959	8%
PM	3,618	6,307	11,231	3,260	1,287	25,704	7%
2038							
AM	4,818	7,494	9,484	4,101	1,726	27,624	22%
IP	4,082	4,765	11,970	3,869	1,490	26,176	23%
PM	3,708	7,108	12,453	4,377	1,436	29,083	21%

Variable Demand Modelling

7.2.3 Variable Demand Modelling has been carried out at this stage of the scheme assessment as agreed in the PCF Stage 3 Appraisal Specification Report (HA551502-WSP-GEN-0000-RE-TR-00009-P03).

7.2.4 The demand model is an incremental type of model (also known as a “pivot-point” model) as recommended in WebTAG. The demand response in the model is therefore, a function of relative changes in cost between a forecast and comparator scenario. In order to produce the Do Minimum year models, the Do

Minimum pivoted off the base model (i.e. demand model used base year costs as a comparator.

7.2.5 The Department for Transport's DIADEM software programme (Version 5) has been used to specify and operate the demand model processes.

7.2.6 For more details on the VDM methodology please see Section 15 of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

7.2.7 The impact of VDM on the forecast matrices can be seen in Table 7-2.

Table 7-2: Comparison of Matrix Totals

Year	Growth Scenario	Scenario	Average Peak Period Hour	Ref Case matrix total (pcu)	Post Diadem matrix total (pcu)	Difference (pcu)	Percentage Difference
2023	CORE	DS	AM	24,394	24,522	128	1%
			IP	22,959	23,025	66	0%
			PM	25,704	25,827	123	0%
	HIGH	DS	AM	26,119	26,277	158	1%
			IP	24,582	24,668	86	0%
			PM	27,521	27,619	98	0%
	LOW	DS	AM	22,670	22,843	173	1%
			IP	21,336	21,429	93	0%
			PM	23,887	24,007	120	1%
2038	CORE	DS	AM	27,624	28,028	404	1%
			IP	26,176	26,357	181	1%
			PM	29,083	29,300	217	1%
	HIGH	DS	AM	30,936	31,200	264	1%
			IP	29,315	29,484	169	1%
			PM	32,570	32,635	65	0%
	LOW	DS	AM	24,312	24,632	320	1%
			IP	23,038	23,223	185	1%
			PM	25,596	25,857	261	1%

Do Something Infrastructure Improvements

7.2.8 Table 7-3 outlines the infrastructure improvement schemes which have been included in the forecast scenarios.

7.2.9 New zones have been coded for all the 'Near Certain' and 'More than Likely' developments outlined in Table 5-2, including access junctions for those located within the simulation network. These were coded as priority junctions unless plans have been provided by Cornwall Council indicating otherwise. Junction layouts from planning applications were available for a number of developments including Willow Green, Maiden Green and Langarth in Truro. These were coded into the model as signalised junctions as per the planning applications.

Table 7-3: Infrastructure Improvement Schemes for Inclusion in the Forecast Modelling

		DM		DS7A Option	
Scheme	**Status**	**2023**	**2038**	**2023**	**2038**
A30 Temple	Committed	Y	Y	Y	Y
Newquay Strategic Route	Growth Deal Funding Allocated	Y	Y	Y	Y
Truro - Northern Access Road	Committed	Y	Y	Y	Y
Truro - Threemilestone Roundabout	Under Construction	Y	Y	Y	Y
Truro - Treliske Roundabout	Growth Deal Funding Allocated	Y	Y	Y	Y
Truro - Arch Hill	Growth Deal Funding	Y	Y	Y	Y
St. Erth	N/A - Junction Schemes in buffer network				
Loggans Moor	N/A - Junction Schemes in buffer network				
A38 Island Shop	N/A - Junction Schemes in buffer network				
A38 Carkeel Signalised scheme	N/A - Junction Schemes in buffer network				
Callywith Gate, Bodmin	N/A - Junction Schemes in buffer network				
A38 Carminnow Cross, Bodmin	N/A - Junction Schemes in buffer network				
A39 Treluswell, Falmouth	N/A - Junction Schemes in buffer network				
Option 7A A30 Chiverton to Carland Cross				Y	Y

7.3 Summary of DS

Assignment Convergence

7.3.1 Convergence is required in order to provide stable, consistent and robust model results and to differentiate between real changes and those associated with differing degrees of convergence. The convergence criteria are set out in Table 4 of TAG Unit M3.1[16].

7.3.2 Table 7-4 and Table 7-5 show the convergence results for 2023 and 2038 core Do Minimum scenarios.

[16] Department for Transport (2014) TAG Unit M3.1 – Highway Assignment Modelling [Online]. Available at: (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427124/webtag-tag-unit-m3-1-highway-assignment- modelling.pdf)

Table 7-4: 2023 DS7A Convergence Results

Year	Time Period	% of Links with Flow Change (P) < 1%	Acceptability (Final 4 Consecutive Iterations > 98%)	Delta (δ)	Acceptability (< 0.1%)
2023 DS7A	AM Peak	98.0	PASS	0.001	PASS
		98.1			
		98.5			
		98.4			
	Interpeak	98.9	PASS	0.001	PASS
		99.3			
		99.0			
		99.3			
	PM Peak	98.6	PASS	0.011	PASS
		98.7			
		98.1			
		98.4			

Table 7-5: 2038 DS7A Convergence Results

Year	Time Period	% of Links with Flow Change (P) < 1%	Acceptability (Final 4 Consecutive Iterations > 98%)	Delta (δ)	Acceptability (< 0.1%)
2038 DM	AM Peak	98.8	PASS	0.002	PASS
		98.4			
		98.5			
		98.1			
	Interpeak	98.3	PASS	0.002	PASS
		98.5			
		98.7			
		98.7			
	PM Peak	98.7	PASS	0.013	PASS
		98.6			
		98.1			
		98.6			

7.3.3 The convergence results show stability with the final four iterations seeing more than 98% of links achieving a change in traffic flows of less than one percent in all peak periods. The Delta value is stable and less than 0.1 all peaks which is considered acceptable.

Journey Times

7.3.4 Changes in journey time within the scheme extents were assessed to understand the impact of the scheme. Table 7-6 shows the journey times between Carland and Chiverton Cross on the A30 with and without the scheme in place. The journey times shown in the table show the journey time benefits on the A30 with

the scheme in place (Do Something scenario) compared to the scenario if the scheme is not constructed (Do Minimum scenario).

Table 7-6: Journey Times Between Chiverton and Carland Cross

Direction	Peak	Journey Times (mm:ss)			
		2023 Do Minimum	2023 Do Something	2038 Do Minimum	2038 Do Something
Westbound	AM	13:10	07:01	15:59	07:16
	IP	12:28	06:56	13:50	07:08
	PM	12:56	07:02	14:46	07:13
Eastbound	AM	13:04	07:03	16:36	07:23
	IP	11:41	07:00	15:04	07:14
	PM	13:01	07:02	18:32	07:34

7.3.5 Table 7-6 shows that the journey times reduce significantly in the Do Something scenario. This is expected, given the increase in speed limit and capacity.

Traffic Flows

Table 7-7: AM Peak A30 Link Flows in the Vicinity of the Scheme

Site Location	Dir	2015 Base	2023 DM	2023 DS7A	2038 DM	2038 DS7A
EB, A30, Between Carland Cross Rbt and Mitchell	EB	1,302	1,472	1,677	1,662	2,278
WB, A30, Between Carland Cross Rbt and Mitchell	WB	1,652	1,831	1,992	2,013	2,477
EB, A30, Between Zelah and Carland Cross Rbt	EB	792	898	1,293	1,083	1,870
WB, A30, Between Zelah and Carland Cross Rbt	WB	933	1,024	1,427	1,113	1,848
EB, A30, Between Redruth and Scorrier	EB	1,527	1,804	1,844	2,040	2,163
WB, A30, Between Redruth and Scorrier	WB	1,321	1,470	1,499	1,695	1,867
WB, A30, Between Scorrier and Chiverton Cross Rbt	WB	1,490	1,797	1,990	1,967	2,407
EB, A30, Between Scorrier and Chiverton Cross Rbt	EB	1,434	1,550	1,653	1,818	2,135
EB, A30, Between Chybucca and Marazanvose	EB	837	931	1,293	1,117	1,870
WB, A30, Between Chybucca and Marazanvose	WB	900	988	1,426	1,097	1,848

Table 7-8: IP Peak A30 Link Flows in the Vicinity of the Scheme

Site Location	Dir	2015 Base	2023 DM	2023 DS7A	2038 DM	2038 DS7A
EB, A30, Between Carland Cross Rbt and Mitchell	EB	1,317	1,503	1,693	1,723	2,256
WB, A30, Between Carland Cross Rbt and Mitchell	WB	1,349	1,523	1,672	1,809	2,029
EB, A30, Between Zelah and Carland Cross Rbt	EB	752	858	1,245	1,178	1,686
WB, A30, Between Zelah and Carland Cross Rbt	WB	836	920	1,189	1,042	1,554
EB, A30, Between Redruth and Scorrier	EB	1,269	1,479	1,537	1,782	1,851
WB, A30, Between Redruth and Scorrier	WB	1,411	1,612	1,594	1,885	2,003
WB, A30, Between Scorrier and Chiverton Cross Rbt	WB	1,354	1,501	1,686	1,809	2,099
EB, A30, Between Scorrier and Chiverton Cross Rbt	EB	1,572	1,725	1,814	2,050	2,336
EB, A30, Between Chybucca and Marazanvose	EB	745	846	1,245	1,177	1,686
WB, A30, Between Chybucca and Marazanvose	WB	819	909	1,189	1,068	1,554

Table 7-9: PM Peak A30 Link Flows in the Vicinity of the Scheme

Site Location	Dir	2015 Base	2023 DM	2023 DS7A	2038 DM	2038 DS7A
EB, A30, Between Carland Cross Rbt and Mitchell	EB	1,553	1,669	2,279	1,761	2,944
WB, A30, Between Carland Cross Rbt and Mitchell	WB	1,460	1,642	1,861	1,918	2,191
EB, A30, Between Zelah and Carland Cross Rbt	EB	841	1,046	1,568	1,267	2,156
WB, A30, Between Zelah and Carland Cross Rbt	WB	874	955	1,351	1,109	1,692
EB, A30, Between Redruth and Scorrier	EB	1,237	1,424	1,492	1,602	1,975
WB, A30, Between Redruth and Scorrier	WB	1,671	1,774	1,866	1,863	1,970
WB, A30, Between Scorrier and Chiverton Cross Rbt	WB	1,451	1,634	1,832	1,775	2,345
EB, A30, Between Scorrier and Chiverton Cross Rbt	EB	1,966	2,030	2,195	2,129	2,337
EB, A30, Between Chybucca and Marazanvose	EB	846	1,053	1,568	1,244	2,156
WB, A30, Between Chybucca and Marazanvose	WB	887	973	1,351	1,180	1,692

7.3.6 The tables above show that there is an increase in traffic on the A30 between 2015, 2023 and 2038. There is also an increase in traffic to the immediate west and to east of the scheme in all time periods. The traffic flows in the do minimum scenario are constrained by the capacity of the current single carriageway A30 which accounts for the large increase in flow with the scheme in place. In addition, traffic reroutes from local routes such as the A3075 and accesses the A30 at Chiverton Cross and Carland Cross.

Network Reassignment Effects

7.3.7 Table 7-10 to Table 7-12 show the impact of reassignment due to the A30 scheme on the key roads in the vicinity of the scheme.

Table 7-10: AM Peak Key Route Link Flows in the Vicinity of the Scheme

Site Location	Dir	2015 BASE	2023 DM	2023 DS7A	2038 DM	2038 DS7A
A3075 Between Chiverton and B3284	NB	368	439	332	589	388
A3075 Between Chiverton and B3284	SB	440	492	502	598	608
A39, Between Truro and Carland Cross Rbt	NB	470	511	331	496	407
A39, Between Truro and Carland Cross Rbt	SB	605	697	499	693	732
A39, Between Truro and Carnon Downs	NB	915	979	927	1,117	1,049
A39, Between Truro and Carnon Downs	SB	744	807	784	858	869
A390, Between Chiverton Cross and Threemilestone	EB	839	1,102	1,019	1,096	1,137
A390, Between Chiverton Cross and Threemilestone	WB	635	652	548	856	709
A390, Between Treliske Hospital and Truro	EB	1,001	1,119	836	1,214	1,032
A390, Between Treliske Hospital and Truro	WB	1,134	1,171	982	1,235	1,093
A390, Between Truro and Probus	EB	478	557	526	688	577
A390, Between Truro and Probus	WB	826	865	875	886	943
B3284, Between Shortlanesend and Truro	NB	229	281	424	323	475
B3284, Between Shortlanesend and Truro	SB	552	528	797	530	818
Chacewater Hill between Threemilestone and Chacewater	EB	582	651	671	867	845
Chacewater Hill between Threemilestone and Chacewater	WB	129	188	226	233	279

Table 7-11: IP Peak Key Route Link Flows in the Vicinity of the Scheme

Site Location	Dir	2015 BASE	2023 DM	2023 DS7A	2038 DM	2038 DS7A
A3075 Between Chiverton and B3284	NB	426	486	409	632	466
A3075 Between Chiverton and B3284	SB	410	449	451	563	552
A39, Between Truro and Carland Cross Rbt	NB	581	655	421	496	558
A39, Between Truro and Carland Cross Rbt	SB	504	557	419	608	444
A39, Between Truro and Carnon Downs	NB	845	924	813	952	862
A39, Between Truro and Carnon Downs	SB	772	828	779	877	770
A390, Between Chiverton Cross and Threemilestone	EB	727	687	627	796	758
A390, Between Chiverton Cross and Threemilestone	WB	872	917	594	1,170	801
A390, Between Treliske Hospital and Truro	EB	1,120	1,118	877	1,190	978
A390, Between Treliske Hospital and Truro	WB	1,077	1,113	876	1,233	1,007
A390, Between Truro and Probus	EB	635	692	666	832	752
A390, Between Truro and Probus	WB	583	607	586	646	628
B3284, Between Shortlanesend and Truro	NB	363	449	659	536	725
B3284, Between Shortlanesend and Truro	SB	328	434	604	435	650
Chacewater Hill between Threemilestone and Chacewater	EB	303	366	395	498	511
Chacewater Hill between Threemilestone and Chacewater	WB	284	313	398	394	442

Table 7-12: PM Peak Key Route Link Flows in the Vicinity of the Scheme

Site Location	Dir	2015 BASE	2023 DM	2023 DS7A	2038 DM	2038 DS7A
A3075 Between Chiverton and B3284	NB	628	687	509	767	599
A3075 Between Chiverton and B3284	SB	427	486	473	636	564
A39, Between Truro and Carland Cross Rbt	NB	656	565	651	444	785
A39, Between Truro and Carland Cross Rbt	SB	453	518	434	568	511
A39, Between Truro and Carnon Downs	NB	882	873	791	868	782
A39, Between Truro and Carnon Downs	SB	921	995	894	1,075	910
A390, Between Chiverton Cross and Threemilestone	EB	538	623	531	649	673
A390, Between Chiverton Cross and Threemilestone	WB	1,255	1,298	810	1,294	774
A390, Between Treliske Hospital and Truro	EB	1,077	1,156	971	1,245	1,011
A390, Between Treliske Hospital and Truro	WB	1,123	1,159	930	1,236	1,072
A390, Between Truro and Probus	EB	952	939	945	943	951
A390, Between Truro and Probus	WB	554	599	539	586	576
B3284, Between Shortlanesend and Truro	NB	557	632	740	711	757
B3284, Between Shortlanesend and Truro	SB	464	402	574	444	614
Chacewater Hill between Threemilestone and Chacewater	EB	178	240	261	354	272
Chacewater Hill between Threemilestone and Chacewater	WB	615	616	676	801	867

7.3.8 The A390 between Treliske Hospital and Truro shows a reduction in flows with the scheme in place. The opposite effect can be found in Shortlanesend, which has an increase in traffic. This is likely due to the presence of the west facing slips at Chybucca making the route via Shortlanesend more attractive for trips to access central Truro.

7.3.9 A decrease in traffic flow can also be seen on the A3075 Northbound, A390 between Chiverton Cross and Threemilestone and the A39 between Truro and Carnon Downs. This is caused by trips that previously used these routes to go to large centres of attraction like Newquay and Truro, now using the scheme, to reduce their travel times.

7.3.10 Analysis of the routing within the model confirms that trips from areas such as Falmouth, Penryn and Helston reroute to access the A30 to the west of Chiverton Cross rather than travel via the A39 when the scheme is in place. The same way, A3075 shows a reduction in trips due to trips to Newquay that previously used this route are using junctions to the east of the scheme such as Summercourt to access the A30 earlier when the scheme is in place. This behaviour is considered a reasonable response to the implementation of the scheme.

7.3.11 For network performance statistics for the Do Something scenarios see Section 16.6 of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

7.3.12 For traffic flows for the Do Something High and Low growth scenarios see Section 16.7 of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

7.3.13 As part of the assessment work undertaken, a number of key junctions have been assessed using the Junction 9 software as this provides a more robust

assessment of junctions than provided by SATURN. The key junctions assessed were Carland Cross, Chybucca and Chiverton. All three junctions were assessed for the Do Minimum and Do Something scenarios for 2023 and 2038.

7.3.14 The results from this assessment can be seen in the Technical Note HA551502-ARP-HGN-SW-FN-TR-000009.

Summary

7.3.15 The impact of the scheme is significant on the A30 with journey times decreasing by 40-50% when travelling on the new A30.

7.3.16 This reduction in journey times can also be see on the existing A30 due to the traffic decreasing from over a thousand vehicles in an average peak hour to less than 200 vehicles in an average peak hour. This reduction in traffic will reduce congestion and thus increase journey times.

7.3.17 The impact of the scheme on Cornwall Council roads is to overall reduce the amount of traffic as vehicles reassign to the A30 scheme rather than routing via alternative routes on the Cornwall Council network to avoid the congestion. The exceptions to this are the A3075 southbound, Shortlanesend and Chacewater to an extent.

7.3.18 The scheme also reduces the majority of journey times for those travelling between Truro and Newquay as the reduction in traffic on the existing A30 has reduced congestion at junctions, thus decreasing journey times.

7.3.19 Overall the A30 scheme has an improvement on the road network in relation to journey time savings due to the reduced congestion and increased capacity as a result of the scheme.

7.4 Walking, Cycling and Horse-Riding

7.4.1 WCH will be prohibited from the proposed dual carriageway and people travelling by these modes will be directed to use the existing de-trunked A30 route instead. However, no specific WCH facilities such as footways or cycle lanes are proposed along the existing A30. The impact on people will be mixed: long-distance cyclists would prefer to continue along the new dual carriageway, particularly given that there is no such prohibition on the connecting sections from Redruth to Bodmin. Local cyclists are keen to use the current A30 in anticipation that it will be quieter in terms of road traffic. However, faster speeds traffic speeds may offset the benefits of the lighter traffic flow.

7.4.2 The current severance that is caused by the roundabout at Chiverton Cross is the principal issue for the local walking and cycling community. A new two-bridge gyratory will replace the existing roundabout but would present a diversion of 1.6km away from the A390-B3277 desire line. To mitigate the impact on pedestrians and cyclists, a new underpass will be provided approximately midway between the existing roundabout and proposed gyratory. This will allow people to avoid walking and cycling through the new two-bridge gyratory and therefore will be a safer route for them to use. The diversion away from the desire line will reduce to 1km and people will need to cross the link roads where the shared foot/cycleway changes from one side of the road to the other. The proposed underpass will therefore reduce the impact on pedestrians and cyclists but not overcome it altogether.

7.4.3 At Chybucca, the existing left/right staggered junction is intimidating for pedestrians, cyclists and horse-riders. The volume of traffic and high speeds leave few gaps for people on the B3284 trying cross from one side of the A30 to the other. To enable pedestrians, cyclists and horse-riders to avoid using the B3284 carriageway, a new length of bridleway is being provided that will connect two extant bridleways. In response to a request from the local community, a short flight of steps will provide able-bodied people with a direct link between the bridleways and new junction over the A30. Through the junction itself, a footway will be provided on one side of the carriageway for the benefit of pedestrians; cyclists and horse-riders will have to use the carriageway. Overall at Chybucca, the new junction would be easier for people to navigate than the current arrangement.

7.4.4 Approximately midway between Chybucca and Tresawsen, a bridleway will be retained for most of its length but stopped up at its north-western end between the current and proposed A30. This will not have any adverse impacts on WCH because the bridleway is in any case already inaccessible from the existing A30.

7.4.5 There will be no adverse impact on people walking, cycling or horse-riding between Shortlanesend and Callestick because an underbridge is being provided at Tresawsen. People will continue to use the carriageway as they do at present. The journey is expected to be easier and more pleasant because the existing A30 will carry significantly less road traffic and be easier to cross.

7.4.6 At Marazanvose, the existing quiet lane is being stopped up and the WCH routes, which are popular with pedestrians and for recreational cycling, were to be severed. This impact is being mitigated by creating a public right of way over the proposed greenbridge, which will also be used by the local farmer for vehicular access. In addition to ensuring north-south links for walking, cycling and horse-riding, local people will be able to access the bus stops that are located near to the bridge. Allowing WCH to share the greenbridge with ecology and farm traffic overcomes the potential severance that would have otherwise occurred at Marazanvose.

7.4.7 Cyclists using NCN 32 at Two Barrows will be marginally inconvenienced by a new left/right staggered junction that interrupts the currently direct lane and makes the journey along the lane slightly longer.

7.4.8 The existing bridleway at Tolgroggan will be retained with a new overbridge and replacement bridleway, with barely discernible impact on users.

7.4.9 In response to a request from the local community, a new pedestrian culvert is proposed at Church Lane under the proposed dual carriageway, which will maintain the walking route between Zelah and the parish church at St Allen. WCHs will still be required to cross the existing A30 at-grade via the stepped accesses on the northern and southern sides. The culvert mitigates the severance that would otherwise have occurred.

7.4.10 At Trevalso, the quiet lane is being maintained with a new underbridge, which includes realignment of Henver Lane at its north-western end. This has a marginal impact on NCN 32 because it is routed on Henver Lane. The footway along Henver Lane is being replaced along the new section of the lane to maintain the walking route to existing bus stops.

7.4.11 A new underbridge is proposed at Pennycomequick and the impact on WCH using the quiet lane, which includes a signed cycle route, will be barely discernible.

7.4.12 At present, a T-junction on the A30 links two quiet lanes that run from Pennycomequick to the A39. The junction will be stopped up but the through route will be maintained with a minor realignment of the roads at the point of intersection. This will ensure there is no impact on local WCH.

7.4.13 Just west of Carland Cross, the proposed Newlyn Downs underpass will cater for ecology and provide a bridleway for WCH. The enables people travelling between Carland Cross and the current A30 to avoid the dumbbell roundabouts that are proposed at the grade separated junction. No footway/cycleway will be provided through the junction and the diversion between the windfarm and Carland Cross services, via the underpass, is about 600m. Workers at the windfarm will have a slightly longer walk or cycle if using the services at Carland Cross or bridleways to Mitchell or Idless. However, the inconvenience is countered by a safer and more pleasant off-road route.

7.4.14 Between Carland Cross and Mitchell, a new bridleway is proposed that will realise an ambition long-held by local cyclists. It will provide a link between the village of Mitchell and existing cycle routes and provide a safer and shorter off-road path.

8 Economic Appraisal

8.1 Introduction

8.1.1 The economic appraisal undertaken for the scheme includes monetisation of travel time benefits, vehicle operating costs, accident savings, construction and maintenance impacts, journey time reliability, environmental impacts, and wider economic impacts. Landscape impacts have not been monetised but are assessed qualitatively in the Appraisal Summary Tables.

8.1.2 All costs and benefits have discounted in-line with guidance from TAG Unit A1.1 to provide the total Present Value of Costs (PVC) and total Present Value of Benefits (PVB), using which the scheme's Benefit-Cost Ratio (BCR) can be calculated. The BCR is given by the ratio of PVB / PVC and so indicates how much benefit is obtained for each unit of cost, with a BCR greater than 1 indicating that the benefits outweigh the costs[17].

8.2 Costs

8.2.1 All costs for the scheme have been rebased to 2010 prices, consistent with DfT requirements.

Construction

8.2.2 The capital costs for the construction of the scheme(in 2010 prices, not discounted to market prices) that have been used in the PCF Stage 3 economic appraisal are as per Table 8-1; these costs include those associated with the cost of the gas main diversion and additional land required for the diversion.

8.2.3 The cost estimate used in the cost benefit analysis is the 'most likely' cost estimate. The cost profile between 2017 and 2022 is specified in the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

Table 8-1: PCF Stage 3 Construction Costs (December 2017)

Cost	PCF Stage 3
Preparation	£9,211,131
Supervision	£4,059,175
Works	£190,572,328
Lands	£20,056,174
Total	**£223,898,807**

Maintenance

8.2.4 Generic maintenance costs for single and dual carriageways were calculated based on those presented in the COBA manual (Volume 13, Section 1, Part 2, Chapter 9). In 2010 prices, this equates to an increase in maintenance costs of £5,892,500 over the 60-year appraisal with the scheme in place.

[17] Department for Transport (2018) TAG Unit A1.1 – Cost-Benefit Analysis [Online]. Available at: (https://www.gov.uk/government/publications/webtag-tag-unit-a1-1-cost-benefit-analysis-may-2018)

8.3 Travel Time and Vehicle Operating Costs

Approach

8.3.1 Benefits arising from the scheme through savings to travel times and vehicle operating costs have been assessed using the DfT's TUBA programme (Transport Users Benefit Analysis) – version 1.9.9. A standard 60-year appraisal period has been utilised, as per WebTAG guidance, for each of the core, high and low growth scenarios.

8.3.2 Travel time benefits from the scheme are calculated by comparing the travel costs between the Do Minimum and Do Something assignments. The time saved is then monetised and a benefit resulting from the scheme is calculated. The value of time varies based upon the journey purpose (e.g. an employer's business trip has a greater value than a personal business trip) and distance of the trip. The value of time is expected to increase over time due to the increase in general wages and growth in the economy.

8.3.3 Annualisation factors are used to convert time slice hourly flows in to annual traffic flows for the purposes of the economic assessment. These factors are specific to this section of highway and they are based on ATCs from the A30 between Chiverton and Carland Cross. The calculation of the annualisation factors can be found in Section 17.1 of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

Results

8.3.4 Table 8-2 shows the total benefits for the core scenario over the 60-year appraisal period, split by benefit type and trip purpose.

Table 8-2: Benefits by Journey Purpose (£000s)

Scenario	Purpose	Travel Time	VOC Fuel	VOC Non-fuel	Indirect Tax	Total
Option 7A	Business	270,065	-53,107	6,719	37,537	261,214
	Commuting	202,914	-5,139	-31,285	21,807	188,297
	Other	235,486	-15,509	-29,794	23,665	213,848
	Total	**708,465**	**-73,755**	**-54,360**	**83,009**	**663,359**

8.3.5 The table shows that the majority of benefits created by the scheme are travel time benefits. This shows that the scheme provides faster journey times along the A30 and across the study area network as a whole and has reduced travel time costs. The majority of the benefits are for business trips.

8.3.6 The results of the high and low growth assessments can be found in Appendix G of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

8.4 Accident Analysis

Approach

8.4.1 Economic benefits due to accident savings following the implementation of the scheme have been assessed using the DfT's COBA-LT programme (Cost and Benefit to Accidents – Light Touch) – version 2017.1.

8.4.2 COBA-LT uses accident rates for different road types to estimate the number of accidents and the resulting casualties based on modelled traffic flows. The accidents are monetised to determine the economic benefits from the scheme.

8.4.3 The entire SATURN simulation area has been used for the COBA-LT assessment to ensure the impact of the scheme is covered in relation to accidents. This network, along with Annual Average Daily Traffic (AADT) flows and accident rates for major roads within the study area were needed as inputs for this process.

8.4.4 The calculation of accident rates on the A30 Chiverton to Carland Cross can be found in Section 8.2 of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

Results

8.4.5 Table 8-3 presents the COBA-LT results for the scheme option in the three growth scenarios. Table 8-4 outlines the monetised benefits due to the total reduction in accidents between the DM and DS scenarios.

Table 8-3: COBA-LT Results

Scenario		Low	Core	High
Do Minimum	Casualties			
	Fatal	155	169	180
	Serious	1357	1483	1587
	Slight	10830	11821	12650
	Cost (£000)	£456,527.6	£497,576.1	£531,871.6
Option 7A	Casualties			
	Fatal	130	144	157
	Serious	1176	1308	1417
	Slight	9683	10783	11681
	Cost (£000)	£399,589.6	£443,636.0	£480,025.7

Table 8-4: Safety Benefits

Scenario		Low	Core	High
Option 7A	Accident Saving	865	772	719
	Benefit (£000)	£56,938.0	£53,940.1	£51,845.9

8.4.6 The results show that the scheme would provide benefits in terms of accident savings in all growth scenarios and that the scheme meets the safety target set in the scheme objectives.

8.5 Construction and Maintenance

Approach

8.5.1 Delays to transport users during construction and maintenance of the A30 Chiverton to Carland Cross Scheme have been assessed using the SATURN traffic model and additional TUBA models.

8.5.2 The construction modelling has used a network coded specifically to represent the network conditions during the construction phase and currently is scheduled for 2020 to 2022, with demand interpolated between the 2015 base and 2023 forecast year demand. The TUBA assessment has been run only for this three-year period.

8.5.3 The maintenance modelling has accounted for the difference in maintenance between the Do Minimum and the Do Something scenarios – i.e. maintenance on the existing A30 from Chiverton to Carland Cross compared with maintenance on the proposed new dual carriageway. Network coding has been developed to represent each of these scenarios, with demand interpolated between the 2023 and 2038 forecast years' demand. The TUBA assessment was run for a standard 60-year appraisal period.

8.5.4 Full details of the approach to the construction and maintenance modelling can be found in Section 17.8 of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

Results

8.5.5 The results of the construction and maintenance economic assessments are shown in Table 8-5.

Table 8-5: Construction and Maintenance Benefits (£000s)

Modelled Years	Construction	Maintenance	Total
Present Value of Benefits (PVB)	-19,357	26,732	7,375

8.5.6 The construction phase produces a disbenefit of £19,357K due to the reduction in speed along the section of the A30 during the road works.

8.5.7 The maintenance phase produces a benefit of £26,732K. In the DM scenario shuttle working with traffic signals is necessary because there is only one lane in each direction. In the DS scenario, the new dual carriageway allows there to be one lane operating continuously in each direction during maintenance and so does not create as much delay as the DM scenario. Therefore, it is of benefit to have the A30 as a dual carriageway for maintenance purposes.

8.6 Environmental Impacts

Approach

8.6.1 Environmental impacts have been assessed in-line with DMRB guidance, for the following three categories:

- Noise;
- Local Air Quality; and

- Greenhouse Gases.

8.6.2 Each assessment utilises traffic flows from the forecast years for both the Do Minimum and Do Something scenarios, to assess any environmental benefits arising from the scheme. The monetisation of the environmental impacts of the scheme has been completed in line with TAG unit A3 – Environmental Impact Appraisal.

8.6.3 The full scope of the air quality, noise and greenhouse gas assessments can be found in the **Environmental Statement** (Volume 6, Document Ref 6.2, Chapters 5, 11 and 14) respectively.

Results

8.6.4 The monetised environmental impacts are presented in Table 8-6.

Table 8-6: Monetised Environmental Impacts

Scenario	Core
Noise	£552,880
Local Air Quality	£20,273,369
Greenhouse Gases	£71,687,778

8.6.5 The results show that for each of the noise, local air quality and greenhouse gas assessments there will be benefits from the scheme. Although traffic volumes are increasing, the lack of congestion with the scheme in place will increase the efficiency of vehicles in the affected areas compared to the Do Minimum scenario, thereby reducing emissions. The landscaping of the scheme produces a net reduction in overall noise levels to local residents.

8.7 Journey Time Variability

8.7.1 The impact of the scheme upon reliability has been assessed, where reliability refers to journey time variability. The assessment is based upon changes in ‘stress’, the ratio of Annual Average Daily Traffic to Congestion Reference Flow, as a proxy to changes in reliability, as recommended by WebTAG. Stress has been calculated for the section of single carriageway with and without the scheme.

8.7.2 Using this methodology, the scheme is assessed as having a ‘slightly beneficial’ impact upon reliability.

8.7.3 As a result of the slightly beneficial impact on journey time reliability, an uplift of 5% of the travel time savings, as per DfT guidance, has been included in the adjusted BCR. The travel time benefits are £708,465,000 and therefore the monetised journey time reliability benefits are £35,423,000.

8.8 Wider Economic Impacts

8.8.1 Wider impacts are identified in TAG guidance (Unit A2.1) and can be included in an adjusted BCR calculation. Due to the nature of this scheme a more complete assessment of wider impacts is considered to be of only marginal value.

8.8.2 The following wider impacts will be included:

WI2 – Output change in imperfectly competitive agglomeration impact markets.

8.8.3 In markets which are dominated by a few suppliers, prices may be above and the quantity below that which would occur in competitive markets. Transport investment may induce a price reduction and increase in the quantity supplied, through its impact upon firms' cost base.

8.8.4 The calculation for this Wider Impact advised in WebTAG is a 10% uplift in business user benefits.

8.8.5 The travel time benefits to business users are £270,065,000 and therefore the wider economic impacts are £27,006,500.

8.9 Transport Economic Efficiency Table

8.9.1 The Transport Economic Efficiency (TEE) table provides a summary of the travel time and vehicle operating cost benefits. The benefits are summarised by trip purpose. This includes the benefits generated from the main TUBA assessment, maintenance and construction scenarios. The TEE table for the core growth scenario for the scheme is shown in Figure 8-1.

Economic Efficiency of the Transport System (TEE)

Non-business: Commuting	ALL MODES		ROAD	
User benefits	TOTAL		Private Cars and LGVs	
Travel time	202,914		202,914	
Vehicle operating costs	-36,423		-36,423	
User charges	0		0	
During Construction & Maintenance	342		342	
NET NON-BUSINESS BENEFITS: COMMUTING	166,833	*(1a)*	166,833	
Non-business: Other	**ALL MODES**		**ROAD**	
User benefits	TOTAL		Private Cars and LGVs	
Travel time	235,486		235,486	
Vehicle operating costs	-45,303		-45,303	
User charges	0		0	
During Construction & Maintenance	1,898		1,898	
NET NON-BUSINESS BENEFITS: OTHER	192,081	*(1b)*	192,081	
Business				
User benefits			Road Personal	Road Freight
Travel time	270,065		49,376	220,689
Vehicle operating costs	-46,388		370	-46,758
User charges	0		0	0
During Construction & Maintenance	3,526		443	3,083
Subtotal	227,203	*(2)*	50,189	177,014
Private sector provider impacts				
Revenue	0			
Operating costs	0			
Investment costs	0			
Grant/subsidy	0			
Subtotal	0	*(3)*		
Other business impacts				
Developer contributions	0	*(4)*	0	
NET BUSINESS IMPACT	227,203	*(5) = (2) + (3) + (4)*		
TOTAL				
Present Value of Transport Economic Efficiency Benefits (TEE)	586,117	*(6) = (1a) + (1b) + (5)*		

Notes: Benefits appear as positive numbers, while costs appear as negative numbers.
discounted

Figure 8-1: Transport Economic Efficiency Table – Core Scenario (£000s)

8.10 Analysis of Monetised Costs and Benefits Table

8.10.1 The benefits from each individual assessment have been totalled to create the Present Value Benefits of the scheme. They have been summarised in the Analysis of Monetised Costs and Benefits (AMCB) table along with the PVC and the BCR. The AMCB table for the core growth scenario for the scheme is shown in Figure 8-2.

Analysis of Monetised Costs and Benefits

Noise	553	*(12)*
Local Air Quality	20,273	*(13)*
Greenhouse Gases	71,688	*(14)*
Journey Quality		*(15)*
Physical Activity		*(16)*
Accidents	53,940	*(17)*
Economic Efficiency: Consumer Users (Commuting)	166,833	*(1a)*
Economic Efficiency: Consumer Users (Other)	192,081	*(1b)*
Economic Efficiency: Business Users and Providers	227,203	*(5)*
Wider Public Finances (Indirect Taxation Revenues)	84,617	*- (11) - sign changed from PA table, as PA table represents costs, not benefits*
Present Value of Benefits (see notes) (PVB)	817,188	*(PVB) = (12) + (13) + (14) + (15) + (16) + (17) + (1a) + (1b) + (5) - (11)*
Broad Transport Budget	190,981	*(10)*
Present Value of Costs (see notes) (PVC)	190,981	*(PVC) = (10)*
OVERALL IMPACTS		
Net Present Value (NPV)	626,207	NPV=PVB-PVC
Benefit to Cost Ratio (BCR)	4.28	BCR=PVB/PVC

Note : This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.

Figure 8-2: Analysis of Monetised Costs and Benefits Table – Core Scenario (£000s)

8.10.2 The results show that the scheme provides significant benefits to transport users, resulting from the significant improvement in the performance of the A30 provided by the scheme. The scheme produces a BCR in excess of 4 which represents Very High Value for Money.

8.10.3 The results also show that PVB has increased when compared to the PCF Stage 2 assessment. This increase is attributable to changes in the forecast years and a model that takes more account of local traffic on single lane roads. Furthermore, the environmental impact assessment has reported strong benefits from noise, local air quality and greenhouse gas assessments. The PCF Stage 3 appraisal uses TUBA 1.9.9 and values from WebTAG Data Book March 2017.

8.10.4 The AMCB tables for the High and Low growth scenarios are included in Appendix G of the PCF Stage 3 ComMA Report (HA551502-ARP-GEN-SW_WCH-RP-TR-000001).

8.11 Adjusted BCR

8.11.1 In addition to those categories included in the AMCB table in Figure 8-2, the BCR can be further adjusted to account for changes to journey time variability and the wider economic impact benefits that are not included in the AMCB table. Table 8-7 outlines the initial BCR reported in the AMCB and the adjusted BCR.

Table 8-7: Adjusted Benefit Cost Ratio

	PVB Present Value of Benefits (£000s)	PVC Present Value of Costs (£000s)	NPV Net Present Value (£000s)	BCR
Initial BCR	817,188	190,981	626,207	4.28
Adjusted BCR	879,618		688,637	4.61

8.11.2 The table shows that including the monetised journey time reliability benefits and wider impacts results in a BCR of 4.61. The adjusted BCR represents Very High Value for Money.

9 Summary

9.1.1 The purpose of this report is to provide a summary of the transport planning works that have been completed to support the DCO submission for the scheme. Details of the scheme background, the policy context within which the scheme sits and the existing conditions demonstrating the need for the scheme are provided.

9.1.2 The methodology to develop both the base year and forecast year transport model is presented. Analysis of the calibration and validation of the transport model demonstrates it is a model which is fit for purpose in line with WebTAG criteria for testing the A30 Chiverton to Carland Cross scheme.

9.1.3 Economic assessment of the scheme undertaken using outputs from the transport model in line with WebTAG criteria shows it is a very high value for money scheme which will provide significant benefits to road users and residents of Cornwall.

9.1.4 Further information is provided to present the impact of the scheme to walkers, cyclists and horse riders.

Abbreviations List

AADT	Annual Average Daily Traffic
ATC	Automatic Traffic Count
BCR	Benefit to Cost Ratio
COBA-LT	Cost and Benefit to Accidents – Light Touch
ComMA	Combined Modelling and Appraisal Report
CPIR	Camborne, Pool, Illogan and Redruth
DCO	Development Consent Order
DfT	Department for Transport
DIADEM	Dynamic Integrated Assignment and Demand Modelling
DM	Do Minimum
DMRB	Design Manual for Roads and Bridges
DS	Do Something
EIA	Environmental Impact Assessment
GIS	Geographical Information Systems
HGV	Heavy Goods Vehicle
KSI	Killed or Seriously Injured
LGV	Light Goods Vehicle
LMVR	Local Model Validation Report
MCC	Manual Classified Count
ME2	Matrix Estimation from Maximum Entropy
NCN	National Cycle Network
NN NPS	National Policy Statement for National Networks
NPPF	National Planning Policy Framework
NPS	National Policy Statements
NPV	Net Present Value
NRTF	National Road Traffic Forecasts
NSIP	Nationally Significant Infrastructure Project
NTEM	National Trip End Model
NTM	National Transport Model
PCF	Project Control Framework
PCU	Passenger Car Unit
PIA	Personal Injury Accidents

PPG	Planning Practice Guidance
PVB	Present Value of Benefits
PVC	Present Value of Costs
RIS	Road Investment Strategy
RSI	Roadside Interview
RTM	Regional Transport Model
SATURN	Simulation and Assignment of Traffic to Urban Road Networks
SRN	Strategic Road Network
SWRTM	South West Regional Transport Model
TAG	Transport Analysis Guidance
TDCR	Traffic Data Collection Report
TEE	Transport Economic Efficiency
TEMPro	Trip End Mode Presentation Program
TRICS	Trip Rate Information Computer System
TUBA	Transport Users Benefit Analysis
VDM	Variable Demand Modelling
WCH	Walking, Cycling and Horse-Riding
WHS	World Heritage Site